PRACTICE TEST

for

ASSEMBLY

THIS TEST MIMICS THE STYLE OF TEST FOR
ASSEMBLY USED BY THE PLANT OPERATOR
SELECTION SYSTEM (POSS).

PRACTICING FOR THE ASSEMBLY TEST

The Plant Operator Selection System (POSS) includes a test for Assembly. Assembly involves reviewing parts and their assembly instruction in order to put the parts together in the correct manner.

To help you prepare, a practice test follows designed so you may practice correctly matching unassembled parts, with how they would look as assembled, within a suggested time limit of five (5) minutes.

For each of the total of nine (9) questions you answer, there will be five (5) possible answers. Carefully review the instructions before beginning this test, then set a timer for five (5) minutes. You should be able to answer all nine (9) assembly problems within this time.

Practicing taking this type of test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by taking the complete test with all nine questions
- Be sure to set a timer before beginning each part
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions
These instructions provide an example using two examples, shown below in Figures 1 and 2:

Figure 1 shows a prism with two surfaces marked. One is marked B, referring to the end of the prism while the other is marked C pointing to one of the six long sides of the prism.

![Figure 1](image1)

Each test problem presents a total of four objects that could be similar to this one, with each object having one or more surfaces or edges marked by a letter. Your job is to match the surfaces and/or edges with the same letters to complete the assembly. Figure 2 looks like a real test question. When you determine how the final assembly will look it will match one of the five possible answers, numbered 1 through 5. Fill in the number of the assembly that is correct.

![Figure 2](image2)

A step-by-step approach may work better than attempting to visualize the actual assembly. You may find it helpful to look at how the letters should match, but also consider where they obviously do not.

In Figure 2, try matching up the letter A on two objects. For example, letter A points to one edge of the upside down wedge. However, it does not point to the edge having the circular cutout. Letter A also points to the long edge along the bottom of a rectangular block. With this information in mind, evaluate the possible answers. Answer 1 has a correct match for Letter A. Answer 2 does not. Answer 3 has a correct match for Letter A. Answer 4 and 5 do not. So at this point you may rule out Answers 2, 4 and 5. The remaining possible answers are 1 and 3.

Now consider how the letter B should match in this example. In both 1 and 3, the match for B is possible. Move on to letter C. Answer 1 does not match the bottom of the cone against the side of the wedge. Answer 3, however, does.

In this example the correct answer to mark is Answer 3.
ASSEMBLY PRACTICE TEST

1.

\[ \text{Assembly Test #1} \]

ASSEMBLY PRACTICE TEST

1.

\[ \text{Image 1} \]

2.

\[ \text{Image 2} \]

3.

\[ \text{Image 3} \]

4.

\[ \text{Image 4} \]
Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is picture #3. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 3 and 4 have the ends marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 4 show that the two places marked B are put together? Of the two, only picture 3 has the places marked B put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.

2. The correct answer is picture #1. Look at the edges marked A. If the edges marked A were put together, how would they look? Of the five pictures, only pictures 1 and 5 have the ends marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 5 show that the two places marked B are put together? Both pictures have the places marked B put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

3. The correct answer is picture #5. Look at the pieces with edges marked A. If the edges marked A were put together, how would they look? Of the five pictures, only pictures 3 and 5 have the edges marked A touching. Now look at the parts marked with a B. Which of the pictures 3 and 5 show that the two places marked B are put together? Of the two, only picture 5 has the places marked B put together. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

4. The correct answer is picture #2. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 2 and 5 have the ends marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 4 show that the two places marked B are put together? Of the two, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

5. The correct answer is picture #3. Look at the edges marked A. If the edges marked A were put together, how would they look? Of the five pictures, only pictures 3, 4, and 5 have the edges marked A touching. Now look at the parts marked with a B. Which of the pictures 3, 4 and/or 5 show that the two places marked B are put together? Of the three, only picture 3 has the places marked B put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.

6. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2, 3, and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2, 3 and/or 5 show that the two places marked B are put together? Of the three, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

7. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 4 and 5 show that the two places marked B are put together? Of the two, only picture 4 has the places marked B put together. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

8. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 3 show that the two places marked B are put together? Of the two, only picture 1 has the places marked B put together. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.
9. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 2 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 2 show that the two places marked B are put together? Of the two, only picture 1 has the places marked B put together. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.
PRACTICE TEST

for

MECHANICAL CONCEPTS

THIS TEST MIMICS THE STYLE OF TEST FOR MECHANICAL CONCEPTS USED BY
THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICE for MECHANICAL CONCEPTS

The Plant Operator Selection System (POSS) includes a test for Mechanical Concepts. Mechanical concepts are seen in everyday life, can be quite simple, and yet are actually founded on the principles of physics, material properties and basic electrical properties. This test gages your ability to draw appropriate conclusions regarding mechanical principles.

To help you prepare, a practice test follows with 26 different scenarios. Each scenario gives you a picture to illustrate a particular situation. For each situation, there will be one correct answer out the three possible answers shown. This practice test helps you to practice determining the appropriate outcome for each situation, and within a suggested time limit.

The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 13 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle your choice of A, B, or C. You should be able to answer all 26 questions within the 13-minute time limit.

Practicing by taking this test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by completing all 26 test questions
- Be sure to set a timer before beginning each part
- Do not look at the answers that follow at the end until you have completed all the test questions
1. If the vehicle's brakes fail simultaneously, which vehicle will hit the brick wall with greater force? (If equal, mark C.)

![Diagram of two vehicles hitting brick walls]

2. Which switch (A, B, or C) should be closed for the fan to operate?

![Diagram of a fan circuit with switches]

3. Which of the three switches (A, B, or C), if broken and cannot be closed, will prevent the flow of electricity in the terminal?

![Diagram of a circuit with a broken switch]
4. Water enters the pipe at A and exits the pipe at B. At which location is the water moving at greater velocity? (If equal, mark C.)

5. Two trucks of equal length carry equal weight loads. The load on Truck A is three feet higher than the load on Truck B. Which truck will require a greater turning radius to ensure it does not tip over during the turn? (If equal, mark C.)

6. Each conveyor belt moves the same load from bottom to top for a total distance of 50 feet. If each conveyor begins at the same time and its load arrives at the top at the same time, then which conveyor belt requires the bigger motor? (If equal, mark C.)
7. As the weight compresses on the surface of the fluid on the left (at X), will the level of the fluid in the right tank (Y) move up (A) or down (B) or stay constant level (C)?

8. Which 25-pound load (A or B) has the greatest force applied to it to keep the load in its current position? (If equal, mark C.)

9. In the picture of the dam shown below, will the force of the water on the dam be greater at A or B? (If equal, mark C.)

10. Both tanks contain the same gas that is under pressure. Tank A has approximately twice the volume of Tank B. If both tanks show the same pressure reading, which tank contains a greater quantity of the gas?
11. When the gear W moves clockwise, will gear Z move in direction A or B? (If no movement, mark C.)

12. Object A and Object B are both given a push measuring the same force. Which object is more likely to travel further (A or B) along a flat surface? (If equal, mark C)

13. The beaker shown below has fallen on its side. At what point, (A, B, or C) will the liquid no longer drain out of the spout?
14. The carts X and Y have the same mass. When a load is placed upon cart X and it is then pushed into cart Y, will cart Y travel leftward (A), nowhere (B), or rightward (C)?

15. A hydraulic lift is used to raise the car to change its tire. If the hydraulic pressure in the lift begins to lower, will the lift move in direction A or B? (If equal, mark C.)

16. When the skier increases his speed at the jump off point, will he more likely increase his overall jump distance (A) or decrease his overall jump distance (B)? (If equal, mark C.)
17. Box A and Box B have the same mass. Both are placed upon an incline of 60 degrees and released at the same time. The surface beneath Box A is glass. The surface beneath Box B is cobblestone. Will Box A or B reach the bottom first? (If equal, mark C.)

18. The mass applied at point A is equal to the mass applied at point B. Which side, (A or B) will move lower? (If equal, mark C.)

19. It is mid-day and sunny. Which picture shows a more likely representation (A or B)? (If equal, mark C.)

20. The screws shown below are equal diameter and each has the same distance between its threads. Which screw, (A or B) will require more work to embed? (If equal, mark C.)
21. Will the water flow more easily through valve A or B? (If equal, mark C.)

![Valve A and Valve B](image)

22. The bottle shown in diagram A floats in fresh water. The same size and weight bottle in diagram B floats in ocean saltwater. Which bottle will be more exposed above the surface of the water (A or B)? (If equal, mark C.)

![Bottle A and Bottle B in water](image)

23. After a burner is lit beneath a beaker of water and the water has boiled for 10 minutes, will the water surface be lower (A) or higher (B)? (If equal, mark C.)

![Beaker A and Beaker B](image)
24. As the top gear moves counterclockwise, will the flexible bar that is secured to the wall at Z, move upward (A) or downward (B)? (If equal, mark C.)

![Diagram of gears and bar](image1)

25. Identical plants are maintained indoors by an office. Plant A has just been watered thoroughly for 1/2 hour. Plant B was watered the previous week. Which plant will be easier to move (A or B)? (If equal, mark C.)

![Plants A and B](image2)

26. The wind is blowing in the direction shown. In which direction, will the loaded cart move more easily (A or B)? (If equal, mark C.)

![Wind and carts](image3)

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is A. The force of the object hitting the brick wall depends on the objects mass and acceleration. In both pictures, the incline of the hill is the same and the acceleration of each object rolling down the hill will be the same. The only difference will be the object's mass. The concrete truck will have greater mass than the sports car.

2. The correct answer is C. For the fan to work, it requires electricity flowing along a path of a closed circuit. If switch A is broken, electricity can still move through switch B or C when they are closed. With switch B closed, the electricity can bypass the fan altogether. Only switch C completes the electrical circuit from pole to pole to supply the fan.

3. The correct answer is A. If switch C is broken, electricity can still flow from the negative pole through switch A. Likewise, if switch B is broken, electricity can still flow from the negative pole through switch A. The electricity must flow through switch A to reach the positive pole.

4. The correct answer is C. As the fluid enters the pipe at A at a given speed such as feet per second, (velocity), it also has a flow rate (volume such as gallons per minute). The pipe is the same diameter throughout its length, so the flow rate of fluid exiting will be the same.

5. The correct answer is B. Although the truck B carries the same weight of cargo, the height of the cargo is higher. This raises the overall center of gravity of the truck and its load. To take a corner without risking movement of the load, the truck B requires a larger turning radius than truck A that has a lower center of gravity.

6. The correct answer is A. If both conveyors have the same length, are loaded equally, and begin moving at the same time, the conveyor A has to overcome a greater force of gravity because of its greater incline.

7. The correct answer is A. The fluid surfaces in tank X and Y are originally in equilibrium (water seeks its own level); however, as the weight is applied to the surface of tank X the pressure in the fluid increases and will raise the surface level in tank Y proportionately.

8. The correct answer is A. This question has to do with pulleys. The force required in picture A to keep the box from moving does not change by adding a rope for pulling. The two pulleys in B distribute the weight of the box and this means less force is required to keep the box from moving.

9. The correct answer is B. As the depth of a body of water increases, the pressure increases. More force will be exerted on the dam at point B than at point A.

10. The correct answer is A. In this question, you have two gas containers, with Container A having about double the volume of Container B. If the same volume of gas (quantity) were in each container, the smaller container would register a higher pressure reading. Since the pressure reading is the same, the smaller container has a smaller volume of gas than the bigger Container A.

11. The correct answer is A. Since Gear W is moving clockwise, it will move Gear X counterclockwise. Gear X will then move Gear Y clockwise, and finally Gear Y will move Gear Z counterclockwise, direction A.

12. The correct answer is A. Given an equal applied force, the shape of Object B will cause it to move along an arc-shaped path. Object A will move in a straighter line as each triangular plane of its shape touches a floor.
13. The correct answer is C. Above the level of C, the fluid in the beaker can still flow out the neck of the beaker.

14. The correct answer is C. This answer has to do with momentum of a heavier object. Cart X with its load has a greater mass than Cart Y.

15. The correct answer is A. Hydraulic lifts contain hydraulic fluid under pressure and when fully pressurized the fluid fills the lift cylinder. As the lift cylinder fills with hydraulic fluid, it pushes up a platform to lift the car. When the pressure releases, whether by opening a valve on purpose, or from a leak, the fluid takes the path of least resistance and the piston in the lift cylinder will lower.

16. The correct answer is A. When the skier's velocity at the jump off point is greater, their momentum is greater and the resultant landing point will extend further away from the jumping off point.

17. The correct answer is A. This question has to do with surface friction. As the Box A glides down the glass surface it will reach the bottom much more quickly than Box B because the cobblestone surface that Box B travels poses greater friction resistance.

18. The correct answer is B. This question has to do with levers. A lever is a simple machine that uses an immovable point of support called a fulcrum. The lengths of the areas to the right of the fulcrum are called the arms. As a rule, when arms are equal on each side of the fulcrum they will be level. When an equal weight is applied to the end of two arms of different lengths, the arm with the shortest length requires greater force to move.

19. The correct answer is B. At mid-day, the sun is almost directly above the earth. The shadows cast from any object will be minimal or none at all. Long shadows occur when the sun is lower in the sky and closer to the horizon.

20. The correct answer is B. The longer length of Screw B means it must be turned more rotations to fully embed into a material than Screw A.

21. The correct answer is B. Valve B with the stem extended indicates the valve is further open than Valve A. The more open the valve handle, the greater the flow through the pipe.

22. The correct answer is B. Salt water is denser than fresh water. The bottle will be more buoyant on the salt water than in the fresh water. Increased buoyancy means the bottle will ride higher and thus have more of its surface exposed above the water.

23. The correct answer is A. As water is heated above its boiling point, it turns into steam. The longer the water boils, the more steam is created and the overall water volume will reduce, lowering the level of its surface.

24. The correct answer is B. As the top gear moves counterclockwise, it causes the lower gear to move clockwise. The flexible bar will move toward B while the gear is in motion.

25. The correct answer is B. As Plant A is watered, the soil medium will become saturated with the weight of the water. The drier Plant B will be easier to move.

26. The correct answer is A. The loaded cart in A will move more easily in the direction the wind is blowing. The Cart B must move against the force created by the wind.
PRACTICE TEST

for

TABLES AND GRAPHS

includes

PART I - TABLES

PART II - GRAPHS

THIS TEST MIMICS THE STYLE OF TEST FOR TABLES AND GRAPHS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING WITH TABLES AND GRAPHS

The Plant Operator Selection System (POSS) includes tests for tables and graphs.

To help you prepare, a two-part practice test follows. Each part is designed so you may practice correctly interpreting tables and graphs within a suggested time limit.

Part I concerns reading tables that are similar in design to multiplication tables. The questions you answer will be multiple-choice and depend upon you accurately choosing answers (values or information) from the table. Carefully review the instructions before beginning this part, then set a timer for three (3) minutes. You should be able to answer all 24 questions within this time.

Part II checks your ability to interpret charts with graphed information. In this part you are also presented a choice of possible answers. Carefully review the instructions before beginning this part, then set a timer for two (2) minutes You should be able to read the instructions and answer all 14 questions within this time.

Practicing taking these tests will familiarize you with the style of the real selection tests. To create conditions most like a real test:

➢ Practice by taking Part I and Part II tests, together one after the other
➢ Be sure to set a timer before beginning each part
➢ Do not look at the answers until you have completed all the test questions
PART I - TABLES

HOW TO TAKE THIS TEST

These instructions provide an example using the sample Table A, shown below:

**Table A**

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength (in pounds per square inch (PSI))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>20</td>
<td>1170.3</td>
</tr>
<tr>
<td>30</td>
<td>1841.7</td>
</tr>
<tr>
<td>40</td>
<td>1975.5</td>
</tr>
</tbody>
</table>

Table A gives you information about how strong a concrete anchor will be (note the title of the table), measured in pounds, for certain conditions. The conditions are determined by the values in the **first column** on the left side which shows applied torque, and the **top row** which shows type of concrete that will receive the anchor.

For example, for a torque of 30 Ft/Lb and concrete strength of 2500 psi, read across from 30 and down from 2500. In this case the strength of the anchor would be 2030.2 LBS.

Now consider a sample problem that rearranges the information somewhat:

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength</th>
<th>Strength of Concrete Anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>A</td>
</tr>
<tr>
<td>20.00</td>
<td>2000</td>
<td>1841.7</td>
</tr>
</tbody>
</table>

The two left-hand columns are torque and concrete strength. In the row shown, the torque is 20 Ft/LB and the concrete strength is 2000. Refer back to the Table A and read across from 20 and down from 2000.

Now you see that 1170.3 is the correct strength for the anchor. So in this case, you completely fill the circle to the right of 1170.3 to show this is the correct answer:

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength</th>
<th>Strength of Concrete Anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>A</td>
</tr>
<tr>
<td>20.00</td>
<td>2000</td>
<td>1841.7</td>
</tr>
</tbody>
</table>
BEGIN TEST PART I

Table I is the reference information for the test questions built into the table on the next page. Completing the table on the next page requires looking up 24 sets of information from Table I. The suggested time limit to answer all 24 questions is three (3) minutes. To answer each test question, refer to Table I. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

Table I

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength (in pounds per square inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>20</td>
<td>1170.0</td>
</tr>
<tr>
<td>30</td>
<td>1841.0</td>
</tr>
<tr>
<td>40</td>
<td>1975.0</td>
</tr>
<tr>
<td>50</td>
<td>1631.0</td>
</tr>
<tr>
<td>60</td>
<td>3229.0</td>
</tr>
<tr>
<td>70</td>
<td>4075.0</td>
</tr>
<tr>
<td>80</td>
<td>3999.0</td>
</tr>
<tr>
<td>90</td>
<td>6336.0</td>
</tr>
<tr>
<td>100</td>
<td>6902.0</td>
</tr>
<tr>
<td>110</td>
<td>4999.0</td>
</tr>
<tr>
<td>120</td>
<td>8854.0</td>
</tr>
<tr>
<td>130</td>
<td>9381.0</td>
</tr>
<tr>
<td>140</td>
<td>6638.0</td>
</tr>
<tr>
<td>150</td>
<td>10084.0</td>
</tr>
<tr>
<td>160</td>
<td>11170.0</td>
</tr>
</tbody>
</table>
### Tables and Graphs Test #1

#### Test Questions for Test Part I

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength</th>
<th>Strength of Concrete Anchor</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2000</td>
<td>2490.3</td>
<td>1570.7</td>
<td>1170.0</td>
<td>2809.5</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2500</td>
<td>2967.7</td>
<td>9629.5</td>
<td>1570.7</td>
<td>2030.0</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>3000</td>
<td>4845.0</td>
<td>3229.0</td>
<td>4042.0</td>
<td>2681.8</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>3500</td>
<td>5577.0</td>
<td>8942.0</td>
<td>5814.0</td>
<td>8507.7</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>5000</td>
<td>3301.8</td>
<td>8747.0</td>
<td>8165.0</td>
<td>19805.0</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>4000</td>
<td>1771.0</td>
<td>6714.0</td>
<td>1975.0</td>
<td>18408.0</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>5500</td>
<td>9254.5</td>
<td>6328.0</td>
<td>2809.5</td>
<td>16710.0</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>3000</td>
<td>2490.3</td>
<td>5653.0</td>
<td>6352.0</td>
<td>15590.0</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>2500</td>
<td>4826.0</td>
<td>4904.0</td>
<td>16643.0</td>
<td>11314.0</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>5000</td>
<td>1570.7</td>
<td>17221.0</td>
<td>8122.3</td>
<td>10175.0</td>
<td></td>
</tr>
<tr>
<td>160</td>
<td>3000</td>
<td>9253.5</td>
<td>8890.5</td>
<td>14467.3</td>
<td>16926.7</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>5500</td>
<td>4999.0</td>
<td>4075.0</td>
<td>20421.0</td>
<td>9084.0</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>3500</td>
<td>14048.3</td>
<td>15488.5</td>
<td>17476.5</td>
<td>5249.0</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>5500</td>
<td>10534.7</td>
<td>4037.0</td>
<td>11591.8</td>
<td>5952.5</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>4000</td>
<td>3636.0</td>
<td>5989.5</td>
<td>13722.0</td>
<td>8073.3</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5000</td>
<td>9755.3</td>
<td>17020.7</td>
<td>19750.0</td>
<td>2272.0</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>4500</td>
<td>6336.0</td>
<td>1670.8</td>
<td>21163.5</td>
<td>2768.5</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>2000</td>
<td>2408.0</td>
<td>9381.0</td>
<td>20484.3</td>
<td>3839.0</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>4500</td>
<td>9506.8</td>
<td>11170.0</td>
<td>19079.0</td>
<td>5733.5</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>2500</td>
<td>18749.0</td>
<td>2299.3</td>
<td>6248.3</td>
<td>11119.5</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3500</td>
<td>2313.5</td>
<td>2021.5</td>
<td>15001.0</td>
<td>16965.5</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>3000</td>
<td>21842.8</td>
<td>2499.3</td>
<td>2522.5</td>
<td>13344.7</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>2500</td>
<td>3999.0</td>
<td>8196.7</td>
<td>9879.5</td>
<td>7497.7</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>2500</td>
<td>6336.0</td>
<td>12858.7</td>
<td>10647.3</td>
<td>7993.0</td>
<td></td>
</tr>
</tbody>
</table>
These instructions provide an example using the sample graph, above, titled "Electricity Use (in KW) by Time of Day." The use of electricity at different times of days differs depending on the line read on the graph. In this graph example, there are four possible locations:

- Sports Arena shown by a line with diamonds marks
- School, shown by a line with square marks
- Office Complex, shown by a line with triangular marks
- Apartment Building, shown by a line with X marks

Each location has its own electricity use (in KW) indicated for various times of day. The test evaluates your ability to read the graph and select correct values for each of the two types of tables.

**For the first table type, consider this example:**

An electricity use of 20 KW and time of day of 07:00 match at the line with the triangle marks. Read across from 20 and up from 7:00. In this case the location that uses 20 KW at 7:00 is the office complex.

As you can see, the answer for office complex has been darkened.
For the second table type, consider this example that rearranges the information somewhat:

The two left-hand columns are time of day and location. In the row shown, the time of day is 8:00 and the location is the Office Complex. Refer back to the graph and read up from 8:00 until the line representing the Office Complex is intersected. From the point of intersection, follow the horizontal line to the left read the KW hours used. Note that each horizontal line marks 2 KW.

As you can see, the answer for 44.0 KW has been darkened.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Location</th>
<th>Electricity Use in KW</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00</td>
<td>Office Complex</td>
<td>44.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.0</td>
</tr>
</tbody>
</table>
BEGIN TEST PART II

The graph shown is the reference information for the test questions built into the two tables that follow. Completing the tables on this page and the next requires looking up 14 sets of information from the graph. The suggested time limit to answer all 14 questions, on this page and the next, is two (2) minutes. To answer each test question, refer to this graph. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

Electricity Use (in KW) by Time of Day

<table>
<thead>
<tr>
<th>Electricity Use (KW)</th>
<th>Time of Day</th>
<th>Sports Arena</th>
<th>School</th>
<th>Office Complex</th>
<th>Apartment Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>8:30</td>
<td></td>
<td>O</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>15</td>
<td>14:30</td>
<td>O</td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>12:00</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5</td>
<td>12:00</td>
<td>O</td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>10:00</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>75</td>
<td>9:00</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>7:00</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>
## Tables and Graphs Test #1

### Electricity Use in KW

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Location</th>
<th>Electricity Use in KW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>08:30</td>
</tr>
<tr>
<td>08:30</td>
<td>Apartment Building</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.0</td>
</tr>
<tr>
<td>13:30</td>
<td>School</td>
<td>36.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td>10:00</td>
<td>Office Complex</td>
<td>54.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45.0</td>
</tr>
<tr>
<td>09:00</td>
<td>Apartment Building</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td>07:00</td>
<td>Sports Arena</td>
<td>65.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30.0</td>
</tr>
<tr>
<td>14:30</td>
<td>Office Complex</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.0</td>
</tr>
<tr>
<td>12:00</td>
<td>School</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40.0</td>
</tr>
</tbody>
</table>

Answers with explanations begin on the next page.
# ANSWERS FOR PART I - TABLES

<table>
<thead>
<tr>
<th>Torque Ft/Lb</th>
<th>Concrete Strength</th>
<th>Strength of Concrete Anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>20</td>
<td>2000</td>
<td>2490.3</td>
</tr>
<tr>
<td>30</td>
<td>2500</td>
<td>2967.7</td>
</tr>
<tr>
<td>60</td>
<td>2000</td>
<td>4845.0</td>
</tr>
<tr>
<td>90</td>
<td>3500</td>
<td>5577.0</td>
</tr>
<tr>
<td>80</td>
<td>5000</td>
<td>3301.8</td>
</tr>
<tr>
<td>20</td>
<td>4000</td>
<td>1771.0</td>
</tr>
<tr>
<td>40</td>
<td>5500</td>
<td>9254.5</td>
</tr>
<tr>
<td>40</td>
<td>3000</td>
<td>2490.3</td>
</tr>
<tr>
<td>70</td>
<td>2500</td>
<td>4826.0</td>
</tr>
<tr>
<td>130</td>
<td>5000</td>
<td>1570.7</td>
</tr>
<tr>
<td>160</td>
<td>3000</td>
<td>9253.5</td>
</tr>
<tr>
<td>150</td>
<td>5500</td>
<td>4999.0</td>
</tr>
<tr>
<td>130</td>
<td>3500</td>
<td>14048.3</td>
</tr>
<tr>
<td>100</td>
<td>5500</td>
<td>10534.7</td>
</tr>
<tr>
<td>50</td>
<td>4000</td>
<td>3636.0</td>
</tr>
<tr>
<td>20</td>
<td>5000</td>
<td>9755.3</td>
</tr>
<tr>
<td>70</td>
<td>4500</td>
<td>6336.0</td>
</tr>
<tr>
<td>130</td>
<td>2000</td>
<td>2408.0</td>
</tr>
<tr>
<td>150</td>
<td>4500</td>
<td>9506.8</td>
</tr>
<tr>
<td>50</td>
<td>2500</td>
<td>18749.0</td>
</tr>
<tr>
<td>30</td>
<td>3500</td>
<td>2313.5</td>
</tr>
<tr>
<td>120</td>
<td>3000</td>
<td>21842.8</td>
</tr>
<tr>
<td>140</td>
<td>2500</td>
<td>3999.0</td>
</tr>
<tr>
<td>100</td>
<td>2500</td>
<td>6336.0</td>
</tr>
</tbody>
</table>
# ANSWERS FOR PART II GRAPHS

<table>
<thead>
<tr>
<th>Electricity Use (KW)</th>
<th>Time of Day</th>
<th>Sports Arena</th>
<th>School</th>
<th>Office Complex</th>
<th>Apartment Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>830</td>
<td>o</td>
<td>●</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>15</td>
<td>1430</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>●</td>
</tr>
<tr>
<td>45</td>
<td>1200</td>
<td>o</td>
<td>●</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>5</td>
<td>1200</td>
<td>●</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>30</td>
<td>1000</td>
<td>o</td>
<td>●</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>75</td>
<td>900</td>
<td>o</td>
<td>o</td>
<td>●</td>
<td>o</td>
</tr>
<tr>
<td>10</td>
<td>700</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Location</th>
<th>Electricity Use in KW</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Apartment Building</td>
<td>8.0 o 5.0 ● 2.0</td>
</tr>
<tr>
<td>13:30</td>
<td>School</td>
<td>36.0 ● 20.0 o 40.0 o</td>
</tr>
<tr>
<td>10:00</td>
<td>Office Complex</td>
<td>54.0 o 50.0 o 75.0 ●</td>
</tr>
<tr>
<td>09:00</td>
<td>Apartment Building</td>
<td>8.0 o 15.0 o 7.0</td>
</tr>
<tr>
<td>07:00</td>
<td>Sports Arena</td>
<td>65.0 ● 10.0 o 60.0 o</td>
</tr>
<tr>
<td>14:30</td>
<td>Office Complex</td>
<td>45.0 o 60.0 ● 34.0 o</td>
</tr>
<tr>
<td>12:00</td>
<td>School</td>
<td>5.0 o 54.0 o 18.0 o</td>
</tr>
</tbody>
</table>
MATHEMATICAL USAGE PRACTICE TEST 1

Use this table to solve problems 1 through 19. For each problem, circle the letter that corresponds to the correct answer. Circle “e” for “none” if none of the answers are right.

It should take you about 8 minutes to complete.

1 yard = 36 inches
1 pound = 16 ounces
1 mile/minute = 88 feet/second
1 gallon = 3.785 liters
1 acre = 10 square chains
1 gill = 0.25 pints
1 kilometer = 1000 meters
160 square rods = 1 acre
1 acre = 43,560 square feet
1 slug = 14.59 kilograms
1 hand = 10 centimeters
1 hogshead = 63 gallons
1 kilogram = 1000 grams
1 rod = 0.25 chains
1 kilogram = 2.205 pounds
40 rods = 1 furlong
1 mile = 5,280 feet
1 pint = 0.5 quarts
1 fathom = 6 feet

1) 3 yards = _____ inches
   a. 36   b. 12   c. 108   d. 72   e. None

2) 0.5 mile/minute = _____ feet/second
   a. 88   b. 44   c. 22   d. 176   e. None

3) 80 square chains = _____ acres
   a. 8   b. 0.8   c. 20   d. 40   e. None

4) 0.25 kilometers = _____ meters
   a. 25   b. 125   c. 500   d. 250   e. None

5) 217,800 square feet = _____ acres
   a. 2   b. 5   c. 3   d. 10   e. None

6) 5 kilograms = _____ pounds
   a. 50   b. 112.5   c. 500   d. 11.025   e. None
Mathematical Usage Test #1

7) 32 ounces = _____ pounds
   a. 0.5  b. 2  c. 10  d. 22  e. None

8) 5 gallons = _____ liters
   a. 16.752  b. 18.925  c. 15  d. 8  e. None

9) 2 gills = _____ pints
   a. 2.5  b. 3  c. 0.8  d. 0.5  e. None

10) 40 square rods = _____ acres
    a. 2  b. 0.25  c. 12  d. 20  e. None

11) 6 slugs = _____ kilograms
    a. 53.78  b. 64  c. 87.54  d. 83  e. None

12) 8 hogsheads = _____ gallons
    a. 185  b. 504  c. 207  d. 115.5  e. None

13) 30 chains = _____ furlongs
    a. 3  b. 5  c. 30  d. 14  e. None

14) 3 miles = _____ fathoms
    a. 1,325  b. 560  c. 2,685  d. 2,640  e. None

15) 15 square chains = _____ square feet
    a. 65,340  b. 7,225  c. 49,560  d. 58,870  e. None

16) 5 slugs = _____ grams
    a. 5,689  b. 8,473  c. 72,950  d. 4,750  e. None

17) 2000 grams = _____ pounds
    a. 4,410  b. 13.9  c. 7.43  d. 0.8  e. None

18) 30 quarts = _____ gills
    a. 125.5  b. 240  c. 150  d. 27  e. None

19) 25 quarts = _____ pints
    a. 12.5  b. 100  c. 15  d. 50  e. None

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1.  C is the right answer. Since 1 yard equals 36 inches, you need to multiply 36 by 3 to find how many inches there are in 3 yards. 36 x 3 = 108 so, the answer is 108 inches.

   Problem: 3 yards = ______ inches

   We know that 1 yard = 36 inches.

   So, 3(1 yard) = 3 (36 inches)

   3 yards = 108 inches

2.  B is the right answer. Since 1 mile/minute equals 88 feet/second, you need to multiply 88 by 0.5 to find how many feet/second there are in 0.5 mile/minute. 88 x 0.5 = 44 so, the answer is 44 feet/second.

   Problem: 0.5 mile/minute = ______ feet/second

   We know that 1 mile/minute = 88 feet/second.

   So, 0.5 (1 mile/minute) = 0.5(88feet/second)

   0.5 mile/minute = 44 feet/second

3.  A is the right answer. Since 10 square chains equals 1 acre, you need to divide 80 by 10 to find how many acres there are in 80 square chains. 80/10 = 8 so, the answer is 8 acres.

   Problem: 80 square chains = ______ acres

   We know that 10 square chains = 1 acre.

   So, 80/10 = 8 acres

4.  D is the right answer. Since 1 kilometer equals 1000 meters, you need to multiply 1000 by 0.25 to find how many meters there are in 0.25 kilometers. 1000 x 0.25 = 250 so, the answer is 250 meters.

   Problem: 0.25 kilometers = ______ meters

   We know that 1 kilometer = 1000 meters.

   So, 0.25 (1 kilometer) = 0.25 (1000 meters)

   0.25 kilometer = 250 meters

5.  B is the right answer. Since 43,560 square feet equals 1 acre, you need to divide 217,800 by 43,560 to find how many acres there are in 217,800 square feet. 217,800 / 43,560 = 5 so, the answer is 5 acres.

   Problem: 217,800 square feet = ______ acres

   We know that 43,560 square feet = 1 acre.

   So, 217,800/ 43,560 square feet = 5 acres
6. D is the right answer. Since 1 kilogram equals 2.205 pounds, you need to multiply 2.205 by 5 to find how many pounds there are in 5 kilograms. 
   \[ 2.205 \times 5 = 11.025 \], so the answer is 11.025 pounds.

   Problem: 5 kilograms = _____ pounds

   We know that 1 kilogram = 2.205 pounds.

   So, 5(1 kilogram) = 5 (2.205 pounds)

   5 kilograms = 11.025 pounds

7. B is the right answer. Since 16 ounces equals 1 pound, you need to divide 32 by 16 to find how many pounds there are in 32 ounces. \( 32 / 16 = 2 \), so the answer is 2 pounds.

   Problem: 32 ounces = _____ pounds

   We know that 16 ounces = 1 pound.

   So, 32 / 16 ounces = 2 pounds

8. B is the right answer. Since 1 gallon equals 3.785 liters, you need to multiply 3.785 by 5 to find how many liters there are in 5 gallons. \( 3.785 \times 5 = 18.925 \), so the answer is 18.925 liters.

   Problem: 5 gallons = _____ liters

   We know that 1 gallon = 3.785 liters.

   So, 5(1 gallon) = 5 (3.785 liters)

   5 gallons = 18.925 liters

9. D is the right answer. Since 1 gill equals 0.25 pints, you need to multiply 0.25 by 2 to find how many pints there are in 2 gills. \( 0.25 \times 2 = 0.5 \), so, the answer is 0.5 pints.

   Problem: 2 gills = _____ pints

   We know that 1 gill = 0.25 pints.

   So, 2(1 gill) = 2 (0.25 pints)

   2 gills = 0.5 pints

10. B is the right answer. Since 160 square rods equal 1 acre, you need to divide 40 by 160 to find how many acres there are in 40 square rods. \( 40 / 160 = 0.25 \), so, the answer is 0.25 acres.

    Problem: 40 square rods = _____ acres

    We know that 160 square rods = 1 acre.

    So, 40/160 square rods = 0.25 acre
11. C is the right answer. Since 1 slug equals 14.59 kilograms, you need to multiply 14.59 by 6 to find how many kilograms there are in 6 slugs. \(14.59 \times 6 = 87.54\) so, the answer is 87.54 kilograms.

Problem: 6 slugs = ____ kilograms

We know that 1 slug = 14.59 kilograms.

So, 6(1 slug) = 6 (14.59 kilograms)

6 slugs = 87.54 liters

12. B is the right answer. Since 1 hogshead equals 63 gallons, you need to multiply 63 by 8 to find how many gallons there are in 8 hogsheads. \(63 \times 8 = 504\) so, the answer is 504 gallons.

Problem: 8 hogsheads = ____ gallons

We know that 1 hogshead = 63 gallons.

So, 8(1 hogshead) = 8 (63 gallons)

8 hogsheads = 504 gallons

The equivalents needed to solve problems 13–18 are not directly listed in the table. So, you need to use 2 equivalents with a common metric.

13. A is the right answer. In the table, there is no equivalent between chains and furlongs, but the table shows that 0.25 chains = 1 rod and 40 rods = 1 furlong. The common metric in both equivalents is rods. So, you need to use these 2 equivalents to find how many furlongs are in 30 chains.

Problem: 30 chains = ____ furlongs

We know that 0.25 chains equal = 1 rod. To find how many rods are in 30 chains, divide 30 by 0.25. This equals 120. So, 30 chains is equivalent to 120 rods.

\[
0.25 \text{ chains} = 1 \text{ rod} \quad \quad \quad 30/0.25 \text{ chains} = 120 \text{ rods}
\]

We also know that 40 rods equals 1 furlong. To find how many furlongs are in 120 rods, divide 120 by 40. The answer is 3. So, 30 chains is equivalent to 3 furlongs.

\[
40 \text{ rods} = 1 \text{ furlong} \quad \quad \quad 120/40 \text{ rods} = 3 \text{ furlongs}
\]
14. D is the right answer. In the table, there is no equivalent between miles and fathoms, but the table shows that 1 mile = 5,280 feet and 1 fathom = 6 feet. The common metric in both equivalents is feet. So, you need to use these 2 equivalents to find how many fathoms are in 3 miles.

Problem: 3 miles = _____ fathoms

We know that 1 mile equals 5,280 feet. To find how many feet are in 3 miles, multiply 3 by 5,280. This equals 15,840. So, 3 miles is equivalent to 115,840 feet.

\[
1 \text{ mile} = 5,280 \text{ feet} \quad 3(1\text{mile}) = 3(5,280 \text{ feet}) \quad 3 \text{ miles} = 15,840 \text{ feet}
\]

We also know that 1 fathom equals 6 feet. To find how many fathoms are in 15,840 feet divide 15,840 by 6. The answer is 2,640. So, 3 miles equals 2,640 fathoms.

\[
6 \text{ feet} = 1 \text{ fathom} \quad 15,840/6 = 2,640 \text{ fathoms}
\]

15. A is the right answer. In the table, there is no equivalent between square chains and square feet but the table shows that 1 acre = 10 square chains and 1 acre = 43,560 square feet. The common metric in both equivalents is acre. So, you need to use these 2 equivalents to find how many square feet are in 15 square chains.

Problem: 15 square chains = _____ square feet

We know that 1 acre equals = 10 square chains. To find how many acres are in 15 square chains, divide 15 by 10. This equals 1.5. So, 15 square chains is equivalent to 1.5 acres.

\[
10 \text{ square chains} = 1 \text{ acre} \quad 15/10 = 1.5 \text{ acres}
\]

We also know that 1 acre equals 43,560 square feet. To find how many square feet are in 1.5 acres, multiply 1.5 by 43,560 square feet. The answer is 65,340. So, 15 square chains equal 65,340 square feet.

\[
1 \text{ acre} = 43,560 \text{ square feet} \quad 1.5 (1 \text{ acre}) = 1.5(43,560 \text{ square feet}) \quad 1.5 \text{ acres} = 65,340 \text{ square feet}
\]
16. C is the right answer. In the table, there is no equivalent between slugs and grams, but the table shows that 1 slug = 14.59 kilograms and 1 kilogram = 1000 grams. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many grams are in 5 slugs.

Problem: 5 slugs = _____ grams

We know that 1 slug = 14.59 kilograms. To find how many kilograms are in 5 slugs, multiply 14.59 by 5. This equals 72.95. So, 5 slugs are equivalent to 72.95 kilograms.

1 slug = 14.59 kilograms

5(1 slug) = 3(14.59 kilograms)

5 slugs = 72.95 kilograms

We also know that 1 kilogram = 1000 grams. To find how many grams are in 72.95 kilograms, multiply 72.95 by 1000. The answer is 72,950. So, 5 slugs equal 72,950 grams.

1 kilogram = 1000 grams

72.95(1 kilogram) = 72.95(1000 grams)

72.95 kilograms = 72950 grams

17. A is the right answer. In the table, there is no equivalent between grams and pounds, but the table shows that 1 kilogram = 1000 grams and 1 kilogram = 2.205 pounds. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many pounds are in 2000 grams.

Problem: 2,000 grams = _____ pounds

We know that 1,000 grams = 1 kilograms. To find how many kilograms are in 2,000 grams divide 2,000 by 1,000. This equals 2. So, 2,000 grams are equivalent to 2 kilograms.

1,000 grams = 1 kilogram

2,000/1,000 grams = 2 kilograms

We also know that 1 kilogram = 2.205 pounds. To find how many pounds are in 2 kilograms, multiply 2 by 2.205. The answer is 4.410. So, 2,000 grams equal 4.410 pounds.

1 kilogram = 2.205 pounds

2(1 kilogram) = 2(2.205 pounds)

2 kilograms = 4.410 pounds
18. B is the right answer. In the table, there is no equivalent between quarts and gills, but the table shows that 1 pint = 0.5 quarts and 1 gill = 0.25 pints. The common metric in both equivalents is pints. So, use these 2 equivalents to find how many gills are in 30 quarts.

Problem: 30 quarts = _____gills

We know that 0.5 quarts = 1 pint. To find how many pints are in 30 quarts, divide 30 by 0.5. This equals 60. So, 30 quarts are equivalent to 60 pints.

0.5 quarts = 1 pint
30/0.5 quarts = 60 pints

We also know that 0.25 pints = 1 gill. To find how many gills are in 60 pints, divide 60 by 0.25. The answer is 240. So, 30 quarts equal 240 gills.

0.25 pints = 1 gill
60/0.25 pints = 240 gills

19. D is the right answer. Since 1 pint equals 0.5 quarts, you need to divide 25 by 0.5 to find how many pints there are in 25 quarts. 25 / 0.5 = 50 so, the answer is 50 pints.

Problem: 25 quarts = ____pints,

We know 0.5 quarts equal 1 pint. So, 25/0.5 quarts = 50 pints
**PRACTICE TEST**

for

**ASSEMBLY**

THIS TEST MIMICS THE STYLE OF TEST FOR ASSEMBLY USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

**PRACTICING FOR THE ASSEMBLY TEST**

The Plant Operator Selection System (POSS) includes a test for Assembly. Assembly involves reviewing parts and their assembly instruction in order to put the parts together in the correct manner.

To help you prepare, a practice test follows designed so you may practice correctly matching unassembled parts, with how they would look as assembled, within a suggested time limit of five (5) minutes.

For each of the total of nine (9) questions you answer, there will be five (5) possible answers. Carefully review the instructions before beginning this test, and then set a timer for five (5) minutes. You should be able to answer all nine (9) assembly problems within this time.

Practicing taking this type of test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by taking the complete test with all nine questions
- Be sure to set a timer before beginning each part
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions
These instructions provide an example using two examples, shown below in Figures 1 and 2:

Figure 1 shows a prism with two surfaces marked. One is marked B, referring to the end of the prism while the other is marked C pointing to one of the six long sides of the prism.

Each test problem presents a total of four (4) objects that could be similar to this one, with each object having one or more surfaces or edges marked by a letter. Your job is to match the surfaces and/or edges with the same letters to complete the assembly. Figure 2 looks like a real test question. When you determine how the final assembly will look it will match one of the five possible answers, numbered 1 through 5. Fill in the number of the assembly that is correct.

A step-by-step approach may work better than attempting to visualize the actual assembly. You may find it helpful to look at how the letters should match, but also consider where they obviously do not.

In Figure 2, try matching up the letter A on two objects. For example, letter A points to one edge of the upside down wedge. However, it does not point to the edge having the circular cutout. Letter A also points to the long edge along the bottom of a rectangular block. With this information in mind, evaluate the possible answers. Answer 1 has a correct match for Letter A. Answer 2 does not. Answer 3 has a correct match for Letter A. Answer 4 and 5 do not. So at this point, you may rule out Answers 2, 4 and 5. The remaining possible answers are 1 and 3.

Now consider how the letter B should match in this example. In both 1 and 3, the match for B is possible. Move on to letter C. Answer 1 does not match the bottom of the cone against the side of the wedge. Answer 3; however, does.

In this example, the correct answer to mark is Answer 3.
ASSEMBLY PRACTICE TEST

1.

2.

3.

4.
Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is picture #4. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 1, 4 and 5 have the ends marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 4 and 5 show that the two places marked B are put together? Of the three pictures 1, 4 and 5, all have places marked B put together. Now look at the parts marked with a C. Which of the pictures 1, 4 and 5 show that the two places marked C are put together? Of the three pictures 1, 4 and 5, only picture 4 has the places marked C put together. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

2. The correct answer is picture #3. Look at the edges marked A. If the edges marked A were put together, how would they look? Of the five pictures, only pictures 3 and 4 have the edges marked A touching. Now look at the parts marked with a B. Which of the pictures 3 and 4 show that the two places marked B are put together? Both pictures 3 and 4 have the places marked B put together. Now look at the parts marked C. Which of the pictures 3 and 4 show that the two places marked C are put together? Of the two, only picture 3 has the places marked C put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.

3. The correct answer is picture #2. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 1, 2 and 3 have the ends marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three pictures 1, 2 and 3, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

4. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2 and 5 have the places marked A touching. Now look at the ends marked with a B. Which of the pictures 2 and 5 show that the two ends marked B are put together? Of the two pictures 2 and 5, only picture 5 has the ends marked B touching. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

5. The correct answer is picture #1. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 1 and 3 have the ends marked A touching. Now look at the ends marked with a B. Which of the pictures 1 and 3 show that the two places marked B are put together? Of the two pictures 1 and 3, only picture 1 has the place marked B touching. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

6. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 2, 3 and 4 have the places marked A touching. Now look at the ends marked with a B. Which of the pictures 1, 2, 3 and 4 show that the two ends marked B are put together? Of the pictures 1, 2, 3 and 4, only picture 1 has the ends marked B touching. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

7. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 2 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 1 and 2 show that the two places marked B are put together? Of the two pictures 1 and 2, only picture 2 has the places marked B touching as marked. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.
8. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 4 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 1 and 4 show that the two places marked B are put together? Of the two pictures 1 and 4, only picture 4 has the ends marked B touching. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

9. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 5 have the places marked A touching. Now look at the ends marked with a B. Which of the pictures 1 and 5 show that the two ends marked B are put together? Of the two pictures 1 and 5, only picture 5 has the ends marked B touching. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.
PRACTICE TEST

for

MECHANICAL CONCEPTS

THIS TEST MIMICS THE STYLE OF TEST FOR MECHANICAL CONCEPTS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICE for MECHANICAL CONCEPTS

The Plant Operator Selection System (POSS) includes a test for Mechanical Concepts. Mechanical concepts are seen in everyday life, can be quite simple, and yet are actually founded on the principles of physics, material properties and basic electrical properties. This test gages your ability to draw appropriate conclusions regarding mechanical principles.

To help you prepare, a practice test follows with 26 different scenarios. Each scenario gives you a picture to illustrate a particular situation. For each situation, there will be one correct answer out the three possible answers shown. This practice test helps you to practice determining the appropriate outcome for each situation, and within a suggested time limit.

The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 13 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle your choice of A, B, or C. You should be able to answer all 26 questions within the 13-minute time limit.

Practicing by taking this test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by completing all 26 test questions
- Be sure to set a timer before beginning each part
- Do not look at the answers that follow at the end until you have completed all the test questions
1. If the tank shown ruptures and the windsock points in the direction shown, which group of people are in the safest evacuation area (A or B)? (If equal, mark C.)

2. Should the switch be in position (A) or position (B) for the receptacle to operate? (If the receptacle will operate when the switch is in either position, mark C.)

3. Which circuit breaker shown in (A) or (B) will most likely trip first and shut off when all receptacles are used to the maximum capacity (amperage)? (If neither or both, mark C.)
4. As the piano is played, will a person standing at position (A) or position (B) hear a greater sound intensity? (If equal, mark C.)

5. The force applied is large enough to move the object weighing 100 LBS toward the wall, which in turn, compresses the spring. If the force is released suddenly after the spring is compressed, will the object move back to the right, for a distance further from the wall than it was originally, (A), or will it more likely move only back to its original position and stop (B)? (If neither applies, mark C.)

6. Each conveyor belt moves the same load at the same speed down an identical incline. When the load gets to the bottom, will it stop more easily on the roller surface shown in (A) or the flat surface shown in (B)? (If equal, mark C.)
7. The faucets in each view turn on simultaneously releasing the same flow of water in gallons per minute. Which view, (A) or (B), better represents how the tubes will fill? (If neither is correct, mark C.)

8. Which person (A or B) has the easier job lifting the 100-pound load, given the pulley arrangements shown? (If equal, mark C.)

9. Both rooms are the same temperature to begin with, before the boiler flame is activated. Which room, (A or B) will likely become hotter when the boiler is activated and water continuously flows through the piping in the direction of the arrow? (If equal, mark C.)
10. Squeeze bulb A is squeezed and then released before picking up liquid. Squeeze bulb B is not squeezed. Which bulb's syringe will pick up more liquid (A or B)? (If equal, mark C.)

A

B

11. When the gear W moves clockwise, will gear Z move in direction A or B? (If no movement, mark C.)

12. Which stockpile is more stable on a flat surface, (A or B)? (If equal, mark C.)

A

B
13. When the cone-shaped weights are placed at position X, the lever stays level. When the weights are removed, will the lever move up toward B or down toward A? (If the lever will not move, mark C.)

14. A strong force moves the pool cue in the direction shown. The cue hits the white ball "dead-on" (in the center of its profile). After the white ball is hit, will a ball be more likely to drop into the pool table pocket at corner (A) or (B)? (If equal possibility, mark C.)

15. When skating on the same path, will a skater have an easier time stopping with a skate of the type and position shown in (A) or (B)? (If equal, mark C.)
16. Based upon the satellite photo of the tropical storm, has the storm more likely come from the direction (A) or (B)? (If each direction is an equal possibility, mark C.)

![Satellite photo of tropical storm](image)

17. Airplane A and B are the same model, with identical engines, loaded mass, and propeller speed. Both are on a level runway. The runway beneath Airplane A is paved. The runway beneath Airplane B is grass. Both airplanes take off at the same time. Which airplane (A or B) will become airborne first? (If equal, mark C.)

![Airplanes A and B](image)

18. The mass loaded at point A is equal in weight to the mass loaded at point B. Will the force of the pull at X need to be larger when the load is at point (A) or point (B)? (If equal, mark C.)

![Force diagrams](image)
19. Which home’s roof is more likely to withstand a heavy snow load without collapsing (A or B)? (If equal, mark C.)

A

B

20. The scrap metal pile shown has been placed below a powerful magnet. Which magnet position, (A or B) is the most likely placement of the magnet to attract the scrap metal as shown? (If equal, mark C.)

A

B

21. When the knots are pulled tight, which knot, (A or B) is less likely to slip off of a pipe? (If equal, mark C.)

A

B

Direction of Pull or Load
22. Both tugboats are the same size and capacity. Each tugboat has the same cargo load, same power, and same size crew, but shows a very different profile on the water. One tugboat operates in salt water and the other in fresh water. Is tugboat (A) or (B) working in fresh water? (If both tugboats could be working in either fresh water or ocean water yet have a different profile, mark C.)

23. Balloons A and B are in different regions of the country. The outside temperature is lower in the region where Balloon A is located than it is where Balloon B is located. If the burner for each balloon remains on long enough for one balloon to begin to rise, which balloon rises faster (A or B)? (If equal, mark C.)

24. As the pinion gear moves clockwise, will the outer gear X move toward (A) or (B)? (If no change in movement of the outer gear X, mark C.)
25. Both flasks contain the same amount of water and air. A tight fitting glass stoppers Flask A. Flask B was stoppered by manually pushing a vented cork into the top opening. If both flasks are heated at the same temperature for the same time, which flask will be safer to handle (A or B)? (If equal, mark C.)

26. The steamboat's paddlewheel is turning in the direction shown. Will the steamboat move in direction A or B? (If equal, mark C.)

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is A. The windsock shows the direction the wind blows by filling with air and lifting with the air current. This one shows the wind blowing toward the group of people labeled B, thus, any hazardous elements (toxic smoke, etc.) released will blow away from group A.

2. The correct answer is C. The receptacle is not dependent on the switch A being open or closed. The receptacle is on a completed circuit path with available power supply.

3. The correct answer is B. A circuit breaker should trip when overloaded. If every receptacle were used, the possibility for overload exists. However, the 20-amp circuit breaker will take more load than the 15-amp circuit breaker before tripping because it has five amps more capacity.

4. The correct answer is B. The sound we interpret is actually an energy wave. The piano creates sound energy that resonates from the piano where its soundboard is located. A listener on the side A will hear the sound after the energy wave has traveled through and around the lid of the piano. A listener on the side of the piano marked B will hear the sound from an unobstructed energy wave because there is nothing between the listener and the source of the sound.

5. The correct answer is A. The spring compresses when the force F is applied. This compression of the spring, toward the wall, and in relation to point B, stores energy. The compressed spring when released, will move back, beyond point B toward point A, exerting a restoring force.

6. The correct answer is B. Think of walking over marbles on a walk surface. Your feet tend to slide out from under you. Rollers provide the least resistance to an object in motion, so the object will stop more easily on the flat surface due to its greater surface friction.

7. The correct answer is A. When water fills each tank, the fluid surface will rise equally, ("water seeks its own level"). The air around us exerts an equal downward pressure on each surface.

8. The correct answer is B. This question has to do with pulleys. The force required in picture A to lift the object does not change by adding a rope for pulling. The two pulleys in B distribute the weight of the object and this lessens the force required to lift the object.

9. The correct answer is B. The boiler heats water flowing through the pipe. Room A has no hot water beneath, but heat exchange from heat in the pipe below Room B radiates into the room.

10. The correct answer is A. Squeezing the bulb expels air inside the bulb and syringe, creating a vacuum void inside. By releasing the bulb with the tip of the syringe placed in water, the water fills the syringe, because the pressure inside the syringe is less than the air pressure around it.

11. The correct answer is B. A moving gear rotates the gear aside it in the opposite direction. If Gear W moves clockwise, both Gears X & Y move counterclockwise moving Gear Z in direction B.

12. The correct answer is A. Look at pipe ends. In figure A, each pipe rests on a lower surface of two pipes providing support. In figure B, this is not the case creating a more unstable.
13. The correct answer is A. This question involves levers. A lever is a simple machine that uses an immovable point of support called a fulcrum. The weights at position X exert a downward force on the lever, yet the lever stays level, in "equilibrium." Removing the weights at X disrupts the equilibrium because a downward force no longer holds the lever in place. As a result, the lever will tend to move up at position X and move down on the other side toward A.

14. The correct answer is B. This answer has to do with momentum of an object. As the white ball is hit, energy is transferred to the ball propelling it forward. The energy path in direct alignment with the white ball provides the surest path of movement. The first ball touched by the white ball receives a glancing blow that will send it in the general direction of pocket A. However, the second ball touched by the white ball is in a direct line between the pool cue and the pocket B. The second ball will hit the third ball and the third ball should drop into the pocket B.

15. The correct answer is B. This question involves surface friction. Skate type B has a heel brake that aids resistance when applied to the surface of the path. Skate type A does not have a brake.

16. The correct answer is A. This question involves acceleration related to the Earth's rotation and centrifugal force. Centrifugal force is an outward force associated with a curved path. The storm shows a rotating counterclockwise movement. The acceleration turns storm toward the Earth's poles. Therefore, the storm turns and travels toward the nearest Earth pole.

17. The correct answer is A. This question involves surface friction. Airplane A gains speed more quickly due to less friction resistance over paving.

18. The correct answer is A. This question has to do with cantilevers and pulleys. The lever is supported on the left. The further the load moves away from the support, the farther "cantilevered" the load becomes. This causes a "bending moment" that the pulley X offsets. A "bending moment" force gets its name because as a load is applied to an object, bending may result. The bending moment force increases with distance because it is calculated as length times applied force. A load at position A will cause a greater downward bend of the lever than a load at position B, so greater pull is required by the pulley when the load is at position A.

19. The correct answer is B. This question involves loads, the snow, applied to a surface, the roof. A flat roof accumulates a snow load, while an inclined roof enables the snow to slide off the roof.

20. The correct answer is B. This question involves magnetic force. A magnet produces an invisible magnetic field creating a force that pulls materials like steel. The strength of the pull drops off with any distance, so the magnet B relative to the pile of steel is the most likely source of pull.

21. The correct answer is B. This question has to do with friction force. When tight, knot B provides more surface resistance against the pipe.

22. The correct answer is B. Salt water is denser than fresh water; therefore, the tugboat will be more buoyant on the salt water than in the fresh water. Decreased buoyancy means the tugboat will ride lower and thus have less of its surface exposed above fresh water.
23. The correct answer is A. Each balloon rises when the air inside is less dense than the air around it. Less dense air is more buoyant. In a hot air balloon, a gas burner heats air inside the balloon. Hot air is less dense (it has fewer molecules per unit of measure), than the air outside the balloon. The lower the temperature outside the balloon, the more quickly the balloon rises, because it takes less heat to make the air inside the balloon hotter than the air outside.

24. The correct answer is B. As the pinion gear inside gear X moves clockwise, the internally configured teeth of gear X will also move clockwise. Gear X is an "internal gear" meaning that its teeth point toward its center rather than away from its center. As a result, it moves differently.

25. The correct answer is B. As the water heats, it has the potential to boil and then create steam. The vented stopper for flask B allows steam to escape. The tight glass stopper of flask A keeps the steam inside, creating a pressure vessel with the potential to explode as steam builds.

26. The correct answer is A. Rotation of the paddle wheel produces thrust, forward or backward as required. In this case, the boat is moving forward, toward A. The upper part of a paddle wheel is usually enclosed in a paddle box to minimize splashing, especially when the boat moves forward.
PRACTICE TEST

for

TABLES AND GRAPHS

includes

PART I - TABLES

PART II - GRAPHS

THIS TEST MIMICS THE STYLE OF TEST FOR TABLES AND GRAPHS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING WITH TABLES AND GRAPHS

The Plant Operator Selection System (POSS) includes tests for tables and graphs.

To help you prepare, a two-part practice test follows. Each part is designed so you may practice correctly interpreting tables and graphs within a suggested time limit.

Part I concerns reading tables that are similar in design to multiplication tables. The questions you answer will be multiple-choice and depend upon you accurately choosing answers (values or information) from the table. Carefully review the instructions before beginning this part, and then set a timer for three (3) minutes. You should be able to answer all 24 questions within this time.

Part II checks your ability to interpret charts with graphed information. In this part, you are also presented a choice of possible answers. Carefully review the instructions before beginning this part, and then set a timer for two (2) minutes. You should be able to read the instructions and answer all 14 questions within this time.

Practicing taking these tests will familiarize you with the style of the real selection tests. To create conditions most like a real test:

- Practice by taking Part I and Part II tests, together one after the other
- Be sure to set a timer before beginning each part
- Do not look at the answers until you have completed all the test questions
PART I - TABLES

HOW TO TAKE THIS TEST

These instructions provide an example using the sample Table A, shown below:

Table A
Capacity of Freight Elevator in CF (Volume)

<table>
<thead>
<tr>
<th>Maximum Load Capacity in LBs</th>
<th>Elevator Speed in Feet per Minute (FPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75</td>
</tr>
<tr>
<td>2000</td>
<td>289.2</td>
</tr>
<tr>
<td>2250</td>
<td>301.2</td>
</tr>
<tr>
<td>2500</td>
<td>340.2</td>
</tr>
</tbody>
</table>

Table A gives you information about the volumetric capacity of freight elevators (note the title of the table), as measured in cubic feet (CF), for certain conditions. The conditions are determined by the values in the first column on the left side, which shows the maximum load, or weight, that the elevator may carry in pounds. The top row shows how fast an elevator as measured in feet per minute.

For example, for an elevator with a maximum load of 2250 LBS and a speed of 100 FPM, read across from 2250 and down from 100. In this case, the volume of the elevator will be 301.2 cubic feet.

The two left-hand columns are Max Load Capacity and Elevator Speed. In the row shown, the Max Load Capacity is 2500 and the elevator speed is 125. Refer back to the Table A, read across from 2500, and down from 125. See next page for how this is done.

Now consider a sample problem that rearranges the information somewhat:

The two left-hand columns are Max Load Capacity and Elevator Speed. In the row shown, the Max Load Capacity is 2500 and the elevator speed is 125. Refer back to the Table A, read across from 2500, and down from 125. See next page for how this is done.
Now you see that 347.8 is the correct volume of the elevator. Therefore, in this case, you completely fill the circle to the right of 347.8 to show this is the correct answer:

<table>
<thead>
<tr>
<th>Max Load Capacity in LBS</th>
<th>Elevator Speed in Feet per Minute (FPM)</th>
<th>Capacity of Freight Elevator in CF (Volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75</td>
<td>A</td>
</tr>
<tr>
<td>2000</td>
<td>289.2</td>
<td>O</td>
</tr>
<tr>
<td>2250</td>
<td>301.2</td>
<td>O</td>
</tr>
<tr>
<td>2500</td>
<td>301.2</td>
<td>O</td>
</tr>
</tbody>
</table>
BEGIN TEST PART I

Table I is the reference information for the test questions built into the table on the next page. Completing the table on the next page requires looking up 24 sets of information from Table I. The suggested time limit to answer all 24 questions is three (3) minutes. To answer each test question, refer to this table. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

**Table I**

**Capacity of Freight Elevator in CF (Volume)**

<table>
<thead>
<tr>
<th>Maximum Load Capacity in LBs</th>
<th>Elevator Speed in Feet per Minute (FPM)</th>
<th>75</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>175</th>
<th>200</th>
<th>225</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td></td>
<td>289.2</td>
<td>289.2</td>
<td>293.4</td>
<td>297.1</td>
<td>325.3</td>
<td>474.7</td>
<td>538.8</td>
<td>624.2</td>
</tr>
<tr>
<td>2250</td>
<td></td>
<td>301.2</td>
<td>301.2</td>
<td>301.2</td>
<td>313.3</td>
<td>325.3</td>
<td>479.5</td>
<td>545.6</td>
<td>633.8</td>
</tr>
<tr>
<td>2500</td>
<td></td>
<td>340.2</td>
<td>340.2</td>
<td>347.8</td>
<td>349.5</td>
<td>382.7</td>
<td>558.7</td>
<td>634.2</td>
<td>734.8</td>
</tr>
<tr>
<td>2750</td>
<td></td>
<td>354.3</td>
<td>354.3</td>
<td>354.3</td>
<td>368.5</td>
<td>382.7</td>
<td>564.1</td>
<td>641.9</td>
<td>745.5</td>
</tr>
<tr>
<td>3000</td>
<td></td>
<td>380.2</td>
<td>380.2</td>
<td>386.3</td>
<td>390.6</td>
<td>427.7</td>
<td>624.2</td>
<td>708.4</td>
<td>820.7</td>
</tr>
<tr>
<td>3250</td>
<td></td>
<td>396.0</td>
<td>396.0</td>
<td>396.0</td>
<td>411.9</td>
<td>427.7</td>
<td>630.5</td>
<td>717.4</td>
<td>833.2</td>
</tr>
<tr>
<td>3300</td>
<td></td>
<td>420.2</td>
<td>420.2</td>
<td>425.1</td>
<td>431.8</td>
<td>472.7</td>
<td>697.3</td>
<td>793.5</td>
<td>921.9</td>
</tr>
<tr>
<td>3500</td>
<td></td>
<td>437.7</td>
<td>437.7</td>
<td>442.2</td>
<td>455.2</td>
<td>472.7</td>
<td>697.3</td>
<td>793.5</td>
<td>921.9</td>
</tr>
<tr>
<td>3600</td>
<td></td>
<td>472.7</td>
<td>472.7</td>
<td>487.8</td>
<td>491.6</td>
<td>510.6</td>
<td>754.1</td>
<td>858.5</td>
<td>997.6</td>
</tr>
<tr>
<td>3750</td>
<td></td>
<td>499.3</td>
<td>499.3</td>
<td>506.8</td>
<td>519.3</td>
<td>539.3</td>
<td>795.7</td>
<td>905.5</td>
<td>1052.1</td>
</tr>
<tr>
<td>4000</td>
<td></td>
<td>525.9</td>
<td>525.9</td>
<td>525.9</td>
<td>546.9</td>
<td>568.0</td>
<td>837.2</td>
<td>952.6</td>
<td>1106.5</td>
</tr>
<tr>
<td>4250</td>
<td></td>
<td>534.8</td>
<td>534.8</td>
<td>534.8</td>
<td>556.1</td>
<td>577.5</td>
<td>851.3</td>
<td>968.7</td>
<td>1125.1</td>
</tr>
<tr>
<td>4500</td>
<td></td>
<td>543.6</td>
<td>543.6</td>
<td>543.6</td>
<td>565.4</td>
<td>587.1</td>
<td>865.4</td>
<td>984.7</td>
<td>1143.8</td>
</tr>
<tr>
<td>4750</td>
<td></td>
<td>555.3</td>
<td>555.3</td>
<td>555.3</td>
<td>577.5</td>
<td>599.7</td>
<td>884.0</td>
<td>1005.9</td>
<td>1168.4</td>
</tr>
<tr>
<td>5000</td>
<td></td>
<td>567.0</td>
<td>567.0</td>
<td>567.0</td>
<td>589.7</td>
<td>612.4</td>
<td>902.7</td>
<td>1027.1</td>
<td>1193.0</td>
</tr>
</tbody>
</table>
### Test Questions for Test Part I

<table>
<thead>
<tr>
<th>Max Load Capacity in LBS</th>
<th>Elevator Speed (FPM)</th>
<th>Capacity of Freight Elevator in CF (Volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>4000</td>
<td>125</td>
<td>427.7</td>
</tr>
<tr>
<td>2000</td>
<td>250</td>
<td>427.7</td>
</tr>
<tr>
<td>4750</td>
<td>100</td>
<td>555.3</td>
</tr>
<tr>
<td>4750</td>
<td>225</td>
<td>546.9</td>
</tr>
<tr>
<td>3750</td>
<td>100</td>
<td>474.7</td>
</tr>
<tr>
<td>4250</td>
<td>75</td>
<td>997.6</td>
</tr>
<tr>
<td>4750</td>
<td>200</td>
<td>884.0</td>
</tr>
<tr>
<td>2000</td>
<td>175</td>
<td>325.3</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>577.5</td>
</tr>
<tr>
<td>4250</td>
<td>225</td>
<td>420.2</td>
</tr>
<tr>
<td>3600</td>
<td>125</td>
<td>499.3</td>
</tr>
<tr>
<td>3300</td>
<td>250</td>
<td>906.7</td>
</tr>
<tr>
<td>4750</td>
<td>150</td>
<td>577.5</td>
</tr>
<tr>
<td>4250</td>
<td>175</td>
<td>1106.5</td>
</tr>
<tr>
<td>3000</td>
<td>100</td>
<td>289.2</td>
</tr>
<tr>
<td>4750</td>
<td>125</td>
<td>717.4</td>
</tr>
<tr>
<td>2250</td>
<td>150</td>
<td>1052.1</td>
</tr>
<tr>
<td>3600</td>
<td>225</td>
<td>968.7</td>
</tr>
<tr>
<td>5000</td>
<td>250</td>
<td>382.7</td>
</tr>
<tr>
<td>3250</td>
<td>175</td>
<td>427.7</td>
</tr>
<tr>
<td>3500</td>
<td>75</td>
<td>437.7</td>
</tr>
<tr>
<td>2750</td>
<td>200</td>
<td>564.1</td>
</tr>
<tr>
<td>3750</td>
<td>150</td>
<td>1168.4</td>
</tr>
<tr>
<td>4500</td>
<td>200</td>
<td>997.6</td>
</tr>
</tbody>
</table>
These instructions provide an example using the sample graph, above, titled "Maximum Load Capacity (in LBS)." This graph gives the load limitations for a rough terrain forklift. The maximum load capacity differs depending on the line read on the graph. In this graph example, there are four load capacities:

- 10,000 LB capacity shown by a line with diamonds marks
- 8,000 LB capacity shown by a line with dotted marks
- 6,000 LB capacity shown by a line with triangular marks
- 4,000 LB capacity shown by a line with square marks

Each loading condition is limited by both how far out the arm of the forklift reaches "Reach Extension (Horizontal Distance) in FT" and how high the forklift arm must be raised when loaded "Vertical Reach Extension (Height) in FT." The test evaluates your ability to read the graph and select correct values for two types of tables.

**For the first table type, consider this example:**

A height of 35 FT and reach of 5 FT match at the line with triangle marks. Read across from 35 and up from 5. In this case, the maximum load that the forklift can handle is 6000 LBS.

As you can see on the next page, the answer for 6000 LBS has been darkened.
For the second table type, consider this example that rearranges the information somewhat:

The two left-hand columns are Horizontal Reach and Maximum Load Capacity.

In the row shown, the Horizontal Reach is 5 and the Maximum Load Capacity is 6000 LBS. Refer back to the graph and read up from 5 until the line representing the 6000 LBS is intersected. From the point of intersection, follow the horizontal line to the left to read the Vertical Reach Extension (Height) in FT. Note that each horizontal line marks 2 FT.

As you can see below, the answer for 35 FT has been darkened.
BEGIN TEST PART II

The graph shown is the reference information for the test questions built into the two tables that follow. Completing the tables requires looking up 14 sets of information from the graph. The suggested time limit to answer all 14 questions is two (2) minutes. To answer each test question, refer to the graph. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

Answers with explanations begin on the next page.
# ANSWERS FOR PART I - TABLES

<table>
<thead>
<tr>
<th>Max Load Capacity in LBS</th>
<th>Elevator Speed (FPM)</th>
<th>Capacity of Freight Elevator in CF (Volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4000 125</td>
<td>427.7</td>
<td>567.0</td>
</tr>
<tr>
<td>2000 225</td>
<td>427.7</td>
<td>538.8</td>
</tr>
<tr>
<td>4750 100</td>
<td>555.3</td>
<td>386.3</td>
</tr>
<tr>
<td>4750 225</td>
<td>546.9</td>
<td>1005.9</td>
</tr>
<tr>
<td>3750 100</td>
<td>474.7</td>
<td>555.3</td>
</tr>
<tr>
<td>4250 75</td>
<td>997.6</td>
<td>851.3</td>
</tr>
<tr>
<td>4750 200</td>
<td>884.0</td>
<td>1052.1</td>
</tr>
<tr>
<td>2000 175</td>
<td>325.3</td>
<td>905.5</td>
</tr>
<tr>
<td>2000 100</td>
<td>577.5</td>
<td>1193.0</td>
</tr>
<tr>
<td>4250 225</td>
<td>420.2</td>
<td>968.7</td>
</tr>
<tr>
<td>3600 125</td>
<td>499.3</td>
<td>472.7</td>
</tr>
<tr>
<td>3300 250</td>
<td>906.7</td>
<td>386.3</td>
</tr>
<tr>
<td>4750 150</td>
<td>577.5</td>
<td>851.3</td>
</tr>
<tr>
<td>4250 175</td>
<td>1106.5</td>
<td>534.8</td>
</tr>
<tr>
<td>3000 100</td>
<td>289.2</td>
<td>420.2</td>
</tr>
<tr>
<td>4750 125</td>
<td>717.4</td>
<td>921.9</td>
</tr>
<tr>
<td>2250 150</td>
<td>1052.1</td>
<td>793.5</td>
</tr>
<tr>
<td>3600 225</td>
<td>968.7</td>
<td>313.3</td>
</tr>
<tr>
<td>5000 250</td>
<td>382.7</td>
<td>1193.0</td>
</tr>
<tr>
<td>3250 175</td>
<td>427.7</td>
<td>555.3</td>
</tr>
<tr>
<td>3500 75</td>
<td>437.7</td>
<td>289.2</td>
</tr>
<tr>
<td>2750 200</td>
<td>564.1</td>
<td>382.7</td>
</tr>
<tr>
<td>3750 150</td>
<td>1168.4</td>
<td>396.0</td>
</tr>
<tr>
<td>4500 200</td>
<td>997.6</td>
<td>865.4</td>
</tr>
</tbody>
</table>
# ANSWERS FOR PART II GRAPHS

<table>
<thead>
<tr>
<th>Vertical Reach (Height) in FT</th>
<th>Horizontal Reach in FT</th>
<th>4000</th>
<th>6000</th>
<th>8000</th>
<th>10000</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>5</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>35</td>
<td>34</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>10</td>
<td>32</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>25</td>
<td>14</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>40</td>
<td>6</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>15</td>
<td>54</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>30</td>
<td>8</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizontal Reach</th>
<th>Maximum Load Capacity (LBS)</th>
<th>Vertical Reach Extension (Height) in FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>8000</td>
<td>8 ○ 45 ● 2 ○ 60 ○ 15 ○</td>
</tr>
<tr>
<td>20</td>
<td>6000</td>
<td>36 ○ 20 ○ 40 ○ 34 ○ 18 ●</td>
</tr>
<tr>
<td>45</td>
<td>8000</td>
<td>6 ● 50 ○ 75 ○ 18 ○ 45 ○</td>
</tr>
<tr>
<td>0</td>
<td>4000</td>
<td>8 ○ 15 ○ 30 ● 10 ○ 5 ○</td>
</tr>
<tr>
<td>25</td>
<td>10000</td>
<td>65 ○ 10 ○ 60 ○ 20 ○ 45 ●</td>
</tr>
<tr>
<td>5</td>
<td>4000</td>
<td>45 ○ 60 ○ 34 ○ 26 ● 20 ○</td>
</tr>
<tr>
<td>10</td>
<td>10000</td>
<td>5 ○ 56 ● 18 ○ 65 ○ 40 ○</td>
</tr>
</tbody>
</table>
Use this table to solve problems 1 through 19. For each problem, circle the letter that corresponds to the correct answer. Circle “e” for “none” if none of the answers are right.

It should take you about 8 minutes to complete.

<table>
<thead>
<tr>
<th>Conversion</th>
<th>1 yard = 36 inches</th>
<th>1 pound = 16 ounces</th>
<th>1 mile/minute = 88 feet/second</th>
<th>1 gallon = 3.785 liters</th>
<th>1 acre = 10 square chains</th>
<th>1 gill = 0.25 pints</th>
<th>1 kilometer = 1000 meters</th>
<th>160 square rods = 1 acre</th>
<th>1 acre = 43,560 square feet</th>
<th>1 slug = 14.59 kilograms</th>
<th>1 hand = 10 centimeters</th>
<th>1 hogshead = 63 gallons</th>
<th>1 kilogram = 1000 grams</th>
<th>1 rod = 0.25 chains</th>
<th>1 kilogram = 2.205 pounds</th>
<th>40 rods = 1 furlong</th>
<th>1 mile = 5,280 feet</th>
<th>1 pint = 0.5 quarts</th>
<th>1 fathom = 6 feet</th>
</tr>
</thead>
</table>

1) 25 quarts = ____ pints
- a. 12.5
- b. 100
- c. 15
- d. 50
- e. None

2) 8 hogsheads = ____ gallons
- a. 185
- b. 504
- c. 207
- d. 115.5
- e. None

3) 6 slugs = ____ kilograms
- a. 53.78
- b. 64
- c. 87.54
- d. 83
- e. None

4) 40 square rods = ____ acres
- a. 2
- b. 0.25
- c. 12
- d. 20
- e. None

5) 2 gills = ____ pints
- a. 2.5
- b. 3
- c. 0.8
- d. 0.5
- e. None

6) 5 gallons = ____ liters
- a. 16.752
- b. 18.925
- c. 15
- d. 8
- e. None
Mathematical Usage Test #2

7) 240 ounces = _____ pounds
   a. 15      b. 2      c. 10      d. 22      e. None

8) 5 kilograms = _____ pounds
   a. 50      b. 112.50  c. 500     d. 11.025   e. None

9) 217,800 square feet = _____ acres
   a. 2       b. 5       c. 3       d. 10       e. None

10) 0.25 kilometers = _____ meters
    a. 25      b. 125     c. 500      d. 250      e. None

11) 80 square chains = _____ acres
    a. 8       b. 0.8     c. 20       d. 40       e. None

12) 0.5 mile/minute = _____ feet/second
    a. 88      b. 44      c. 22       d. 176      e. None

13) 30 quarts = _____ gills
    a. 125.5    b. 240     c. 150      d. 27       e. None

14) 2000 grams = _____ pounds
    a. 4,410    b. 13.9    c. 7.43     d. 0.8      e. None

15) 5 slugs = _____ grams
    a. 5,689    b. 8,473    c. 72,950   d. 4,750     e. None

16) 15 square chains = _____ square feet
    a. 65,340   b. 7,225    c. 49,560   d. 58,870    e. None

17) 3 miles = _____ fathoms
    a. 1,325    b. 560     c. 2,685    d. 2,640     e. None

18) 30 chains = _____ furlongs
    a. 3        b. 5       c. 30       d. 14       e. None

19) 3 yards = _____ inches
    a. 36       b. 12      c. 108      d. 72       e. None

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. D is the right answer. Since 1 pint equals 0.5 quarts, you need to divide 25 by 0.5 to find how many pints there are in 25 quarts. The answer is 50 pints.

   Problem: 25 quarts = ____ pints

   We know 0.5 quarts equal 1 pint.

   So, 25/0.5 quarts = 50 pints

2. B is the right answer. Since 1 hogshead equals 63 gallons, you need to multiply 63 by 8 to find how many gallons there are in 8 hogsheads. The answer is 504 gallons.

   Problem: 8 hogsheads = ____ gallons

   We know that 1 hogshead = 63 gallons.

   So, 8(1 hogshead) = 8 (63 gallons)

   8 hogsheads = 504 gallons

3. C is the right answer. Since 1 slug equals 14.59 kilograms, you need to multiply 14.59 by 6 to find how many kilograms there are in 6 slugs. The answer is 87.54 kilograms.

   Problem: 6 slugs = ____ kilograms

   We know that 1 slug = 14.59 kilograms.

   So, 6(1 slug) = 6 (14.59 kilograms)

   6 slugs = 87.54 liters

4. B is the right answer. Since 160 square rods equal 1 acre, you need to divide 40 by 160 to find how many acres there are in 40 square rods. The answer is 0.25 acres.

   Problem: 40 square rods = ____ acres

   We know that 160 square rods = 1 acre.

   So, 40/160 square rods = 0.25 acre
5. D is the right answer. Since 1 gill equals 0.25 pints, you need to multiply 0.25 by 2 to find how many pints there are in 2 gills. The answer is 0.5 pints.

   Problem: 2 gills = ____ pints
   We know that 1 gill = 0.25 pints.
   So, 2(1 gill) = 2 (0.25 pints)
   2 gills = 0.5 pints

6. B is the right answer. Since 1 gallon equals 3.785 liters, you need to multiply 3.785 by 5 to find how many liters there are in 5 gallons. The answer is 18.925 liters.

   Problem: 5 gallons = ____ liters
   We know that 1 gallon = 3.785 liters.
   So, 5(1 gallon) = 5 (3.785 liters)
   5 gallons = 18.925 liters

7. A is the right answer. Since 16 ounces equals 1 pound, you need to divide 240 by 16 to find how many pounds there are in 240 ounces. The answer is 15 pounds.

   Problem: 240 ounces = _____ pounds
   We know that 16 ounces = 1 pound.
   So, 240/16 ounces = 15 pounds

8. D is the right answer. Since 1 kilogram equals 2.205 pounds, you need to multiply 2.205 by 5 to find how many pounds there are in 5 kilograms. The answer is 11.025 pounds.

   Problem: 5 kilograms = _____ pounds
   We know that 1 kilogram = 2.205 pounds.
   So, 5(1 kilogram) = 5 (2.205 pounds)
   5 kilograms = 11.025 pounds
9. B is the right answer. Since 43,560 square feet equals 1 acre, you need to divide 217,800 by 43,560 to find how many acres there are in 217,800 square feet. The answer is 5 acres.

Problem: 217,800 square feet = _____ acres

We know that 43,560 square feet = 1 acre.
So, 217,800/ 43,560 square feet = 5 acres

10. D is the right answer. Since 1 kilometer equals 1000 meters, you need to multiply 1000 by 0.25 to find how many meters there are in 0.25 kilometers. The answer is 250 meters.

Problem: 0.25 kilometers = _____ meters

We know that 1 kilometer = 1000 meters.
So, 0.25 (1 kilometer) = 0.25 (1000 meters)
0.25 kilometer = 250 meters

11. A is the right answer. Since 10 square chains equals 1 acre, you need to divide 80 by 10 to find how many acres there are in 80 square chains. The answer is 8 acres.

Problem: 80 square chains = _____ acres

We know that 10 square chains = 1 acre.
So, 80/10 = 8 acres

12. B is the right answer. Since 1 mile/minute equals 88 feet/second, you need to multiply 88 by 0.5 to find how many feet/second there are in 0.5 mile/minute. The answer is 44 feet/second.

Problem: 0.5 mile/minute = _____ feet/second

We know that 1 mile/minute = 88 feet/second. So, 0.5 (1 mile/minute) = 0.5(88feet/second)
0.5mile/minute = 44 feet/second
The equivalents needed to solve problems 13–18 are not directly listed in the table. So, you need to use 2 equivalents with a common metric.

13. B is the right answer. In the table, there is no equivalent between quarts and gills, but the table shows that 1 pint = 0.5 quarts and 1 gill = 0.25 pints. The common metric in both equivalents is pints. So, use these 2 equivalents to find how many gills are in 30 quarts.

Problem: 30 quarts = _____gills

We know that 0.5 quarts = 1 pint. To find how many pints are in 30 quarts, divide 30 by 0.5.

This equals 60. So, 30 quarts are equivalent to 60 pints.

\[
0.5 \text{ quarts} = 1 \text{ pint} \quad 30/0.5 \text{ quarts} = 60 \text{ pints}
\]

We also know that 0.25 pints = 1 gill. To find how many gills are in 60 pints, divide 60 by 0.25.

The answer is 240. So, 30 quarts equal 240 gills.

\[
0.25 \text{ pints} = 1 \text{ gill} \quad 60/0.25 \text{ pints} = 240 \text{ gills}
\]

14. A is the right answer. In the table, there is no equivalent between grams and pounds, but the table shows that 1 kilogram = 1000 grams and 1 kilogram = 2.205 pounds. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many pounds are in 2000 grams.

Problem: 2,000 grams = _____pounds

We know that 1,000 grams = 1 kilograms. To find how many kilograms are in 2,000 grams divide 2,000 by 1,000. This equals 2. So, 2,000 grams are equivalent to 2 kilograms.

\[
1,000 \text{ grams} = 1 \text{ kilogram} \quad 2,000/1,000 \text{ grams} = 2 \text{ kilograms}
\]

We also know that 1 kilogram = 2.205 pounds. To find how many pounds are in 2 kilograms, multiply 2 by 2.205. The answer is 4.410. So, 2,000 grams equal 4.410 pounds.

\[
1 \text{ kilogram} = 2.205 \text{ pounds} \quad 2(1 \text{ kilogram}) = 2(2.205 \text{ pounds})
\]

\[
2 \text{ kilograms} = 4.410 \text{ pounds}
\]
15. C is the right answer. In the table, there is no equivalent between slugs and grams, but the table shows that 1 slug = 14.59 kilograms and 1 kilogram = 1000 grams. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many grams are in 5 slugs.

Problem: 5 slugs = _____ grams

We know that 1 slug = 14.59 kilograms. To find how many kilograms are in 5 slugs, multiply 14.59 by 5. This equals 72.95. So, 5 slugs are equivalent to 72.95 kilograms.

\[
\begin{align*}
1 \text{ slug} &= 14.59 \text{ kilograms} \\
5(1 \text{ slug}) &= 3(14.59 \text{ kilograms}) \\
5 \text{ slugs} &= 72.95 \text{ kilograms}
\end{align*}
\]

We also know that 1 kilogram = 1000 grams. To find how many grams are in 72.95 kilograms, multiply 72.95 by 1000. The answer is 72,950. So, 5 slugs equal 72,950 grams.

\[
\begin{align*}
1 \text{ kilogram} &= 1000 \text{ grams} \\
72.95(1 \text{ kilogram}) &= 72.95(1000 \text{ grams}) \\
72.95 \text{ kilograms} &= 72950 \text{ grams}
\end{align*}
\]

16. A is the right answer. In the table, there is no equivalent between square chains and square feet but the table shows that 1 acre = 10 square chains and 1 acre = 43,560 square feet. The common metric in both equivalents is acre. So, you need to use these 2 equivalents to find how many square feet are in 15 square chains.

Problem: 15 square chains = _____ square feet

We know that 1 acre equals = 10 square chains. To find how many acres are in 15 square chains, divide 15 by 10. This equals 1.5. So, 15 square chains is equivalent to 1.5 acres.

\[
\begin{align*}
10 \text{ square chains} &= 1 \text{ acre} \\
15/10 &= 1.5 \text{ acres}
\end{align*}
\]

We also know that 1 acre equals 43,560 square feet. To find how many square feet are in 1.5 acres, multiply 1.5 by 43,560 square feet. The answer is 65,340. So, 15 square chains equal 65,340 square feet.

\[
\begin{align*}
1 \text{ acre} &= 43,560 \text{ square feet} \\
1.5 (1 \text{ acre}) &= 1.5(43,560 \text{ square feet}) \\
1.5 \text{ acres} &= 65,340 \text{ square feet}
\end{align*}
\]
17. D is the right answer. In the table, there is no equivalent between miles and fathoms, but the table shows that 1 mile = 5,280 feet and 1 fathom = 6 feet. The common metric in both equivalents is feet. So, you need to use these 2 equivalents to find how many fathoms are in 3 miles.

Problem: 3 miles = _____ fathoms

We know that 1 mile equals 5,280 feet. To find how many feet are in 3 miles, multiply 3 by 5,280. This equals 15,840. So, 3 miles is equivalent to 115,840 feet.

\[ 1 \text{ mile} = 5,280 \text{ feet} \]
\[ 3(1\text{ mile}) = 3(5,280 \text{ feet}) \]
\[ 3 \text{ miles} = 15,840 \text{ feet} \]

We also know that 1 fathom equals 6 feet. To find how many fathoms are in 15,840 feet divide 15,840 by 6. The answer is 2,640. So, 3 miles equals 2,640 fathoms.

6 feet = 1 fathom
\[ 15,840/6 = 2,640 \text{ fathoms} \]

18. A is the right answer. In the table, there is no equivalent between chains and furlongs, but the table shows that 0.25 chains = 1 rod and 40 rods = 1 furlong. The common metric in both equivalents is rods. So, you need to use these 2 equivalents to find how many furlongs are in 30 chains.

Problem: 30 chains = ____ furlongs

We know that 0.25 chains equal = 1 rod. To find how many rods are in 30 chains, divide 30 by 0.25. This equals 120. So, 30 chains is equivalent to 120 rods.

0.25 chains = 1 rod
\[ 30/0.25 \text{ chains} = 120 \text{ rods} \]

We also know that 40 rods equals 1 furlong. To find how many furlongs are in 120 rods, divide 120 by 40. The answer is 3. So, 30 chains is equivalent to 3 furlongs.

40 rods = 1 furlong
\[ 120/40 \text{ rods} = 3 \text{ furlongs} \]

19. C is the right answer. Since 1 yard equals 36 inches, you need to multiply 36 by 3 to find how many inches there are in 3 yards. The answer is 108 inches.

Problem: 3 yards = _____ inches

We know that 1 yard = 36 inches. So, 3(1 yard) = 3 (36 inches)
\[ 3 \text{ yards} = 108 \text{ inches} \]
PRACTICE TEST
for
ASSEMBLY

THIS TEST MIMICS THE STYLE OF TEST FOR ASSEMBLY USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING FOR THE ASSEMBLY TEST

The Plant Operator Selection System (POSS) includes a test for Assembly. Assembly involves reviewing parts and their assembly instruction in order to put the parts together in the correct manner.

To help you prepare, a practice test follows designed so you may practice correctly matching unassembled parts, with how they would look as assembled, within a suggested time limit of five (5) minutes.

For each of the total of nine (9) questions you answer, there will be five (5) possible answers. Carefully review the instructions before beginning this test, and then set a timer for five (5) minutes. You should be able to answer all nine (9) assembly problems within this time.

Practicing taking this type of test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by taking the complete test with all nine questions
- Be sure to set a timer before beginning each part
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions
ASSEMBLY

HOW TO TAKE THIS TEST

These instructions provide an example using two examples, shown below in Figures 1 and 2:

Figure 1 shows a prism with two surfaces marked. One is marked B, referring to the end of the prism while the other is marked C pointing to one of the six long sides of the prism.

Each test problem presents a total of four (4) objects that could be similar to this one, with each object having one or more surfaces or edges marked by a letter. Your job is to match the surfaces and/or edges with the same letters to complete the assembly. Figure 2 looks like a real test question. When you determine how the final assembly will look it will match one of the five possible answers, numbered 1 through 5. Fill in the number of the assembly that is correct.

A step-by-step approach may work better than attempting to visualize the actual assembly. You may find it helpful to look at how the letters should match, but also consider where they obviously do not.

In Figure 2, try matching up the letter A on two objects. For example, letter A points to one edge of the upside down wedge. However, it does not point to the edge having the circular cutout. Letter A also points to the long edge along the bottom of a rectangular block. With this information in mind, evaluate the possible answers. Answer 1 has a correct match for Letter A. Answer 2 does not. Answer 3 has a correct match for Letter A. Answer 4 and 5 do not. So at this point, you may rule out Answers 2, 4 and 5. The remaining possible answers are 1 and 3.

Now consider how the letter B should match in this example. In both 1 and 3, the match for B is possible. Move on to letter C. Answer 1 does not match the bottom of the cone against the side of the wedge. Answer 3; however, does.

In this example, the correct answer to mark is Answer 3.
ASSEMBLY PRACTICE TEST

1.

2.

3.

4.
Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is picture #2. Look at the ends marked A. If the ends marked A were put together, how would they look? Of the five pictures, only pictures 1, 2 and 3 have the ends marked A touching. Now look at the places marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three pictures, only picture 2 has the places marked B touching. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

2. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 3 and 4 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 3 and 4 show that the two places marked B are put together? Of the two pictures 3 and 4, only picture 4 has the places marked B touching. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

3. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 2, 3 and 4 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 1, 2, 3 and 4 show that the two places marked B are put together? Of the four pictures 1, 2, 3 and 4, only picture 2 does not have the places marked B touching. Now look at the places marked with a C. Which of the remaining pictures 1, 3 and 4 show that the two places marked C are put together? Of the three pictures 1, 3 and 4, only picture 4 has the places marked C touching. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

4. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 3 and 4 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 3 and 4 show that the two places marked B are put together? Of the two pictures 3 and 4, only picture 4 has the places marked B touching. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

5. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 3 and 5 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 3 and 5 show that the two places marked B are put together? Of the two pictures 3 and 5, only picture 5 has the places marked B touching. This assembly problem is tricky because the circular part marked B on its inner circle is viewed directly from its side in picture 5. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

6. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 3 and 4 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 3 and 4 show that the two places marked B are put together? Of the two pictures 3 and 4, both pictures have the places marked B touching. Now look at the places marked with a C. Which of the pictures 3 and 4 show that the two places marked with a C are put together? Of the two pictures 3 and 4, only picture 4 has the two places marked with a C touching. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.
7. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 2, and 3 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three pictures 1, 2 and 3, pictures 1 and 2 both have the places marked B touching. Now look at the places marked with a C. Of the two pictures 1 and 2, only picture 1 has the parts marked C touching. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

8. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 3 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 1 and 3 show that the two places marked B are put together? Of the two pictures 1 and 3, only picture 1 has the places marked B touching. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

9. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2 and 3 have the places marked A touching. Now look at the places marked with a B. Which of the pictures 2 and 3 show that the two places marked B are put together? Of the two pictures 2 and 3, only picture 2 has the places marked B touching. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.
PRACTICE TEST

for

MECHANICAL CONCEPTS

This test mimics the style of test for mechanical concepts used by the plant operator selection system (POSS).

Practice for MECHANICAL CONCEPTS

The Plant Operator Selection System (POSS) includes a test for Mechanical Concepts. Mechanical concepts seen in everyday life, can be quite simple, and yet found on the principles of physics, material properties and basic electrical properties. This test gages your ability to draw appropriate conclusions regarding mechanical principles.

To help you prepare, a practice test follows with 26 different scenarios. Each scenario gives you a picture to illustrate a particular situation. For each situation, there will be one correct answer out of the three possible answers shown. This practice test helps you to practice determining the appropriate outcome for each situation, and within a suggested time limit.

The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 13 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle your choice of A, B, or C. You should be able to answer all 26 questions within the 13-minute time limit.

Practicing by taking this test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by completing all 26 test questions
- Be sure to set a timer before beginning each part
- Do not look at the answers that follow at the end until you have completed all the test questions
MECHANICAL CONCEPTS PRACTICE TEST

1. Each truck travels at a very high rate of speed without braking, through a curve to their right side. Which truck is less likely to veer off the road while negotiating the curve (A or B)? (If equal, mark C.)

![Truck A and Truck B images]

2. In each picture shown, the tugboat tows the military ship. Assume the tugboat and military ships all weigh the same; each tugboat operates at the same power; and in both situations, the distance to port is the same. Disregarding wind, currents and tides (all things being equal), which tug and ship (A or B) is more likely to reach port the faster. (If equal, mark C.)

![Tugboat A and Ocean-going vessels images]

![Tugboat B and Inland-river vessels images]

3. Water flows, in the direction of the arrows, through the piping when the boiler flame burns. Which room, (A or B) will likely remain the hottest when the boiler operates and water continuously flows through the piping in the direction of the arrow? (If equal, mark C.)

![Water flow through piping and two rooms images]
4. Should the switch be in position (A) or position (B) for the alarm to operate? (If the alarm will operate when the switch is in either position, mark C.)

![Diagram of alarm system with switch options A and B.]

5. In view X, the lift has pushed upward on the lever to compress the spring as shown. If the lift suddenly drops, will the lever more likely move up (A) or up & down as in (B)? (If neither applies, mark C.)

![Diagram of lever system showing upward and up & down movement options A and B.]

6. The indicator attached to Gear Y points to X. Which way must Gear Z rotate (A or B) in order for the indicator to point to X as shown? (If either rotation moves the indicator to X, mark C.)

![Diagram of gear system showing rotations A and B.]

Page 84 of 191
7. An equal push at the same speed propels an identical load down each slide toward the water. Both slides orient at the same angle and height relative to the water. The surface of the slide shown in A is a smooth, and in B, it is a roller surface. Will the splash at A or B be bigger? (If equal, mark C.)

8. The outside gear X counterclockwise (in the direction of the outside arrow.) This enables the internal pinion gear to rotate. Will the shaft inside the pinion gear turn toward (A) or (B)? (If the shaft does not move, mark C.)

9. For each hot air balloon shown, the temperature inside each balloon displays on the thermometers. Based on the temperatures shown, which hot air balloon, (A or B), has the greatest internal pressure? (If equal, mark C.)
10. Light from the lamp reflects off the mirrored surface between points X and Y. Which person, (A or B) will have a better light on their display map? (If equal, mark C.)

11. The picture shows a suspended coil spring in a starting position on the left. When a load much heavier than the spring, is loaded onto the suspended plate beneath the spring, how will the spring move? Will the spring more likely behave as shown in A or B? (If neither applies, mark C.)

12. When the top gear moves counter-clockwise, will the chain around the bottom gear move in direction A or B? (If no movement, mark C.)
13. When the load applies downward upon the lever, will the ball move toward A or toward B? (If the ball remains unaffected by applying the load, mark C.)

![Diagram of lever with load and ball]

14. The drum of oil is full when filled to level A, and low when filled to level B. At which level will the pressure gage shown on the right side read the highest (A or B)? (If equal, mark C.)

![Diagram of oil drum with pressure gage]

15. The top right sprocket gear moves, when a motor activates, in the direction of the arrow. Will this movement cause the bottom sprocket gear to move counterclockwise toward A, or clockwise toward B? (If the bottom sprocket gear does not move, mark C.)

![Diagram of sprocket gears with arrows]
16. Two arrows are shot from the ground with the same force. Arrow A follows the 60° path (A). Arrow B follows the 45° path. Which arrow will obtain the greatest height before falling to the ground (A or B)? (If equal, mark C.)

17. Each picture shows the same circuit, powered by a battery, with a voltmeter and an open switch. When the switch in each picture is closed, will the voltmeter more likely register at position A or B? (If neither, mark C.)

18. Will a motor pulling at point (A) or at point (B) require more horsepower to lift the 100-pound load? (If equal, mark C.)
19. Gas enters the chamber from the pipe at X. Is gas more likely to escape from (A or B)? (If equal, mark C.)

![Diagram of gas chamber with pipes and escape routes labeled A and B.]

20. A burner heats the liquid in the glass beaker until vapor escapes from the top of the beaker. Will the liquid surface more likely register at (A) or (B) after prolonged heating? (If the surface of the liquid does not change, mark C.)

![Diagram showing a burner heating a beaker with a liquid surface at A or B.] 

21. When the laboratory flask containing water heats until the water boils and steam forms inside the beaker, will the top of the flask grow tighter by expanding, like shown in (B), or will it more likely pop off, like shown in (A)? (If A or B could happen, or if nothing will happen, mark C.)

![Diagram of a laboratory flask with a flame heating the liquid and expansion or pop-off options labeled A and B.]
22. The steamboat’s paddlewheel is turning in the direction shown. Will the steamboat move in direction A or B? (If neither, mark C.)

23. Tanks A and B contain the same type and volume of a gas. Will the laboratory technician find the pressure reading higher on Tank A or Tank B? (If equal, mark C.)

24. Car X is twice the weight of Car Y. If both cars, traveling at equal speeds hit head-on, which picture, (A or B) better represents the resulting collision? (If either could apply, mark C.)
25. An equal load is applied to each end of the lever in the direction of the arrows shown. Will the lever move up at (A), or at (B) when the loads are applied? (If the lever will not move, mark C.)

26. The lever shown is being pulled upward on the left side. Will this action create movement in the ball toward (A) or (B)? (If no movement is created, mark C.)

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is B. This question involves centripetal force, which is sometimes confused with centrifugal force. Stock car drivers know that centripetal force increases when traveling around corners during acceleration or no braking. Racetracks are purposely elevated on the outside of the curve to counteract this force.

2. The correct answer is A. This question involves water density and resistance. The tug and ship combination in A will ride higher on the water because ocean water contains salt. Salt water is denser than fresh water therefore, the tug and ship will be more buoyant on the salt water than in the ones traveling in river water. Decreased buoyancy means the tug and ship in B will ride lower, have more of its surface below water, and greater drag to overcome.

3. The correct answer is B. The boiler heats water flowing through the pipe. Cooling occurs in the water the farther it is away from the boiler. Room A is furthest away from the heat source.

4. The correct answer is B. With the switch open as shown for A, the circuit is not complete. The circuit is only completed when the switch is closed at B, allowing flow of electricity through the alarm.

5. The correct answer is B. This question has to do with forces on springs and "simple harmonic motion". If the upward force is suddenly removed, the stored energy in the compressed spring transforms back and forth between kinetic and potential energy, pushing the lever down, then up, then down, then up until all the energy is transferred into some other form.

6. The correct answer is A. This question involves how gears work. The gear adjacent to gear Z must move counterclockwise for its indicator to point to X. Therefore, gear Z needs to rotate clockwise, toward A.

7. The correct answer is B. The object will hit the water with a greater rate of speed in picture B. This is because rollers provide the least resistance to an object in motion. The bigger splash associates with an object hitting water with greater force.

8. The correct answer is B. As the pinion gear inside Gear X moves counterclockwise, the internally configured teeth of the pinion gear also moves counterclockwise. Gear X is an "internal gear" meaning that its teeth point toward its center rather than away from its center. The shaft built into the pinion gear will move the same direction as the pinion gear, counterclockwise.

9. The correct answer is B. The pressure of a gas inside a container, such as a balloon, increases as its temperature increases. This means that the pressure exerted on the inside of the balloon is proportional to the temperature of the heated air. Since the temperature is greater for Hot Air Balloon B, it has the greatest internal pressure inside the balloon.

10. The correct answer is A. This question involves light rays and reflective surfaces. Imagine an identical lamp mirrored on the opposite side of the reflective surface from the lamp shown. Imaginary light from the imaginary lamp would also hit the surface between points X and Y. This path identifies the direction of the path that the real reflected light will travel.

11. The correct answer is A. When a spring is loaded it will stretch toward the direction the load is applied.
12. The correct answer is B. This question involves how gears perform work. Look at the chain around the top gear. When the top gear moves counterclockwise, the chain moves counterclockwise as well. The chain will continue in the counterclockwise direction all the way around the bottom gear. This means the chain will go down towards A (not up at A) and up towards B as the arrow at B shows.

13. The correct answer is A. This question involves levers. A lever is a simple machine that uses an immovable point of support called a fulcrum. The load exerts a downward force on the lever that is supported by a fulcrum that can rotate. As the load is applied, the lever lowers on the side marked A. When the lever lowers on this side, it creates an incline beneath the ball. The ball will roll down, which in this case, is toward side A.

14. The correct answer is A. This question involves fluid pressure. As the depth of the fluid increases, its pressure increases. The pressure in the drum increases when filled with more oil.

15. The correct answer is B. A moving gear rotates the gear aside it in the opposite direction. When the top right sprocket gear moves counterclockwise as shown by the arrow, the bottom gear will move clockwise in direction B.

16. The correct answer is A. This question involves trajectory, which is the curved path an object will take when launched. Gravitational forces cause the object to return to the ground. At each arrow's maximum height, the velocity of the arrow will be zero. Treating the ground as the X-axis and the height as the Y-axis, you can break the trajectory into two components of motion - an X direction or range, and a Y direction or range. The Y height obtained for a 60° launch is always greater than the Y height obtained for a 45° launch.

17. The correct answer is B. The circuit is completed when the switch is closed, allowing flow of electricity. The voltmeter will register electricity when it flows. In position A, the voltmeter registers no electrical power flowing in the circuit.

18. The correct answer is B. This question involves pulleys. At point A, the weight the motor must lift is 100 pounds. In the case of point B, the additional pulleys are not oriented to decrease the work for the motor, and in fact, add friction resistance to the load.

19. The correct answer is A. This question involves forces caused by fluid pressure that keep things, including gas bubbles afloat. The gas pumped in from the pipe at X is a vapor. A vapor form that becomes trapped in a liquid creates pockets of gas that we know as gas bubbles. As the gas enters and breaks into bubbles, it displaces (takes the place of) the liquid in the container. The gas bubble has a weight and the liquid that it displaces also has a weight. The buoyancy force is upward and equal to the weight of the fluid displaced. In this case, the pipe exiting at B is filled with liquid and anything moving through the pipe at B would be moving downward.

20. The correct answer is B. As a liquid changes to vapor form, the volume of liquid decreases. Less volume of liquid means, the surface of the liquid will be lower in the beaker.

21. The correct answer is A. Pressure builds inside the flask as the water heats and turns to steam. This is because steam is a gas that expands inside the flask, creating a pressure vessel with the potential to explode as steam builds.

22. The correct answer is A. Rotation of the paddle wheel produces thrust, forward or backward as required. In this case, the boat pointed toward B, but the paddle wheel is rotating toward A, which moves the boat in that direction.
23. The correct answer is B. This question involves the behavior of gases. Placing the same volume of gas into a smaller container increases the pressure created by the gas against the sides of the container.

24. The correct answer is A. When an object with greater mass hits an object with less mass, the result is that the object with greater mass moves less than the object with less mass.

25. The correct answer is A. This question involves how levers and fulcrums work. Look at how the lever is balanced over the fulcrum support. The lever extends further toward B, than it does toward A. The greater the distance between the end of the lever and its support point, the greater the impact of the force (moment). Side A of the lever has less force effect than side B with the application of the force on each end. This upsets the balance of the lever, causing the side with the greatest force effect to move down and the other side to move up at A.

26. The correct answer is B. This question involves the potential momentum of an object. As the lever is pulled upward on its left side, the right side of the lever travels downward. The lever will graze the ball shown, transferring energy to the ball propelling it toward B.
PRACTICE TEST
for
TABLES AND GRAPHS
includes
PART I - TABLES
PART II - GRAPHS

THIS TEST MIMICS THE STYLE OF TEST FOR TABLES AND GRAPHS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING WITH TABLES AND GRAPHS

The Plant Operator Selection System (POSS) includes tests for tables and graphs.

To help you prepare, a two-part practice test follows. Each part is designed so you may practice correctly interpreting tables and graphs within a suggested time limit.

**Part I** concerns reading tables that are similar in design to multiplication tables. The questions you answer will be multiple-choice and depend upon you accurately choosing answers (values or information) from the table. Carefully review the instructions before beginning this part, and then set a timer for three (3) minutes. You should be able to answer all 24 questions within this time.

**Part II** checks your ability to interpret charts with graphed information. In this part, you are also presented a choice of possible answers. Carefully review the instructions before beginning this part, and then set a timer for two (2) minutes. You should be able to read the instructions and answer all 14 questions within this time.

Practicing taking these tests will familiarize you with the style of the real selection tests. To create conditions most like a real test:

- Practice by taking Part I and Part II tests, together one after the other
- Be sure to set a timer before beginning each part
- Do not look at the answers until you have completed all the test questions
These instructions provide an example using the sample Table A, shown below:

**Table A**

<table>
<thead>
<tr>
<th>Convector Length in Inches</th>
<th>Temperature of Forced Hot Water at Degrees Fahrenheit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>180°F</td>
</tr>
<tr>
<td>16</td>
<td>1700.3</td>
</tr>
<tr>
<td>20</td>
<td>2280.7</td>
</tr>
<tr>
<td>24</td>
<td>2810.6</td>
</tr>
</tbody>
</table>

Table A gives you information about the heating output of standard sized radiant convection piping (note the title of the table), as measured in BTU per Hr (BTU/HR), for certain conditions. The conditions are determined by the values in the first column on the left side, which shows the length of the radiant convector, in inches. The top row shows how the BTU output varies depending on the temperature, measure in degrees Fahrenheit (°F) of the water being forced through the standard radiant convector.

For example, for a convector with a length of 20 inches and containing water at 185°F, read across from 20 and down from 185. In this case, the heat output will be 2330.0 BTU/HR.

<table>
<thead>
<tr>
<th>Convector Length in Inches</th>
<th>Temperature of Forced Hot Water at Degrees Fahrenheit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>180°F</td>
</tr>
<tr>
<td>16</td>
<td>1700.3</td>
</tr>
<tr>
<td>20</td>
<td>2280.7</td>
</tr>
<tr>
<td>24</td>
<td>2810.6</td>
</tr>
</tbody>
</table>

Now consider a sample problem on the next page that rearranges the information somewhat:
In the table shown above, the two left-hand columns are Convector Length and Hot Water Temperature. In the row shown, the Convector Length is 24 and the hot water temperature is 185. Refer back to the Table A, read across from 24, and down from 185. See below for how this is done.

Now you see that 2820.6 is the correct BTU output for the radiant convector. Therefore, in this case, you completely fill the circle to the right of 2820.6 to show this is the correct answer:
BEGIN TEST PART I

Table I is the reference information for the test questions built into a different table on the next page. Completing the table on the next page requires looking up 24 sets of information from Table I. The suggested time limit to answer all 24 questions is three (3) minutes. To answer each test question, refer to Table I. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

Table I

<table>
<thead>
<tr>
<th>Convector Length in Inches</th>
<th>Temperature of Forced Hot Water at Degrees Fahrenheit</th>
<th>180°</th>
<th>185°</th>
<th>190°</th>
<th>195°</th>
<th>200°</th>
<th>205°</th>
<th>210°</th>
<th>215°</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td></td>
<td>1700.3</td>
<td>1897.8</td>
<td>2040.3</td>
<td>2130.7</td>
<td>2170.0</td>
<td>2846.7</td>
<td>3523.3</td>
<td>4200.0</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>2280.7</td>
<td>2330.0</td>
<td>2480.0</td>
<td>2780.6</td>
<td>2840.0</td>
<td>3426.7</td>
<td>4013.3</td>
<td>4600.6</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>2810.6</td>
<td>2820.6</td>
<td>2800.0</td>
<td>2800.0</td>
<td>2800.0</td>
<td>2800.0</td>
<td>2800.0</td>
<td>2800.0</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td>3480.3</td>
<td>3530.0</td>
<td>3750.3</td>
<td>3840.0</td>
<td>4340.0</td>
<td>4860.6</td>
<td>5380.0</td>
<td>5900.3</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>2950.8</td>
<td>3635.6</td>
<td>3635.6</td>
<td>3635.6</td>
<td>3635.6</td>
<td>3635.6</td>
<td>3635.6</td>
<td>3635.6</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>3700.3</td>
<td>3973.3</td>
<td>3973.3</td>
<td>3973.3</td>
<td>3973.3</td>
<td>3973.3</td>
<td>3973.3</td>
<td>3973.3</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>4200.0</td>
<td>4480.2</td>
<td>4670.2</td>
<td>5230.0</td>
<td>6430.0</td>
<td>6720.0</td>
<td>7010.6</td>
<td>7300.0</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>4369.0</td>
<td>4558.3</td>
<td>4910.0</td>
<td>5670.0</td>
<td>7260.6</td>
<td>7406.7</td>
<td>4937.8</td>
<td>7700.3</td>
</tr>
<tr>
<td>48</td>
<td></td>
<td>5071.1</td>
<td>5315.6</td>
<td>4880.5</td>
<td>5810.0</td>
<td>7760.0</td>
<td>7973.3</td>
<td>5315.6</td>
<td>8400.0</td>
</tr>
<tr>
<td>56</td>
<td></td>
<td>5150.0</td>
<td>5457.8</td>
<td>5620.0</td>
<td>6090.0</td>
<td>7930.2</td>
<td>8186.7</td>
<td>5457.8</td>
<td>8700.6</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>5820.5</td>
<td>5440.5</td>
<td>6440.3</td>
<td>6977.5</td>
<td>7980.0</td>
<td>8420.3</td>
<td>8510.7</td>
<td>9300.8</td>
</tr>
<tr>
<td>64</td>
<td></td>
<td>6220.0</td>
<td>6745.0</td>
<td>6830.0</td>
<td>7720.0</td>
<td>8120.3</td>
<td>8580.0</td>
<td>9260.0</td>
<td>9500.1</td>
</tr>
<tr>
<td>68</td>
<td></td>
<td>6960.3</td>
<td>7200.3</td>
<td>7870.7</td>
<td>8030.5</td>
<td>8270.6</td>
<td>8913.3</td>
<td>10100.3</td>
<td>10200.0</td>
</tr>
<tr>
<td>72</td>
<td></td>
<td>7070.2</td>
<td>8180.0</td>
<td>8180.3</td>
<td>8570.0</td>
<td>9200.3</td>
<td>10166.7</td>
<td>10500.6</td>
<td>12100.3</td>
</tr>
<tr>
<td>76</td>
<td></td>
<td>8260.0</td>
<td>8440.3</td>
<td>9240.9</td>
<td>9380.1</td>
<td>9640.8</td>
<td>11026.7</td>
<td>11520.0</td>
<td>13800.3</td>
</tr>
<tr>
<td>Convector Length in Inches</td>
<td>Hot Water Temperature in °F</td>
<td>Standard Radiant Convector Heating Output in BTU per HR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>185</td>
<td>3530.0 $\circ$</td>
<td>12100.3 $\circ$</td>
<td>5670.0 $\circ$</td>
<td>4480.2 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>190</td>
<td>5620.0 $\circ$</td>
<td>4910.0 $\circ$</td>
<td>8270.6 $\circ$</td>
<td>3530.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>205</td>
<td>8913.3 $\circ$</td>
<td>4480.2 $\circ$</td>
<td>5960.8 $\circ$</td>
<td>4880.5 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>200</td>
<td>6720.0 $\circ$</td>
<td>9640.8 $\circ$</td>
<td>3635.6 $\circ$</td>
<td>3080.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>195</td>
<td>8030.5 $\circ$</td>
<td>3840.0 $\circ$</td>
<td>3090.5 $\circ$</td>
<td>7930.2 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>205</td>
<td>6745.0 $\circ$</td>
<td>4369.0 $\circ$</td>
<td>7720.0 $\circ$</td>
<td>11026.7 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>200</td>
<td>2780.6 $\circ$</td>
<td>5670.0 $\circ$</td>
<td>7760.0 $\circ$</td>
<td>4013.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>205</td>
<td>3523.3 $\circ$</td>
<td>4369.0 $\circ$</td>
<td>7973.3 $\circ$</td>
<td>13800.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>200</td>
<td>1897.8 $\circ$</td>
<td>5457.8 $\circ$</td>
<td>6330.0 $\circ$</td>
<td>4930.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>215</td>
<td>7010.6 $\circ$</td>
<td>10200.0 $\circ$</td>
<td>2780.6 $\circ$</td>
<td>7406.7 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>195</td>
<td>3090.5 $\circ$</td>
<td>7406.7 $\circ$</td>
<td>2846.7 $\circ$</td>
<td>7980.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>190</td>
<td>4560.2 $\circ$</td>
<td>8120.3 $\circ$</td>
<td>4880.5 $\circ$</td>
<td>2040.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>215</td>
<td>8580.0 $\circ$</td>
<td>3700.3 $\circ$</td>
<td>4200.0 $\circ$</td>
<td>8120.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>210</td>
<td>8440.3 $\circ$</td>
<td>6220.0 $\circ$</td>
<td>7930.2 $\circ$</td>
<td>5457.8 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>180</td>
<td>3480.3 $\circ$</td>
<td>3530.0 $\circ$</td>
<td>4910.0 $\circ$</td>
<td>2040.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>190</td>
<td>9300.8 $\circ$</td>
<td>3840.0 $\circ$</td>
<td>4860.6 $\circ$</td>
<td>8180.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>200</td>
<td>1897.8 $\circ$</td>
<td>8580.0 $\circ$</td>
<td>4910.0 $\circ$</td>
<td>7260.6 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>185</td>
<td>6745.0 $\circ$</td>
<td>10500.6 $\circ$</td>
<td>2810.6 $\circ$</td>
<td>2810.6 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>210</td>
<td>4340.0 $\circ$</td>
<td>4013.3 $\circ$</td>
<td>3840.0 $\circ$</td>
<td>6960.3 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>205</td>
<td>6430.0 $\circ$</td>
<td>11520.0 $\circ$</td>
<td>4860.6 $\circ$</td>
<td>10200.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>195</td>
<td>3840.0 $\circ$</td>
<td>6090.0 $\circ$</td>
<td>6977.5 $\circ$</td>
<td>3530.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>180</td>
<td>8570.0 $\circ$</td>
<td>5315.6 $\circ$</td>
<td>5150.0 $\circ$</td>
<td>6700.8 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>210</td>
<td>5453.3 $\circ$</td>
<td>6440.5 $\circ$</td>
<td>6745.0 $\circ$</td>
<td>10500.6 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>190</td>
<td>6430.0 $\circ$</td>
<td>2040.3 $\circ$</td>
<td>2780.6 $\circ$</td>
<td>6830.0 $\circ$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
These instructions provide an example using the sample graph, above, titled "Labor SF/HR Coverage using Various Paint Finishes." The surface area that a laborer can cover with a finish differs depending on the line read on the graph. In this graph example, there are four possible paint finishes:

- 2nd Coat shown by a line with square marks
- 1st Coat, shown by a line with triangular marks
- Sealer Coat, shown by a line with dot marks
- Single Coat, shown by a line with diamond marks

Each paint finish has its own rate for the SF/HR applied and SF/Gallon yielded. The test evaluates your ability to read the graph and select correct values for two types of tables.

For the first table type, consider this example:

A paint application of 200 SF/HR and (yield) of SF/Gallon coverage match at the line with the dotted marks. Read across from 200 and up from 350. In this case, the type of paint finish yielding 350 SF/gallon while applied at a rate of 200 SF/HR is the sealer coat.

As you can see, the answer for sealer coat has been darkened.
For the second table type, consider this example that rearranges the information somewhat:

The two left-hand columns are yield coverage in SF/Gallon and Type of Paint Finish. In the row shown, the yield coverage in SF/Gallon is 325 and the Type of Paint Finish is the 1st Coat. Refer back to the graph and read up from 325 until the line representing the 1st Coat is intersected. From the point of intersection, follow the horizontal line to the left to read the SF coverage per hour. Note that each horizontal line marks 10 SF.

As you can see, the answer for 100 SF has been darkened.

<table>
<thead>
<tr>
<th>Coverage (yield) in SF/Gallon</th>
<th>Type of Paint Finish</th>
<th>SF/HR Coverage per Paint Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>325</td>
<td>1st Coat</td>
<td>210 ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 ●</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>190 ○</td>
</tr>
</tbody>
</table>
BEGIN TEST PART II

The graph shown is the reference information for the test questions built into the two tables that follow. Completing the tables requires looking up 14 sets of information from the graph. The suggested time limit to answer all 14 questions is two (2) minutes. To answer each test question, refer to the graph. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

### Labor SF/HR Coverage using Various Paint Finishes

![Graph showing SF/HR coverage for different paint finishes.]

<table>
<thead>
<tr>
<th>SF/HR Coverage per Paint Finish</th>
<th>Coverage (yield) in SF/Gallon</th>
<th>Single Coat</th>
<th>Sealer Coat</th>
<th>1st Coat</th>
<th>2nd Coat</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>400</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>250</td>
<td>600</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>135</td>
<td>325</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>200</td>
<td>500</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>40</td>
<td>250</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>190</td>
<td>450</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>100</td>
<td>325</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coverage (yield) in SF/Gallon</th>
<th>Type of Paint Finish</th>
<th>SF/HR Coverage per Paint Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>1st Coat</td>
<td>210 O</td>
</tr>
<tr>
<td>600</td>
<td>Sealer Coat</td>
<td>165 O</td>
</tr>
<tr>
<td>325</td>
<td>1st Coat</td>
<td>200 O</td>
</tr>
<tr>
<td>500</td>
<td>2nd Coat</td>
<td>185 O</td>
</tr>
<tr>
<td>250</td>
<td>Sealer Coat</td>
<td>130 O</td>
</tr>
<tr>
<td>275</td>
<td>Single Coat</td>
<td>45 O</td>
</tr>
<tr>
<td>325</td>
<td>2nd Coat</td>
<td>100 O</td>
</tr>
</tbody>
</table>

Answers with explanations begin on the next page.
### ANSWERS FOR PART I - TABLES

<table>
<thead>
<tr>
<th>Convecter Length in Inches</th>
<th>Hot Water Temperature in °F</th>
<th>Standard Radiant Convector Heating Output in BTU per HR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>40</td>
<td>185</td>
<td>3530.0</td>
</tr>
<tr>
<td>44</td>
<td>190</td>
<td>5620.0</td>
</tr>
<tr>
<td>36</td>
<td>205</td>
<td>8913.3</td>
</tr>
<tr>
<td>76</td>
<td>200</td>
<td>6720.0</td>
</tr>
<tr>
<td>68</td>
<td>195</td>
<td>8030.5</td>
</tr>
<tr>
<td>76</td>
<td>205</td>
<td>6745.0</td>
</tr>
<tr>
<td>48</td>
<td>200</td>
<td>2780.6</td>
</tr>
<tr>
<td>48</td>
<td>205</td>
<td>3523.3</td>
</tr>
<tr>
<td>32</td>
<td>200</td>
<td>1897.8</td>
</tr>
<tr>
<td>68</td>
<td>215</td>
<td>7010.6</td>
</tr>
<tr>
<td>24</td>
<td>195</td>
<td>3090.5</td>
</tr>
<tr>
<td>48</td>
<td>190</td>
<td>4560.2</td>
</tr>
<tr>
<td>16</td>
<td>215</td>
<td>8580.0</td>
</tr>
<tr>
<td>56</td>
<td>210</td>
<td>8440.3</td>
</tr>
<tr>
<td>28</td>
<td>180</td>
<td>3480.3</td>
</tr>
<tr>
<td>72</td>
<td>190</td>
<td>9300.8</td>
</tr>
<tr>
<td>44</td>
<td>200</td>
<td>1897.8</td>
</tr>
<tr>
<td>64</td>
<td>185</td>
<td>6745.0</td>
</tr>
<tr>
<td>20</td>
<td>210</td>
<td>4340.0</td>
</tr>
<tr>
<td>28</td>
<td>205</td>
<td>6430.0</td>
</tr>
<tr>
<td>60</td>
<td>195</td>
<td>3840.0</td>
</tr>
<tr>
<td>56</td>
<td>180</td>
<td>8570.0</td>
</tr>
<tr>
<td>72</td>
<td>210</td>
<td>5453.3</td>
</tr>
<tr>
<td>16</td>
<td>190</td>
<td>6430.0</td>
</tr>
</tbody>
</table>
# ANSWERS FOR PART II GRAPHS

<table>
<thead>
<tr>
<th>SF/HR Coverage per Paint Finish</th>
<th>Coverage (yield) in SF/Gallon</th>
<th>Single Coat</th>
<th>Sealer Coat</th>
<th>1st Coat</th>
<th>2nd Coat</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>400</td>
<td>O</td>
<td>●</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>250</td>
<td>600</td>
<td>O</td>
<td>O</td>
<td>●</td>
<td>O</td>
</tr>
<tr>
<td>135</td>
<td>325</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>●</td>
</tr>
<tr>
<td>200</td>
<td>500</td>
<td>O</td>
<td>●</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>40</td>
<td>250</td>
<td>●</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>190</td>
<td>450</td>
<td>O</td>
<td>O</td>
<td>●</td>
<td>O</td>
</tr>
<tr>
<td>100</td>
<td>325</td>
<td>O</td>
<td>O</td>
<td>●</td>
<td>O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coverage (yield) in SF/Gallon</th>
<th>Type of Paint Finish</th>
<th>SF/HR Coverage per Paint Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>1st Coat</td>
<td>210 ○ 130 ○ 125 ○ 200 ○ 190 ●</td>
</tr>
<tr>
<td>600</td>
<td>Sealer Coat</td>
<td>165 ○ 225 ● 190 ○ 145 ○ 185 ○</td>
</tr>
<tr>
<td>325</td>
<td>1st Coat</td>
<td>200 ○ 185 ○ 130 ○ 100 ● 260 ○</td>
</tr>
<tr>
<td>500</td>
<td>2nd Coat</td>
<td>185 ○ 225 ○ 210 ● 170 ○ 190 ○</td>
</tr>
<tr>
<td>250</td>
<td>Sealer Coat</td>
<td>130 ○ 90 ● 190 ○ 200 ○ 165 ○</td>
</tr>
<tr>
<td>275</td>
<td>Single Coat</td>
<td>45 ● 130 ○ 250 ○ 200 ○ 190 ○</td>
</tr>
<tr>
<td>325</td>
<td>2nd Coat</td>
<td>100 ○ 260 ○ 210 ○ 190 ○ 135 ●</td>
</tr>
</tbody>
</table>
Use this table to solve problems 1 through 19. For each problem, circle the letter that corresponds to the correct answer. Circle “e” for “none” if none of the answers are right.

It should take you about 8 minutes to complete.

<table>
<thead>
<tr>
<th>1 yard = 36 inches</th>
<th>1 pound = 16 ounces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mile/minute = 88 feet/second</td>
<td>1 gallon = 3.785 liters</td>
</tr>
<tr>
<td>1 acre = 10 square chains</td>
<td>1 gill = 0.25 pints</td>
</tr>
<tr>
<td>1 kilometer = 1000 meters</td>
<td>160 square rods = 1 acre</td>
</tr>
<tr>
<td>1 acre = 43,560 square feet</td>
<td>1 slug = 14.59 kilograms</td>
</tr>
<tr>
<td>1 hand = 10 centimeters</td>
<td>1 hogshead = 63 gallons</td>
</tr>
<tr>
<td>1 kilogram = 1000 grams</td>
<td>1 rod = 0.25 chains</td>
</tr>
<tr>
<td>1 kilogram = 2.205 pounds</td>
<td>40 rods = 1 furlong</td>
</tr>
<tr>
<td>1 mile = 5,280 feet</td>
<td>1 pint = 0.5 quarts</td>
</tr>
<tr>
<td>1 fathom = 6 feet</td>
<td></td>
</tr>
</tbody>
</table>

1) 5 gallons = ____ liters
   a. 16.752     b. 18.925     c. 15     d. 8     e. None

2) 2 gills = ____ pints
   a. 2.5     b. 3     c. 0.8     d. 0.5     e. None

3) 40 square rods = ____ acres
   a. 2     b. 0.25     c. 12     d. 20     e. None

4) 6 slugs = ____ kilograms
   a. 53.78     b. 64     c. 87.54     d. 83     e. None

5) 8 hogsheads = ____ gallons
   a. 185     b. 504     c. 207     d. 115.5e. None

6) 25 quarts = ____ pints
   a. 12.5     b. 100     c. 15     d. 50     e. None
Mathematical Usage Test #3

7) 3 yards = _____ inches
   a. 36  b. 12  c. 108  d. 72  e. None

8) 0.5 mile/minute = _____ feet/second
   a. 88  b. 44  c. 22  d. 176  e. None

9) 80 square chains = _____ acres
   a. 8  b. 0.8  c. 20  d. 40  e. None

10) 0.25 kilometers = _____ meters
    a. 25  b. 125  c. 500  d. 250  e. None

11) 217,800 square feet = _____ acres
     a. 2  b. 5  c. 3  d. 10  e. None

12) 5 kilograms = _____ pounds
     a. 50  b. 112.5  c. 500  d. 11.025  e. None

13) 15 square chains = ____ square feet
     a. 65,340  b. 7,225  c. 49,560  d. 58,870  e. None

14) 3 miles = ____ fathoms
     a. 1,325  b. 560  c. 2,685  d. 2,640  e. None

15) 30 quarts = ____ gills
     a. 125.5  b. 240  c. 150  d. 27  e. None

16) 5 slugs = ____ grams
     a. 5,689  b. 8,473  c. 72,950  d. 4,750  e. None

17) 30 chains = ____ furlongs
     a. 3  b. 5  c. 30  d. 14  e. None

18) 2000 grams = ____ pounds
     a. 4,410  b. 13.9  c. 7.43  d. 0.8  e. None

19) 240 ounces = ____ pounds
     a. 15  b. 2  c. 10  d. 22  e. None

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. B is the right answer. Since 1 gallon equals 3.785 liters, you need to multiply 3.785 by 5 to find how many liters there are in 5 gallons. The answer is 18.925 liters.

   Problem: 5 gallons = ____ liters

   We know that 1 gallon = 3.785 liters.

   So, 5(1 gallon) = 5 (3.785 liters)

   5 gallons = 18.925 liters

2. D is the right answer. Since 1 gill equals 0.25 pints, you need to multiply 0.25 by 2 to find how many pints there are in 2 gills. The answer is 0.5 pints.

   Problem: 2 gills = ____ pints

   We know that 1 gill = 0.25 pints.

   So, 2(1 gill) = 2 (0.25 pints)

   2 gills = 0.5 pints

3. B is the right answer. Since 160 square rods equal 1 acre, you need to divide 40 by 160 to find how many acres there are in 40 square rods. The answer is 0.25 acres.

   Problem: 40 square rods = ____ acres

   We know that 160 square rods = 1 acre.

   So, 40/160 square rods = 0.25 acre

4. C is the right answer. Since 1 slug equals 14.59 kilograms, you need to multiply 14.59 by 6 to find how many kilograms there are in 6 slugs. The answer is 87.54 kilograms.

   Problem: 6 slugs = ____ kilograms

   We know that 1 slug = 14.59 kilograms.

   So, 6(1 slug) = 6 (14.59 kilograms)

   6 slugs = 87.54 liters
5. B is the right answer. Since 1 hogshead equals 63 gallons, you need to multiply 63 by 8 to find how many gallons there are in 8 hogsheads. The answer is 504 gallons.

   Problem: 8 hogsheads = _____ gallons
   We know that 1 hogshead = 63 gallons.
   So, 8(1 hogshead) = 8 (63 gallons)
   8 hogsheads = 504 gallons

6. D is the right answer. Since 1 pint equals 0.5 quarts, you need to divide 25 by 0.5 to find how many pints there are in 25 quarts. The answer is 50 pints.

   Problem: 25 quarts = ____ pints
   We know 0.5 quarts equal 1 pint.
   So, 25/0.5 quarts = 50 pints

7. C is the right answer. Since 1 yard equals 36 inches, you need to multiply 36 by 3 to find how many inches there are in 3 yards. The answer is 108 inches.

   Problem: 3 yards = _____ inches
   We know that 1 yard = 36 inches.
   So, 3(1 yard) = 3 (36 inches)
   3 yards = 108 inches

8. B is the right answer. Since 1 mile/minute equals 88 feet/second, you need to multiply 88 by 0.5 to find how many feet/second there are in 0.5 mile/minute. The answer is 44 feet/second.

   Problem: 0.5 mile/minute = _____ feet/second
   We know that 1 mile/minute = 88 feet/second.
   So, 0.5 (1 mile/minute) = 0.5(88feet/second)
   0.5mile/minute = 44 feet/second
9. A is the right answer. Since 10 square chains equals 1 acre, you need to divide 80 by 10 to find how many acres there are in 80 square chains. The answer is 8 acres.

Problem: 80 square chains = _____ acres

We know that 10 square chains = 1 acre.

So, 80/10 = 8 acres

10. D is the right answer. Since 1 kilometer equals 1000 meters, you need to multiply 1000 by 0.25 to find how many meters there are in 0.25 kilometers. The answer is 250 meters.

Problem: 0.25 kilometers = _____ meters

We know that 1 kilometer = 1000 meters.

So, 0.25 (1 kilometer) = 0.25 (1000 meters)

0.25 kilometer = 250 meters

11. B is the right answer. Since 43,560 square feet equals 1 acre, you need to divide 217,800 by 43,560 to find how many acres there are in 217,800 square feet. The answer is 5 acres.

Problem: 217,800 square feet = _____ acres

We know that 43,560 square feet = 1 acre.

So, 217,800/ 43,560 square feet = 5 acres

12. D is the right answer. Since 1 kilogram equals 2.205 pounds, you need to multiply 2.205 by 5 to find how many pounds there are in 5 kilograms. The answer is 11.025 pounds.

Problem: 5 kilograms = _____ pounds

We know that 1 kilogram = 2.205 pounds.

So, 5(1 kilogram) = 5 (2.205 pounds)

5 kilograms = 11.025 pounds
The equivalents needed to solve problems 13–18 are not directly listed in the table. So, you need to use 2 equivalents with a common metric.

13. A is the right answer. In the table, there is no equivalent between square chains and square feet but the table shows that 1 acre = 10 square chains and 1 acre = 43,560 square feet. The common metric in both equivalents is acre. So, you need to use these 2 equivalents to find how many square feet are in 15 square chains.

Problem: 15 square chains = _____ square feet

We know that 1 acre equals = 10 square chains. To find how many acres are in 15 square chains, divide 15 by 10. This equals 1.5. So, 15 square chains are equivalent to 1.5 acres.

\[
10 \text{ square chains} = 1 \text{ acre} \quad 15/10 = 1.5 \text{ acres}
\]

We also know that 1 acre equals 43,560 square feet. To find how many square feet are in 1.5 acres, multiply 1.5 by 43,560 square feet. The answer is 65,340. So, 15 square chains equal 65,340 square feet.

\[
1 \text{ acre} = 43,560 \text{ square feet} \quad 1.5(1 \text{ acre}) = 1.5(43,560 \text{ square feet})
\]

1.5 acres = 65,340 square feet

14. D is the right answer. In the table, there is no equivalent between miles and fathoms, but the table shows that 1 mile = 5,280 feet and 1 fathom = 6 feet. The common metric in both equivalents is feet. So, you need to use these 2 equivalents to find how many fathoms are in 3 miles.

Problem: 3 miles = _____ fathoms

We know that 1 mile equals 5,280 feet. To find how many feet are in 3 miles, multiply 3 by 5,280. This equals 15,840. So, 3 miles is equivalent to 115,840 feet.

\[
1 \text{ mile} = 5,280 \text{ feet} \quad 3(1\text{mile}) = 3(5,280 \text{ feet})
\]

3 miles = 15,840 feet

We also know that 1 fathom equals 6 feet. To find how many fathoms are in 15,840 feet divide 15,840 by 6. The answer is 2,640. So, 3 miles equals 2,640 fathoms.

\[
6 \text{ feet} = 1 \text{ fathom} \quad 15,840/6 = 2,640 \text{ fathoms}
\]
15. B is the right answer. In the table, there is no equivalent between quarts and gills, but the table shows that 1 pint = 0.5 quarts and 1 gill = 0.25 pints. The common metric in both equivalents is pints. So, use these 2 equivalents to find how many gills are in 30 quarts.

Problem: 30 quarts = _____gills

We know that 0.5 quarts = 1 pint. To find how many pints are in 30 quarts, divide 30 by 0.5. This equals 60. So, 30 quarts are equivalent to 60 pints.

\[ \frac{30}{0.5} = 60 \text{ pints} \]

We also know that 0.25 pints = 1 gill. To find how many gills are in 60 pints, divide 60 by 0.25. The answer is 240. So, 30 quarts equal 240 gills.

\[ \frac{60}{0.25} = 240 \text{ gills} \]

16. C is the right answer. In the table, there is no equivalent between slugs and grams, but the table shows that 1 slug = 14.59 kilograms and 1 kilogram = 1000 grams. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many grams are in 5 slugs.

Problem: 5 slugs = _____ grams

We know that 1 slug = 14.59 kilograms. To find how many kilograms are in 5 slugs, multiply 14.59 by 5. This equals 72.95. So, 5 slugs are equivalent to 72.95 kilograms.

\[ 5 \text{ slugs} = 5(14.59 \text{ kilograms}) = 72.95 \text{ kilograms} \]

We also know that 1 kilogram = 1000 grams. To find how many grams are in 72.95 kilograms, multiply 72.95 by 1000. The answer is 72,950. So, 5 slugs equal 72,950 grams.

\[ 72.95 \text{ kilograms} = 72,950 \text{ grams} \]
17. A is the right answer. In the table, there is no equivalent between chains and furlongs, but the table shows that 0.25 chains = 1 rod and 40 rods = 1 furlong. The common metric in both equivalents is rods. So, you need to use these 2 equivalents to find how many furlongs are in 30 chains.

Problem: 30 chains = ____ furlongs

We know that 0.25 chains equal = 1 rod. To find how many rods are in 30 chains, divide 30 by 0.25. This equals 120. So, 30 chains is equivalent to 120 rods.

0.25 chains = 1 rod  
30/0.25 chains = 120 rods

We also know that 40 rods equals 1 furlong. To find how many furlongs are in 120 rods, divide 120 by 40. The answer is 3. So, 30 chains is equivalent to 3 furlongs.

40 rods = 1 furlong  
120/40 rods = 3 furlongs

18. A is the right answer. In the table, there is no equivalent between grams and pounds, but the table shows that 1 kilogram = 1000 grams and 1 kilogram = 2.205 pounds. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many pounds are in 2000 grams.

Problem: 2,000 grams = _____ pounds

We know that 1,000 grams = 1 kilograms. To find how many kilograms are in 2,000 grams divide 2,000 by 1,000. This equals 2. So, 2,000 grams are equivalent to 2 kilograms.

1,000 grams = 1 kilogram  
2,000/1,000 grams = 2 kilograms

We also know that 1 kilogram = 2.205 pounds. To find how many pounds are in 2 kilograms, multiply 2 by 2.205. The answer is 4.410. So, 2,000 grams equal 4.410 pounds.

1 kilogram = 2.205 pounds  
2(1 kilogram) = 2(2.205 pounds)  
2 kilograms = 4.410 pounds

19. A is the right answer. Since 16 ounces equals 1 pound, you need to divide 240 by 16 to find how many pounds there are in 240 ounces. The answer is 15 pounds.

Problem: 240 ounces = _____ pounds

We know that 16 ounces = 1 pound. So, 240/16 ounces = 15 pounds
PRACTICE TEST
for
ASSEMBLY

THIS TEST MIMICS THE STYLE OF TEST FOR
ASSEMBLY USED BY THE PLANT OPERATOR
SELECTION SYSTEM (POSS).

PRACTICING FOR THE ASSEMBLY TEST

The Plant Operator Selection System (POSS) includes a test for Assembly. Assembly involves reviewing parts and their assembly instruction in order to put the parts together in the correct manner.

To help you prepare, a practice test follows designed so you may practice correctly matching unassembled parts, with how they would look as assembled, within a suggested time limit of five (5) minutes.

For each of the total of nine (9) questions you answer, there will be five (5) possible answers. Carefully review the instructions before beginning this test, and then set a timer for five (5) minutes. You should be able to answer all nine (9) assembly problems within this time.

Practicing taking this type of test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by taking the complete test with all nine questions
- Be sure to set a timer before beginning each part
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions
HOW TO TAKE THIS TEST

These instructions provide an example using two examples, shown below in Figures 1 and 2:

Figure 1 shows a prism with two surfaces marked. One is marked B, referring to the end of the prism while the other is marked C pointing to one of the six long sides of the prism.

![Figure 1](image)

Each test problem presents a total of four (4) objects that could be similar to this one, with each object having one or more surfaces or edges marked by a letter. Your job is to match the surfaces and/or edges with the same letters to complete the assembly. Figure 2 looks like a real test question. When you determine how the final assembly will look it will match one of the five possible answers, numbered 1 through 5. Fill in the number of the assembly that is correct.

![Figure 2](image)

A step-by-step approach may work better than attempting to visualize the actual assembly. You may find it helpful to look at how the letters should match, but also consider where they obviously do not.

In Figure 2, try matching up the letter A on two objects. For example, letter A points to one edge of the upside down wedge. However, it does not point to the edge having the circular cutout. Letter A also points to the long edge along the bottom of a rectangular block. With this information in mind, evaluate the possible answers. Answer 1 has a correct match for Letter A. Answer 2 does not. Answer 3 has a correct match for Letter A. Answer 4 and 5 do not. So at this point, you may rule out Answers 2, 4 and 5. The remaining possible answers are 1 and 3.

Now consider how the letter B should match in this example. In both 1 and 3, the match for B is possible. Move on to letter C. Answer 1 does not match the bottom of the cone against the side of the wedge. Answer 3; however, does.

In this example, the correct answer to mark is Answer 3.
1. ASSEMBLY PRACTICE TEST

2.

3.

4.
Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 3 show that the two places marked B are put together? Of the two, only picture 1 has the places marked B put together. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

2. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 4 and 5 show that the two places marked B are put together? Of the three, only picture 4 has the places marked B put together. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

3. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 3, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 3, 4 and 5 show that the two places marked B are put together? Of the four, only picture 5 has the places marked B put together. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

4. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 4 and 5 can have the places marked A touching. In picture 4 you would have to be looking down (in "plan" view) and in picture 5 you would have to be looking from the side (in "elevation" view). Now look at the parts marked with a B. Which of the pictures 4 and 5 show that the two places marked B are put together? Of the two, both pictures 4 and 5 can have the places marked B put together. Now look at the parts marked with a C. Which of the pictures 4 and 5 show that the two places marked C are put together? Of the two pictures 4 and 5, only picture 4 has the places marked C put together. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

5. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 2, 3 and 4 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2, 3 and 4 show that the two places marked B are put together? Of the four, pictures 1, 2 and 3 have the places marked B put together. Now look at the parts marked with a C. Which of the pictures 1, 2 and 3 show that the two places marked C are put together? Of the three pictures 1, 2 and 3, only picture 2 has the places marked C put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

6. The correct answer is picture #3. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 2 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three, only picture 3 has the places marked B put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.
7. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 2 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2 and 5 show that the two places marked B are put together? Of the three, only picture 5 has the places marked B put together. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

8. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2 and 3 show that the two places marked B are put together? Of the two, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

9. The correct answer is picture #3. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1, 2 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three, pictures 1 and 3 have the places marked B put together. Now look at the parts marked with a C. Which of the pictures 1 and 3 show that the two places marked C are put together? Of the two pictures, 1 and 3 only picture 3 has the places marked C put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.
PRACTICE TEST

for

MECHANICAL CONCEPTS

This test mimics the style of test for mechanical concepts used by the Plant Operator Selection System (POSS).

PRACTICE for MECHANICAL CONCEPTS

The Plant Operator Selection System (POSS) includes a test for Mechanical Concepts. Mechanical concepts seen in everyday life, can be quite simple, and yet found on the principles of physics, material properties and basic electrical properties. This test gages your ability to draw appropriate conclusions regarding mechanical principles.

To help you prepare, a practice test follows with 26 different scenarios. Each scenario gives you a picture to illustrate a particular situation. For each situation, there will be one correct answer out the three possible answers shown. This practice test helps you to practice determining the appropriate outcome for each situation, and within a suggested time limit.

The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 13 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle your choice of A, B, or C. You should be able to answer all 26 questions within the 13-minute time limit.

Practicing by taking this test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by completing all 26 test questions
- Be sure to set a timer before beginning each part
- Do not look at the answers that follow at the end until you have completed all the test questions
MECHANICAL CONCEPTS PRACTICE TEST

1. The spigot (faucet) shown is turned on, allowing a slight trickle of water to begin filling tank X. Tank X connects to Tank Y with the piping as shown. The faucet is allowed to stay on until the water completely fills to the top of Tank X. By the time the water reaches the top of Tank X, will the water level in Tank Y be closer to level (A) or (B). (If either are a possibility, mark C.)

2. In each picture shown, a liquid fills a container that has a tube in the middle. If the containers and their tubes are the same size, with the same volume of liquid placed in each, and the containers are both at sea level, which container is more likely to be holding water? (If equal, mark C.)

3. When the train hits the stalled car, would it be safer to stand at location (A or B) to avoid being hit by the car if it moves? Assume the train remains on the track after the collision. (If equal, mark C.)
4. Fluid enters the pump in the direction of the arrowheads at position X. Should the internal gears of the pump turn in the direction of the dotted arrows (A) or the solid arrows (B) in order for the liquid to leave the pump at Y? (If either direction will work, mark C.)

5. Given the pulley loaded as shown, will the 50-pound load accelerate toward (A) or (B)? (If neither applies, mark C.)

6. As the train hits the stalled car, the train's brakes fail. By crashing into the car, will the train more likely slow to a stop closer to (A or B)? (If equal, mark C.)
7. A spring supports Tank X. When Tank X fills half-full, the spring compresses as shown. By addition of a second spring is added and filling the tank completely, will the springs compress as shown in (A or B)? (If equal, mark C.)

8. Does closing the switch at (A) or (B) enable the lights on the antenna to flash and warn the helicopter? (If neither, or both, mark C.)

9. For each hot air balloon shown, the thermometer displays the temperature inside the balloon. Which balloon will gain altitude more quickly (A or B)? (If equal, mark C.)
10. The dam releases water through its gates. Will water released at level A or level B jet out with less velocity? (If equal, mark C.)

11. In picture X, a 100-pound mass compresses a coil spring, while the mass attaches to Pulley A. In picture Y, a coil spring is at rest, not compressed and not stretched, but attaches to a 100-pound weight that connects to Pulley B. If Pulley A operates upon release of the spring, will it typically be easier to move the 100-pound block to the right with pulley A or pulley B? (If equal, mark C.)

12. Is more force required at (A or B) to move the 100 pound weight to the right? (If equal, mark C.)
13. The top sprocket gear moves in the direction shown. Will this movement cause the bottom sprocket gear to move counterclockwise toward A, or clockwise toward B? (If the sprocket gear does not move, mark C).

14. Water heats in the beaker until fully evaporated. Steam moves up the vertical tube and then out through the inclined chiller tube toward the beaker. As the steam moves through the chiller tube, it condenses into distilled water. Test A is one case, and uses fresh water. Test B is the second case and uses seawater. Which test will produce more distilled water (Test A or B)? (If equal, mark C.)
15. Does battery (A) or battery (B) power the double pole switch when it is closed to position X? (If either battery powers the switch when it is in position X, mark C.)

![Double Pole Switch Diagram]

16. Assuming the liquid in the container is level with the Full line and pressure readings are taken when the container is full, will the gage read a higher pressure at (A or B)? (If equal, Mark C.)

![Pressure Gage Diagram]

17. The pair of gears X and Y both move in the direction of the arrow (counterclockwise). When gears X and Y are in motion, will the pulley powered by gear Z move in the direction (A or B). (Mark C, if either direction could result.)

![Gear and Pulley Diagram]
18. Will a motor pulling at point (A) or at point (B) require more work to lift the load? In both cases, the pulleys do not move with the load. (If equal, mark C.)

19. A bottle is sealed and then transported from location A to B. At location B, the bottle begins to collapse. Is the altitude higher at location (A) or location (B)? (If equal, mark C.)

20. Bowl A and B contain the same volume of the same type of liquid. Assume the temperature of the liquid, the bowl, and the outside temperature are all the same. If so, from which bowl will evaporation occur more quickly (A) or (B)? (If equal, mark C.)
21. Each of the two staplers is used to staple together a stack of 20 pages. Stapler A has a greater distance between its open jaw and its pivot point (as shown by the dimension line). Stapler B has a smaller distance between its open jaw and its pivot point (as shown by the dimension line). Which stapler, (A or B) will require greater force applied to staple the papers, if the force is applied as shown? (If equal, mark C.)

![Force Applied at Downward Arrow](8 inches) ![Force Applied at Downward Arrow](4 inches)

22. A flask containing water is loaded onto the lever at the position shown. If the type of water is (A) sea water, or (B) fresh water, which flask moves the end of the lever further down? (If equal, mark C.)

![A](Sea Water) ![B](Fresh Water)

23. Tank A holds exactly twice the volume of Tank B. Both tanks contain the same type and mass (amount) of gas. For the pressure gage on each tank to read the same, is the temperature higher in Tank A or Tank B? (If equal, mark C.)

![A](Tank A) ![B](Tank B)
24. Gear Z moves as shown. A gage pointer attached to Gear Y indicates when it moves and in which direction. When Gear Z rotates counterclockwise, will the gage pointer attached to Gear Y move toward (A) or (B)? (If neither, mark C).

25. Consider a load applied to each end of the lever in the direction of the arrows shown. Does the load need to be heavier at (A or B) in order to keep the lever balanced? (If equal loading at each end keeps the lever from moving, mark C).

26. If the lever shown is not balanced, it will not make contact with the gears and move them. A ten-pound load sits at the left end. Will placing a ten-pound load at location (A) or (B) more likely to cause the gears to move? (If equal, mark C).

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is B. The water will drain to the lowest level before accumulating. Then the fluid surface will begin rising as more water is supplied. If the air pressure exerted on each tank is the same, the fluid will rise equally in each tank. When Tank X is full, the equivalent level in Tank Y is at mark B. The air around us exerts an equal downward pressure on each surface.

2. The correct answer is B. This question has to do with fluid density and capillary action. The density (mass/volume) of the liquid contained affects the height of the liquid column in the tube. Capillary action refers to the tendency of water to move up a narrow tube against the force of gravity. Therefore, the container B will more likely hold water.

3. The correct answer is A. This question has to do with momentum of an object. As the train hits the car, energy transfers to the car, propelling it away from the train. Note the angle of the car at the crossing. The train hits the left front fender, generating movement of the car toward B.

4. The correct answer is B. The fluid must travel clockwise around the left gear and counterclockwise around the right gear in order to exit the pump at X. When a gear moves a fluid, the fluid follows in the direction of the gear's rotation. Therefore, the gears need to move in the direction of the solid arrows as designated by B.

5. The correct answer is A. The 100-pound load represents one mass. The 50-pound load represents the other mass. The two masses are connected by a pulley (This arrangement is sometimes called an Atwood machine). The heavier mass will move down, causing the lighter mass to move up toward A.

6. The correct answer is B. This question has to do with momentum transfer. The Law of Conservation of Energy states: energy cannot be created or destroyed; it can be transformed from one form to another but the total amount of energy never changes. The energy created by a mass increases with its velocity (Force = mass times acceleration). The train hits the car at a certain speed, losing some energy transferred to the car in the collision. However, the train has significantly greater momentum to begin with and the mass of the car times its velocity creates significantly less energy than the train's. The energy before the collision equals the energy after the collision. Even after transferring some of the train's energy to the car, the train will continue moving due to its greater momentum. The train will keep going in its original direction, pushing the insignificant mass of the car down the track. Point B is the more likely stopping point.

7. The correct answer is A. This question involves springs working together in parallel. Each spring provides enough force to hold up a half-filled tank. Therefore, two springs will hold a full tank at the same level that one spring will hold a half-filled tank.

8. The correct answer is B. Closing the switch at B is required to complete the circuit through the power source.

9. The correct answer is A. This question has to do with the relationship between temperature, pressure and density of a gas - in this case, air. The pressure of a gas inside a container, such as a balloon, increases as its temperature increases. The pressure exerted on the inside of each balloon is proportional to the temperature of the heated air inside it. Since the temperature is greater for Balloon A, it has the greatest internal pressure. This also mean the air inside is less dense than the air inside Balloon B. Less dense air is also more buoyant so the balloon will rise when the air inside it is less dense than the air around it. The higher the temperature inside the balloon compared to the outside air temperature, the more quickly the balloon rises.
10. The correct answer is A. This question involves fluid pressure. As the depth of the fluid increases, its pressure increases. The pressure in the water will be greater where the water is deeper. Higher pressure will cause greater flow (velocity) through the gate of the dam. Therefore, at level A, the velocity of the water released will be less.

11. The correct answer is A. The pulley arrangement for both A and B are the same. The only difference is the compression of the spring. In picture X, the spring is compressed and storing energy that when released will assist Pulley A.

12. The correct answer is A. This question has to do with how pulleys assist work. The spring shown is the same for A and B, so the springs do not make a difference in the effort required at A or B. Pulley arrangement A does not move with the load and only reroutes the rope. Pulley B does move with the load, cutting the required effort in half. A moveable pulley requires less effort to move the load.

13. The correct answer is A. The movement of each gear causes the gear next to it to rotate in the opposite direction. The top gear rotates clockwise, the next gear counterclockwise, the next gear clockwise, and finally, the bottom gear counterclockwise.

14. The correct answer is A. This question has to do with distillation and the fact that sea water is a combination of water and minerals. Seawater is water from a sea or ocean. On average, every liter of seawater has approximately 35 grams of dissolved salts. There is less pure water to evaporate from a quantity of seawater than a quantity of fresh water.

15. The correct answer is A. When the switch connects to the wiring at position X, it completes a circuit through battery A. Battery B can only complete the circuit when the switch closes to position Y.

16. The correct answer is B. This question involves fluid pressure. As the depth of a fluid increases, its pressure increases. The pressure in the liquid will be greater at a lower depth. Therefore, the pressure will read higher at gage B.

17. The correct answer is B. When the pair of X and Y gears move counterclockwise, the gear Z moves clockwise. A belt or pulley connected to a gear will move in the same direction as the gear, in this case clockwise, toward B.

18. The correct answer is A. This question has to do with how pulleys can make work easier by reducing the force required to lift or pull a load. The pulley arrangement A is lifting a 300-pound load using pulleys that do not move with the load, but do add length of rope to the pull. The net effect is still lifting 300 pounds. In pulley arrangement B, the pulley does not lower the required force at B, but the load is smaller (175 pounds.) Therefore, more work is required to lift the load at point A.

19. The correct answer is A. This question has to do with pressure and altitude. Low-pressure areas have less atmospheric mass (air) above their location. By contrast, high-pressure areas have more atmospheric mass (weight of air) above their location. Similarly, as elevation increases there is less overlying atmospheric mass, so that pressure decreases with increasing elevation. Sealing a container at a high altitude means that you have low pressure sealed inside the container. Taking the container to an area with significantly lower pressure means, you are transporting it to a significantly lower altitude. The air pressure around us at the lower altitude creates a force collapsing the container. The correct answer is B. Each stapler is a simple machine that works by providing a lever and a pivot point. The shorter the distance between the pivot point and the opposite end of the lever at the open jaw of the stapler, the greater the force required to push the stapler closed.

20. The correct answer is B. This question has to do with surface area. A substance with a larger surface area will evaporate faster as there are more surface molecules able to escape.
21. The correct answer is B. This question has to do with "second order" levers. Second order levers, unlike a seesaw, have a fixed pivot (fulcrum) at one end. Force is applied at the opposite open end, with the load in between the lever arms, as in a stapler. The shorter the length of the lever (stapler), the greater the force required to deal with the same load (stapling through 20 sheets of paper).

22. The correct answer is A. This question has to do with density of a fluid and levers. The average density of seawater at the ocean surface is 1.025 g/ml; seawater is denser than freshwater because of the salts’ added mass. Greater mass will cause the lever to move further downward.

23. The correct answer is A. This question involves how temperature affects the pressure of gases. For pressure to read the same "constant" for a greater volume of the same gas, the temperature would be higher. The temperature of a gas directly relates to its pressure and volume. So if either pressure or volume are increased, then so is the temperature.

24. The correct answer is B. When Gear Z rotates counterclockwise, it causes clockwise motion in Gear Y. A movement indicator attached to Gear Y will move toward B. Without a stop of some kind, the pointer would continue moving in the clockwise direction.

25. The correct answer is A. This question involves a "first order" lever, where the pivot or fulcrum is between the loaded ends. Look at how the lever balances over the fulcrum support. The lever extends further toward B, than it does toward A. The greater the distance between the end of the lever and its support point, the greater the impact of the force (moment). Side A of the lever will have less force effect than side B with application of its load. Therefore, to keep the lever positioned level, the load at A must be heavier than at B.

26. The correct answer is B. This question involves a "first order" lever, where the pivot or fulcrum is between the loaded ends. Look at how the lever balances over the fulcrum support. The lever extends further toward B, than it does toward A. The greater the distance between the end of the lever and its support point, the greater the impact of the force (moment). To disrupt the equilibrium of the lever the 10-pound load placed at B, will cause the right end of the lever to move downward, engaging the gears.
PRACTICE TEST

for

TABLES AND GRAPHS

includes

PART I - TABLES

PART II - GRAPHS

THIS TEST MIMICS THE STYLE OF TEST FOR TABLES AND GRAPHS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING WITH TABLES AND GRAPHS

The Plant Operator Selection System (POSS) includes tests for tables and graphs.

To help you prepare, a two-part practice test follows. Each part is designed so you may practice correctly interpreting tables and graphs within a suggested time limit.

Part I concerns reading tables that are similar in design to multiplication tables. The questions you answer will be multiple-choice and depend upon you accurately choosing answers (values or information) from the table. Carefully review the instructions before beginning this part, and then set a timer for three (3) minutes. You should be able to answer all 24 questions within this time.

Part II checks your ability to interpret charts with graphed information. In this part, you are also presented a choice of possible answers. Carefully review the instructions before beginning this part, and then set a timer for two (2) minutes. You should be able to read the instructions and answer all 14 questions within this time.

Practicing taking these tests will familiarize you with the style of the real selection tests. To create conditions most like a real test:

➢ Practice by taking Part I and Part II tests, together one after the other
➢ Be sure to set a timer before beginning each part
➢ Do not look at the answers until you have completed all the test questions
Tables and Graphs Test #4

PART I - TABLES

HOW TO TAKE THIS TEST

These instructions provide an example using the sample Table A, shown below:

Table A

Magnetizing Force

<table>
<thead>
<tr>
<th>Magnetic Field &quot;Remanence&quot; Bd measured in (Teslas)</th>
<th>Magnetizing Force &quot;Oersted&quot; Measured in Kiloampere Turns/Meter units at &quot;Residual Induction&quot; Br levels measured in Teslas</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.22</td>
<td>136.00 136.45 136.91</td>
</tr>
<tr>
<td>0.37</td>
<td>380.00 377.53 375.06</td>
</tr>
<tr>
<td>0.40</td>
<td>450.63 454.93 459.24</td>
</tr>
</tbody>
</table>

Table A gives you information about Magnetizing Force (*note the title of the table*), as measured for certain conditions. The conditions are determined by the values in the *first column* on the left side, which shows the strength of the Magnetic Field, "Remanence", measured in Teslas. The *top row* shows how the Magnetizing Force "Oersted" in Kiloampere Turns/Meter varies depending on the magnet's "Residual Induction" (Br) level measured in Teslas.

For example, for a Magnetic Field of 0.37 with a Residual Induction of 0.7, read across from 0.37 and down from 0.7. In this case, the Magnetizing Force will be 377.53 Kiloamperes Turns/Meter.

Now consider the sample problem on the next page that rearranges the information somewhat.
In the table shown above, the two left-hand columns are Magnetic Field and Remanence. In the row shown, the Magnetic Field is 0.40 and the Residual Induction is 0.8. Refer back to the Table A, read across from 0.40 and down from 0.8. See below for how this is done.

Now you see that 459.24 is the correct Magnetizing Force output for the magnet. Therefore, in this case, you completely fill the circle to the right of 459.24 to show this is the correct answer:
Table I is the reference information for the test questions built into a different table on the next page. Completing the table on the next page requires looking up 24 sets of information from Table I. The suggested time limit to answer all 24 questions is three (3) minutes. To answer each test question, refer to Table I. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

### Table I

**Magnetizing Force**

<table>
<thead>
<tr>
<th>Magnetic Field &quot;Remanence&quot; Bd measured in (Teslas)</th>
<th>0.6 Residual Induction (B_r)</th>
<th>0.7 Residual Induction (B_r)</th>
<th>0.8 Residual Induction (B_r)</th>
<th>0.9 Residual Induction (B_r)</th>
<th>1.0 Residual Induction (B_r)</th>
<th>1.1 Residual Induction (B_r)</th>
<th>1.2 Residual Induction (B_r)</th>
<th>1.3 Residual Induction (B_r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.22</td>
<td>136.00</td>
<td>136.45</td>
<td>136.91</td>
<td>137.81</td>
<td>139.63</td>
<td>143.26</td>
<td>150.52</td>
<td>165.03</td>
</tr>
<tr>
<td>0.37</td>
<td>380.00</td>
<td>377.53</td>
<td>375.06</td>
<td>370.12</td>
<td>360.24</td>
<td>340.49</td>
<td>300.98</td>
<td>221.95</td>
</tr>
<tr>
<td>0.40</td>
<td>450.63</td>
<td>454.93</td>
<td>459.24</td>
<td>467.86</td>
<td>485.10</td>
<td>519.58</td>
<td>588.54</td>
<td>726.46</td>
</tr>
<tr>
<td>0.58</td>
<td>460.00</td>
<td>465.63</td>
<td>471.25</td>
<td>482.51</td>
<td>505.02</td>
<td>550.04</td>
<td>640.08</td>
<td>820.15</td>
</tr>
<tr>
<td>0.68</td>
<td>630.00</td>
<td>633.96</td>
<td>637.92</td>
<td>645.85</td>
<td>661.70</td>
<td>693.39</td>
<td>756.79</td>
<td>883.58</td>
</tr>
<tr>
<td>0.88</td>
<td>765.00</td>
<td>767.89</td>
<td>770.79</td>
<td>776.57</td>
<td>788.14</td>
<td>811.28</td>
<td>857.56</td>
<td>950.13</td>
</tr>
<tr>
<td>0.99</td>
<td>800.00</td>
<td>802.36</td>
<td>804.72</td>
<td>809.45</td>
<td>818.90</td>
<td>837.79</td>
<td>875.58</td>
<td>951.16</td>
</tr>
<tr>
<td>1.04</td>
<td>810.00</td>
<td>812.35</td>
<td>814.70</td>
<td>819.40</td>
<td>828.79</td>
<td>847.59</td>
<td>885.18</td>
<td>960.35</td>
</tr>
<tr>
<td>1.06</td>
<td>815.00</td>
<td>822.59</td>
<td>830.18</td>
<td>845.36</td>
<td>875.73</td>
<td>936.46</td>
<td>1,057.91</td>
<td>1,300.83</td>
</tr>
<tr>
<td>1.10</td>
<td>817.30</td>
<td>825.64</td>
<td>833.98</td>
<td>850.65</td>
<td>884.00</td>
<td>950.71</td>
<td>1,084.11</td>
<td>1,350.93</td>
</tr>
<tr>
<td>1.12</td>
<td>825.83</td>
<td>834.07</td>
<td>842.31</td>
<td>858.79</td>
<td>891.75</td>
<td>957.66</td>
<td>1,089.50</td>
<td>1,353.16</td>
</tr>
<tr>
<td>1.14</td>
<td>850.00</td>
<td>857.87</td>
<td>865.75</td>
<td>881.49</td>
<td>912.98</td>
<td>975.96</td>
<td>1,101.93</td>
<td>1,353.85</td>
</tr>
<tr>
<td>1.16</td>
<td>850.00</td>
<td>861.72</td>
<td>873.44</td>
<td>896.88</td>
<td>943.75</td>
<td>1,037.51</td>
<td>1,225.01</td>
<td>1,600.03</td>
</tr>
<tr>
<td>1.17</td>
<td>850.00</td>
<td>865.41</td>
<td>880.82</td>
<td>911.64</td>
<td>973.28</td>
<td>1,096.56</td>
<td>1,343.13</td>
<td>1,836.25</td>
</tr>
<tr>
<td>1.18</td>
<td>850.00</td>
<td>867.19</td>
<td>884.39</td>
<td>918.78</td>
<td>987.56</td>
<td>1,125.12</td>
<td>1,400.23</td>
<td>1,950.47</td>
</tr>
</tbody>
</table>
### Test Questions for Test Part I

<table>
<thead>
<tr>
<th>Magnetic Field &quot;Remanence&quot; (B_d) measured in (Teslas)</th>
<th>Residual Induction (B_r) measured in (Teslas)</th>
<th>Magnetizing Force &quot;Oersted&quot; in Kiloampere Turns/Meter units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>0.68</td>
<td>1.2</td>
<td>1300.83</td>
</tr>
<tr>
<td>0.99</td>
<td>1.2</td>
<td>630.00</td>
</tr>
<tr>
<td>1.10</td>
<td>1.1</td>
<td>370.12</td>
</tr>
<tr>
<td>1.17</td>
<td>1.1</td>
<td>221.95</td>
</tr>
<tr>
<td>0.68</td>
<td>0.8</td>
<td>765.00</td>
</tr>
<tr>
<td>1.14</td>
<td>0.6</td>
<td>850.00</td>
</tr>
<tr>
<td>1.04</td>
<td>1.2</td>
<td>165.03</td>
</tr>
<tr>
<td>1.06</td>
<td>1.0</td>
<td>340.49</td>
</tr>
<tr>
<td>1.17</td>
<td>0.6</td>
<td>850.00</td>
</tr>
<tr>
<td>0.88</td>
<td>0.7</td>
<td>837.79</td>
</tr>
<tr>
<td>1.06</td>
<td>0.9</td>
<td>1125.12</td>
</tr>
<tr>
<td>1.17</td>
<td>0.7</td>
<td>865.41</td>
</tr>
<tr>
<td>1.17</td>
<td>0.9</td>
<td>756.79</td>
</tr>
<tr>
<td>0.22</td>
<td>1.2</td>
<td>918.78</td>
</tr>
<tr>
<td>1.06</td>
<td>1.1</td>
<td>815.00</td>
</tr>
<tr>
<td>0.99</td>
<td>1.3</td>
<td>885.18</td>
</tr>
<tr>
<td>1.18</td>
<td>0.6</td>
<td>850.00</td>
</tr>
<tr>
<td>0.37</td>
<td>1.1</td>
<td>814.70</td>
</tr>
<tr>
<td>1.06</td>
<td>1.2</td>
<td>815.00</td>
</tr>
<tr>
<td>0.88</td>
<td>0.6</td>
<td>765.00</td>
</tr>
<tr>
<td>0.37</td>
<td>1.0</td>
<td>875.58</td>
</tr>
<tr>
<td>0.99</td>
<td>1.1</td>
<td>370.12</td>
</tr>
<tr>
<td>1.16</td>
<td>1.1</td>
<td>693.39</td>
</tr>
<tr>
<td>1.04</td>
<td>0.8</td>
<td>885.18</td>
</tr>
</tbody>
</table>
These instructions provide an example using the sample graph, above, titled "Overconsolidation Ratio, OCR (ratio has no units)." The Overconsolidation Ratio (OCR) differs depending on the line read on the graph.\(^1\) This graph example charts four possible types of clay:

- Blue Clay shown by a line with square marks
- River Organic Clay, shown by a line with triangular marks
- Varved\(^2\) Clay, shown by a line with dot marks
- Bay Marine Clay, shown by a line with diamond marks

Each type of clay has its own Overconsolidation Rate (OCR) and Field Vane Strength\(^3\) measured as \(\frac{C_u (FV)}{\sigma'_v}\). The test evaluates your ability to read the graph and correct values for each of two types of tables.

**For the first table type, consider this example:**

*The given Field Vane Strength and Overconsolidation Ratio (OCR) and match at the line with the triangle marks. Read across from 1.8 and up from 4.0. In this case, the type of clay yielding a Field Vane Strength of 1.8 at an OCR of 4.0 is the River Organic Clay.*

As you can see, the answer for **River Organic Clay** has been darkened.

<table>
<thead>
<tr>
<th>Overconsolidation (OCR) Ratio</th>
<th>Field Vane Strength, (\frac{C_u (FV)}{\sigma'_v})</th>
<th>Blue Clay</th>
<th>River Organic Clay</th>
<th>Varved Clay</th>
<th>Bay Marine Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>1.8</td>
<td>(\bigcirc)</td>
<td>(\bullet)</td>
<td>(\bigcirc)</td>
<td>(\bigcirc)</td>
</tr>
</tbody>
</table>

\(^1\) Knowing what OCR is not what this test concerns. However, just FYI: *Overconsolidation ratio in soil geology means the ratio of past effective stress (pre-consolidation stress) to the current effective stress.*

\(^2\) Knowing what Varved means is not what this test concerns. However, just FYI: *Varved means a type of clay with alternating layers of silt & clay.*

\(^3\) Knowing what Field Vane Strength is not what this test concerns. However, just FYI: *Field Vane Strength means the undrained shear strength of clay as tested by a field technician using a specific scientific method.*
For the second table type, consider this example that rearranges the information somewhat:

The two left-hand columns are the OCR and Type of Clay. In the row shown, a Field Vane Strength, $C_u (FV) / \sigma^'_{vo}$ of 1.8 applies for an OCR of 4.0 when the Type of Clay is River Organic Clay. Refer to the graph, where the line representing the specified type of clay is intersected. From the point of intersection, follow the horizontal line to the left to read the Field Vane Strength, $C_u (FV) / \sigma^'_{vo}$. Note that each horizontal line marks 0.1 units measured in $C_u (FV) / \sigma^'_{vo}$. As you can see, the answer for 1.80 $(FV) / \sigma^'_{vo}$ has been darkened.

<table>
<thead>
<tr>
<th>Overconsolidation (OCR) Ratio</th>
<th>Type of Clay</th>
<th>Field Vane Strength, $C_u (FV) / \sigma^'_{vo}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>River Organic Clay</td>
<td>0.50  ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.80   ●</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.40  ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.60  ○</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.20  ○</td>
</tr>
</tbody>
</table>
BEGIN TEST PART II

The graph shown is the reference information for the test questions built into the two tables that follow. Completing the tables on this page and the next requires looking up two types of information sets from the graph.

Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

### Overconsolidation Ratio, OCR (ratio has no units)

![Graph showing Overconsolidation Ratio for different types of clay]

<table>
<thead>
<tr>
<th>Overconsolidation (OCR) Ratio</th>
<th>Field Vane Strength, $C_u (FV) / \sigma_{vo}$</th>
<th>Blue Clay</th>
<th>River Organic Clay</th>
<th>Varved Clay</th>
<th>Bay Marine Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>0.5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8.0</td>
<td>4.0</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3.2</td>
<td>1.8</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.4</td>
<td>0.5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6.4</td>
<td>0.7</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5.6</td>
<td>0.8</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>1.6</td>
<td>0.1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### Overconsolidation Ratio, OCR (ratio has no units)

<table>
<thead>
<tr>
<th>Overconsolidation Ratio (OCR)</th>
<th>Type of Clay</th>
<th>Field Vane Strength, $C_u (FV)/\sigma_{vo}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4</td>
<td>Varved Clay</td>
<td>0.24 0.35 0.22 0.70 0.26</td>
</tr>
<tr>
<td>4.8</td>
<td>Bay Marine Clay</td>
<td>0.80 0.35 0.18 2.30 0.24</td>
</tr>
<tr>
<td>4.8</td>
<td>Blue Clay</td>
<td>0.22 3.20 0.75 0.40 0.19</td>
</tr>
<tr>
<td>8.0</td>
<td>River Organic Clay</td>
<td>4.00 0.50 0.37 0.80 0.42</td>
</tr>
<tr>
<td>2.4</td>
<td>River Organic Clay</td>
<td>0.16 1.40 0.52 0.70 0.81</td>
</tr>
<tr>
<td>5.6</td>
<td>Varved Clay</td>
<td>0.16 0.23 0.19 0.40 3.20</td>
</tr>
<tr>
<td>3.2</td>
<td>Blue Clay</td>
<td>0.50 0.80 1.40 3.20 1.15</td>
</tr>
</tbody>
</table>

Answers with explanations begin on the next page.
### ANSWERS FOR PART I - TABLES

<table>
<thead>
<tr>
<th>Magnetic Field &quot;Remanence&quot; (Bd) measured in (Teslas)</th>
<th>Residual Induction (Br) measured in (Teslas)</th>
<th>Magnetizing Force &quot;Oersted&quot; in Kiloampere Turns/Meter units</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.68</td>
<td>1.2</td>
<td>A: 1300.83 • B: 802.36 • C: 875.73 • D: 756.79 •</td>
</tr>
<tr>
<td>0.99</td>
<td>1.2</td>
<td>A: 630.00 • B: 918.78 • C: 865.41 • D: 875.58 •</td>
</tr>
<tr>
<td>1.10</td>
<td>1.1</td>
<td>A: 370.12 • B: 1836.25 • C: 950.71 • D: 137.81 •</td>
</tr>
<tr>
<td>1.17</td>
<td>1.1</td>
<td>A: 221.95 • B: 776.57 • C: 1096.56 • D: 1096.56 •</td>
</tr>
<tr>
<td>0.68</td>
<td>0.8</td>
<td>A: 765.00 • B: 637.92 • C: 896.88 • D: 951.16 •</td>
</tr>
<tr>
<td>1.14</td>
<td>0.6</td>
<td>A: 850.00 • B: 1101.93 • C: 300.98 • D: 973.28 •</td>
</tr>
<tr>
<td>1.04</td>
<td>1.2</td>
<td>A: 165.03 • B: 1836.25 • C: 885.18 • D: 1057.91 •</td>
</tr>
<tr>
<td>1.06</td>
<td>1.0</td>
<td>A: 340.49 • B: 875.73 • C: 377.53 • D: 300.98 •</td>
</tr>
<tr>
<td>1.17</td>
<td>0.6</td>
<td>A: 850.00 • B: 136.91 • C: 973.28 • D: 881.49 •</td>
</tr>
<tr>
<td>0.88</td>
<td>0.7</td>
<td>A: 837.79 • B: 767.89 • C: 776.57 • D: 960.35 •</td>
</tr>
<tr>
<td>1.06</td>
<td>0.9</td>
<td>A: 1125.12 • B: 370.12 • C: 845.36 • D: 837.79 •</td>
</tr>
<tr>
<td>1.17</td>
<td>0.7</td>
<td>A: 865.41 • B: 845.36 • C: 1950.47 • D: 756.79 •</td>
</tr>
<tr>
<td>1.17</td>
<td>0.9</td>
<td>A: 756.79 • B: 865.41 • C: 911.64 • D: 828.79 •</td>
</tr>
<tr>
<td>0.22</td>
<td>1.2</td>
<td>A: 918.78 • B: 880.82 • C: 830.18 • D: 150.52 •</td>
</tr>
<tr>
<td>1.06</td>
<td>1.1</td>
<td>A: 815.00 • B: 819.40 • C: 936.46 • D: 950.13 •</td>
</tr>
<tr>
<td>0.99</td>
<td>1.3</td>
<td>A: 885.18 • B: 833.98 • C: 865.41 • D: 951.16 •</td>
</tr>
<tr>
<td>1.18</td>
<td>0.6</td>
<td>A: 850.00 • B: 828.79 • C: 1300.83 • D: 770.79 •</td>
</tr>
<tr>
<td>0.37</td>
<td>1.1</td>
<td>A: 814.70 • B: 802.36 • C: 340.49 • D: 865.41 •</td>
</tr>
<tr>
<td>1.06</td>
<td>1.2</td>
<td>A: 815.00 • B: 819.40 • C: 950.13 • D: 1057.91 •</td>
</tr>
<tr>
<td>0.88</td>
<td>0.6</td>
<td>A: 765.00 • B: 300.98 • C: 875.73 • D: 1057.91 •</td>
</tr>
<tr>
<td>0.37</td>
<td>1.0</td>
<td>A: 875.58 • B: 360.24 • C: 1353.85 • D: 340.49 •</td>
</tr>
<tr>
<td>0.99</td>
<td>1.1</td>
<td>A: 370.12 • B: 137.81 • C: 850.00 • D: 837.79 •</td>
</tr>
<tr>
<td>1.16</td>
<td>1.1</td>
<td>A: 693.39 • B: 975.96 • C: 765.00 • D: 1037.51 •</td>
</tr>
<tr>
<td>1.04</td>
<td>0.8</td>
<td>A: 885.18 • B: 814.70 • C: 776.57 • D: 800.00 •</td>
</tr>
</tbody>
</table>
# ANSWERS FOR PART II GRAPHS

<table>
<thead>
<tr>
<th>Overconsolidation (OCR) Ratio</th>
<th>Field Vane Strength, ( C_u ) (FV) /( \sigma'_{vo} )</th>
<th>Blue Clay</th>
<th>River Organic Clay</th>
<th>Varved Clay</th>
<th>Bay Marine Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>0.5</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8.0</td>
<td>4.0</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3.2</td>
<td>1.8</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2.4</td>
<td>0.5</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>6.4</td>
<td>0.7</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>5.6</td>
<td>0.8</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>1.6</td>
<td>0.1</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Over-consolidation Ratio (OCR)</th>
<th>Type of Clay</th>
<th>Field Vane Strength, ( C_u ) (FV) /( \sigma'_{vo} )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4</td>
<td>Varved Clay</td>
<td>0.24</td>
<td>0.35</td>
</tr>
<tr>
<td>4.8</td>
<td>Bay Marine Clay</td>
<td>0.80</td>
<td>●</td>
</tr>
<tr>
<td>4.8</td>
<td>Blue Clay</td>
<td>0.22</td>
<td>○</td>
</tr>
<tr>
<td>8.0</td>
<td>River Organic Clay</td>
<td>4.00</td>
<td>○</td>
</tr>
<tr>
<td>2.4</td>
<td>River Organic Clay</td>
<td>0.16</td>
<td>○</td>
</tr>
<tr>
<td>5.6</td>
<td>Varved Clay</td>
<td>0.16</td>
<td>○</td>
</tr>
<tr>
<td>3.2</td>
<td>Blue Clay</td>
<td>0.50</td>
<td>●</td>
</tr>
</tbody>
</table>
Use this table to solve problems 1 through 19. For each problem, circle the letter that corresponds to the correct answer. Circle “e” for “none” if none of the answers are right.

It should take you about 8 minutes to complete.

<table>
<thead>
<tr>
<th>Conversion</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 yard</td>
<td>36 inches</td>
</tr>
<tr>
<td>1 mile/minute</td>
<td>88 feet/second</td>
</tr>
<tr>
<td>1 acre</td>
<td>10 square chains</td>
</tr>
<tr>
<td>1 kilometer</td>
<td>1000 meters</td>
</tr>
<tr>
<td>1 acre</td>
<td>43,560 square feet</td>
</tr>
<tr>
<td>1 hand</td>
<td>10 centimeters</td>
</tr>
<tr>
<td>1 kilogram</td>
<td>1000 grams</td>
</tr>
<tr>
<td>1 kilogram</td>
<td>2.205 pounds</td>
</tr>
<tr>
<td>1 mile</td>
<td>5,280 feet</td>
</tr>
<tr>
<td>1 fathom</td>
<td>6 feet</td>
</tr>
<tr>
<td>1 pound</td>
<td>16 ounces</td>
</tr>
<tr>
<td>1 gallon</td>
<td>3.785 liters</td>
</tr>
<tr>
<td>1 gill</td>
<td>0.25 pints</td>
</tr>
<tr>
<td>160 square rods</td>
<td>1 acre</td>
</tr>
<tr>
<td>40 rods</td>
<td>1 furlong</td>
</tr>
<tr>
<td>1 pint</td>
<td>0.5 quarts</td>
</tr>
</tbody>
</table>

1) 0.25 kilometers = _____ meters
   a. 25  b. 125  c. 500  d. 250  e. None

2) 80 square chains = _____ acres
   a. 8  b. 0.8  c. 20  d. 40  e. None

3) 0.5 mile/minute = _____ feet/second
   a. 88  b. 44  c. 22  d. 176  e. None

4) 3 yards = _____ inches
   a. 36  b. 12  c. 108  d. 72  e. None

5) 5 gallons = _____ liters
   a. 16.752  b. 18.925  c. 15  d. 8  e. None

6) 32 ounces = _____ pounds
   a. 0.5  b. 2  c. 10  d. 22  e. None
Mathematical Usage Test #4

7) 5 kilograms = _____ pounds
   a. 50       b. 112.50    c. 500    d. 11.025    e. None

8) 217,800 square feet = _____ acres
   a. 2        b. 5       c. 3        d. 10        e. None

9) 25 quarts = ____ pints
   a. 12.52    b. 100    c. 15       d. 50       e. None

10) 6 slugs = ____ kilograms
    a. 53.782    b. 64    87.54    d. 83    e. None

11) 8 hogsheads = ____ gallons
    a. 185    b. 504    c. 207    d. 115.5    e. None

12) 40 square rods = ____ acres
    a. 2        b. 1.25    c. 12        d. 20        e. None

13) 5 slugs = ____ grams
    a. 5,689    b. 8,473    c. 72,950    d. 4,750    e. None

14) 15 square chains = ____ square feet
    a. 65,340    b. 7,225    c. 49,560    d. 58,870    e. None

15) 30 chains = ____ furlongs
    a. 3        b. 5        c. 30        d. 14        e. None

16) 2000 grams = ____ pounds
    a. 4,410    b. 13.9    c. 7.43    d. 0.8        e. None

17) 30 quarts = ____ gills
    a. 125.5    b. 240    c. 150    d. 27        e. None

18) 3 miles = ____ fathoms
    a. 1,325    b. 560    c. 2,685    d. 2,640    e. None

19) 2 gills = ____ pints
    a. 2.5    b. 3    c. 0.8    d. 0.5        e. None

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. D is the right answer. Since 1 kilometer equals 1000 meters, you need to multiply 1000 by 0.25 to find how many meters there are in 0.25 kilometers. 1000 x 0.25 = 250 so, the answer is 250 meters.

   Problem: 0.25 kilometers = _____ meters

   We know that 1 kilometer = 1000 meters.

   So, 0.25 (1 kilometer) = 0.25 (1000 meters)

   0.25 kilometer = 250 meters

2. A is the right answer. Since 10 square chains equals 1 acre, you need to divide 80 by 10 to find how many acres there are in 80 square chains. 80/10 = 8 so, the answer is 8 acres.

   Problem: 80 square chains = _____ acres

   We know that 10 square chains = 1 acre.

   So, 80/10 = 8 acres

3. B is the right answer. Since 1 mile/minute equals 88 feet/second, you need to multiply 88 by 0.5 to find how many feet/second there are in 0.5 mile/minute. 88 x 0.5 = 44 so, the answer is 44 feet/second.

   Problem: 0.5 mile/minute = _____ feet/second

   We know that 1 mile/minute = 88 feet/second.

   So, 0.5 (1 mile/minute) = 0.5(88feet/second)

   0.5 mile/minute = 44 feet/second

4. C is the right answer. Since 1 yard equals 36 inches, you need to multiply 36 by 3 to find how many inches there are in 3 yards. 36 x 3 = 108 so, the answer is 108 inches.

   Problem: 3 yards = _____ inches

   We know that 1 yard = 36 inches.

   So, 3(1 yard) = 3 (36 inches)

   3 yards = 108 inches
5. B is the right answer. Since 1 gallon equals 3.785 liters, you need to multiply 3.785 by 5 to find how many liters there are in 5 gallons. \(3.785 \times 5 = 18.925\) so, the answer is 18.925 liters.

\[
\text{Problem: } 5 \text{ gallons} = \underline{\text{____}} \text{ liters}
\]

We know that 1 gallon = 3.785 liters.

So, \(5\) (1 gallon) = \(5\) (3.785 liters)

\(5\) gallons = 18.925 liters

6. B is the right answer. Since 16 ounces equals 1 pound, you need to divide 32 by 16 to find how many pounds there are in 32 ounces. \(32 \div 16 = 2\) so, the answer is 2 pounds.

\[
\text{Problem: } 32 \text{ ounces} = \underline{\text{____}} \text{ pounds}
\]

We know that 16 ounces = 1 pound.

So, \(32 \div 16\) ounces = 2 pounds

7. D is the right answer. Since 1 kilogram equals 2.205 pounds, you need to multiply 2.205 by 5 to find how many pounds there are in 5 kilograms. \(2.205 \times 5 = 11.025\) so, the answer is 11.025 pounds.

\[
\text{Problem: } 5 \text{ kilograms} = \underline{\text{____}} \text{ pounds}
\]

We know that 1 kilogram = 2.205 pounds.

So, \(5\) (1 kilogram) = \(5\) (2.205 pounds)

\(5\) kilograms = 11.025 pounds

8. B is the right answer. Since 43,560 square feet equals 1 acre, you need to divide 217,800 by 43,560 to find how many acres there are in 217,800 square feet. \(217,800 \div 43,560 = 5\) so, the answer is 5 acres.

\[
\text{Problem: } 217,800 \text{ square feet} = \underline{\text{____}} \text{ acres}
\]

We know that 43,560 square feet = 1 acre.

So, \(217,800 \div 43,560\) square feet = 5 acres
9. D is the right answer. Since 1 pint equals 0.5 quarts, you need to divide 25 by 0.5 to find how many pints there are in 25 quarts. \( 25 / 0.5 = 50 \) so, the answer is 50 pints.

Problem: 25 quarts = ____ pints

We know 0.5 quarts equal 1 pint.

So, \( 25/0.5 \) quarts = 50 pints

10. C is the right answer. Since 1 slug equals 14.59 kilograms, you need to multiply 14.59 by 6 to find how many kilograms there are in 6 slugs. \( 14.59 \times 6 = 87.54 \) so, the answer is 87.54 kilograms.

Problem: 6 slugs = ____ kilograms

We know that 1 slug = 14.59 kilograms.

So, \( 6 \times 14.59 \) kilograms = 87.54 liters

11. B is the right answer. Since 1 hogshead equals 63 gallons, you need to multiply 63 by 8 to find how many gallons there are in 8 hogsheads. \( 63 \times 8 = 504 \) so, the answer is 504 gallons.

Problem: 8 hogsheads = ____ gallons

We know that 1 hogshead = 63 gallons.

So, \( 8 \times 63 \) gallons = 504 gallons

12. B is the right answer. Since 160 square rods equal 1 acre, you need to divide 40 by 160 to find how many acres there are in 40 square rods. \( 40 / 160 = 0.25 \) so, the answer is 0.25 acres.

Problem: 40 square rods = ____ acres

We know that 160 square rods = 1 acre.

So, \( 40/160 \) square rods = 0.25 acres
The equivalents needed to solve problems 13–18 are not directly listed in the table. So, you need to use 2 equivalents with a common metric.

13. C is the right answer. In the table, there is no equivalent between slugs and grams, but the table shows that 1 slug = 14.59 kilograms and 1 kilogram = 1000 grams. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many grams are in 5 slugs.

Problem: 5 slugs = _____ grams

We know that 1 slug = 14.59 kilograms. To find how many kilograms are in 5 slugs, multiply 14.59 by 5. This equals 72.95. So, 5 slugs are equivalent to 72.95 kilograms.

1 slug = 14.59 kilograms

5(1 slug) = 3(14.59 kilograms)

5 slugs = 72.95 kilograms

We also know that 1 kilogram = 1000 grams. To find how many grams are in 72.95 kilograms, multiply 72.95 by 1000. The answer is 72,950. So, 5 slugs equal 72,950 grams.

1 kilogram = 1000 grams

72.95(1 kilogram) = 72.95(1000 grams)

72.95 kilograms = 72950 grams

14. A is the right answer. In the table, there is no equivalent between square chains and square feet but the table shows that 1 acre = 10 square chains and 1 acre = 43,560 square feet. The common metric in both equivalents is acre. So, you need to use these 2 equivalents to find how many square feet are in 15 square chains.

Problem: 15 square chains = _____ square feet

We know that 1 acre equals 10 square chains. To find how many acres are in 15 square chains, divide 15 by 10. This equals 1.5. So, 15 square chains is equivalent to 1.5 acres.

10 square chains = 1 acre

15/10 = 1.5 acres

We also know that 1 acre equals 43,560 square feet. To find how many square feet are in 1.5 acres, multiply 1.5 by 43,560 square feet. The answer is 65,340. So, 15 square chains equal 65,340 square feet.

1 acre = 43,560 square feet

1.5 (1 acre) = 1.5(43,560 square feet)

1.5 acres = 65,340 square feet
15. A is the right answer. In the table, there is no equivalent between chains and furlongs, but the table shows that 0.25 chains = 1 rod and 40 rods = 1 furlong. The common metric in both equivalents is rods. So, you need to use these 2 equivalents to find how many furlongs are in 30 chains.

Problem: 30 chains = ____ furlongs

We know that 0.25 chains equal = 1 rod. To find how many rods are in 30 chains, divide 30 by 0.25. This equals 120. So, 30 chains is equivalent to 120 rods.

\[
\begin{align*}
0.25 \text{ chains} & = 1 \text{ rod} \\
30/0.25 \text{ chains} & = 120 \text{ rods}
\end{align*}
\]

We also know that 40 rods equals 1 furlong. To find how many furlongs are in 120 rods, divide 120 by 40. The answer is 3. So, 30 chains is equivalent to 3 furlongs.

\[
\begin{align*}
40 \text{ rods} & = 1 \text{ furlong} \\
120/40 \text{ rods} & = 3 \text{ furlongs}
\end{align*}
\]

16. A is the right answer. In the table, there is no equivalent between grams and pounds, but the table shows that 1 kilogram = 1000 grams and 1 kilogram = 2.205 pounds. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many pounds are in 2000 grams.

Problem: 2,000 grams = _____ pounds

We know that 1,000 grams = 1 kilograms. To find how many kilograms are in 2,000 grams divide 2,000 by 1,000. This equals 2. So, 2,000 grams are equivalent to 2 kilograms.

\[
\begin{align*}
1,000 \text{ grams} & = 1 \text{ kilogram} \\
2,000/1,000 \text{ grams} & = 2 \text{ kilograms}
\end{align*}
\]

We also know that 1 kilogram = 2.205 pounds. To find how many pounds are in 2 kilograms, multiply 2 by 2.205. The answer is 4.410. So, 2,000 grams equal 4.410 pounds.

\[
\begin{align*}
1 \text{ kilogram} & = 2.205 \text{ pounds} \\
2(1 \text{ kilogram}) & = 2(2.205 \text{ pounds})
\end{align*}
\]

\[
2 \text{ kilograms} = 4.410 \text{ pounds}
\]
17. B is the right answer. In the table, there is no equivalent between quarts and gills, but the table shows that 1 pint = 0.5 quarts and 1 gill = 0.25 pints. The common metric in both equivalents is pints. So, use these 2 equivalents to find how many gills are in 30 quarts.

Problem: 30 quarts = _____gills

We know that 0.5 quarts = 1 pint. To find how many pints are in 30 quarts, divide 30 by 0.5. This equals 60. So, 30 quarts are equivalent to 60 pints.

\[ 0.5 \text{ quarts} = 1 \text{ pint} \quad 30/0.5 \text{ quarts} = 60 \text{ pints} \]

We also know that 0.25 pints = 1 gill. To find how many gills are in 60 pints, divide 60 by 0.25. The answer is 240. So, 30 quarts equal 240 gills.

\[ 0.25 \text{ pints} = 1 \text{ gill} \quad 60/0.25 \text{ pints} = 240 \text{ gills} \]

18. D is the right answer. In the table, there is no equivalent between miles and fathoms, but the table shows that 1 mile = 5,280 feet and 1 fathom = 6 feet. The common metric in both equivalents is feet. So, you need to use these 2 equivalents to find how many fathoms are in 3 miles.

Problem: 3 miles = _____fathoms

We know that 1 mile equals 5,280 feet. To find how many feet are in 3 miles, multiply 3 by 5,280. This equals 15,840. So, 3 miles is equivalent to 115,840 feet.

\[ 1 \text{ mile} = 5,280 \text{ feet} \quad 3(1 \text{ mile}) = 3(5,280 \text{ feet}) \]

\[ 3 \text{ miles} = 15,840 \text{ feet} \]

We also know that 1 fathom equals 6 feet. To find how many fathoms are in 15,840 feet divide 15,840 by 6. The answer is 2,640. So, 3 miles equals 2,640 fathoms.

\[ 6 \text{ feet} = 1 \text{ fathom} \] \[ 15,840/6 = 2,640 \text{ fathoms} \]

19. D is the right answer. Since 1 gill equals 0.25 pints, you need to multiply 0.25 by 2 to find how many pints there are in 2 gills. 0.25 x 2 = 0.5 so , the answer is 0.5 pints.

Problem: 2 gills = _____ pints

We know that 1 gill = 0.25 pints.

So, 2(1 gill) = 2 (0.25 pints) 2 gills = 0.5 pints
PRACTICE TEST

for

ASSEMBLY

THIS TEST MIMICS THE STYLE OF TEST FOR
ASSEMBLY USED BY THE PLANT OPERATOR
SELECTION SYSTEM (POSS).

PRACTICING FOR THE ASSEMBLY TEST

The Plant Operator Selection System (POSS) includes a test for Assembly. Assembly involves reviewing parts and their assembly instruction in order to put the parts together in the correct manner.

To help you prepare, a practice test follows designed so you may practice correctly matching unassembled parts, with how they would look as assembled, within a suggested time limit of five (5) minutes.

For each of the total of nine (9) questions you answer, there will be five (5) possible answers. Carefully review the instructions before beginning this test, and then set a timer for five (5) minutes. You should be able to answer all nine (9) assembly problems within this time.

Practicing taking this type of test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by taking the complete test with all nine questions
- Be sure to set a timer before beginning each part
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions
Assembly Test #5

ASSEMBLY

HOW TO TAKE THIS TEST

These instructions provide an example using two examples, shown below in Figures 1 and 2:

Figure 1 shows a prism with two surfaces marked. One is marked B, referring to the end of the prism while the other is marked C pointing to one of the six long sides of the prism.

![Figure 1](image1)

Each test problem presents a total of four (4) objects that could be similar to this one, with each object having one or more surfaces or edges marked by a letter. Your job is to match the surfaces and/or edges with the same letters to complete the assembly. Figure 2 looks like a real test question. When you determine how the final assembly will look it will match one of the five possible answers, numbered 1 through 5. Fill in the number of the assembly that is correct.

![Figure 2](image2)

A step-by-step approach may work better than attempting to visualize the actual assembly. You may find it helpful to look at how the letters should match, but also consider where they obviously do not.

In Figure 2, try matching up the letter A on two objects. For example, letter A points to one edge of the upside down wedge. However, it does not point to the edge having the circular cutout. Letter A also points to the long edge along the bottom of a rectangular block. With this information in mind, evaluate the possible answers. Answer 1 has a correct match for Letter A. Answer 2 does not. Answer 3 has a correct match for Letter A. Answer 4 and 5 do not. So at this point, you may rule out Answers 2, 4 and 5. The remaining possible answers are 1 and 3.

Now consider how the letter B should match in this example. In both 1 and 3, the match for B is possible. Move on to letter C. Answer 1 does not match the bottom of the cone against the side of the wedge. Answer 3; however, does.

In this example, the correct answer to mark is Answer 3.
ASSEMBLY PRACTICE TEST

1.

2.

3.

4.
Assembly Test #5

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 2 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2 and 3 show that the two places marked B are put together? Of the three, pictures 1 and 2 have the places marked B put together. Now look at the parts marked with a C. Which of the pictures 1 and 2 show that the two places marked C are put together? Of the two pictures 1 and 2, only picture 1 has the places marked C put together. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

2. The correct answer is picture #1. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 3, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 3, 4 and 5 show that the two places marked B are put together? Of the four, only picture 1 has the places marked B put together. Therefore, picture 1 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 1 on your answer sheet.

3. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 1, 2, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1, 2, 4 and 5 show that the two places marked B are put together? Of the four, only picture 5 has the places marked B put together. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

4. The correct answer is picture #5. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 2, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2, 4 and 5 show that the two places marked B are put together? Of the three, each one has the places marked B put together. Now look at the parts marked with a C. Which of the pictures 2, 4 and 5 show that the two places marked C are put together? Of the three pictures 2, 4 and 5, only picture 5 has the places marked C put together. Therefore, picture 5 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 5 on your answer sheet.

5. The correct answer is picture #3. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2 and 3 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2 and 3 show that the two places marked B are put together? Of the two, only picture 3 has the places marked B put together. Therefore, picture 3 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 3 on your answer sheet.

6. The correct answer is picture #4. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 2, 3, 4 and 5 all have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2, 3, 4 and 5 show that the two places marked B are put together? Of the four, only picture 4 has the places marked B put together. Therefore, picture 4 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 4 on your answer sheet.

7. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 1 and 2 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 1 and 2 show that the two places marked B are put together? Of the two, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.
8. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, pictures 2, 3, 4 and 5 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2, 3, 4 and 5 show that the two places marked B are put together? Of the four, only pictures 2 and 3 have the places marked B put together. Now look at the parts marked with a C. Which of the pictures 2 and 3 show that the two places marked C are put together? Of the two pictures 2 and 3, only picture 2 has the places marked C put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.

9. The correct answer is picture #2. Look at the places marked A. If the places marked A were put together, how would they look? Of the five pictures, only pictures 2 and 4 have the places marked A touching. Now look at the parts marked with a B. Which of the pictures 2 and 4 show that the two places marked B are put together? Of the two, only picture 2 has the places marked B put together. Therefore, picture 2 is the correct answer. This is the only picture of the five that has all the parts put together in the way they should be. Therefore, you need to fill circle 2 on your answer sheet.
PRACTICE TEST

for

MECHANICAL CONCEPTS

THIS TEST MIMICS THE STYLE OF TEST FOR MECHANICAL CONCEPTS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICE for MECHANICAL CONCEPTS

The Plant Operator Selection System (POSS) includes a test for Mechanical Concepts. Mechanical concepts seen in everyday life, can be quite simple, and yet found on the principles of physics, material properties and basic electrical properties. This test gages your ability to draw appropriate conclusions regarding mechanical principles.

To help you prepare, a practice test follows with 26 different scenarios. Each scenario gives you a picture to illustrate a particular situation. For each situation, there will be one correct answer out of the three possible answers shown. This practice test helps you to practice determining the appropriate outcome for each situation, and within a suggested time limit.

The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 13 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle your choice of A, B, or C. You should be able to answer all 26 questions within the 13-minute time limit.

Practicing by taking this test will familiarize you with the style of the real selection test. To create conditions most like a real test:

- Practice by completing all 26 test questions
- Be sure to set a timer before beginning each part
- Do not look at the answers that follow at the end until you have completed all the test questions
1. The drum of oil is full when filled to level A, and low when filled to level B. When the oil spills out through pipe X, will its flow rate at pipe X's outlet be higher if the pipe X was opened when the tank was full (at A) or low (at B)? (If equal, mark C.)

2. When Gear X rotates counterclockwise, the conveyor belt moves the three bottles. Will the bottles travel toward (A or B) when Gear X rotates? (If either direction is possible, mark C.)

3. Cart X is not loaded and has a mass of 50 pounds. Cart Y is loaded and plus its load it weighs 100 pounds. Cart X is given a hard push so that it moves toward Cart Y at a steady 5 mph. After Cart X hits the stationary Cart Y, will its velocity be greater than its original velocity (A) or less than its original velocity (B)? (If neither applies or is possible, mark C.)
4. Does the Switch controlling the fan need to be closed at (A or B) for the fan to work? (If either, mark C.)

5. When the shaft inside the Pinion Gear moves clockwise, will the Outside Pulley Belt rotate toward (A or B)? (If either is possible, mark C.)

6. A white laser beam is directed toward the prism. As the beam refracts through the prism, the light exiting the prism displays a rainbow of color, including red and blue. Will light exiting the prism be blue on top of the rainbow (A) or red on top of the rainbow (B)? (If either is a possibility, mark C.)
7. Given the same conditions, which beaker will evaporate more quickly over time (A or B)? (If equal, mark C.)

Beaker A is Sea Water

Beaker B is Fresh Water

8. The pictures show how iron filings behave when laid over two bar-shaped magnets with ends near each other. The iron filings are shaped as if long thin needles oriented parallel to the magnetic field lines. In one picture, the magnets are attracted to each other because their opposite poles are close together. In the other picture, the magnets repel each other, because their similar poles are close together. From the position of the iron filings in the pictures, which set of magnets has their opposite poles next to each other (A or B)? (If both or neither, mark C.)

9. If the strength of this dam is based upon the thickness of the material from which it is built, should the dam be thicker at point A (near the top) or point B (near its base) in order to counteract the force of the water behind the dam? (If equal, mark C.)
10. Which loaded cart, (A or B) will be easier to move in its forward direction? (If equal, mark C.)

11. The faucet shown fills the container. Does condition A or condition B better represent how the container will fill? (If neither applies, mark C.)

12. Airplane A and B are the same model, with identical engines, same loaded mass, and propeller speed. Both are on a level runway. The runway beneath Airplane A is paved. The runway beneath Airplane B is grass. Both airplanes take off at the same time. Which airplane (A or B) is more likely to become airborne first? (If equal, mark C.)
13. Pressurized hydraulic fluid flows freely between the two hydraulic rams X and Y. When the hydraulic rams push upward beneath the lever, it moves. When the lever moves, does the ball resting atop the lever roll toward (A or B)? (If neither applies, mark C.)

14. Each conveyor belt moves the same load from bottom to top over a total distance of 100 feet. If each conveyor begins at the same time and under the same power, which load will reach the top first? (If equal, mark C.)

15. Water tanks A and B are both installed at sea level with piping to access the water at their base. Which water tank (A or B), will require less power to serve a community at a higher elevation? (If equal, mark C.)
16. Does pushing the object (a pentagonal pyramid) more likely cause it travel in direction A or B? (If either or neither applies, mark C.)

17. Forklift A and B are identical and carry the same exact load. The only difference is the position of the forks beneath the load. Which forklift (A or B) has greater stability? (If equal, mark C.)

18. Given pulley arrangement X, which change in pulley wheels, A or B, will create a bigger reduction in the required force at Y needed to lift the load?
19. The fixed saw operates at high speed. Would the operator push the board beneath the saw in direction (A or B) to cut the board down the middle of its length? (If either would work, mark C.)

20. The screws shown below are equal diameter and length, but each has a different distance between its threads. Screw A has greater thread spacing and the threads angle about 30 degrees. Screw B has tighter thread spacing with the threads at an angle less than those in Screw A. Which screw, (A or B) will require more work to embed? (If equal, mark C.)

21. When the button X is pushed, which picture better represents how the light bulb will respond (A or B)? (If equal, mark C.)
22. The conveyor belt shown moves the bottles in the direction of the arrow. If the conveyor belt suddenly increased speed through the turn, would the bottles more likely fall toward (A or B)? (If equal, mark C.)

23. The rifle X is held loosely while it shoots the bullet Y. Upon the shot, does the rifle move toward A or B? (If neither applies, mark C.)

24. Imagine the rifle from the question above shoots three bullets at three different angles, 30°, 45°, and 60°. The bullet shot at 30° lands at A. Will the bullet shot at 60° more likely land at (A or B)? (If neither applies, mark C.)
25. Consider the hydraulic rams in the diagram below. Does the mechanical analogy at (A or B) better represent the forces and their actions on the pressurized fluid? (If neither applies, mark C.)

26. Two bullets are shot simultaneously, with the same velocity, but with different paths (A and B). Path A begins at 60° from the ground and Path B begins at 45° from the ground. Which bullet, (A or B) is sure to clear the fence? (If both or neither, mark C.)

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. The correct answer is A. This question has to do with how pressure and flow rates relate to each other in a fixed system. The pressure and flow rate associated with Level A is proportional to the pressure and flow rate associated with Level B. The pressure will be higher for Level A than Level B. Therefore, Level A provides the greatest exiting flow rate at the pipe X outlet.

2. The correct answer is B. This question illustrates how gears are used to assist work. A gear will move a belt, pulley, or conveyor in the same direction it rotates. Since the gear rotates counterclockwise, the conveyor will move the bottles counterclockwise toward B.

3. The correct answer is B. This question has to do with conservation of momentum. The total momentum before the collision is the mass times the speed (velocity) of each cart. In this case, the total momentum before the collision is 50 pounds x 5 mph, which equals 250. (Cart Y can be ignored because its speed was zero and 200 pounds times zero is zero.) Conserving momentum means that after the collision the momentum must be the same as before the collision. Some energy will be transferred to the Cart Y, which means that Cart X has to move slower than before the crash. Mathematically, after the collision, the combined masses of the two carts (50 plus 200 = 250) times their resulting velocity is equal to the total momentum before the collision. (250 = 250 x V) So the resulting velocity has to be 250 divided by 250 and the answer is one, which is less than five.

4. The correct answer is B. Closing the switch to the B position completes the circuit.

5. The correct answer is A. Gear X is an "internal gear" meaning that its teeth point toward its center rather than away from its center. The central pinion gear rotates in the same direction as its shaft and thus Gear X also rotates clockwise. In turn, the pulley rotates clockwise toward A.

6. The correct answer is B. This question involves how white light refracts through a prism, breaking up into different colors at different wavelengths. White light separates into different colors (wavelengths) on entering the prism. The exiting red light refracts by a smaller angle than blue light. When the light leaves the prism, the red rays have turned through a smaller angle than the blue rays, producing a rainbow with the red on top.

7. The correct answer is B. The higher the density, the slower a liquid evaporates. Seawater has a higher density than fresh water, so the fresh water will evaporate more rapidly.

8. The correct answer is B. When the opposite poles are next to each other, the magnets are attracted to each other with their magnetic field lines running from one magnet to the other.

9. The correct answer is B. The dam needs to be stronger at its base because the pressure of the water on the other side is greater at the bottom of the dam. The pressure of the water is determined by its height. The greater the height of water above, the greater the pressure.

10. The correct answer is B. The obvious difference between Cart A and Cart B is the direction of the filled windsock. The windsock indicates the direction from which the wind blows. Cart A would have a headwind, which is an opposing force. Therefore, Cart B would be easier to push.
11. The correct answer is A. This question involves atmospheric pressure that is a downward force. The air around us exerts an equal downward pressure on each surface. When water fills each tank, the fluid surface will rise equally. ("Water seeks its own level.")

12. The correct answer is A. This question involves surface friction, which acts against the force of acceleration when a plane is taking off. Airplane A gains speed more quickly due to less friction resistance over pavers versus Airplane B that must travel over cobblestone. The rougher and more uneven a surface, the greater friction it poses.

13. The answer is A. Because the hydraulic fluid can flow freely between the two hydraulic rams X and Y, the pressures inside the two cylinders containing the fluid are equal. The pressurized hydraulic fluid forces each piston upward with a force equal to the pressure times the surface area of the piston. The upward force at Y comes from a bigger surface area because the piston is wider. Therefore, the upward force will be greater on the Y side of the lever, which will push it up and cause the ball to roll toward A.

14. The correct answer is A. Conveyor belt A has a lesser vertical climb than Conveyor belt B. Treat the ground level as the horizontal axis and the incline formed by the conveyor itself as the hypotenuse of a triangle. In case A, the vertical side of the triangle is smaller than case B. In both cases, the horizontal axis is the same. In both cases, the hypotenuse is the same (100 feet). The only difference is the vertical climb. The lower the vertical side, the more efficient the conveyor.

15. The correct answer is A. This question involves fluid pressure. Water in tank A gains the aid of gravity as it accelerates downward in a pipe. The water in Tank B does not have as far to go to reach the ground. It will require less effort to pump the water from Tank A to a higher elevation than from Tank B.

16. The correct answer is B. Applying enough force to the pentagonal pyramid to cause it to move is like applying force to a spinning top. A spinning top takes a generally circular path, particularly when slowing down.

17. The correct answer is B. This question has to do with center of mass. Sometimes the term "center of gravity" is used interchangeably with the term "center of mass." The center of mass is the imaginary point where all the weight of the forklift, together with its load, is concentrated. Forklift A has a higher center of mass than Forklift B. The lower the center of mass, the greater stability you have. Automakers design sports cars for low center of mass to improve their stability on the road.

18. The correct answer is B. In the assembly shown in A, the force required at Y is decreased in half because of the addition of the pulley wheel that moves with the load. One moving pulley wheel has ropes on each side, so the original force at Y is divided by two. In the assembly shown in B, the force required at Y is decreased to one fourth because two pulley wheels that move with the load have been added. Each moving pulley wheel has ropes on each side for a total of four ropes, so the original force at Y is divided by four.

19. The correct answer is A. This saw will cut when its blade rotates in the same direction its teeth point, which is counterclockwise. Moving the board in direction A allows the saw to cut through the length of the board.
20. The correct answer is B. This question has to do with inclined planes and conversion of motion. The threads of a screw are like a spiral staircase wrapped around a rod. The incline of the threads on a screw are what enables the screw to move itself when turned by a screwdriver. Turning the screw converts rotational force (torque) into linear force to embed the screw. Where the distance between the threads is less (pitch) as in B, the mechanical advantage increases and less force (work) is required to embed the screw.

21. The correct answer is A. Pushing the button at X closes and completes the circuit that feeds the light bulb. The light bulb should light up as in A.

22. The correct answer is A. This question involves centripetal force, which is sometimes confused with centrifugal force. Stock car drivers know that centripetal force increases toward the outside direction when traveling around corners during periods of acceleration or no braking.

23. The correct answer is A. The rifle will recoil toward the shooter in the opposite direction the bullet flies. This question has to do with conservation of momentum, which does not depend on how the rifle works. The bullet and the rifle have equal and opposite momentum force after the interaction because they were subjected to equal and opposite interaction forces for the same amount of time.

24. The correct answer is A. This question involves trajectory, which is the curved path an object will take when launched. Gravitational forces cause each bullet to return to the ground. At each bullet’s maximum height, its velocity is zero. Treating the ground as the X-axis and the height as the Y-axis, you can break the trajectory into two components of motion - an X direction or range, and a Y direction or range. Because 30° and 60° are complementary angles, the X distance will be the same.

25. The correct answer is B. This question is similar to number 11. The hydraulic fluid has the same pressure beneath each piston. More force is required on the right side, so the lever analogy that best fits the scenario is B.

26. The correct answer is B. This question involves trajectory, similar to question number 24. The maximum height of the bullet shot at 60° exceeds that of the bullet shot at 45°. However, we know that 30° and 60° are complementary, meaning these two bullet paths will end at the same path on the ground. Completing an arc over the 60° path and to its landing point will take it through the fence. Therefore, the correct answer is B.
PRACTICE TEST

for

TABLES AND GRAPHS

includes

PART I - TABLES

PART II - GRAPHS

THIS TEST MIMICS THE STYLE OF TEST FOR TABLES AND GRAPHS USED BY THE PLANT OPERATOR SELECTION SYSTEM (POSS).

PRACTICING WITH TABLES AND GRAPHS

The Plant Operator Selection System (POSS) includes tests for tables and graphs.

To help you prepare, a two-part practice test follows. Each part is designed so you may practice correctly interpreting tables and graphs within a suggested time limit.

Part I concerns reading tables that are similar in design to multiplication tables. The questions you answer will be multiple-choice and depend upon you accurately choosing answers (values or information) from the table. Carefully review the instructions before beginning this part, and then set a timer for three (3) minutes. You should be able to answer all 24 questions within this time.

Part II checks your ability to interpret charts with graphed information. In this part, you are also presented a choice of possible answers. Carefully review the instructions before beginning this part, and then set a timer for two (2) minutes. You should be able to read the instructions and answer all 14 questions within this time.

Practicing taking these tests will familiarize you with the style of the real selection tests. To create conditions most like a real test:

➢ Practice by taking Part I and Part II tests, together one after the other
➢ Be sure to set a timer before beginning each part
➢ Do not look at the answers until you have completed all the test questions
PART I - TABLES

HOW TO TAKE THIS TEST

These instructions provide an example using the sample Table A, shown below:

Table A

Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>2.25</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Bicarbonate (HC03)</td>
<td>657.00</td>
<td>655.50</td>
<td>654.00</td>
<td></td>
</tr>
<tr>
<td>Boron (B)</td>
<td>0.81</td>
<td>0.82</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>190.00</td>
<td>172.00</td>
<td>154.00</td>
<td></td>
</tr>
</tbody>
</table>

Table A gives you information about the mineral content in water runoff for application of 6-3-0 Houactinite fertilizer *(note the title of the table)*, as measured in ppm (Parts per Million), for different lengths of time. The conditions are determined by the values in the first column on the left side, which shows the type of mineral. The top row shows how the mineral content varies depending on the length of time after fertilizer application, as measured in ppm.

For example, to find the mineral calcium (Ca) content in the water runoff after 2.25 hours, read across from Calcium (Ca) and down from 2.25. In this case, the calcium (Ca) in the water will be 172 ppm.

Now consider a sample problem that rearranges the information somewhat:

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th>Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>2.5</td>
<td>154.00 (O)</td>
</tr>
</tbody>
</table>
Tables and Graphs Test #5

The two left-hand columns are Mineral type and the number of Hours. In the row shown, the type of mineral is Calcium (Ca) and the number of hours is 2.5. Refer back to the Table A, read across from Calcium (Ca), and down from 2.5. See below for how this is done.

**Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer**

*Applications in ppm (Parts per Million) for Length of Time*

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th>2</th>
<th>2.25</th>
<th>2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicarbonate (HC03)</td>
<td>657.00</td>
<td>655.50</td>
<td>654.00</td>
<td></td>
</tr>
<tr>
<td>Boron (B)</td>
<td>0.81</td>
<td>0.82</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>190.00</td>
<td>172.00</td>
<td>154.00</td>
<td></td>
</tr>
</tbody>
</table>

Now you see that 154.00 is the correct ppm content of Calcium (Ca) measured in the water runoff 2.5 hours after application of the 6-3-0 Houactinite fertilizer. Therefore, in this case, you completely fill the circle to the right of 154.00 to show this is the correct answer:

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th>Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>A</strong></td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>2.5</td>
<td>154.00</td>
</tr>
</tbody>
</table>
BEGIN TEST PART I

Table I is the reference information for the test questions built into the table on the next page. Completing the table on the next page requires looking up 24 sets of information from Table I. The suggested time limit to answer all 24 questions is three (3) minutes. To answer each test question, refer to this table. Select your answer by filling the circle to the right of the answer you choose. Remember, speed AND accuracy are important. Check your work if you have time.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Bicarbonate (HC03)</td>
<td>657.00</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>0.81</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>190.00</td>
</tr>
<tr>
<td>Calcium Carbonate (CaC03)</td>
<td>539.00</td>
</tr>
<tr>
<td>Chloride</td>
<td>524.00</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>0.02</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>0.12</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>33.00</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>0.02</td>
</tr>
<tr>
<td>Nitrate (N)</td>
<td>0.90</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>6.37</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>181.00</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>332.00</td>
</tr>
<tr>
<td>Sulfate</td>
<td>390.00</td>
</tr>
<tr>
<td>Total Dissolved Salts (TDS)</td>
<td>2315.00</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>0.05</td>
</tr>
</tbody>
</table>
## Test Questions

### Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>4</td>
<td>190.00</td>
<td>237.00</td>
<td>1571.00</td>
<td>0.02</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>3.25</td>
<td>0.07</td>
<td>268.50</td>
<td>298.00</td>
<td>5.30</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>2.75</td>
<td>28.00</td>
<td>237.00</td>
<td>0.63</td>
<td>655.50</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>3.5</td>
<td>502.00</td>
<td>116.00</td>
<td>189.00</td>
<td>2015.50</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>2.25</td>
<td>0.02</td>
<td>0.49</td>
<td>0.41</td>
<td>0.82</td>
</tr>
<tr>
<td>Total Dissolved Salts</td>
<td>3.5</td>
<td>622.50</td>
<td>1591.00</td>
<td>0.14</td>
<td>0.37</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>2.25</td>
<td>0.08</td>
<td>0.81</td>
<td>572.00</td>
<td>1591.00</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>4</td>
<td>0.04</td>
<td>0.89</td>
<td>20.00</td>
<td>122.50</td>
</tr>
<tr>
<td>Nitrate (N)</td>
<td>2.5</td>
<td>33.00</td>
<td>0.01</td>
<td>264.50</td>
<td>0.08</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>4</td>
<td>0.01</td>
<td>0.65</td>
<td>527.50</td>
<td>519.00</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>2.5</td>
<td>536.00</td>
<td>351.00</td>
<td>0.02</td>
<td>0.81</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>3.25</td>
<td>106.75</td>
<td>264.50</td>
<td>222.00</td>
<td>0.04</td>
</tr>
<tr>
<td>Bicarbonate (HC03)</td>
<td>2.75</td>
<td>268.50</td>
<td>181.00</td>
<td>6.19</td>
<td>643.50</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>4</td>
<td>309.75</td>
<td>495.50</td>
<td>468.00</td>
<td>0.02</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>2.5</td>
<td>0.37</td>
<td>0.05</td>
<td>33.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Chloride</td>
<td>2.25</td>
<td>0.49</td>
<td>2015.50</td>
<td>495.50</td>
<td>0.82</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>3</td>
<td>0.89</td>
<td>643.50</td>
<td>0.80</td>
<td>2157.00</td>
</tr>
<tr>
<td>Chloride</td>
<td>2.75</td>
<td>19.00</td>
<td>0.65</td>
<td>0.77</td>
<td>424.75</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>2.25</td>
<td>572.00</td>
<td>22.00</td>
<td>0.02</td>
<td>189.00</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>3</td>
<td>0.02</td>
<td>0.15</td>
<td>315.50</td>
<td>468.00</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>3.25</td>
<td>524.00</td>
<td>0.76</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Chloride</td>
<td>3.5</td>
<td>25.00</td>
<td>0.13</td>
<td>332.00</td>
<td>298.00</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>2.75</td>
<td>0.02</td>
<td>0.80</td>
<td>0.01</td>
<td>0.76</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>3.5</td>
<td>0.07</td>
<td>5.89</td>
<td>253.00</td>
<td>264.50</td>
</tr>
</tbody>
</table>
These instructions provide an example using the sample graph, at right, titled "Pull of Magnets in g/mm\(^3\) for Magnet Materials with Different Temperature Limits measured in °Celsius." The size of the magnet differs depending on the line read on the graph. In this graph example, there are four possible magnets with different temperature limits:

- 550°C shown by a line with square marks
- 400°C shown by a line with triangular marks
- 200°C shown by a line with dot marks
- 100°C shown by a line with diamond marks

Each magnet material has a temperature limit that dictates its size; i.e., "volume in mm\(^3\)" for a given strength, or maximum pull, as measured in grams per mm\(^3\). The test evaluates your ability to read the graph and select correct values for two types of tables. Examples begin on the next page.
For the first table type, consider this example:

A magnet size of 6000 mm$^3$ and maximum strength, or pull, of 3.37 grams per mm$^3$ match at the line with the square marks. Read across from 6000 and up from 3.37. In this case, the type of magnet material yielding 3.37 grams/mm$^3$ pull when sized at 6000 mm$^3$ is the one limited to a temperature of 550°C.

As you can see, the answer for 550°C has been darkened.

<table>
<thead>
<tr>
<th>Magnet Size in mm$^3$</th>
<th>Max Magnet Pull in g/mm$^3$</th>
<th>100°C</th>
<th>200°C</th>
<th>400°C</th>
<th>550°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000</td>
<td>3.37</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>
For the second table type, consider this example that rearranges the information somewhat:

The two left-hand columns on the table are Maximum Magnet Pull in grams per cubic millimeter and Temperature Limit for Type of Magnet in degrees Celsius. In the row shown, the Maximum Magnet Pull in grams per cubic millimeters is 3.37 and the Temperature Limit for Type of Magnet in degrees Celsius is 550°C. Refer back to the graph and read up from 3.37 until the line representing the magnet limited to 550°C is intersected. From the point of intersection, follow the horizontal line to the left to read the size of the magnet in cubic millimeters. Note that each horizontal line marks 2000 mm$^3$.

As you can see, the answer for 6000 mm$^3$ has been darkened.

<table>
<thead>
<tr>
<th>Maximum Magnet Pull in g/mm$^3$</th>
<th>Temperature Limit for Type of Magnet in °C</th>
<th>Magnet Volume in mm$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.37</td>
<td>550°C</td>
<td>6000 ⬤ 10250 ○ 4000 ○ 17250 ○ 3000 ○</td>
</tr>
</tbody>
</table>
BEGIN TEST PART II

The graph shown here and on the next page is your source for answering 14 test questions in the two following tables. Complete each question on each table by looking up information from the graph. Try to limit yourself to no more than two (2) minutes total. Fill the circle to the right of your answer choice. Speed AND accuracy are important so check your work if you have time.

<table>
<thead>
<tr>
<th>Magnet Size in mm³</th>
<th>Max Magnet Pull in g/mm³</th>
<th>100°C</th>
<th>200°C</th>
<th>400°C</th>
<th>550°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>56520</td>
<td>6.31</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4000</td>
<td>3.10</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>14300</td>
<td>3.95</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>17000</td>
<td>6.31</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>32000</td>
<td>12.82</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>14750</td>
<td>4.64</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19750</td>
<td>12.82</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### Tables and Graphs Test #5

#### Maximum Magnet Pull in g/mm$^3$

<table>
<thead>
<tr>
<th>Maximum Magnet Pull in g/mm$^3$</th>
<th>Temperature Limit for Type of Magnet in °C</th>
<th>Magnet Volume in mm$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.08</td>
<td>550°C</td>
<td>98250 ○</td>
</tr>
<tr>
<td>4.34</td>
<td>100°C</td>
<td>2750 ○</td>
</tr>
<tr>
<td>3.95</td>
<td>550°C</td>
<td>14000 ○</td>
</tr>
<tr>
<td>12.82</td>
<td>400°C</td>
<td>500 ○</td>
</tr>
<tr>
<td>3.37</td>
<td>400°C</td>
<td>1000 ○</td>
</tr>
<tr>
<td>2.61</td>
<td>100°C</td>
<td>0 ○</td>
</tr>
<tr>
<td>4.66</td>
<td>200°C</td>
<td>2000 ○</td>
</tr>
</tbody>
</table>

#### Diagram: Pull of Magnets in g/mm$^3$ for Magnet Materials with Different Temperature Limits measured in °Celsius

- **550°C**
- **400°C**
- **200°C**
- **100°C**

Answers with explanations begin on the next page.
## ANSWERS FOR PART I - TABLES

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hours</th>
<th>Water Analysis of Runoff from 6-3-0 Houactinite Fertilizer Applications in ppm (Parts per Million) for Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>4</td>
<td>A: 190.00 ●, B: 237.00 ●, C: 1571.00 ○, D: 0.02 ○</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>3.25</td>
<td>A: 0.07 ○, B: 268.50 ○, C: 298.00 ○, D: 5.30 ●</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>2.75</td>
<td>A: 28.00 ●, B: 237.00 ○, C: 0.63 ○, D: 655.50 ○</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>3.5</td>
<td>A: 502.00 ●, B: 116.00 ○, C: 189.00 ○, D: 2015.50 ○</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>2.25</td>
<td>A: 0.02 ○, B: 0.49 ○, C: 0.41 ○, D: 0.82 ●</td>
</tr>
<tr>
<td>Total Dissolved Salts</td>
<td>3.5</td>
<td>A: 622.50 ○, B: 1591.00 ●, C: 0.14 ○, D: 0.37 ○</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>2.25</td>
<td>A: 0.08 ●, B: 0.81 ○, C: 572.00 ○, D: 1591.00 ○</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>4</td>
<td>A: 0.04 ○, B: 0.89 ○, C: 20.00 ●, D: 122.50 ○</td>
</tr>
<tr>
<td>Nitrate (N)</td>
<td>2.5</td>
<td>A: 33.00 ○, B: 0.01 ○, C: 264.50 ○, D: 0.08 ●</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>4</td>
<td>A: 0.01 ○, B: 0.65 ●, C: 527.50 ○, D: 519.00 ○</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>2.5</td>
<td>A: 536.00 ○, B: 351.00 ○, C: 0.02 ●, D: 0.81 ●</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>3.25</td>
<td>A: 106.75 ●, B: 264.50 ○, C: 222.00 ○, D: 0.04 ○</td>
</tr>
<tr>
<td>Bicarbonate (HC03)</td>
<td>2.75</td>
<td>A: 268.50 ○, B: 181.00 ○, C: 6.19 ○, D: 643.50 ●</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>4</td>
<td>A: 309.75 ○, B: 495.50 ○, C: 468.00 ●, D: 0.02 ○</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>2.5</td>
<td>A: 0.37 ●, B: 0.05 ○, C: 33.00 ○, D: 0.01 ●</td>
</tr>
<tr>
<td>Chloride</td>
<td>2.25</td>
<td>A: 0.49 ○, B: 2015.50 ○, C: 495.50 ●, D: 0.82 ○</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>3</td>
<td>A: 0.89 ○, B: 643.50 ○, C: 0.80 ●, D: 2157.00 ○</td>
</tr>
<tr>
<td>Chloride</td>
<td>2.75</td>
<td>A: 19.00 ○, B: 0.65 ○, C: 0.77 ○, D: 424.75 ●</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>2.25</td>
<td>A: 572.00 ○, B: 22.00 ○, C: 0.02 ○, D: 189.00 ●</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>3</td>
<td>A: 0.02 ●, B: 0.15 ○, C: 315.50 ○, D: 468.00 ○</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>3.25</td>
<td>A: 524.00 ○, B: 0.76 ●, C: 0.01 ○, D: 0.02 ●</td>
</tr>
<tr>
<td>Chloride</td>
<td>3.5</td>
<td>A: 25.00 ○, B: 0.13 ○, C: 332.00 ○, D: 298.00 ●</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>2.75</td>
<td>A: 0.02 ●, B: 0.80 ○, C: 0.01 ○, D: 0.76 ○</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>3.5</td>
<td>A: 0.07 ○, B: 5.89 ○, C: 253.00 ●, D: 264.50 ○</td>
</tr>
</tbody>
</table>
# ANSWERS FOR PART II GRAPHS

<table>
<thead>
<tr>
<th>Magnet Size in mm³</th>
<th>Max Magnet Pull in g/mm³</th>
<th>100°C</th>
<th>200°C</th>
<th>400°C</th>
<th>550°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>56520</td>
<td>6.31</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4000</td>
<td>3.10</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>14300</td>
<td>3.95</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>17000</td>
<td>6.31</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>32000</td>
<td>12.82</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14750</td>
<td>4.64</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19750</td>
<td>12.82</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Magnet Pull in g/mm³</th>
<th>Temperature Limit for Type of Magnet in °C</th>
<th>Magnet Volume in mm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.08</td>
<td>550°C</td>
<td>98250 ○ 10250 ○ 2000 ● 17250 ○ 500 ○</td>
</tr>
<tr>
<td>4.34</td>
<td>100°C</td>
<td>2750 ○ 3750 ○ 2600 ● 98250 ○ 2000 ○</td>
</tr>
<tr>
<td>3.95</td>
<td>550°C</td>
<td>14000 ● 56500 ○ 17250 ○ 2000 ○ 8250 ○</td>
</tr>
<tr>
<td>12.82</td>
<td>400°C</td>
<td>500 ○ 2500 ○ 6750 ○ 14500 ○ 19625 ●</td>
</tr>
<tr>
<td>3.37</td>
<td>400°C</td>
<td>1000 ○ 56500 ○ 500 ○ 2000 ● 6250 ○</td>
</tr>
<tr>
<td>2.61</td>
<td>100°C</td>
<td>0 ● 1500 ○ 2250 ○ 8250 ○ 56500 ○</td>
</tr>
<tr>
<td>4.66</td>
<td>200°C</td>
<td>2000 ○ 28250 ● 1250 ○ 2000 ○ 32250 ○</td>
</tr>
<tr>
<td>Conversion</td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>1 yard = 36 inches</td>
<td>1 pound = 16 ounces</td>
<td></td>
</tr>
<tr>
<td>1 mile/minute = 88 feet/second</td>
<td>1 gallon = 3.785 liters</td>
<td></td>
</tr>
<tr>
<td>1 acre = 10 square chains</td>
<td>1 gill = 0.25 pints</td>
<td></td>
</tr>
<tr>
<td>1 kilometer = 1000 meters</td>
<td>160 square rods = 1 acre</td>
<td></td>
</tr>
<tr>
<td>1 acre = 43,560 square feet</td>
<td>1 slug = 14.59 kilograms</td>
<td></td>
</tr>
<tr>
<td>1 hand = 10 centimeters</td>
<td>1 hogshead = 63 gallons</td>
<td></td>
</tr>
<tr>
<td>1 kilogram = 1000 grams</td>
<td>1 rod = 0.25 chains</td>
<td></td>
</tr>
<tr>
<td>1 kilogram = 2.205 pounds</td>
<td>40 rods = 1 furlong</td>
<td></td>
</tr>
<tr>
<td>1 mile = 5,280 feet</td>
<td>1 pint = 0.5 quarts</td>
<td></td>
</tr>
<tr>
<td>1 fathom = 6 feet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) 217,800 square feet = _____ acres
   a. 2                        b. 5                        c. 3                        d. 10                        e. None

2) 2 gills = ____ pints
   a. 2.5                      b. 3                        c. 0.8                      d. 0.5                      e. None

3) 5 kilograms = _____ pounds
   a. 50                       b. 112.50                   c. 500                       d. 11.025                    e. None

4) 5 gallons = ____ liters
   a. 16.752                   b. 18.925                   c. 15                        d. 8                        e. None

5) 6 slugs = ____ kilograms
   a. 53.78                    b. 64                        c. 87.54                     d. 83                        e. None

6) 40 square rods = _____ acres
   a. 2                        b. 0.25                     c. 12                        d. 20                        e. None
7) 8 hogsheads = ____ gallons
   a. 185    b. 504    c. 207    d. 115.5    e. None
8) 25 quarts = ____ pints
   a. 12.5    b. 100    c. 15    d. 50    e. None
9) 32 ounces = _____ pounds
   a. 0.5    b. 2    c. 10    d. 22    e. None
10) 3 yards = _____ inches
    a. 36    b. 12    c. 108    d. 72    e. None
11) 0.25 kilometers = _____ meters
    a. 25    b. 125    c. 500    d. 250    e. None
12) 80 square chains = _____ acres
    a. 8    b. 0.8    c. 20    d. 40    e. None
13) 2000 grams = ____ pounds
    a. 4,410    b. 13.9    c. 7.43    d. 0.8    e. None
14) 5 slugs = ____ grams
    a. 5,689    b. 8,473    c. 72,950    d. 4,750    e. None
15) 3 miles = ____ fathoms
    a. 1,325    b. 560    c. 2,685    d. 2,640    e. None
16) 30 chains = ____ furlongs
    a. 3    b. 5    c. 30    d. 14    e. None
17) 30 quarts = ____ gills
    a. 125.5    b. 240    c. 150    d. 27    e. None
18) 15 square chains = _____ square feet
    a. 65,340    b. 7,225    c. 49,560    d. 58,870    e. None
19) 0.5 mile/minute = _____ feet/second
    a. 88    b. 44    c. 22    d. 176    e. None

Answers with explanations begin on the next page.
ANSWERS AND EXPLANATIONS

1. B is the right answer. Since 43,560 square feet equals 1 acre, you need to divide 217,800 by 43,560 to find how many acres there are in 217,800 square feet. $217,800 / 43,560 = 5$, so the answer is 5 acres.

   Problem: $217,800$ square feet = ____ acres

   We know that $43,560$ square feet = 1 acre.

   So, $217,800 / 43,560$ square feet = 5 acres

2. D is the right answer. Since 1 gill equals 0.25 pints, you need to multiply 0.25 by 2 to find how many pints there are in 2 gills. $0.25 \times 2 = 0.5$, so the answer is 0.5 pints.

   Problem: 2 gills = ____ pints

   We know that 1 gill = 0.25 pints.

   So, $2(1 \text{ gill}) = 2 (0.25 \text{ pints})$

   2 gills = 0.5 pints

3. D is the right answer. Since 1 kilogram equals 2.205 pounds, you need to multiply 2.205 by 5 to find how many pounds there are in 5 kilograms. $2.205 \times 5 = 11.025$, so the answer is 11.025 pounds.

   Problem: 5 kilograms = _____ pounds

   We know that 1 kilogram = 2.205 pounds.

   So, $5(1 \text{ kilogram}) = 5 (2.205 \text{ pounds})$

   5 kilograms = 11.025 pounds

4. B is the right answer. Since 1 gallon equals 3.785 liters, you need to multiply 3.785 by 5 to find how many liters there are in 5 gallons. $3.785 \times 5 = 18.925$, so the answer is 18.925 liters.

   Problem: 5 gallons = ____ liters

   We know that 1 gallon = 3.785 liters.

   So, $5(1 \text{ gallon}) = 5 (3.785 \text{ liters})$

   5 gallons = 18.925 liters
5. C is the right answer. Since 1 slug equals 14.59 kilograms, you need to multiply 14.59 by 6 to find how many kilograms there are in 6 slugs. \(14.59 \times 6 = 87.54\) so, the answer is 87.54 kilograms.

**Problem:** 6 slugs = ____ kilograms

We know that 1 slug = 14.59 kilograms.

So, \(6(1 \text{ slug}) = 6(14.59 \text{ kilograms})\)

6 slugs = 87.54 liters

6. B is the right answer. Since 160 square rods equal 1 acre, you need to divide 40 by 160 to find how many acres there are in 40 square rods. \(40 / 160 = 0.25\) so, the answer is 0.25 acres.

**Problem:** 40 square rods = ____ acres

We know that 160 square rods = 1 acre.

So, \(40/160\) square rods = 0.25 acre

7. B is the right answer. Since 1 hogshead equals 63 gallons, you need to multiply 63 by 8 to find how many gallons there are in 8 hogsheads. \(63 \times 8 = 504\) so, the answer is 504 gallons.

**Problem:** 8 hogsheads = ____ gallons

We know that 1 hogshead = 63 gallons.

So, \(8(1 \text{ hogshead}) = 8(63 \text{ gallons})\)

8 hogsheads = 504 gallons

8. D is the right answer. Since 1 pint equals 0.5 quarts, you need to divide 25 by 0.5 to find how many pints there are in 25 quarts. \(5 / 0.5 = 50\) so, the answer is 50 pints.

**Problem:** 25 quarts = ____ pints

We know 0.5 quarts equal 1 pint.

So, \(25/0.5\) quarts = 50 pints
9. B is the right answer. Since 16 ounces equals 1 pound, you need to divide 32 by 16 to find how many pounds there are in 32 ounces. \( \frac{32}{16} = 2 \) so, the answer is 2 pounds.

   Problem: 32 ounces = _____ pounds
   
   We know that 16 ounces = 1 pound.
   
   So, \( \frac{32}{16} \) ounces = 2 pounds

10. C is the right answer. Since 1 yard equals 36 inches, you need to multiply 36 by 3 to find how many inches there are in 3 yards. \( 36 \times 3 = 108 \) so, the answer is 108 inches.

   Problem: 3 yards = _____ inches
   
   We know that 1 yard = 36 inches.
   
   So, \( 3 \times 1 \) yard = 3 (36 inches)
   
   3 yards = 108 inches

11. D is the right answer. Since 1 kilometer equals 1000 meters, you need to multiply 1000 by 0.25 to find how many meters there are in 0.25 kilometers. \( 1000 \times 0.25 = 250 \) so, the answer is 250 meters.

   Problem: 0.25 kilometers = _____ meters
   
   We know that 1 kilometer = 1000 meters.
   
   So, \( 0.25 \times 1 \) kilometer = 0.25 (1000 meters)
   
   0.25 kilometer = 250 meters

12. A is the right answer. Since 10 square chains equals 1 acre, you need to divide 80 by 10 to find how many acres there are in 80 square chains. \( \frac{80}{10} = 8 \) so, the answer is 8 acres.

   Problem: 80 square chains = _____ acres
   
   We know that 10 square chains = 1 acre.
   
   So, \( \frac{80}{10} = 8 \) acres
The equivalents needed to solve problems 13–18 are not directly listed in the table. So, you need to use 2 equivalents with a common metric.

13. A is the right answer. In the table, there is no equivalent between grams and pounds, but the table shows that 1 kilogram = 1000 grams and 1 kilogram = 2.205 pounds. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many pounds are in 2000 grams.

Problem: 2,000 grams = _____ pounds

We know that 1,000 grams = 1 kilogram. To find how many kilograms are in 2,000 grams, divide 2,000 by 1,000. This equals 2. So, 2,000 grams are equivalent to 2 kilograms.

\[ 1,000 \text{ grams} = 1 \text{ kilogram} \]
\[ \frac{2,000}{1,000} \text{ grams} = 2 \text{ kilograms} \]

We also know that 1 kilogram = 2.205 pounds. To find how many pounds are in 2 kilograms, multiply 2 by 2.205. The answer is 4.410. So, 2,000 grams equal 4.410 pounds.

\[ 1 \text{ kilogram} = 2.205 \text{ pounds} \]
\[ 2(1 \text{ kilogram}) = 2(2.205 \text{ pounds}) \]
\[ 2 \text{ kilograms} = 4.410 \text{ pounds} \]

14. C is the right answer. In the table, there is no equivalent between slugs and grams, but the table shows that 1 slug = 14.59 kilograms and 1 kilogram = 1000 grams. The common metric in both equivalents is kilograms. So, use these 2 equivalents to find how many grams are in 5 slugs.

Problem: 5 slugs = _____ grams

We know that 1 slug = 14.59 kilograms. To find how many kilograms are in 5 slugs, multiply 14.59 by 5. This equals 72.95. So, 5 slugs are equivalent to 72.95 kilograms.

\[ 1 \text{ slug} = 14.59 \text{ kilograms} \]
\[ 5(1 \text{ slug}) = 3(14.59 \text{ kilograms}) \]
\[ 5 \text{ slugs} = 72.95 \text{ kilograms} \]

We also know that 1 kilogram = 1000 grams. To find how many grams are in 72.95 kilograms, multiply 72.95 by 1000. The answer is 72,950. So, 5 slugs equal 72,950 grams.

\[ 1 \text{ kilogram} = 1000 \text{ grams} \]
\[ 72.95(1 \text{ kilogram}) = 72.95(1000 \text{ grams}) \]
\[ 72.95 \text{ kilograms} = 72,950 \text{ grams} \]
15. D is the right answer. In the table, there is no equivalent between miles and fathoms, but the table shows that 1 mile = 5,280 feet and 1 fathom = 6 feet. The common metric in both equivalents is feet. So, you need to use these 2 equivalents to find how many fathoms are in 3 miles.

Problem: 3 miles = _____ fathoms

We know that 1 mile equals 5,280 feet. To find how many feet are in 3 miles, multiply 3 by 5,280. This equals 15,840. So, 3 miles is equivalent to 115,840 feet.

\[
1 \text{ mile} = 5,280 \text{ feet} \\
3(1 \text{ mile}) = 3(5,280 \text{ feet}) \\
3 \text{ miles} = 15,840 \text{ feet}
\]

We also know that 1 fathom equals 6 feet. To find how many fathoms are in 15,840 feet divide 15,840 by 6. The answer is 2,640. So, 3 miles equals 2,640 fathoms.

\[
6 \text{ feet} = 1 \text{ fathom} \\
15,840/6 = 2,640 \text{ fathoms}
\]

16. A is the right answer. In the table, there is no equivalent between chains and furlongs, but the table shows that 0.25 chains = 1 rod and 40 rods = 1 furlong. The common metric in both equivalents is rods. So, you need to use these 2 equivalents to find how many furlongs are in 30 chains.

Problem: 30 chains = ____ furlongs

We know that 0.25 chains equal = 1 rod. To find how many rods are in 30 chains, divide 30 by 0.25. This equals 120. So, 30 chains is equivalent to 120 rods.

\[
0.25 \text{ chains} = 1 \text{ rod} \\
30/0.25 \text{ chains} = 120 \text{ rods}
\]

We also know that 40 rods equals 1 furlong. To find how many furlongs are in 120 rods, divide 120 by 40. The answer is 3. So, 30 chains is equivalent to 3 furlongs.

\[
40 \text{ rods} = 1 \text{ furlong} \\
120/40 \text{ rods} = 3 \text{ furlongs}
\]

17. B is the right answer. In the table, there is no equivalent between quarts and gills, but the table shows that 1 pint = 0.5 quarts and 1 gill = 0.25 pints. The common metric in both equivalents is pints. So, use these 2 equivalents to find how many gills are in 30 quarts.

Problem: 30 quarts = _____gills

We know that 0.5 quarts = 1 pint. To find how many pints are in 30 quarts, divide 30 by 0.5. This equals 60. So, 30 quarts are equivalent to 60 pints.

\[
0.5 \text{ quarts} = 1 \text{ pint} \\
30/0.5 \text{ quarts} = 60 \text{ pints}
\]

We also know that 0.25 pints = 1 gill. To find how many gills are in 60 pints, divide 60 by 0.25. The answer is 240. So, 30 quarts equal 240 gills.

\[
0.25 \text{ pints} = 1 \text{ gill} \\
60/0.25 \text{ pints} = 240 \text{ gills}
\]
18. A is the right answer. In the table, there is no equivalent between square chains and square feet but the table shows that 1 acre = 10 square chains and 1 acre = 43,560 square feet. The common metric in both equivalents is acre. So, you need to use these 2 equivalents to find how many square feet are in 15 square chains.

Problem: 15 square chains = _____ square feet

We know that 1 acre equals 10 square chains. To find how many acres are in 15 square chains, divide 15 by 10. This equals 1.5. So, 15 square chains is equivalent to 1.5 acres.

10 square chains = 1 acre
15/10 = 1.5 acres

We also know that 1 acre equals 43,560 square feet. To find how many square feet are in 1.5 acres, multiply 1.5 by 43,560 square feet. The answer is 65,340. So, 15 square chains equal 65,340 square feet.

1 acre = 43,560 square feet
1.5 (1 acre) = 1.5(43,560 square feet)
1.5 acres = 65,340 square feet

19. B is the right answer. Since 1 mile/minute equals 88 feet/second, you need to multiply 88 by 0.5 to find how many feet/second there are in 0.5 mile/minute. 88 x 0.5 = 44 so, the answer is 44 feet/second.

Problem: 0.5 mile/minute = _____ feet/second

We know that 1 mile/minute = 88 feet/second. So, 0.5 (1 mile/minute) = 0.5(88feet/second)

0.5 mile/minute = 44 feet/second