



Cast-R Test Prep

Practice Tests and Answer Keys

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PRACTICE TEST #1

FOR

MECHANICAL CONCEPTS

PRACTICE 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 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.

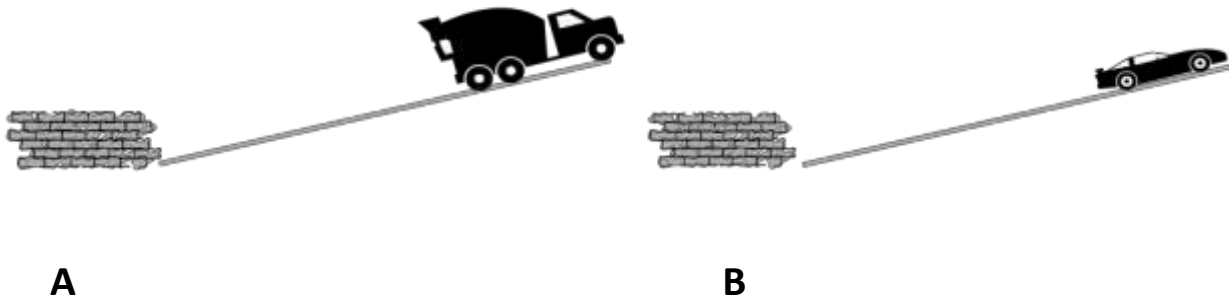
The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle of your choice of A, B, or C.

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

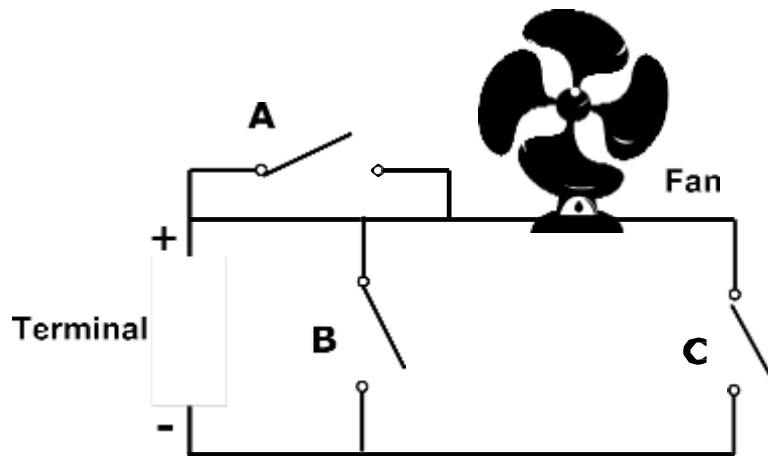
- Practice by completing all 26 test questions
- Be sure to set a timer before beginning
- Aim to finish within 12 minutes to achieve the pace needed to complete within the time allowed for the actual EEI assessment
- Do not look at the answers that follow at the end until you have completed all the test questions

MECHANICAL CONCEPTS PRACTICE TEST

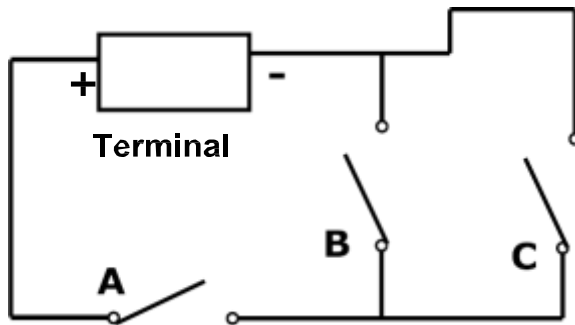
1. If the vehicle's brakes fail simultaneously, which vehicle will hit the brick wall with greater force?
(If equal, mark C.)



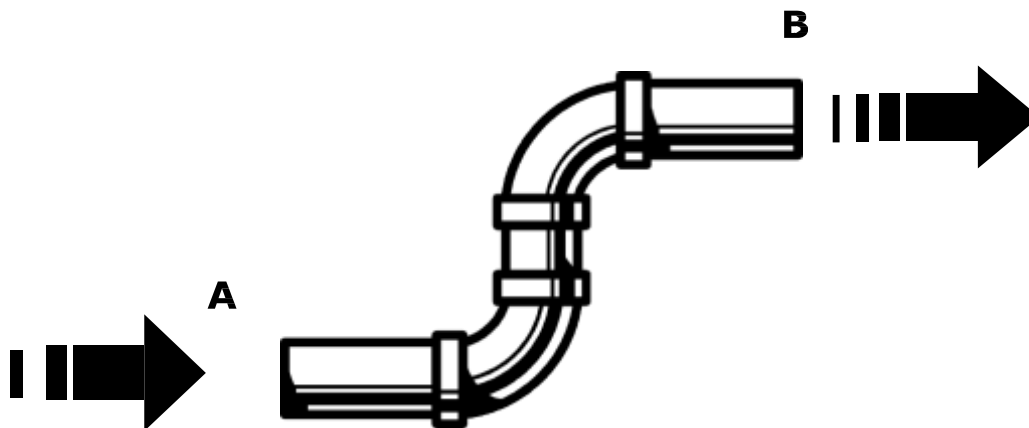
2. Which switch (A, B, or C) should be closed for the fan to operate?



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?



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

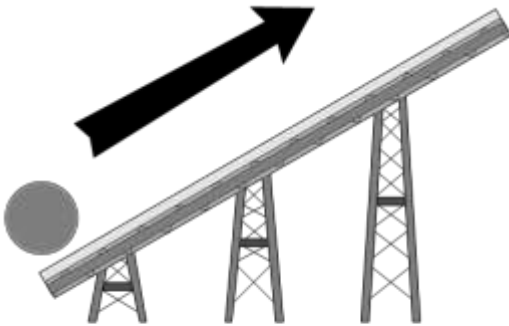


A

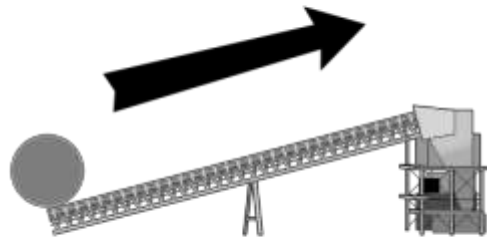


B

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.)

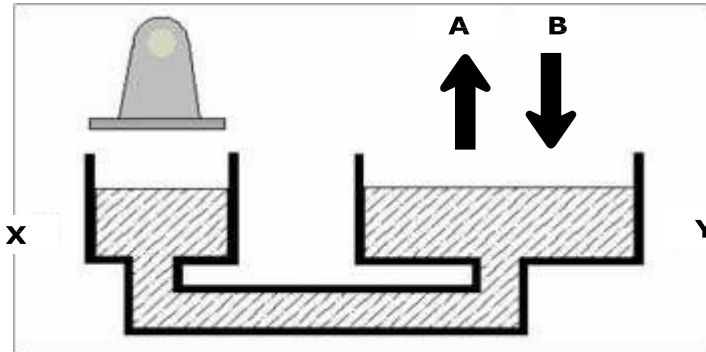


A

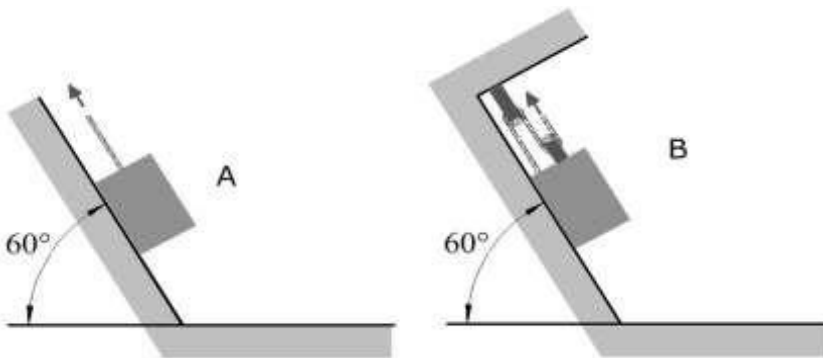


B

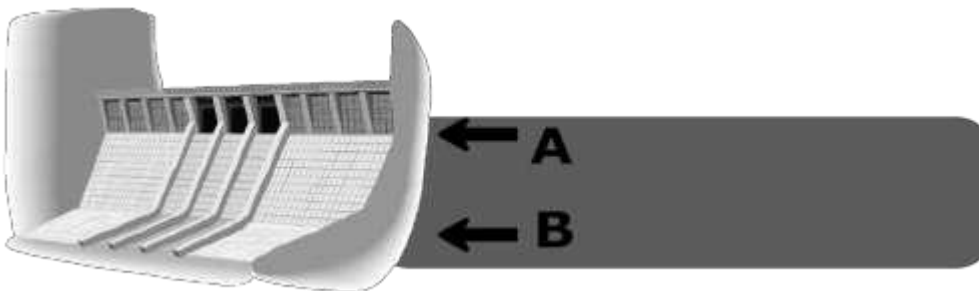
7. As the weight compresses on the surface of the fluid on the left (at X), will the level of the fluid in the right tank (Y) move up (A) or down (B) or stay constant level (C)?



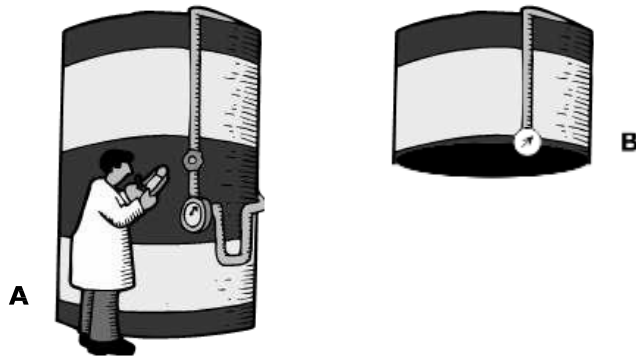
8. Which 25-pound load (A or B) has the greatest force applied to the rope to keep the load in its current position? (If equal, mark C.)



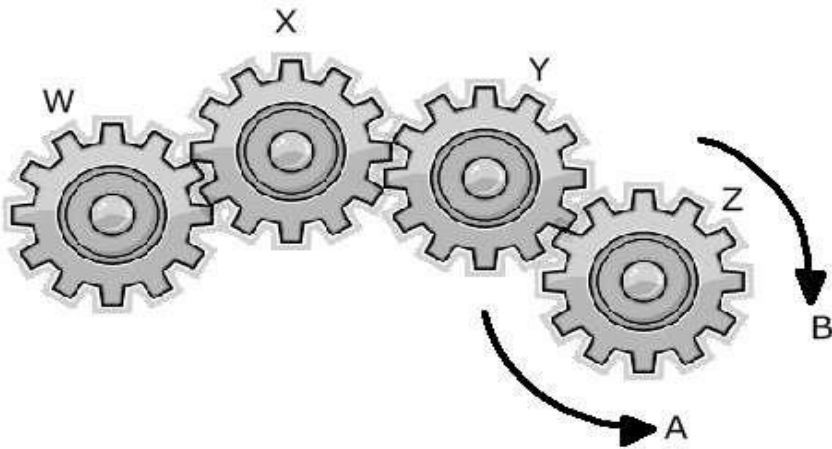
9. In the picture of the dam shown below, will the force of the water on the dam be greater at A or B? (If equal, mark C.)



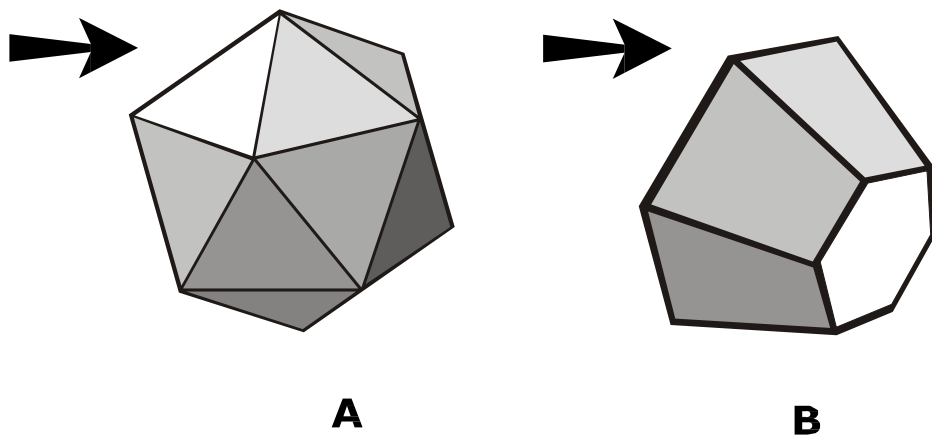
10. Both tanks contain the same gas that is under pressure. Tank A has approximately twice the volume of Tank B. If both tanks show the same pressure reading, which tank contains a greater quantity of the gas?



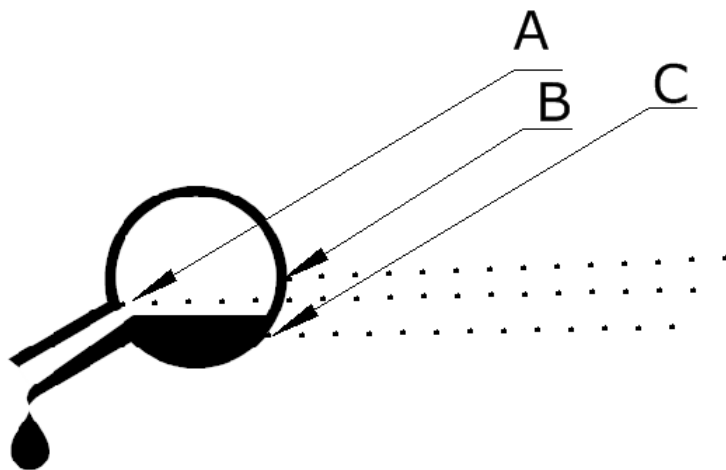
11. When the gear W moves clockwise, will gear Z move in direction A or B? (If no movement, mark C.)



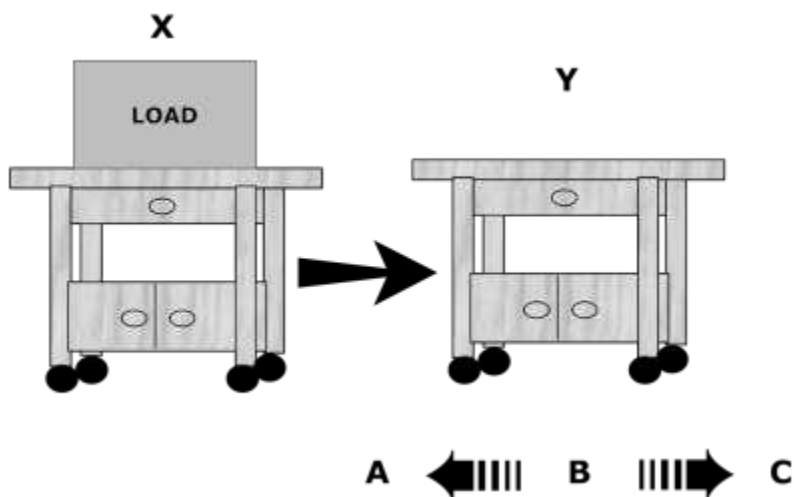
12. Object A and Object B are both given a push measuring the same force. Which object is more likely to travel further (A or B) along a flat surface? (If equal, mark C)



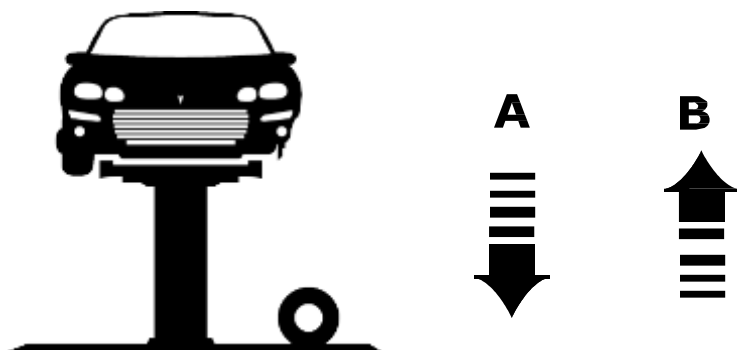
13. The beaker shown below has fallen on its side. At what point, (A, B, or C) will the liquid no longer drain out of the spout?



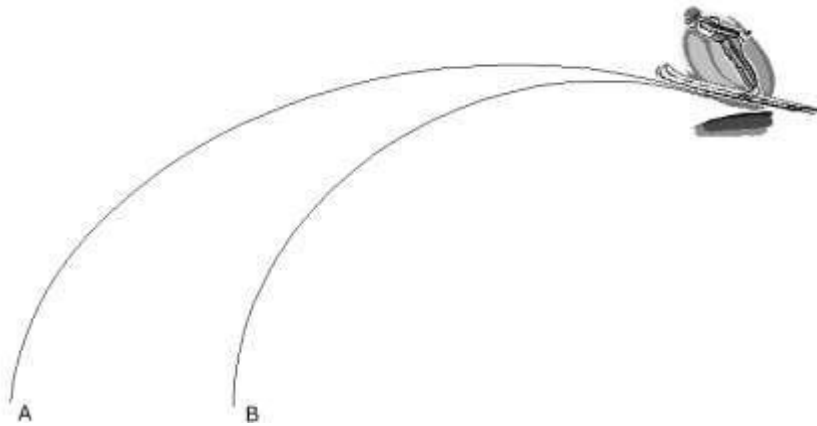
14. The carts X and Y have the same mass. When a load is placed upon cart X and it is then pushed into cart Y, will cart Y travel leftward (A), nowhere (B), or rightward (C)?



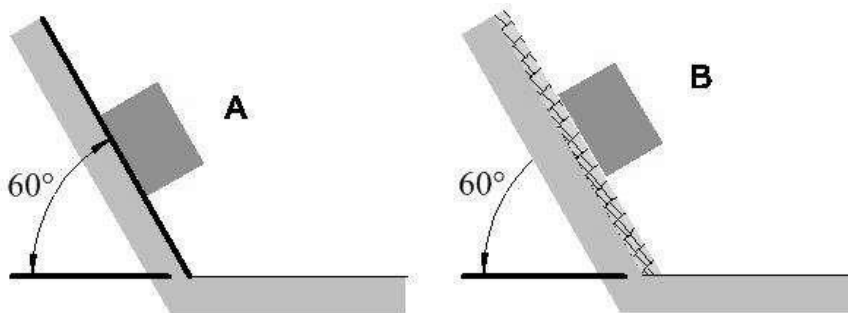
15. A hydraulic lift is used to raise the car to change its tire. If the hydraulic pressure in the lift begins to lower, will the lift move in direction A or B? (If equal, mark C.)



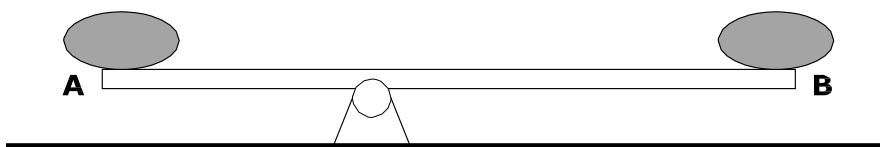
16. When the skier increases his speed at the jump off point, will he more likely increase his overall jump distance (A) or decrease his overall jump distance (B)? (If equal, mark C.)



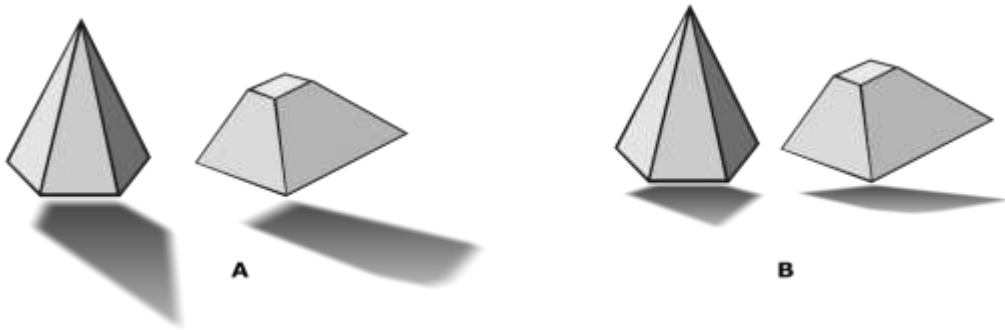
17. Box A and Box B have the same mass. Both are placed upon an incline of 60 degrees and released at the same time. The surface beneath Box A is glass. The surface beneath Box B is cobblestone. Will Box A or B reach the bottom first? (If equal, mark C.)



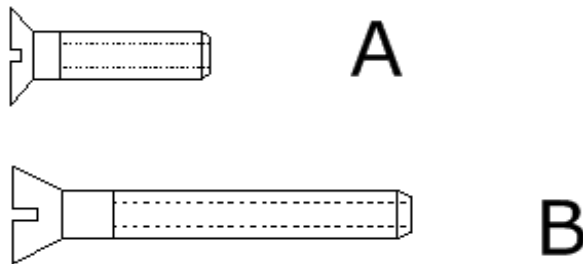
18. The mass applied at point A is equal to the mass applied at point B. Which side, (A or B) will move lower? (If equal, mark C.)



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 more water flow through valve A or B? Both compression valves are the same size and connected to water lines with the same size and water pressure. (If equal, mark C.)



A



B

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.)

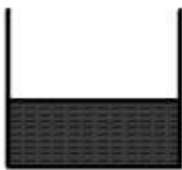


A



B

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.)

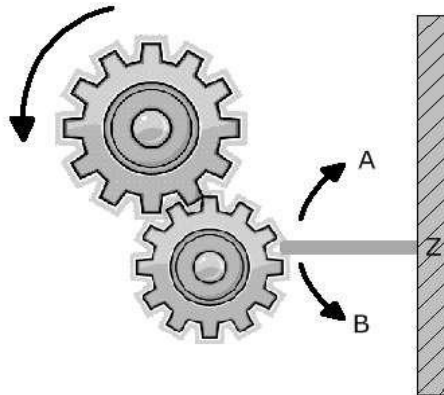


A

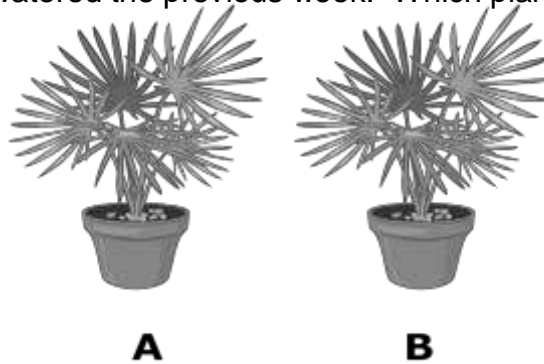


B

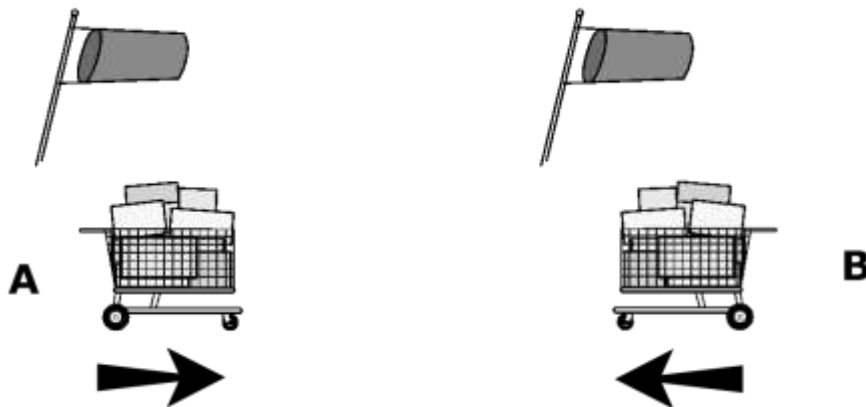
24. As the top gear moves counterclockwise, will the flexible bar that is secured to the wall at Z, move upward (A) or downward (B)? (If equal, mark C.)



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.)



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.)



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 #2

FOR

MECHANICAL CONCEPTS

PRACTICE 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 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.

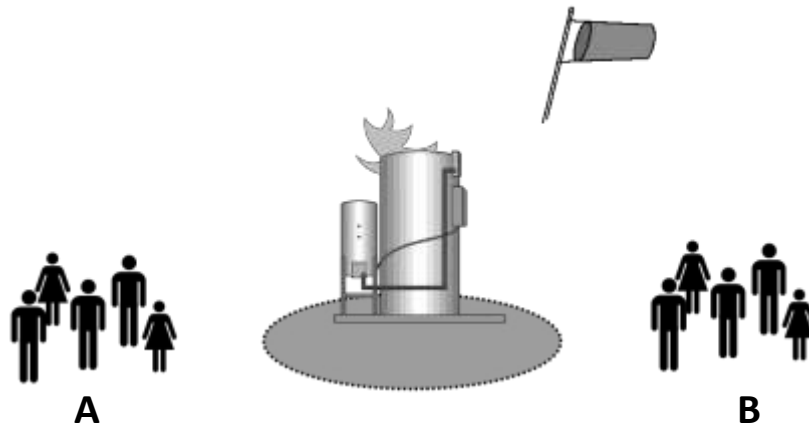
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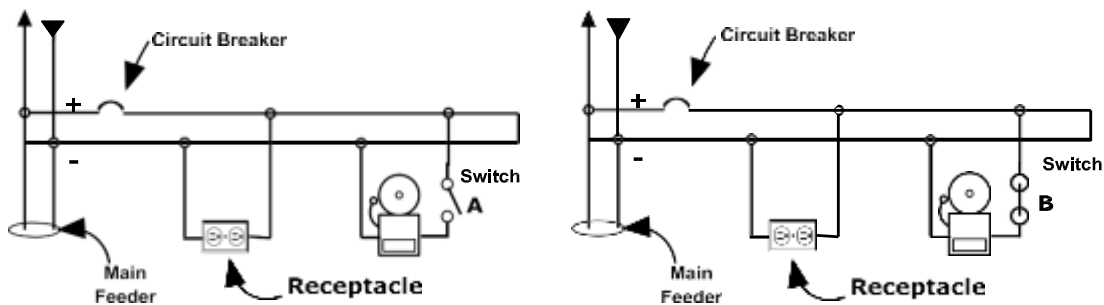
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MECHANICAL CONCEPTS PRACTICE TEST

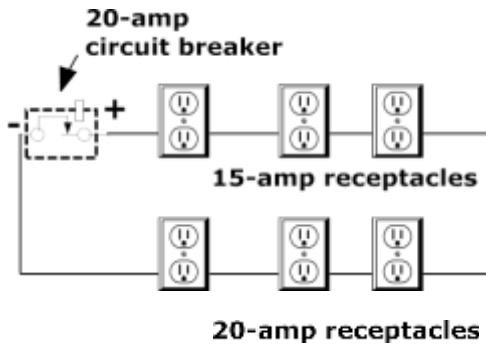
1. If the tank shown ruptures and the windssock points in the direction shown, which group of people are in the safest evacuation area (A or B)? (If equal, mark C.)



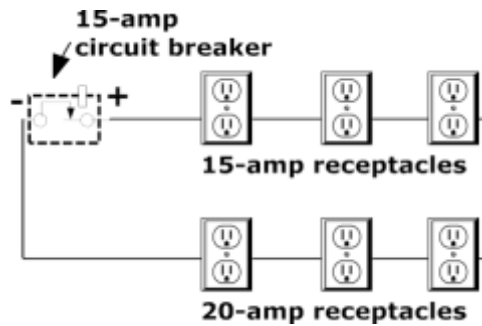
2. Should the switch be in position (A) or position (B) for the receptacle to operate? (If the receptacle will operate when the switch is in either position, mark C.)



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).

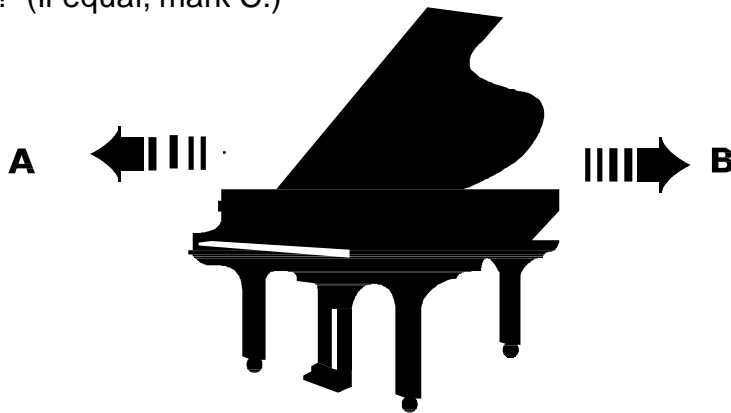


A

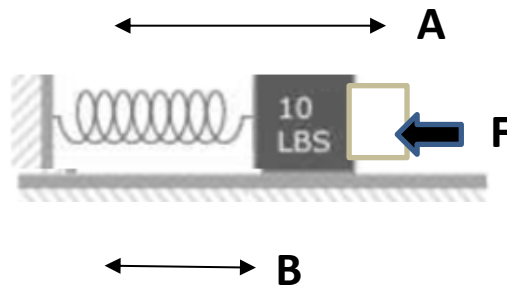


B

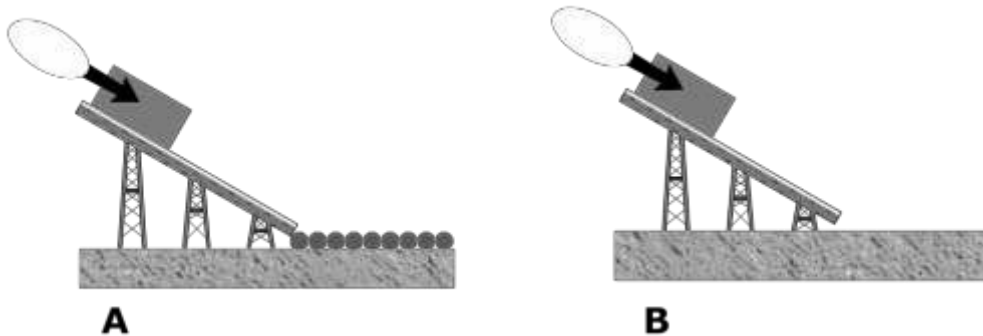
4. As the piano is played, will a person standing at position (A) or position (B) hear a greater sound intensity? (If equal, mark C.)



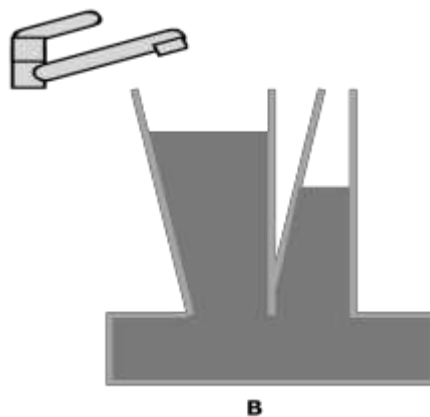
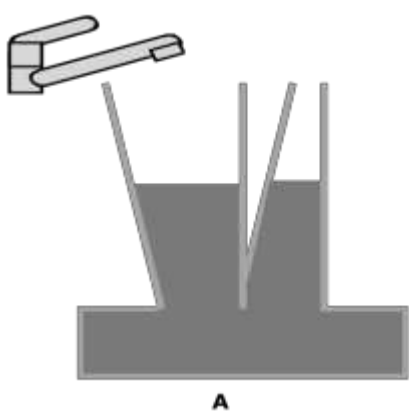
5. The force applied is large enough to move the object weighing 10 LBS toward the wall, which in turn, compresses the spring. If the force is released suddenly after the spring is compressed, will the object move back to the right, for a distance further from the wall than it was originally, (A), or will it more likely move only back to its original position and stop (B)? (If neither applies, mark C.)



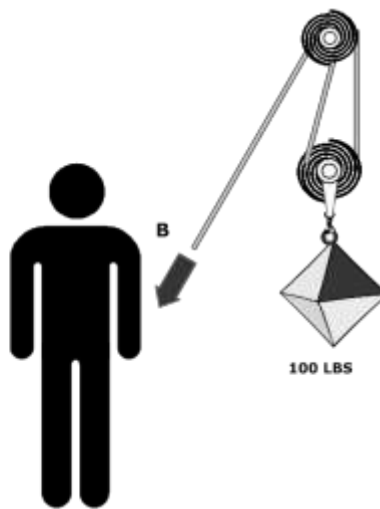
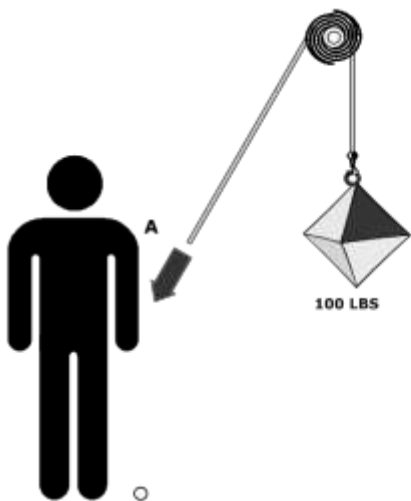
6. Each conveyor belt moves the same load at the same speed down an identical incline. When the load gets to the bottom, will it stop more easily on the roller surface shown in (A) or the flat surface shown in (B)? (If equal, mark C.)



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.)



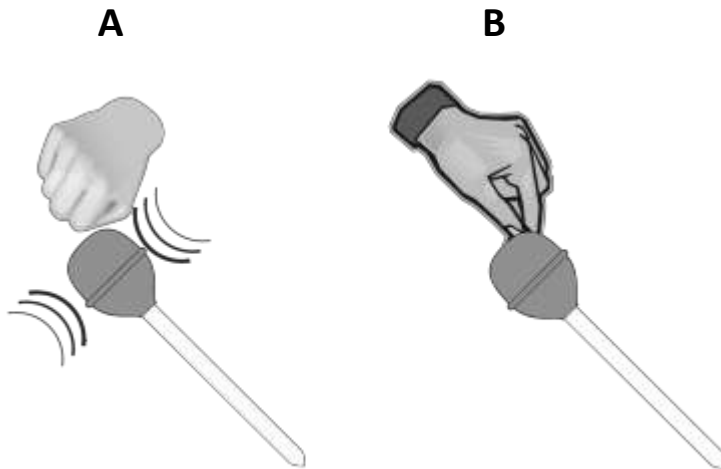
8. Which person (A or B) will have to apply less force to the rope to lift the 100-pound load, given the pulley arrangements shown? (If equal, mark C.)



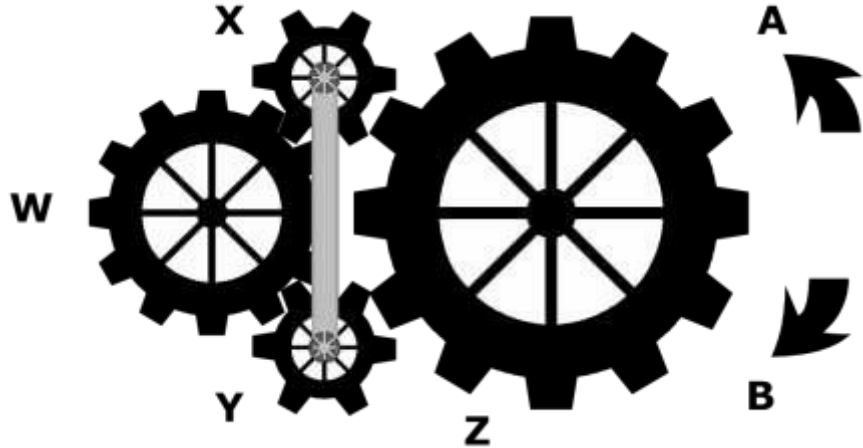
9. Both rooms are the same temperature to begin with, before the boiler flame is activated. Which room, (A or B) will likely become hotter when the boiler is activated and water continuously flows through the piping in the direction of the arrow? (If equal, mark C.)



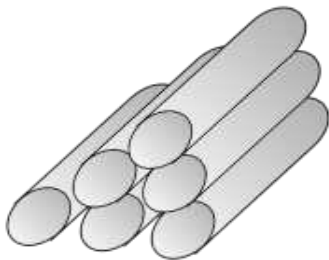
10. Squeeze bulb A is squeezed and then released while the tip is in liquid. Squeeze bulb B is not squeezed. Which bulb's syringe will pick up more liquid (A or B)? (If equal, mark C.)



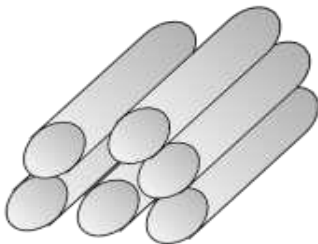
11. When the gear W moves clockwise, will gear Z move in direction A or B? (If no movement, mark C.)



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

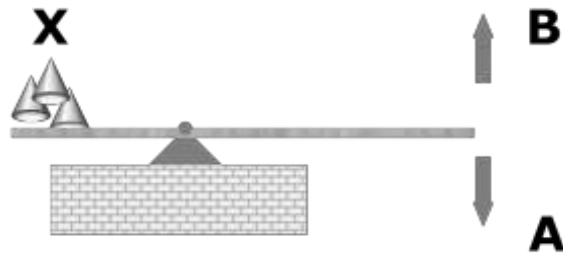


A

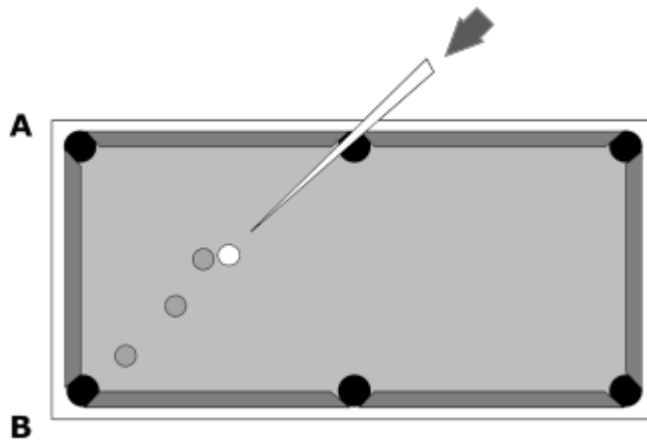


B

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 neither, 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).

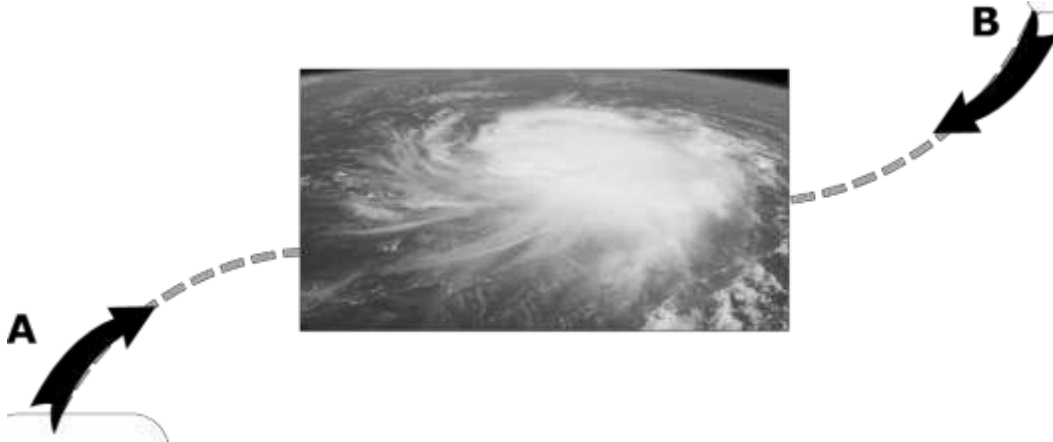


A



B

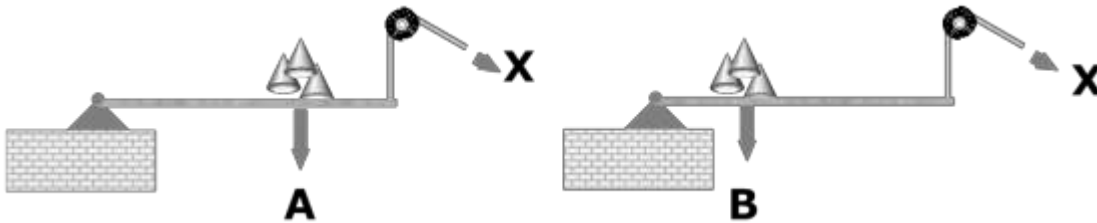
16. Based upon the satellite photo of the tropical storm (North Atlantic), has the storm more likely come from the direction (A) or (B)? (If each direction is an equal possibility, mark C.)



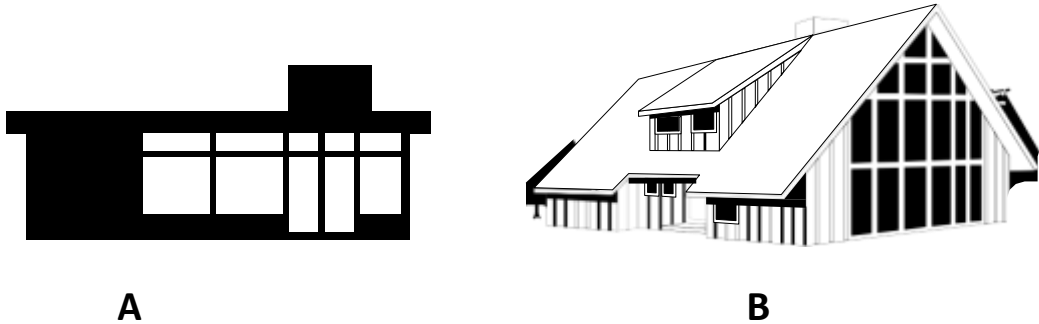
17. Airplanes A and B are identical and taking off under identical conditions (such as temperature, wind, altitude, load weight, and prop speed), except the runway beneath Airplane A is paved and the runway beneath Airplane B is grass. Which airplane (A or B) will lift off in less time? (If equal, mark C.)



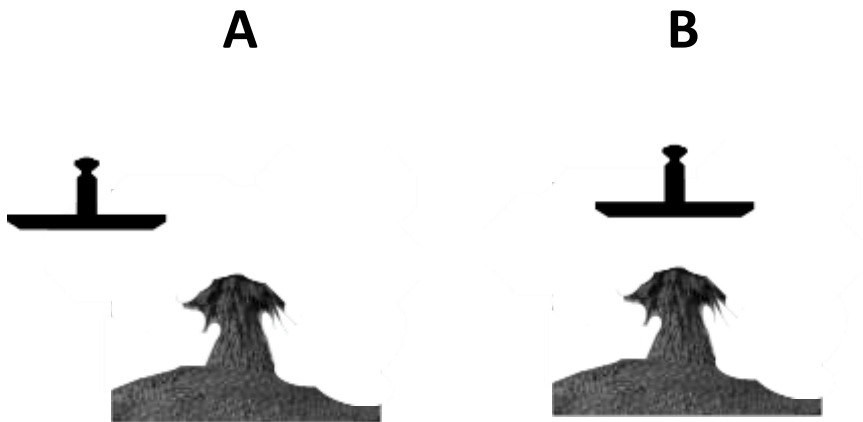
18. The mass loaded at point A is equal in weight to the mass loaded at point B. Will the force of the pull at X need to be larger when the load is at point (A) or point (B)? (If equal, mark C.)



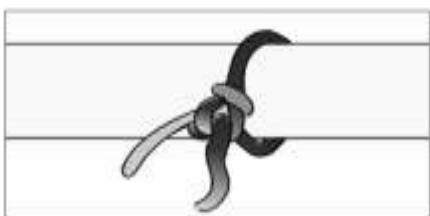
19. Which home's roof is more likely to withstand a heavy snow load without collapsing (A or B)? (If equal, mark C.)



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.)



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.)



Direction of Pull or Load

A

B

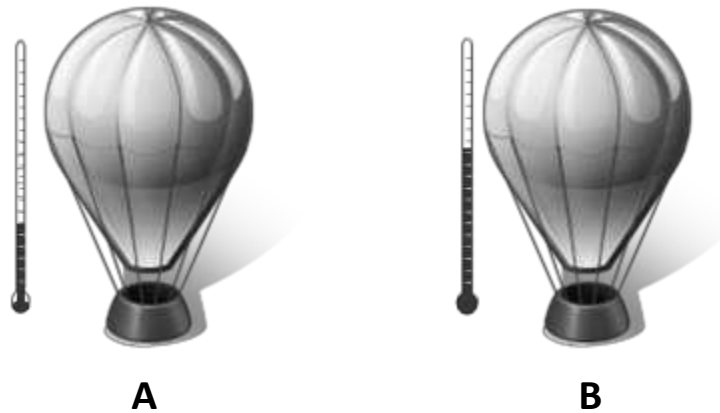
22. Both tugboats are the same size and capacity. Each tugboat has the same cargo load, same power, and same size crew, but shows a very different profile on the water. One tugboat operates in salt water and the other in fresh water. Is tugboat (A) or (B) working in fresh water? (If both tugboats could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



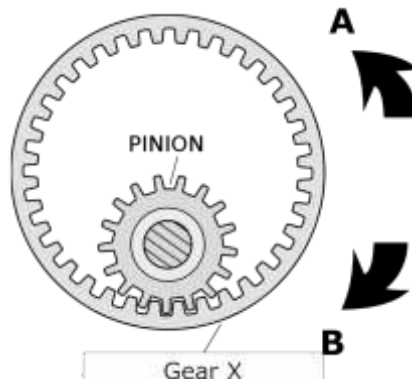
A

B

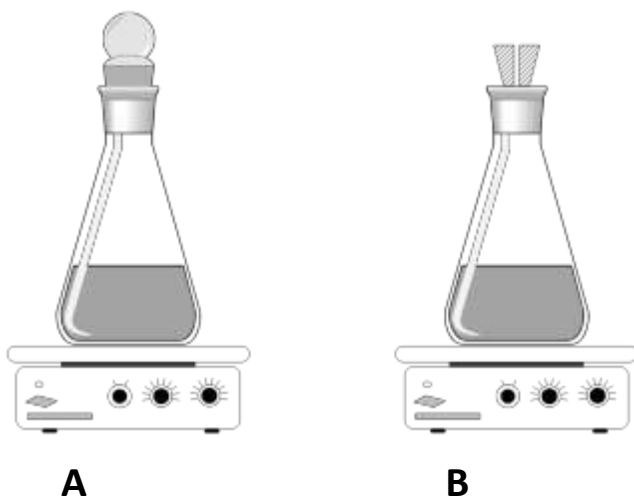
23. Balloons A and B are in different regions of the country. The outside temperature is lower in the region where Balloon A is located than it is where Balloon B is located. If the burner for each balloon remains on long enough for one balloon to begin to rise, which balloon rises faster (A or B)? (If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



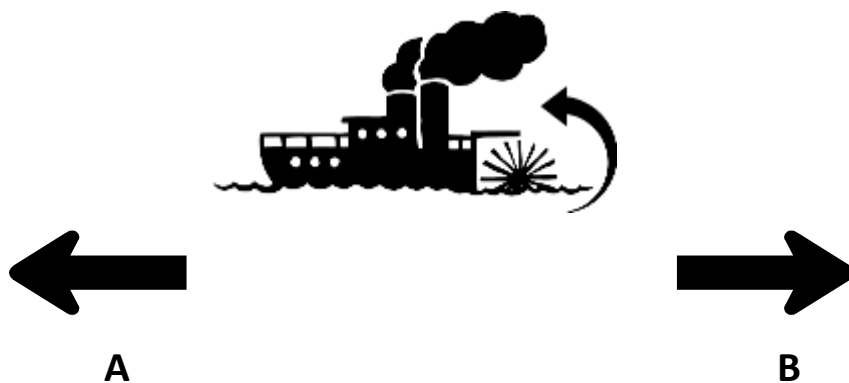
24. As the pinion gear moves clockwise, will the outer gear X move toward (A) or (B)? (If no change in movement of the outer gear X, mark C.)



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 beside 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 C. 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 first ball touched by the white ball receives a glancing blow that will send it toward a point between corner pockets A and B and send the white ball toward a point between corner pocket B and the side pocket near it. None of the other balls will be hit or move.
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 #3

FOR

MECHANICAL CONCEPTS

PRACTICE 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.

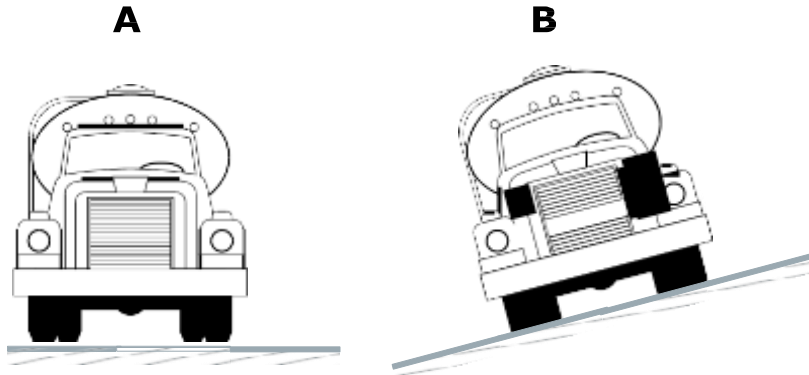
The questions you answer will be multiple-choice, A, B or C. The correct answer depends upon your accurate determination of the outcome posed by the situation. Set a timer for 20 minutes. Carefully consider each situational problem for the outcome that will occur. Select the appropriate answer on the answer sheet by completely filling in the circle of your choice of A, B, or C.

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

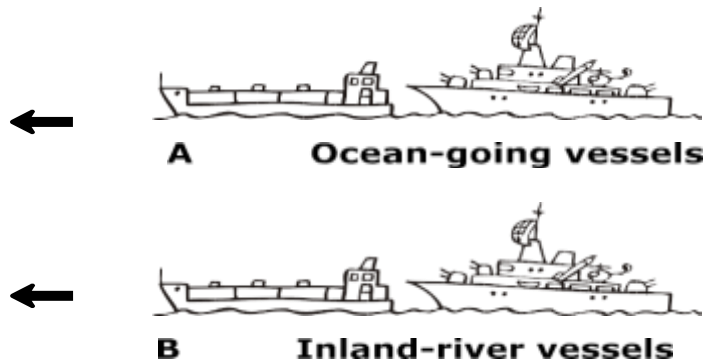
- Practice by completing all 26 test questions
- Be sure to set a timer before beginning
- Aim to finish within 12 minutes to achieve the pace needed to complete within the time allowed the actual EEI assessment
- Do not look at the answers provided at the end of this practice test until you have completed all the test questions.

MECHANICAL CONCEPTS PRACTICE TEST

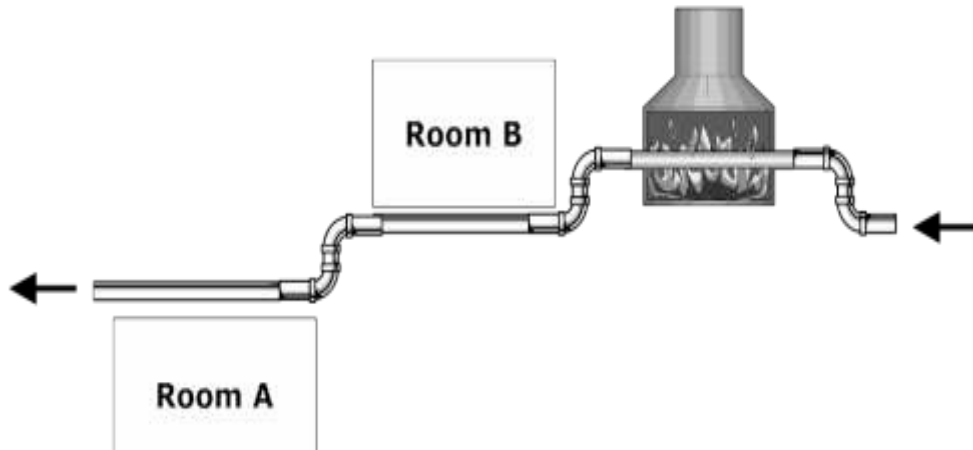
1. Each truck travels at a very high rate of speed without braking, through a curve to their right side. Which truck is less likely to veer off the road while negotiating the curve (A or B)? (If equal, mark C.)



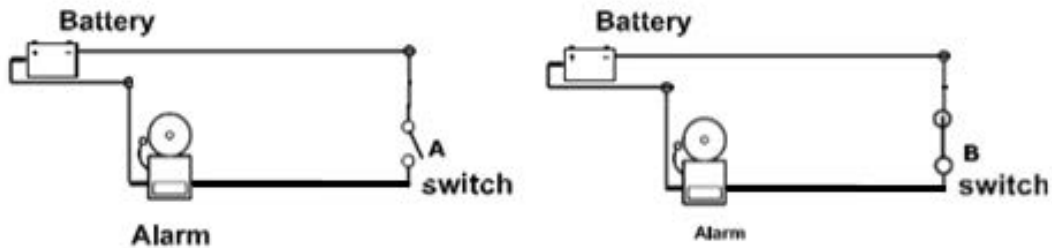
2. In each picture shown, the tugboat tows the military ship. Assume the tugboat and military ships all weigh the same; each tugboat operates at the same power; and in both situations, the distance to port is the same. Disregarding wind, currents and tides (all things being equal), which tug and ship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



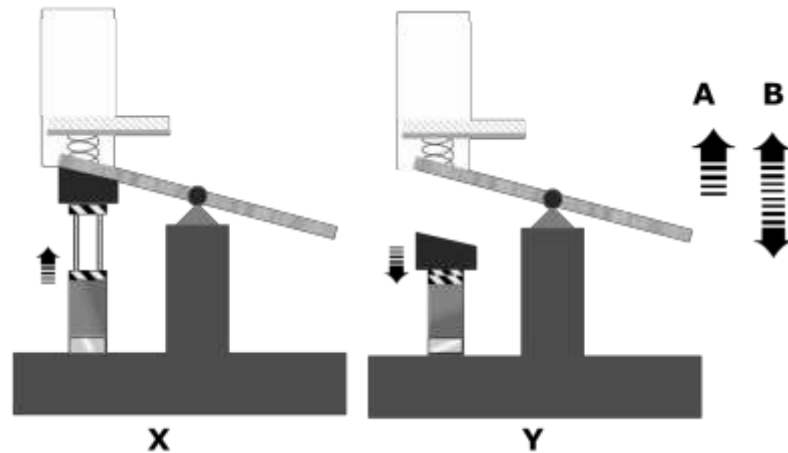
3. Water flows, in the direction of the arrows, through the piping when the boiler flame burns. Which room, (A or B) will likely remain the hottest when the boiler operates and water continuously flows through the piping in the direction of the arrow? (If equal, mark C.)



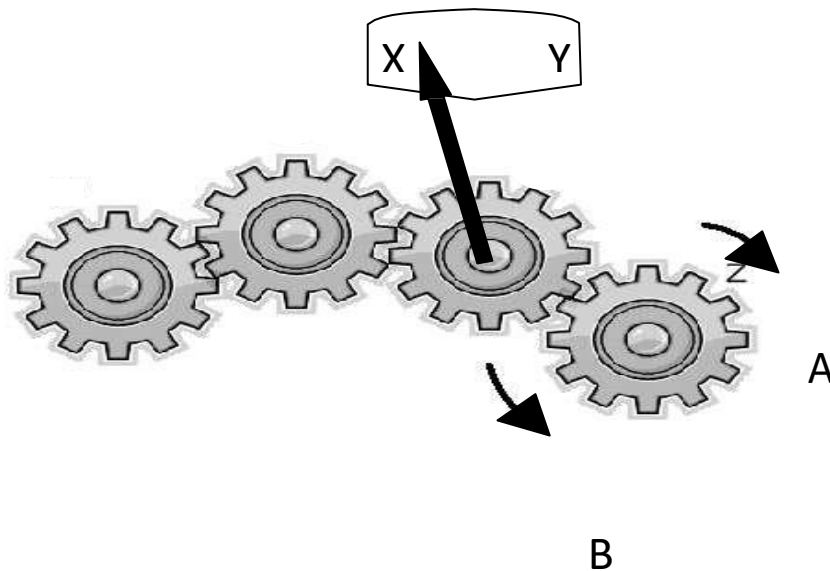
4. Should the switch be in position (A) or position (B) for the alarm to operate? (If the alarm will operate when the switch is in either position, mark C.)



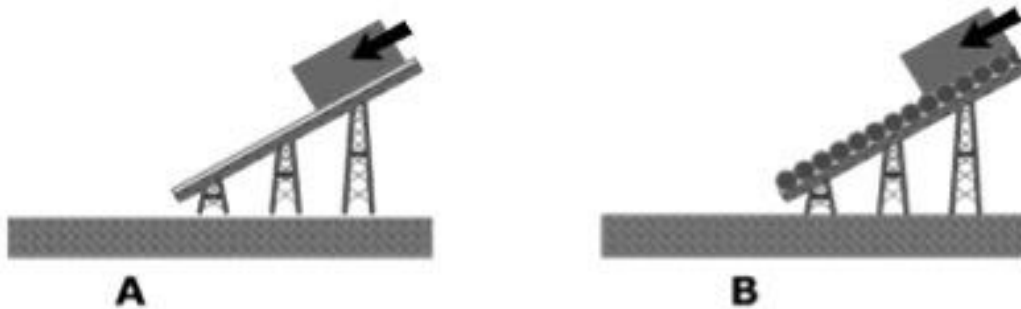
5. In view X, the lift has pushed upward on the lever to compress the spring that is attached to both the left end of the lever and a horizontal surface above the spring. If the lift suddenly drops, will the right end of the lever more likely move up (A) or up & down (B)? (If neither applies, mark C.)



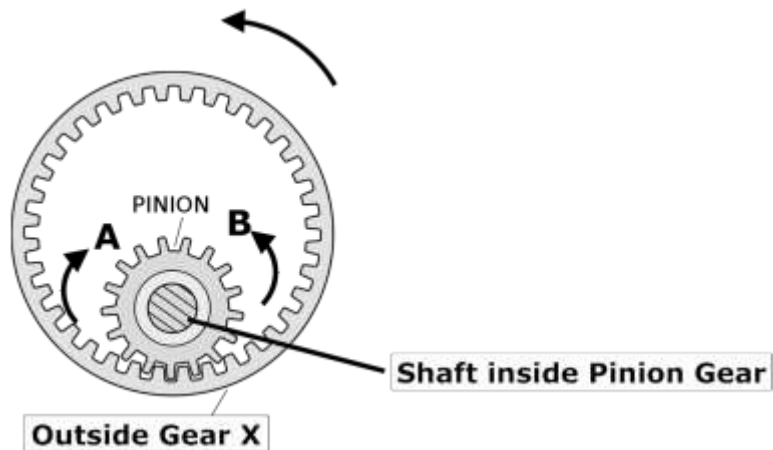
6. The indicator attached to Gear Y points to X. Which way must Gear Z rotate (A or B) in order for the indicator to point to X as shown? (If either rotation moves the indicator to X, mark C.)



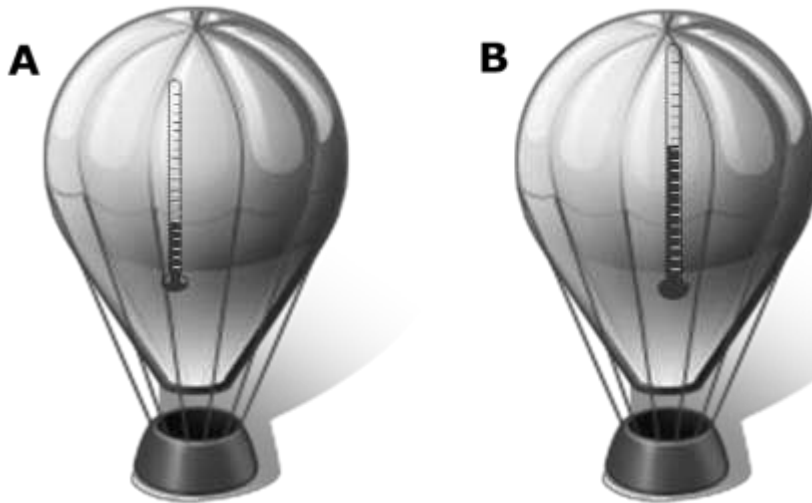
7. An equal push at the same speed propels an identical load down each slide toward the water. Both slides orient at the same angle and height relative to the water. The surface of the slide shown in A is a smooth, and in B, it is a roller surface. Will the splash at A or B be bigger? (If equal, mark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



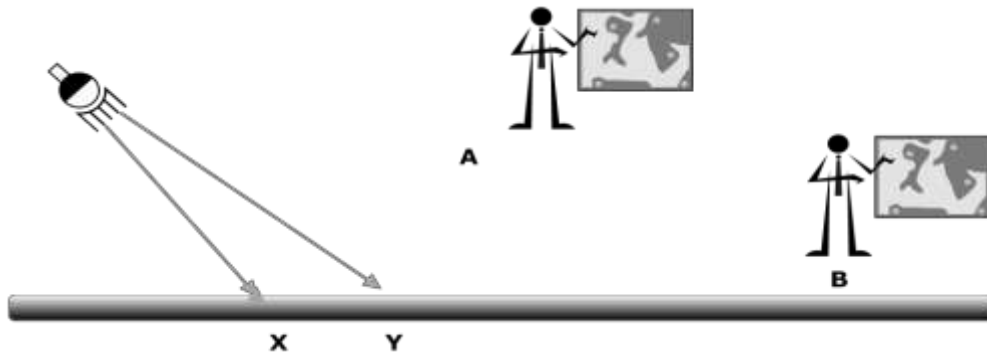
8. The outside gear X turns counterclockwise (in the direction of the outside arrow.) This enables the internal pinion gear to rotate. Will the shaft inside the pinion gear turn toward (A) or (B)? (If the shaft does not move, mark C.)



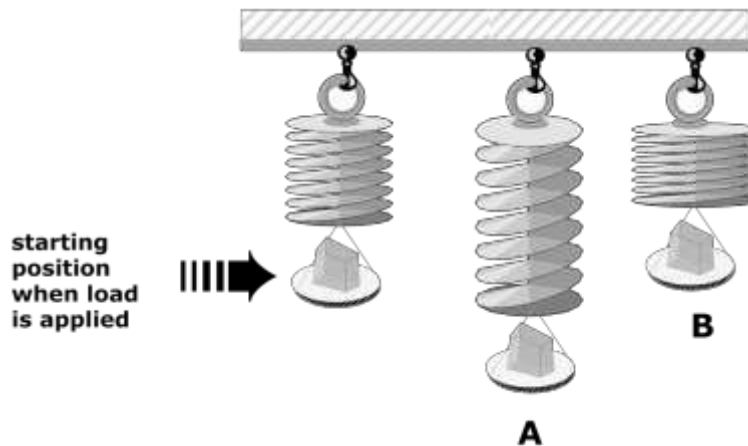
9. For each hot air balloon shown, the temperature inside each balloon displays on the thermometers. Based on the temperatures shown, which hot air balloon, (A or B), has the greatest internal pressure? (If equal, mark C.)



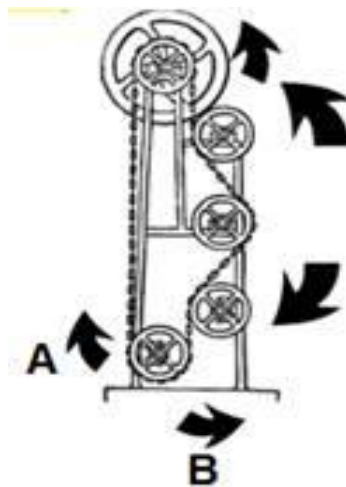
10. Light from the lamp reflects off the mirrored surface between points X and Y. Which person, (A or B) will have a better light on their display map? (If equal, mark C.)



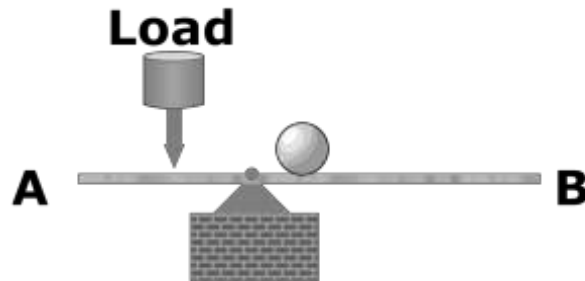
11. The picture shows a suspended coil spring in a starting position on the left. When a load much heavier than the spring, is loaded onto the suspended plate beneath the spring, how will the spring move? Will the spring more likely behave as shown in A or B? (If neither applies, mark C.)



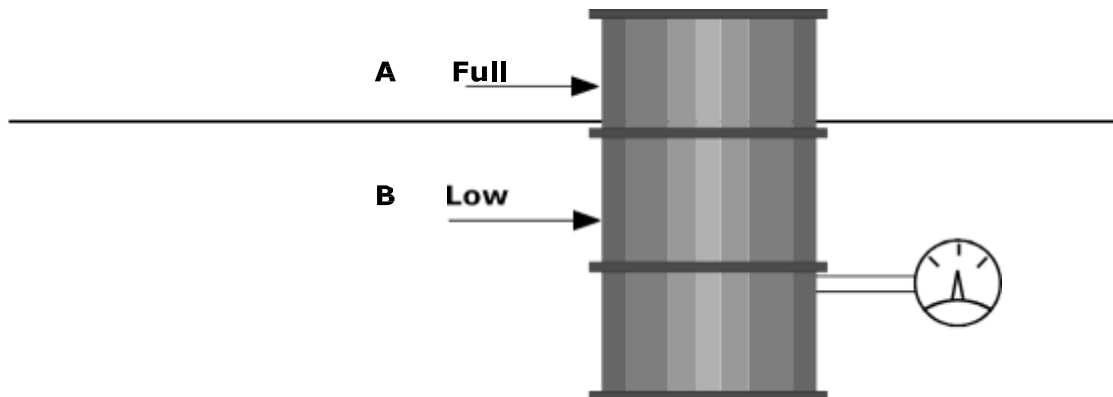
12. When the top gear moves counter-clockwise, will the chain around the bottom gear move in direction A or B? (If no movement, mark C.)



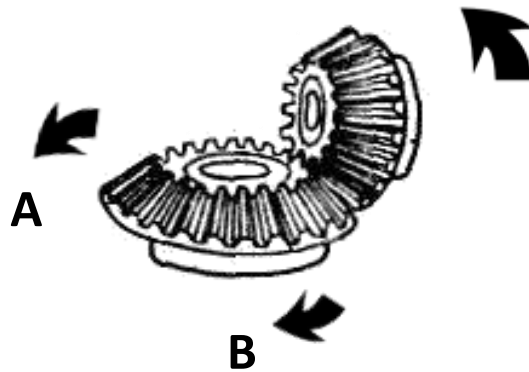
13. When the load applies downward upon the lever, will the ball move toward A or toward B? (If the ball remains unaffected by applying the load, mark C.)



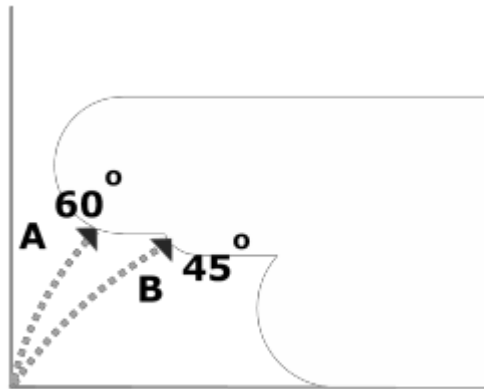
14. The drum of oil is full when filled to level A, and low when filled to level B. At which level will the pressure gage shown on the right side read the highest (A or B)? (If equal, mark C.)



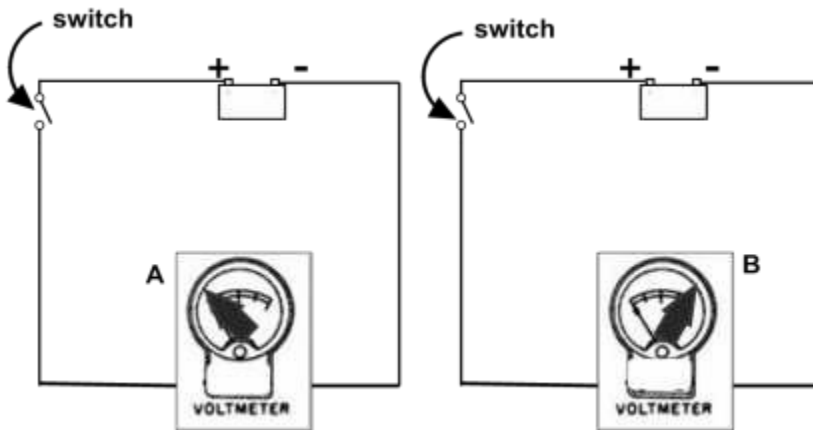
15. The top right gear moves, when a motor activates, in the direction of the arrow. Will this movement cause the bottom bevel gear to counterclockwise toward A, or clockwise toward B? (If the bottom bevel gear does not move, mark C).



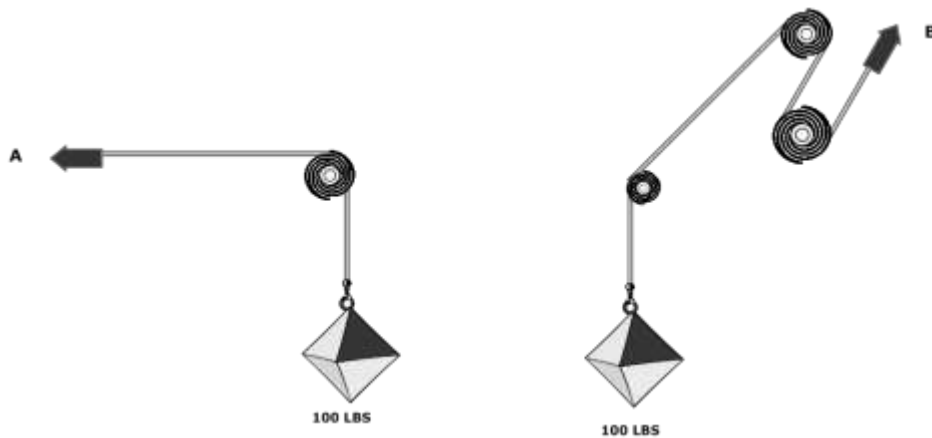
16. Two arrows are shot from the ground with the same force. Arrow A follows the 60° path (A). Arrow B follows the 45° path. Which arrow will obtain the greatest height before falling to the ground (A or B)? (If equal, mark C.)



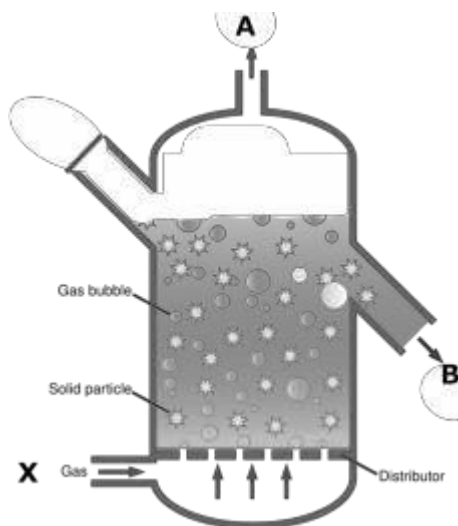
17. Each picture shows the same circuit, powered by a battery, with a voltmeter and an open switch. When the switch in each picture is closed, will the voltmeter more likely register at position A or B? (If neither, mark C.)



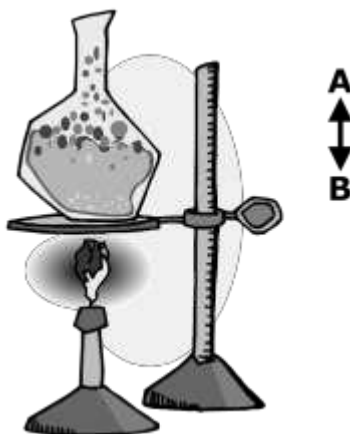
18. Will a motor pulling at point (A) or at point (B) require more horsepower to lift the 100-pound load? (If equal, mark C.)



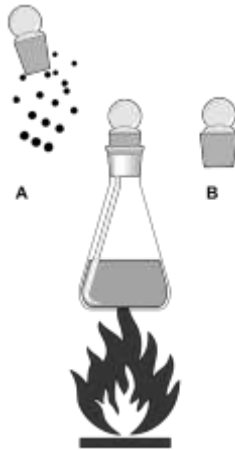
19. Gas enters the chamber from the pipe at X. Is gas more likely to escape from (A or B)? (If equal, mark C.)



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.)



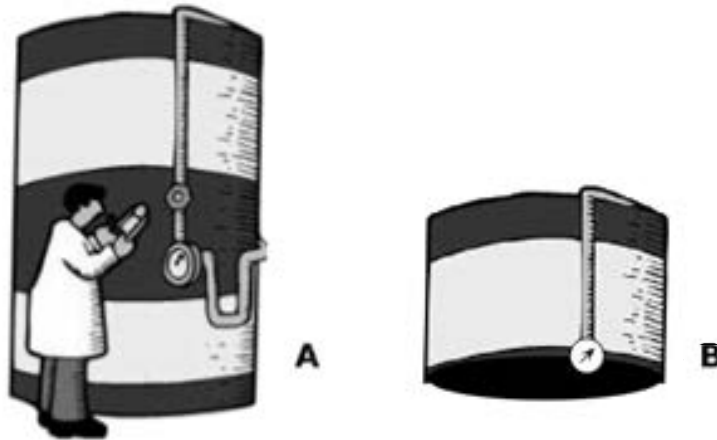
21. When the laboratory flask containing water heats until the water boils and steam forms inside the beaker, will the top of the flask grow tighter by expanding, like shown in (B), or will it more likely pop off, like shown in (A)? (If A or B could happen, or if nothing will happen, mark C.)



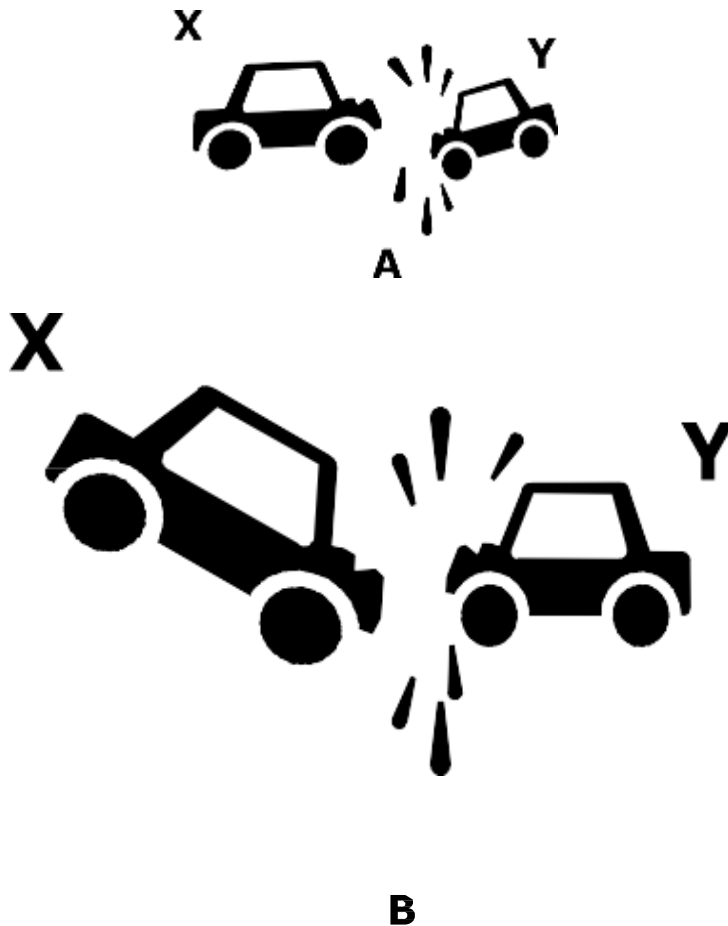
22. The steamboat's paddlewheel is turning in the direction shown. Will the steamboat move in direction A or B? (If neither, mark C.)



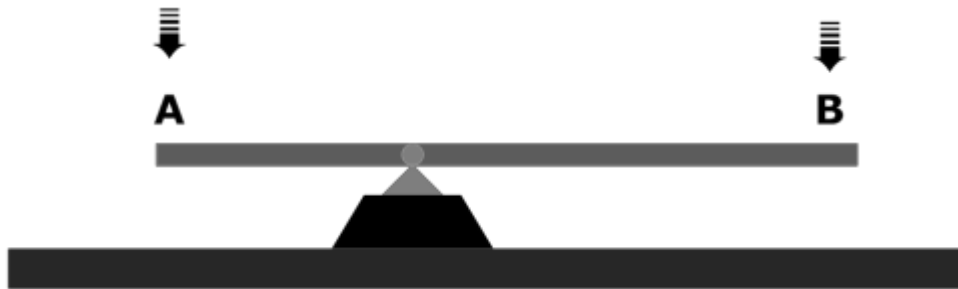
23. Tanks A and B contain the same type and volume of a gas. Will the laboratory technician find the pressure reading higher on Tank A or Tank B? (If equal, mark C.)



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 of the incline which acts to push the truck toward the inside of the curve made by a right turn.
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 beside it in the opposite direction. When the top right bevel 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 #1

FOR

READING COMPREHENSION

The Reading Comprehension selection test measures a candidate's ability to read and understand written materials. The test consists of two reading passages, each followed by several multiple-choice questions about the passage.

Directions

This is a test of your ability to read and understand written materials. This test includes two passages, each followed by questions about the passage. You are to read each passage and then answer the corresponding questions. All questions should be answered based strictly on the information presented in the passage. Do not answer on the basis of experiences you have had, or any information not specifically presented in the passage. To do so might result in choosing an incorrect answer.

For each question, select the best answer from the choices given. Answer all the questions regarding one passage before moving on to the next. You may look back at the passage while you answer the question.

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 completing all 14 test questions.
- ☐ Be sure to set a timer before beginning.
- ☐ Aim to finish within 14 minutes to achieve the pace needed to complete within the time allowed for the actual EEI assessment
- ☐ Do not look at the answers provided at the end of this practice test until you have completed all the test questions.

PASSAGE 1: ENERGY FROM NATURAL GAS

Natural gas is a fuel that can be used to cook food; heat water; heat homes; and perform thousands of useful tasks in shops, plants, and factories. It is made mostly of methane, an odorless, colorless, and tasteless gas. Because of the hazards associated with gas leaks, as a safety precaution a scented chemical called mercaptan is injected into the gas. Mercaptan allows even small gas leaks to be detected and stopped.

The natural gas system starts with exploration and extraction through gas wells. Once natural gas is extracted from the ground in onshore or offshore fields, it is processed through cleaning and treatment systems. After cleaning and processing, pipelines then move the gas to a compressor station before being fed into high - pressure transmission lines.

To move natural gas from where it is produced to the places where it is needed, the natural gas industry has constructed more than 250,000 miles of large - diameter pipelines. The pressure of gas in each section of line typically ranges from 200 pounds to 1,500 pounds per square inch, depending on the type of area in which the pipeline is operating. As a safety measure, pipelines are designed and constructed to handle much more pressure than is ever actually reached in the system. For example, pipelines in more populated areas operate at less than one-half of their design pressure level.

A local gas company receives natural gas from the long-distance pipeline at what is called a city gate station where the pressure is lowered and mercaptan is added. After passing through the city gate station, the gas enters the underground network of pipes of the local distribution system. Pipes carry the gas under the streets to buildings in the community. These principal underground pipes are called gas mains.

Local gas distribution systems are divided into sections. Each section can be shut off by closing a valve in the street main for emergencies or for maintenance or repair. Individual service connections are attached to each home or business. A service pipe extends from the street main underground to a home gas meter. Gas flows through the meter into the pipes that supply your range, water heater, home heating furnace or boiler, and the other gas appliances in your home.

Answer questions 1 through 7 based on information presented in the above passage.

1. What is a city gate station?

- A. Station where a compressor increases the pressure of natural gas in the pipeline.
- B. Connection where local gas companies receive natural gas from long-distance pipelines.
- C. Facility that manufactures mercaptan for low-pressure local distribution systems.
- D. The primary system in natural gas transmission lines for ensuring safe pipeline pressures.

2. After natural gas is extracted, what happens to it next?

- A. It's compressed for high-pressure lines.
- B. It enters the service lines for distribution.
- C. It's processed through cleaning systems.
- D. It is depressurized for cleaning.

3. How does the pressure in transmission lines compare to that in local distribution lines? The pressure in local distribution lines is:

- A. Lower.
- B. Half as much.
- C. The same.
- D. Twice as much.

4. What is the pressure of natural gas in local distribution lines?

- A. 200 pounds per square inch.
- B. One-half that of transmission lines.
- C. One-half of their design pressure level.
- D. 100 pounds per square inch.

5. What is the purpose of a service pipe for natural gas?

- A. Provide a means to move natural gas from the well to a compressor.
- B. Serve as the input for adding mercaptan to natural gas.
- C. Move natural gas from the transmission to distribution lines.
- D. Transport natural gas from the street main to a gas meter.

6. What is the purpose of mercaptan in the natural gas system?

- A. Reduce friction in gas lines.
- B. Prevent corrosion in gas lines.
- C. Prevent overpressure in gas lines.
- D. Allow detection of gas leaks.

7. What is the main theme of this reading passage?

- A. The process of extracting and transporting natural gas.
- B. The hazards of working with natural gas.
- C. The different kinds of jobs for natural gas workers.
- D. The many uses of natural gas in today's environment.

PASSAGE 2: EMERGING TECHNOLOGIES

The electricity utility industry is facing the challenges of rising consumer demand and an aging infrastructure. The costs of new construction and improvements to the national electricity system are increasing along with consumer demand for better service and technology. New construction and upgrades will be needed to maintain system integrity. Just as with the national transmission system, emerging technologies are being sought to keep the national power grid, including local power distribution, working efficiently and smoothly. The main areas of research and development in electric power distribution include new technologies to increase accuracy and efficiency. Technologies that enable increased accuracy and efficiency include automated operations and increased monitoring and control capabilities.

Electric metering technologies are being updated to provide advanced bidirectional communication and monitoring abilities. Advanced metering technology provides enhanced sensing and measurement accuracy that allows for the collection and relay of important real - time data. Advanced metering enables functions, such as remote connect/disconnect, outage monitoring, and real-time measurement of electricity use to adjust generation capability to meet changing needs.

New advanced supervisory control equipment and systems allow for more advanced remote control of system components. This remote control saves labor and time, allowing remote operation of distribution equipment to restore power faster with reduced outage time. Advanced power monitoring and control avoids equipment damage with timely recognition and correction of electric faults. In addition to timely remote control, the increased supervisory capabilities provide continuous system analysis, ensuring proper operations and better overall system security.

The new smart grid will affect all parts of the national electricity system—generation, transmission, and distribution. Smart - grid technology provides many possible benefits for the electric power distribution systems. For example, it will enable real-time acquisition of energy use data and provide feedback to customers. The most familiar implementation of smart-grid technology in the distribution system is the installation of new smart meters. As mentioned earlier, smart meters can help improve the distribution system by improving sensing, measurement, and control technologies. New smart meters will allow distribution system controllers to monitor power quality and to better detect and correct system anomalies. On the consumer side, enhanced smart-grid technologies in the distribution system will help consumers be better informed about power consumption activities and will also provide them with opportunities to actually apply that new knowledge in good use practices and demand response control choices.

Answer questions 8 through 14 based on information presented in the above passage.

8. Which parts of the national electricity system will be affected by the new smart grid?

- A. Generation.
- B. Transmission.
- C. Distribution.
- D. All of the above.

9. The challenges facing the electricity utility industry are:

- A. Rising consumer demand and an aging infrastructure.
- B. Acquisition of energy use data and getting feedback from customers.
- C. Increasing efficiency of operations and acquiring control capabilities.
- D. Using bidirectional communication and monitoring energy use.

10. A major benefit of advanced metering technology is:

- A. Ability to adjust generation capability to meet changing needs.
- B. Enhanced sensing and measurement accuracy.
- C. Bidirectional communication and monitoring abilities.
- D. Consumers limit electricity demand during peak usage periods.

11. What is the main idea of this reading passage?

- A. New advanced remote control of system components.
- B. Benefits of advanced electric metering technologies.
- C. Data - driven decision - making and demand response.
- D. Technologies that enable increased accuracy and efficiency.

12. How do new advanced supervisory control equipment and systems keep the national power grid working efficiently and smoothly?

- A. Time and labor savings enabling more efficient restoration of power.
- B. Advanced power monitoring and remote operation of distribution equipment.
- C. Electric power consumers with more real-time data for decision-making.
- D. Collection and relay of important real-time data.

13. What is one benefit of smart-grid technology?

- A. The installation of new smart meters.
- B. Real - time acquisition of energy use data.
- C. Remote control of transmission and distribution equipment.
- D. Larger capacity transmission power carrying capabilities.

14. Why does the electric power industry need emerging technologies?

- A. Costs of new construction are increasing along with consumer demand.
- B. Consumer demand for real-time data is essential for decision-making.
- C. Keep the national power grid working efficiently and smoothly.
- D. Provide the remote control capability need for distribution systems.

ANSWERS AND EXPLANATIONS

PASSAGE 1: ENERGY FROM NATURAL GAS

1. **B:** is the correct answer. A local gas company receives natural gas from the long-distance pipeline at what is called a city gate station where the pressure is lowered.
2. **C** is the correct answer. Once natural gas is extracted from the ground in onshore or offshore fields, it is processed through cleaning and treatment systems.
3. **A** is the correct answer. A local gas company receives natural gas from the long-distance pipeline at what is called a city gate station where the pressure is lowered.
4. **C** is the correct answer. For example, pipelines in more populated areas operate at less than one-half of their design pressure level.
5. **D** is the correct answer. A service pipe extends from the street main underground to a home gas meter.
6. **D** is the correct answer. Mercaptan allows even small gas leaks to be detected and stopped.
7. **A** is the correct answer. The passage covers the entire process from extraction to consumer use of natural gas.

PASSAGE 2: EMERGING TECHNOLOGIES

8. B is the correct answer. First line of last paragraph—“The new smart grid will affect all parts of the national electricity system—generation, transmission, and distribution.”

9. A is the correct answer. The first line of the passage—“The electricity utility industry is facing the challenges of rising consumer demand and an aging infrastructure.”

10. A is the correct answer. The last sentence of the second paragraph states, “Advanced metering enables functions, such as ... to adjust generation capability to meet changing needs.” B and C are advanced metering capabilities, but not a benefit. While D may be true, it is not mentioned in this passage.

11. D is the correct answer. The last sentence of the first paragraph provides the transition from the introduction to the content of the remainder of the passage —“Technologies that enable increased accuracy and efficiency include automated operations and increased monitoring and control capabilities.” The other options are examples of this larger topic.

12. B is the correct answer. The third paragraph provides examples of how advanced supervisory control equipment and systems monitor power and use remote operation of distribution equipment to ensure proper operation.

13. B is the correct answer. The second paragraph states, “Smart - grid technology provides many possible benefits for the electric power distribution systems. For example, it will enable real - time acquisition of energy use data.”

14. C is the correct answer. The first paragraph includes the sentence fragment, “... emerging technologies are being sought to keep the national power grid, including local power distribution, working efficiently and smoothly.”

PRACTICE TEST #2

FOR

READING COMPREHENSION

The Reading Comprehension selection test measures a candidate's ability to read and understand written materials. The test consists of two reading passages, each followed by several multiple-choice questions about the passage.

Directions

This is a test of your ability to read and understand written materials. This test includes two passages, each followed by questions about the passage. You are to read each passage and then answer the corresponding questions. All questions should be answered based strictly on the information presented in the passage. Do not answer on the basis of experiences you have had, or any information not specifically presented in the passage. To do so might result in choosing an incorrect answer.

For each question, select the best answer from the choices given. Answer all the questions regarding one passage before moving on to the next. You may look back at the passage while you answer the question. This test has **15 questions**.

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 questions.
- ☐ Be sure to set a timer before beginning.
- ☐ Aim to finish within 15 minutes to achieve the pace needed to complete within the time allowed for the actual EEI assessment.
- ☐ Do not look at the answers provided at the end of this practice test until you have completed all the test questions.

PASSAGE 1: TRANSFORMERS

Power that is generated at power plants must be collected and delivered to the transmission system at the voltages required for use. In modern power plants, the electrical power leaving the generator travels to a main power transformer which steps up the generated voltage. A transformer is an electrical device by which alternating current of one voltage is changed to another voltage. They operate on the theory of mutual inductance. A basic transformer consists of two windings coiled around an iron core and placed in a covered tank. The primary winding is connected to the source voltage. The secondary winding is connected to the load. There is no physical connection between the windings.

As alternating current flows in the primary winding of the transformer, a magnetic field or flux is developed in the iron core. As the current reverses direction, the magnetic field also changes direction. This action induces an alternate voltage in the secondary winding, and if the secondary circuit is closed, an alternating current will flow. When there is the same number of turns in the primary and secondary windings, the voltage will be the same in both the source and the load circuits. A generating plant's typical output voltages are between 12kV and 30 kV. Typical transmission voltages range from 138kV to 765kV.

If there are fewer turns in the primary winding than in the secondary winding, the transformer is said to be a step-up transformer and the voltage in the primary circuit will be less than the voltage in the secondary circuit. A step-down transformer has more turns in the primary winding than in the secondary winding. Voltages are higher in the primary circuit than in the secondary circuit.

Transformers operate on two basic principles: 1) Whenever an electric current flows, there is magnetism around it. 2) Whenever a magnetic field changes (by moving or by changing strength), voltage is created. If there is a wire close by when this happens then a current will flow in the wire as the magnetism changes.

A transformer can only transfer power, not produce it. Besides the main power transformer that steps voltage up to transmission levels, a variety of other transformers are found along the transmission and distribution lines that adjust voltages for the power grid and that step down voltages to voltages needed by various consumers.

Answer questions 1 through 8 based on information presented in the above passage.

1. _____ develops in the iron core of a transformer as alternating current flows in the primary winding.

- A. Arcing
- B. Three-phase service
- C. Transmission switching
- D. A magnetic field

2. What is the core made up of in a transformer?

- A. Iron
- B. Copper
- C. Silver
- D. Plastic

3. The primary winding is connected to the _____.

- A. load
- B. source voltage
- C. secondary winding
- D. core

4. The secondary winding is connected to the _____.

- A. load
- B. source voltage
- C. primary winding
- D. core

5. When there is the same number of turns in the primary and secondary windings, the voltage the load circuit will be _____ the voltage in the source circuit.
- A. higher than
 - B. lower than
 - C. the same as
 - D. higher then lower than
6. The voltage in the primary circuit will _____ the voltage in the secondary circuit if the transformer is a Step-up transformer.
- A. be more than
 - B. be less than
 - C. be the same
 - D. vary in comparison to
7. A transformer can do which of the following:
- A. Even electric power flow
 - B. Change voltage
 - C. Transmit power
 - D. Produce electricity
8. Which theory is the basis for a transformer as an electrical device by which alternating current of one voltage is changed to another voltage?
- A. Ohm's Law
 - B. Electrical resistance
 - C. Kirchoff's Law
 - D. Mutual inductance

PASSAGE 2: SOLAR POWER GENERATION

Solar energy is radiant energy from the sun. Solar energy is considered a renewable energy source because the chemical reactions that power the sun are expected to keep generating sunlight for many billions of years.

Solar photovoltaic energy relies upon chemical reactions to generate electricity. Most solar cells used today are composed of thin sheets of purified silicon. These materials are made into flat plates with electrical contacts and leads attached to them. These assemblies are called photovoltaic cells, or solar cells. Multiple cells are arranged together to form solar panels.

Photovoltaic systems rely on the photovoltaic effect. The photovoltaic effect is the creation of an electric current in a material when it is exposed to light. Certain materials produce electricity when they are exposed to light. Sunlight is composed of photons, or bundles of radiant energy. When sunlight shines on a solar cell, photons set electrons in motion which initiates a flow of electric current. Current flows up and out of the cell by way of the contacts and leads. Solar cells are encased behind glass plates to protect them from the environment.

The amount of electricity a solar cell produces depends on the size of the solar cell, its conversion efficiency, and the intensity of the light source. For electric energy applications, cells are connected to form photovoltaic modules called solar panels. Solar cells produce electricity in DC form, which must be converted to AC form by an inverter. For personal or small household use, multiple panels would be needed. The majority of private - use photovoltaic systems require the use of a battery to store energy since photovoltaic systems cannot store electricity. An arrangement of multiple connected solar panels is called an array. For mass electricity generation such as generation in solar power plants by utility companies, large numbers of arrays are arranged across many acres of land, hence the term "solar farm." Most solar power plants are tied into the electrical grid and do not use batteries or other energy storage devices.

Even though solar energy systems operate without the production of air emissions, pollutants, or solid wastes, there are a few other environmental concerns associated with them. Certain photovoltaic systems require a large area of land for their solar panels. It is possible that the use of land may have environmental implications such as interference with habitats. The other concern some people have is that the appearance of the large groups of solar panels has a negative aesthetic impact on the environment.

Answer questions 9 through 15 based on information presented in the above passage.

9. Why is solar energy considered a renewable energy source?

- A. The materials needed to produce solar panels are abundantly available.
- B. Chemical reactions of the sun are expected to keep generating sunlight for billions of years.
- C. The production of solar panels uses unlimited natural resources with infinite availability.
- D. The solar array assembly process require no use of finite energy sources.

10. What is the main idea of the entire passage?

- A. Use of solar photovoltaic cells to produce electricity.
- B. Environmental concerns associated with using photovoltaic systems.
- C. Using unlimited energy produced by the sun for generating electricity.
- D. Construction of solar farms using photovoltaic cells in large arrays.

11. A possible environmental impact of solar power plants is:

- A. Cost of the large amount of materials to be processed for solar panels.
- B. Large areas of land needed may interfere with habitats.
- C. Waste generated in the process of manufacturing solar panels.
- D. Public resistance to radiation from solar farms.

12. According to the passage, which of the following is NOT true about solar cells?

- A. Solar energy systems operate without producing air emissions or pollutants.
- B. Solar cells produce electricity in a form ready for use without conversion.
- C. Most solar power plants do not use batteries or other energy storage devices.
- D. Large arrays of solar panels may have a negative aesthetic impact on the environment.

13. How does a photovoltaic cell produce electricity?

- A. The heat produced by the photons in sunlight sets electrons in motion to create electricity.
- B. Photovoltaic solar cells contain materials that expand and contract under sunlight.
- C. The photons in sunlight set electrons in a solar cell in motion, initiating a flow of electric current.
- D. Photovoltaic solar cells interact with batteries to connect to the electric grid.

14. What is the photovoltaic effect?

- A. The creation of an electric current in a material when it is exposed to light.
- B. The chemical composition of certain materials excitable by electricity.
- C. The measurement of the amount of electricity produced by a solar cell.
- D. The protection provided by the construction of solar cells encased in glass plates.

15. Which is the best description of a solar farm?

- A. Large amount of agriculture land used for solar production of electricity.
- B. An arrangement of multiple connected solar panels.
- C. Large areas used for mining of the materials used to manufacture solar panels.
- D. Large numbers of solar panel arrays arranged across many acres of land.

ANSWERS AND EXPLANATIONS

PASSAGE 1: TRANSFORMERS

1. **D:** As alternating current flows in the primary winding of the transformer, a magnetic field or flux is developed in the iron core.
2. **A:** A basic transformer consists of two windings coiled around an iron core and placed in a covered tank. None of the other materials are mentioned in the passage.
3. **B:** The primary winding is connected to the source voltage.
4. **A:** The secondary winding is connected to the load.
5. **C:** When there is the same number of turns in the primary and secondary windings, the voltage will be the same in both the source and the load circuits.
6. **B:** If there are fewer turns in the primary winding than in the secondary winding, the transformer is said to be a step-up transformer and the voltage in the primary circuit will be less than the voltage in the secondary circuit.
7. **B:** A transformer is an electrical device by which alternating current of one voltage is changed to another voltage.
8. **D:** A transformer is an electrical device by which alternating current of one voltage is changed to another voltage. They operate on the theory of mutual inductance.

PASSAGE 2: SOLAR POWER GENERATION

9. **B** is the correct answer. The first paragraph includes, "...Solar energy is considered a renewable energy source because the chemical reactions that power the sun are expected to keep generating sunlight for many billions of years."
10. **A** is the correct answer. Three of the paragraphs are about photovoltaic cells. Only one paragraph addresses environmental concerns. Unlimited energy produced by the sun is briefly mentioned in one paragraph. Solar farms are briefly mentioned in one sentence.
11. **B** is the correct answer. The last paragraph states, "It is possible that the use of land may have environmental implications such as interference with habitats."
12. **B** is the correct answer. The fourth paragraph states, "Solar cells produce electricity in DC form, which must be converted to AC form by an inverter."
13. **C** is the correct answer. The third paragraph states, "When sunlight shines on a solar cell, photons set electrons in motion which initiates a flow of electric current."
14. **A** is the correct answer. The third paragraph states, "The photovoltaic effect is the creation of an electric current in a material when it is exposed to light."
15. **D** is the correct answer. The fourth paragraph includes this sentence fragment, "... large numbers of arrays are arranged across many acres of land, hence the term 'solar farm.'"

PRACTICE TEST #3 FOR READING COMPREHENSION

The Reading Comprehension selection test measures a candidate's ability to read and understand written materials. The test consists of two reading passages, each followed by several multiple-choice questions about the passage.

Directions

This is a test of your ability to read and understand written materials. This test includes two passages, each followed by questions about the passage. You are to read each passage and then answer the corresponding questions. All questions should be answered based strictly on the information presented in the passage. Do not answer on the basis of experiences you have had, or any information not specifically presented in the passage. To do so might result in choosing an incorrect answer.

For each question, select the best answer from the choices given. Answer all the questions regarding one passage before moving on to the next. You may look back at the passage while you answer the question. This test has **16 questions**.

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 questions.
- ☐ Be sure to set a timer before beginning.
- ☐ Aim to finish within 16 minutes to achieve the pace needed to complete within the time allowed for the actual EEI assessment.
- ☐ Do not look at the answers provided at the end of this practice test until you have completed all the test questions.

PASSAGE 1: EARLY HISTORY OF ELECTRICITY

When we think of the history of electricity, we usually think of Benjamin Franklin. But his famous kite experiment with lightning didn't occur until 1752. The first recorded mention of the electricity was made by ancient Egyptians about electric fish in the Nile River. Until 1821, when Michael Faraday developed a very crude electric motor, discoveries about electricity were limited to scientific theory with no value to the average citizen. Starting in the mid-1800s, however, clever inventors began to see the potential uses of its power. Samuel Morse invented the telegraph in 1835, revolutionizing communication with messages sent long distances via wires. In 1844, Congress approved funds to build a telegraph line from Washington to Baltimore. Telegraph lines quickly spread across the United States. They caught the attention of Thomas Edison, who was a telegraph operator in the Midwest. He moved to the main Western Union telegraph company office in Boston in 1868. He soon turned his efforts to inventing refinements to the telegraph system, such as the ability to send more than one message at once.

In 1878 Thomas Edison founded the Edison Electric Light Company in New York City and bought a number of patents related to electric lighting. On September 4, 1882, Edison opened the Pearl Street Station—one of the first electricity-generating plants. Powered by steam engines, it provided direct current (DC) electricity to customers within a one-mile radius. In lieu of overhead transmission lines, Edison designed a system of underground tubes containing thick copper wire. A few weeks later, a hydroelectric plant began operation in Appleton, Wisconsin. Consumer demand for electric service quickly grew with the use of labor-saving devices such as the electric iron and fan.

Another technological breakthrough was the installation in 1888 of the nation's first large-scale electric streetcar system. It covered twelve miles in Richmond, Virginia. Just as electric lights replaced gas lighting, streetcars replaced horse drawn public transportation. The advent of transformers and the ability to use high-voltage alternating current (AC) rather than just DC further improved the electric power system. The system allows voltage to be stepped up and the high-voltage power to be transmitted long distances and stepped down for consumer use at the end.

Answer questions 1 through 8 based on information presented in the above passage.

1. What is the first recorded mention of electricity?

- A. Ben Franklin's experiment with lightning
- B. Egyptian mention of electric fish in the Nile River
- C. Michael Faraday's development of an electric motor
- D. Thomas Edison's electric light company

2. Early discoveries about electricity were:

- A. Of great benefit to the average citizen
- B. Curiosities displayed in museums
- C. Limited to scientific theory
- D. Quickly in use across the country

3. Government funds were used early on to build:

- A. An electricity plant in New York
- B. A hydroelectric plant in Appleton, Wisconsin
- C. An electric streetcar system in Richmond, Virginia
- D. A telegraph line from Washington to Baltimore

4. Who revolutionized communication with messages sent long distances via wires?

- A. Michael Faraday
- B. Thomas Edison
- C. Edward Appleton
- D. Samuel Morse

5. Based on information in the passage, which of the following statements is not true?

- A. Thomas Edison invented the light bulb
- B. Thomas Edison invented refinements to the telegraph system
- C. Direct current can be transmitted only over short distances
- D. The Pearl Street Station was one of the first electricity-generating plants

- 6. Which of the following increased consumer demand for electricity?**
- A. Electric irons
 - B. Electric street cars
 - C. Electric lights
 - D. Telegraph lines
- 7. According to the passage, which of the following is a true statement about transformers?**
- A. Transformers convert alternating current to direct current
 - B. Transformers step up voltage for use by consumers
 - C. Transformers were first used to charge small appliances
 - D. Transformers allow power to be transmitted long distances
- 8. Which inventor's invention was essential to the development of electric streetcars?**
- A. Ben Franklin
 - B. Michael Faraday
 - C. Thomas Edison
 - D. Samuel Morse

PASSAGE 2: GENERATING PLANT COMPONENTS

The Furnace. In the furnace, the chemical energy of the fuel is converted into thermal energy (heat) through combustion. The three most common fuels used in fossil fueled plants today are natural gas, oil, and coal. Because of the relative cost and availability of the various fuels, coal had been the first choice for decades. Hydropower and nuclear power do not require a furnace, as combustion is not part of the hydroelectric power or nuclear power generation processes.

The Boiler. In a fossil fuel-fired plant, the heat energy that is released as the fuel burns is absorbed by water in the boiler, converting it to steam.

The Turbine. The third major component of a steam-electric generating station is the turbine. The turbine converts steam energy to mechanical energy. The turbine is essentially a windmill, but it has hundreds of blades. The turbine blades are arranged in groups called stages on a shaft that turns as the steam is forced through the turbine.

The Generator. The main function of a generator is to convert the mechanical energy of the turbine into electrical energy. A generator uses a magnetic force to push electrons along a conductor. The magnet in a generator excites electrons in the conductor and generates an electrical force. A single electron doesn't flow through a conductor and return. Instead one electron from one atom will become excited to the point it will leave its atom. It will collide with another atom, knock an electron free, and then join the atom with which it collided. The continued movement of the magnet keeps the flow of electrons moving through the conductor.

A generator in a power plant may operate by itself or with other generators. Most electrical power utilities have more than one power plant, each plant having more than one generator. When electric demand is low, such as at night, only a few generators will be operating. As the customer demand for electric power increases, more generators are placed in operation to meet the demand. All generators supplying electricity are said to be operating in parallel. In cases where a system is small or a system has only one power plant, it is possible that only one generator is supplying the total system demand. A single generator operating to supply the demand is called an isolated generator.

Answer questions 9 through 16 based on information presented in the above passage.

9. The main purpose of the furnace in a generating plant is to convert:

- A. Heat energy into steam
- B. Fuel into electricity
- C. Chemical energy into thermal energy
- D. Nuclear energy into generation energy

10. What source of fuel had been the first choice for many years?

- A. Nuclear
- B. Coal
- C. Solar
- D. Oil

11. Why do hydropower and nuclear power not require a furnace?

- A. Combustion is not part of their power generation processes
- B. Their power sources are more efficient than others
- C. Generation of steam is a natural part of the hydropower process
- D. Neither of these sources relies on the production of steam

12. The primary purpose of the boiler in a generating plant is to:

- A. Connect the furnace to the generator
- B. Capture pollution from the furnace
- C. Absorb heat from the water
- D. Convert water to steam

13. A generating plant requires a turbine to convert:

- A. Steam energy to mechanical energy
- B. Thermal energy to chemical energy
- C. Fuel to electric power
- D. Mechanical to electrical energy

14. The main function of a generator is to convert the mechanical energy of the _____ into electrical energy.

- A. furnace
- B. boiler
- C. turbine
- D. fuel

15. What does a generator use to push electrons through a conductor?

- A. Pump
- B. Turbine
- C. Steam pressure
- D. Magnet

16. Most electrical power plants have multiple generators to be able to:

- A. Have a spare when one breaks down
- B. Meet changes in demand
- C. Avoid the case of an isolated generator
- D. Keep them operating in parallel

ANSWERS AND EXPLANATIONS

PASSAGE 1: EARLY HISTORY OF ELECTRICITY

1. **B:** The first recorded mention of the electricity was made by ancient Egyptians about electric fish in the Nile River.
2. **C:** Until 1821, when Michael Faraday developed a very crude electric motor, discoveries about electricity were limited to scientific theory with no value to the average citizen.
3. **D:** In 1844, Congress approved funds to build a telegraph line from Washington to Baltimore.
4. **D:** Samuel Morse invented the telegraph in 1835, revolutionizing communication with messages sent long distances via wires.
5. **A:** Thomas Edison turned his efforts to inventing refinements to the telegraph system, such as the ability to send more than one message at once. Thomas Edison bought a number of patents related to electric lighting. The passage does not state Thomas Edison invented the light bulb and doesn't mention who invented the light bulb.
6. **A:** Consumer demand for electric service quickly grew with the use of labor-saving devices such as the electric iron and fan.
7. **D:** The advent of transformers and the ability to use high-voltage alternating current (AC) rather than just DC further improved the electric power system. While transformers can be used in the other applications, these uses are not mentioned in the passage.
8. **B:** Michael Faraday developed a very crude electric motor. Electric motors are necessary for streetcars to run. Ben Franklin conducted experiments with lightning. Samuel Morse invented the telegraph. Thomas Edison invented refinements to the telegraph system.

PASSAGE 2: GENERATING PLANT COMPONENTS

9. **C:** In the furnace, the chemical energy of the fuel is converted into thermal energy (heat) through combustion.
10. **B:** Because of the relative cost and availability of the various fuels, coal had been the first choice for decades.
11. **A:** Hydropower and nuclear power do not require a furnace, as combustion is not part of the hydroelectric power or nuclear power generation processes. The nuclear reaction produces heat to make steam in a nuclear electric power plant and the flow of water turns the turbines in a hydroelectric plant.
12. **D:** In a fossil fuel-fired plant, the heat energy that is released as the fuel burns is absorbed by water in the boiler, converting it to steam.
13. **A:** The turbine converts steam energy to mechanical energy. The passage mentions nothing about the other options.
14. **C:** The main function of a generator is to convert the mechanical energy of the turbine into electrical energy.
15. **D:** The magnet in a generator excites electrons in the conductor and generates an electrical force. The continued movement of the magnet keeps the flow of electrons moving through the conductor.
16. **B:** When electric demand is low, such as at night, only a few generators will be operating. As the customer demand for electric power increases, more generators are placed in operation to meet the demand.

PRACTICE TEST #1

FOR

GRAPHIC ARITHMETIC

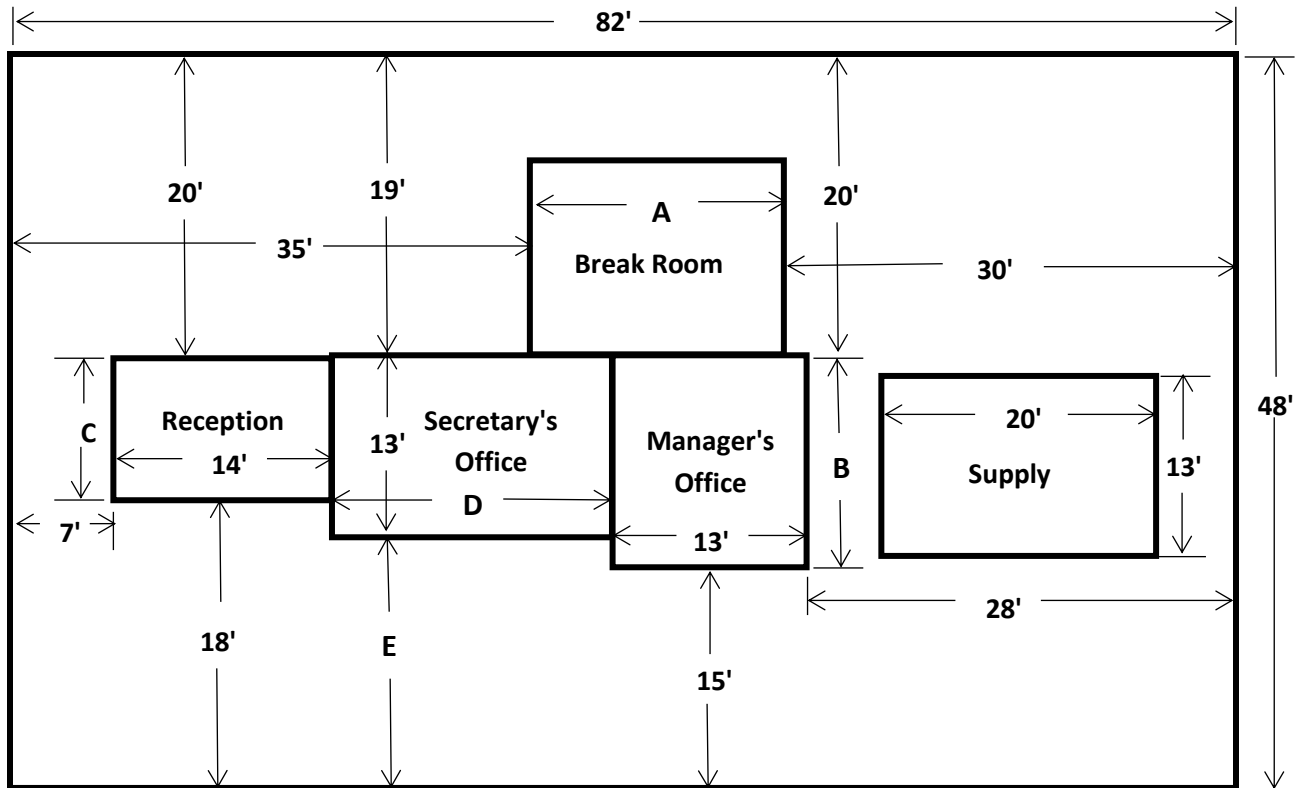
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Question 1

What is the width ("A") of the break room?

- A. 13'
- B. 17'
- C. 27'
- D. 35'

Question 2

What is the length ("B") of the manager's office?

- A. 7'
- B. 11'
- C. 13'
- D. 20'

Question 3

What is the length ("C") of reception?

- A. 10'
- B. 14'
- C. 20'
- D. 27'

Question 4

By how much is the width of supply (from left to right) greater than the width of reception?

- A. 4'
- B. 5'
- C. 6'
- D. 7'

Question 5

What is the area of supply?

- A. 140 square feet
- B. 169 square feet
- C. 260 square feet
- D. 400 square feet

Question 6

The total length (top to bottom) of the property is _____ times longer than the width of supply.

- A. 1.5
- B. 2.1
- C. 2.2
- D. 2.4

Question 7

What is the width ("D") of the secretary's office?

- A. 13'
- B. 14'
- C. 17'
- D. 20'

Question 8

What is the distance ("E") between the edge of the property and the secretary's office?

- A. 7'
- B. 16'
- C. 18'
- D. 20'

Answers and explanations on next page.

ANSWERS AND EXPLANATIONS

1. B is the correct answer. As can be seen in the drawing, 35' plus 30' plus A equals the total length of the rectangle. To find A subtract 35' plus 30' from width of the rectangle specified at the top of the drawing (82').
 $A = 82' - (35' + 30')$
 $A = 17'$
2. C is the correct answer. As can be seen in the drawing, 20' plus 15' plus B equals the total length of the rectangle. To find B subtract 20' plus 15' from the length of the rectangle specified at the right of the drawing (48').
 $B = 48' - (20' + 15')$
 $B = 13'$
3. A is the correct answer. As can be seen in the drawing, 20' plus 18' plus C equals the total length of the rectangle. To find C subtract 20' plus 18' from length of the rectangle specified at the right of the drawing (48').
 $C = 48' - (20' + 18')$
 $C = 10'$
4. C is the correct answer. As can be seen in the drawing, the width of supply from left to right is 20' and the width of reception is 14'. To solve the problem, subtract 14' from 20'.
 $20' - 14' = 6'$
5. C is the correct answer. To find the area of supply, multiply the length by the width of supply. As shown in the drawing, the length is 13' and the width is 20'.
 $13' * 20' = 260 \text{ square feet}$
6. D is the correct answer. To solve this question, you have to find the ratio of the two distances provided in the drawing. The length of the rectangle is 48' and the width of supply is 20'. To find the ratio divide 48' by 20'.
 $48' \div 20' = 2.4$
7. D is the correct answer. As can be seen in the drawing, 7' plus 14' plus 13' plus 28' plus D equals the total width of the rectangle. To find D subtract 7' plus 14' plus 13' plus 28' from width of the rectangle specified at the top of the drawing (82').
 $D = 82' - (7' + 14' + 13' + 28')$
 $D = 20'$

8. B is the correct answer. As can be seen in the drawing, 19' plus 13' plus E equals the distance ("E") between the edge of the property and the secretary's office. To find E subtract 19' plus 13' from length of the rectangle (top to bottom) specified at the right of the drawing (48').

$$E = 48' - (19' + 13')$$

$$E = 16'$$

PRACTICE TEST #2

FOR

GRAPHIC ARITHMETIC

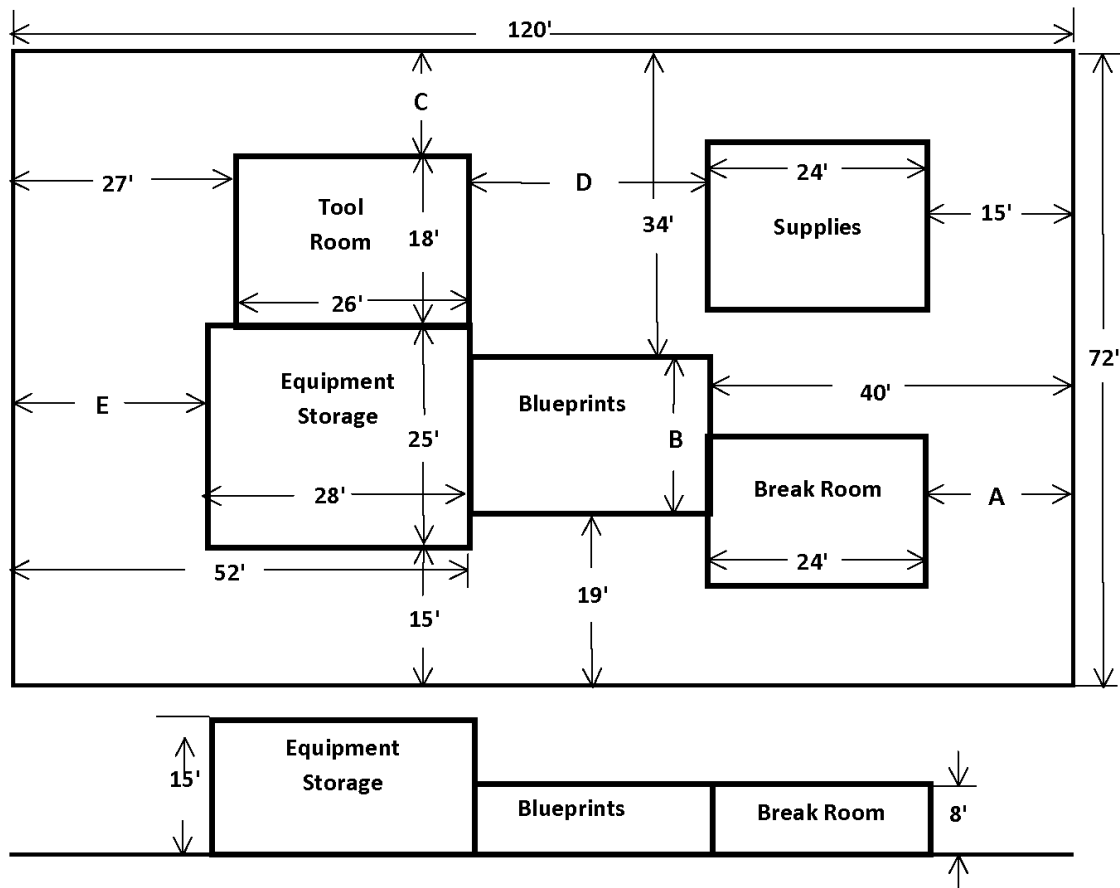
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Question 1

What is the distance ("A") between the break room and the right edge of the rectangle?

- A. 13'
- B. 16'
- C. 27'
- D. 35'

Question 2

What is the length ("B") of the blueprints room?

- A. 1'
- B. 19'
- C. 24'
- D. 28'

Question 3

What is the distance ("C") between the tool room and the top edge of the rectangle?

- A. 10'
- B. 14'
- C. 20'
- D. 27'

Question 4

What is the area of the front wall of the blueprints room?

- A. 152 square feet
- B. 192 square feet
- C. 224 square feet
- D. 361 square feet

Question 5

What is the area of the tool room?

- A. 140 square feet
- B. 169 square feet
- C. 260 square feet
- D. 468 square feet

Question 6

The total length (top to bottom) of the property is _____ times longer than the length of the tool room (top to bottom).

- A. 2
- B. 2.5
- C. 3.5
- D. 4

Question 7

What is the distance ("D") between the tool room and supplies?

- A. 20'
- B. 23'
- C. 28'
- D. 30'

Question 8

What is the distance ("E") between the edge of the property and equipment storage?

- A. 8'
- B. 14'
- C. 18'
- D. 24'

Answers and explanations on next page.

ANSWERS AND EXPLANATIONS

1. B is the correct answer. As can be seen in the drawing, 40' minus 24' equals the distance between the break room and the right edge of the rectangle. To find A subtract 24' from 40'.
 $A = 40' - 24' = 16$
2. B is the correct answer. As can be seen in the drawing, 19' plus 34' plus B equals the total length of the rectangle. To find B subtract 19' plus 34' from the length of the rectangle specified at the right of the drawing (72').
 $B = 72' - (19' + 34')$
 $B = 19'$
3. B is the correct answer. As can be seen in the drawing, 18' plus 25' plus 15' plus C equals the total length of the rectangle. To find C subtract 18' plus 25' plus 15' from length of the rectangle specified at the right of the drawing (72').
 $C = 72' - (18' + 25' + 15')$
 $C = 14'$
4. C is the correct answer. To find the area of the wall, first find the width of the blueprints room by subtracting 52' and 40' from the width of the property, 120'. Then multiply the width by the height of the room, 8', shown in the bottom drawing.
 $8' * (120' - 52' - 40') = 224 \text{ square feet}$
5. D is the correct answer. To find the area the tool room, multiply the length by the width of the room. As shown in the drawing, the length is 18' and the width is 26'. $18' * 26' = 468 \text{ square feet}$
6. D is the correct answer. To solve this question, you have to find the ratio of the two distances provided in the drawing. The length of the property is 72' and the length of the tool room is 18. To find the ratio divide 72' by 18'.
 $72' \div 18' = 4$
7. C is the correct answer. As can be seen in the drawing, 27' plus 26' plus 24' plus 15' plus D equals the total width of the rectangle. To find D subtract 27' plus 26' plus 24' plus 15' from width of the rectangle specified at the top of the drawing (120').
 $D = 120' - (27' + 26' + 24' + 15')$
 $D = 28'$

8. D is the correct answer. As can be seen in the drawing, the distance ("E") between the edge of the property and equipment storage equals 52' minus 28'. To find E subtract 28' from 52'.

$$E = 52' - 28'$$

$$E = 24'$$

PRACTICE TEST #3

FOR

GRAPHIC ARITHMETIC

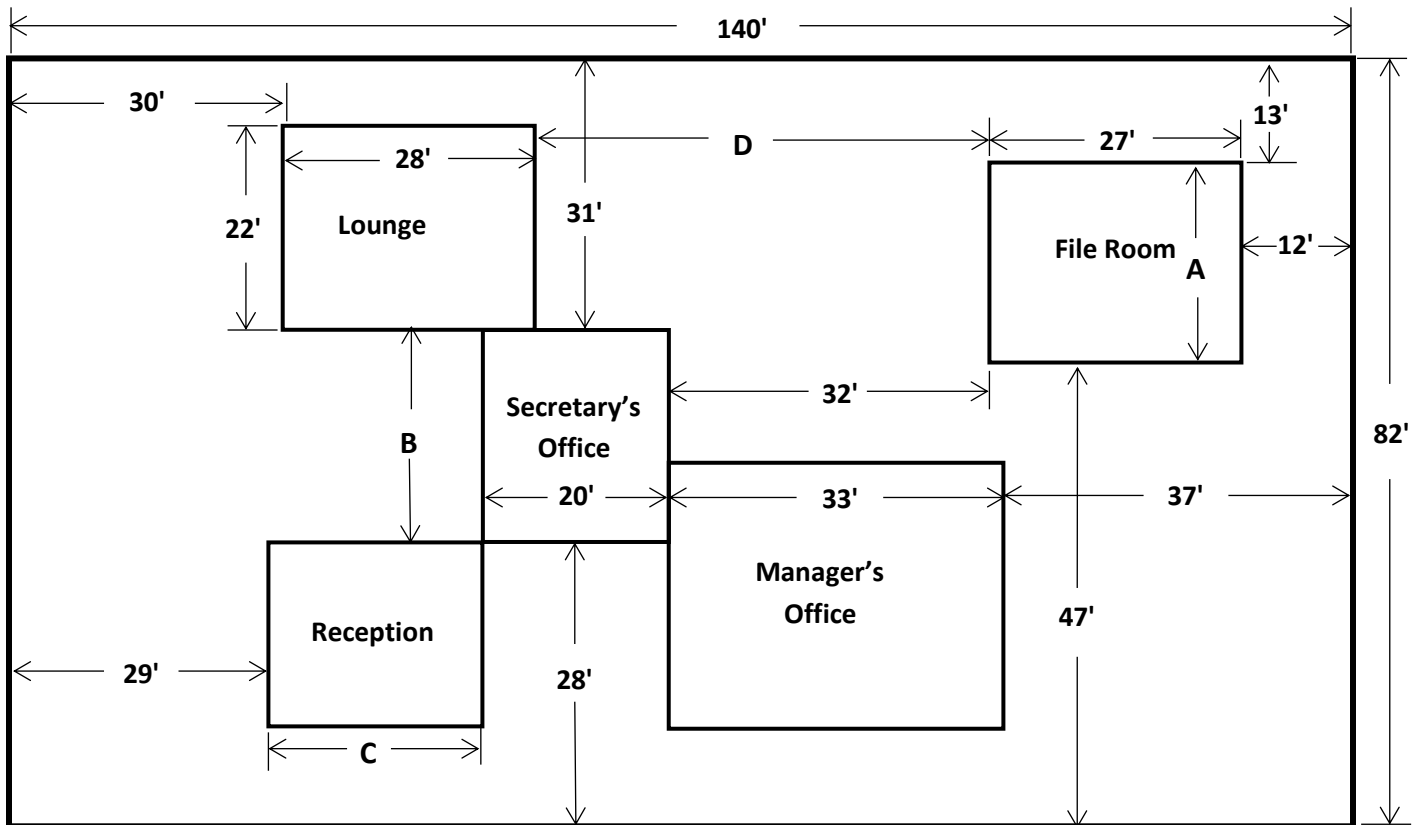
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Question 1

What is the length ("A") of the file room?

- A. 13'
- B. 22'
- C. 27'
- D. 35'

Question 2

What is the length ("B") of the secretary's office?

- A. 18'
- B. 22'
- C. 23'
- D. 31'

Question 3

What is the width ("C") of the reception area?

- A. 21'
- B. 23'
- C. 29'
- D. 33'

Question 4

By how much is the width of the manager's office (from left to right) greater than the width of the secretary's office?

- A. 32'
- B. 28'
- C. 25'
- D. 13'

Question 5

What is the area of the lounge?

- A. 460 square feet
- B. 560 square feet
- C. 616 square feet
- D. 868 square feet

Question 6

The total width of the property is _____ times longer than the width of the lounge.

- A. 3.5
- B. 4
- C. 4.5
- D. 5

Question 7

What is the distance ("D") between the lounge and the file room?

- A. 43'
- B. 37'
- C. 29'
- D. 27'

Question 8

What is the distance between reception and the manager's office?

- A. 19'
- B. 20'
- C. 22'
- D. 23'

Answers and explanations on next page.

ANSWERS AND EXPLANATIONS

1. B is the correct answer. As can be seen in the drawing, 13' plus 47' plus A equals the total length of the rectangle. To find A subtract 13' plus 47' from length of the rectangle specified at the right of the drawing (82').
 $A = 82' - (13' + 47')$
 $A = 22'$
2. C is the correct answer. As can be seen in the drawing, 28' plus 31' plus B equals the total length of the rectangle. To find B subtract 28' plus 31' from the length of the rectangle specified at the right of the drawing (82').
 $B = 82' - (28' + 31')$
 $B = 23'$
3. A is the correct answer. As can be seen in the drawing, 29' plus 20' plus 33' plus 37' plus C equals the total width of the rectangle. To find C subtract 29' plus 20' plus 33' plus 37' from width of the rectangle specified at the top of the drawing (140').
 $C = 140' - (29' + 20' + 33' + 37')$
 $C = 21'$
4. D is the correct answer. As can be seen in the drawing, the width of the manager's office from left to right is 33' and the width of the secretary's office is 20'. To solve the problem, subtract 20' from 33'.
 $33' - 20' = 13'$
5. C is the correct answer. To find the area of the lounge, multiply the length by the width of the lounge. As shown in the drawing, the length is 22' and the width is 28'.
 $22' \times 28' = 616'$
6. D is the correct answer. To solve this question, you have to find the ratio of the two distances provided in the drawing. The width of the rectangle is 140' and the width of the lounge is 28'. To find the ratio divide 140' by 28'.
 $140' \div 28' = 5$
7. A is the correct answer. As can be seen in the drawing, 30' plus 28' plus 27' plus 12' plus D equals the total width of the rectangle. To find D subtract 30' plus 28' plus 27' plus 12' from width of the rectangle specified at the top of the drawing (140').
 $D = 140' - (30' + 28' + 27' + 12')$
 $D = 43'$
8. B is the correct answer. The distance between reception and the manager's office is the same as the width of the secretary's office, 20', as shown in the drawing.

PRACTICE TEST #4

for

GRAPHIC ARITHMETIC

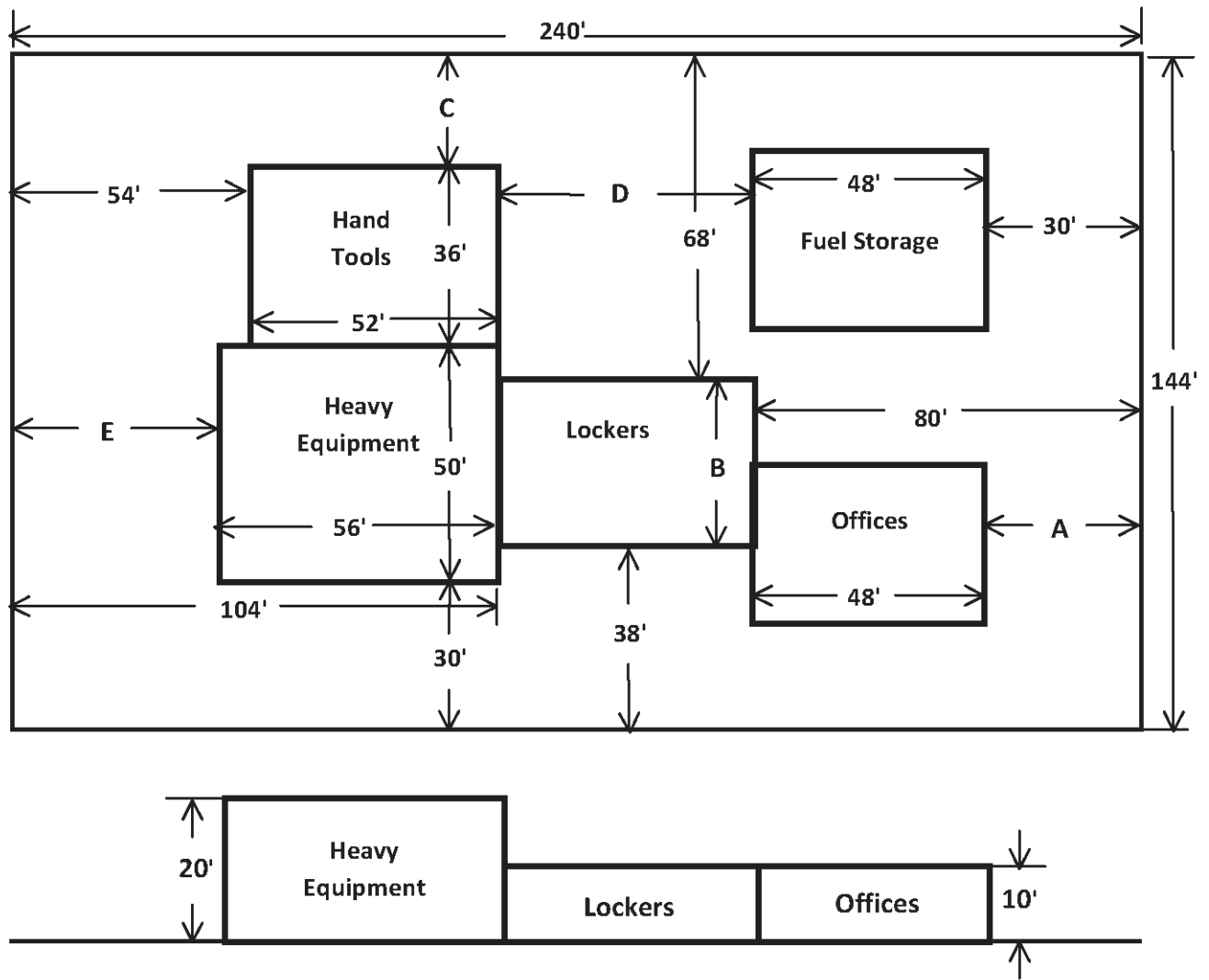
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Question 1

What is the distance ("A") between the office building and the right edge of the property?

- A. 32'
- B. 54'
- C. 68'
- D. 72'

Question 2

What is the length ("B") of the lockers building?

- A. 18'
- B. 38'
- C. 48'
- D. 56'

Question 3

What is the distance ("C") between the hand tools building and the back edge of the property?

- A. 20'
- B. 28'
- C. 40'
- D. 54'

Question 4

What is the area of the hand tools building?

- A. 560 square feet
- B. 680 square feet
- C. 1,040 square feet
- D. 1,872 square feet

Question 5

By how much is the width of heavy equipment building (from left to right) greater than the width of the office building?

- A. 14'
- B. 12'
- C. 10'
- D. 8'

Question 6

The total length (front to back) of the property is _____ times the height of the heavy equipment building.

- A. 3.6
- B. 6.4
- C. 7.2
- D. 14.4

Question 7

What is the distance (“D”) between the hand tools building and the fuel storage building?

- A. 40’
- B. 46’
- C. 56’
- D. 60’

Question 8

What is the distance (“E”) between the edge of the property and the heavy equipment building?

- A. 16’
- B. 28’
- C. 36’
- D. 48’

Answers and explanations on next page.

ANSWERS AND EXPLANATIONS

1. A is the correct answer. As can be seen in the drawing, 80' minus 48' equals the distance between the office building and the right edge of the property. To find A subtract 48' from 80'.
 $A = 80' - 48' = 32'$
2. B is the correct answer. As can be seen in the drawing, 38' plus 68' plus B equals the total length of the property. To find B subtract 19' plus 34' from the length of the property specified at the right of the drawing (144').
 $B = 144' - (38' + 68')$
 $B = 38'$
3. B is the correct answer. As can be seen in the drawing, 36' plus 50' plus 30' plus C equals the total length of the rectangle. To find C subtract 36' plus 50' plus 30' from length of the rectangle specified at the right of the drawing (144').
 $C = 144' - (36' + 50' + 30')$
 $C = 28'$
4. D is the correct answer. To find the area of the hand tools building, multiply the length by the width of the room. As shown in the drawing, the length is 36' and the width is 52'.
 $36' \times 52' = 1,872 \text{ square feet}$
5. D is the correct answer. As can be seen in the drawing, the width of the heavy equipment building from left to right is 56' and the width of the office building is 48'. To solve the problem, subtract 48' from 56'.
 $56' - 48' = 8'$
6. C is the correct answer. To solve this question, you have to find the ratio of the two distances provided in the drawing. The length of the property is 144' and the height of the heavy equipment building is 20'. To find the ratio divide 144' by 20'.
 $144' \div 20' = 7.2$
7. C is the correct answer. As can be seen in the drawing, 54' plus 52' plus 48' plus 30' plus D equals the total width of the rectangle. To find D subtract 54' plus 52' plus 48' plus 30' from the width of the property specified at the top of the drawing (240').
 $D = 240' - (54' + 52' + 48' + 30')$
 $D = 56'$
8. D is the correct answer. As can be seen in the drawing, the distance ("E") between the edge of the property and the heavy equipment building equals 104' minus 56'. To find E subtract 56' from 104'.
 $E = 104' - 56'$
 $E = 48'$