

ANSWERS AND EXPLANATIONS

1. The correct answer is A. The windsock shows the direction the wind blows by filling with air and lifting with the air current. This one shows the wind blowing toward the group of people labeled B, thus, any hazardous elements (toxic smoke, etc.) released will blow away from group A.
2. The correct answer is C. The receptacle is not dependent on the switch A being open or closed. The receptacle is on a completed circuit path with available power supply.
3. The correct answer is B. A circuit breaker should trip when overloaded. If every receptacle were used, the possibility for overload exists. However, the 20-amp circuit breaker will take more load than the 15-amp circuit breaker before tripping because it has five amps more capacity.
4. The correct answer is B. The sound we interpret is actually an energy wave. The piano creates sound energy that resonates from the piano where its soundboard is located. A listener on the side A will hear the sound after the energy wave has traveled through and around the lid of the piano. A listener on the side of the piano marked B will hear the sound from an unobstructed energy wave because there is nothing between the listener and the source of the sound.
5. The correct answer is A. The spring compresses when the force F is applied. This compression of the spring, toward the wall, and in relation to point B, stores energy. The compressed spring when released, will move back, beyond point B toward point A, exerting a restoring force.
6. The correct answer is B. Think of walking over marbles on a walk surface. Your feet tend to slide out from under you. Rollers provide the least resistance to an object in motion, so the object will stop more easily on the flat surface due to its greater surface friction.
7. The correct answer is A. When water fills each tank, the fluid surface will rise equally, ("water seeks its own level"). The air around us exerts an equal downward pressure on each surface.
8. The correct answer is B. This question has to do with pulleys. The force required in picture A to lift the object does not change by adding a rope for pulling. The two pulleys in B distribute the weight of the object and this lessens the force required to lift the object.
9. The correct answer is B. The boiler heats water flowing through the pipe. Room A has no hot water beneath, but heat exchange from heat in the pipe below Room B radiates into the room.
10. The correct answer is A. Squeezing the bulb expels air inside the bulb and syringe, creating a vacuum void inside. By releasing the bulb with the tip of the syringe placed in water, the water fills the syringe, because the pressure inside the syringe is less than the air pressure around it.
11. The correct answer is B. A moving gear rotates the gear aside it in the opposite direction. If Gear W moves clockwise, both Gears X & Y move counterclockwise moving Gear Z in direction B.
12. The correct answer is A. Look at pipe ends. In figure A, each pipe rests on a lower surface of two pipes providing support. In figure B, this is not the case creating a more unstable.

Mechanical Concept Test #2

13. The correct answer is A. This question involves levers. A lever is a simple machine that uses an immovable point of support called a fulcrum. The weights at position X exert a downward force on the lever, yet the lever stays level, in "equilibrium." Removing the weights at X disrupts the equilibrium because a downward force no longer holds the lever in place. As a result, the lever will tend to move up at position X and move down on the other side toward A.
14. The correct answer is B. This answer has to do with momentum of an object. As the white ball is hit, energy is transferred to the ball propelling it forward. The energy path in direct alignment with the white ball provides the surest path of movement. The first ball touched by the white ball receives a glancing blow that will send it in the general direction of pocket A. However, the second ball touched by the white ball is in a direct line between the pool cue and the pocket B. The second ball will hit the third ball and the third ball should drop into the pocket B.
15. The correct answer is B. This question involves surface friction. Skate type B has a heel brake that aids resistance when applied to the surface of the path. Skate type A does not have a brake.
16. The correct answer is A. This question involves acceleration related to the Earth's rotation and centrifugal force. Centrifugal force is an outward force associated with a curved path. The storm shows a rotating counterclockwise movement. The acceleration turns storm toward the Earth's poles. Therefore, the storm turns and travels toward the nearest Earth pole.
17. The correct answer is A. This question involves surface friction. Airplane A gains speed more quickly due to less friction resistance over paving.
18. The correct answer is A. This question has to do with cantilevers and pulleys. The lever is supported on the left. The further the load moves away from the support, the farther "cantilevered" the load becomes. This causes a "bending moment" that the pulley X offsets. A "bending moment" force gets its name because as a load is applied to an object, bending may result. The bending moment force increases with distance because it is calculated as length times applied force. A load at position A will cause a greater downward bend of the lever than a load at position B, so greater pull is required by the pulley when the load is at position A.
19. The correct answer is B. This question involves loads, the snow, applied to a surface, the roof. A flat roof accumulates a snow load, while an inclined roof enables the snow to slide off the roof.
20. The correct answer is B. This question involves magnetic force. A magnet produces an invisible magnetic field creating a force that pulls materials like steel. The strength of the pull drops off with any distance, so the magnet B relative to the pile of steel is the most likely source of pull.
21. The correct answer is B. This question has to do with friction force. When tight, knot B provides more surface resistance against the pipe.
22. The correct answer is B. Salt water is denser than fresh water; therefore, the tugboat will be more buoyant on the salt water than in the fresh water. Decreased buoyancy means the tugboat will ride lower and thus have less of its surface exposed above fresh water.

Mechanical Concept Test #2

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.