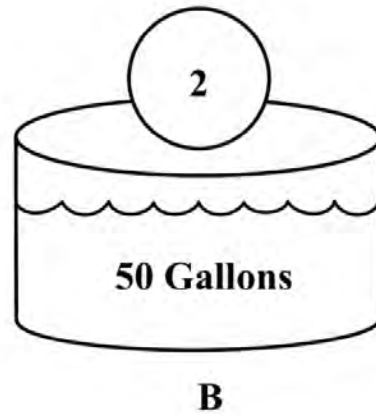
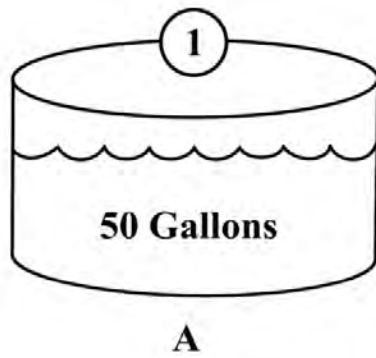


Total Question: 114 QAs

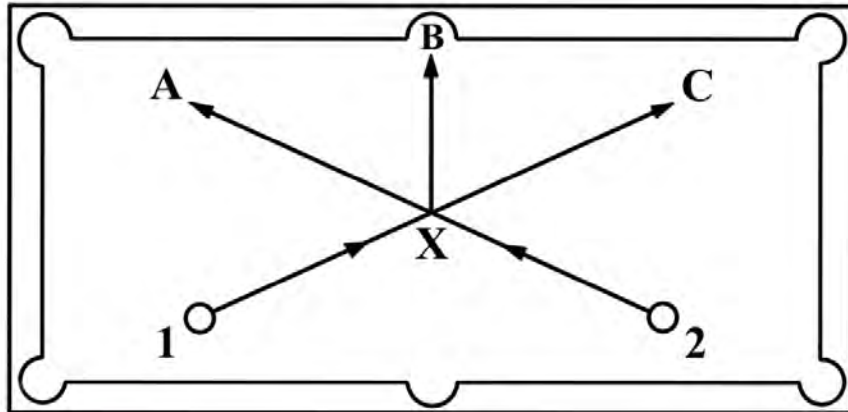
1. Objects 1 and 2 are submerged in separate tanks, both filled with water. In which tank (A or B) will the water level be the highest? (If equal, mark C)



- ☐ a. Tank A
- ☒ b. Tank B **Correct**
- ☐ c. Tanks are equal

Object 2 is larger than object 1, so it will displace more water and cause the water level in tank B to be higher than that of tank A.

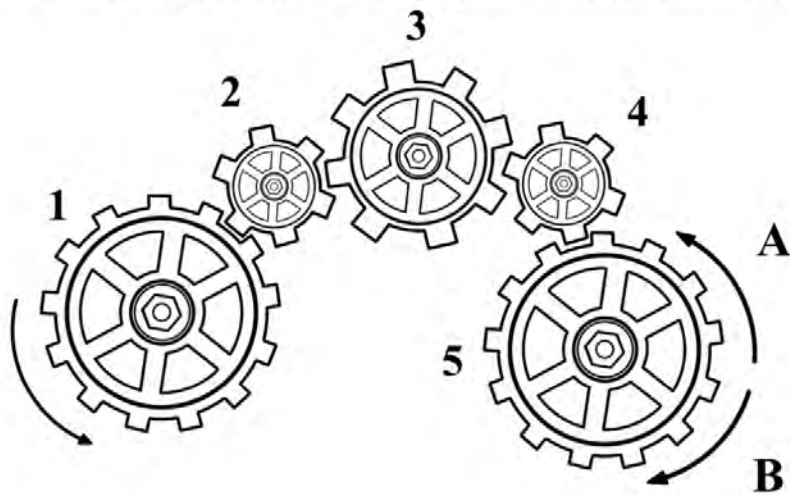
2. If ball 1 and ball 2 are of equal weight and moving at the same speed, in which direction (A, B or C) will ball 1 tend to go when it collides with ball 2 at point X?



- ☒ a. Direction A **Correct**
- ☐ b. Direction B
- ☐ c. Direction C

Since momentum is conserved in all collisions, and there is no indication that the balls merge into one upon colliding, ball 1 must rebound off ball 2 toward the upper left pocket.

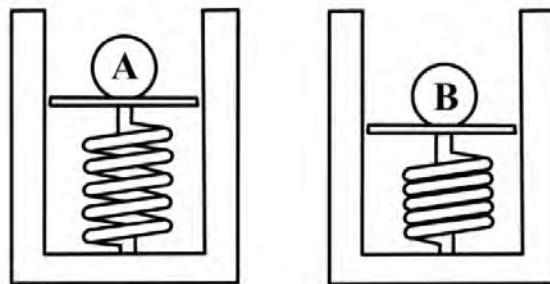
3. In which direction (A or B) will gear 5 spin if gear 1 is spinning counter-clockwise? (If both, mark C)



- ☒ a. Direction A **Correct**
- ☐ b. Direction B
- ☐ c. Both directions

Consecutive gears alternate rotation direction, which means all odd numbered gears turn the same direction. Since 1 and 5 are both odd, both are spinning counter-clockwise in this problem.

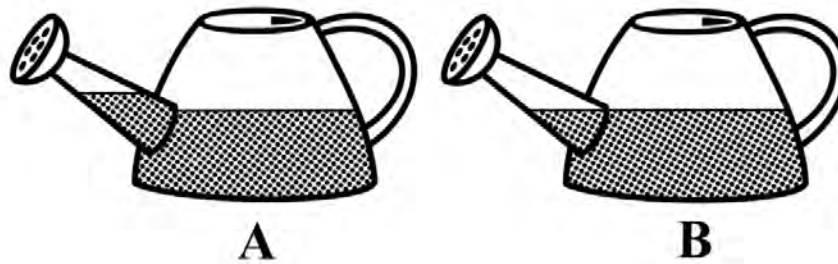
4. Which of the two identical objects (A or B) will launch a higher distance when the springs are released? (If equal, mark C)



- ☐ a. Object A
- ☒ b. Object B **Correct**
- ☐ c. Equal

The spring being compressed under object B is being compressed further, and therefore has more potential energy stored up to launch the ball higher into the air.

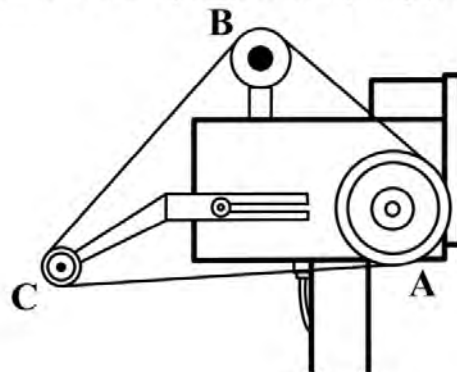
5. A watering can is filled with water. Which of the pictures (A or B) shows a more accurate representation of how the water will rest?



- ☐ a. Picture A
- ☒ b. Picture B **Correct**

Water (along with nearly every other substance) seeks the lowest energy state in which to rest. Functionally, this means that the water level will be equally high in all parts of the watering can.

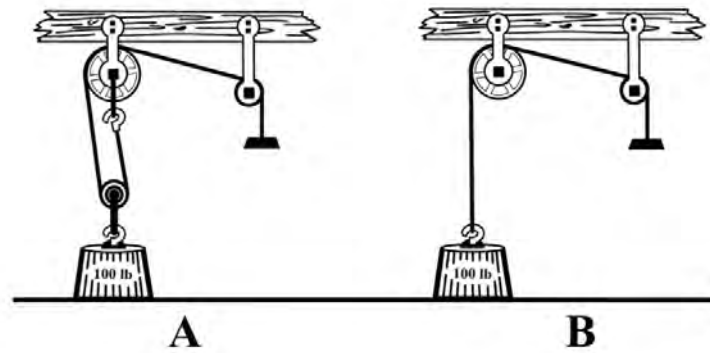
6. Among this arrangement of three pulleys, which pulley (A, B or C) turns fastest?



- ☐ a. Pulley A
- ☐ b. Pulley B
- ☒ c. Pulley C **Correct**

Every point on the belt, and consequently every point on the outside of each pulley, is moving at the same linear speed. Therefore, the pulley with the smallest circumference will rotate the fastest.

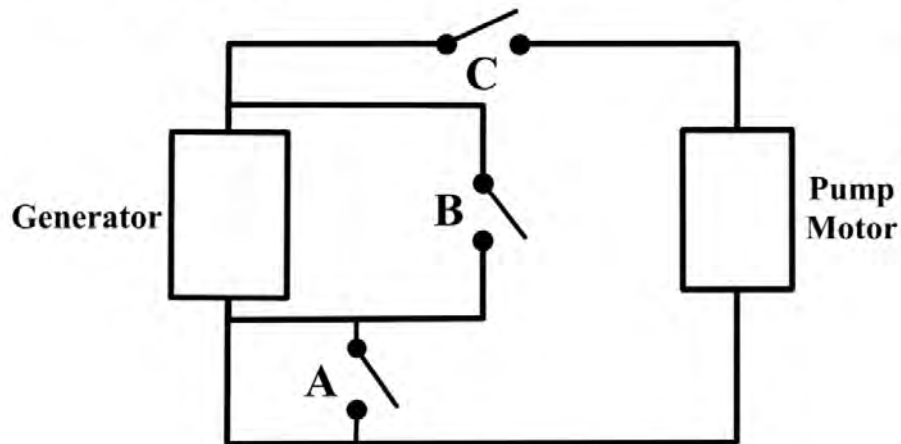
7. Which of the two scenarios (A or B) requires more effort to pull the weight up off the ground? (If equal, mark C)



- ☐ a. Scenario A
- ☒ b. Scenario B **Correct**
- ☐ c. Equal

A pulley only reduces the amount of force required to lift an object if the weight is distributed across multiple sections of the rope, as is done in A.

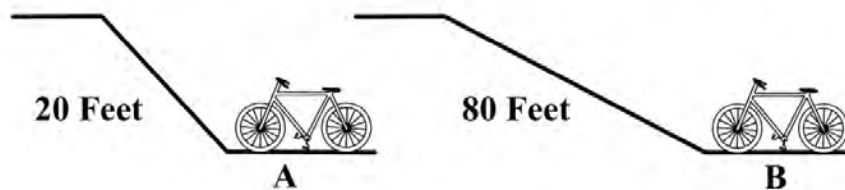
8. Which switch (A, B or C) should be closed in order to start the pump motor?



- ☐ a. Switch A
- ☐ b. Switch B
- ☒ c. Switch C **Correct**

Only switch C creates a closed loop between the generator and the motor. Closing B creates a short circuit, and closing A does nothing.

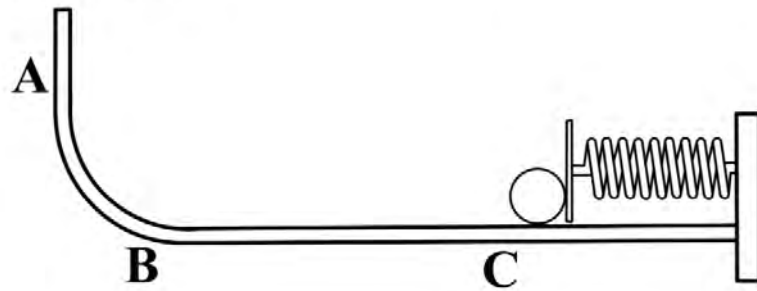
9. Which situation (A or B) requires more force to peddle the bicycle up the ramp? (If equal, mark C)



- ☒ a. Situation A **Correct**
- ☐ b. Situation B
- ☐ c. Equal

More force is required to propel a bicycle up a steeper slope.

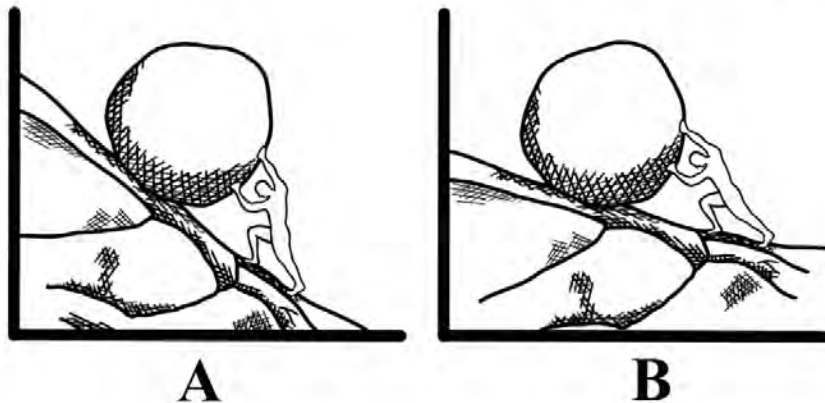
10. When the spring is released, the ball travels away from the spring to its highest point (A) and then begins to travel back towards its place of origin. At which point (A, B or C) will the ball travel to after it hits the spring a second time?



- ☐ a. Point A
- ☒ b. Point B **Correct**
- ☐ c. Point C

Because of friction losses within the spring and between the ball and the surface, the ball will not travel as far the second time.

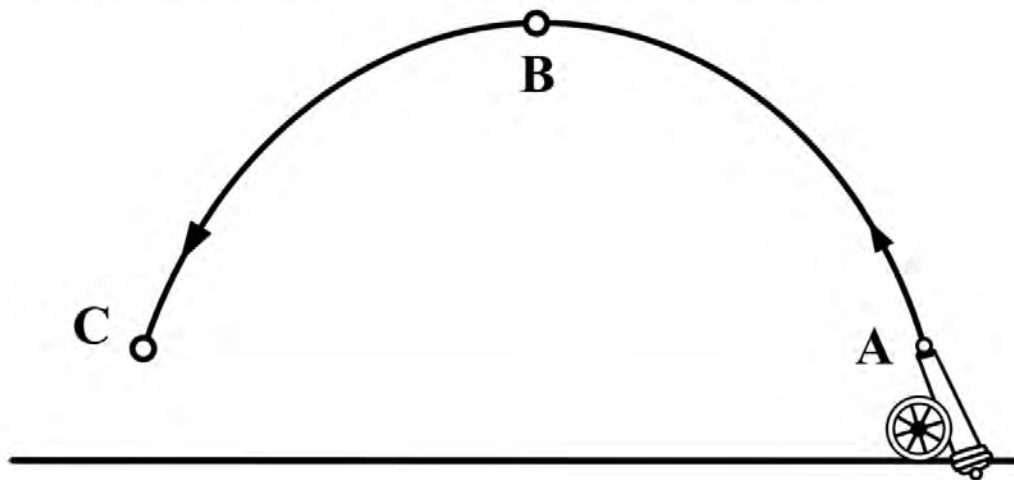
11. Which of the two boulders of equal weight (A or B) requires more force to push up the hill? (If equal, mark C)



- ☒ a. Boulder A **Correct**
- ☐ b. Boulder B
- ☐ c. Equal

More force is required to push a boulder up a steeper slope.

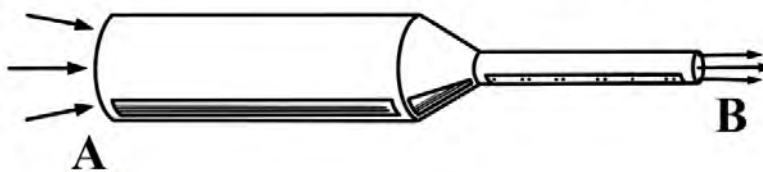
12. At which point (A, B or C) will the cannonball be traveling the slowest?



- ☐ a. Point A
- ☒ b. Point B **Correct**
- ☐ c. Point C

In ballistic flight, the horizontal component of velocity is essentially constant. At point B, the vertical component of the cannonball's velocity is zero, making the peak of its arc the slowest point.

13. On which side of the pipe (A or B) would the water speed be slower? (If equal, mark C)



- ☒ a. Side A **Correct**
- ☐ b. Side B
- ☐ c. Equal

Since all the water must leave at the same rate at which it enters, the water must travel significantly faster at point B, since the opening is much smaller.

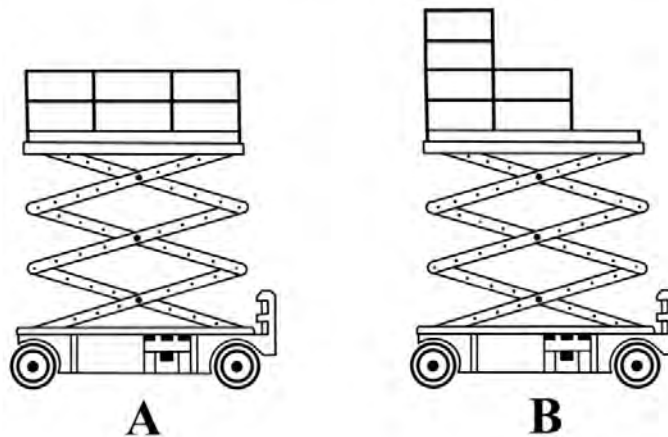
14. In which of the two figures (A or B) is the person bearing more weight? (If equal, mark C)



- ☒ a. Figure A **Correct**
- ☐ b. Figure B
- ☐ c. Equal

In figure A, the load is centered much closer to the man and much farther from the wheel than in figure B. This means that the man will have to bear a larger percentage of the weight of the load.

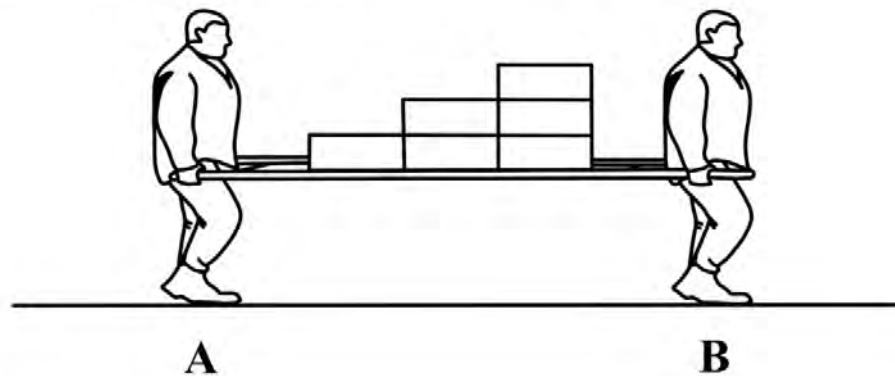
15. Which of the two lift trucks (A or B) carrying the same amount of weight is more likely to tip over? (If equal, mark C)



- ☐ a. Lift truck A
- ☒ b. Lift truck B **Correct**
- ☐ c. Equal

On truck A, the load is evenly distributed, while on truck B it is concentrated on one end, making it more likely to tip over.

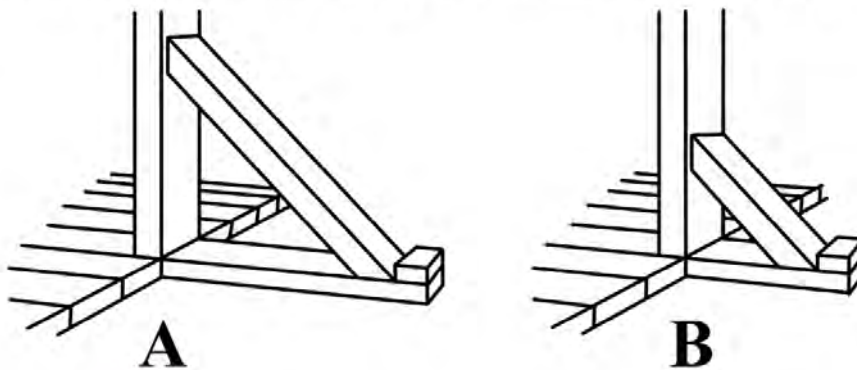
16. The weight of the boxes is being carried by the two men shown below. Which of the two men (A or B) is carrying more weight? (If equal, mark C)



- ☐ a. Man A
- ☒ b. Man B **Correct**
- ☐ c. Equal

The load on the stretcher is concentrated more closely to man B than man A, so man B is bearing more of the load.

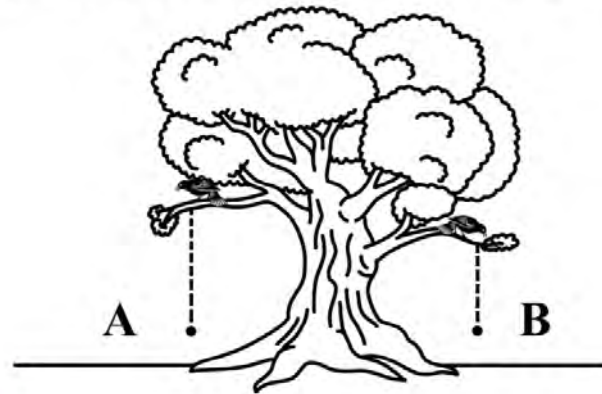
17. In the pictures below, which of the angles (A or B) is braced more solidly? (If equal, mark C)



- ☒ a. Angle A **Correct**
- ☐ b. Angle B
- ☐ c. Equal

The bracing in A is more solid because it extends higher up on the post.

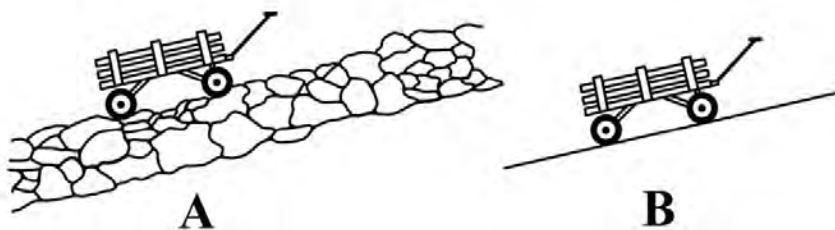
18. Given two birds sitting on branches of a tree at different elevations. Both drop objects of identical size and weight. Which object (A or B) will hit the ground with bigger force? (If equal, mark C)



- ☒ a. Object A **Correct**
- ☐ b. Object B
- ☐ c. Equal

Though the force of gravity is the same on both objects, object A will have had more time to build up speed, so it will hit the ground with more force than object B.

19. Which of the two wagons (A or B) of equal size and weight would be easier to drag up the hill? (If equal, mark C)



- ☐ a. Wagon A
- ☒ b. Wagon B **Correct**
- ☐ c. Equal

The wagon will roll more easily up the smoother slope.

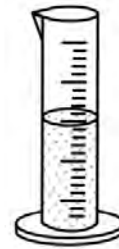
20. In which of the three positions (A, B or C) will it be easiest to accurately measure the amount of liquid in the graduated cylinder?



A



B



C

- ☐ a. Position A
- ☐ b. Position B
- ☒ c. Position C **Correct**

The amount of liquid will be easiest to measure when the angle of the water line matches the lines drawn on the cylinder.

21. In which of the two figures (A or B) will the person require less force to lift a 100 pound weight? (If equal, mark C)



A

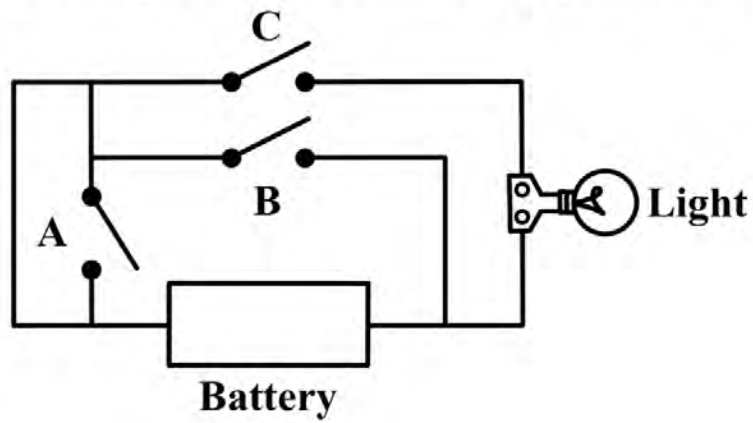


B

- ☒ a. Figure A **Correct**
- ☐ b. Figure B
- ☐ c. Equal

In figure A, the weight is much closer to the fulcrum, so it will require less force to raise.

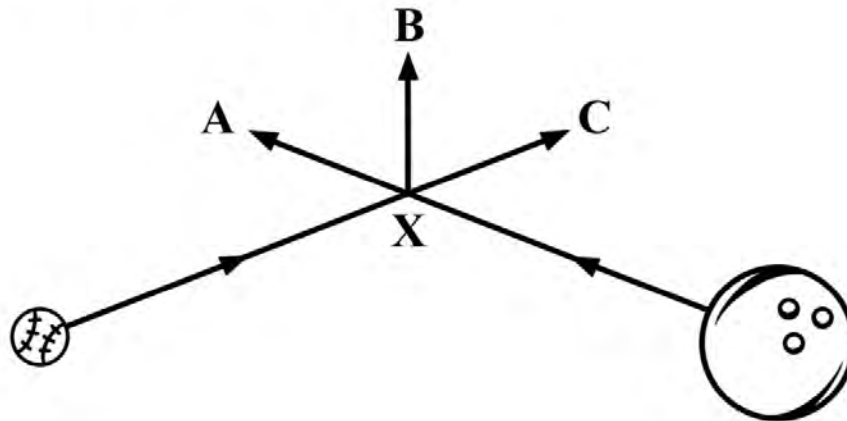
22. Which switch (A, B or C) should be closed to give power to the light?



- ☐ a. Switch A
- ☐ b. Switch B
- ☒ c. Switch C Correct

Only switch C creates a closed loop between the battery and the light. Closing B creates a short circuit, and closing A does nothing.

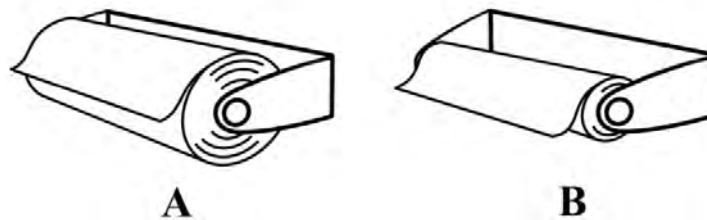
23. If the baseball and bowling ball are moving at the same speed, in which direction will the bowling ball tend to go when it collides with the baseball at point X?



- ☒ a. Direction A **Correct**
- ☐ b. Direction B
- ☐ c. Direction C

Since a bowling ball weighs nearly 50 times as much as a baseball, the bowling ball's path will not be significantly affected by its collision with the baseball.

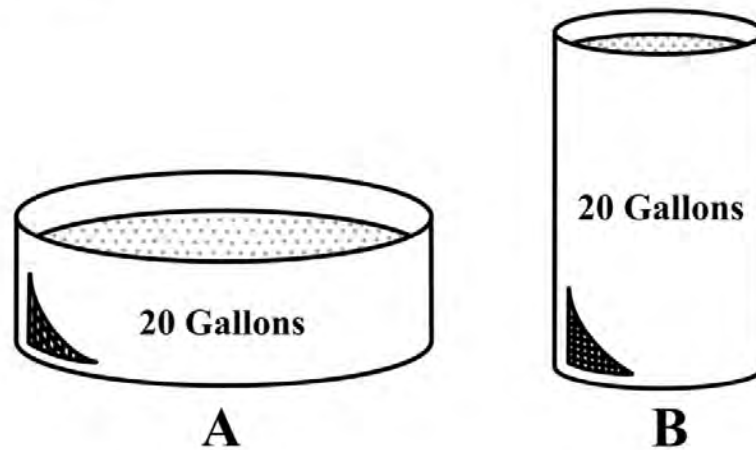
24. Which of the two rolls of paper towels (A or B) will undergo more revolutions if the ends of each roll were pulled downward with the same amount of force? (If equal, mark C)



- ☐ a. Roll A
- ☒ b. Roll B **Correct**
- ☐ c. Equal

Roll B will turn faster, both because it is lighter, thus having a lower moment of inertia, and because it requires less paper to be pulled to undergo a revolution.

25. In which of the two containers (A or B) will water that is boiled to the same temperature cool more slowly? (If equal, mark C)



- ☐ a. Container A
- ☒ b. Container B **Correct**
- ☐ c. Equal

Water in container B will cool more slowly because less of the surface of the water is exposed to the air.