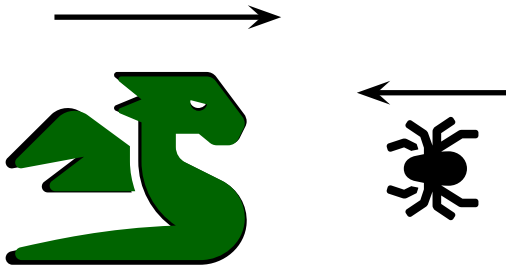


Question 1

A spider and dragon approach each other. They eventually collide.

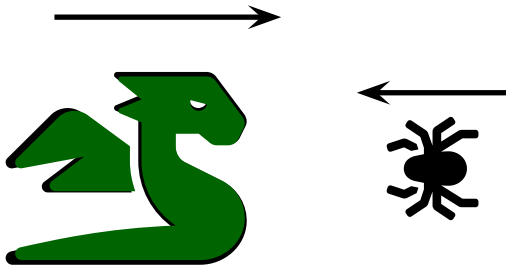


In the initial moments when they collide, which of the following is true?

1. The force exerted by the dragon is larger than that exerted by the spider if their speeds are roughly the same.
2. The force exerted by the dragon is larger than that exerted by the spider only if the dragon's speed is much larger.
3. The force exerted by the dragon is the same as that exerted by the spider only if the dragon's speed is smaller.
4. The force exerted by the dragon is the same as that exerted by the spider regardless of the speeds.

Question 2

A spider and dragon approach each other. They eventually collide.



Throughout the collision, which of the following is true?

1. The force exerted by the dragon is sometimes larger and sometimes smaller than that exerted by the spider.
2. The force exerted by the dragon is always larger than that exerted by the spider.
3. The force exerted by the dragon is always smaller than that exerted by the spider.
4. The force exerted by the dragon is always the same as that exerted by the spider.

Question 3

The Moon orbits the Earth at approximately constant speed and in a circle.

An apple falls straight to the center of the earth.

Which of the following is true?

1. Net force on moon is zero. Net force on apple is zero.
2. Net force on moon is zero. Net force on apple is not zero.
3. Net force on moon is not zero. Net force on apple is zero.
4. Net force on moon is not zero. Net force on apple is not zero.

Question 4

Suppose that a cannonball is fired from a cannon on top of a mountain higher than all others. The cannon points horizontally and can fire the cannonball at various speeds.

Ignoring air resistance, what happens to the cannonball as the launch speed increases?

1. It always hits Earth at the same location.
2. It always hits Earth but at a further distance when fired faster.
3. It can avoid hitting Earth completely.