

# Question 1

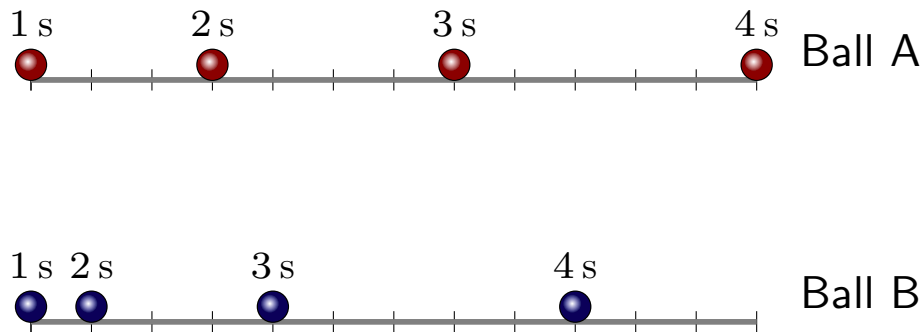
In Copernicus' theory Venus orbits the Sun in a circle which lies between the Sun and Earth's orbit.

Which of the following is true regarding possible phases of Venus?

1. Venus can sometimes appear "full" and sometimes "new."
2. Venus can sometimes appear "full" but never "new."
3. Venus never appears "full" and sometimes "new."
4. Venus never appears "full" nor "new."  
About half of it is always in view from Earth.

## Question 2

Two identical balls slide along horizontal surfaces. The positions of the balls are recorded at intervals spaced 1 s apart. These are illustrated in the diagram.



In the interval between 1 s and 4 s, which of the following is true?

1. The net force on each ball is zero.
2. The net force on ball A is the same as that on ball B but not zero.
3. The net force on ball A is smaller than that on ball B.
4. The net force on ball A is larger than that on ball B.

## Question 3

A roller coaster slides along a frictionless track. At its highest point it has potential energy 2000 J. It drops from the highest point and a little later has kinetic energy 500 J.

What is the total energy of the roller coaster?

1. 500 J
2. 1500 J
3. 2000 J
4. 2500 J

## Question 4

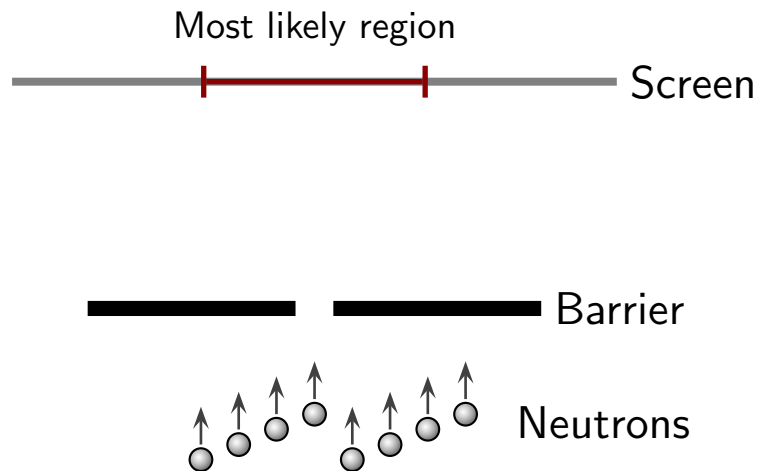
A roller coaster slides along a frictionless track. At its highest point it has potential energy 2000 J. It drops from the highest point and a little later has kinetic energy 500 J.

What is the kinetic energy of the roller coaster at this later moment?

1. 500 J
2. 1500 J
3. 2000 J
4. 2500 J

## Question 5

Neutrons are fired, one at a time, toward a barrier that contains one opening. They approach the barrier in the illustrated direction. The majority of the neutrons that pass through the opening arrive in the indicated region.

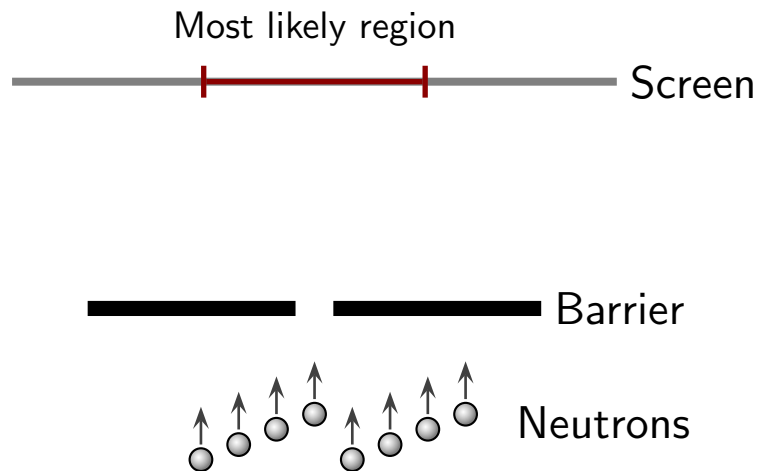


The speed of the neutrons before the slits is decreased. What happens to the wavelength of the neutrons?

1. It increases.
2. It decreases.
3. It stays the same.

## Question 6

Neutrons are fired, one at a time, toward a barrier that contains one opening. They approach the barrier in the illustrated direction. The majority of the neutrons that pass through the opening arrive in the indicated region.



The speed of the neutrons before the slits is decreased. What happens to the region where they are most likely to arrive?

1. It becomes larger.
2. It becomes smaller.
3. It stays the same.