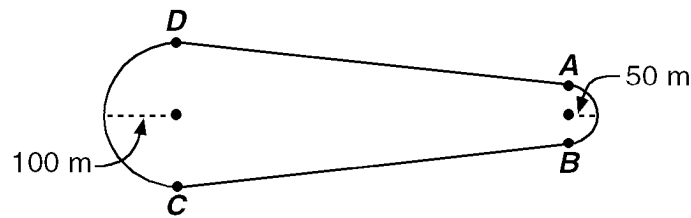


Question 1 refers to the following:

The diagram below represents a flat racetrack as viewed from above, with the radii of its two curves indicated. A car with a mass of 1,000 kilograms moves counterclockwise around the track at a constant speed of 20 meters per second.



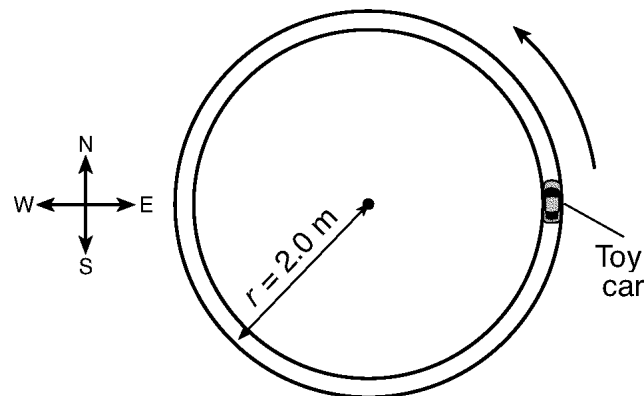
- 1) The net force acting on the car while it is moving from *A* to *D* is
 - A) 8,000 N
 - B) 400 N
 - C) 0 N
 - D) 20,000 N
- 2) An object is moving with constant speed in a circular path. The object's centripetal acceleration remains constant in
 - A) magnitude, only
 - B) direction, only
 - C) both magnitude and direction
 - D) neither magnitude nor direction
- 3) Which one of the following diagrams represents the directions of the velocity, v , and acceleration, a , of a toy car as it moves in a clockwise, horizontal, circular path at a constant speed?

A)

B)

C)

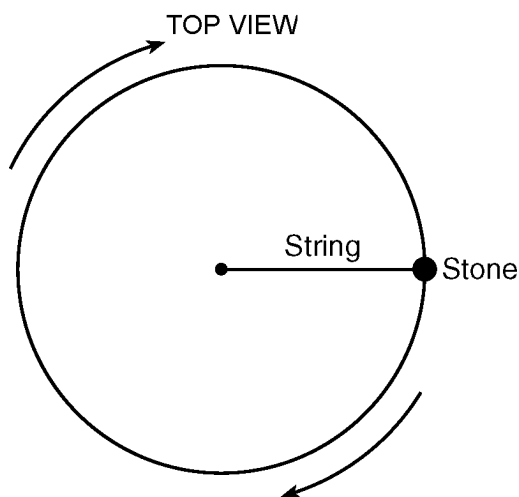
D)
- 4) The diagram below represents a 2.0-kilogram toy car moving at a constant speed of 3.0 meters per second counterclockwise in a circular path with a radius of 2.0 meters.



At the instant shown in the diagram, the centripetal force acting on the car is

- A) 9.0 N north
- B) 4.5 N north
- C) 4.5 N west
- D) 9.0 N west

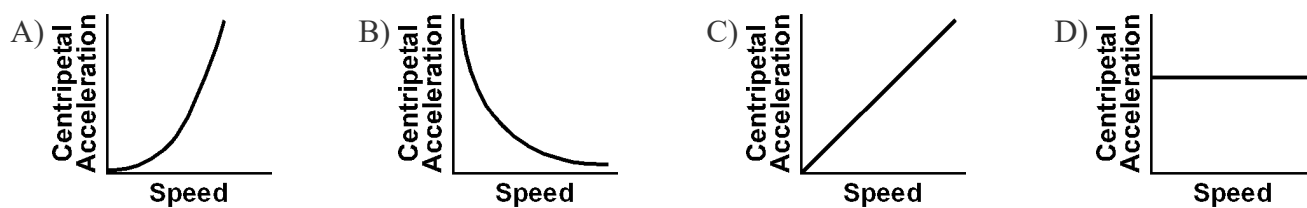
- 5) An unbalanced force of 40. newtons keeps a 5.0-kilogram object traveling in a circle of radius 2.0 meters. What is the speed of the object?
- A) 16 m/s B) 8.0 m/s C) 4.0 m/s D) 2.0 m/s
- 6) A student on an amusement park ride moves in a circular path with a radius of 3.5 meters once every 8.9 seconds. What is the average speed at which the student moves?
- A) 0.39 m/s B) 2.5 m/s C) 4.3 m/s D) 1.2 m/s
- 7) A 1.0×10^3 -kilogram car travels at a constant speed of 20. meters per second around a horizontal circular track. The diameter of the track is 1.0×10^2 meters. The magnitude of the car's centripetal acceleration is
- A) 8.0 m/s^2 B) 4.0 m/s^2 C) 0.20 m/s^2 D) 2.0 m/s^2
- 8) A stone on the end of a string is whirled clockwise at constant speed in a horizontal circle as shown in the diagram below.



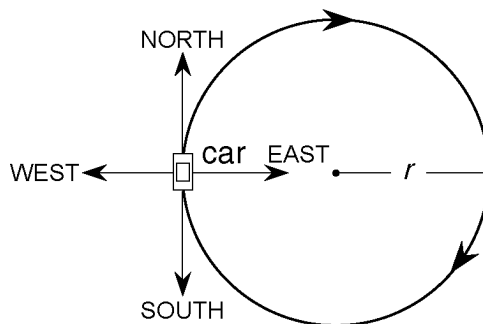
Which pair of arrows *best* represents the directions of the stone's velocity, v , and acceleration, a , at the position shown?

- A) v ↓ a ← B) v ↓ a ↓ C) v ← a ↓ D) v ↓ a →

- 9) Which graph *best* represents the relationship between the magnitude of the centripetal acceleration and the speed of an object moving in a circle of constant radius?

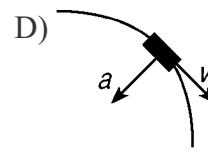
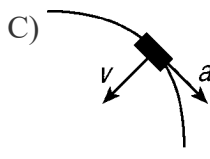
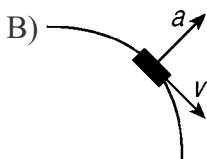
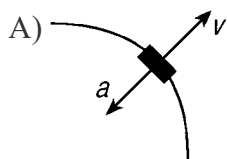


- 10) A 0.50-kilogram object moves in a horizontal circular path with a radius of 0.25 meter at a constant speed of 4.0 meters per second. What is the magnitude of the object's acceleration?
- A) 64 m/s^2 B) 16 m/s^2 C) 8.0 m/s^2 D) 32 m/s^2
- 11) A car moves with a constant speed in a clockwise direction around a circular path of radius r , as represented in the diagram below.



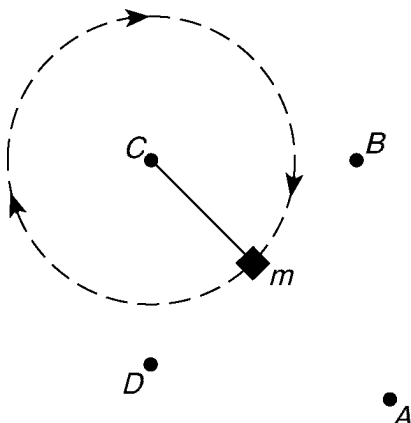
When the car is in the position shown, its acceleration is directed toward what direction?

- A) north B) east C) west D) south
- 12) A car rounds a horizontal curve of constant radius at a constant speed. Which diagram *best* represents the directions of *both* the car's velocity, v , and acceleration, a ?



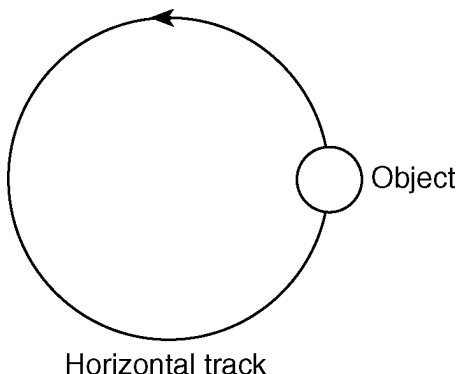
- 13) The centripetal force acting on the space shuttle as it orbits Earth is equal to the shuttle's
- A) inertia B) velocity C) weight D) momentum
- 14) Centripetal force F_c acts on a car going around a curve. If the speed of the car were twice as great, the magnitude of the centripetal force necessary to keep the car moving in the same path would be
- A) $2F_c$ B) F_c C) $\frac{F_c}{2}$ D) $4F_c$
- 15) A 1,750-kilogram car travels at a constant speed of 15.0 meters per second around a horizontal, circular track with a radius of 45.0 meters. What is the magnitude of the centripetal force acting on the car?
- A) 5.00 N B) 8,750 N C) 583 N D) $3.94 \times 10^5 \text{ N}$

- 16) The diagram below represents a mass, m , being swung clockwise at constant speed in a horizontal circle.



At the instant shown, the centripetal force acting on mass m is directed toward point

- A) A B) B C) C D) D
- 17) The diagram below shows an object moving counterclockwise around a horizontal, circular track.



Which diagram represents the direction of *both* the object's velocity and the centripetal force acting on the object when it is in the position shown?

- A) **Centripetal Force** (left arrow) and **Velocity** (down arrow)
- B) **Velocity** (up arrow) and **Centripetal Force** (right arrow)
- C) **Velocity** (up arrow) and **Centripetal Force** (left arrow)
- D) **Centripetal Force** (right arrow) and **Velocity** (down arrow)

- 18) The magnitude of the centripetal force acting on an object traveling in a horizontal, circular path will decrease if the

- A) radius of the path is increased C) speed of the object is increased
 B) direction of motion of the object is reversed D) mass of the object is increased