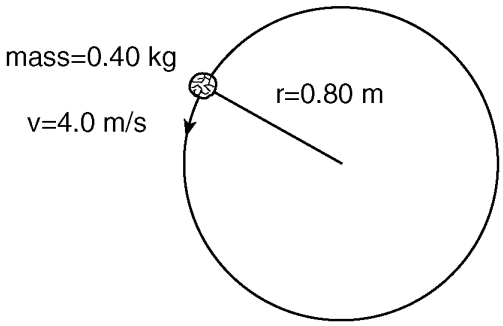
Name **Circular Motion** **Period**

1. 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) 8.0 m/s^2 B) 16 m/s^2
   C) 32 m/s^2 D) 64 m/s^2

2. The diagram below represents a 0.40-kilogram stone attached to a string. The stone is moving at a constant speed of 4.0 meters per second in a horizontal circle having a radius of 0.80 meter.



   The magnitude of the centripetal acceleration of the stone is

   A) 0.0 m/s^2 B) 2.0 m/s^2
   C) 5.0 m/s^2 D) 20. m/s^2

3. An amusement park ride moves a rider at a constant speed of 14 meters per second in a horizontal circular path of radius 10. meters. What is the rider's centripetal acceleration in terms of g, the acceleration due to gravity?

   A) $1g$ B) $2g$ C) $3g$ D) $0g$

4. A 1750-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. The magnitude of the centripetal force acting on the car is

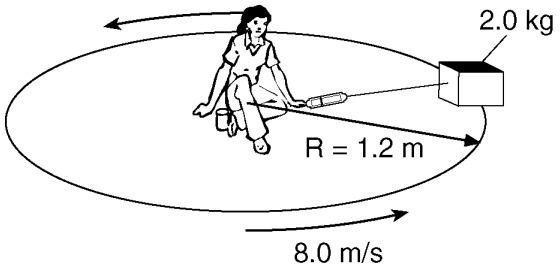
   A) 5.00 N B) 583 N
   C) 8750 N D) 3.94×10^5 N

5. A child is riding on a merry-go-round. As the speed of the merry-go-round is doubled, the magnitude of the centripetal force acting on the child

   A) remains the same B) is doubled
   C) is halved D) is quadrupled

6. Base your answer to the following question on the information and diagram below.

   The diagram shows a student seated on a rotating circular platform, holding a 2.0-kilogram block with a spring scale. The block is 1.2 meters from the center of the platform. The block has a constant speed of 8.0 meters per second. [Frictional forces on the block are negligible.]



   The reading on the spring scale is approximately

   A) 20. N B) 53 N
   C) 110 N D) 130 N

7. A ball of mass M at the end of a string is swinging in a horizontal circular path of radius R at constant speed V. Which combination of changes would require the greatest increase in the centripetal force acting on the ball?

   A) doubling V and doubling R
   B) doubling V and halving R
   C) halving V and doubling R
   D) halving V and halving R

Base your answers to questions **8** and **9** on the information below.

A 2.0×10^3-kilogram car travels at a constant speed of 12 meters per second around a circular curve of radius 30. meters.

8. What is the magnitude of the centripetal acceleration of the car as it goes around the curve?

A) 0.40 m/s^2 B) 4.8 m/s^2
C) 800 m/s^2 D) 9,600 m/s^2

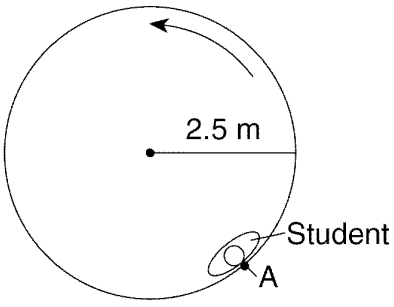
9. As the car goes around the curve, the centripetal force is directed

A) toward the center of the circular curve
B) away from the center of the circular curve
C) tangent to the curve in the direction of motion
D) tangent to the curve opposite the direction of motion

---

10. Base your answer to the following question on the information and diagram below.

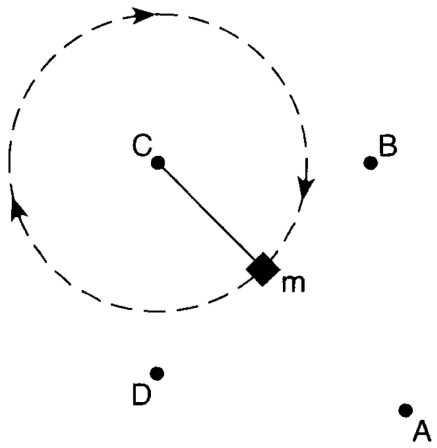
The diagram shows the top view of a 65-kilogram student at point *A* on an amusement park ride. The ride spins the student in a horizontal circle of radius 2.5 meters, at a constant speed of 8.6 meters per second. The floor is lowered and the student remains against the wall without falling to the floor.



The magnitude of the centripetal force acting on the student at point *A* is approximately

A) 1.2×10^4N B) 1.9×10^3N
C) 2.2×10^2N D) 3.0×10^1N

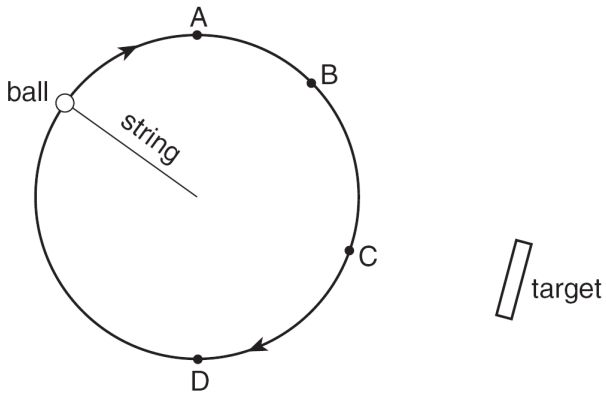
11. The diagram below represents a mass, *m*, being swung clockwise at constant speed in a horizontal circle.



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

A) *A* B) *B* C) *C* D) *D*

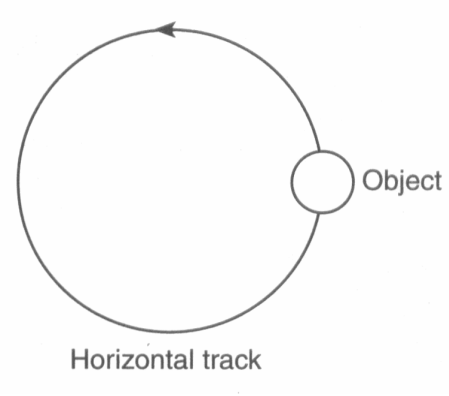
12. Base your answer to the following question on A ball attached to a string is moved at constant speed in a horizontal circular path. A target is located near the path of the ball as shown in the diagram.



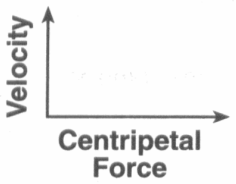
At which point along the ball's path should the string be released, if the ball is to hit the target?

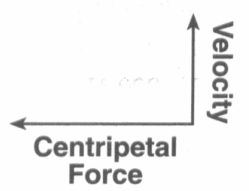
A) *A* B) *B* C) *C* D) *D*

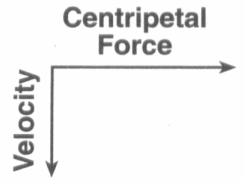
13. The diagram below shows an object moving counterclockwise around a horizontal, circular track.

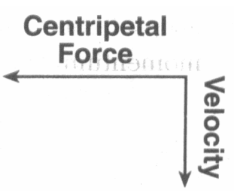


Which diagram represents the direction of both the object's velocity and the centripetal force acting on the object when it is in the position shown?

A)


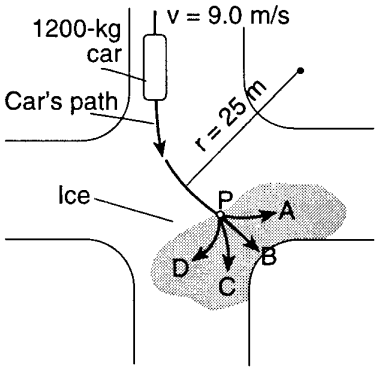
B)


C)


D)


Base your answers to questions **14** and **15** on the information and diagram below.

A 1200-kilogram car traveling at a constant speed of 9.0 meters per second turns at an intersection. The car follows a horizontal circular path with a radius of 25 meters to point *P*.



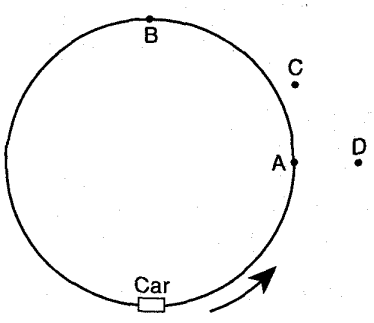
14. The magnitude of the centripetal force acting on the car as it travels around the circular path is approximately

A) 1.1×10^4 N B) 1.2×10^4 N
C) 3.9×10^3 N D) 4.3×10^2 N

15. At point *P*, the car hits an area of ice and loses all frictional force on its tires. Which path does the car follow on the ice?

A) *A* B) *B* C) *C* D) *D*

16. A convertible car with its top down is traveling at constant speed around a circular track, as shown in the diagram below.

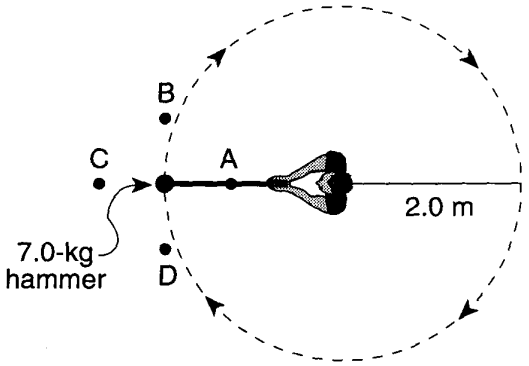


When the car is at point *A*, if a passenger in the car throws a ball straight up, the ball could land at point

A) *A* B) *B* C) *C* D) *D*

Base your answers to questions **17** and **18** on the information and diagram below.

An athlete in a hammer-throw event swings a 7.0-kilogram hammer in a horizontal circle at a constant speed of 12 meter per second. The radius of the hammer's path is 2.0 meters



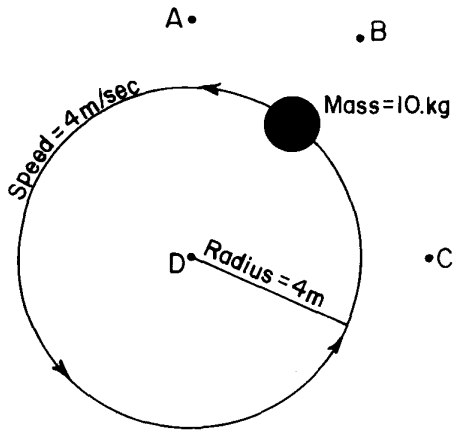
17. What is the magnitude of the centripetal acceleration of the hammer?

A) 6.0 m/s^2 B) 24 m/s^2
C) 72 m/s^2 D) 500 m/s^2

18. If the hammer is released at the position shown, it will travel toward point

A) *A* B) *B* C) *C* D) *D*

19. Base your answer to the following question on the diagram below which represents a mass of 10.0 kilograms traveling at constant speed of 4. meters per second in a horizontal circular path about point *D*.



Which quantity would increase if the radius increased?

A) period
B) tangential velocity
C) mass
D) centripetal acceleration