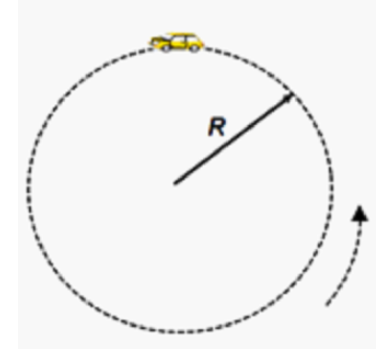
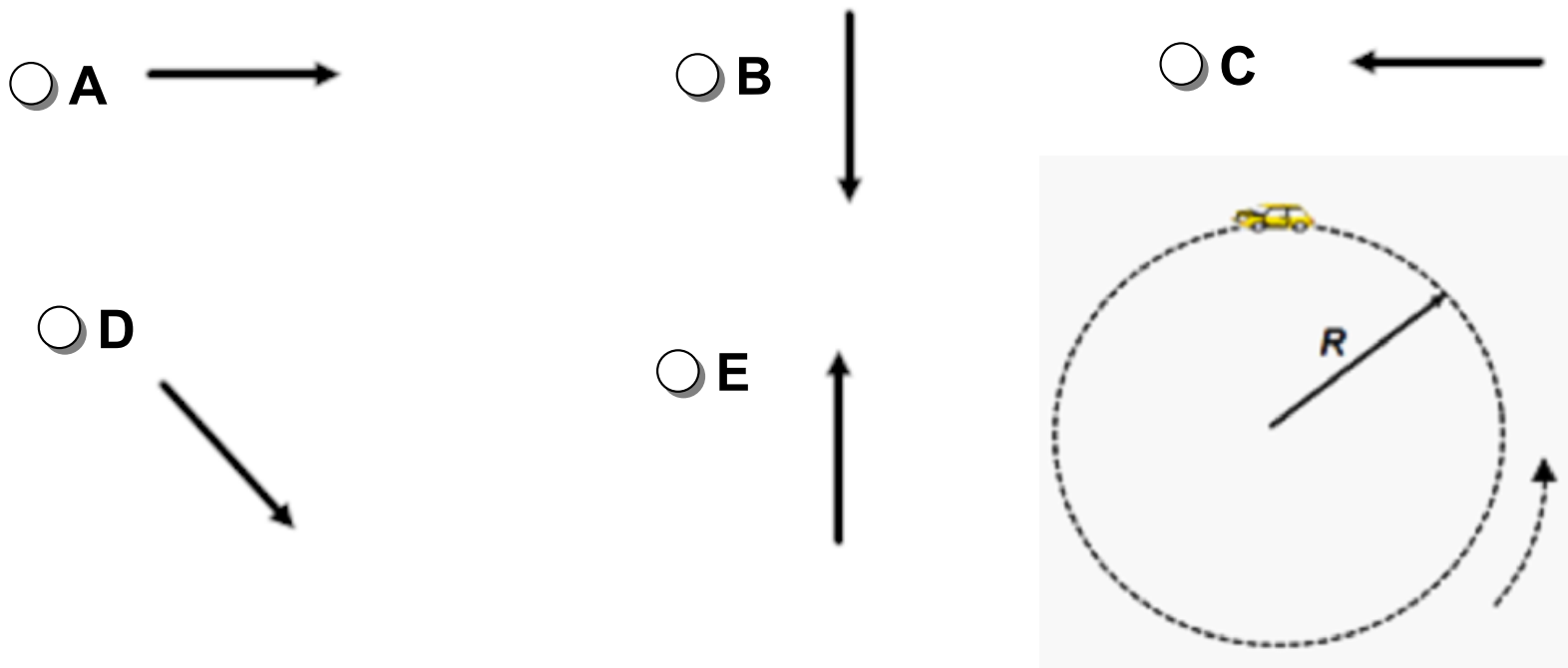


1 A car moves around a circular path of a constant radius at a constant speed. Which of the following statements is true?

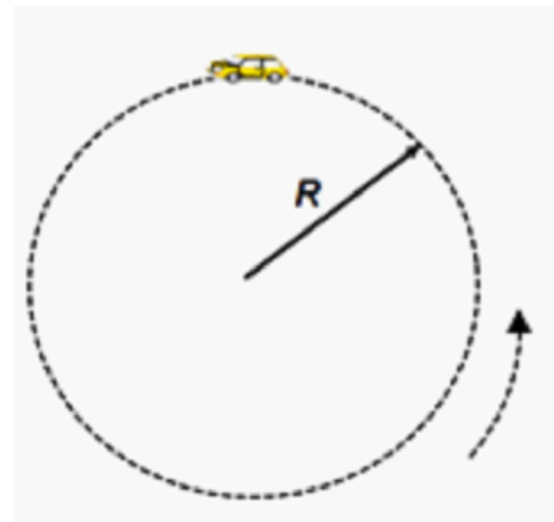
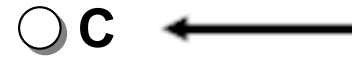


- ☐ A The car's velocity is constant
- ☐ B The car's acceleration is constant
- ☐ C The car's acceleration is zero
- ☐ D The car's velocity is directed toward the center
- ☐ E The car's acceleration is directed toward the center

2 A car moves around a circular path of a constant radius at a constant speed. When the car is at the top of the circular path, what is the direction of the velocity?



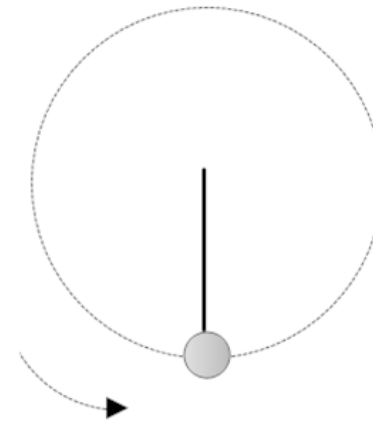
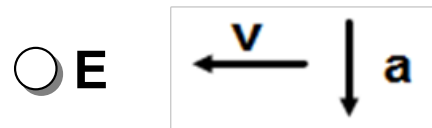
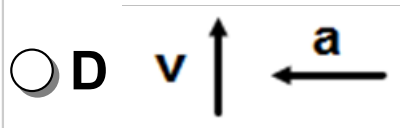
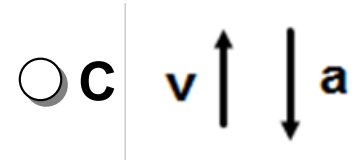
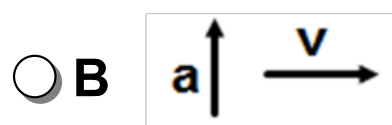
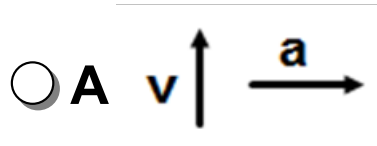
3 A car moves around a circular path of a constant radius at a constant speed. When the car is at the top of the circular path, what is the direction of the acceleration?



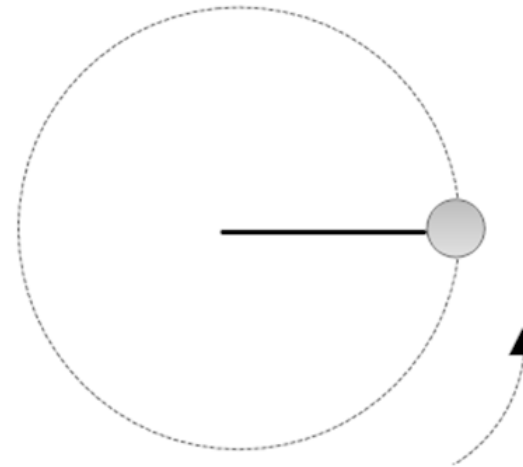
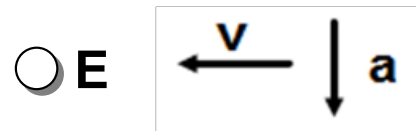
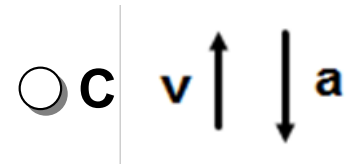
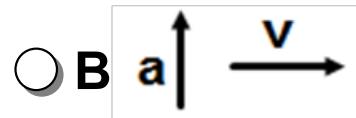
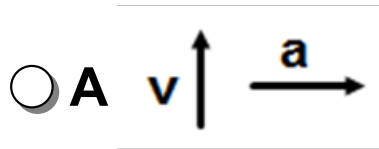
4 An object moves in a circular path at a constant speed. Which of the following is true?

- ☐ **A The car's acceleration is zero because it has a constant speed**
- ☐ **B The car's acceleration is not zero and causes the car to slow down**
- ☐ **C The car's acceleration is not zero and causes the car to speed up**
- ☐ **D The car's acceleration is not zero and causes the change in the direction of the car's velocity**
- ☐ **E None from the above**

5 A small sphere is swung in a vertical circle. Which of the following combinations represents the direction of the velocity and acceleration at the bottom of the circle?

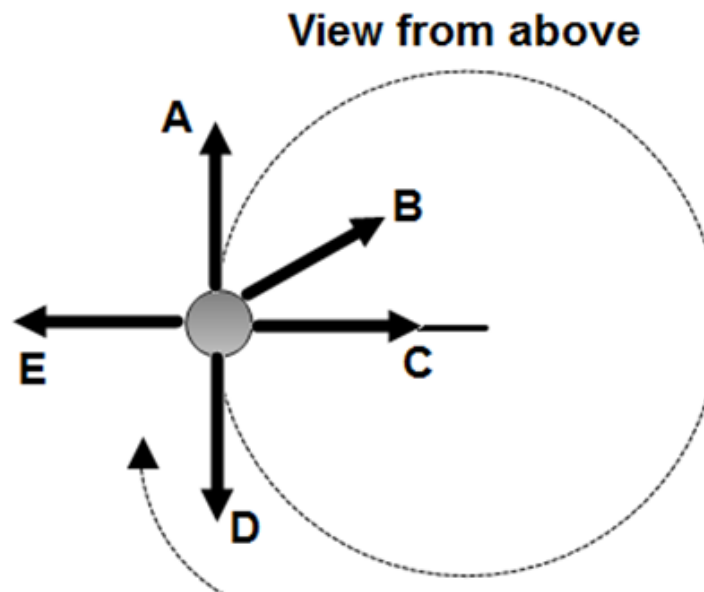


6 A small sphere is swung in a vertical circle. Which of the following combinations represents the direction of the velocity and acceleration at the right-most point of the circle?



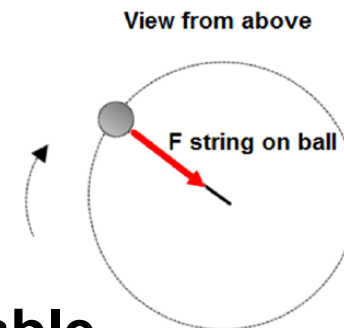
7 An object experiences a uniform circular motion in a horizontal plane, as illustrated below. The direction of the net force is:

- ☐ A A
- ☐ B B
- ☐ C C
- ☐ D D
- ☐ E E



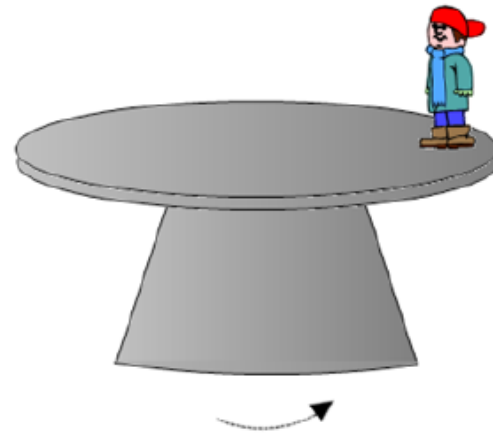
8 A small ball attached to the end of a string experiences a uniform circular motion on a horizontal frictionless table. In order to keep the ball moving in a circle the string must apply force on the ball toward the center of the circle. Which of the following refers to a reaction force?

- ☐ A The force of gravity pulling down
- ☐ B The normal force pushing up
- ☐ C The force applied by the ball on the table
- ☐ D The force applied by the ball on the string
- ☐ E The force applied by the table on the ball

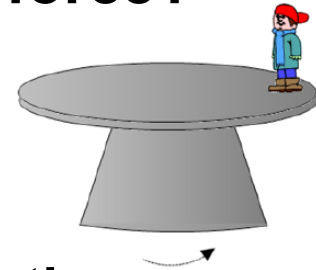


9 A boy stands at the edge of a rotating table. Which of the following forces prevents him from sliding off the table?

- ☐ **A The force of gravity**
- ☐ **B The normal force**
- ☐ **C The static friction**
- ☐ **D The kinetic friction**
- ☐ **E None from the above**



10 A boy stands at the edge of a rotating table. In order to keep him moving in a circular path the table applies a certain force on the boy. Which of the following is the reaction force to this force?



- ☐ A The normal force on the boy
- ☐ B The force of gravity exerted on the boy by Earth
- ☐ C The force of gravity exerted on Earth by the boy
- ☐ D The force exerted on the table by the boy that is directed straight down
- ☐ E The static friction force exerted by the boy on the table

11 An object travels in a circular path of radius r at a constant speed v . What happens to the object's acceleration if the radius of the circle is doubled and the speed stays unchanged?

- ☐ **A It doubles**
- ☐ **B It quadruples**
- ☐ **C It is cut to a half**
- ☐ **D It is cut to a quarter**
- ☐ **E Stays unchanged**

12 An object travels in a circular path of radius r at a constant speed v . What happens to the object's acceleration if the speed is doubled and the radius stays unchanged?

- ☐ **A It doubles**
- ☐ **B It quadruples**
- ☐ **C It is cut to a half**
- ☐ **D It is cut to a quarter**
- ☐ **E Stays unchanged**

13 An object travels in a circular path of radius r at a constant speed v . What happens to the object's acceleration if the radius of the circle is quadrupled and the speed is doubled?

- ☐ **A It doubles**
- ☐ **B It quadruples**
- ☐ **C It is cut to a half**
- ☐ **D It is cut to a quarter**
- ☐ **E Stays unchanged**

14 An object moves at a constant acceleration a in a circular path of radius r . Which of the following is the object's velocity?

☐ **A** ar

☐ **B** $\frac{a}{r}$

☐ **C** $\frac{r}{a}$

☐ **D** \sqrt{ar}

☐ **E** $\sqrt{\frac{a}{r}}$

15 An object moves around a circular path at a constant speed and makes five complete revolutions in 20 seconds. What is the period of rotation?

- ☐ **A 5 s**
- ☐ **B 10 s**
- ☐ **C 4 s**
- ☐ **D 20 s**
- ☐ **E 15 s**

16 An object moves around a circular path at a constant speed and makes ten complete revolutions in 5 seconds. What is the frequency of rotation?

- ☐ **A 2 Hz**
- ☐ **B 4 Hz**
- ☐ **C 6 Hz**
- ☐ **D 10 Hz**
- ☐ **E 20 Hz**

17 An object rotates with a period of 10 s. How many revolutions will it make in 25 s?

- ☐ **A 10**
- ☐ **B 15**
- ☐ **C 5**
- ☐ **D 2.5**
- ☐ **E 2**

18 An object rotates with a frequency of 300Hz. How many revolutions will it make in 15 s?

☐ **A 1000**

☐ **B 1500**

☐ **C 2000**

☐ **D 3500**

☐ **E 4500**

19 An object rotates with a period of 0.5 s. What is the frequency of rotations?

- ☐ **A 1.0 Hz**
- ☐ **B 1.5 Hz**
- ☐ **C 2.0 Hz**
- ☐ **D 2.5 Hz**
- ☐ **E 3.0 Hz**

20 An object rotates with a frequency of 50 Hz. What is the period of rotations?

☐ **A 0.02 s**

☐ **B 0.15 s**

☐ **C 0.25 s**

☐ **D 0.05 s**

☐ **E 0.03 s**

21 A ball of mass m moves at a constant speed v in circular path with a radius R . Which of the following represents the net force applied on the ball?

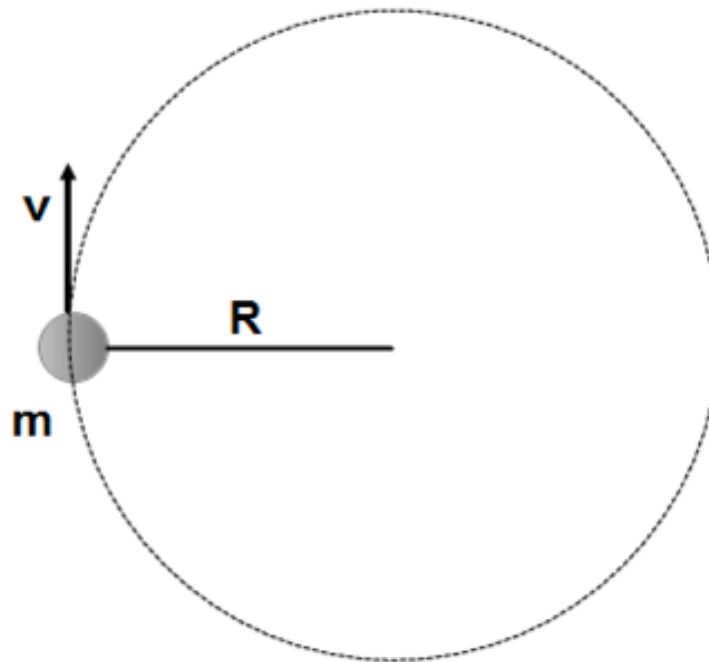
☐ **A** mvR

☐ **B** $\frac{mv}{R}$

☐ **C** $\frac{mv^2}{R}$

☐ **D** $\frac{v^2}{R}$

☐ **E** $\frac{R}{mv}$



22 An object of mass m moves at a constant speed v around a circular path of radius r . The net force applied to the object is F . What happens to the net force if the speed is doubled and the radius remains the same?

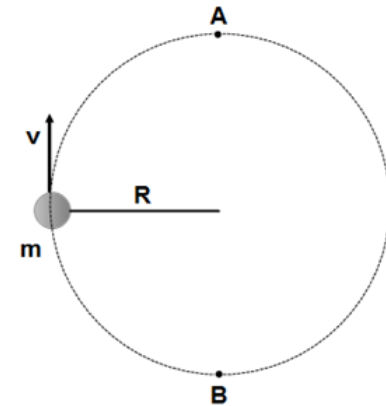
- ☐ **A It doubles**
- ☐ **B It quadruples**
- ☐ **C Stays the same**
- ☐ **D Is cut to one-half**
- ☐ **E Is cut to one-quarter**

23 An object of mass m moves at a constant speed v around a circular path of radius r . The net force applied on the object is F . What happens to the net force if speed is doubled and radius is quadrupled?

- ☐ **A It doubles**
- ☐ **B It quadruples**
- ☐ **C Stays the same**
- ☐ **D It is cut to one-half**
- ☐ **E It is cut to one-quarter**

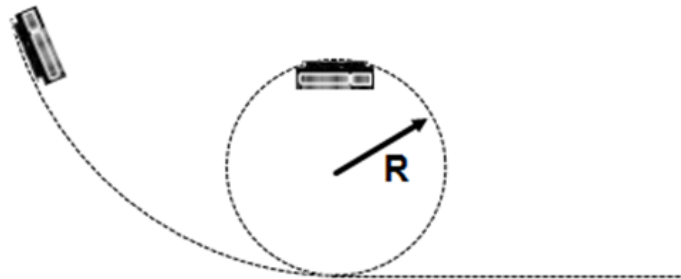
24 A ball of mass m attached to a light string moves at a constant speed v in a vertical circle with a radius R . Which of the following is true about the magnitude of the net force at point A compared to that at point B?

- ☐ **A The net force at point A is greater than at point B**
- ☐ **B The net force at point A is less than at point B**
- ☐ **C The net force is zero at all points around the circle**
- ☐ **D The net force at point A is equal to the net force at point B**



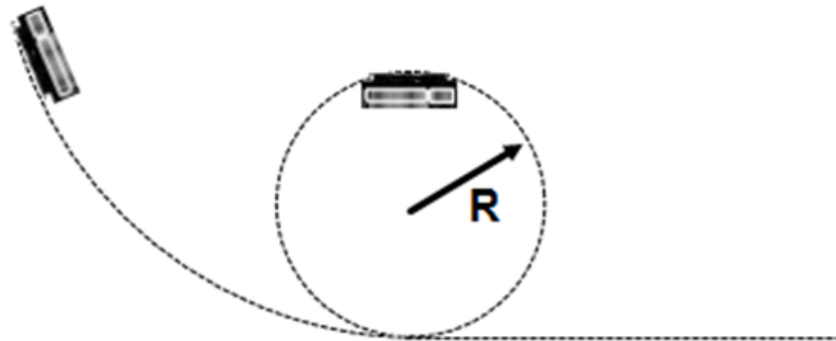
25 A roller coaster car moves on a track with one section that is a vertical circular loop of radius R . When the car is at the top of the loop it just maintains contact with the track. What is the car's acceleration at this point?

- ☐ A **g upward**
- ☐ B **0.5 g upward**
- ☐ C **Zero**
- ☐ D **0.5 g downward**
- ☐ E **g downward**



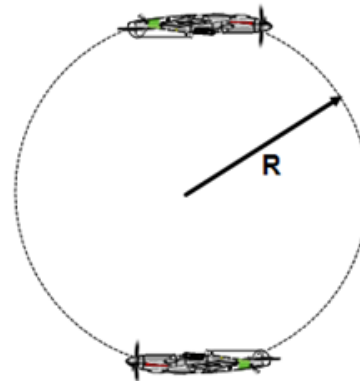
26 A roller coaster car moves on a track with one section that is a vertical circular loop of radius R . When the car is at the top of the loop it just maintains contact with the track. What is the car's velocity at this point?

- ☐ **A** Rg
- ☐ **B** $\frac{g}{R}$
- ☐ **C** *Zero*
- ☐ **D** $\frac{R}{g}$
- ☐ **E** \sqrt{Rg}



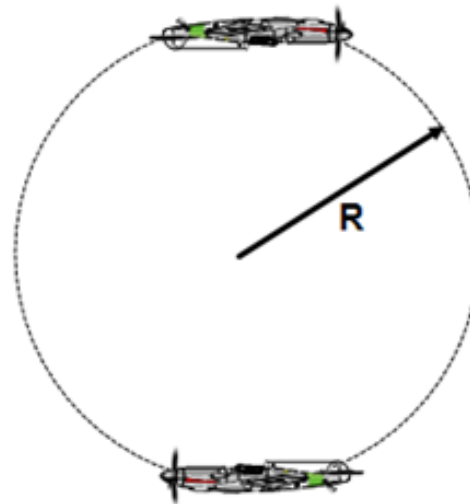
27 A pilot performs a vertical maneuver around a circle with a radius R . Which of the following is true about the pilot's apparent weight?

- ☐ **A It increases when he moves from the lowest to the highest point of the circle**
- ☐ **B It decreases when he moves from the lowest to the highest point of the circle**
- ☐ **C It decreases when he moves from the highest to the lowest point of the circle**
- ☐ **D Remains constant at all points**
- ☐ **E More information is required**



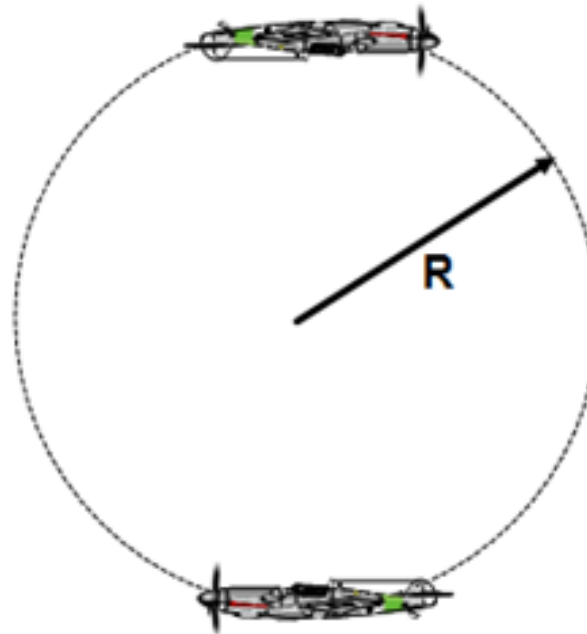
28 A pilot performs a vertical maneuver around a circle with a radius R . When the airplane is at the lowest point of the circle the pilot's apparent weight is 6 mg . What is the acceleration of the plane at the lowest point?

- ☐ A g
- ☐ B 2 g
- ☐ C 3 g
- ☐ D 4 g
- ☐ E 5 g



29 A pilot performs a vertical maneuver around a circle with a radius R . When the airplane is at the lowest point of the circle pilot's weight is 4 mg . What is the velocity at the lowest point?

- ☐ **A** \sqrt{Rg}
- ☐ **B** $\sqrt{2Rg}$
- ☐ **C** $\sqrt{3Rg}$
- ☐ **D** $\sqrt{4Rg}$
- ☐ **E** $\sqrt{5Rg}$



30 A coin lies on the top of a turntable at a distance R from the center. The table rotates at a constant speed v . What is the minimum coefficient of static friction that can prevent the coin from sliding off the table?

- ☐ **A** $vr g$
- ☐ **B** $\frac{Rg}{v^2}$
- ☐ **C** $\frac{v}{Rg}$
- ☐ **D** $\frac{v^2}{Rg}$
- ☐ **E** \sqrt{vRg}