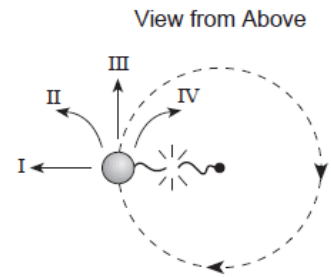


Assignment 6 Centripetal Motion

Name: _____

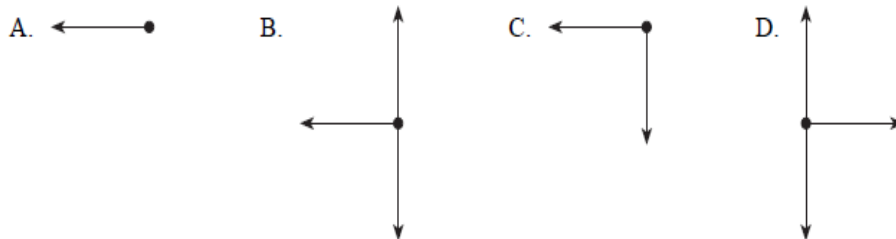
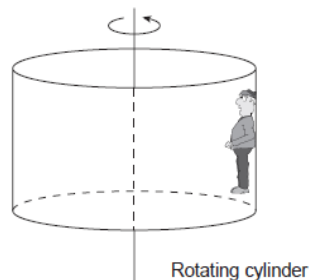
Show all workings for multiple choice.

1. A ball attached to a string is swung in a horizontal circle. Which path will the ball follow at the instant the string breaks?
 A. I
 B. II
 C. III
 D. IV



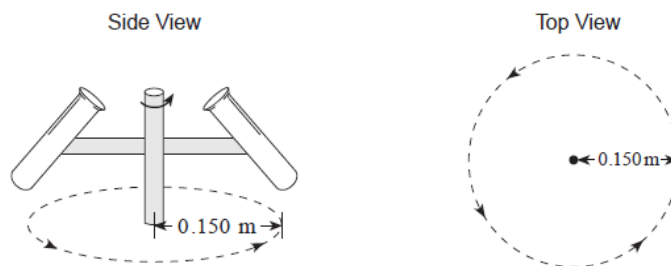
2. Which best describes the direction of the centripetal acceleration of an object in uniform circular motion?
 A. in the direction of motion
 B. inward towards the centre of the circle
 C. opposite the direction of motion
 D. outward from the centre of the circle

3. In a popular amusement park ride, a large cylinder is set in rotation. The floor then drops away leaving the riders suspended against the wall in a vertical position as shown. Which of the following is the correct free-body diagram for the person at the position shown?



4. By what factor does the centripetal force change if a car goes around a curve at half its original speed?
 A. decreases by a factor of 2
 B. decreases by a factor of 4
 C. increases by a factor of 2
 D. increases by a factor of 4
5. A boy is whirling a stone around his head by means of a string. The string makes one complete revolution every second, and the tension in the string is FT . The boy then speeds up the stone, keeping the radius of the circle unchanged, so that the string makes two complete revolutions every second. What happens to the tension in the string?
 A. The tension reduces to half of its original value.
 B. The tension increases to twice its original value.
 C. The tension increases to four times its original value.
 D. The tension reduces to one-fourth of its original value.
6. A ball is whirled on the end of a string in a horizontal circle of radius R at constant speed v . How can the centripetal acceleration of the ball can be increased by a factor of 4?
 A. keeping the speed fixed and increasing the radius by a factor of 4.
 B. keeping the radius fixed and increasing the speed by a factor of 4.
 C. keeping the radius fixed and increasing the period by a factor of 4.
 D. keeping the speed fixed and decreasing the radius by a factor of 4.
7. Which force is responsible for holding a car in an unbanked curve?
 A. the car's weight
 B. the force of friction
 C. the vertical component of the normal force
 D. the horizontal component of the normal force

8. The tires on a moving bicycle make one complete rotation in 0.18 s. If the radius of the tires is 0.42 m, how fast is the bicycle travelling?
- 2.3 m/s
 - 3.1 m/s
 - 4.7 m/s
 - 15 m/s
9. What is the centripetal acceleration of a car as it travels at 36.0 m/s around a circle with radius 3.4×10^2 m?
- 0.11 m/s^2
 - 0.26 m/s^2
 - 3.8 m/s^2
 - 9.4 m/s^2
10. A 0.500 kg ball is swung in a horizontal circle of radius 1.20 m with a period of 1.25 s. What is the centripetal force on the ball?
- 0.384 N
 - 15.2 N
 - 18.9 N
 - 30.3 N
11. A test tube rotates in a centrifuge with a period of 1.20×10^{-3} s. The bottom of the test tube travels in a circular path of radius 0.150 m.

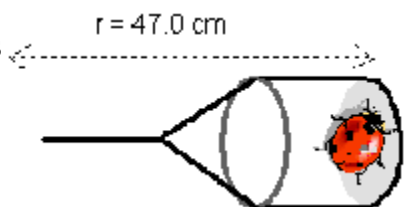


- What is the centripetal force exerted on a 2.00×10^{-8} kg amoeba at the bottom of the tube?
- 9.86×10^{-5} N
 - 2.08×10^{-3} N
 - 8.22×10^{-2} N
 - 4.11×10^6 N
12. A 0.25-kg ball attached to a string is rotating in a horizontal circle of radius 0.5 m. If the ball revolves twice every second, what is the tension in the string?
- 5 N
 - 7 N
 - 10 N
 - 20 N
13. A certain string just breaks when it is under 400 N of tension. A boy uses this string to whirl a 10-kg stone in a horizontal circle of radius 10 m. The boy continuously increases the speed of the stone. At approximately what speed will the string break?
- 10 m/s
 - 20 m/s
 - 80 m/s
 - 400 m/s
14. A car enters a horizontal, curved roadbed of radius 50 m. The coefficient of static friction between the tires and the roadbed is 0.20. What is the maximum speed with which the car can safely negotiate the unbanked curve?
- 5 m/s
 - 10 m/s
 - 20 m/s
 - 40 m/s
15. A space station is designed in the shape of a large, uniformly rotating hollow donut. The outer radius of the station is 350 m. With what period must the station rotate so that a person sitting on the outer wall experiences "artificial gravity," i.e. an acceleration of 9.8 m/s^2 ?
- 38 s
 - 76 s
 - 110 s
 - 170 s

1. A motorcycle traveling at 55 km/hr has a centripetal acceleration of 7.5 m/s^2 as it rounds a circular curve in the road. What is the radius of the curve? {2}

2. What is the magnitude of the centripetal acceleration at a point 7.6 cm from the centre of a centrifuge that is spinning at $9.5 \times 10^3 \text{ rpm}$? How many "g's" are represented? {6}

3. The can in the picture is being swung at a rate of 2.3 revolutions per second. The mass of the bug is 5.2 g. With what force is the can pushing against the bug's feet? {4}



4. In a Celtic field event called the hammer throw; a 12 kg ball is whirled in a circle of radius of 2.0 m with a frequency of 1.5 Hz. What is the velocity when it is released? What is the centripetal force? {4}

5. A car is moving around a horizontal curve with a radius of 50.0 m. If the coefficient of static friction is 0.75, what is the maximum speed for the car to travel safely around the curve without skidding? {3}