Unit 3.5_Form A

Name: _____ **Date:** _____

Multiple Choice (1 pt. each)

1. The shape of natural orbits of satellites is best described as being

   A. circular B. parabolic

   C. elliptical D. hyperbolic

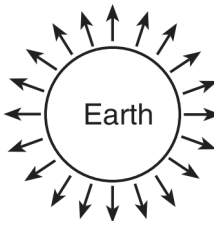
2. What is the acceleration due to gravity at a location where a 15.0-kilogram mass weighs 45.0 newtons?

   A. 675 m/s^2 B. 9.81 m/s^2

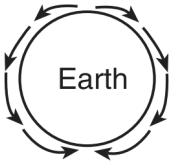
   C. 3.00 m/s^2 D. 0.333 m/s^2

3. Which diagram best represents the gravitational field lines surrounding Earth?

   A.

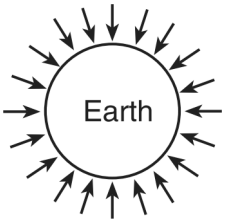


   B.

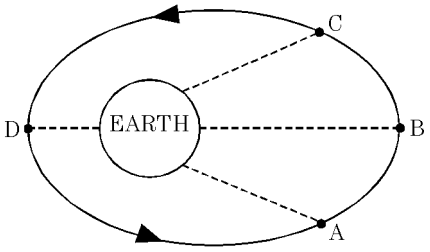


   C.

   D.



4. The diagram shows positions of a satellite as it orbits the Earth. At which position will the satellite achieve its highest velocity?



A. *A* B. *B* C. *C* D. *D*

5. The centers of two 15.0-kilogram spheres are separated by 3.00 meters. The magnitude of the gravitational force between the two spheres is approximately

A. 1.11×10^{-10} N B. 3.34×10^{-10} N

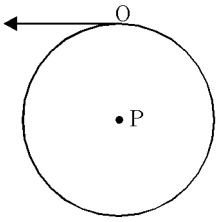
C. 1.67×10^{-9} N D. 5.00×10^{-9} N

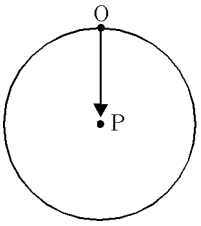
6. An object traveling with uniform circular motion has a centripetal acceleration due to the change in

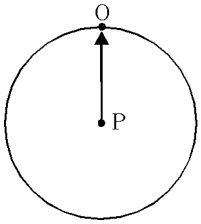
A. speed B. direction

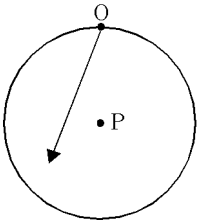
C. kinetic energy D. mass

7. If object *O* is moving in a uniform circular motion around point *P* at constant speed, which vector shown represents a centripetal force?

A.


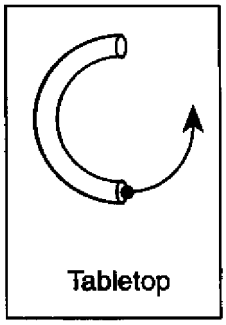
B.


C.


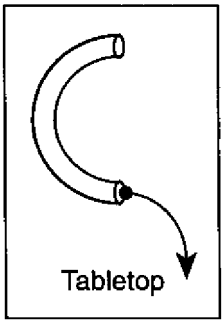
D.


8. A ball rolls through a hollow semicircular tube lying flat on a horizontal tabletop. Which diagram best shows the path of the ball after emerging from the tube, as viewed from above?

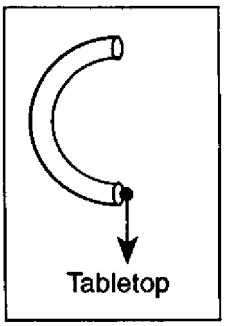
A.



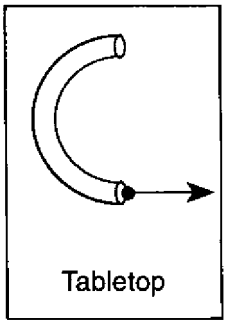
B.



C.

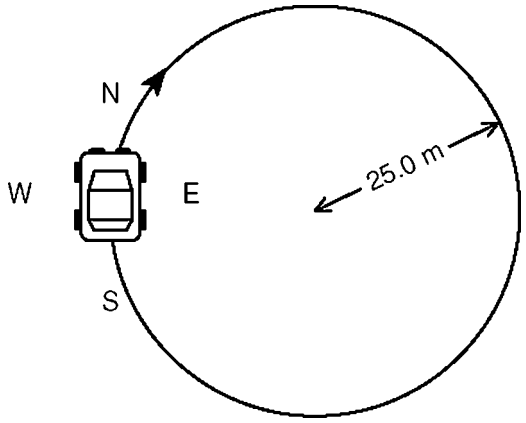


D.



9. Base your answer(s) to the following question(s) on the information and diagram below.

A 1.00×10^3-kilogram car is driven clockwise around a flat circular track of radius 25.0 meters. The speed of the car is a constant 5.00 meters per second.



At the instant shown in the diagram, the car's centripetal acceleration is directed

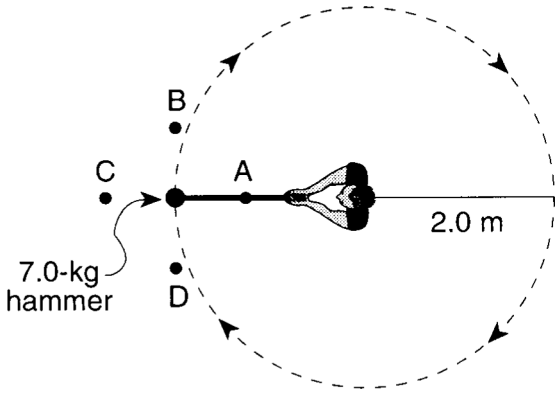
A. toward E
B. toward N
C. toward W
D. clockwise

10. 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
B. mass of the object is increased
C. direction of motion of the object is reversed
D. speed of the object is increased

11. Base your answer(s) to the following question(s) 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 meters per second. The radius of the hammer's path is 2.0 meters.



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

12. An astronaut weighs 500 newtons on Earth and 25 newtons on asteroid X. The acceleration due to gravity on asteroid X is approximately

A. 1 m/s^2 B. 2 m/s^2

C. 0.2 m/s^2 D. 0.5 m/s^2

Open Response (2 pts. each - MUST SHOW WORK)

13. Base your answer(s) to the following question(s) on the information below.

The combined mass of a race car and its driver is 600. kilograms. Traveling at constant speed, the car completes one lap around a circular track of radius 160 meters in 36 seconds.

Calculate the speed of the car. [Show all work, including the equation and substitution with units.]

14. Calculate the magnitude of the centripetal acceleration of the car. [Show all work, including the equation and substitution with units.]

15. Calculate the magnitude of the average gravitational force between Earth and the Moon. [Show all work, including the equation and substitution with units.]

Extra Credit (1 pt. each - MUST SHOW WORK)

16. A 15-kilogram mass weighs 60. newtons on planet X. The mass is allowed to fall freely from rest near the surface of the planet. After falling for 6.0 seconds, the acceleration of the mass is

A. 0.25 m/s^2 B. 10. m/s^2

C. 24 m/s^2 D. 4.0 m/s^2

17. When a satellite is a distance R from the center of Earth, the force due to gravity on the satellite is F. What is the force due to gravity on the satellite when its distance from the center of Earth is $3R$?

A. $\frac{F}{9}$ B. $\frac{F}{3}$ C. F D. $9F$

Problem-Attic format version 4.4.375
© 2011–2018 EducAide Software
Licensed for use by Jasleen Singh
Terms of Use at www.problem-attic.com

Unit 3.5_Form A 2/5/2020

1.
Answer: C
Points: 1

2.
Answer: C
Points: 1

3.
Answer: D
Points: 1

4.
Answer: D
Points: 1

5.
Answer: C
Points: 1

6.
Answer: B
Points: 1

7.
Answer: B
Points: 1

8.
Answer: D
Points: 1

9.
Answer: A
Points: 1

10.
Answer: A
Points: 1

11.
Answer: C
Points: 1

12.
Answer: D
Points: 1

13.
Answer: $\bar{v} = \frac{d}{t}$

$\bar{v} = \frac{2\pi r}{t}$

$\bar{v} = \frac{2\pi(160\text{ m})}{36\text{ s}}$

$\bar{v} = 28\text{ m/s}$ *or* 27.9 m/s

Points: 1

14.
Answer: $A_c = \frac{v^2}{r}$ $A_c = \frac{(28\,\text{m/s})^2}{160\,\text{m}}$ $A_c = 4.9\,\text{m/s}^2$
Points: 1

15.
Answer: $F_g = \frac{Gm_1m_2}{r^2}$; $F_g = 1.99 \times 10^{20}\,\text{N}$
Points: 1

16.
Answer: D
Points: 1

17.
Answer: A
Points: 1