

Questions 7-8 refer to a ball that is tossed straight up from the surface of a small, spherical asteroid with no atmosphere. The ball rises to a height equal to the asteroid's radius and then falls straight down toward the surface of the asteroid.

7. What forces, if any, act on the ball while it is on the way up?
- (A) Only a decreasing gravitational force that acts downward
 - (B) Only an increasing gravitational force that acts downward
 - (C) Only a constant gravitational force that acts downward
 - (D) Both a constant gravitational force that acts downward and a decreasing force that acts upward
 - (E) No forces act on the ball.
8. The acceleration of the ball at the top of its path is
- (A) at its maximum value for the ball's flight
 - (B) equal to the acceleration at the surface of the asteroid
 - (C) equal to one-half the acceleration at the surface of the asteroid
 - (D) equal to one-fourth the acceleration at the surface of the asteroid
 - (E) zero

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9. The equation of motion of a simple harmonic oscillator is $\frac{d^2x}{dt^2} = -9x$, where x is displacement and t is time. The period of oscillation is

- (A) 6π
- (B) $\frac{9}{2\pi}$
- (C) $\frac{3}{2\pi}$
- (D) $\frac{2\pi}{3}$
- (E) $\frac{2\pi}{9}$

10. A pendulum with a period of 1 s on Earth, where the acceleration due to gravity is g , is taken to another planet, where its period is 2 s. The acceleration due to gravity on the other planet is most nearly
- (A) $g/4$
 - (B) $g/2$
 - (C) g
 - (D) $2g$
 - (E) $4g$
11. A satellite of mass M moves in a circular orbit of radius R with constant speed v . True statements about this satellite include which of the following?
- I. Its angular speed is v/R .
 - II. Its tangential acceleration is zero.
 - III. The magnitude of its centripetal acceleration is constant.
- (A) I only
 - (B) II only
 - (C) I and III only
 - (D) II and III only
 - (E) I, II, and III