1. . A ball of mass m on a string of length R, swinging around in circular motion, with instantaneous velocity v and centripetal acceleration a. What is the centripetal acceleration of the ball if the length of the string is doubled? (A) a/4 (B) a/2 (C) a (D) 2a (E) 4a

2. . A ball of mass m on a string of length R, swinging around in circular motion, with instantaneous velocity v and centripetal acceleration a. What is the centripetal acceleration of the ball if the instantaneous velocity of the ball is doubled? (A) a/4 (B) a/2 (C) a (D) 2a (E) 4a

3. . A ball of mass m on a string of length R, swinging around in circular motion, with instantaneous velocity v and centripetal acceleration a. What is the centripetal acceleration of the ball if its mass is doubled? (A) a/4 (B) a/2 (C) a (D) 2a (E) 4a

4. . A bullet of mass m traveling at velocity v strikes a block of mass 2m that is attached to a rod of length R. The bullet collides with the block at a right angle and gets stuck in the block. The rod is free to rotate. What is the centripetal acceleration of the block after the collision?  (A) v2 /R (B) (1/2)v2 /R (C) (1/3)v2 /R (D) (1/4)v2 /R (E) (1/9)v2 /R

5. . A car wheel drives over a pebble, which then sticks to the wheel momentarily as the wheel displaces it. What is the direction of the initial acceleration of the pebble?  (A)  (B)  (C)  (D)  (E) 

6. .If we consider the gravitational force *F* between two objects of masses m1 and m2 respectively, separated by a distance *R*, and we double the distance between them, what is the new magnitude of the gravitational force between them? (A) F/4 (B) F/2 (C) F (D) 2F (E) 4F

7. . If the Earth were compressed in such a way that its mass remained the same, but the distance around the equator were just one-half what it is now, what would be the acceleration due to gravity at the surface of the Earth? (A) g/4 (B) g/2 (C) g (D) 2g (E) 4g

8. . A satellite orbits the Earth at a radius r and a velocity v. If the radius of its orbit is doubled, what is its velocity? (A) v/2 (B) v/ (C) v (D) v (E) 2v

9. .An object is released from rest at a distance of from the center of the Earth, where is the radius of the Earth. In terms of the gravitational constant (G), the mass of the Earth (M), and , what is the velocity of the object when it hits the Earth? (A) (B) (C) (D) (E)

10. . Two planets, A and B, orbit a star. Planet A moves in an elliptical orbit whose semimajor axis has length a. Planet B moves in an elliptical orbit whose semimajor axis has a length of 9a. If planet A orbits with a period T, what is the period of planet B’s orbit? (A) 729T (B) 27T (C) 3T (D) T/3 (E) T/27