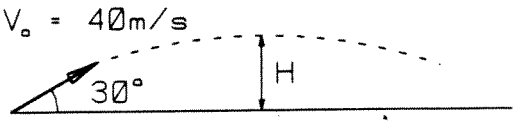
DYNAMICS REVIEW

1. A projectile fired at 30° from the horizontal with an initial velocity of 40 meters per second will reach a maximum height H above the horizontal of:

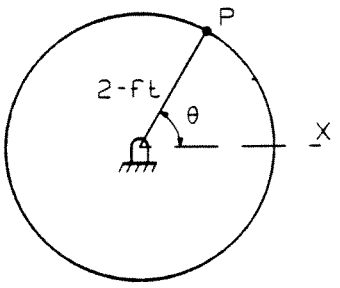


a. __ 81.5 m
b. __ 20.4 m
c. __ 6.2 m
d. __ 24.8 m
e. __ 141 m

2. At the highest point on its trajectory the radius of curvature of the path of the projectile in problem 1 (above) would be:

a. __ zero.
b. __ infinity.
c. __ equal to the maximum elevation H (answer to problem 1).
d. __ 122 m.
e. __ 163 m.

3. The gear starts from rest and the angular position of line OP is given by $\theta = 2t^3 - 7t^2$ where θ is in radians and t in seconds. The magnitude of the total acceleration of point P when t = 2 seconds is:

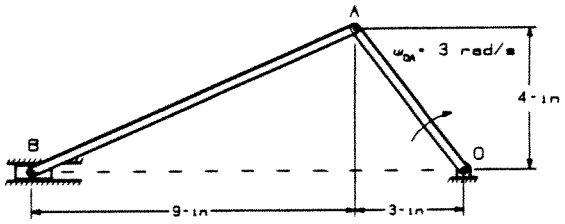


a. __ 38 fps^2
b. __ 10 fps^2
c. __ 32 fps^2
d. __ 20 fps^2
e. __ 19 fps^2

4. The acceleration of a particle moving along a straight line is directly proportional to its displacement: a = 2s where a is in meters per second squared and s is in meters. if the particle has a velocity of +2 m/s as it passes through the origin, its velocity at s = 4 m will be:

a. __ 18 m/s
b. __ 4.0 m/s
c. __ 3.5 m/s
d. __ 4.5 m/s
e. __ 6 m/s

5. Member OA has a constant angular velocity of 3 radians per seconds clockwise. For the position shown B is moving to the right with a velocity of:



a. __ 12 ips.

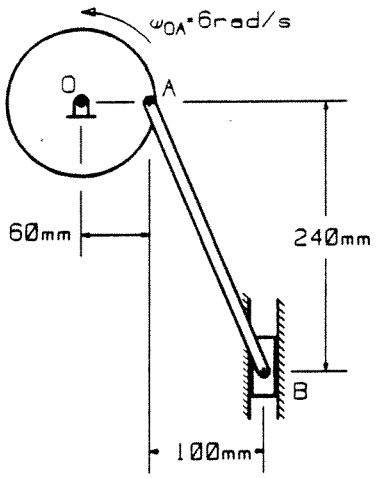
b. __ 9 ips.

c. __ 16 ips.

d. __ 15 ips.

e. __ zero (it is instantaneously at rest).

6. Wheel OA is rotating counterclockwise with a constant angular velocity of 6 radians per second. At the instant shown the angular velocity of member AB is zero, and the angular acceleration of AB is:



a. __ zero.

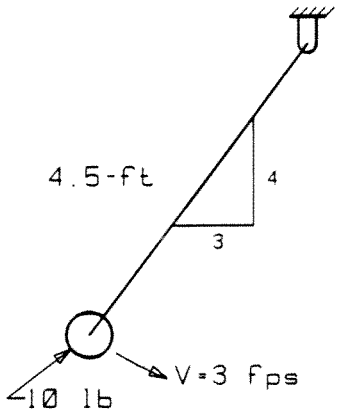
b. __ 9 rad/s^2 counterclockwise.

c. __ 9 rad/s^2 clockwise.

d. __ 6 rad/s^2 counterclockwise.

e. __ 8.3 rad/s^2 clockwise.

7. The 10 pound ball is supported by a cord and is swinging in the vertical plane. At the instant shown the velocity of the ball is 3 fps, and the tension in the cord is:



a. __ 28.0 lb.

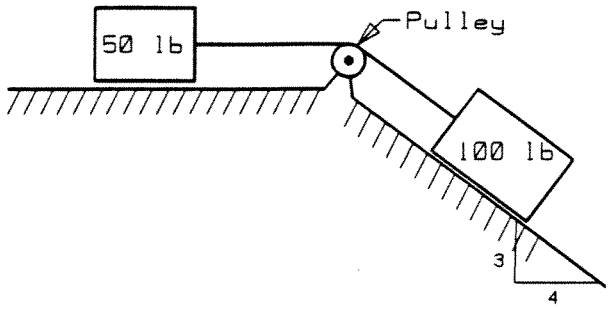
b. __ 8.0 lb.

c. __ 6.0 lb.

d. __ 10.0 lb.

e. __ 8.6 lb.

8. The two bodies shown move on frictionless planes and are connected by a flexible cord. The tensile load in the cord is:



a. __ 20 lb.

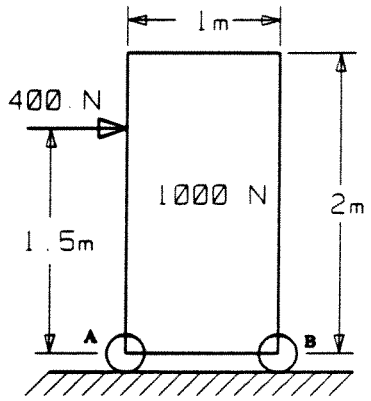
b. __ 50 lb.

c. __ 60 lb.

d. __ 80 lb.

e. __ 110 lb.

9. The homogeneous 1000 newton crate moves on small frictionless rollers of negligible mass. The combined normal reaction on the front rollers at B is:



a. __ 400 N

b. __ 500 N

c. __ 700 N

d. __ 1100 N

e. __ 1000 N (i.e. it is tipping).

10. The 32.2 pound homogeneous cylinder is released from rest on the inclined plane. The angular acceleration of the cylinder after it is released will be:

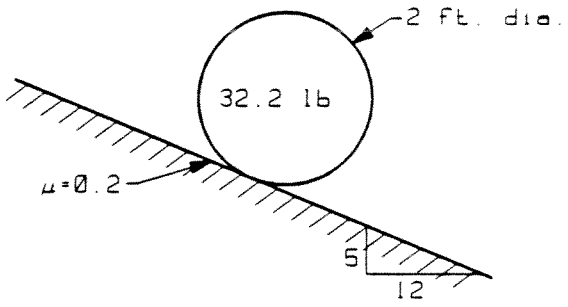
a. __ 13.4 rad/s^2

b. __ 12.4 rad/s^2

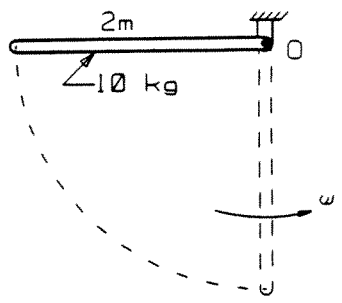
c. __ 3.2 rad/s^2

d. __ 5.9 rad/s^2

e. __ 8.3 rad/s^2



11. A slender rod 2 meters long and having a mass of 10 kilograms is released from rest in the horizontal position. It swings counterclockwise in the vertical plane while pivoted about point 'O'. Its angular velocity as it reaches the vertical position is:

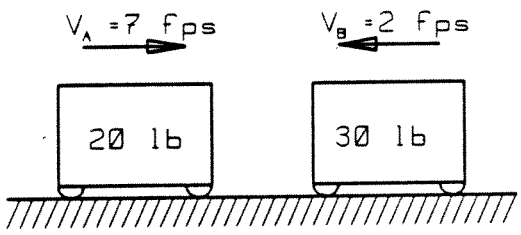


a. __ 1.2 rad/s
b. __ 7.7 rad/s
c. __ 19.6 rad/s
d. __ 9.8 rad/s
e. __ 3.8 rad/s

12. Two identical cylinders R and S are released simultaneously from rest at the top of two inclined planes having the same length and slope. Cylinder R rolls without slipping while cylinder S moves down a perfectly smooth plane. The two cylinders reach the bottom of their respective planes:

a. __ at the same instant.
b. __ with the same angular velocity.
c. __ with the same linear velocity of the mass centers.
d. __ with the same kinetic energy.
e. __ with none of the above.

13. Carts A and B have weights and initial velocities as shown. The velocity of cart B immediately after impact is observed to be 4 ft/sec to the right. The velocity of cart A immediately after impact is:



a. __ 1 fps^2
b. __ 2 fps^2
c. __ 4 fps^2
d. __ 5.6 fps^2
e. __ 10 fps^2

14. The carts in problem No. 13 rebound with a coefficient of restitution of:

a. __ 0.67
b. __ 0.22
c. __ 0.40
d. __ 1.2
e. __ 2.0

Ans: 1-b, 2-d, 3-a, 4-e, 5-c, 6-b, 7-e, 8-a, 9-c, 10-e, 11-e, 12-d, 13-b, 14-a