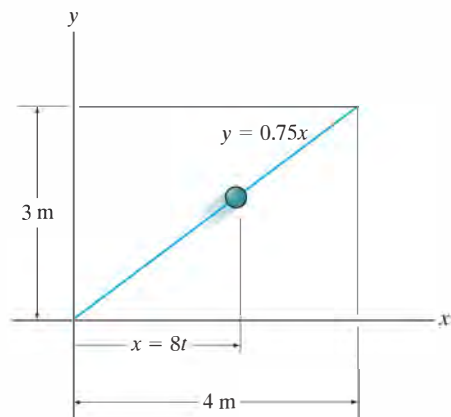


FUNDAMENTAL PROBLEMS

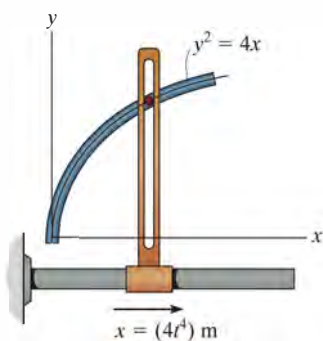
F12-15. If the x and y components of a particle's velocity are $v_x = (32t)$ m/s and $v_y = 8$ m/s, determine the equation of the path $y = f(x)$. $x = 0$ and $y = 0$ when $t = 0$.

F12-16. A particle is traveling along the straight path. If its position along the x axis is $x = (8t)$ m, where t is in seconds, determine its speed when $t = 2$ s.



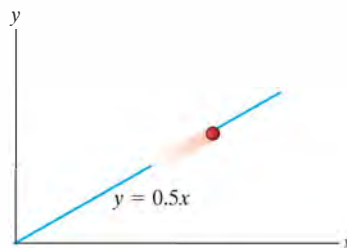
F12-16

F12-17. A particle is constrained to travel along the path. If $x = (4t^4)$ m, where t is in seconds, determine the magnitude of the particle's velocity and acceleration when $t = 0.5$ s.



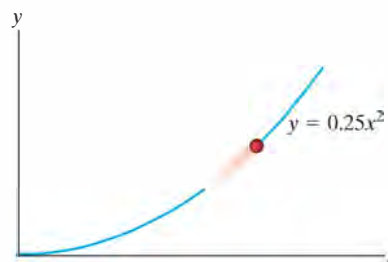
F12-17

F12-18. A particle travels along a straight-line path $y = 0.5x$. If the x component of the particle's velocity is $v_x = (2t^2)$ m/s, where t is in seconds, determine the magnitude of the particle's velocity and acceleration when $t = 4$ s.



F12-18

F12-19. A particle is traveling along the parabolic path $y = 0.25x^2$. If $x = (2t^2)$ m, where t is in seconds, determine the magnitude of the particle's velocity and acceleration when $t = 2$ s.



F12-19

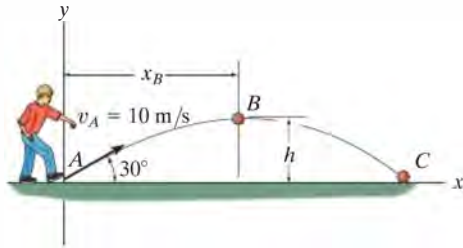
F12-20. The position of a box sliding down the spiral can be described by $\mathbf{r} = [2 \sin(2t)\mathbf{i} + 2 \cos t\mathbf{j} - 2t^2\mathbf{k}]$ ft, where t is in seconds and the arguments for the sine and cosine are in radians. Determine the velocity and acceleration of the box when $t = 2$ s.



F12-20

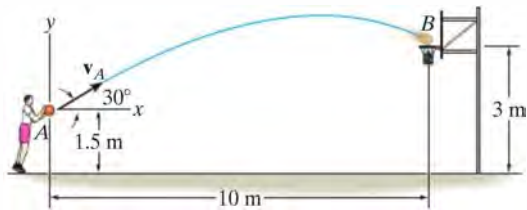
F12-21. The ball is kicked from point A with the initial velocity $v_A = 10 \text{ m/s}$. Determine the maximum height h it reaches.

F12-22. The ball is kicked from point A with the initial velocity $v_A = 10 \text{ m/s}$. Determine the range R , and the speed when the ball strikes the ground.



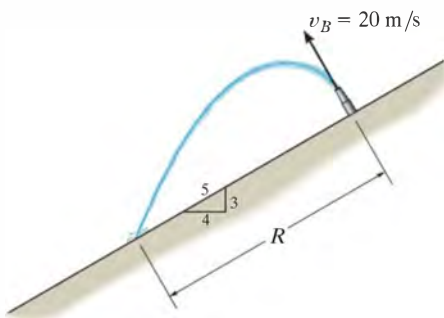
F12-21/22

F12-23. Determine the speed at which the basketball at A must be thrown at the angle of 30° so that it makes it to the basket at B .



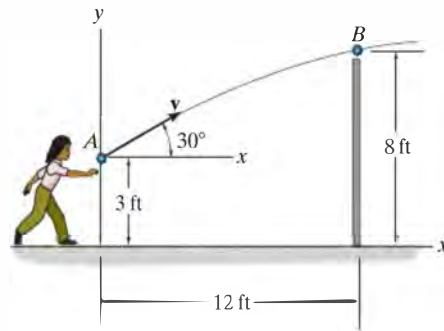
F12-23

F12-24. Water is sprayed at an angle of 90° from the slope at 20 m/s . Determine the range R .



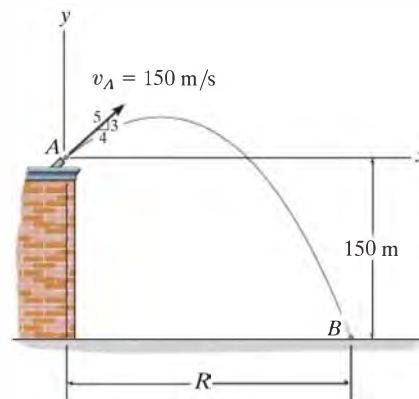
F12-24

F12-25. A ball is thrown from A . If it is required to clear the wall at B , determine the minimum magnitude of its initial velocity v_A .



F12-25

F12-26. A projectile is fired with an initial velocity of $v_A = 150 \text{ m/s}$ off the roof of the building. Determine the range R where it strikes the ground at B .



F12-26