

Questions on Motion in Two Dimensions

Q1: The vector position of a particle varies in time according to the expression

$$\mathbf{r} = (3.00\hat{\mathbf{i}} - 6.00t^2\hat{\mathbf{j}})\text{m}$$

(a) Find expressions for the velocity and acceleration as functions of time. (b) Determine the particle's position and velocity at $t = 1.00$ s.

Q2: A rock is thrown upward from the level ground in such way that the maximum height h of its flight is equal to the horizontal range R . At what angle θ was the rock thrown?

Q3: A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection?

Q4: (a) A firefighter, a distance d from a burning building, directs a stream of water from a fire hose at angle θ_i above the horizontal as in the Figure. If the initial speed of the stream is v_i , at what height h does the water strike the building?

(b) A firefighter 50.0 m away from a burning building directs a stream of water from a fire hose at an angle of 30.0° above the horizontal, as in the Figure. If the speed of the stream is 40.0 m/s, at what height will the water strike the building?

