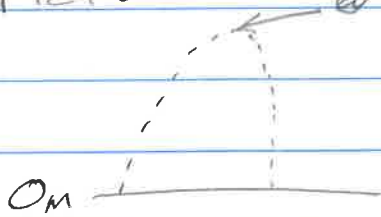


# Free Fall activity II

Picture  $\rightarrow$  @  $y_{max}$ ,  $v = 0 \text{ m/s}$



c) k:  $v_i = 16 \text{ m/s}$       U:  $x_f$       Eqn:  $x_f = x_i + v_i t + \frac{1}{2} a t^2$   
 $t = 1.8 \text{ s}$       Eqn  $x_f = 0 \text{ m} + 16 \frac{\text{m}}{\text{s}} \cdot 1.8 \text{ s} + \frac{1}{2} (-9.8 \frac{\text{m}}{\text{s}^2}) (1.8 \text{ s})^2$   
 $a = -9.8 \text{ m/s}^2$        $x_f = 0 \text{ m} + 28.8 \text{ m} - 15.876 \text{ m}$   
 $x_i = 0 \text{ m/s}$        $x_f = 12.924 \text{ m}$

b) k:  $v_i = 16 \frac{\text{m}}{\text{s}}$       U:  $v_f$       Eqn:  $v_f = v_i + a t$   
 $t = 1.5 \text{ s}$        $v_f = 16 \frac{\text{m}}{\text{s}} - 9.8 \frac{\text{m}}{\text{s}^2} \cdot 1.5 \text{ s}$   
 $a = -9.8 \text{ m/s}^2$        $v_f = 1.3 \text{ m/s}$

c)  $v_f = 0 \text{ m/s}$  @  $y_{max}$

d) k:  $x_i = 0 \text{ m}$       U:  $x_f$       Eqn:  $v_f^2 = v_i^2 + 2 a \Delta x$   
 $v_i = 16 \frac{\text{m}}{\text{s}}$        $-v_i^2 = \Delta y = \frac{-(16 \frac{\text{m}}{\text{s}})^2}{2(-9.8 \frac{\text{m}}{\text{s}^2})} = 13.06 \text{ m}$   
 $a = -9.8 \text{ m/s}^2$   
 $v_f = 0 \text{ m/s}$

e) k:  $v_i = 16 \frac{\text{m}}{\text{s}}$        $v_f = v_i + a t$        $v_f = 8 \frac{\text{m}}{\text{s}}$        $t = \frac{8 \frac{\text{m}}{\text{s}} - 16 \frac{\text{m}}{\text{s}}}{-9.8 \frac{\text{m}}{\text{s}^2}} = 0.816 \text{ s}$   
 $a = -9.8 \frac{\text{m}}{\text{s}^2}$        $t = \frac{v_f - v_i}{a}$   
 $v_f = 8 \frac{\text{m}}{\text{s}}$

U:  $t = ?$        $v_f = -8 \frac{\text{m}}{\text{s}}$        $t = \frac{-8 \frac{\text{m}}{\text{s}} - 16 \frac{\text{m}}{\text{s}}}{-9.8 \frac{\text{m}}{\text{s}^2}} = 2.415 \text{ s}$

f)  $a = -9.8 \text{ m/s}^2$  All the time!

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g)  $V_i = 16 \frac{\text{m}}{\text{s}}$   $U: \Delta y \quad \Delta y = U_i t + \frac{1}{2} a t^2$   
 $a = -9.8 \frac{\text{m}}{\text{s}^2}$   $\Delta y = 16 \frac{\text{m}}{\text{s}} \cdot 1.6 \text{ s} + \frac{1}{2} (-9.8 \frac{\text{m}}{\text{s}^2}) (1.6 \text{ s})^2$   
 $t = 1.6 \text{ s}$   $\Delta y = 25.6 \text{ m} - 12.5 \text{ m} = 13.1 \text{ m}$

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h) Same as g if object is still on its way up.

$V_i = 16 \frac{\text{m}}{\text{s}}$   $U = U_f$   $U_f = U_i + a t$   
 $t = 1.6 \text{ s}$   $U_f = 16 \frac{\text{m}}{\text{s}} - 9.8 \frac{\text{m}}{\text{s}^2} \cdot 1.6 \text{ s} = 0.32 \frac{\text{m}}{\text{s}}$   
 $a = -9.8 \frac{\text{m}}{\text{s}^2}$  on its way up. 13.1 m

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i) acceleration of object in free fall is always  $-9.8 \frac{\text{m}}{\text{s}^2}$