



مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

Chapter 2

3 Data $t = 0.001 \text{ s}$ $v = 8.5 \text{ m/s}$ $x = ?$

Solution $x = vt$
 $= 8.5 \times 0.001$
 $= 8.5 \times 10^{-3} \text{ m} = 8.5 \text{ mm}$

4 Data $x = 2 + 3t - t^2$ $t = 3$ $x = ?$

Solution $x(3) = 2 + 3(3) - 1(3)^2$
 $= 2 + 9 - 9$
 $= 2 \text{ m}$

5 $v_x = ?$

Solution $v_x = \frac{dx}{dt} = 3 - 2t$

at $t = 3 \Rightarrow v_x(3) = 3 - 2(3)$
 $= 3 - 6$
 $= -3 \text{ m/s}$

6 $a_x = ?$

Solution $a_x = \frac{dv_x}{dt} = -2 \text{ m/s}^2$

7 Data $x(t) = 3t^2 - 2t + 3$ $t = 2$ $v_{avr} = ?$

Solution $v_{avr} = \frac{x}{t} = \frac{3(2)^2 - 2(2) + 3}{2} = \frac{11}{2} = 5.5 \text{ m/s}$

$$8 \quad v_x = 5$$

$$t = 2 \text{ s}$$

Solution

$$v_x = \frac{dx}{dt} = 6t - 2$$

$$v_x(2) = 6(2) - 2 = 10 \text{ m/s}$$

$$9 \quad a_{\text{avr}} = ?$$

$$t = 2 \text{ s}$$

Solution

$$a_{\text{avr}} = \frac{\Delta v_x}{\Delta t} = \frac{6t - 2}{2}$$

$$= \frac{6(2) - 2}{2} = \frac{10}{2} = 5 \text{ m/s}^2$$

$$10 \quad a_x = ?$$

$$t = 2 \text{ s}$$

Solution

$$a_x = \frac{dv_x}{dt} = 6 \text{ m/s}^2$$

11 Data

$$x = 40 \text{ m}$$

$$v_f = 2.8 \text{ m/s}$$

$$v_i = ?$$

$$t = 8.5 \text{ s}$$

Solution

$$x = \frac{1}{2} (v_i + v_f) t$$

$$40 = \frac{1}{2} (v_i + 2.8)(8.5)$$

$$v_i = \frac{2 \times 40}{8.5} - 2.8$$

$$v_i = 6.6 \text{ m/s}$$

$$12 \quad a = ?$$

Solution

$$v_f = v_i + at$$

$$2.8 = 6.6 + a(8.5)$$

$$a = \frac{2.8 - 6.6}{8.5} = -0.447 \text{ m/s}^2$$

13) Data $v_i = 2 \times 10^4 \text{ m/s}$ $v_f = 6 \times 10^6$ $x = 1.5 \text{ cm}$ $t = ?$

Solution

$$x = \frac{1}{2} (v_i + v_f) t$$

$$1.5 \times 10^{-2} = \frac{1}{2} (2 \times 10^4 + 6 \times 10^6) t$$

$$t = \frac{2 \times 1.5 \times 10^{-2}}{6.02 \times 10^6} = 4.98 \times 10^{-9} \text{ s}$$

14) $a = ?$

Solution

$$v_f = v_i + at$$

$$6 \times 10^6 = 2 \times 10^4 + a (4.98 \times 10^{-9})$$

$$a = \frac{6 \times 10^6 - 2 \times 10^4}{4.98 \times 10^{-9}} = 1.2 \times 10^{15} \text{ m/s}^2$$

15) Data $v_x = 40 - 5t^2$ $t=0$ to $t=2\text{s}$ $a_{\text{avr}} = ?$

Solution

$$a_{\text{avr}} = \frac{\Delta v_x}{\Delta t} = \frac{v_f(2) - v_i(0)}{2 - 0}$$

$$= \frac{[40 - 5(2)^2] - [40 - 5(0)^2]}{2}$$

$$= \frac{40 - 20 - 40}{2} = -10 \text{ m/s}^2$$

16 Data $v_i = 100 \text{ m/s}$ $a = -5 \text{ m/s}^2$ $v_f = 0$ $t = ?$

Solution $v_f = v_i + at \Rightarrow 0 = 100 - 5t \Rightarrow t = \frac{100}{5} = 20 \text{ s}$

17 Data $v_i = 0$ $a = 2 \text{ m/s}^2$ $v_f = 20 \text{ m/s}$ $t_2 = 20 \text{ s}$ $t_3 = 5 \text{ s}$
 $t_1 = ?$

Solution $v_f = v_i + at_1 \Rightarrow 20 = 0 + 2t_1 \Rightarrow t_1 = \frac{20}{2} = 10 \text{ s}$

\therefore Total time = $t_1 + t_2 + t_3$
 $= 10 + 20 + 5 = 35 \text{ s}$

18 Data $x(t) = (t - 2t^2) \text{ m}$ $t = 1$ $v = ?$

Solution $v_x = \frac{dx}{dt} = t - 4t$

$v_x(1) = 1 - 4(1) = -3 \text{ m/s}$

19 Data $v_x = 50 - 6t^2$ $t=0$ to $t=2$ $a_{\text{avr}} = ?$

Solution $a_{\text{avr}} = \frac{\Delta v}{\Delta t} = \frac{v_f(2) - v_i(0)}{2 - 0}$
 $= \frac{[50 - 6(2)^2] - [50 - 6(0)]}{2}$
 $= \frac{50 - 24 - 50}{2} = -12 \text{ m/s}^2$

21) upward $\Rightarrow v_i = 225 \text{ m/s}$ $v_f = 0$ $g = -9.8$ $t_1 = ?$

$$v_f = v_i + g t_1$$

$$0 = 225 - 9.8 t_1 \Rightarrow t_1 = \frac{225}{9.8} = 22.96 \text{ s}$$

$$y_1 = v_i t + \frac{1}{2} g t^2$$

$$y_1 = (225)(22.96) + \frac{1}{2} (-9.8)(22.96)^2$$

$$y_1 = 2582.9 \text{ m}$$

$$y_2 = y_1 - 620 = 1962.9 \text{ m}$$

Downward $\Rightarrow v_i = 0$

$$y_2 = 1962.9 \text{ m}$$

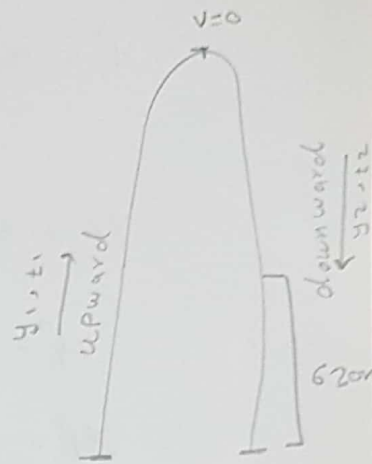
$$g = 9.8 \quad t_2 = ?$$

$$y_2 = v_i t_2 + \frac{1}{2} g t_2^2$$

$$1962.9 = (0)t_2 + \frac{1}{2} (9.8) t_2^2$$

$$t_2 = 20.01 \text{ s}$$

$$\text{Total time } T = t_1 + t_2 \Rightarrow 22.96 + 20.01 = 42.97 \approx 43 \text{ s}$$



22) upward $\rightarrow v_i = 15 \text{ m/s}$ $v_f = 0$ $g = -9.8$ $t_1 = ?$

$$v_f = v_i + g t_1 \Rightarrow 0 = 15 - 9.8 t_1 \Rightarrow t_1 = \frac{15}{9.8} = 1.53 \text{ s}$$

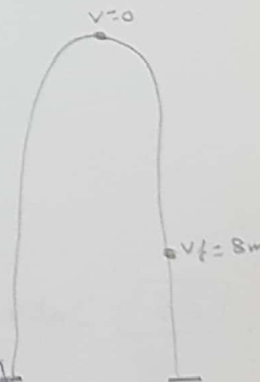
Downward $\Rightarrow v_i = 0$

$$v_f = 8 \text{ m/s}$$

$$g = 9.8 \quad t_2 = ?$$

$$v_f = v_i + g t_2 \Rightarrow 8 = 0 + 9.8 t_2 \Rightarrow t_2 = \frac{8}{9.8} = 0.816 \text{ s}$$

$$\text{Total time } T = t_1 + t_2 = 1.53 + 0.816 = 2.35 \text{ s}$$



23 Data $v_i = 0$ $v_f = 4 \text{ m/s}$ $g = 9.8 \text{ m/s}^2$

Solution $v_f^2 = v_i^2 + 2gy$

$$4^2 = 0 + 2(9.8)y \Rightarrow y = \frac{4^2}{2(9.8)} = 0.816 \text{ m}$$

$v_i = 3 \text{ m/s}$ $v_f = ?$

$y = 0.816 \text{ m}$

$$v_f^2 = v_i^2 + 2gy$$

$$v_f^2 = 3^2 + 2(9.8)(0.816)$$

$$v_f^2 = \sqrt{24.99} = 4.9 \approx 5 \text{ m/s}$$

24 Data $t = 3 \text{ s}$ $v_f = 0$ $g = -9.8 \text{ m/s}^2$ $v_i = ?$

Solution $v_f = v_i + gt$

$$0 = v_i - 9.8(3) \Rightarrow v_i = 29.4 \text{ m/s}$$

25 $y = 9$

Solution

$$y = v_i t + \frac{1}{2} g t^2$$

$$9 = (29.4)(3) + \frac{1}{2} (-9.8)(3)^2$$

$$y = 44.1 \text{ m}$$

26 Data $y = 4 \text{ m}$ $t = 1.5 \text{ s}$ $v_i = ?$ $g = -9.8 \text{ m/s}^2$

Solution

$$y = v_i t + \frac{1}{2} g t^2$$

$$4 = v_i (1.5) + \frac{1}{2} (-9.8)(1.5)^2$$

$$v_i = 10 \text{ m/s}$$

27 Data $v_i = 29.4 \text{ m/s}$ $t = 2.94 \text{ s}$ $v_f = 0$ $y = ?$ $g = -9.8$

Solution

$$y = v_i t + \frac{1}{2} g t^2$$

$$y = (29.4)(2.94) + \frac{1}{2}(-9.8)(2.94)^2$$

$$y = 44 \text{ m}$$

28 Data $v_i = 20 \text{ m/s}$ $v_f = 0$ $g = -9.8 \text{ m/s}^2$

Solution

$$v_f = v_i + g t$$

$$0 = 20 - 9.8 t \Rightarrow t = 2.04$$

$$T = 2t \Rightarrow T = 2(2.04) = 4 \text{ s}$$