

More Acceleration

Thursday, October 02, 2014 8:55 AM

Ex: A tire rolling down a hill at 6.0 m/s , acc at 1.5 m/s^2 for 10 s . How far does it travel, How fast is it going?

$6 \text{ m/s} \rightarrow$
 $= 0$



$$a = 1.5 \text{ m/s}^2$$

$$V_0 = 6.0 \text{ m/s}$$

$$t = 10 \text{ s}$$

$$d = ?$$

$$V_f = ?$$

$$d = V_0 t + \frac{1}{2} a t^2$$
$$= (6 \text{ m/s})(10 \text{ s}) + \frac{1}{2} (1.5 \text{ m/s}^2)(10 \text{ s})^2$$

$$d = 135 \text{ m}$$

$$V_f = V_0 + a t$$
$$= 6 + (1.5)(10)$$

$$= 21 \text{ m/s}$$

Last but not least

$$V_f^2 = V_0^2 + 2ad$$

Ex A car travelling at 20 m/s , acc at 4 m/s^2 for 100 m . $V_f = ?$

$$V_0 = 20 \text{ m/s}$$

$$V_f =$$

$$a = 4 \text{ m/s}^2$$

$$V_f^2 = V_0^2 + 2ad$$

$$= 20^2 + 2(4)(100)$$

$$a = 4 \text{ m/s}^2$$

$$d = 100$$

$$= 20 + 2(7)(100)$$

$$V_f^2 = 1200$$

$$V_f = 34.6 \text{ m/s}$$

Ex: How long must a landing strip be so that a plane ~~travelling~~ ^{landing} at 7 m/s can safely stop if acc. -2.5 m/s^2

$$V_0 \rightarrow 7 \text{ m/s}$$

$$V_f \rightarrow 0 \text{ m/s}$$

$$a \rightarrow -2.5 \text{ m/s}^2$$

$$d \rightarrow ?$$

$$V_f^2 = V_0^2 + 2ad$$

$$0 = 7^2 + 2(-2.5)(d)$$

$$0 = 50 + 2(-2.5)d$$

$$\underline{-50 = 2(-2.5)(d)}$$

$$2$$

$$\underline{-250 = (-2.5)(d)}$$

$$-2.5$$

$$d = 100 \text{ m}$$

Acceleration due to gravity - a very special unit

$$g = 9.8 \text{ m/s}^2$$

+ \uparrow upward
+ velocity
+ displacement

- downward
- velocity
- displacement

\uparrow + displacement \downarrow - displacement
 \downarrow - acc (due to gravity) (-9.8 m/s^2)

Ex A ball is thrown upward at 26 m/s . Determine its velocity at a) 1.8 s b) 3.3 s

up \uparrow + down \downarrow -

$$V_0 = +26 \text{ m/s}$$

$$a = -9.8 \text{ m/s}^2$$

$$V_f = ?$$

$$t = 1.8 \text{ s}, 3.3 \text{ s}$$

$$V_f = V_0 + at$$

$$= 26 + (-9.8)(1.8)$$

$$= 26 + (-17.6)$$

$$= 8.4 \text{ m/s}$$

$$V_f = -6.3 \text{ m/s}$$

Ex A ball is thrown up at 26 m/s

a) How long to reach max height

$$a = -9.8 \text{ m/s}^2 \quad t = ?$$

$$V_0 = 26 \text{ m/s}$$

$$V_f = 0 \text{ m/s}$$

$$V_f = V_0 + at$$

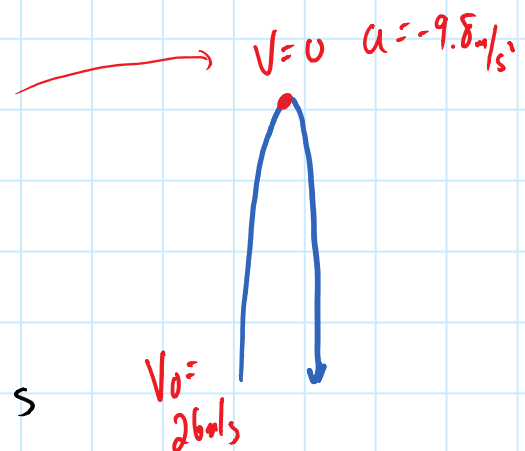
$$0 = 26 + (-9.8)t$$

$$-26 = -9.8t$$

$$\frac{-26}{-9.8} = 2.7 \text{ s}$$

b) What is max height.

$$d = ? \quad V_f^2 = V_0^2 + 2ad$$



$$0 = 26^2 + 2(-9.8)d$$

$$-26^2 = -19.6d$$

$$d = 34.5 \text{ m}$$

P. 74 # 17-20, 75 # 21-24

~~76~~ P. 77 # 25

P. 79 # 27