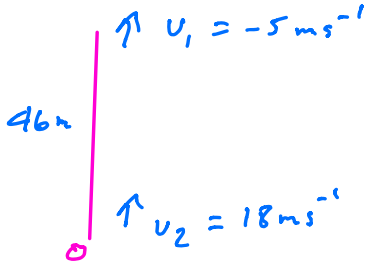
Exercise 9E Q12



$s_1 - 46 = v_1 t - 4.9t^2$ (1)

$s_2 = v_2 t - 4.9t^2$ (2)

Come together when $s_1 = s_2$

$$v_1 t - 4.9t^2 + 46 = v_2 t - 4.9t^2$$

$$-5t + 46 = 18t$$

$$46 = 23t$$

$$2 = t \qquad \underline{t = 2\,s}$$

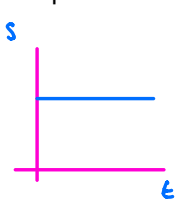
when $t = 2$

$$s_1 - 46 = -5(2) - 4.9(2)^2$$

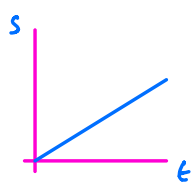
$$s_1 = -10 - 19.6 + 46 = 16.4\,m$$

Distance from A $= 46 - 16.4 = 29.6\,m$

Displacement Time Graphs



stationary



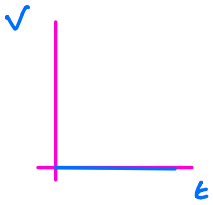
constant gradient

= constant velocity

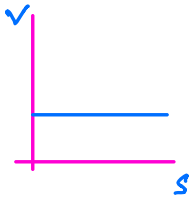
gradient increasing

= velocity increasing

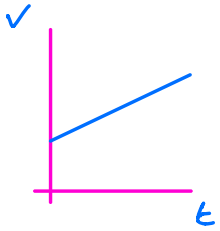
Velocity Time Graphs



velocity 0
stationary



velocity
constant
acceleration
= 0

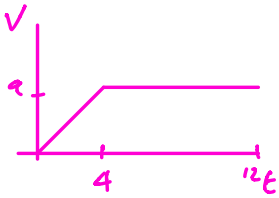


velocity
changing at
constant rate
acceleration
is constant

Area under graph = displacement

Exercise 9B

1)

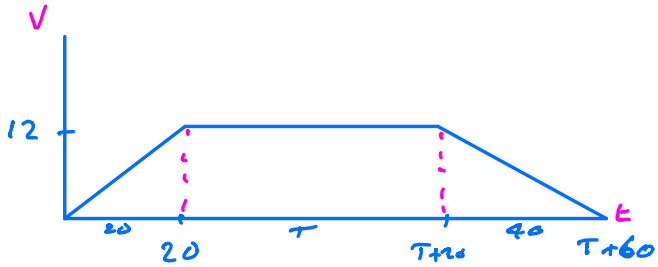


a) Acceleration $= \frac{9}{4} = 2.25\,ms^{-2}$

b) Displacement $= \frac{(12+8)}{2} \times 9$

$= 90\,m$

5) a)



$v = u + at$

$v = 0 + 0.6 \times 20$

$v = 12$

b) Area under graph = 4200 m

$\frac{(T+60+T)}{2} \times 12 = 4200$

$(2T+60) \times 6 = 4200$

$2T + 60 = 700$

$2T = 640$

$T = 320\,s$

c) Distance while constant velocity $= 12T$

$= 12 \times 320$

$= 3840\,m$

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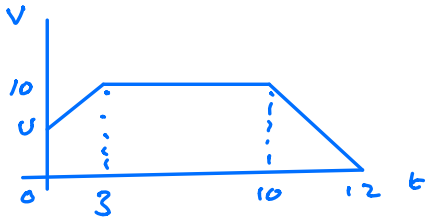
7)



Displacement $= 100\,m$

$\Rightarrow$ Area under graph $= 100$

$\frac{(u+10)}{2} \times 3 + \frac{(9+7)}{2} \times 10 = 100$

$(u+10) \times \frac{3}{2} + 80 = 100$

$(u+10) \times \frac{3}{2} = 20$

$(u+10) = 20 \times \frac{2}{3}$

$u + 10 = \frac{40}{3}$

$u = 13\frac{1}{3} - 10$

$u = 3\frac{1}{3}$ or $3.33\,ms^{-1}$

b) $v = u + at$

$10 = \frac{10}{3} + a \times 3$

$\frac{20}{9} = 3a$

$a = \frac{20}{9}\,ms^{-2}$

$a = 2.22\,ms^{-2}$

Homework Exercise 9B 2, 4, 6, 8