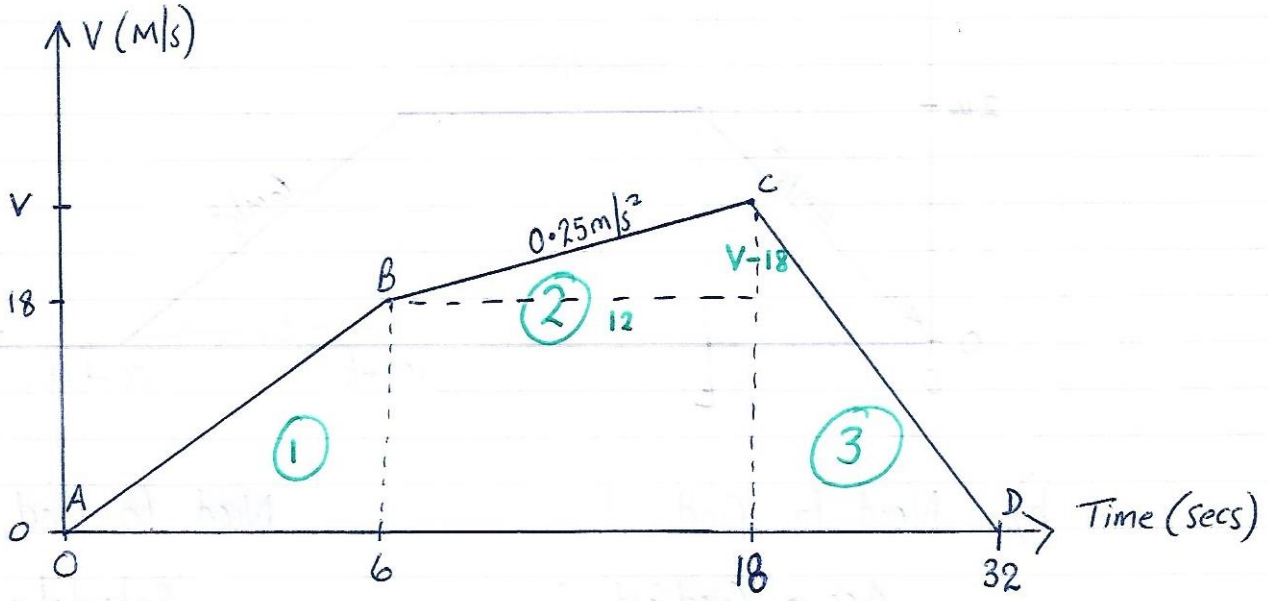
# V/T Graphs 1 : Answers

1) a)




b) AB

Acc = Gradient

$= \frac{18}{6} = 3\ m/s^2$

CD

Retardation = $\frac{V}{14}$

Find V

BC Acc = Gradient

$0.25 = \frac{V-18}{12}$

$3 = V - 18$

$21\ m/s = V$

$\therefore$ Retardation = $\frac{21}{14}$

$= 1.5\ m/s^2$.

c) Distance AD = Area under Graph

$= (1) + (2) + (3)$

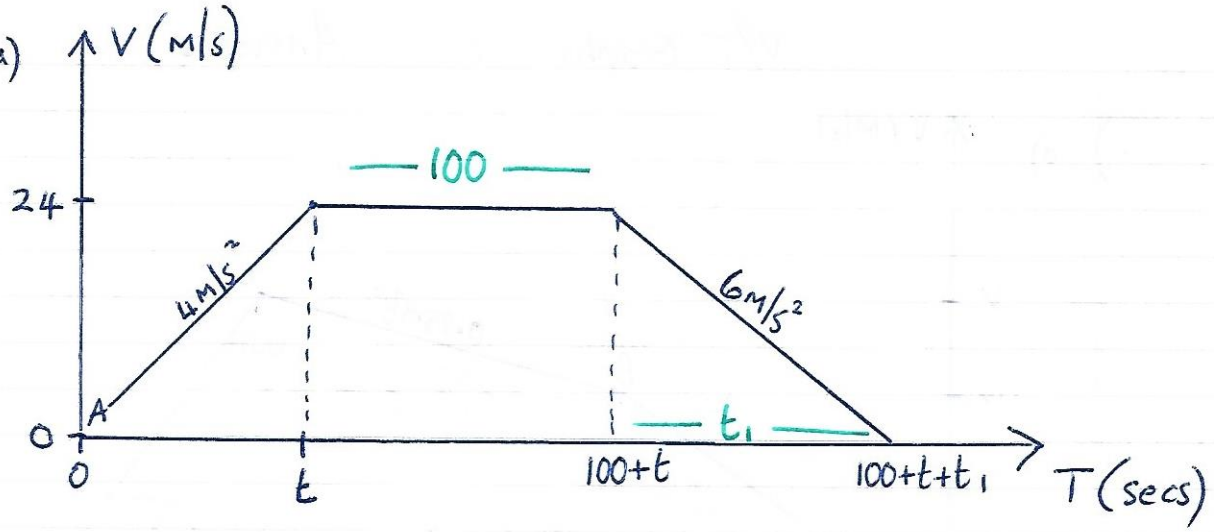
$= \frac{bh}{2} + \frac{(a+b)h}{2} + \frac{bh}{2}$

$= \frac{6 \times 18}{2} + \frac{(18+21)12}{2} + \frac{14 \times 21}{2}$

$= 54 + 234 + 147$

$= 435\ m$

2) a)




b) Need to find $t$

Acc = Gradient

$4 = \frac{24}{t}$

$t = \frac{24}{4} = 6$ secs

Need to find $t_1$

Retardation = $\frac{24}{t_1}$

$6 = \frac{24}{t_1}$

$t_1 = 4$ secs

∴ Total time AB

$= 100 + 6 + 4$

$= 110$ secs

c) Dist AB = area under graph

= area large trapezium

$= \frac{(a+b)h}{2}$

$= \frac{(100+110)\,24}{2}$

$= 210 \times 12$

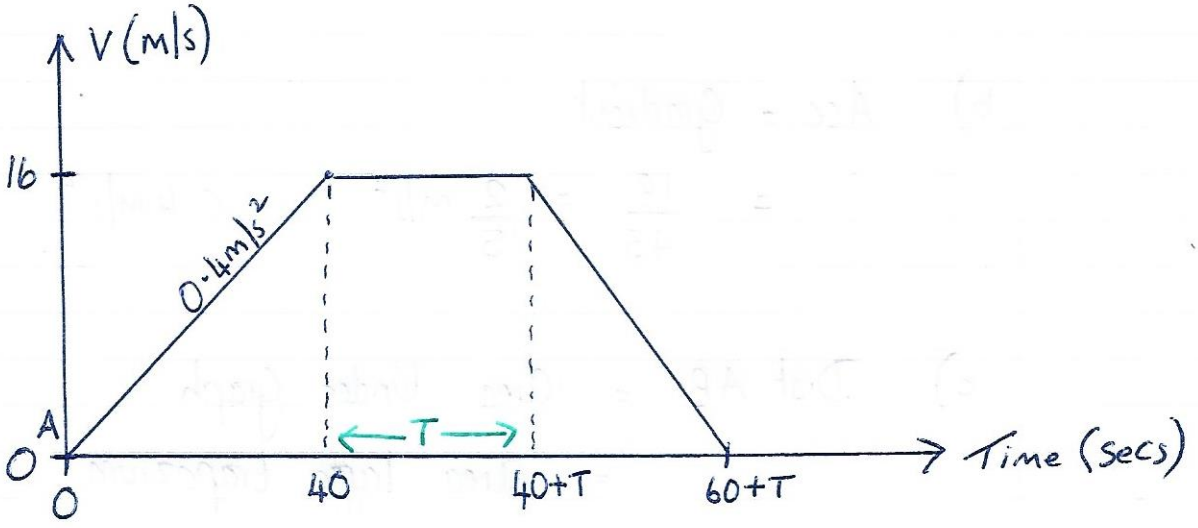
$= 2520\text{m}$

Acc

3) a) $u = 0$
$a = 0.4$
$v = 16$
$t = t$

$v = u + at$
$16 = 0 + 0.4t$
$160 = 4t$
$40 \text{ secs} = t$ = time spent accelerating

b)




c) Distance covered = area under graph

$2400 =$ area of large trapezium

$$2400 = \frac{(a+b)h}{2}$$

$$2400 = \frac{(T + 60+T)}{2} \times 16$$

$\times 2 \div 16$

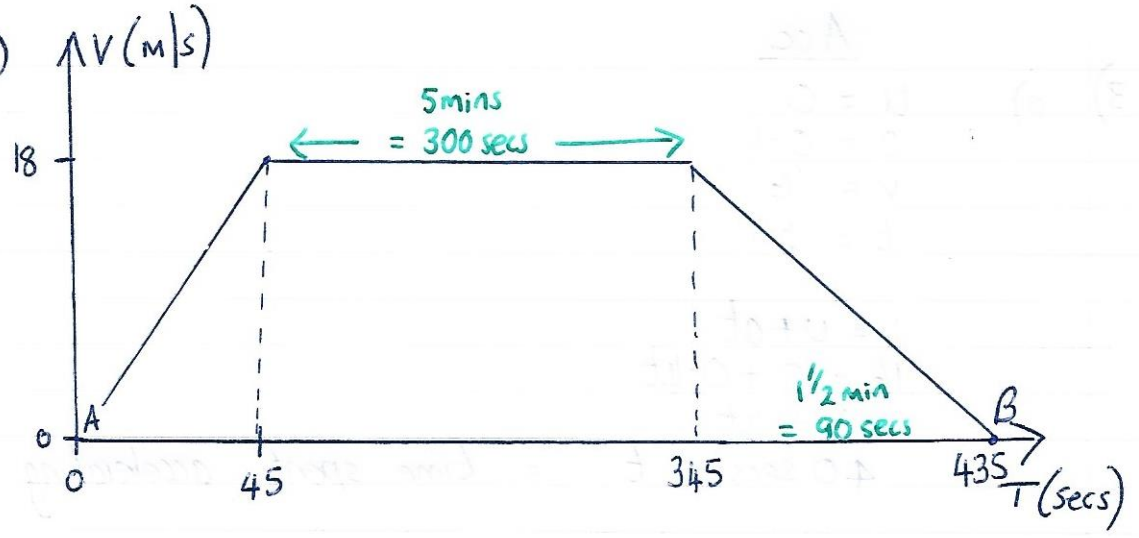
$$300 = T + 60 + T$$

$$300 - 60 = 2T$$

$$\frac{240}{2} = T$$

$120 \text{ secs} = T$

4) a)




b) Acc = Gradient

$= \frac{18}{45} = \frac{2}{5}\ m/s^2$ or $0.4\ m/s^2$

c) Dist AB = Area Under Graph

= Area large trapezium

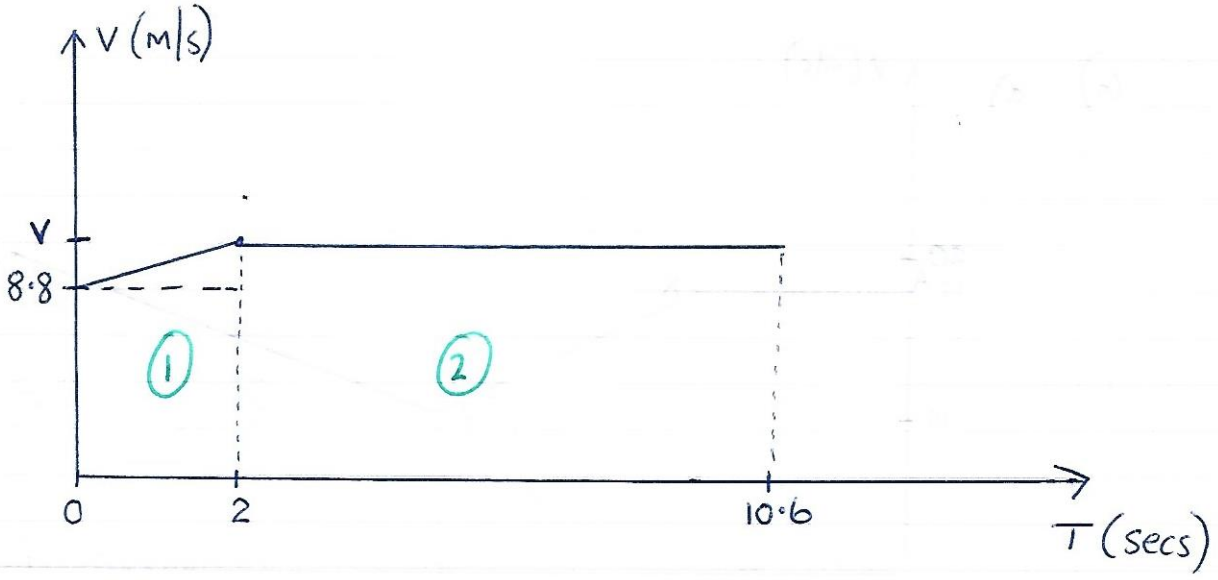
$= \frac{(a+b)h}{2}$

$= \frac{(300+435)\ 18}{2}$

$= 735 \times 9$

$= 6615\ m$.

5) a)




b) Total distance = area under graph

$$100 = (1) + (2)$$

$$100 = \frac{(a+b)h}{2} + lw$$

$$100 = \frac{(8.8+V)2}{2} + (8.6 \times V)$$

$$100 = 8.8 + V + 8.6V$$

$$91.2 = 9.6V$$

$$\frac{91.2}{9.6} = V$$

$$9.5 \text{ m/s} = V$$

* We don't use gradient to find V because we haven't been told the acceleration so not enough information.

c)

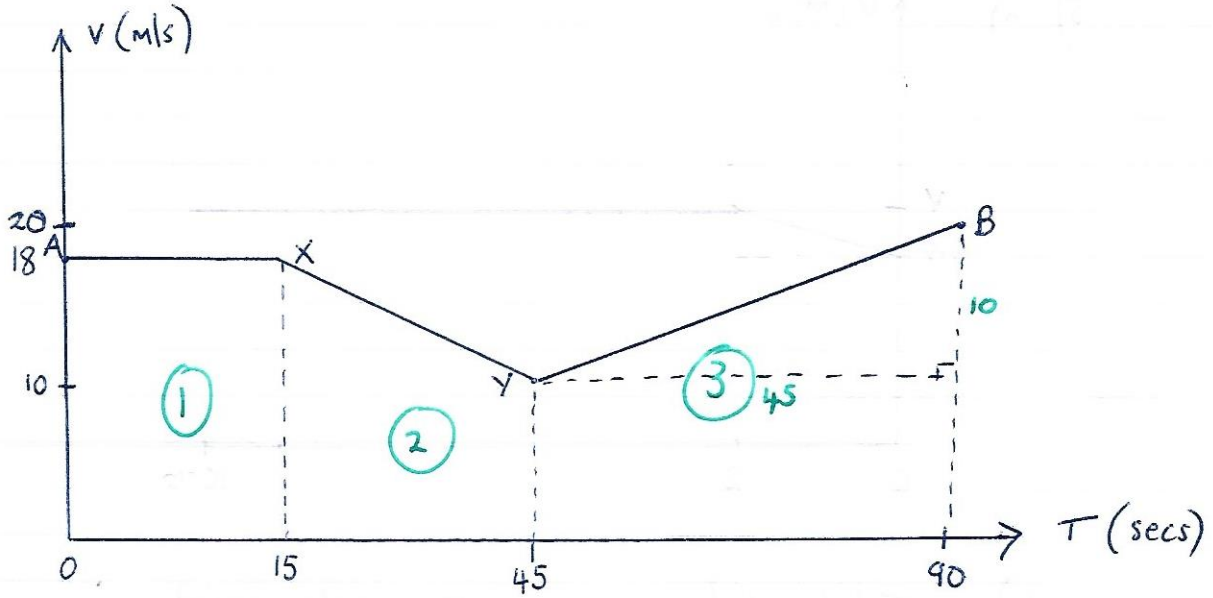
$$\text{Acc} = \text{Gradient}$$

$$= \frac{9.5 - 8.8}{2}$$

$$= \frac{0.7}{2}$$

$$= 0.35 \text{ m/s}^2$$

6) a)




b) Acc of YB

$$\text{Acc} = \text{Gradient} = \frac{10}{45} = \frac{2}{9}\ m/s^2$$

c) Dist AB = area under graph

$$= (1) + (2) + (3)$$

$$= lw + \frac{(a+b)h}{2} + \frac{(a+b)h}{2}$$

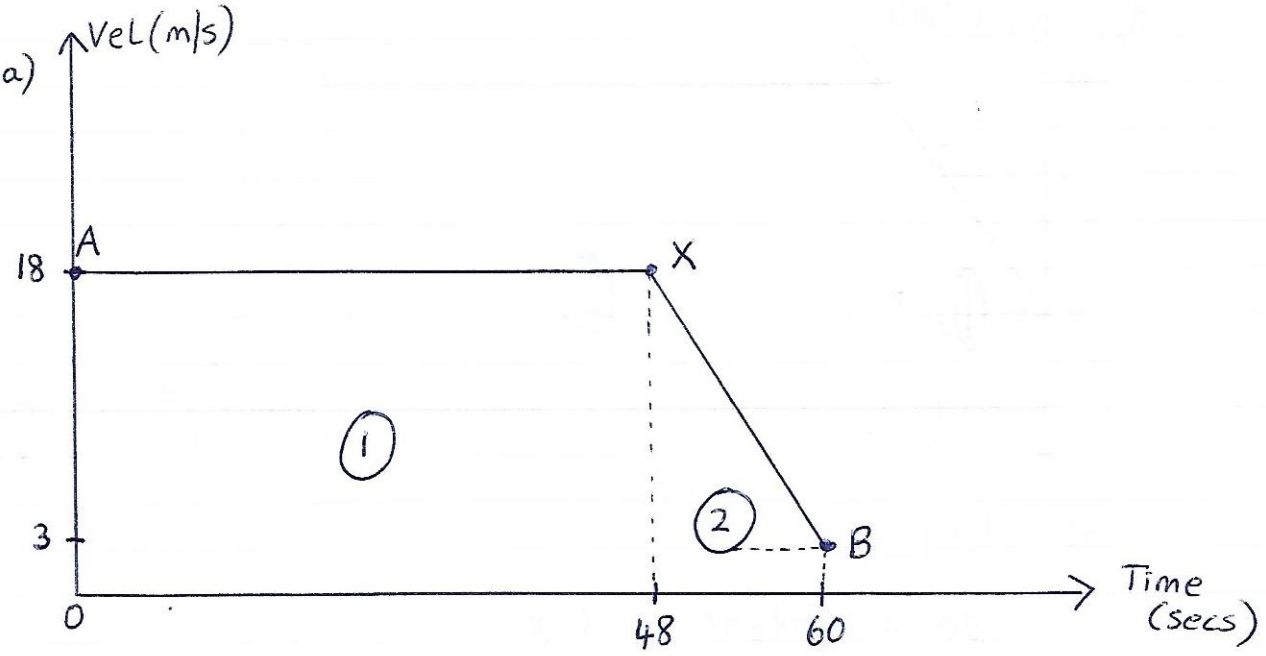
$$= (15 \times 18) + \frac{(18+10)30}{2} + \frac{(10+20)45}{2}$$

$$= 270 + \frac{28 \times 30}{2} + \frac{30 \times 45}{2}$$

$$= 270 + 420 + 675$$

$$= 1365\ m$$

7) a)




b) Deceleration = gradient of XB

$$= \frac{ht}{base}$$

$$= \frac{18-3}{60-48} = \frac{15}{12} = \frac{5}{4}\ m/s^2 = 1{\cdot}25\ m/s^2$$

c) Distance AB = area under graph A to B

Area ① + ② = $lw + \frac{(a+b)h}{2}$

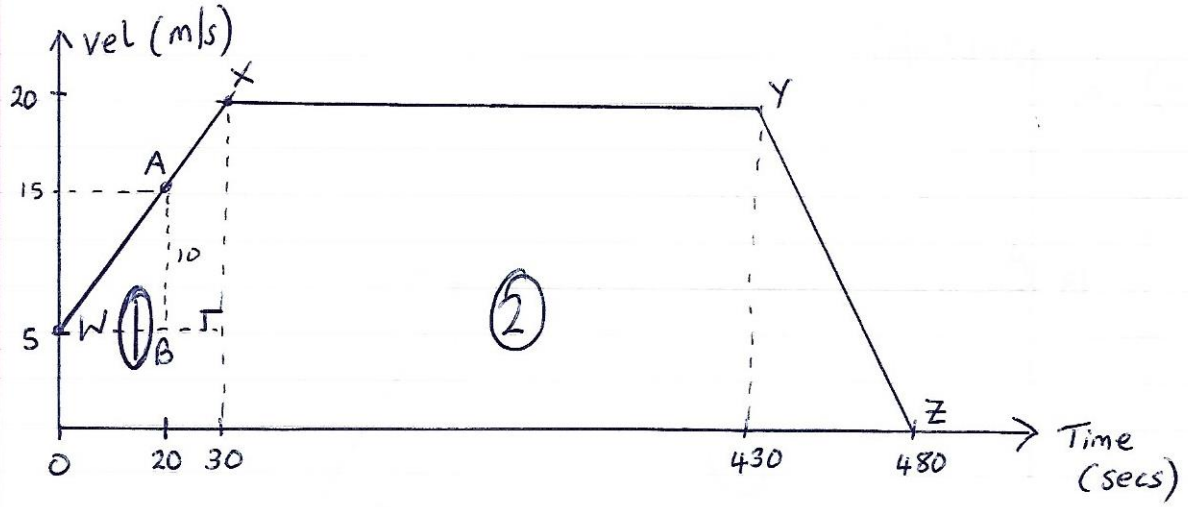
$= (48 \times 18) + \left(\frac{18+3}{2}\right) 12$

$= (48 \times 18) + (21 \times 6)$

$= 864 + 126$

$= 990\ m.$

8)




a) $\underline{t = 10}$

acc = gradient of WX

$= \frac{ht}{base}$

$= \frac{20-5}{30} = \frac{15}{30} = \frac{1}{2} = 0.5\ m/s^2$

$\underline{t = 420}$

At $t = 420$, vel is const 20 m/s.

$\therefore$ acc $= 0\ m/s^2$

b) At $t = 20$

Use triangle WAB

$Acc = \frac{ht}{base}$

$0.5 = \frac{ht}{20}$

$10 = height$

$\therefore$ Velocity at $t = 20 = 5 + 10$

$= 15\ m/s.$

c) Distance = area under graph

= trapezium (1) + trapezium (2)

$= \frac{(5+20)\,30}{2} + \frac{(450+400)\,20}{2}$

$= (25 \times 15) + (850 \times 10)$

$= 375 + 8500$

$= 8875\ m$