YEAR 11 GENERAL MATHEMATICS INVESTIGATIVE TASK 4 SOLUTIONS

Linear graph applications

1 a $C = x + 4000$ **[1]**

b $C = 250 + 4000$

$C = \$4250$ **[1]**

c $R = 5x$ **[1]**

d $R = 5 \times 250$

$R = \$1250$ **[1]**

e i No **[1]** The revenue is 3000 less than the cost. **[1]**

ii $5x = x + 4000$

$4x = 4000$

$x = 100$ **[1]**

100 pencil cases must be produced and sold for the profit to equal the cost **[1]**

f i $P = 5x - (x + 4000)$ **[1]**

$P = 4x - 4000$ **[1]**

ii $P = 4x - 4000$

$5000 = 4x - 4000$ **[1]**

$9000 = 4x$

$x = 2250$ **[1]**

[Total 12 marks]

2 a 480 litres **[1]**

b 300 litres **[1]**

c $488 - 360 = 120$ litres **[1]**

d 30 litres **[1]**

e $V = mt + b$

$V = -30t + 480$

[1 mark for $m = -30$ and 1 mark for $b = 480$]

f $V = -30t + 480$

$0 = -30t + 480$ **[1]**

$t = 16$

It would take 16 hours for the tank to empty. **[1]**

g i $V = at + c$

$a = -10$ **[1]**

$V = -10t + c$

$t = 10, V = 180$

$180 = -10 \times 10 + c$ **[1]**

$180 = -100 + c$

$c = 280$

$V = -10t + 280$ **[1]**

ii $0 = -10t + 280$ **[1]**

$-280 = -10t$

$t = 28$ **[1]**

3 a

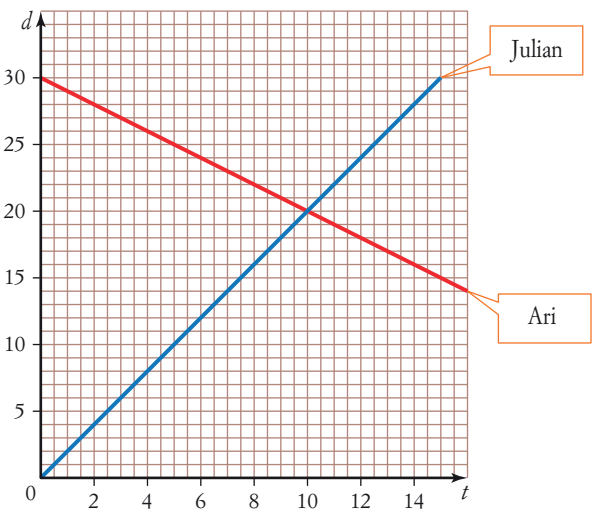
Time (seconds)	0	2	4	6	8	10
d, Julian	0	4	8	12	16	20
d, Ari	40	39	38	37	36	35

[1 mark for starting values correct]

[1 mark for d Julian all correct]

[1 mark for d Ari all correct]

b



[1 mark for correct vertical intercept for each graph]

[1 mark for correct gradient for each graph]

c After 10 seconds **[1]**

d Julian: $d = 2t$ **[1]**

Ari: $d = 30 - t$ **[1 mark for each constant in the rule]**

[Total 3 marks]

e 15 seconds **[1]**

[Total 12 marks]

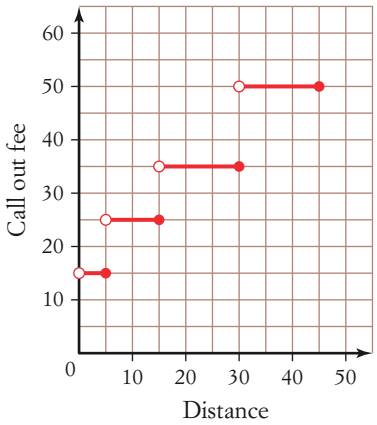
4 a i 35 **[1]**

ii 5 km **[1]**

b $35 + 25 + 35$ **[1]**

$= \$95$ **[1]**

c



[1]

d $f = md + b$

$d = 0, f = 60$ so $b = 60$ **[1]**

$f = md + 160$

$d = 100, f = 40$

$40 = m \times 100 + 60$

$m = -0.2$

$f = -0.2d + 60$ **[1]**

e $f = 0$

$0 = -0.2d + 60$

$d = 300$ **[1]**

He would be able to travel a further 200 km **[1]**

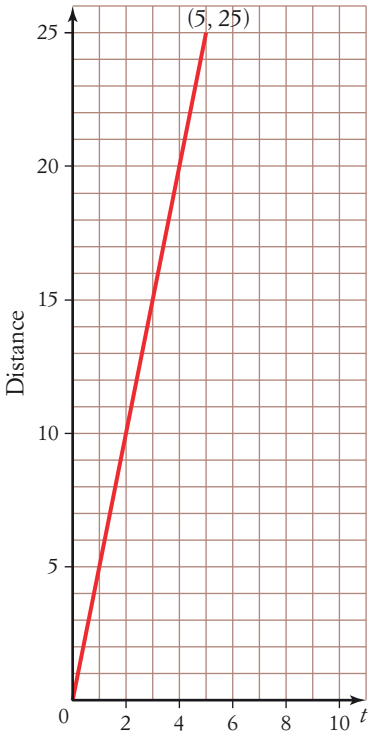
[Total 9 marks]

5 a i $5 \times 2 = 10$ km **[1]**

ii $\frac{25}{5} = 5$ hours **[1]**

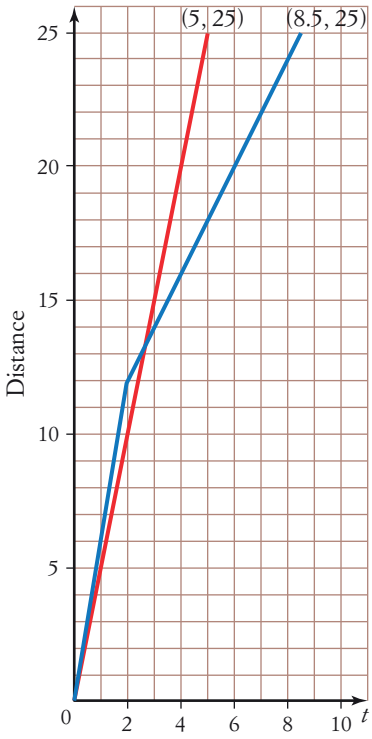
b i $k = 5$ **[1]**

ii



[1 for correct line, 1 for correct endpoint]

c



[1 mark for each correct line segment]

[1 mark for the endpoint correctly labelled]

d $n = 6$ **[1]**

$a = 2$ **[1]**

$b = 8.5$ **[1]**

The equation of the second line segment is:

$d = 2t + c$

$t = 2, d = 12$

$12 = 4 + c$

$c = 8$

$d = 2t + 8$

$m = 2$ **[1]**

$c = 8$ **[1]**

e $5t = 2t + 8$ **[1]**

$3t = 8$

$t = \frac{8}{3}$

Cara overtakes Marcus after $2\frac{2}{3}$ or 2 hours and 40 minutes **[1]**

[Total 15 marks]