Algebra B

Midpoint of $(-4, 6, 10)$ and $(10, -8, 6)$:

$$\left(\frac{-4+10}{2}, \frac{6+-8}{2}, \frac{10+6}{2}\right) = \left(\frac{6}{2}, \frac{-2}{2}, \frac{16}{2}\right)$$
$$= (3, -1, 8)$$

Solve the inequality $4 \leq 2x + 8 < 12$

-8: $-4 \leq 2x \leq 4$ (then -8)

$\div 2$: $-2 \leq x \leq 2$ (then $\div 2$)

Use the quadratic formula to solve $x^2 - 4x - 8 = 0$

$a = 1 \quad b = -4 \quad c = -8$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{--4 \pm \sqrt{(-4)^2 - (4 \times 1 \times -8)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - -32}}{2}$$

$$x = \frac{4 \pm \sqrt{48}}{2}$$

$$x = \frac{4 + \sqrt{48}}{2} = 5.464101615 = 5.46 \text{ (2dp)}$$

$$x = \frac{4 - \sqrt{48}}{2} = -1.464101615 = -1.46 \text{ (2dp)}$$

Solve ① $3x + 2y = 13$ $\times 2 \rightarrow$ $6x + 4y = 26$

② $5x - 4y = 18$ $+$ $5x - 4y = 18$

$11x = 44$

$x = 4$

$4y \square - 4y = 0$ ↑ must be '+'

Sub into ①: $3(4) + 2y = 13$

$12 + 2y = 13$

$2y = 1$

$y = \frac{1}{2} = 0.5$

check: $5(4) - 4(0.5)$

$20 - 2 = 18$ ✓

a) Factorise $4x + 20 = 4(x+5)$

b) $3y^2 + 12y = 3y(y+4)$

c) $x^2 + 4y - 21 = (x+7)(x-3)$

Equation of a line parallel to $y = 2x+5$:

$y = 2x + $ 'anything'

e.g $y = 2x$

$y = 2x + 7$

$y = 2x - 4$

Perpendicular : gradient must be $\frac{-1}{2}$

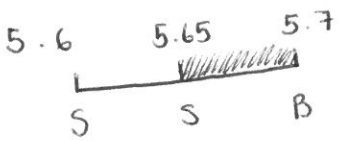
e.g. $y = -\frac{1}{2}x + 2$

$y = -\frac{1}{2}x - 9$

etc

Trial & Improvement $2x^2 - 3x = 47$

x	$2x^2$	$3x$	Answer	Comment
5	50	15	35	too small
6	72	18	54	too big
5.5	60.5	16.5	44	too small
5.6	62.72	16.8	45.92	too small
5.7	64.98	17.1	47.88	too big
5.65	63.845	16.95	46.895	too small



$x = 5.7$ to 1 d.p.

Change the subject to x:

a)

$$3x + t = y$$

$-t$ / $-t$

$$3x = y - t$$

$\div 3$ / $\div 3$

$$x = \frac{y-t}{3}$$

b)

$$\frac{x}{p} - pr = z$$

$+pr$ / $+pr$

$$\frac{x}{p} = z + pr$$

$\times p$ / $\times p$

$$x = p(z+pr)$$

$$\left[\underline{\text{OR}} \quad pz + p^2r\right]$$

c)

$$t(x+r) = p$$

$\div t$ / $\div t$

$$x + r = \frac{p}{t}$$

$-r$ / $-r$

$$x = \frac{p}{t} - r$$

$\underline{\text{OR}}$

$$t(x+r) = p$$

expand

$$tx + tr = p$$

$-tr$ / $-tr$

$$tx = p - tr$$

$\div t$ / $\div t$

$$x = \frac{p-tr}{t}$$

Number B

a) $4^0 = \underline{1}$

b) $5^3 = 5 \times 5 \times 5 = \underline{125}$

c) $64^{\frac{1}{2}} = \sqrt{64} = \underline{8}$

d) $3^{-7} = \frac{1}{3^7} = \underline{\frac{1}{2187}}$

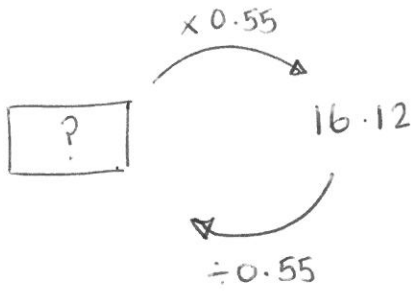
÷55: 16·12 = 55% ÷55

÷55: 0·29309 = 1%

×100: 29·309 = 100% ×100

£29·31 to 2dp

OR



16·12 ÷0.55 = 29·309

£29·31 to 2dp

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* 45% off means 55% remaining

4% of £2500 = $\frac{2500}{100} \times 4 = 100$

Year 1 2500 − 100 = 2400

4% of £2400 = $\frac{2400}{100} \times 4 = 96$

Year 2 2400 − 96 = 2304

4% of £2304 = $\frac{2304}{100} \times 4 = 92.16$

Year 3 2304 − 92·16 = 2211·84

etc

⋮

Year 7 1956.894474 − 78·27577897 = 1878·618695

= £1878·62 (2dp)

OR

2500×0.96^7

7: no. years

2500: initial amount

0.96: percentage left after decrease (as a decimal)

= 1878·618695

= £1878·62 to 2dp

* Assuming they've been rounded to nearest whole number

8cm → UB = 8.5
8cm → LB = 7.5

6cm → UB = 6.5
6cm → LB = 5.5

max. area = UB × UB = $8.5 \times 6.5 = 55.25\ cm^2$

min. area = LB × LB = $7.5 \times 5.5 = 41.25\ cm^2$

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a) $0.333333\ldots = \frac{1}{3}$

b) $x = 0.76767676\ldots$

$100x = 76.76767676\ldots$

$99x = 76$

$x = \frac{76}{99}$

c) $x = 0.428428\ldots$

$1000x = 428.428428\ldots$

$999x = 428$

$x = \frac{428}{999}$

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a) $\sqrt{24} = \sqrt{4} \times \sqrt{6} = 2 \times \sqrt{6} = 2\sqrt{6}$

b) $\sqrt{5} \times \sqrt{7} = \sqrt{5 \times 7} = \sqrt{35}$

c) $(\sqrt{3} + 4)(\sqrt{3} - 2)$

$\sqrt{9} - 2\sqrt{3} + 4\sqrt{3} - 8$

$= 3 + 2\sqrt{3} - 8$

$= -5 + 2\sqrt{3}$ [or $2\sqrt{3} - 5$]

$\frac{7}{20} = \frac{35}{100} = 35\%$ shopping

cinema = 100% − 35% − 15% = 50%

50% of 1,400 = 700 went to the cinema

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a) $3\frac{4}{5} - 2\frac{1}{4} = \frac{19}{5} - \frac{9}{4} = \frac{76}{20} - \frac{45}{20} = \frac{31}{20}$

$3\frac{4}{5} = \frac{19}{5}$

$2\frac{1}{4} = \frac{9}{4}$

b) $4\frac{1}{3} \times 5\frac{3}{4} = \frac{13}{3} \times \frac{23}{4} = \frac{13 \times 23}{3 \times 4} = \frac{299}{12}$

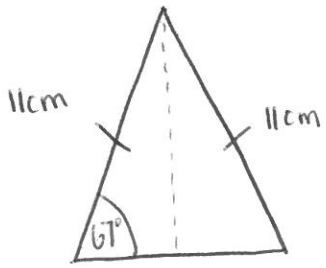
$4\frac{1}{3} = \frac{13}{3}$

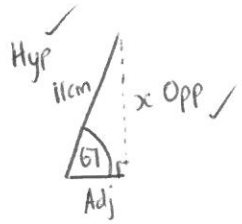
$5\frac{3}{4} = \frac{23}{4}$

x	20	3
10	200	30
3	60	9

200
30
+ 60
9
299

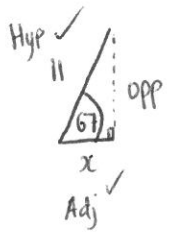
Geometry B





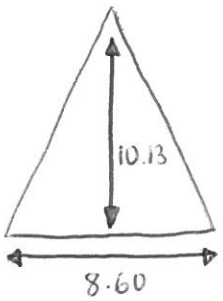
$opp = \sin(67) \times 11$

$= 10.12555... = 10.13$ (2dp)

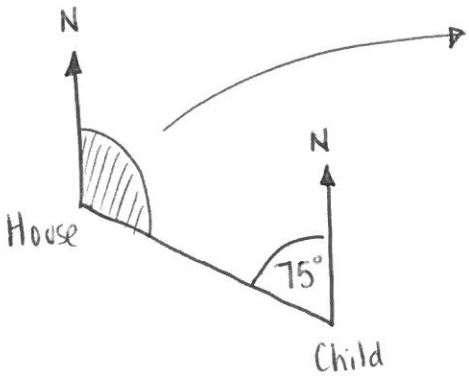


$adj = \cos(67) \times 11$

$= 4.29804... = 4.30$ (2dp)

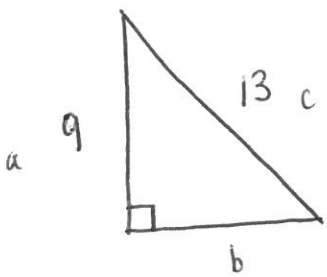


$$\text{area} = \frac{10.13 \times 8.60}{2} = 43.559 \text{ cm}^2$$



child from house : co-interior angles add up to 180°

So $180 - 75 = \underline{105^\circ}$



$a^2 + b^2 = c^2$

$9^2 + b^2 = 13^2$

$81 + b^2 = 169$

$b^2 = 169 - 81 = 88$

$b = \sqrt{88} = 9.38083152...$

$= 9.38$ (2 dp)

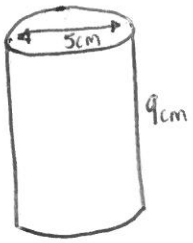
Interior angle = 156 $\therefore$ exterior = 180 − 156 = 24

$$\text{Exterior angle} = \frac{360}{\text{no. sides}}$$

$$24 = \frac{360}{?}$$

$$24 \times ? = 360$$

$$? = \frac{360}{24} = \underline{\underline{15}}$$



diameter = 5

radius = 2.5

area of circle = $\pi \times 2.5^2$

= 19.63 (2dp)

circumference = $\pi \times 5$

= 15.71 (2dp)

Volume = area of cross-section × length

= πr^2 × length

= 19.63 × 9

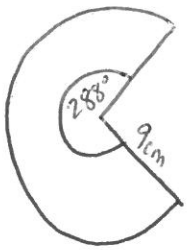
= 176.67 cm^3

Surface area

 × 2 : 19.63 × 2 = 39.26 cm^2

: 15.71 × 9 = 141.39 cm^2

39.26 + 141.39 = 180.65 cm^2



$$\text{area} = \frac{288}{360} \times \pi r^2$$

$$= \frac{288}{360} \times \pi \times 9^2$$

$$= 203.58 \text{ (2dp) } cm^2$$

$$\text{perimeter of arc} = \frac{288}{360} \times \pi d$$

$$= \frac{288}{360} \times \pi \times 18$$

$$= 45.24 \text{ cm (2dp)}$$

Full perimeter : $45.24 + 9 + 9 = 63.24$ cm (2dp)

Rotation 180° (clockwise) around the point (0, 0)

Data B

Any 2 from:

* no time frame given in the question
* no option for £0 (or less than £1)
* answer boxes overlap
* no option for more than £15

$P(\text{win}) = \frac{2}{5}$

in 150 games : $\frac{2}{5} \times 150 = \underline{\underline{60}}$

Height	Frequency	Midpoint	Freq × Mid
$0 < h \leq 10$	9	5	45
$10 < h \leq 20$	7	15	105
$20 < h \leq 40$	8	30	240
$40 < h \leq 50$	6	45	270
	30		660

$$\text{mean} = \frac{660}{30} = 22$$

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(1) The median is higher at golf club A which means on average the players are older than at golf club B.

(2) The interquartile range is smaller at golf club B

OR The range is higher at golf club B

Interquartile range = upper quartile - lower quartile

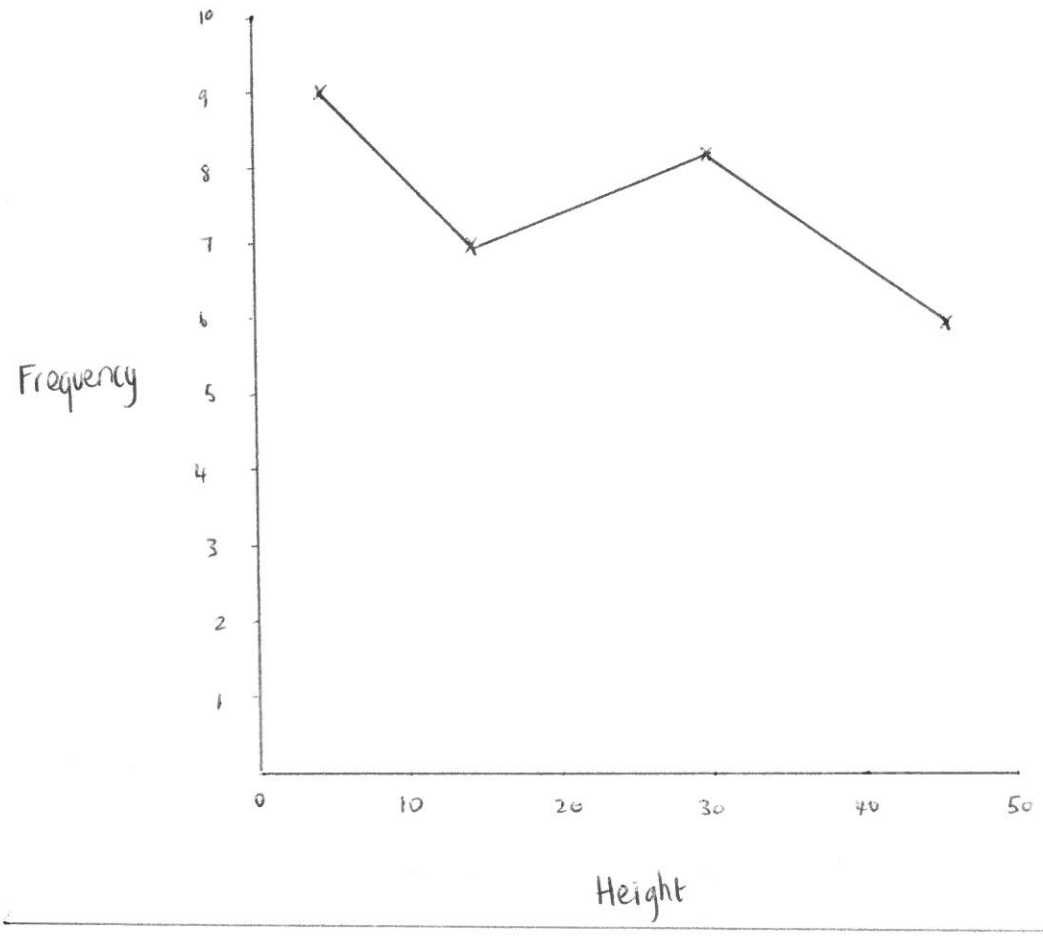
draw a line across from $\frac{3}{4}$ of 100 (75) and read the time

Approx. 18

draw a line across from $\frac{1}{4}$ of 100 (25) and read the time

Approx. 11

IQR = 18 − 11 = 7



Frequency Polygon

Coin	Heads	H,1	H2	H3	H4	H5	H6
	Tails	F1	T2	T3	T4	T5	T6

P(Head & even) = $\frac{3}{12}$