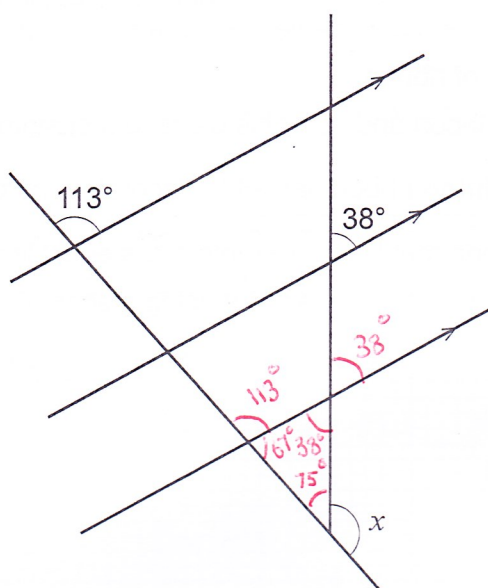


1.

*Diagram not drawn to scale*Calculate the size of angle x .

[3]

$$180 - 67 - 38 = 75^\circ$$

$$\text{Now } 180 - 75$$

$$x = 105^\circ$$



2. Maria sells ribbon.

She has a 400 cm length of ribbon.

Maria cuts off $\frac{3}{10}$ of this ribbon and sells this piece to a customer.

She uses $\frac{2}{5}$ of the **remaining** ribbon herself to decorate a card.

Then, Maria cuts the ribbon that is left over into three equal lengths.

What is the length of each of these three remaining pieces of ribbon?

[5]

$$\frac{3}{10} \text{ of } 400 = 400 \div 10 \times 3 = 40 \times 3 = 120 \text{ cm}$$

$$\therefore 400 - 120 = 280 \text{ cm left.}$$

$$\frac{2}{5} \text{ of } 280 = 280 \div 5 \times 2 = 112 \text{ cm}$$

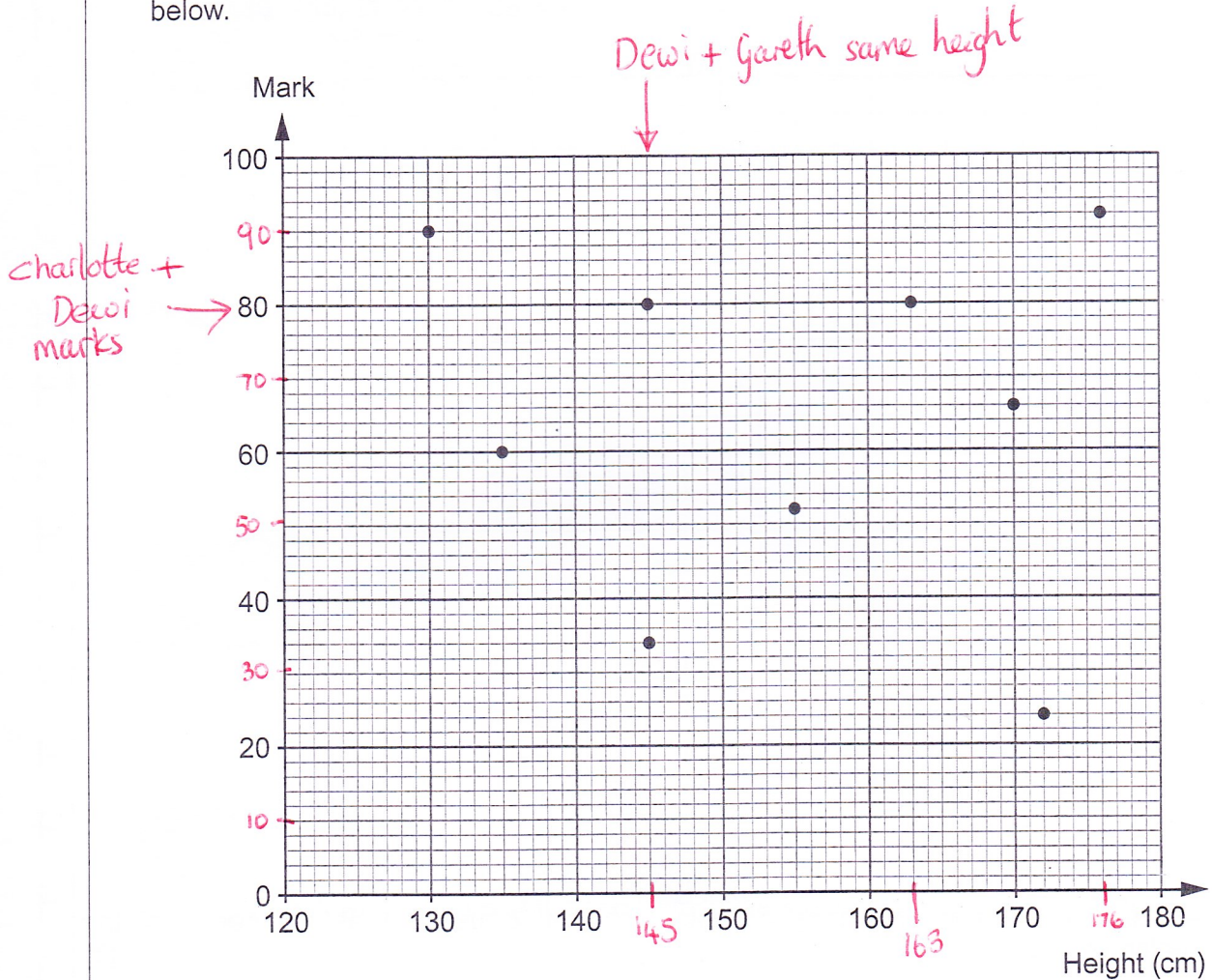
$$\therefore 280 - 112 = \boxed{168 \text{ cm}} \text{ left}$$

$$\text{Now } 168 \div 3 = 3 \overline{)168}^{56} = 56 \text{ cm}$$

The length of each remaining piece of ribbon is 56 cm



3. A number of students took an examination. The heights of these students and the mark they each scored is shown in the scatter diagram below.



- (a) Describe the correlation shown by the scatter diagram.

[1]

NO correlation

- (b) Charlotte scored the same mark as Dewi.
Charlotte is taller than Dewi.
Henri is the tallest student in the class.
Dewi and Gareth are both the same height.

Complete the table.

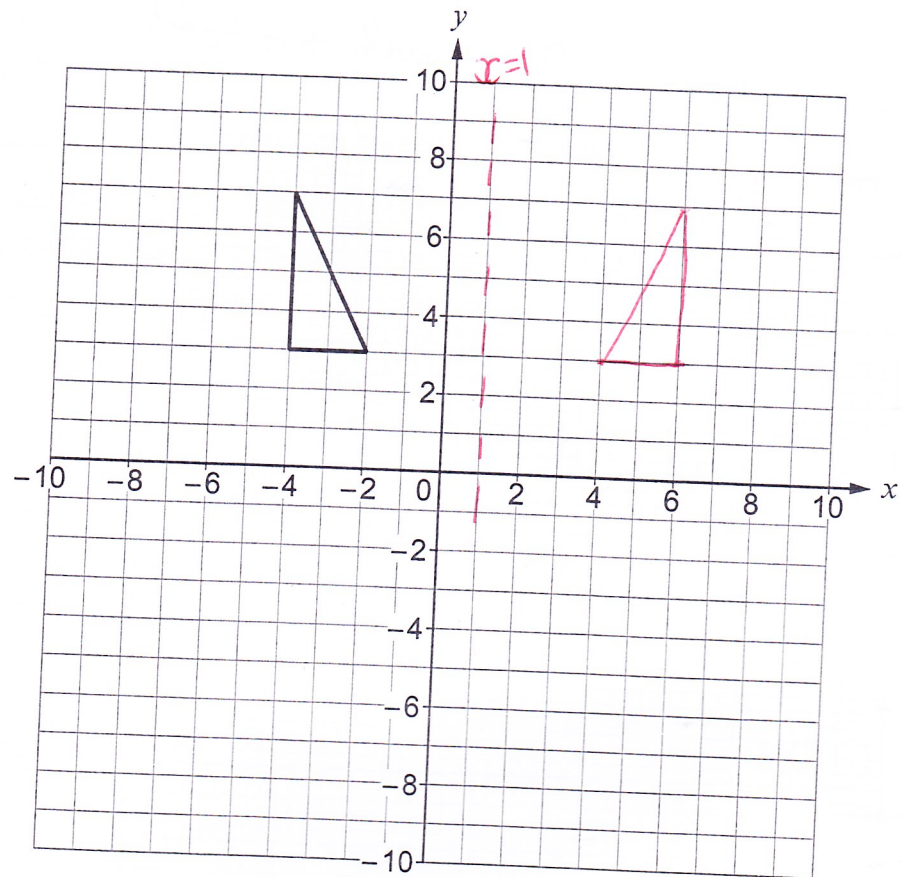
[3]

Name	Height (cm)	Mark
Dewi	145	80
Charlotte	163	80
Henri	176 176	92
Gareth	145	34



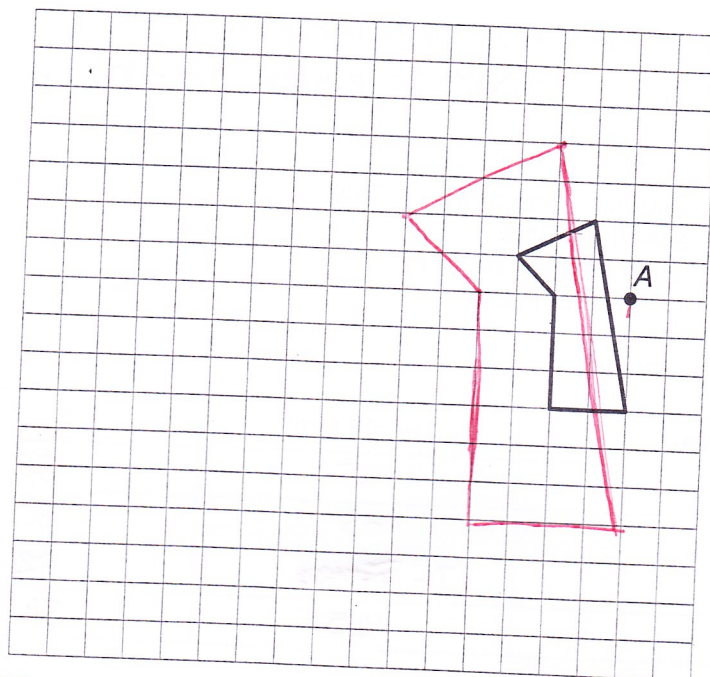
4. (a) Draw a reflection of the triangle in the line $x = 1$.

[2]



- (b) Enlarge the shape shown by a scale factor of 2, using A as the centre of enlargement.

[3]



5. (a) Find the n th term for each of the following sequences.

(i) 15, 21, 27, 33, 39, 45, ...

[2]

$+6 +6 +6 +6 +6$

$$6n + 9$$

(ii) 30, 26, 22, 18, 14, 10, ...

[2]

$-4 -4 -4 -4 -4$

$$-4n + 34$$

(iii) -1, 2, 7, 14, 23, 34, 47, 62, ...

[2]

$+3 +5 +7 +9 +11 +13 +15$

$+2 +2 +2 +2 +2 +2$

$$n^2 - 2$$

(b) The n th term of a sequence is $4n + 15$.

Write down the value of the first term in the sequence that is greater than 100.

[3]

$$4n + 15 = 100$$

$$4n = 100 - 15$$

$$4n = 85$$

$$n = \frac{85}{4}$$

$$n = 21\frac{1}{4}$$

$$\therefore n = 22$$

$$4(22) + 15$$

$$= 88 + 15$$

$$= 103$$

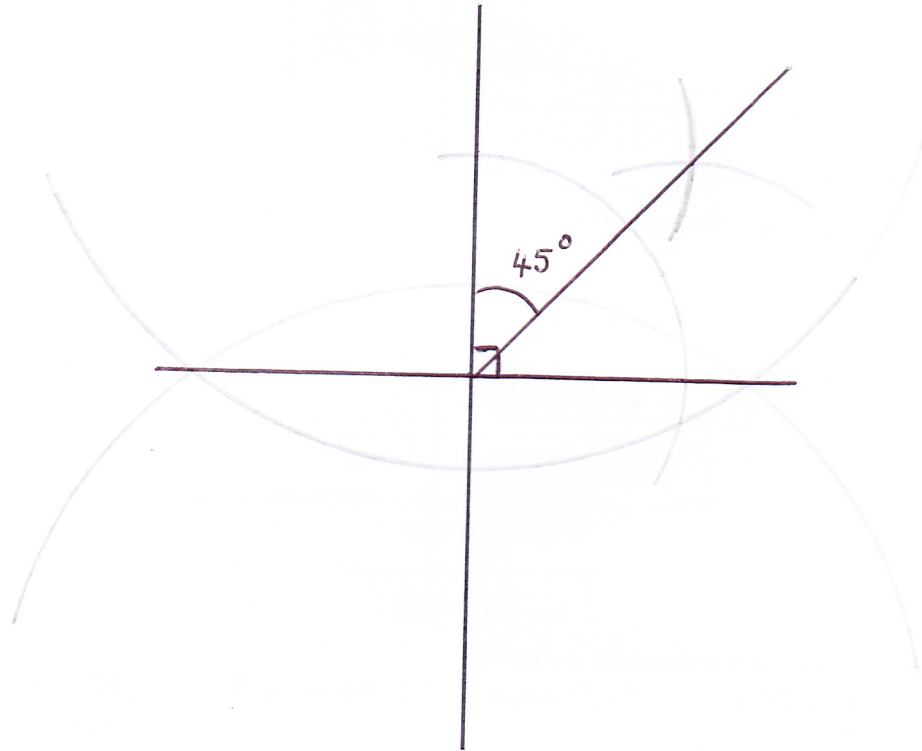
Value of $4n + 15$ is 103



6. In answering this question you **must show all your construction arcs**.
Use a ruler and a pair of compasses to construct an angle of 45° at the midpoint of the straight line below.
Label your angle 45° .

Draw a perpendicular bisector and then bisect the 90° angle formed.

[3]



7. You will be assessed on the quality of your written communication in this question.

Our recommended daily intake of food is often given in calories.



A small bag of 20 almonds provides 160 calories.

It is recommended that Joseff's diet should contain 1920 calories per day.

Joseff eats a large portion of almonds one day.
It is 25% of his recommended daily calories.

How many almonds does he eat?
You must show all your working.

[7]

$$\begin{array}{l} 25\% \text{ of recommended calories} = \frac{1920}{4} \\ \uparrow \\ \text{same as } \frac{1}{4} \end{array}$$

$$\begin{array}{r} 480 \\ 4 \overline{) 1920} \end{array}$$

$$= 480 \text{ calories}$$

A small bag of almonds = 160 calories.

$$\therefore \frac{480}{160} = 3$$

$\therefore$ He eats 3 bags of almonds.

$\therefore$ Number of almonds

$$\begin{aligned} \text{eaten} &= 3 \times 20 \\ &= 60 \end{aligned}$$



8. (a) Solve
- $5x - 65 = 3x - 17$
- .

[3]

$$5x - 3x = -17 + 65$$

$$2x = 48$$

$$x = \frac{48}{2}$$

$$x = 24$$

- (b) Solve
- $\frac{x}{4} + 12 = 28$
- .

[2]

$$\frac{x}{4} = 28 - 12$$

$$\frac{x}{4} = 16$$

$$x = 16 \times 4$$

$$x = 64$$

OR You could do this
 $\frac{x}{4} + 12 = 28$
 All terms $\times 4$ $x + 48 = 112$

$$x = 112 - 48$$

$$x = 64$$

- (c) Expand
- $y(y + 8)$
- .

[2]

$$= y^2 + 8y$$

- (d) Factorise
- $3y^2 - y$
- .

[1]

$$= y(3y - 1)$$

- (e) Solve
- $10x + 8 < 42$
- .

[2]

$$10x < 42 - 8$$

$$10x < 34$$

$$x < \frac{34}{10}$$

$$x < 3.4$$



9. (a) Express 396 as a product of prime numbers in index form.

[3]

$$\begin{array}{r}
 2 \overline{) 396} \\
 2 \overline{) 198} \\
 3 \overline{) 99} \\
 3 \overline{) 33} \\
 11 \overline{) 11} \\
 1
 \end{array}$$

$$\therefore 396 = 2^2 \times 3^2 \times 11$$

You need
an extra
" to make all powers even

- (b) y^2 is the smallest square number that is a multiple of 396.

$$11 \times 396 = y^2$$

Write down the value of y .

[2]

y will be $2 \times 3 \times 11$

$$y = 66$$



10. (a) Express 8^{-1} as a fraction.

[1]

$$\frac{1}{8}$$

- (b) Calculate $(3 \times 10^2) \times (1.2 \times 10^3)$.
Give your answer in standard form.

[1]

$$(3 \times 1.2) \times 10^2 \times 10^3$$

$$= 3.6 \times 10^5$$

- (c) Express 5.4×10^{-3} as a decimal.

[1]

$$0.0054$$

11. Rearrange the following formulae to make w the subject.

(a) $t + 5w = h$

[2]

$$5w = h - t$$

$$w = \frac{h - t}{5}$$

(b) $aw + 3 = 4(bw + 5)$

[4]

$$aw + 3 = 4bw + 20$$

$$aw - 4bw = 20 - 3$$

common factor w $w(a - 4b) = 17$

$$w = \frac{17}{(a - 4b)}$$



12. The probability that Daisy wears a bracelet is 0.7.
The probability that Daisy wears a bracelet **and** wears a necklace is 0.63.
For Daisy, wearing a bracelet and wearing a necklace are independent events.

(a) (i) Find the probability that Daisy wears a necklace. [2]

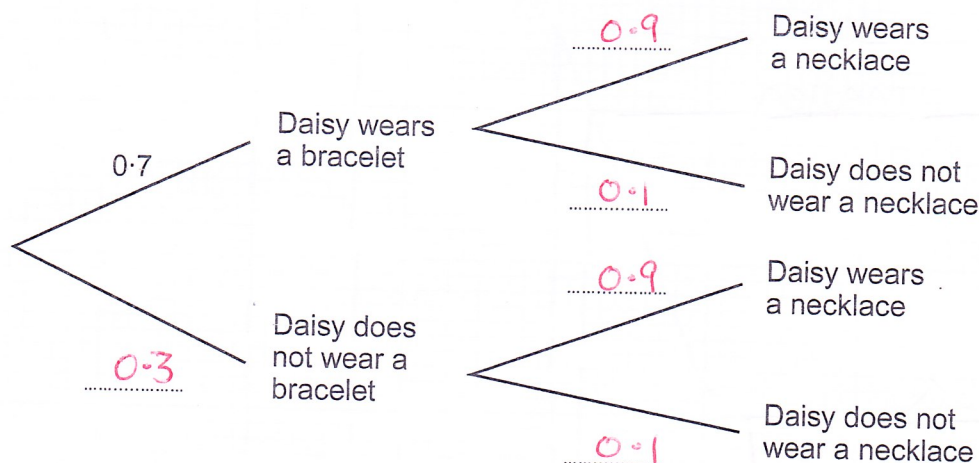
$$P(B \text{ and } N) = 0.63$$

$$0.7 \times \square = 0.63$$

$$\therefore P(N) = 0.9$$

Probability that Daisy wears a necklace = 0.9

(ii) Complete the tree diagram. [2]



(b) Find the probability that Daisy does not wear a bracelet **and** does not wear a necklace. [2]

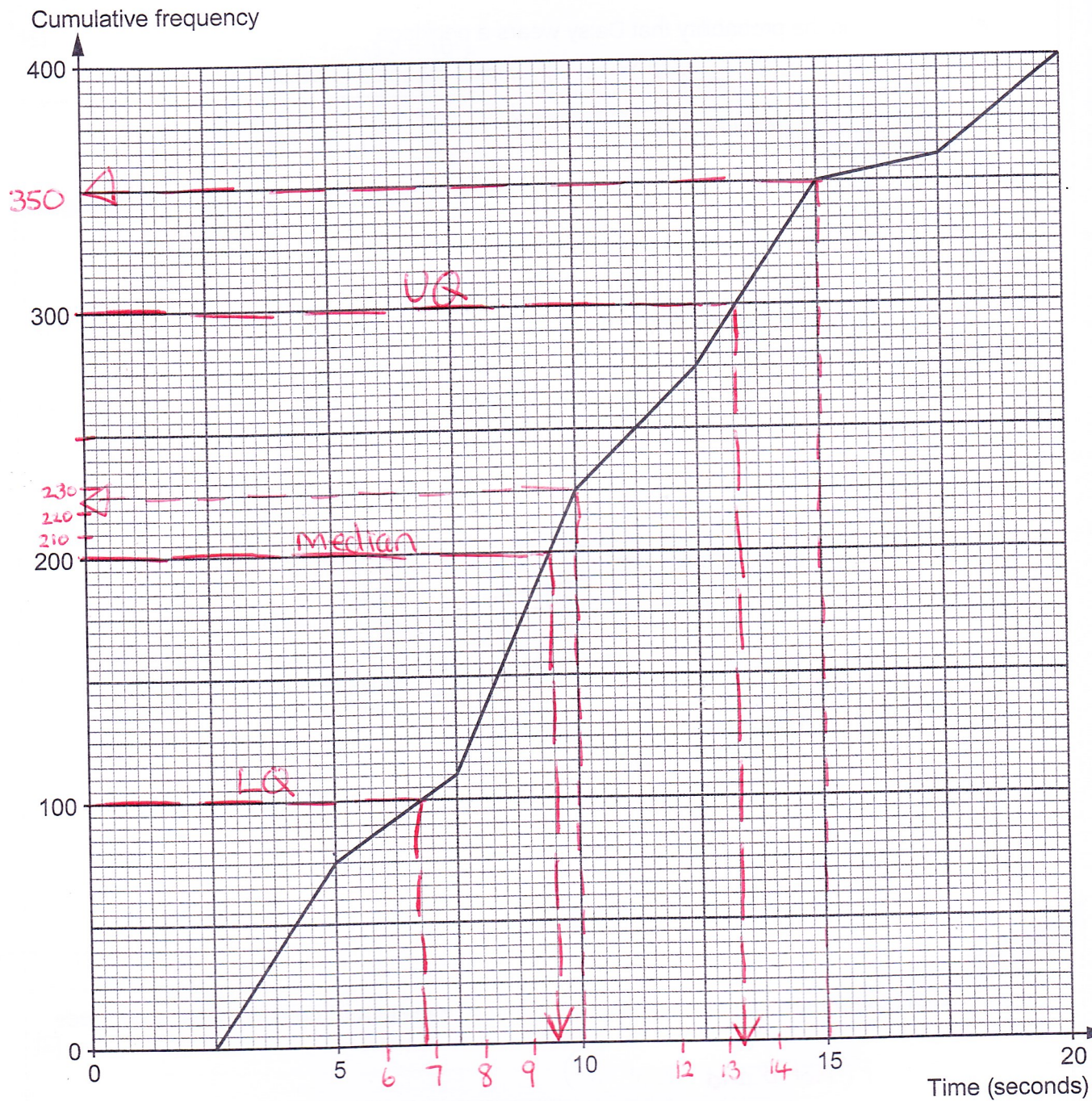
$$P(\text{Not } B \text{ and Not } N)$$

$$= 0.3 \times 0.1$$

$$= 0.03$$



13. The cumulative frequency diagram illustrates the times, in seconds, 400 people took to unwrap a box containing a new computer.



- (a) How many of these people unwrapped the box in less than 10 seconds? [1]

225



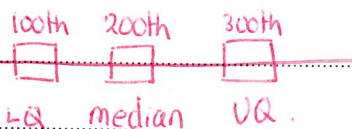
- (b) What percentage of people took longer than 15 seconds to unwrap the box? [2]

350 people took less than 15 secs.

So 50 people took longer than 15 secs.

$$\therefore \% \text{ needed} = \frac{50}{400} = \frac{12.5}{100} = 12.5\%$$

- (c) Find the median and the interquartile range of the times taken to unwrap the box. [3]



$$LQ = 6.75 \text{ secs}$$

$$UQ = 13.25 \text{ secs}$$

$$IQR = 13.25 - 6.75$$

$$\text{Median } 9.5 \text{ secs} = 6.5$$

$$\text{Interquartile range } 6.5 \text{ secs}$$



14. Wilf thinks of a number, x .



His sister says that if Wilf subtracts 6 from his number and multiplies this new number by the number he first thought of, he will get an answer of -5 .

Use this information to

- find a quadratic equation in the form $x^2 + ax + b = 0$, and
- hence solve the equation to find the possible values of x .

[6]

$$(x-6)x = -5$$

$$x^2 - 6x + 5 = 0$$

$$(x-5)(x-1) = 0$$

x	$+$
$+5$	-6

$$(-5)(-1)$$

either $x-5=0$ or $x-1=0$

$$\underline{x=5}$$

$$\underline{x=1}$$



15. The straight lines XAD and YAB intersect at point A , which lies on the circumference of two circles.

Points B , C and D lie on the circumference of one circle.

Points X and Y lie on the circumference of the other circle.

The centre of one of the circles is at O .

$$\widehat{BCD} = w^\circ.$$

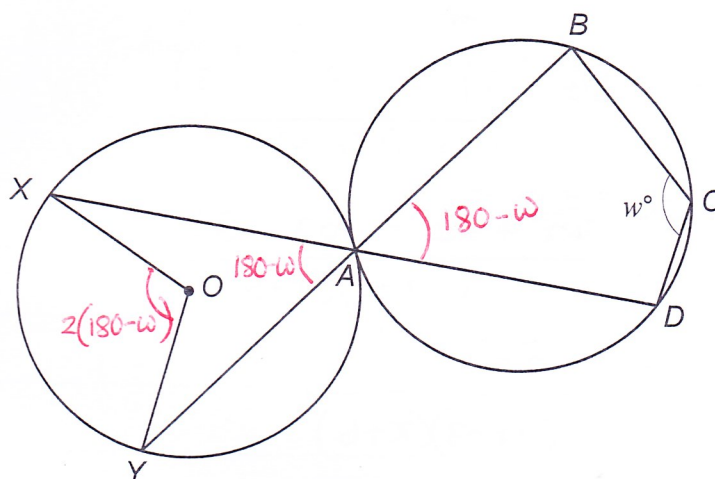


Diagram not drawn to scale

Write an expression for $\widehat{XOY}$ in terms of w .

You must show all the stages of your work and give reasons at each stage.

[5]

First $\widehat{BAD} = 180 - w$ because opposite angles of cyclic quad add up to 180°

Then $\widehat{XAY} = 180 - w$ because of vertically opposite angles are equal

Then $\widehat{XOY} = 2(180 - w)$ because angle to centre = 2x angle to circumference
OR $360 - 2w$



16. (a) Express $\frac{4}{2x-3} + \frac{8}{x+6}$ as a single fraction in its simplest form. [3]

Lcm $(2x-3)(x+6)$

$$= \frac{4(x+6)}{(2x-3)(x+6)} + \frac{8(2x-3)}{(2x-3)(x+6)}$$

$$= \frac{4(x+6) + 8(2x-3)}{(2x-3)(x+6)}$$

$$= \frac{4x + 24 + 16x - 24}{(2x-3)(x+6)}$$

$$= \frac{20x}{(2x-3)(x+6)}$$

- (b) Simplify $\frac{9x^2-25}{6x+10}$. $\leftarrow (3x)^2 - 5^2$ so use difference of 2 squares
 $\leftarrow$ use common factor [4]

$$= \frac{(3x+5)(3x-5)}{2(3x+5)} \quad \leftarrow \text{Now cancel ie } \frac{(3x+5)}{(3x+5)}$$

$$= \frac{(3x-5)}{2}$$



17. Evaluate $(\sqrt{50} - 3\sqrt{2})^2$.

Examiner
only

[3]

$$= (\sqrt{50} - 3\sqrt{2})(\sqrt{50} - 3\sqrt{2})$$

$$3\sqrt{2} \times 3\sqrt{2}$$

$$= 3 \times 3 \times \sqrt{2} \times \sqrt{2}$$

$$= 50 - 3\sqrt{100} - 3\sqrt{100} + 18$$

$$= 9 \times 2$$

$$= 68 - 6\sqrt{100}$$

$$= 18$$

$$= 68 - 6(10)$$

$$= 68 - 60$$

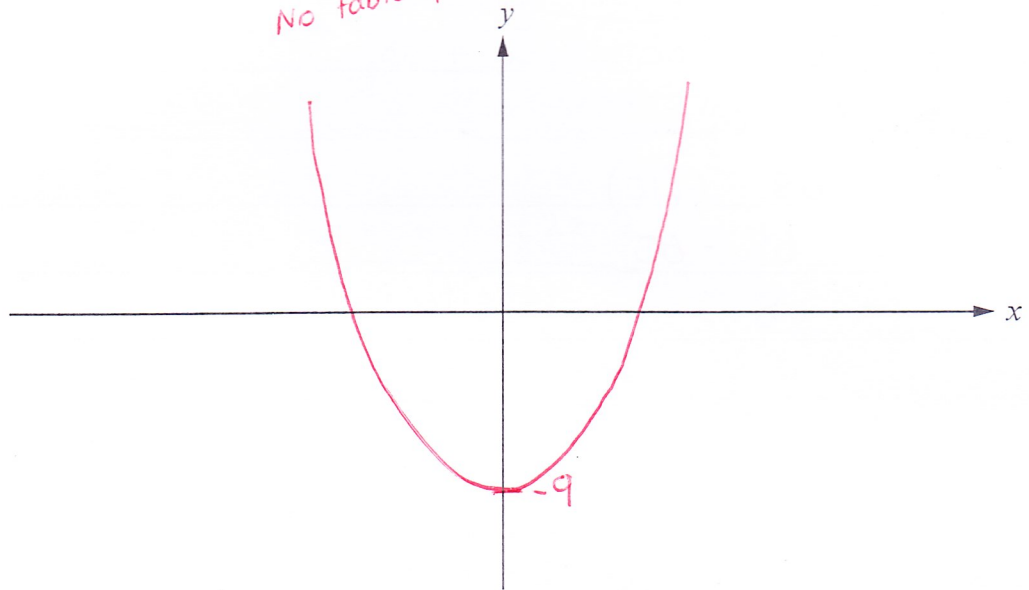
$$= 8$$



shift U shape
down 9

18. (a) Use the axes below to sketch $y = x^2 - 9$.
Mark clearly the coordinates of any point where this curve meets an axis. [3]

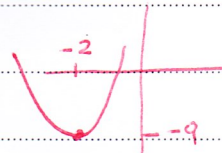
No table of values



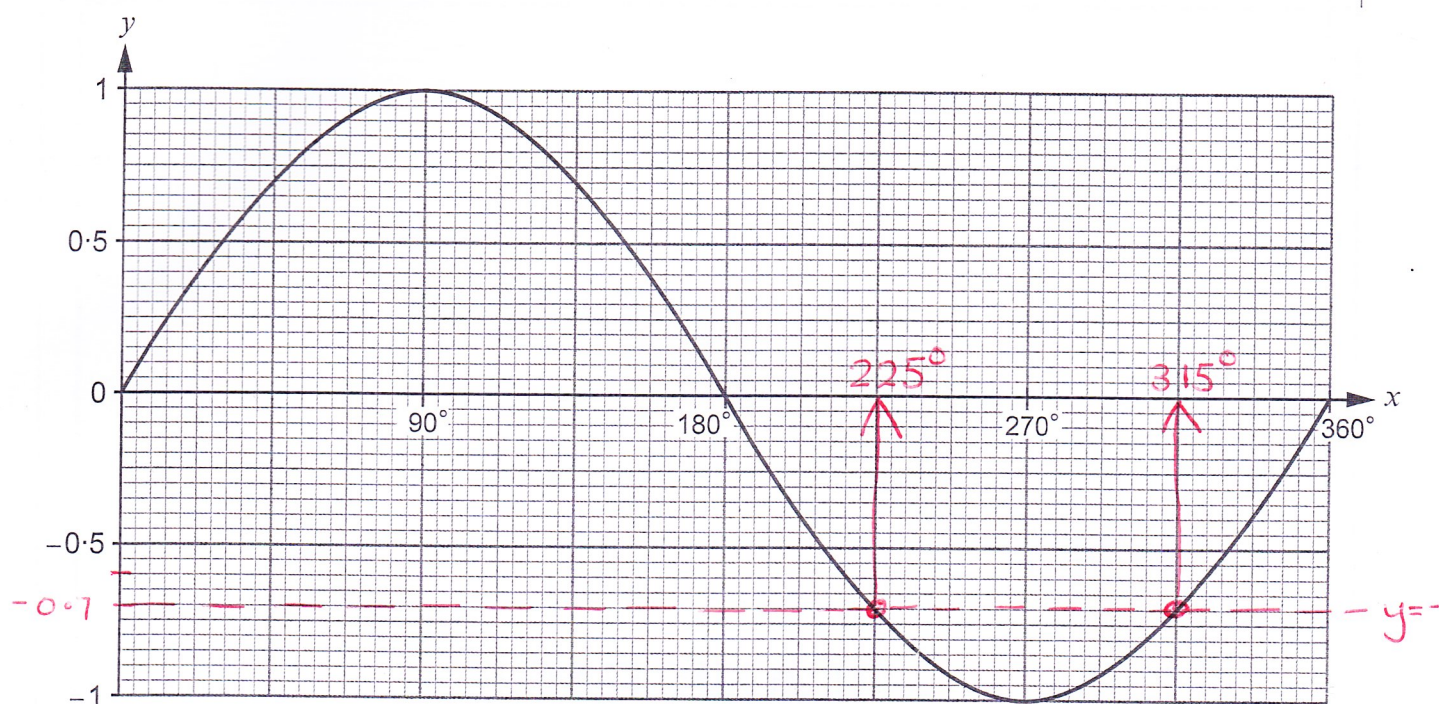
- (b) Mari is asked to sketch $y = (x + 2)^2 - 9$.
Describe how Mari could use your sketch from (a) to sketch this curve. [2]

shift left 2

Simply shift the curve above 2 places
left.



19. The diagram below shows the graph of $y = \sin x$ for values of x from 0° to 360° .



Find, as accurately as possible, all solutions of the following equation in the range 0° to 360° .

[2]

$$\sin x = -0.7$$

Plot $y = \sin x$ DONE

Plot $y = -0.7$ this is the horizontal line drawn in dots

$$\therefore x = 225^\circ \quad x = 315^\circ$$

END OF PAPER

