MORRELL Hannah

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	21 from 38	0 from 3	4 from 9	5 from 8	8 from 14	4 from 4
A02 and 3	10 from 42	1 from 7	1 from 19	4 from 4	4 from 9	0 from 3
Total	31 from 80	1 from 10	5 from 28	9 from 12	12 from 23	4 from 7

Your Pinpoint Topics

(1) Averages from Frequency Tables. MWatch: 130, Hegarty:

(2) Reverse Percentage. MWatch: 110, Hegarty:

(3) Speed. MWatch: 142, Hegarty:

(4) Box plots. MWatch: 187, Hegarty:

(5) Functions. MWatch: NA, Hegarty:

1) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

1) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked. ..... 22 .....

(2)

(b) Work out the mean number of cups of coffee drunk. ..... 4·59 (2dp) .....

DRAW 3rd COLUMN

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

..... 1 .....

(1)

(b) Work out the range of the number of goals scored.

4 − 1

..... 3 .....

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

..... 2·1 .....

(3)

(5 marks)

1) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g
(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90
(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90
(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

(1)
(7 marks)

2) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

2) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

£236.25÷ 0.75^2

= £420

…… **(3)**

2) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

3) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

12.5 miles/hour

(2 Marks)

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2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

16 Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

80 minutes

(3 Marks)

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4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

48 Km

(2 Marks)

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3) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

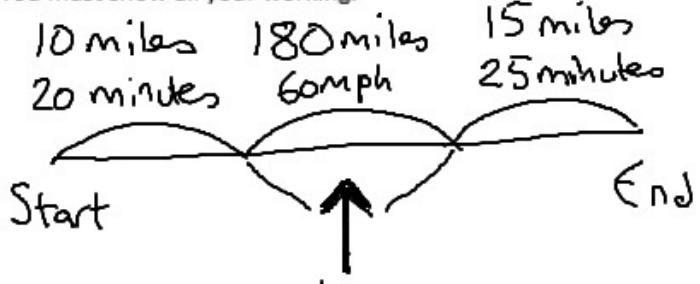
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



$T = D/S$

$T = 180/60 = 3$ hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

3) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

4miles 10mins | 45mins 60mph | 6miles 15mins

Start End

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70 mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

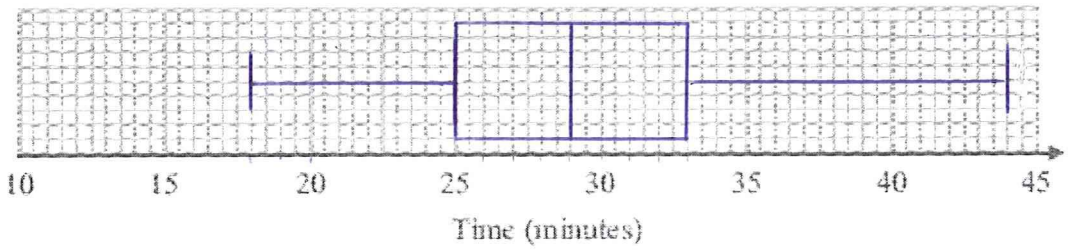
4) Box plots: Easier

2. Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

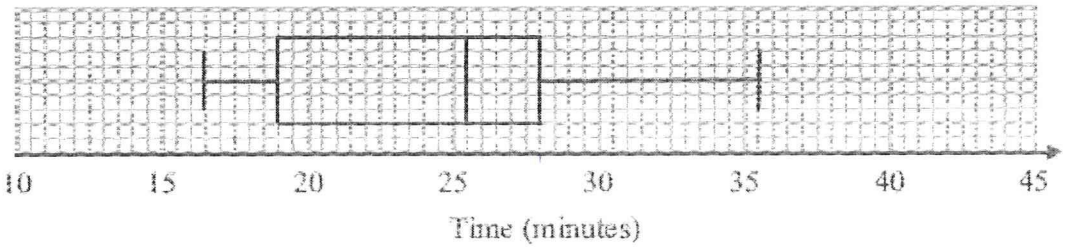
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

(a) On the grid, draw a box plot to show the information in the table.



(2)

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.



(b) Compare the distributions of the girls' times and the boys' times.

The boys median time was less than that of the girls; Boys 25.5mins, Girls 29 mins.

The spread of data for the interquartile range is smaller for the girls (8 mins) than for the boys (9 mins)

(2)

(4 marks)

4) Box plots: Medium

1. (a) (i) 152 2

B1 cao

(ii) 177

B1 cao

(b) 3

B1 for median marked at 167
B1 ft for postion of box with its ends at "152" and "177"
B1 for position of whiskers with ends at 132 and 182
NB: For any points plotted between 141 and 149 give a tolerance of an extra ±1 square

[5]

4. a) median = **14m**

b) Q1 = 9m, Q3= 17m IQR = Q3 - Q1
= 17 - 9 = **8m**

c) Since Q3 = 17m 25% of trees are 17m or taller

25% of 300 = 300/4 = **75 trees**

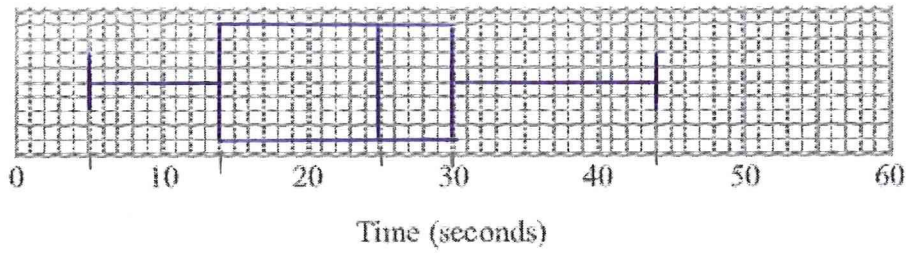
4) Box plots: Harder

7. Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

5 9 11 [14] 15 20 22 [25] 27 27 28 [30] 32 35 44

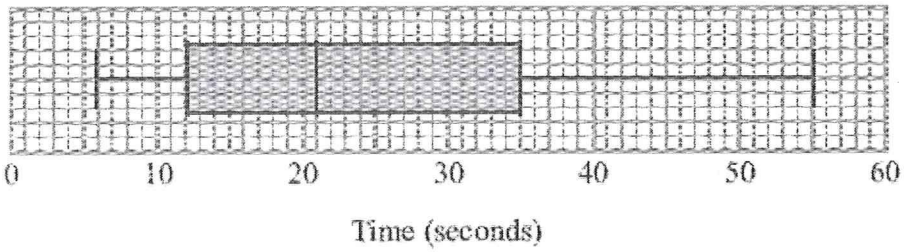
LQ Median UQ.

(a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

There was a greater spread of waiting times in the interquartile range for Green's Garden Centre than Rose's Garden Centre. The median waiting time is greater at Green's than Rose's Garden Centre.

(2)

(5 marks)

5) Functions: Easier

1) The function f is given by

$$f(x) = 2x + 3$$

Evaluate $f(3)$

$$f(3) = 2(3) + 3$$

$$f(3) = 9$$

(1 Mark)

---

2) The function g is given by

$$g(x) = 3x^2 + 5$$

Evaluate $g(2)$

$$g(2) = 3(2)^2 + 5$$

$$g(2) = 3(4) + 5$$
$$g(2) = 12 + 5$$

$$g(2) = 17$$

(1 Mark)

---

3) The function g is given by

$$g(x) = 2x^2 + 3x - 1$$

Evaluate $g(-3)$

$$g(-3) = 2(-3)^2 + 3(-3) - 1$$

$$g(-3) = 2(9) - 9 - 1$$

$$g(-3) = 18 - 9 - 1$$

$$g(-3) = 8$$

(2 Marks)

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5) Functions: Medium

4) The function g is given by

$$g(x) = 3x^2 + 2x - 1$$

Show that for all values of x

$$g(x + 2) = 3x^2 + 14x + 15$$

$$g(x + 2) = 3(x + 2)^2 + 2(x + 2) - 1$$

$$g(x + 2) = 3(x^2 + 4x + 4) + 2x + 4 - 1$$

$$g(x + 2) = 3x^2 + 12x + 12 + 2x + 4 - 1$$

$$g(x + 2) = 3x^2 + 14x + 15$$

(2 Marks)

5) The function f is given by

$$f(x) = 2x^2 - 3x - 1$$

Write $f(x - 1)$ in the form $ax^2 + bx + c$

$$f(x - 1) = 2(x - 1)^2 - 3(x - 1) - 1$$

$$f(x - 1) = 2(x^2 - 2x + 1) - 3x + 3 - 1$$

$$f(x - 1) = 2x^2 - 4x + 2 - 3x + 2$$

$$f(x - 1) = 2x^2 - 7x + 4$$

(2 Marks)

5) Functions: Harder

6) The function f is given by

$$f(x) = 2x^3 - 5x^2 + 2x - 1$$

Write $f(-x) + 2$ in the form $ax^3 + bx^2 + cx + d$

$$f(-x) + 2 = 2(-x)^3 - 5(-x)^2 + 2(-x) - 1 + 2$$

$$f(-x) + 2 = -2x^3 - 5x^2 - 2x + 1$$

(3 Marks)

7) Given that $g(x + 2) = 3x^2 + 14x + 11$

Find the function $g(x)$

$$g(x) = 3(x - 2)^2 + 14(x - 2) + 11$$

$$g(x) = 3(x^2 - 4x + 4) + 14x - 28 + 11$$

$$g(x) = 3x^2 - 12x + 12 + 14x - 17$$

$$g(x) = 3x^2 + 2x - 5$$

(2 Marks)

BRADY Jaydon

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Total	31 from 80	3 from 10	9 from 28	11 from 12	7 from 23	1 from 7

Your Pinpoint Topics

(1) Inequalities. MWatch: 139, Hegarty:

(2) Averages from Frequency Tables. MWatch: 130, Hegarty:

(3) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(4) Loci and Construction. MWatch: 165, Hegarty:

(5) Speed. MWatch: 142, Hegarty:

1) Inequalities: Easier

1. $-1 \leq n < 4$

n is an integer.

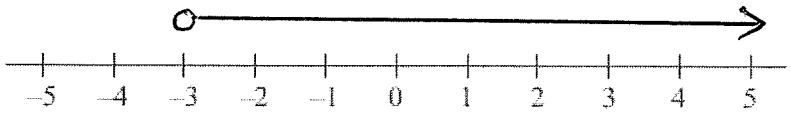
Write down all the possible values of n.

$-1, 0, 1, 2, 3$

(2 marks)

2. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y - 34 \leq 8$

$7y - 34 \leq 8$

$+34$ $7y \leq 42$

$\div 7$ $y \leq 6$

$y \leq 6$

(2)

(c) Write down the integer values of x that satisfy the inequality

$-2 \leq x < 3$

$-2, -1, 0, 1, 2$

(2)

(6 marks)

1) Inequalities: Medium

3. $-2 \leq n < 5$

n is an integer.

(a) Write down all the possible values of n.

$-2, -1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $4x + 1 > 11$

$4x + 1 > 11$

-1 $\quad 4x > 10$

$\div 4$ $\quad x > \frac{10}{4}$

$x > 2.5$

$x > 2.5$

(2)

(4 marks)

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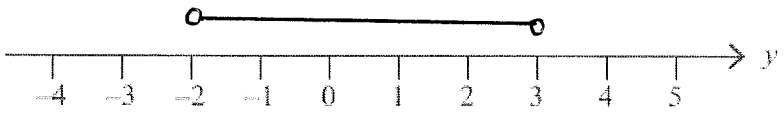
4. (a) On the number line below, show the inequality $-2 < y < 3$



(1)

(b) Here is an inequality, in x, shown on a number line.

Write down the inequality.

$-3 < x \leq 4$

(2)

(c) Solve the inequality $4t - 5 > 11$

$4t - 5 > 11$

$+5$ $\quad 4t > 16$

$\div 4$ $\quad t > 4$

$t > 4$

(2)

(5 marks)

1) Inequalities: Harder

11. (a) Solve $5x + 12 < 17$

(2)

$5x + 12 < 17$
-12 $5x < 5$
$\div 5$ $x < 1$

$x < 1$

(b) Solve the inequality $3(2y + 1) > 10$

(2)

$6y + 3 > 10$
-3 $6y > 7$
$\div 6$ $y > 7/6$

$y > 7/6$ or $y > 1.16$

(4 marks)

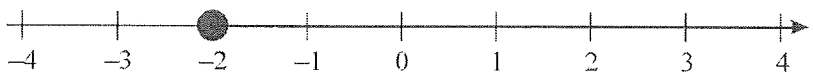
12. (a) Solve the inequality $4x - 3 < 7$

$4x - 3 < 7$
$+3$ $4x < 10$
$\div 4$ $x < 2.5$

$x < 2.5$

(2)

An inequality is shown on the number line.



(b) Write down the inequality.

$x \geq -2$

(2)

(c) n is a whole number such that

$$6 \leq 3n < 15$$

List all the possible values of n.

$\div 3$ $6 \leq 3n < 15$

$2 \leq n < 5$

2, 3, 4 **(2)**

(6 marks)

2) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

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	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

2) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked. ..... 22 .....

(2)

(b) Work out the mean number of cups of coffee drunk. ..... 4·59 (2dp) .....

DRAW 3rd COLUMN

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

..... 1 .....

(1)

(b) Work out the range of the number of goals scored.

4 − 1

..... 3 .....

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

..... 2·1 .....

(3)

(5 marks)

2) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

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$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g

(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90

(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90

(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

(1)

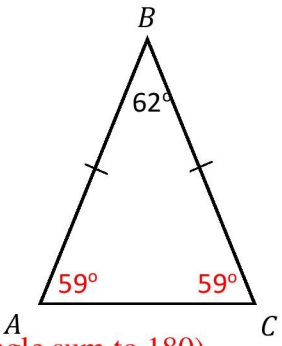
(7 marks)

3) Triangles and Parallel Lines (Non-Calc): Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

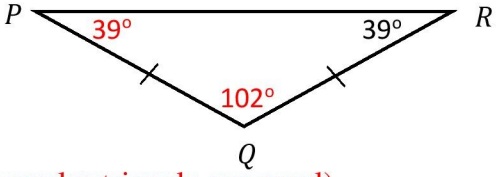
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

(4 Marks)

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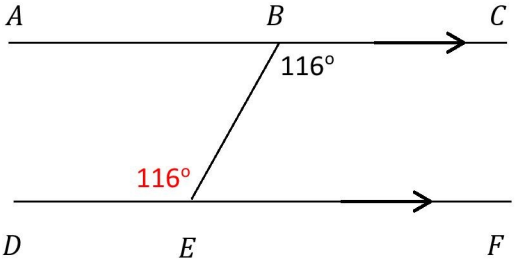
2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



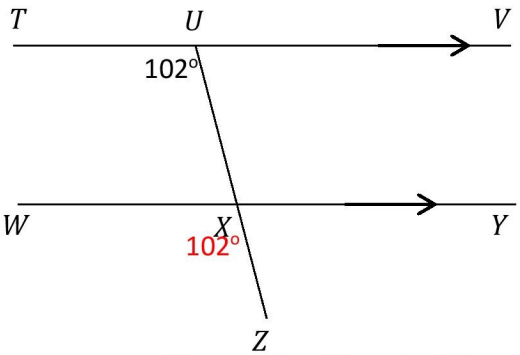
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



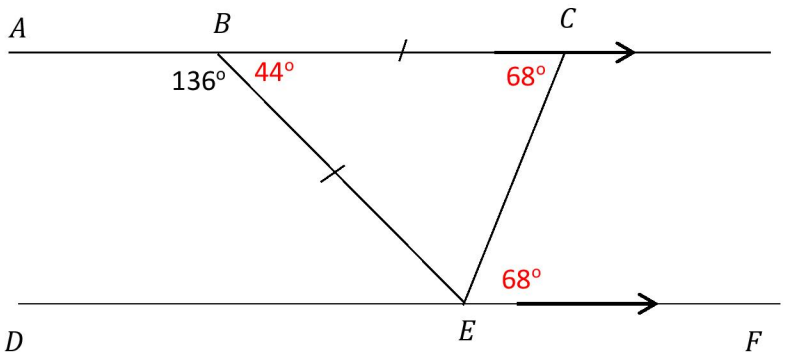
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

3) Triangles and Parallel Lines (Non-Calc): Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

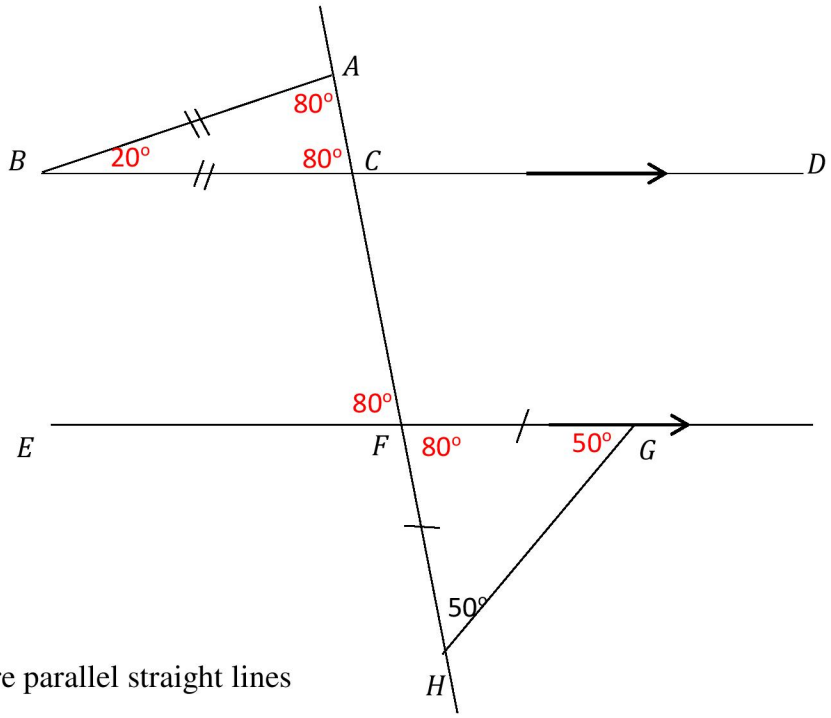
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

3) Triangles and Parallel Lines (Non-Calc): Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

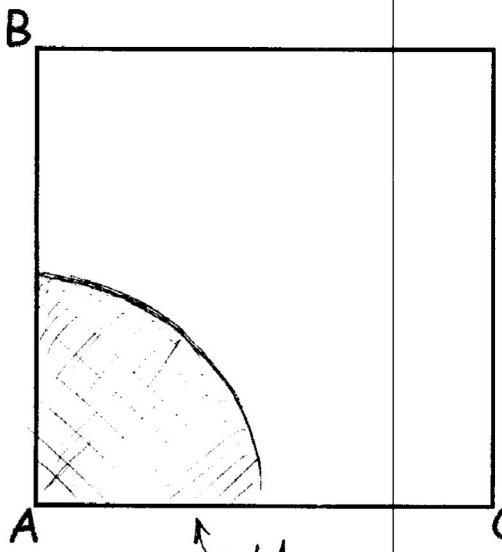
Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

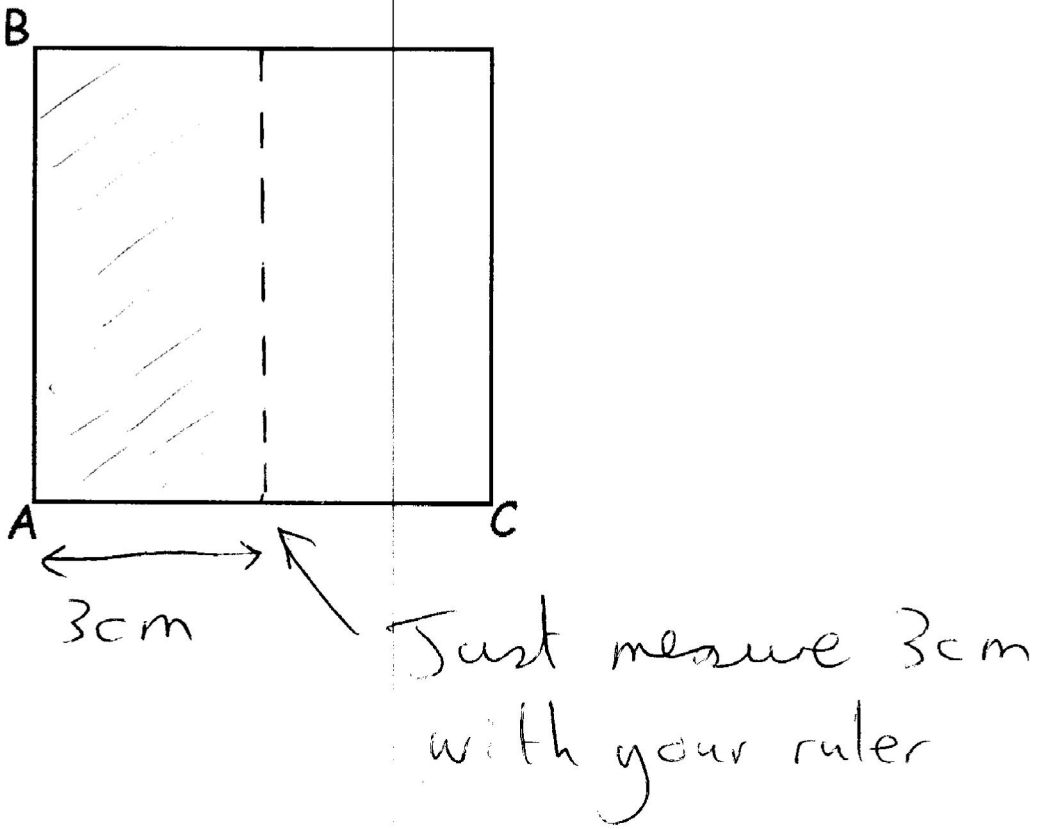
(6 Marks)

4) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:

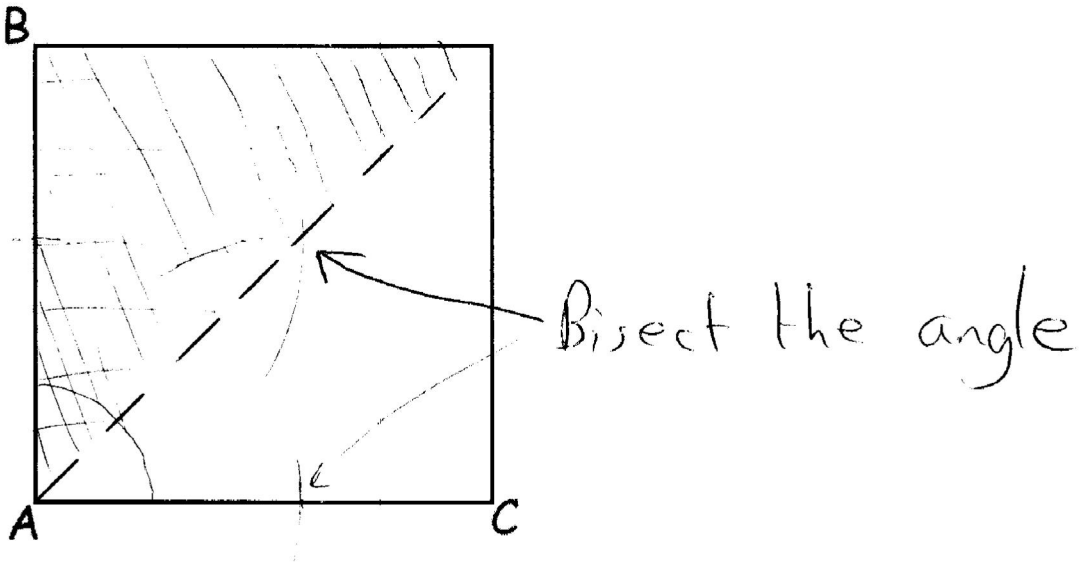


2) Shade the area closer than 3cm to the line AB within the square below:



4) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

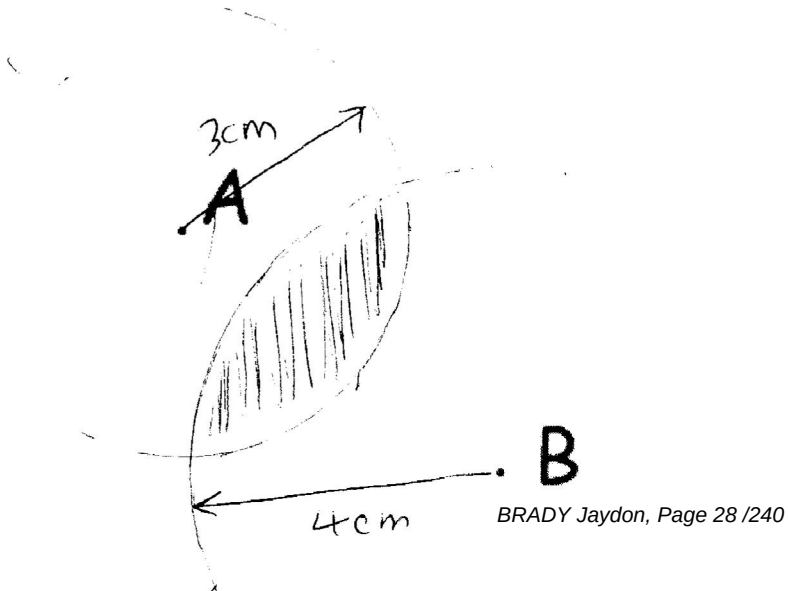


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

4) Loci and Construction: Harder

5) Mariam wants to plant a flower:

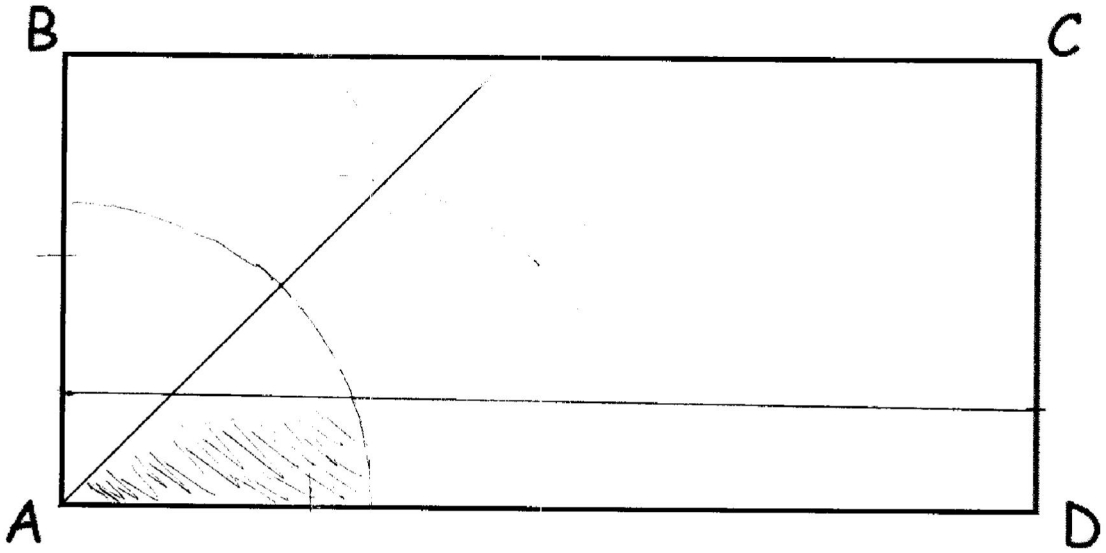
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

5) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

12.5 miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

16 Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

80 minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

48 Km

(2 Marks)

---

5) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

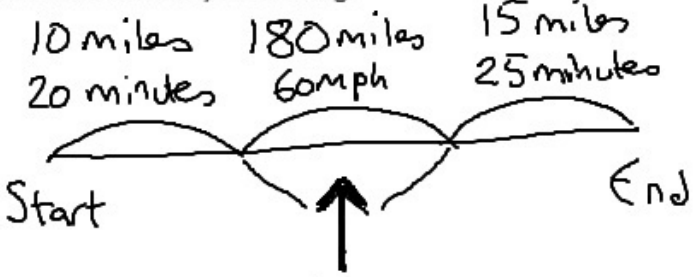
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



$T = D/S$

$T = 180/60 = 3$ hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

5) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

4miles 10mins | 45mins 60mph | 6miles 15mins

Start → End

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70 mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

DONNELLY Oliver

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	14 from 38	0 from 3	2 from 9	6 from 8	5 from 14	1 from 4
A02 and 3	9 from 42	1 from 7	1 from 19	4 from 4	3 from 9	0 from 3
Total	23 from 80	1 from 10	3 from 28	10 from 12	8 from 23	1 from 7

Your Pinpoint Topics

(1) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(2) Changing the Subject of a Formula. MW: 136, Hgrty:

(3) Loci and Construction. MWatch: 165, Hegarty:

(4) Reverse Percentage. MWatch: 110, Hegarty:

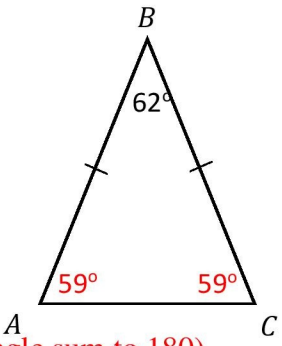
(5) Box plots. MWatch: 187, Hegarty:

1) Triangles and Parallel Lines: Easier

1) (a) ABC is an isosceles triangle with $AB = BC$
Angle ABC= 62°

Calculate the size of angle BAC.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

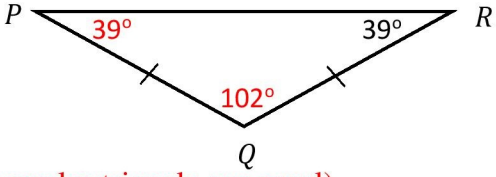
Angle BAC: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) PQR is an isosceles triangle with $PQ = QR$
Angle PRQ = 39°

Calculate the size of angle PQR.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle PQR: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

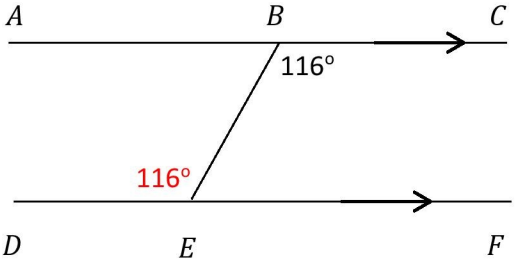
(4 Marks)

---

2) (a) ABC and DEF are parallel straight lines
Angle CBE= 116°

Calculate the size of angle DEB.

Give a reason for your answer.



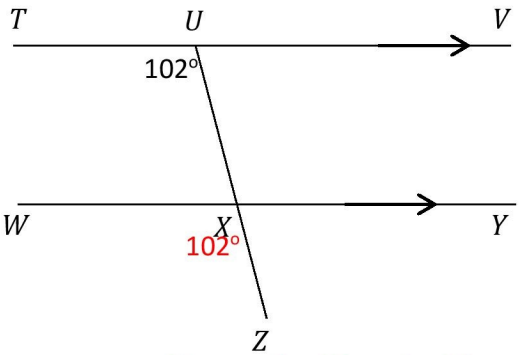
Angle DEB and angle CBE are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) TUV and WXY are parallel straight lines
Angle TUX= 102°

Calculate the size of angle WXZ.

Give a reason for your answer.



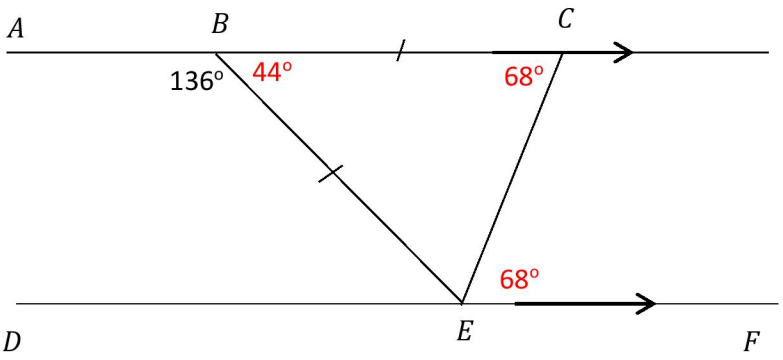
Angle WXZ and angle TUX are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

1) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

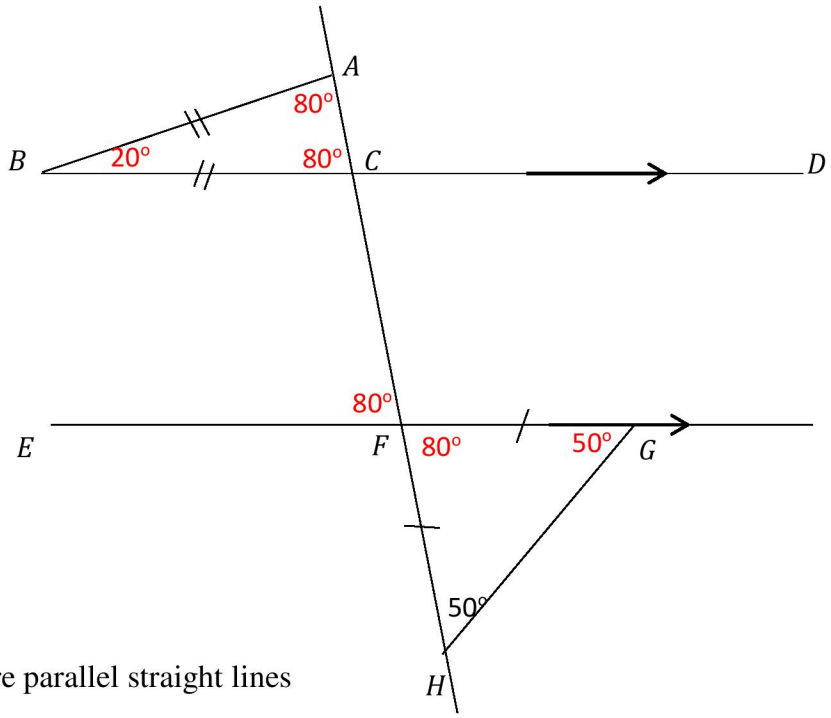
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

1) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

2) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$ | $m - 3n = 2p$ | $-3n$

$\div 2$ | $\frac{m-3n}{2} = p$ | $\div 2$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$ | $a + 4 = 3c$ | $+4$

$\div 3$ | $\frac{a+4}{3} = c$ | $\div 3$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$ | $P - 2a = 2b$ | $-2a$

$\div 2$ | $\frac{P-2a}{2} = b$ | $\div 2$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$ | $\frac{P}{2} = a + b$ | $\div 2$

$-a$ | $\frac{P}{2} - a = b$ | $-a$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

2) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

2) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

$-10 \quad P - 10 = 2q \quad -10$

$\div 2 \quad \frac{P-10}{2} = q \quad \div 2$

$q = \frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square $d^2 = \frac{3h}{2}$ square

$\times 2 \quad 2d^2 = 3h \quad \times 2$

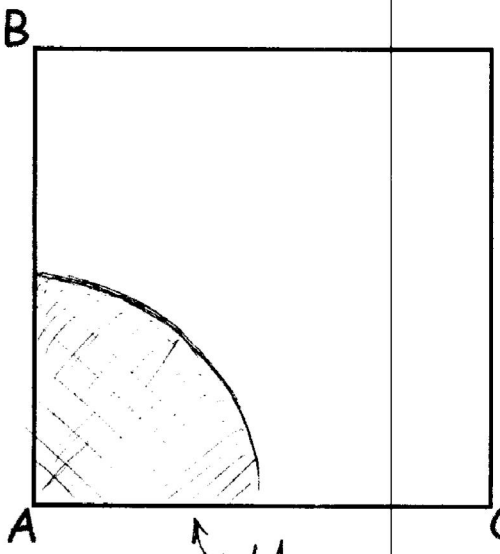
$\div 3 \quad \frac{2d^2}{3} = h \quad \div 3$

$h = \frac{2d^2}{3}$

(Total 2 marks)

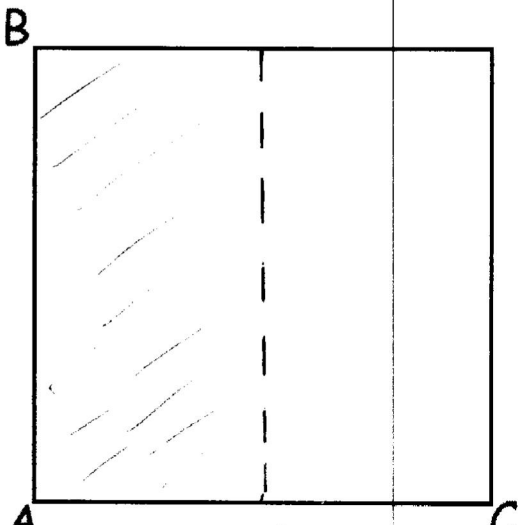
3) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:



Use compass at 3cm

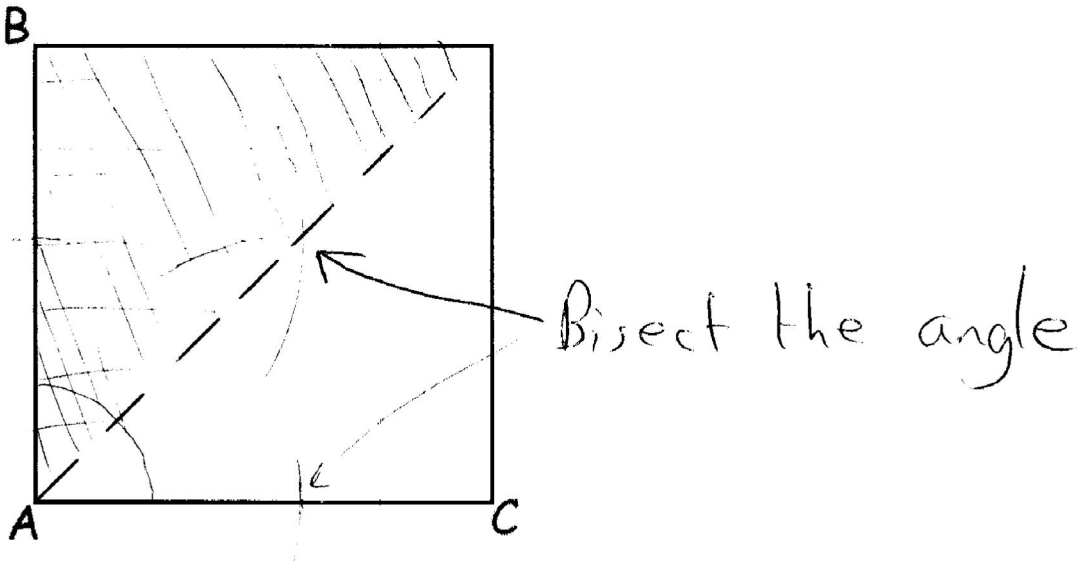
2) Shade the area closer than 3cm to the line AB within the square below:



Just measure 3cm with your ruler

3) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

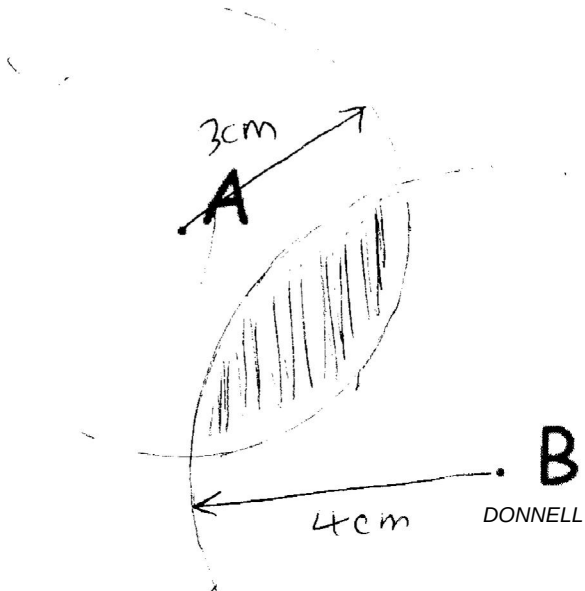


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

3) Loci and Construction: Harder

5) Mariam wants to plant a flower:

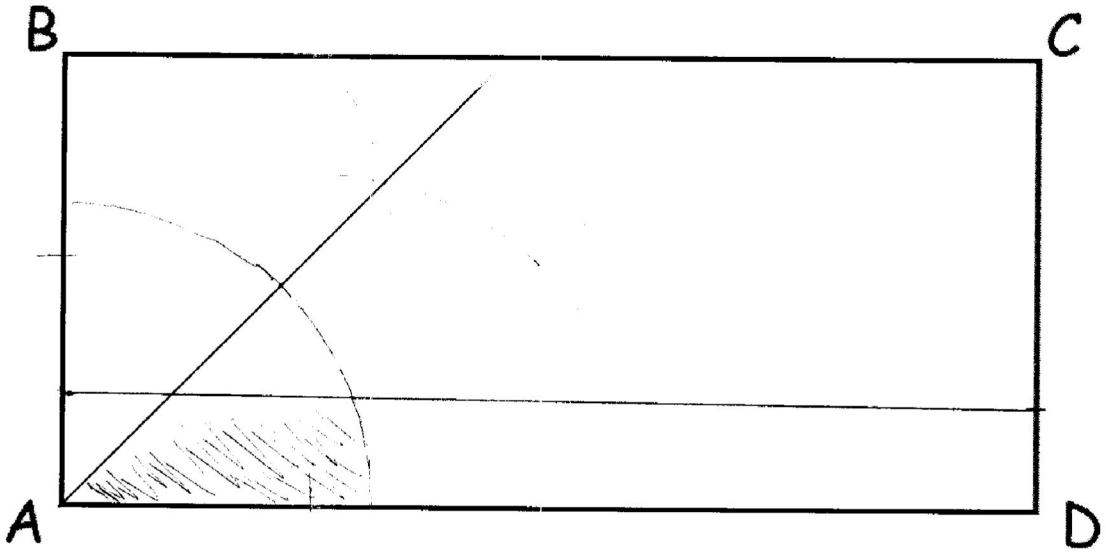
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

4) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

4) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

$£236.25 \div 0.75^2$

= £420

…… **(3)**

4) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

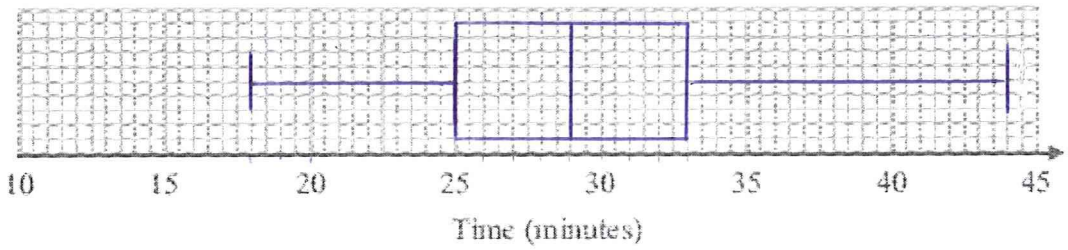
5) Box plots: Easier

2. Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

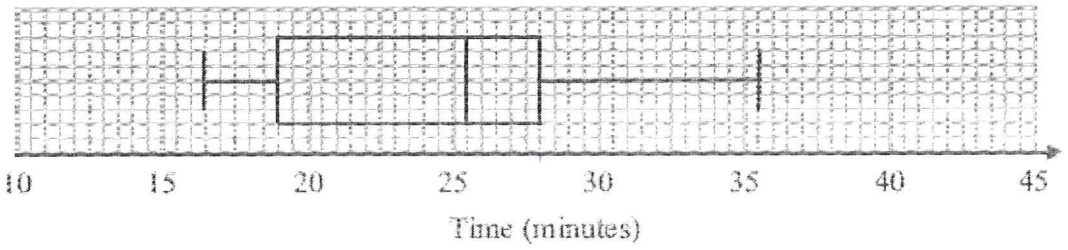
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

(a) On the grid, draw a box plot to show the information in the table.



(2)

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.



(b) Compare the distributions of the girls' times and the boys' times.

The boys median time was less than that of the girls: Boys 25.5mins, Girls 29 mins.

The spread of data for the interquartile range is smaller for the girls (8 mins) than for the boys (9 mins)

(2)

(4 marks)

5) Box plots: Medium

1. (a) (i) 152 2

B1 cao

(ii) 177

B1 cao

(b) 3

B1 for median marked at 167
B1 ft for postion of box with its ends at "152" and "177"
B1 for position of whiskers with ends at 132 and 182
NB: For any points plotted between 141 and 149 give a tolerance of an extra ±1 square

[5]

4. a) median = **14m**

b) Q1 = 9m, Q3= 17m IQR = Q3 - Q1
= 17 - 9 = **8m**

c) Since Q3 = 17m 25% of trees are 17m or taller

25% of 300 = 300/4 = **75 trees**

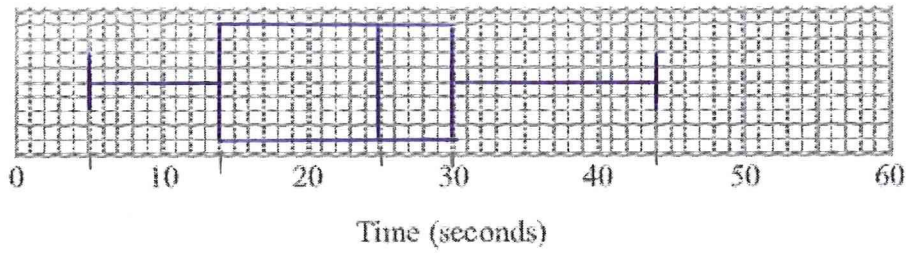
5) Box plots: Harder

7. Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

5 9 11 [14] 15 20 22 [25] 27 27 28 [30] 32 35 44

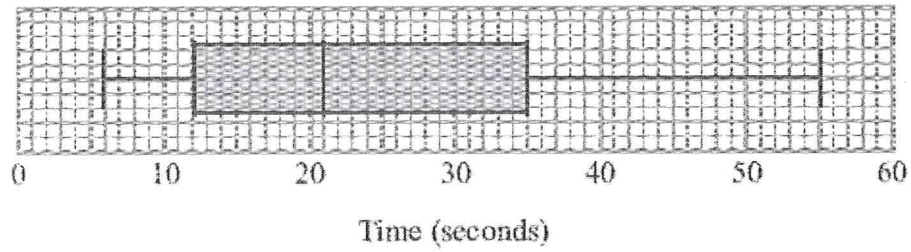
LQ Median UQ.

(a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

There was a greater spread of waiting times in the interquartile range for Green's Garden Centre than Rose's Garden centre. The median waiting time is shorter at Green's than Rose's Garden centre.

(2)

(5 marks)

DWORAKOWSKI Maciej

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	20 from 38	0 from 3	0 from 9	7 from 8	10 from 14	3 from 4
A02 and 3	8 from 42	0 from 7	0 from 19	3 from 4	5 from 9	0 from 3
Total	28 from 80	0 from 10	0 from 28	10 from 12	15 from 23	3 from 7

Your Pinpoint Topics

(1) Inequalities. MWatch: 139, Hegarty:

(2) Sequences. MWatch: 103, Hegarty:

(3) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(4) Changing the Subject of a Formula. MW: 136, Hgrty:

(5) Reverse Percentage. MWatch: 110, Hegarty:

1) Inequalities: Easier

1. $-1 \leq n < 4$

n is an integer.

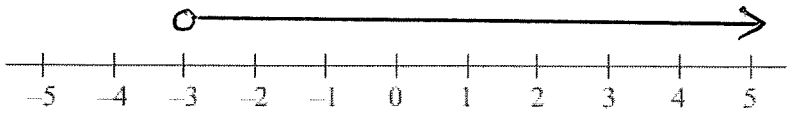
Write down all the possible values of n.

$-1, 0, 1, 2, 3$

(2 marks)

2. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y - 34 \leq 8$

$7y - 34 \leq 8$

$+34$ $7y \leq 42$

$\div 7$ $y \leq 6$

$y \leq 6$

(2)

(c) Write down the integer values of x that satisfy the inequality

$-2 \leq x < 3$

$-2, -1, 0, 1, 2$

(2)

(6 marks)

1) Inequalities: Medium

3. $-2 \leq n < 5$

n is an integer.

(a) Write down all the possible values of n.

$-2, -1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $4x + 1 > 11$

$4x + 1 > 11$

-1 $\quad 4x > 10$

$\div 4$ $\quad x > \frac{10}{4}$

$x > 2.5$

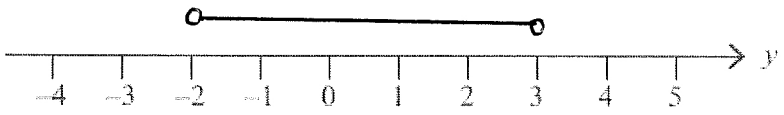
$x > 2.5$

(2)

(4 marks)

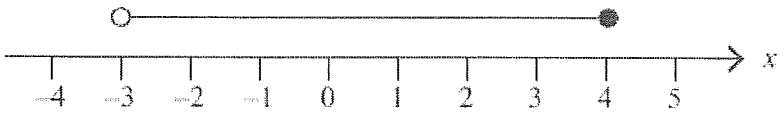
---

4. (a) On the number line below, show the inequality $-2 < y < 3$



(1)

(b) Here is an inequality, in x, shown on a number line.



Write down the inequality.

$-3 < x \leq 4$

(2)

(c) Solve the inequality $4t - 5 > 11$

$4t - 5 > 11$

$+5$ $\quad 4t > 16$

$\div 4$ $\quad t > 4$

$t > 4$

(2)

(5 marks)

1) Inequalities: Harder

11. (a) Solve $5x + 12 < 17$

(2)

$5x + 12 < 17$
-12 $5x < 5$
$\div 5$ $x < 1$

$x < 1$

(b) Solve the inequality $3(2y + 1) > 10$

(2)

$6y + 3 > 10$
-3 $6y > 7$
$\div 6$ $y > 7/6$

$y > 7/6$ or $y > 1.16$

(4 marks)

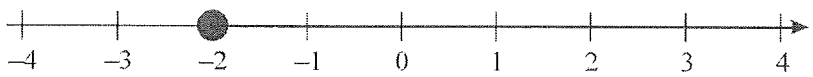
12. (a) Solve the inequality $4x - 3 < 7$

$4x - 3 < 7$
$+3$ $4x < 10$
$\div 4$ $x < 2.5$

$x < 2.5$

(2)

An inequality is shown on the number line.



(b) Write down the inequality.

$x \geq -2$

(2)

(c) n is a whole number such that

$$6 \leq 3n < 15$$

List all the possible values of n.

$\div 3$ $6 \leq 3n < 15$

$2 \leq n < 5$

2, 3, 4 **(2)**

(6 marks)

2) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

5n + 1

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3 8 13 18 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126 122 118 114 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

2) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 − 4 ....46..........

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

+4 +4

(a) Work out the 8th term of the number sequence.

6th = 23

7th = 27

8th = 31

..........31..........

(1)

(b) Write down an expression, in terms of n, for the nth term of the number sequence.

4n

Compare to 4 × table

−1 (4, 8, 16
3, 7, 11

..........4n − 1..........

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

+7 +7 +7

Find, in terms of n, an expression for the nth term of this sequence.

−5 (7 14 21
2 9 16

..........7n − 5..........

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

+5 +5

Write down, in terms of n, an expression for the nth term of this sequence.

−3 (5 10 15 20
2 7 12 22

..........5n − 3..........

(Total 2 marks)

2) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

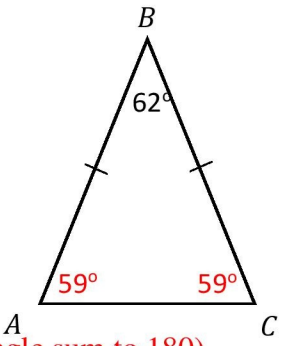
n is not an integer values, therefore, there will not be a shape with 242 blocks.

3) Triangles and Parallel Lines: Easier

1) (a) ABC is an isosceles triangle with $AB = BC$
Angle ABC= 62°

Calculate the size of angle BAC.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

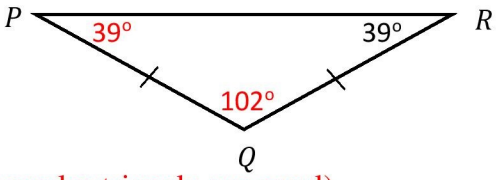
Angle BAC: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) PQR is an isosceles triangle with $PQ = QR$
Angle PRQ = 39°

Calculate the size of angle PQR.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle PQR: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

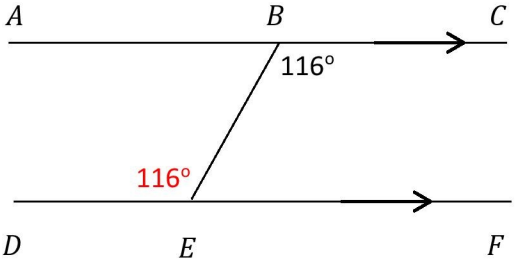
(4 Marks)

---

2) (a) ABC and DEF are parallel straight lines
Angle CBE= 116°

Calculate the size of angle DEB.

Give a reason for your answer.



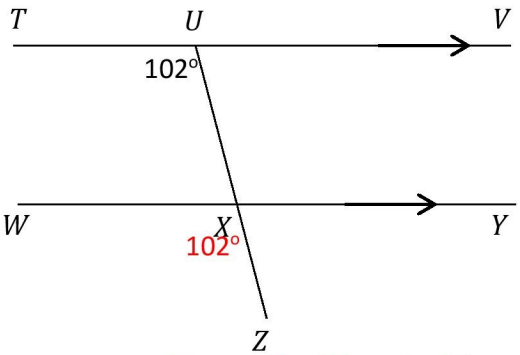
Angle DEB and angle CBE are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) TUV and WXY are parallel straight lines
Angle TUX= 102°

Calculate the size of angle WXZ.

Give a reason for your answer.



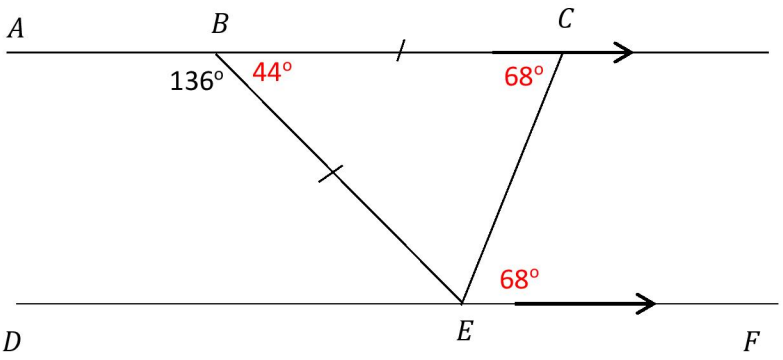
Angle WXZ and angle TUX are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

3) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

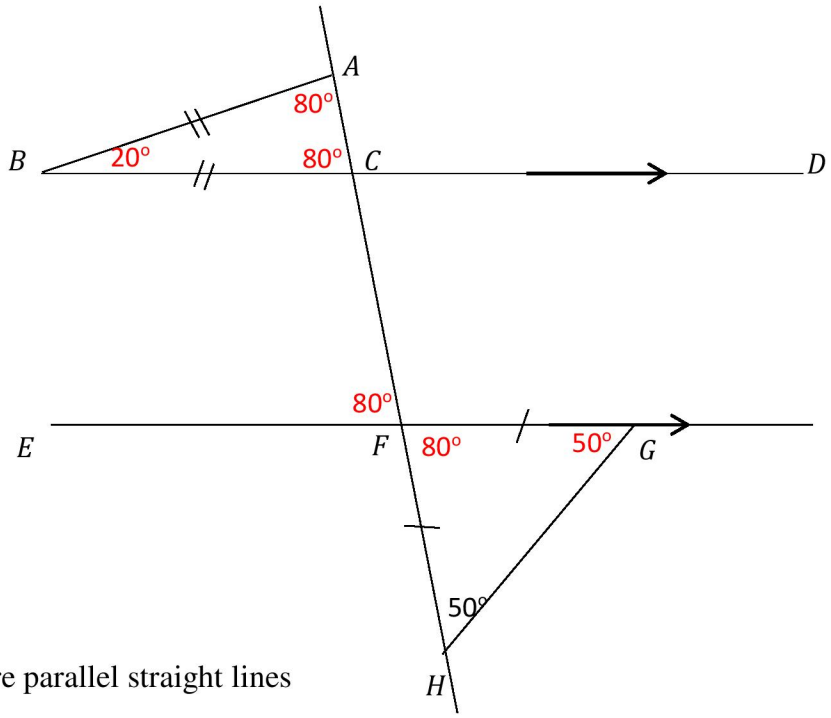
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

3) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

4) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$: $m - 3n = 2p$

$\div 2$: $\frac{m-3n}{2} = p$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$: $a + 4 = 3c$

$\div 3$: $\frac{a+4}{3} = c$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$: $P - 2a = 2b$

$\div 2$: $\frac{P-2a}{2} = b$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$: $\frac{P}{2} = a + b$

$-a$: $\frac{P}{2} - a = b$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

4) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c =$ $\frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t =$ $\frac{u-30}{7}$

(Total 2 marks)

4) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q =$ $\frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h =$ $\frac{2d^2}{3}$

(Total 2 marks)

5) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

5) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

$£236.25 \div 0.75^2$

= £420

…… **(3)**

5) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

GETHINS Charlotte

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	16 from 38	0 from 3	4 from 9	7 from 8	5 from 14	0 from 4
A02 and 3	10 from 42	2 from 7	2 from 19	3 from 4	3 from 9	0 from 3
Total	26 from 80	2 from 10	6 from 28	10 from 12	8 from 23	0 from 7

Your Pinpoint Topics

(1) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(2) Changing the Subject of a Formula. MW: 136, Hgrty:

(3) Loci and Construction. MWatch: 165, Hegarty:

(4) Reverse Percentage. MWatch: 110, Hegarty:

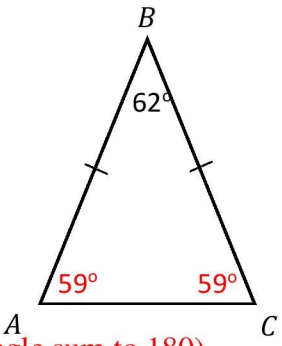
(5) Box plots. MWatch: 187, Hegarty:

1) Triangles and Parallel Lines: Easier

1) (a) ABC is an isosceles triangle with $AB = BC$
Angle ABC= 62°

Calculate the size of angle BAC.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

Angle BAC: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) PQR is an isosceles triangle with $PQ = QR$
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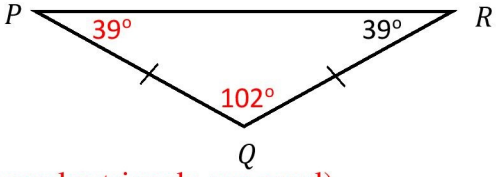
Calculate the size of angle PQR.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle PQR: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

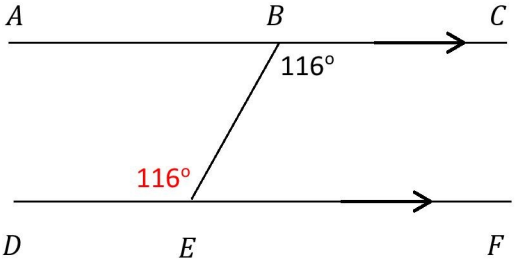
(4 Marks)

---

2) (a) ABC and DEF are parallel straight lines
Angle CBE= 116°

Calculate the size of angle DEB.

Give a reason for your answer.



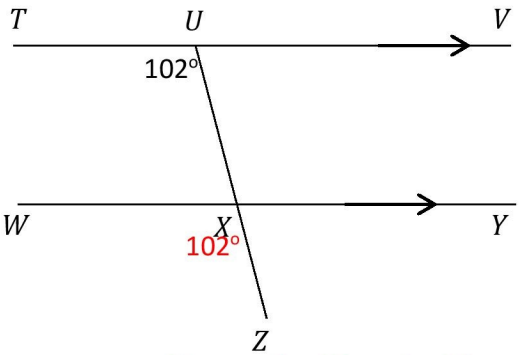
Angle DEB and angle CBE are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) TUV and WXY are parallel straight lines
Angle TUX= 102°

Calculate the size of angle WXZ.

Give a reason for your answer.



Angle WXZ and angle TUX are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

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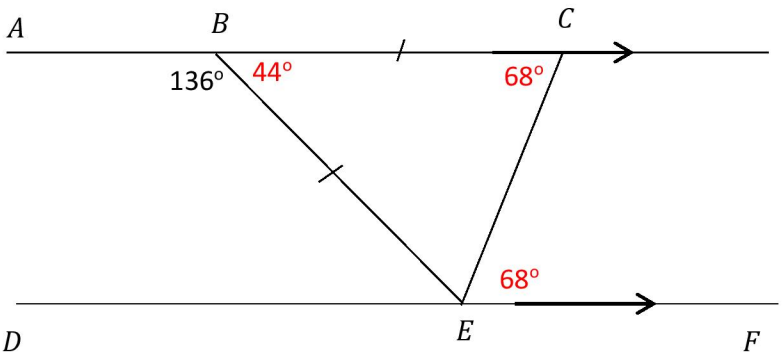
1) Triangles and Parallel Lines: Medium

3)



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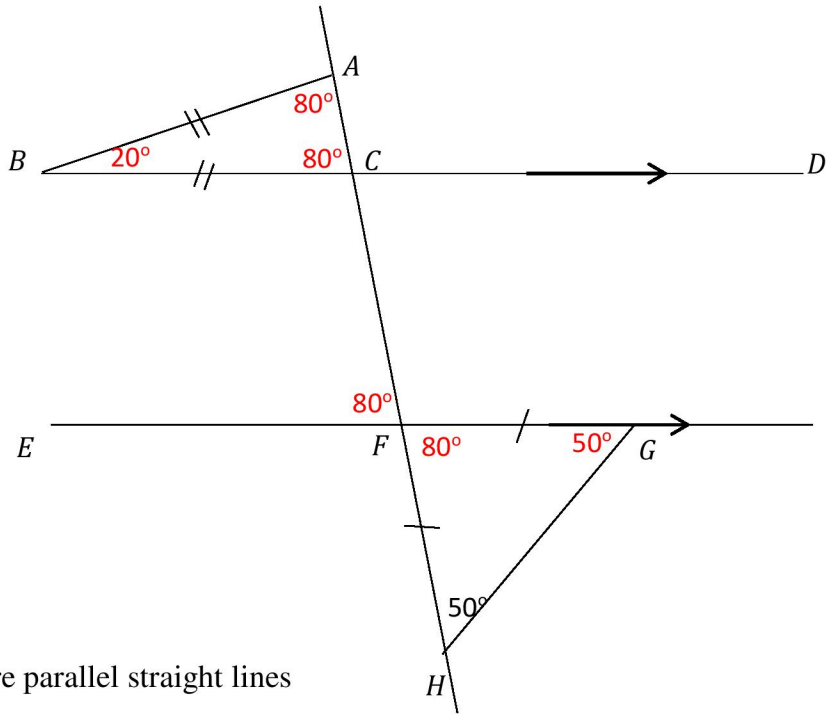
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

1) Triangles and Parallel Lines: Harder

4)



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Angle $FHG = 50^o$

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Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

2) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$: $m - 3n = 2p$

$\div 2$: $\frac{m-3n}{2} = p$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$: $a + 4 = 3c$

$\div 3$: $\frac{a+4}{3} = c$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$: $P - 2a = 2b$

$\div 2$: $\frac{P-2a}{2} = b$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$: $\frac{P}{2} = a + b$

$-a$: $\frac{P}{2} - a = b$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

2) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

2) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q =$ $\frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

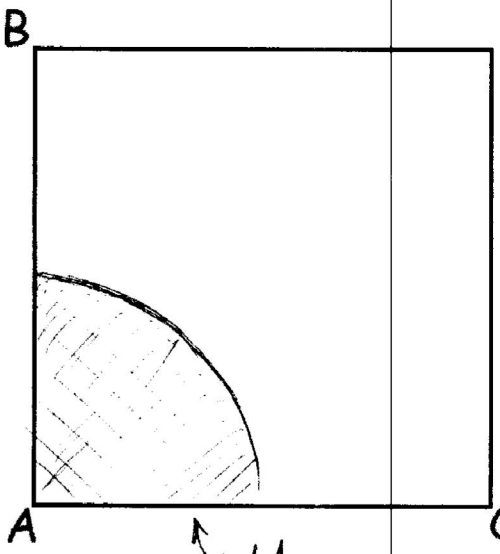
$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h =$ $\frac{2d^2}{3}$

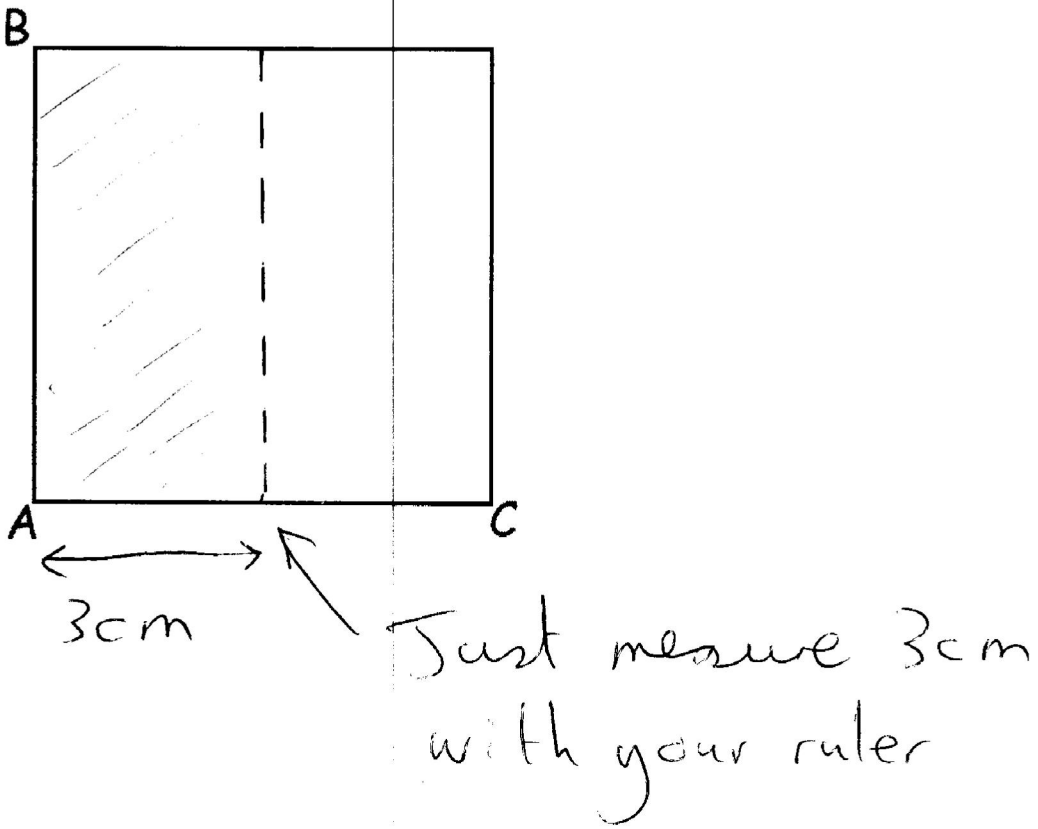
(Total 2 marks)

3) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:

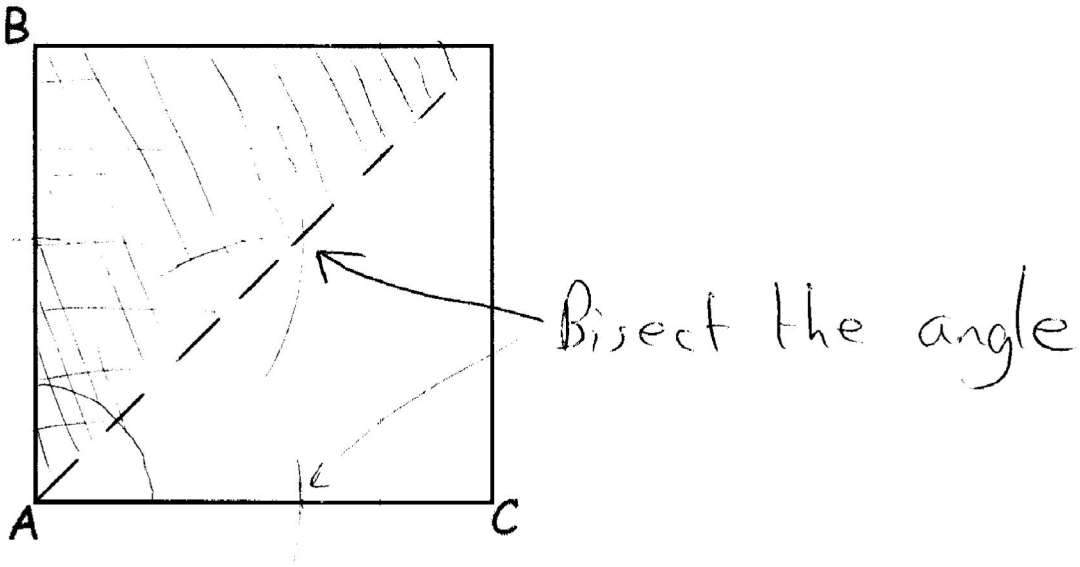


2) Shade the area closer than 3cm to the line AB within the square below:



3) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

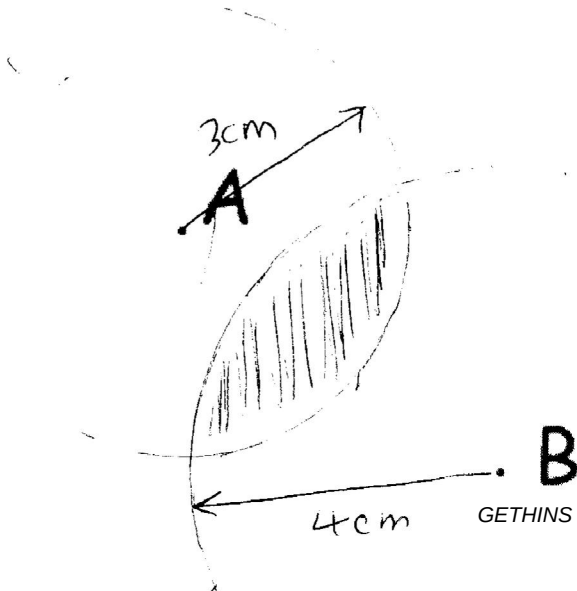


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

3) Loci and Construction: Harder

5) Mariam wants to plant a flower:

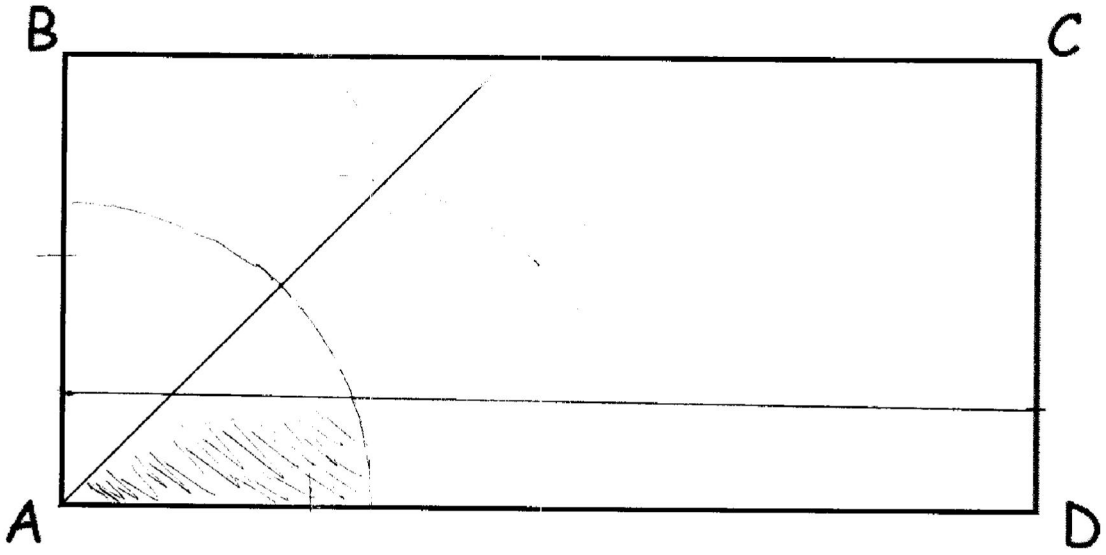
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

4) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

4) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

£236.25÷ 0.75^2

= £420

…… **(3)**

4) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

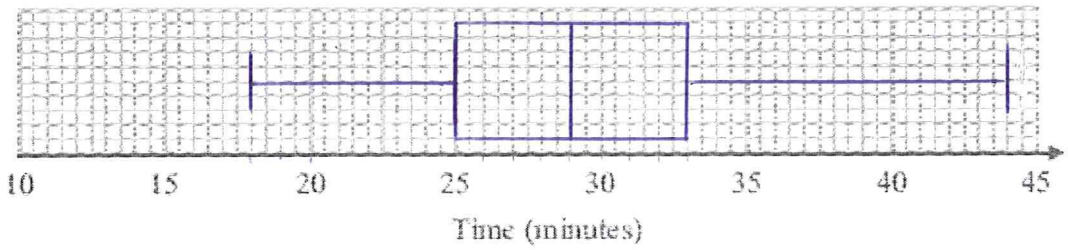
5) Box plots: Easier

2. Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

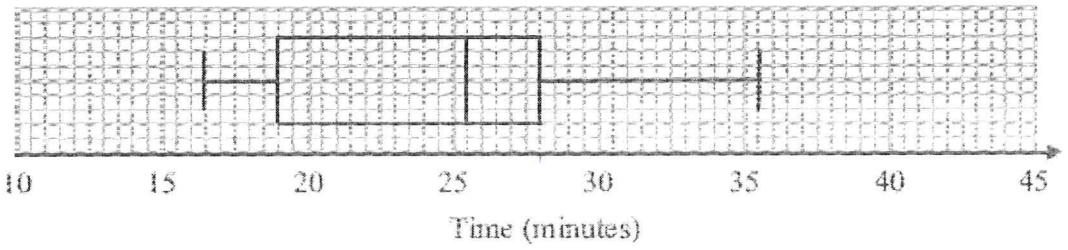
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

(a) On the grid, draw a box plot to show the information in the table.



(2)

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.



(b) Compare the distributions of the girls' times and the boys' times.

The boys median time was less than that of the girls: Boys 25.5mins, Girls 29 mins.

The spread of data for the interquartile range is smaller for the girls (8 mins) than for the boys (9 mins)

(2)

(4 marks)

5) Box plots: Medium

1. (a) (i) 152 2

B1 cao

(ii) 177

B1 cao

(b) 3

B1 for median marked at 167
B1 ft for postion of box with its ends at "152" and "177"
B1 for position of whiskers with ends at 132 and 182
NB: For any points plotted between 141 and 149 give a tolerance of an extra ±1 square

[5]

4. a) median = **14m**

b) Q1 = 9m, Q3= 17m IQR = Q3 - Q1
= 17 - 9 = **8m**

c) Since Q3 = 17m 25% of trees are 17m or taller

25% of 300 = 300/4 = **75 trees**

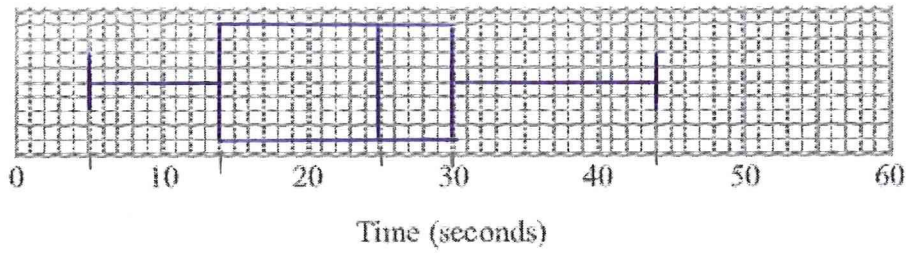
5) Box plots: Harder

7. Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

5 9 11 [14] 15 20 22 [25] 27 27 28 [30] 32 35 44

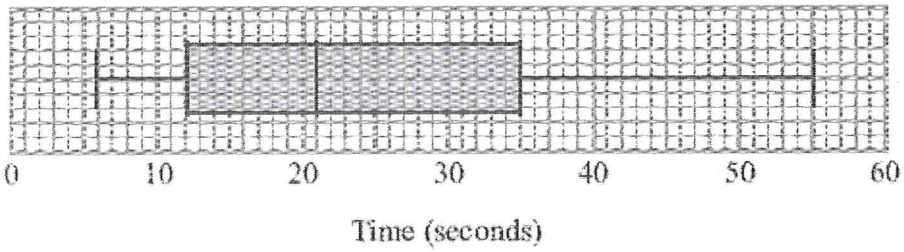
LQ Median UQ.

(a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

There was a greater spread of waiting times in the interquartile range for Green's Garden Centre than Rose's Garden Centre. The median waiting time is shorter at Green's than Rose's Garden Centre.

(2)

(5 marks)

GREGORY Jacob

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	25 from 38	3 from 3	5 from 9	6 from 8	10 from 14	1 from 4
A02 and 3	13 from 42	1 from 7	4 from 19	0 from 4	8 from 9	0 from 3
Total	38 from 80	4 from 10	9 from 28	6 from 12	18 from 23	1 from 7

Your Pinpoint Topics

(1) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(2) Changing the Subject of a Formula. MW: 136, Hgrty:

(3) Frequency trees. MWatch: 57, Hegarty:

(4) Speed. MWatch: 142, Hegarty:

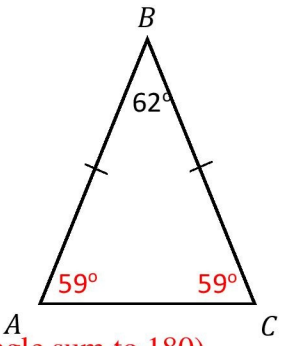
(5) Sine, Cosine Rules and Area of Triangles. MW: 203, Hgrty:

1) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

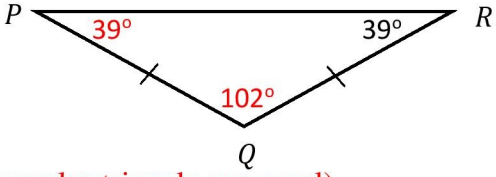
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

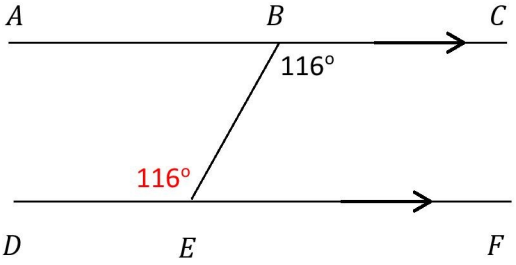
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



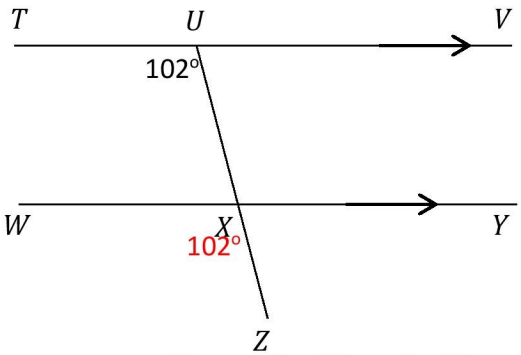
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



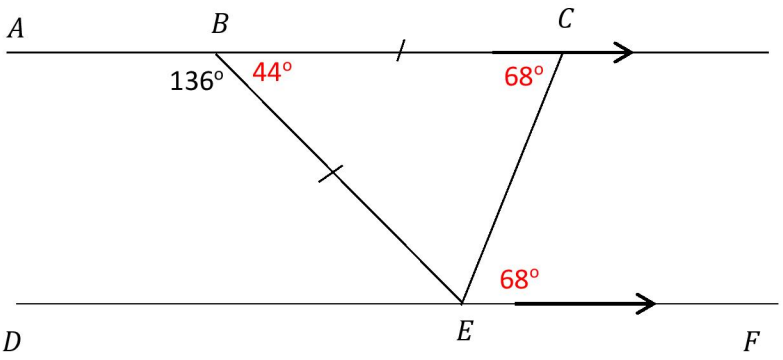
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

1) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

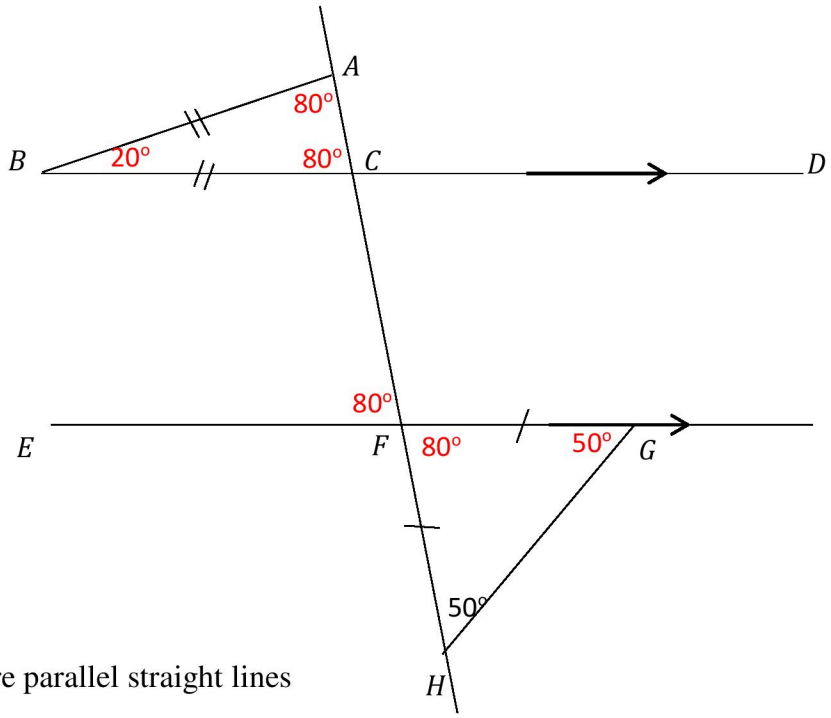
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

1) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

2) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$: $m - 3n = 2p$

$\div 2$: $\frac{m-3n}{2} = p$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$: $a + 4 = 3c$

$\div 3$: $\frac{a+4}{3} = c$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$: $P - 2a = 2b$

$\div 2$: $\frac{P-2a}{2} = b$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$: $\frac{P}{2} = a + b$

$-a$: $b = \frac{P}{2} - a$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

2) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

2) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q =$ $\frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

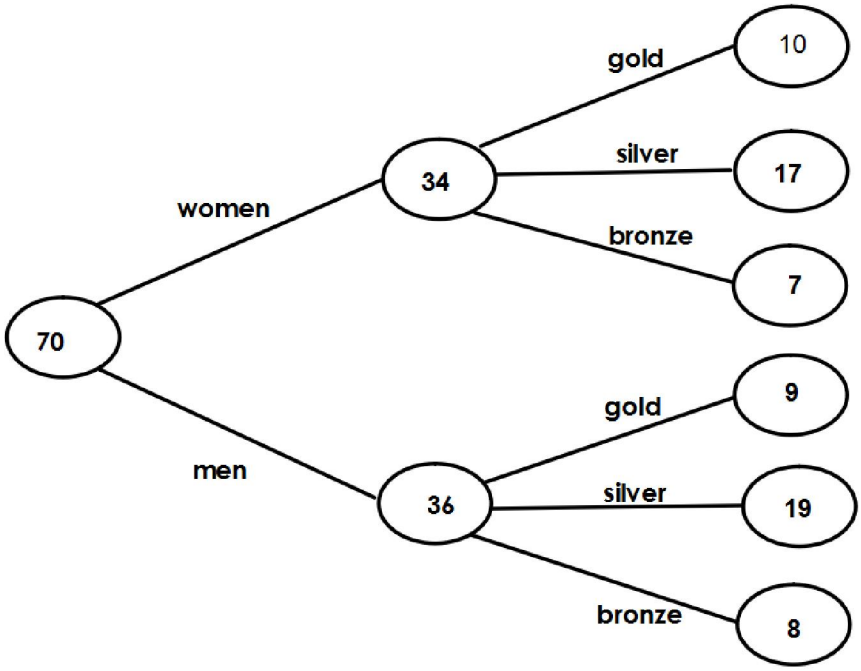
$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h =$ $\frac{2d^2}{3}$

(Total 2 marks)

3) Frequency trees: Easier

1) The frequency tree below shows the results of an athletics competition.



a) How many women received medals in the competition? 34

_____

(1 Mark)

b) How many gold medals were awarded to men?

9

_____

(1 Mark)

c) How many people won medals in the competition?

70

_____

(1 Mark)

d) How many bronze medals were awarded?

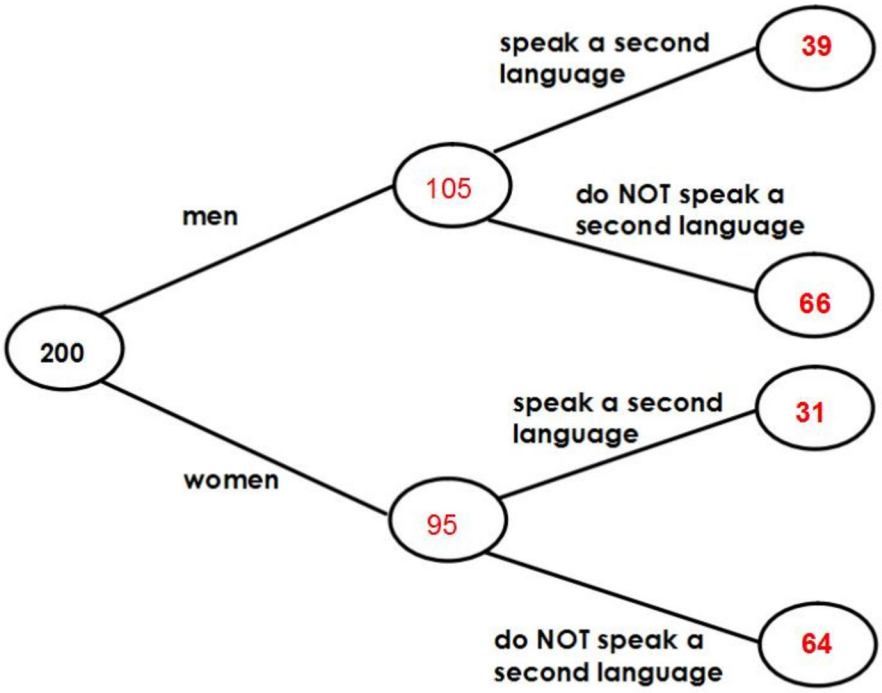
7+8=15 15

_____

(1 Mark)

3) Frequency trees: Medium

2) In an office, there are 200 employees. 105 are men. Employees are asked if they speak a second language. 70 employees say they speak a second language. 31 women speak a second language. Fill in the frequency tree.



(3 marks)

b) A woman is chosen at random. Use your frequency tree to write down the probability that she speaks a second language.

$\frac{31}{95}$

(1 Mark)

c) An employee is chosen at random. Use your frequency tree to write down the probability that they do not speak a second language.

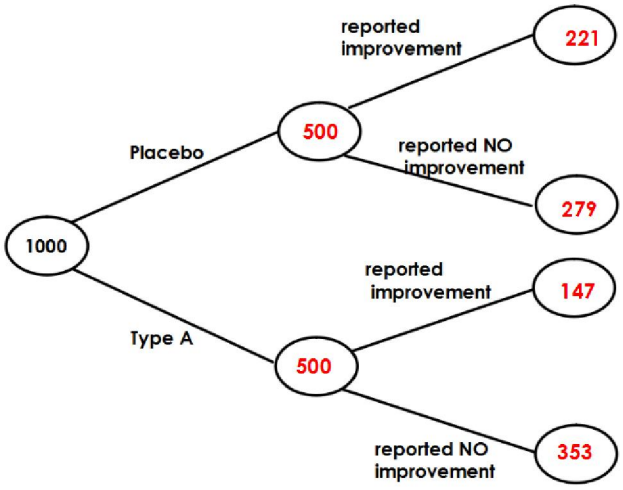
64+66=130

$\frac{130}{200}$

(1 Mark)

3) Frequency trees: Harder

3) 1000 people take part in a clinical trial. 500 were given the placebo drug. The rest were given Type A. Of the patients given Type A, 221 patients reported improvement. Overall, 368 patients reported an improvement. Complete the frequency tree.

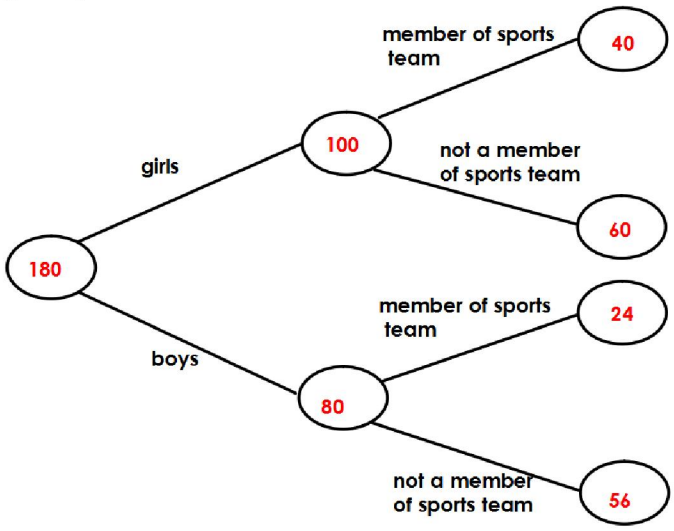


b) What is the ratio of patients that reported improvement to those who reported no improvement. 368:632

46:79

(1 Mark)

4) In a year group in a school there are 180 pupils. The ratio of boys to girls is 4:5 30% of the boys are part of a sports team. 40% of the girls are part of a sports team. Complete the frequency tree.



(4 Marks)

4) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

_____12.5_____miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

_____16_____Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

_____80_____minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

_____48_____Km

(2 Marks)

---

4) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

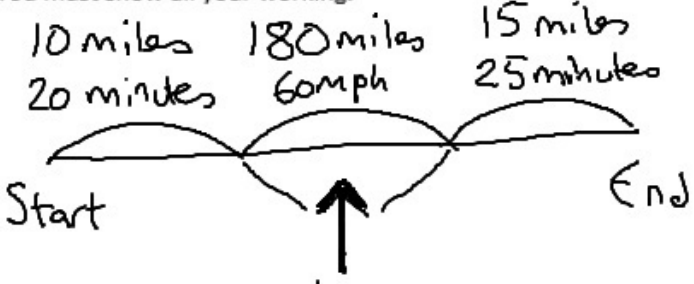
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



T = D/S

T = 180/60 = 3 hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

4) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

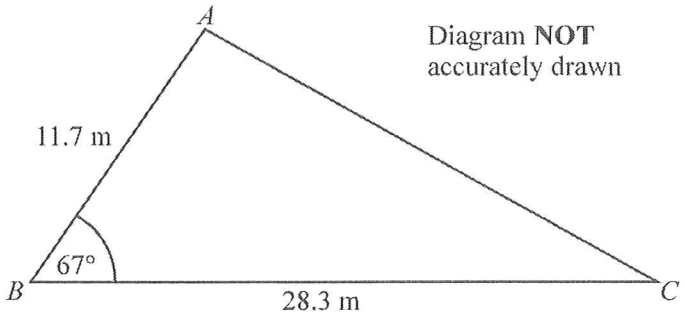
45
15
10
70 mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

5) Sine, Cosine Rules and Area of Triangles: Easier

1.



$AB = 11.7$ m.
$BC = 28.3$ m.
Angle $ABC = 67^0$.

(a) Calculate the area of the triangle ABC.
Give your answer correct to 3 significant figures.

using $\frac{1}{2}ab\sin C$

$$\text{Area} = \frac{1}{2}(11.7)(28.3)\sin 67$$
$$= 152.394181 \text{ m}^2$$
$$= 152 \quad (3\text{ sf})$$

..... 152 ..... m^2

(2)

(b) Calculate the length of AC.
Give your answer correct to 3 significant figures.

using

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$a^2 = (11.7)^2 + (28.3)^2 - 2(11.7)(28.3)\cos 67$$
$$a^2 = 679.0300321$$
$$a = 26.0582047 \text{ cm}$$
$$= 26.1 \quad (3\text{sf})$$

..... 26.1 ..... m

(3)
(Total 5 marks)

5) Sine, Cosine Rules and Area of Triangles: Medium

2.

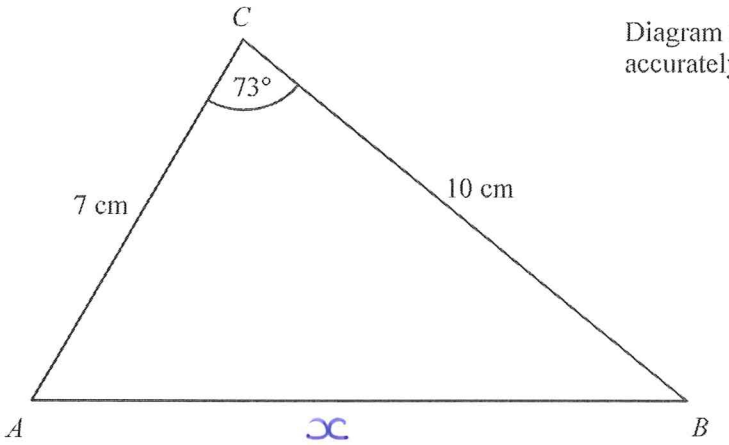


Diagram **NOT** accurately drawn

In triangle ABC,
$AC = 7$ cm,
$BC = 10$ cm,
angle $ACB = 73°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

$x^2 = 7^2 + 10^2 - 2(7)(10)\cos 73$

$x^2 = 108.06796$

$x = \sqrt{108.06796}$

$x = 10.395574$ cm

$x = 10.4$ (3 sf)

10.4 ..... cm

(Total 4 marks)

5) Sine, Cosine Rules and Area of Triangles: Harder

7.

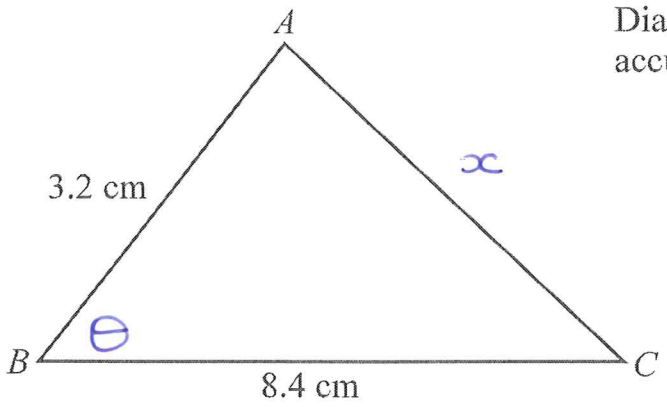


Diagram **NOT** accurately drawn

$AB = 3.2$ cm
$BC = 8.4$ cm

The area of triangle ABC is 10 cm^2.

Calculate the perimeter of triangle ABC.
Give your answer correct to three significant figures.

$$\text{Area} = \frac{1}{2}(3.2)(8.4)\sin\theta$$

$$10 = \frac{1}{2}(3.2)(8.4)\sin\theta$$

$$20 = (3.2)(8.4)\sin\theta$$

$$\frac{20}{(3.2)(8.4)} = \sin\theta$$

$$0.7440476 = \sin\theta$$

$$\theta = 48.07736$$

$$x^2 = 3.2^2 + 8.4^2 - 2(3.2)(8.4)\cos(48.07736)$$

$$x^2 = 44.88151331$$

$$x = 6.6993666$$

$$\text{Perimeter} = 3.2 + 8.4 + 6.6993666$$

$$= 18.2993666$$

$$= 18.3 \text{ cm}$$

18.3 ..... cm

(Total 6 marks)

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	8 from 38	0 from 3	2 from 9	3 from 8	3 from 14	0 from 4
A02 and 3	14 from 42	1 from 7	8 from 19	2 from 4	3 from 9	0 from 3
Total	22 from 80	1 from 10	10 from 28	5 from 12	6 from 23	0 from 7

Your Pinpoint Topics

(1) Inequalities. MWatch: 139, Hegarty:

(2) Sequences. MWatch: 103, Hegarty:

(3) Averages from Frequency Tables. MWatch: 130, Hegarty:

(4) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(5) Loci and Construction. MWatch: 165, Hegarty:

1) Inequalities: Easier

1. $-1 \leq n < 4$

n is an integer.

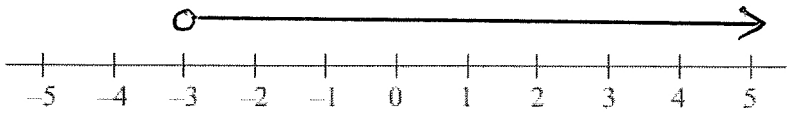
Write down all the possible values of n.

$-1, 0, 1, 2, 3$

(2 marks)

2. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y - 34 \leq 8$

$7y - 34 \leq 8$

$+34$ $7y \leq 42$

$\div 7$ $y \leq 6$

$y \leq 6$

(2)

(c) Write down the integer values of x that satisfy the inequality

$-2 \leq x < 3$

$-2, -1, 0, 1, 2$

(2)

(6 marks)

1) Inequalities: Medium

3. $-2 \leq n < 5$

n is an integer.

(a) Write down all the possible values of n.

$-2, -1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $4x + 1 > 11$

$4x + 1 > 11$

-1 $\quad 4x > 10$

$\div 4$ $\quad x > \frac{10}{4}$

$x > 2.5$

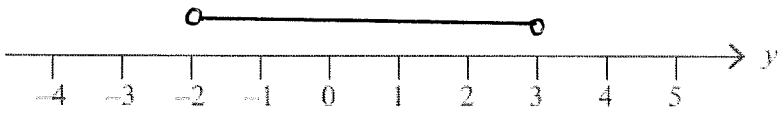
$x > 2.5$

(2)

(4 marks)

---

4. (a) On the number line below, show the inequality $-2 < y < 3$



(1)

(b) Here is an inequality, in x, shown on a number line.

Write down the inequality.

$-3 < x \leq 4$

(2)

(c) Solve the inequality $4t - 5 > 11$

$4t - 5 > 11$

$+5$ $\quad 4t > 16$

$\div 4$ $\quad t > 4$

$t > 4$

(2)

(5 marks)

1) Inequalities: Harder

11. (a) Solve $5x + 12 < 17$

(2)

$5x + 12 < 17$

-12 $5x < 5$

$\div 5$ $x < 1$

$x < 1$

(b) Solve the inequality $3(2y + 1) > 10$

(2)

$6y + 3 > 10$

-3 $6y > 7$

$\div 6$ $y > 7/6$

$y > 7/6$ or $y > 1.16$

(4 marks)

12. (a) Solve the inequality $4x - 3 < 7$

$4x - 3 < 7$

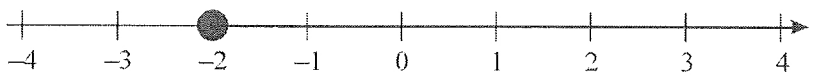
$+3$ $4x < 10$

$\div 4$ $x < 2.5$

$x < 2.5$

(2)

An inequality is shown on the number line.



(b) Write down the inequality.

$x \geq -2$

(2)

(c) n is a whole number such that

$$6 \leq 3n < 15$$

List all the possible values of n.

$\div 3$ $6 \leq 3n < 15$

$2 \leq n < 5$

2, 3, 4 **(2)**

(6 marks)

2) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

5n + 1

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3 8 13 18 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126 122 118 114 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

2) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 − 4

46

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

+4 +4

(a) Work out the 8th term of the number sequence.

6th = 23

7th = 27

8th = 31

31

(1)

(b) Write down an expression, in terms of *n*, for the *n*th term of the number sequence.

4n

Compare to 4 × table

−1 (4, 8, 16

3, 7, 11

$4n - 1$

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

+7 +7 +7

Find, in terms of *n*, an expression for the *n*th term of this sequence.

−5 (7 14 21

2 9 16

$7n - 5$

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

+5 +5

Write down, in terms of *n*, an expression for the *n*th term of this sequence.

−3 (5 10 15 20

2 7 12 22

$5n - 3$

(Total 2 marks)

2) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

n is not an integer values, therefore, there will not be a shape with 242 blocks.

3) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

3) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked.

22

(2)

(b) Work out the mean number of cups of coffee drunk.

DRAW 3rd COLUMN

4·59 (2dp)

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

1

(1)

(b) Work out the range of the number of goals scored.

4 − 1

3

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

2·1

(3)

(5 marks)

3) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g
(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90
(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90
(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

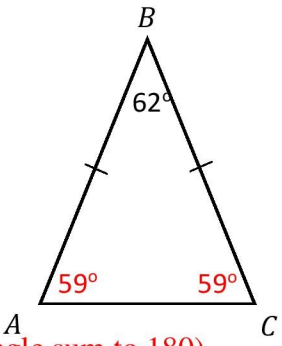
(1)
(7 marks)

4) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

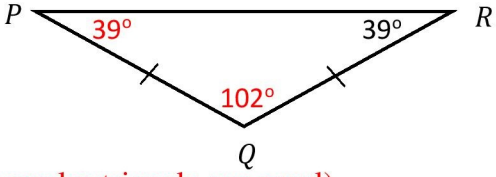
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

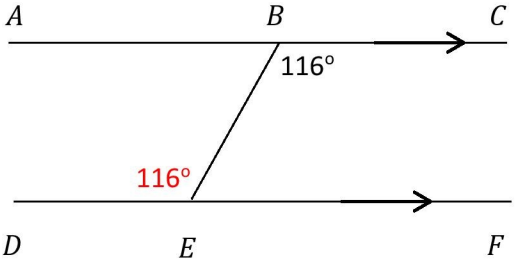
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



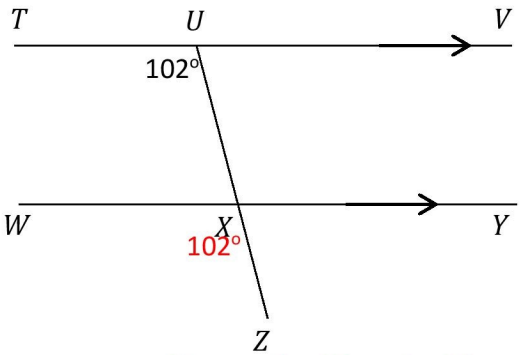
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



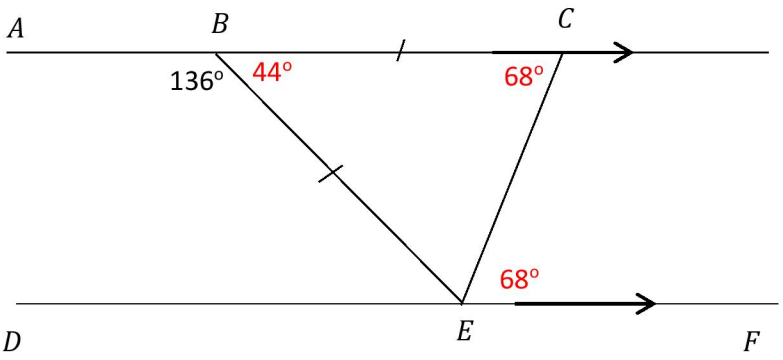
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

4) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

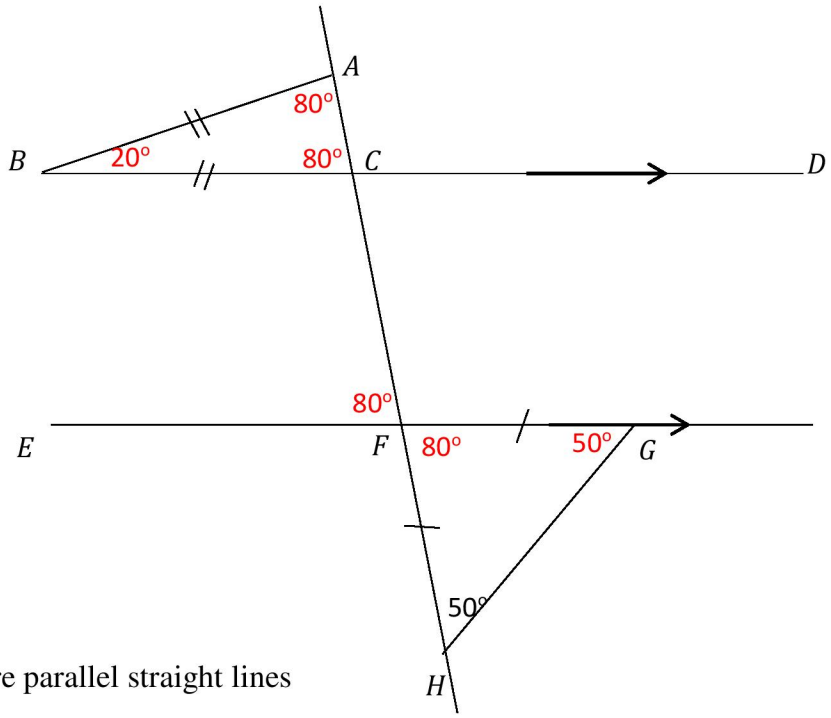
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

4) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

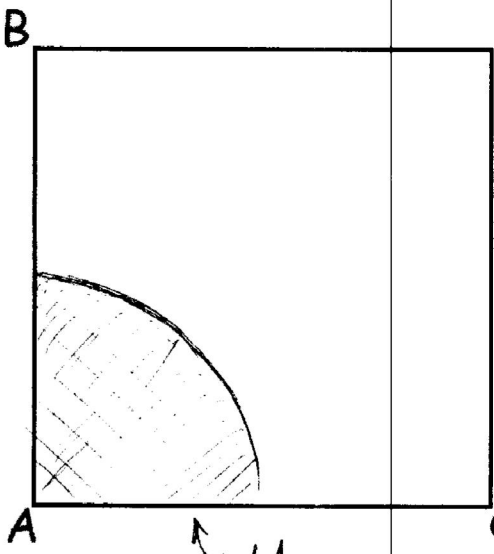
Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

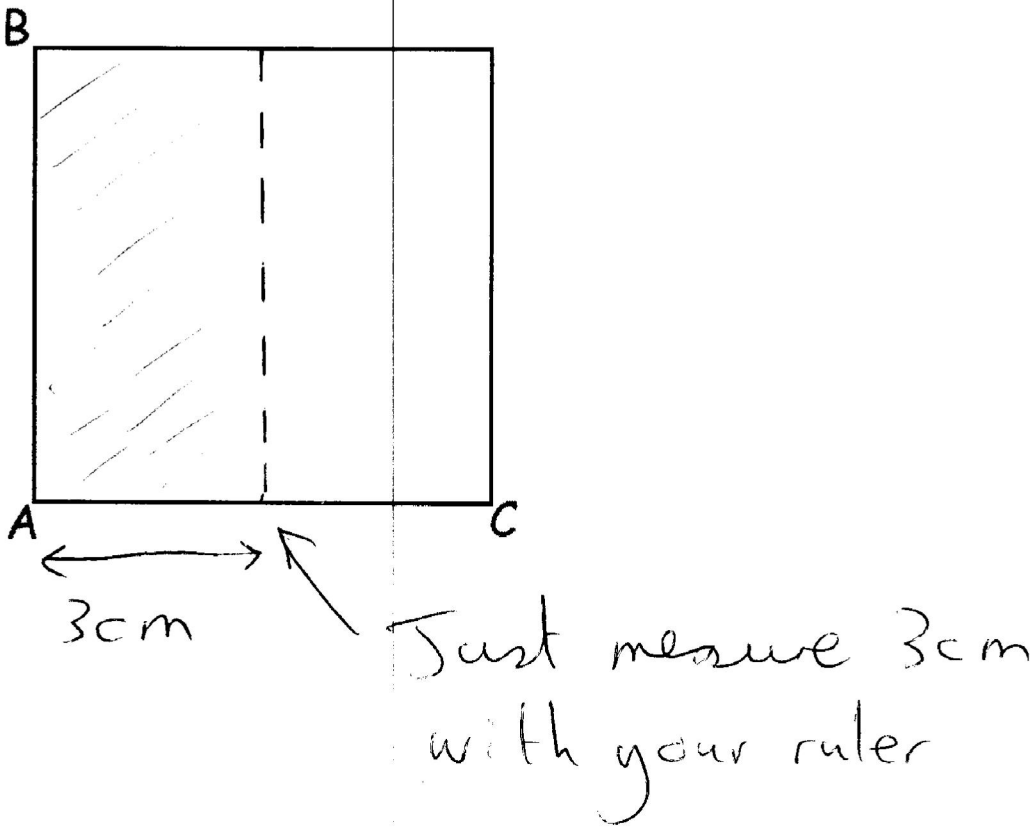
(6 Marks)

5) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:

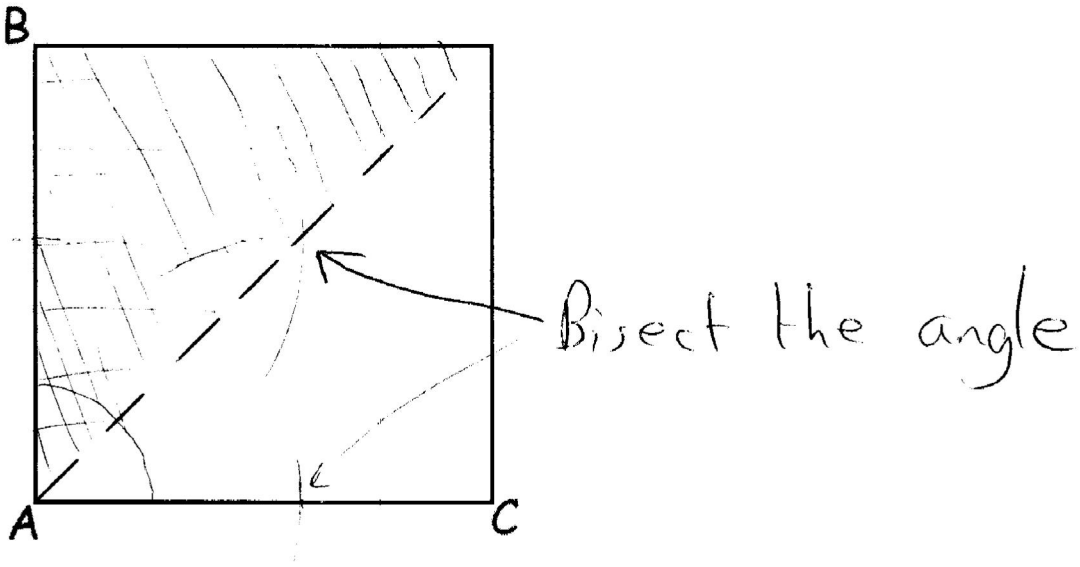


2) Shade the area closer than 3cm to the line AB within the square below:



5) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

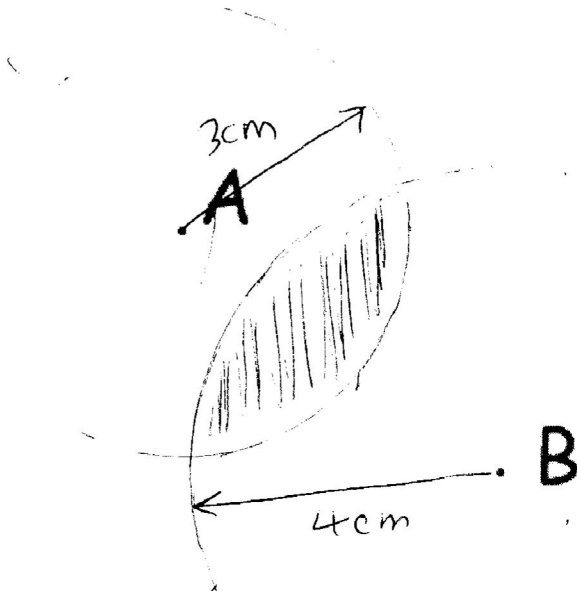


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

5) Loci and Construction: Harder

5) Mariam wants to plant a flower:

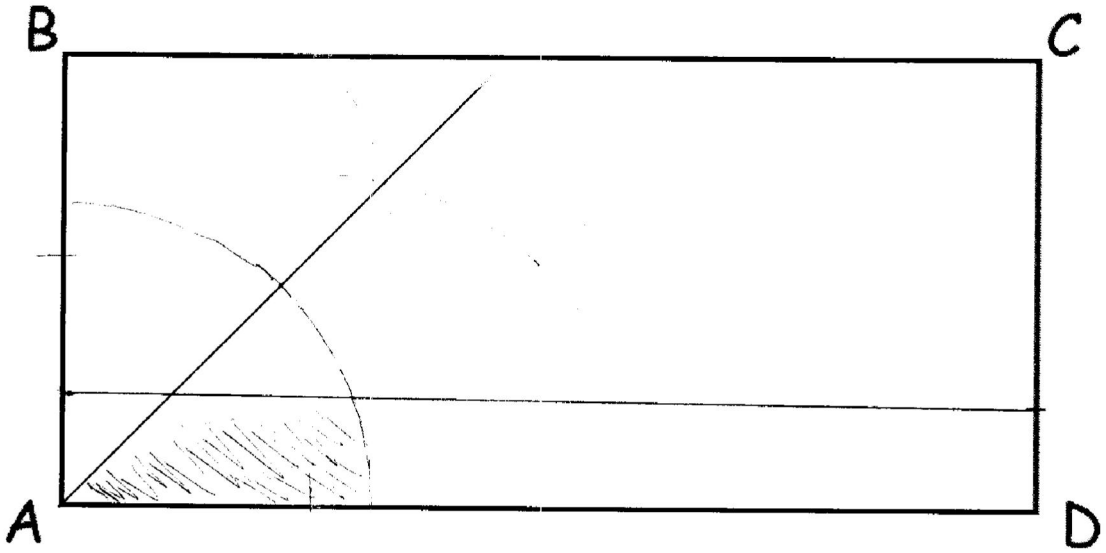
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

PRICE Megan

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Your Pinpoint Topics

(1) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(2) Loci and Construction. MWatch: 165, Hegarty:

(3) Reverse Percentage. MWatch: 110, Hegarty:

(4) Speed. MWatch: 142, Hegarty:

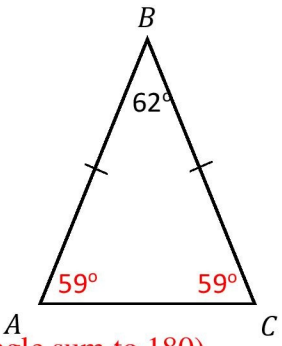
(5) Box plots. MWatch: 187, Hegarty:

1) Triangles and Parallel Lines: Easier

1) (a) ABC is an isosceles triangle with $AB = BC$
Angle ABC= 62°

Calculate the size of angle BAC.

Give a reason for each stage in your working.



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Angle BAC: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

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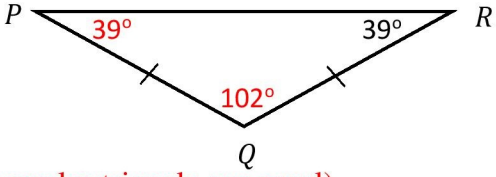
Angle PRQ = 39°

Calculate the size of angle PQR.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle PQR: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

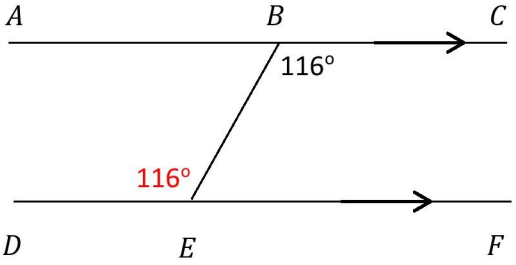
(4 Marks)

---

2) (a) ABC and DEF are parallel straight lines
Angle CBE= 116°

Calculate the size of angle DEB.

Give a reason for your answer.



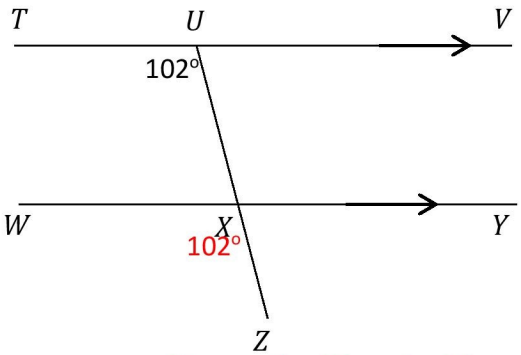
Angle DEB and angle CBE are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) TUV and WXY are parallel straight lines
Angle TUX= 102°

Calculate the size of angle WXZ.

Give a reason for your answer.



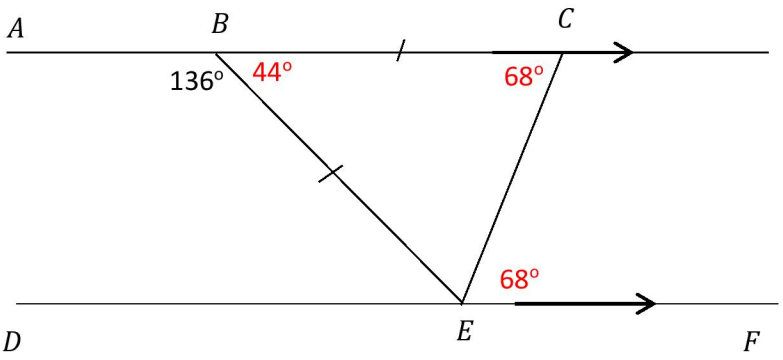
Angle WXZ and angle TUX are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

1) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

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Angle *ABE*= 136°

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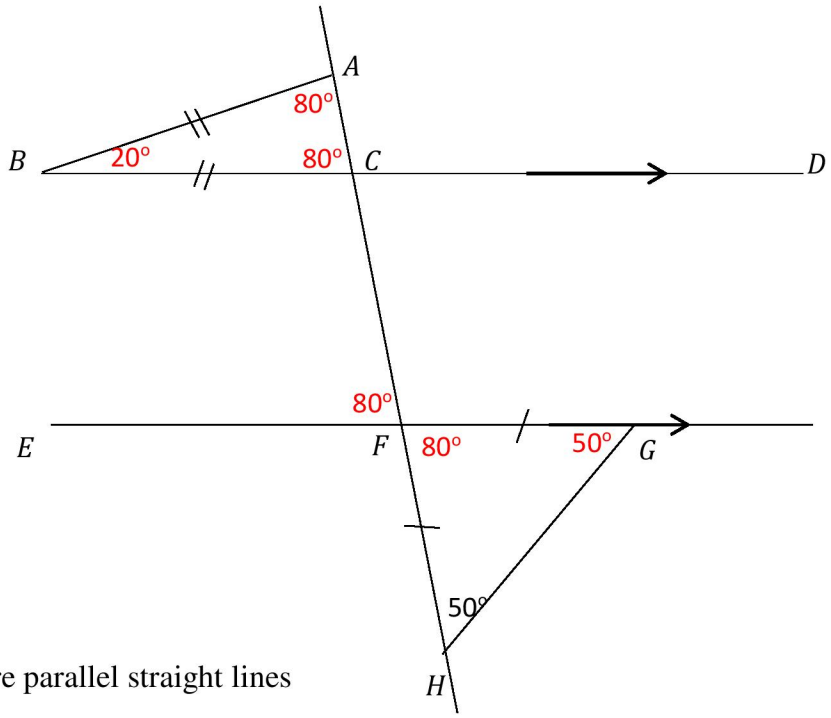
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

1) Triangles and Parallel Lines: Harder

4)



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Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

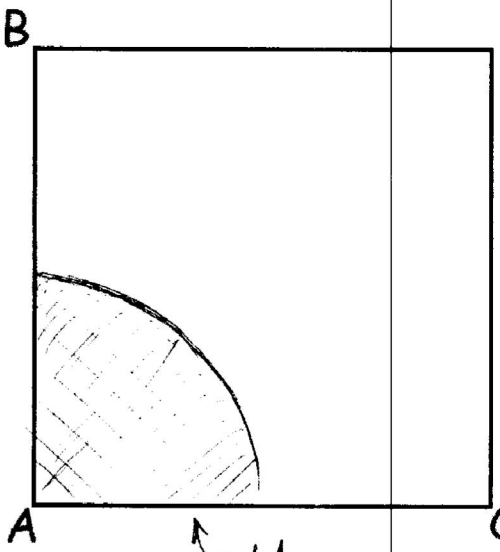
Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

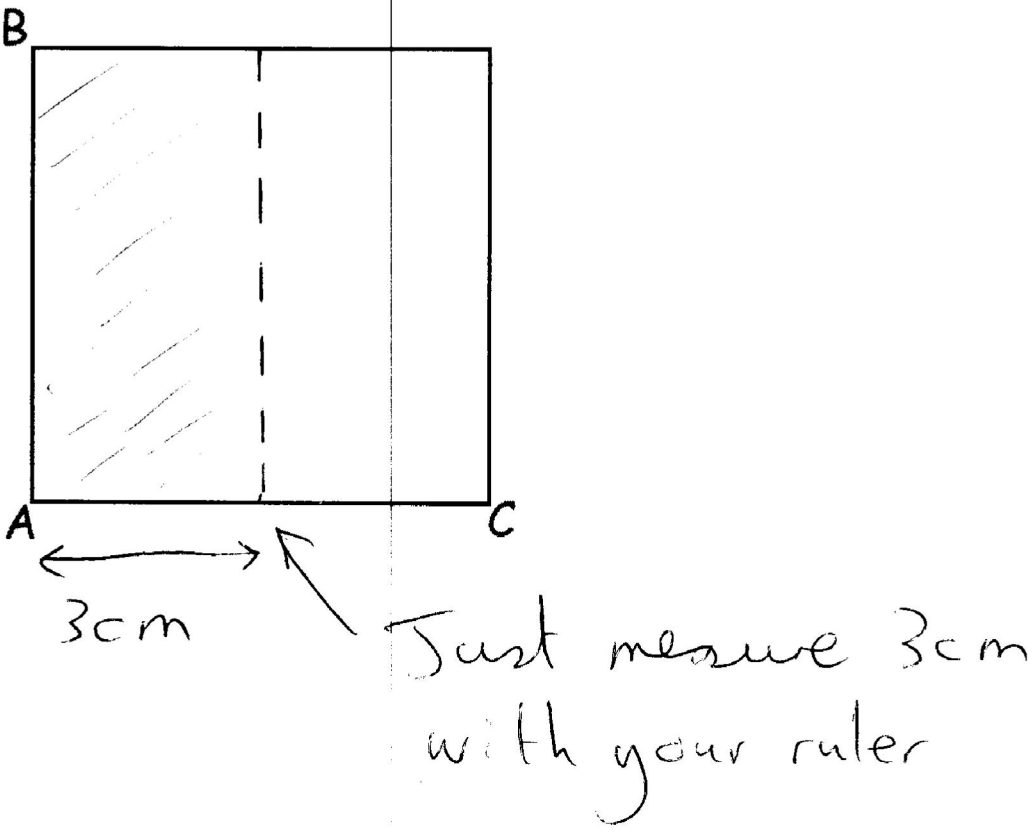
(6 Marks)

2) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:

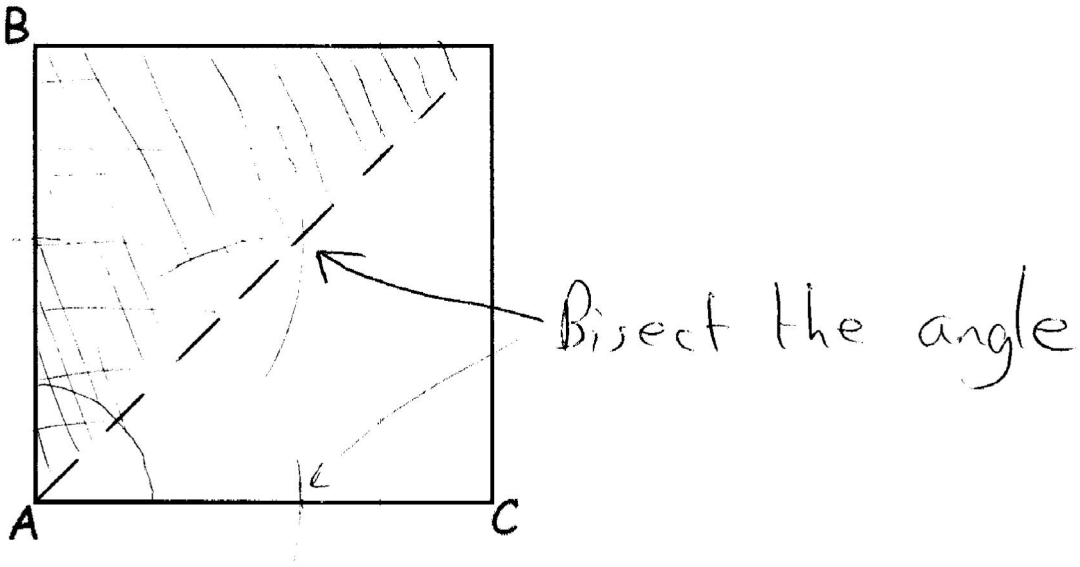


2) Shade the area closer than 3cm to the line AB within the square below:



2) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

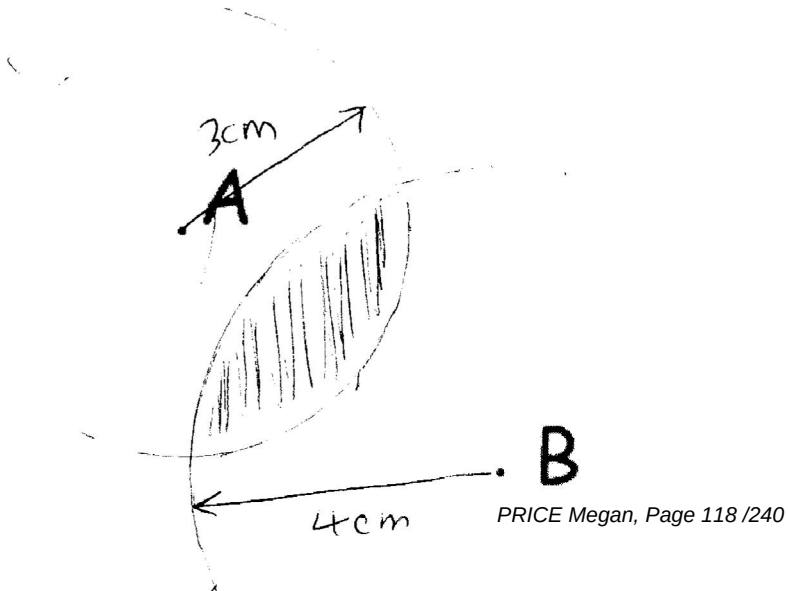


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

2) Loci and Construction: Harder

5) Mariam wants to plant a flower:

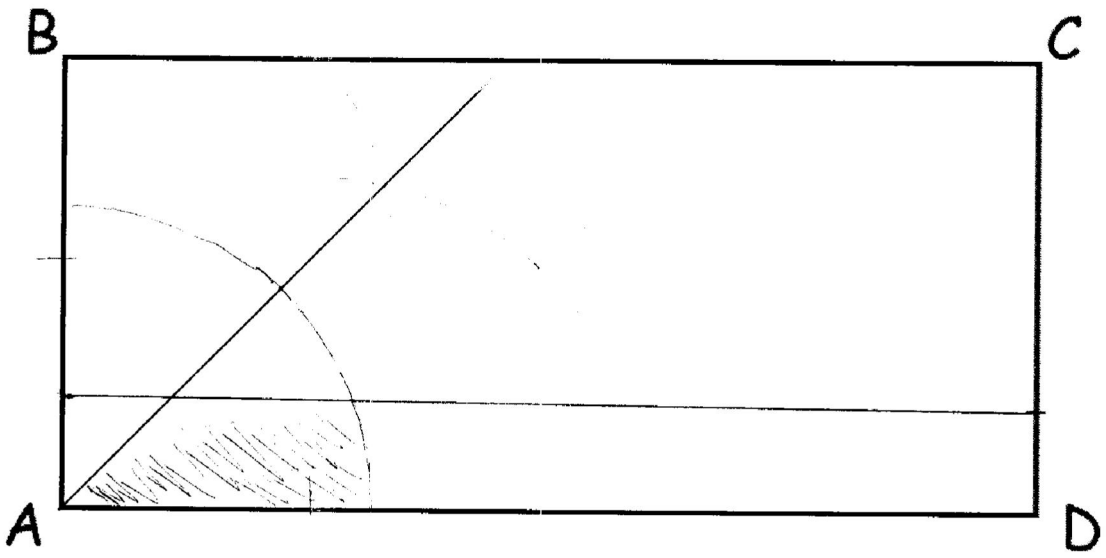
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

3) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

3) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

$£236.25 \div 0.75^2$

= £420

…… **(3)**

3) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

4) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

_____12.5_____miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

_____16_____Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

_____80_____minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

_____48_____Km

(2 Marks)

---

4) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

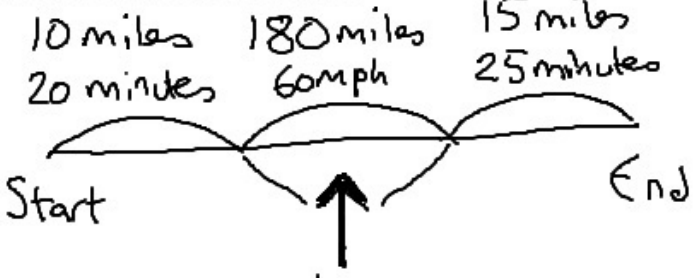
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



$T = D/S$

$T = 180/60 = 3$ hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

4) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70 mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

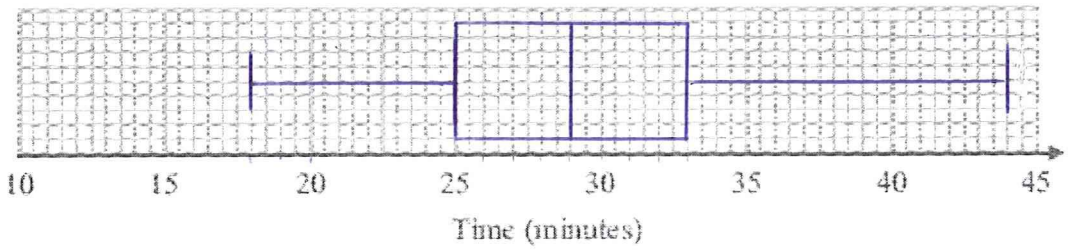
5) Box plots: Easier

2. Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

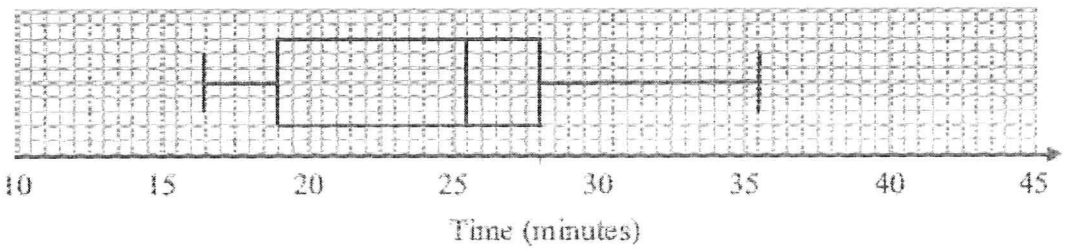
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

(a) On the grid, draw a box plot to show the information in the table.



(2)

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.



(b) Compare the distributions of the girls' times and the boys' times.

The boys median time was less than that of the girls; Boys 25.5mins, Girls 29 mins.

The spread of data for the interquartile range is smaller for the girls (8 mins) than for the boys (9 mins)

(2)

(4 marks)

5) Box plots: Medium

1. (a) (i) 152 2

B1 cao

(ii) 177

B1 cao

(b) 3

B1 for median marked at 167
B1 ft for postion of box with its ends at "152" and "177"
B1 for position of whiskers with ends at 132 and 182
NB: For any points plotted between 141 and 149 give a tolerance of an extra ±1 square

[5]

4. a) median = **14m**

b) Q1 = 9m, Q3= 17m IQR = Q3 - Q1
= 17 - 9 = **8m**

c) Since Q3 = 17m 25% of trees are 17m or taller

25% of 300 = 300/4 = **75 trees**

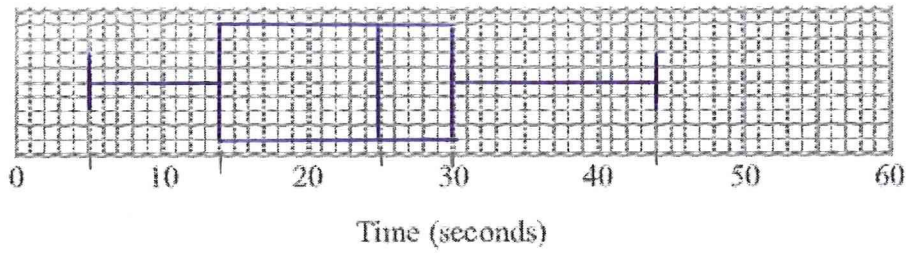
5) Box plots: Harder

7. Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

5 9 11 [14] 15 20 22 [25] 27 27 28 [30] 32 35 44

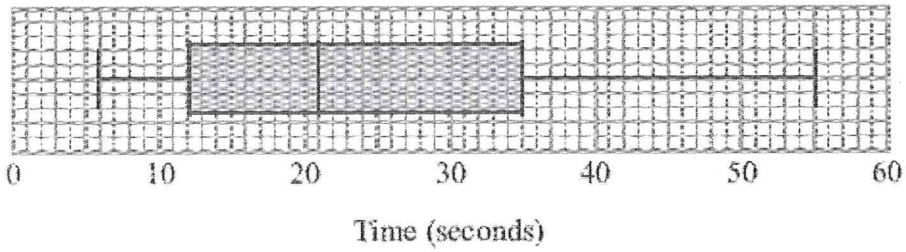
LQ Median UQ.

(a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

There was a greater spread of waiting times in the interquartile range for Green's Garden Centre than Rose's Garden Centre. The median waiting time is shorter at Green's than Rose's Garden Centre.

(2)

(5 marks)

SABBAH Yarah

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	11 from 38	0 from 3	3 from 9	3 from 8	4 from 14	1 from 4
A02 and 3	5 from 42	1 from 7	3 from 19	0 from 4	1 from 9	0 from 3
Total	16 from 80	1 from 10	6 from 28	3 from 12	5 from 23	1 from 7

Your Pinpoint Topics

(1) Sequences. MWatch: 103, Hegarty:

(2) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(3) Frequency trees. MWatch: 57, Hegarty:

(4) Reverse Percentage. MWatch: 110, Hegarty:

(5) Speed. MWatch: 142, Hegarty:

1) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

5n + 1

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3, 8, 13, 18, 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126, 122, 118, 114, 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

1) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 −4 ....46.....

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

+4 +4

(a) Work out the 8th term of the number sequence.

6th = 23
7th = 27
8th = 31

.....31.....

(1)

(b) Write down an expression, in terms of n, for the nth term of the number sequence.

4n
Compare to 4 x table

−1 −1 −1 −1
3, 7, 11

..... 4n − 1 .....

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

+7 +7 +7 +7

Find, in terms of n, an expression for the nth term of this sequence.

−5 7 14 21
2 9 16

..... 7n − 5 .....

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

+5 +5

Write down, in terms of n, an expression for the nth term of this sequence.

−3 5 10 15 20
2 7 12 22

..... 5n − 3 .....

(Total 2 marks)

1) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

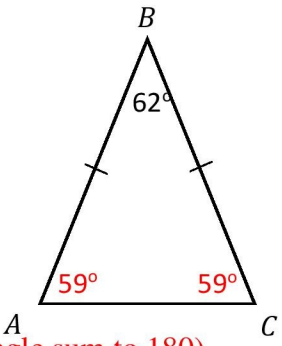
n is not an integer values, therefore, there will not be a shape with 242 blocks.

2) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

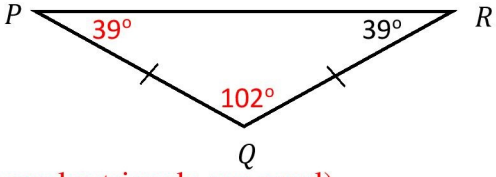
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

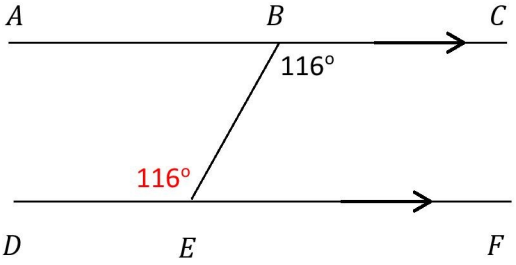
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



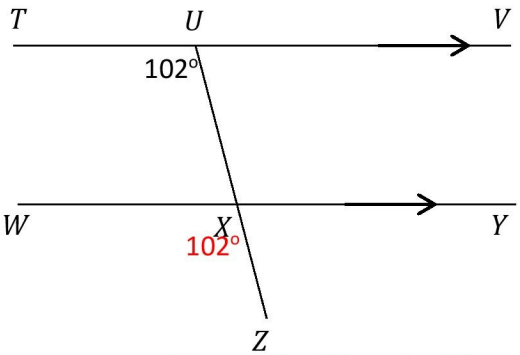
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



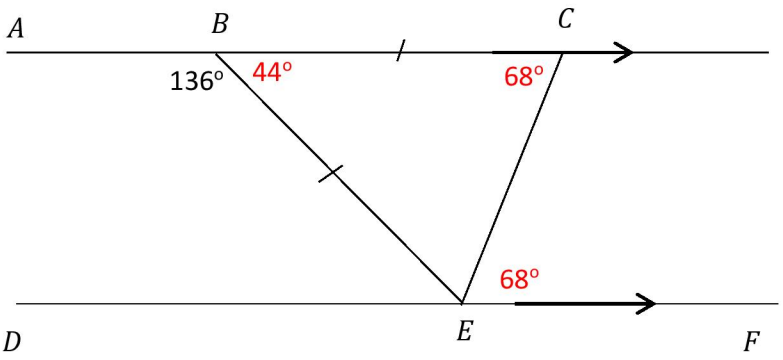
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

2) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

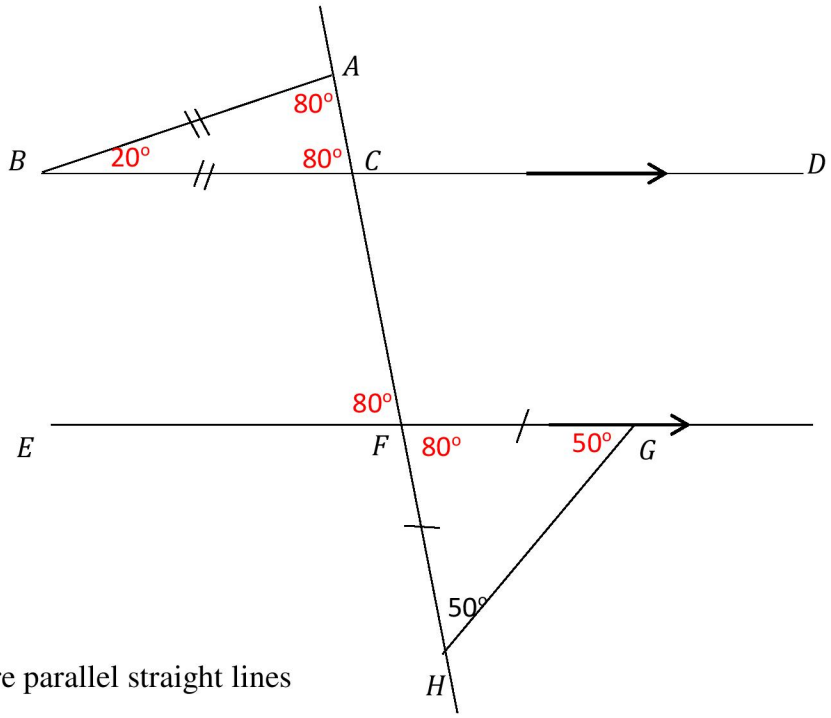
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

2) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

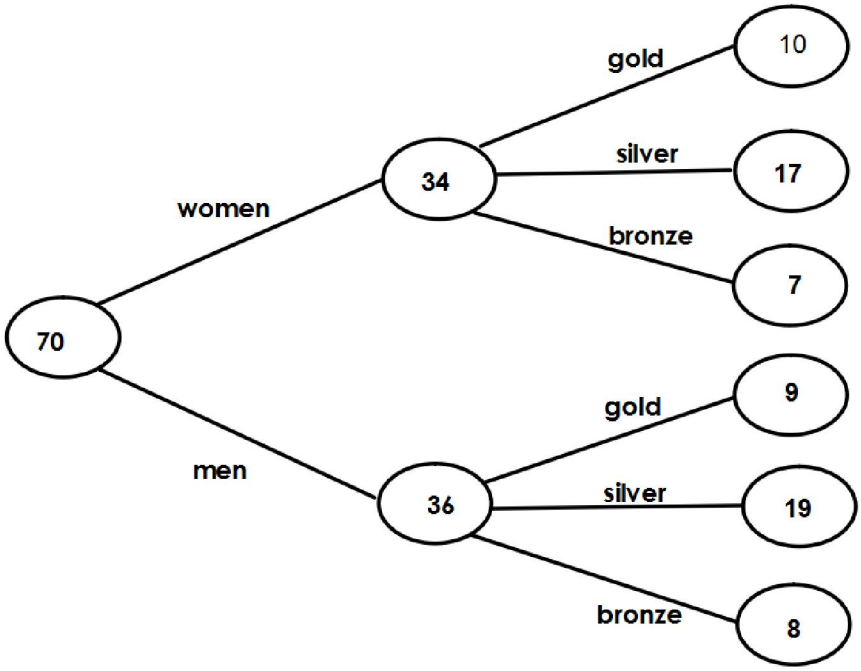
Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

3) Frequency trees: Easier

1) The frequency tree below shows the results of an athletics competition.



a) How many women received medals in the competition? 34

_____

(1 Mark)

b) How many gold medals were awarded to men?

9

_____

(1 Mark)

c) How many people won medals in the competition?

70

_____

(1 Mark)

d) How many bronze medals were awarded?

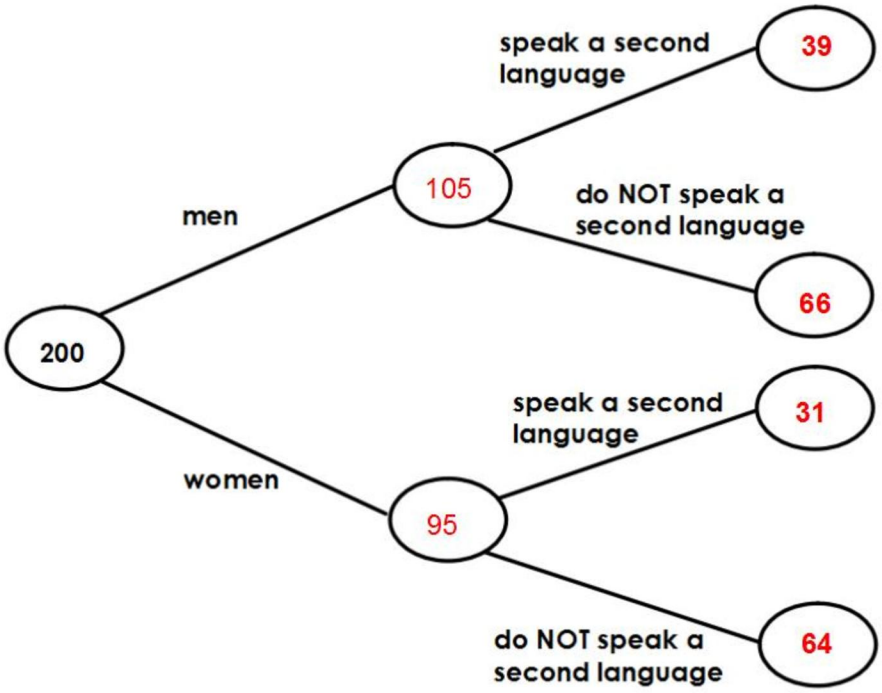
7+8=15 15

_____

(1 Mark)

3) Frequency trees: Medium

2) In an office, there are 200 employees. 105 are men. Employees are asked if they speak a second language. 70 employees say they speak a second language. 31 women speak a second language. Fill in the frequency tree.



(3 marks)

b) A woman is chosen at random. Use your frequency tree to write down the probability that she speaks a second language.

$\frac{31}{95}$

(1 Mark)

c) An employee is chosen at random. Use your frequency tree to write down the probability that they do not speak a second language.

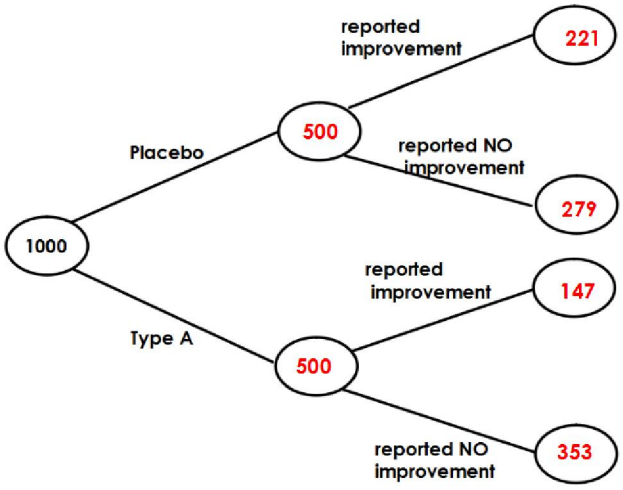
64+66=130

$\frac{130}{200}$

(1 Mark)

3) Frequency trees: Harder

3) 1000 people take part in a clinical trial. 500 were given the placebo drug. The rest were given Type A. Of the patients given Type A, 221 patients reported improvement. Overall, 368 patients reported an improvement. Complete the frequency tree.

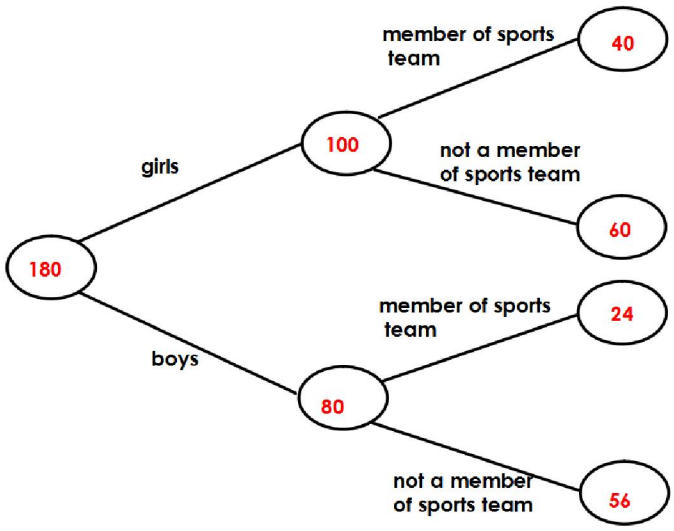


b) What is the ratio of patients that reported improvement to those who reported no improvement. 368:632

46:79

(1 Mark)

4) In a year group in a school there are 180 pupils. The ratio of boys to girls is 4:5 30% of the boys are part of a sports team. 40% of the girls are part of a sports team. Complete the frequency tree.



(4 Marks)

4) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

4) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

£236.25÷ 0.75^2

= £420

…… **(3)**

4) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

5) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

12.5 miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

16 Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

80 minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

48 Km

(2 Marks)

---

5) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

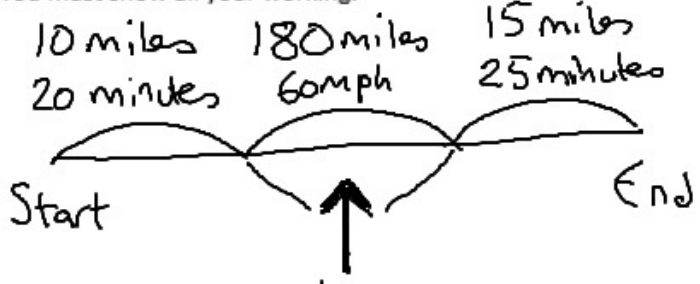
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



$T = D/S$

$T = 180/60 = 3$ hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

5) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

4miles 10mins | 45mins 60mph | 6miles 15mins

Start → End

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

SAKELLARIOU Adonis

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	14 from 38	0 from 3	1 from 9	5 from 8	7 from 14	1 from 4
A02 and 3	6 from 42	1 from 7	1 from 19	1 from 4	3 from 9	0 from 3
Total	20 from 80	1 from 10	2 from 28	6 from 12	10 from 23	1 from 7

Your Pinpoint Topics

(1) Sequences. MWatch: 103, Hegarty:

(2) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(3) Changing the Subject of a Formula. MW: 136, Hgrty:

(4) Frequency trees. MWatch: 57, Hegarty:

(5) Reverse Percentage. MWatch: 110, Hegarty:

1) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

5n + 1

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3, 8, 13, 18, 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126, 122, 118, 114, 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

1) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 −4 ....46.....

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

(a) Work out the 8th term of the number sequence.

6th = 23
7th = 27
8th = 31

.....31.....

(1)

(b) Write down an expression, in terms of n, for the nth term of the number sequence.

4n
Compare to 4 x table
−1 −1 −1 −1
3 7 11

.....4n − 1.....

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

Find, in terms of n, an expression for the nth term of this sequence.

−5 7 14 21
2 9 16

.....7n − 5.....

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

Write down, in terms of n, an expression for the nth term of this sequence.

−3 5 10 15 20
2 7 12 22

.....5n − 3.....

(Total 2 marks)

1) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

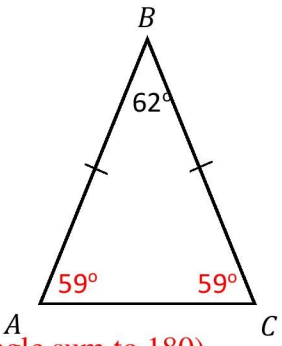
c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

n is not an integer values, therefore, there will not be a shape with 242 blocks.

2) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°



Calculate the size of angle *BAC*.

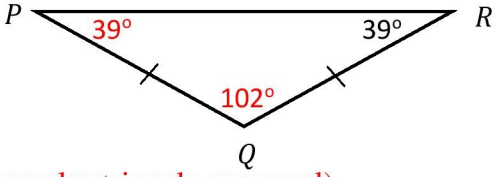
Give a reason for each stage in your working.

Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°



Calculate the size of angle *PQR*.

Give a reason for each stage in your working.

Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

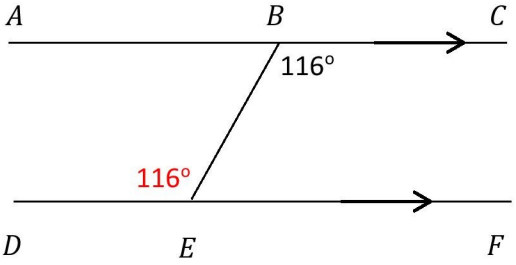
Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°



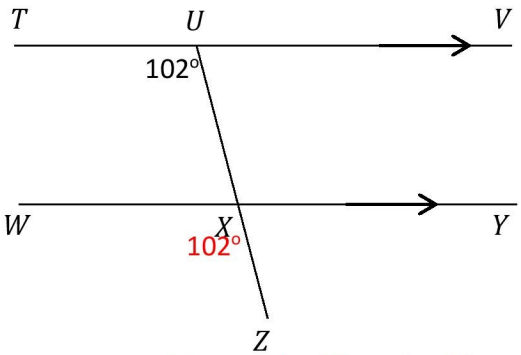
Calculate the size of angle *DEB*.

Give a reason for your answer.

Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°



Calculate the size of angle *WXZ*.

Give a reason for your answer.

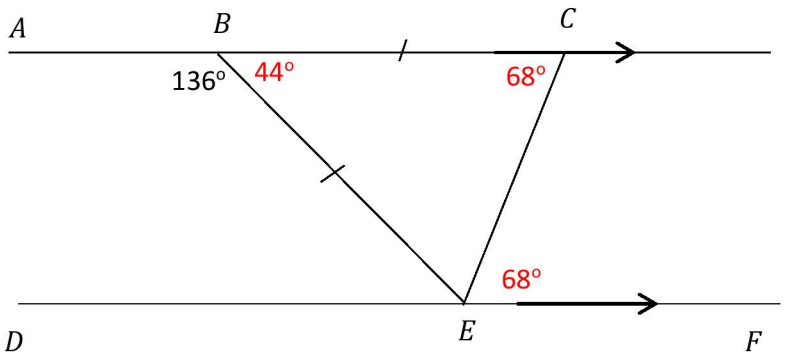
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

2) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

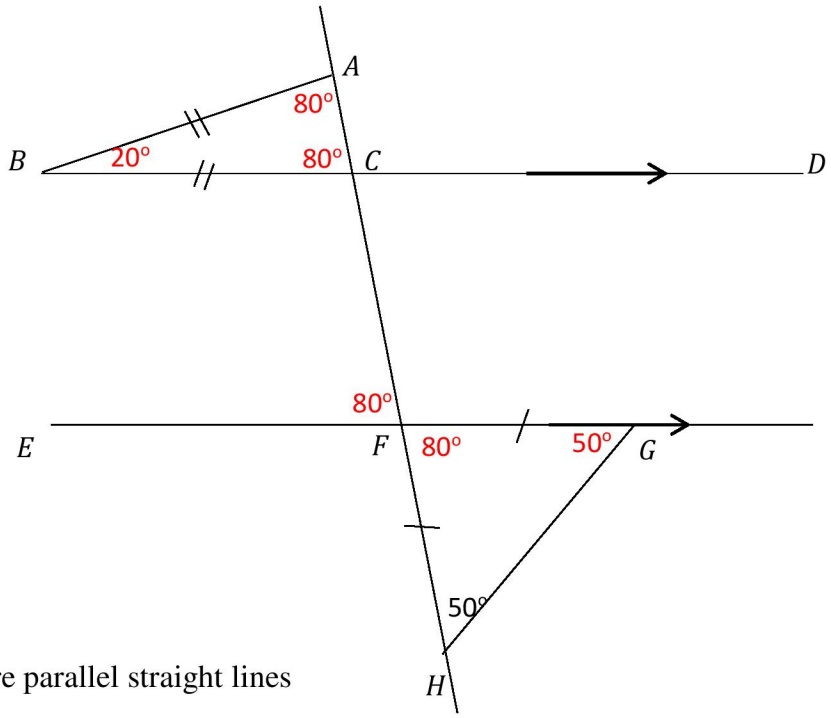
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

2) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

3) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$ | $m - 3n = 2p$ | $-3n$

$\div 2$ | $\frac{m-3n}{2} = p$ | $\div 2$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$ | $a + 4 = 3c$ | $+4$

$\div 3$ | $\frac{a+4}{3} = c$ | $\div 3$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$ | $P - 2a = 2b$ | $-2a$

$\div 2$ | $\frac{P-2a}{2} = b$ | $\div 2$

or

$P = 2a + 2b$

$\div 2$ | $P = 2(a+b)$ | $\div 2$

$-a$ | $\frac{P}{2} = a + b$ | $-a$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

3) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

3) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q = \frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

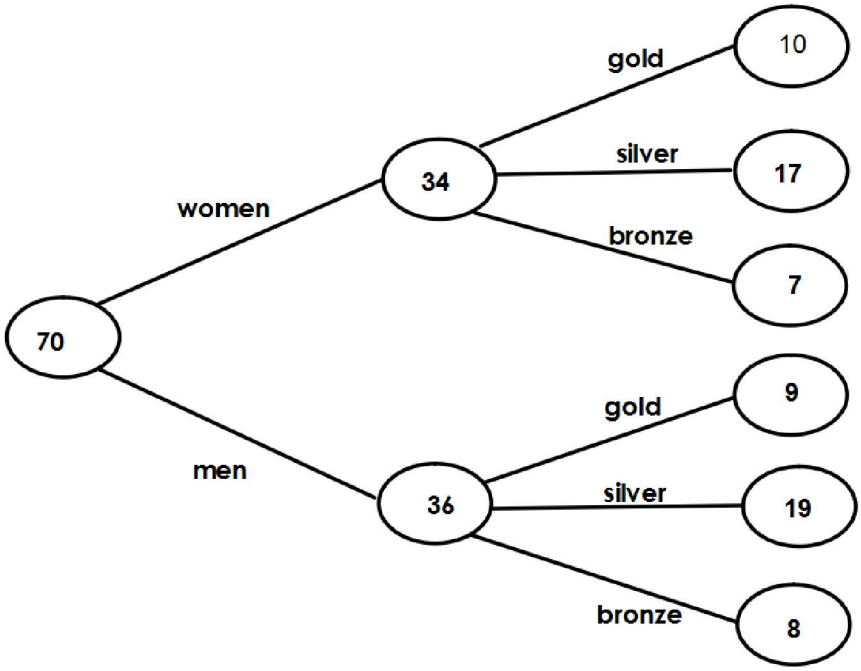
$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h = \frac{2d^2}{3}$

(Total 2 marks)

4) Frequency trees: Easier

1) The frequency tree below shows the results of an athletics competition.



a) How many women received medals in the competition? 34

_____

(1 Mark)

b) How many gold medals were awarded to men?

9

_____

(1 Mark)

c) How many people won medals in the competition?

70

_____

(1 Mark)

d) How many bronze medals were awarded?

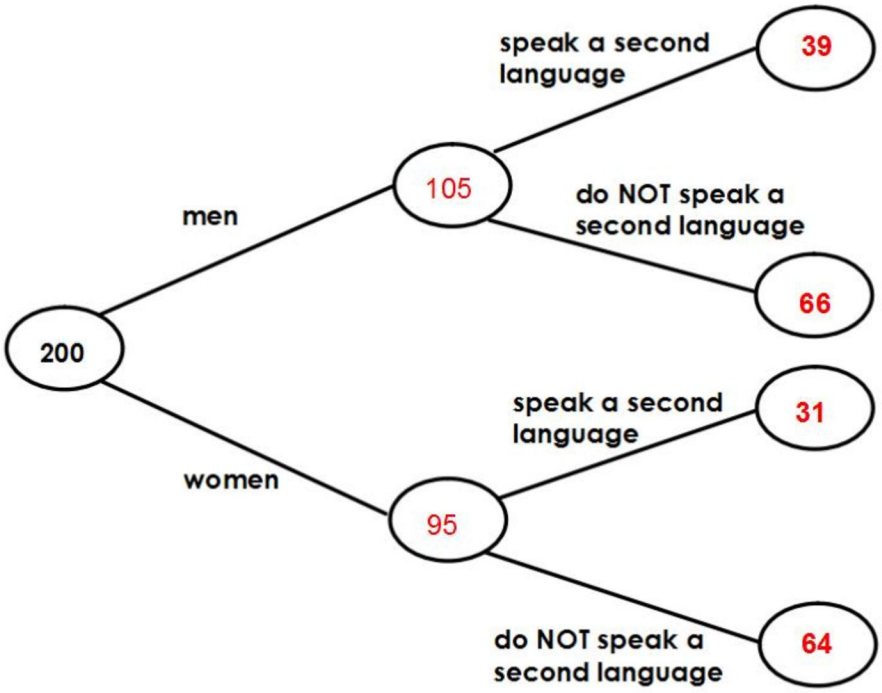
7+8=15 15

_____

(1 Mark)

4) Frequency trees: Medium

2) In an office, there are 200 employees. 105 are men. Employees are asked if they speak a second language. 70 employees say they speak a second language. 31 women speak a second language. Fill in the frequency tree.



(3 marks)

b) A woman is chosen at random. Use your frequency tree to write down the probability that she speaks a second language.

$\frac{31}{95}$

(1 Mark)

c) An employee is chosen at random. Use your frequency tree to write down the probability that they do not speak a second language.

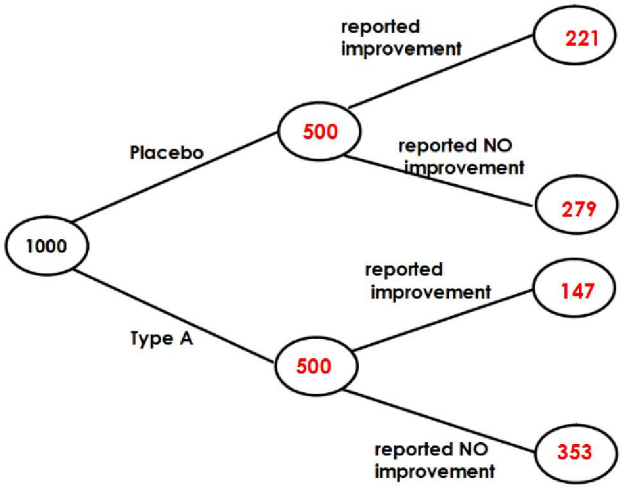
64+66=130

$\frac{130}{200}$

(1 Mark)

4) Frequency trees: Harder

3) 1000 people take part in a clinical trial. 500 were given the placebo drug. The rest were given Type A. Of the patients given Type A, 221 patients reported improvement. Overall, 368 patients reported an improvement. Complete the frequency tree.

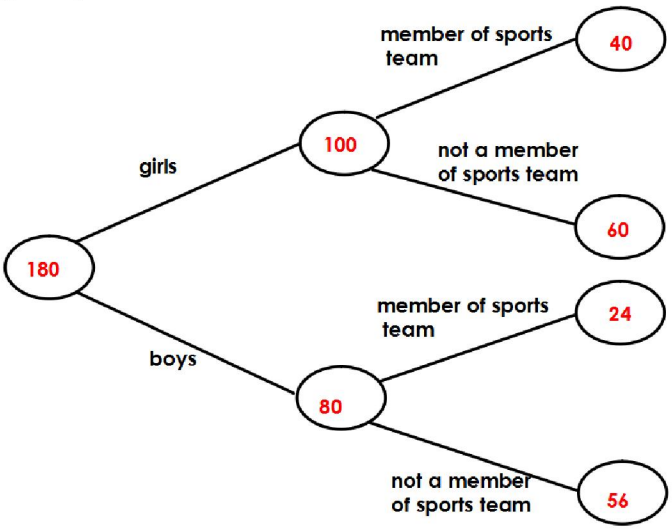


b) What is the ratio of patients that reported improvement to those who reported no improvement. 368:632

46:79

(1 Mark)

4) In a year group in a school there are 180 pupils. The ratio of boys to girls is 4:5 30% of the boys are part of a sports team. 40% of the girls are part of a sports team. Complete the frequency tree.



(4 Marks)

5) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

5) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

£236.25÷ 0.75^2

= £420

…… **(3)**

5) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

TRAVERS Emma

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
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A02 and 3	11 from 42	1 from 7	1 from 19	3 from 4	4 from 9	2 from 3
Total	29 from 80	1 from 10	4 from 28	11 from 12	11 from 23	2 from 7

Your Pinpoint Topics

(1) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(2) Changing the Subject of a Formula. MW: 136, Hgrty:

(3) Reverse Percentage. MWatch: 110, Hegarty:

(4) Speed. MWatch: 142, Hegarty:

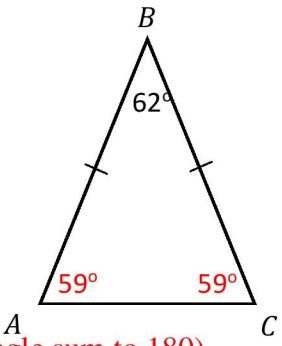
(5) Circle Theorems. MWatch: 183, Hegarty:

1) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

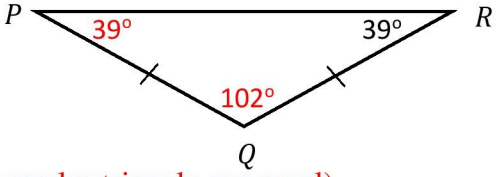
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

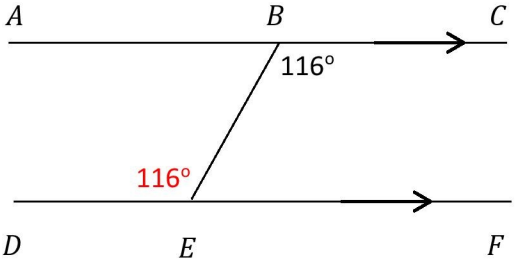
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



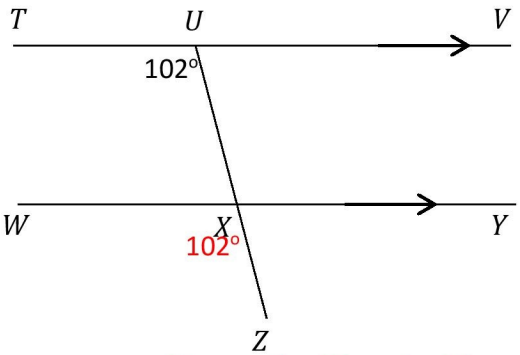
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



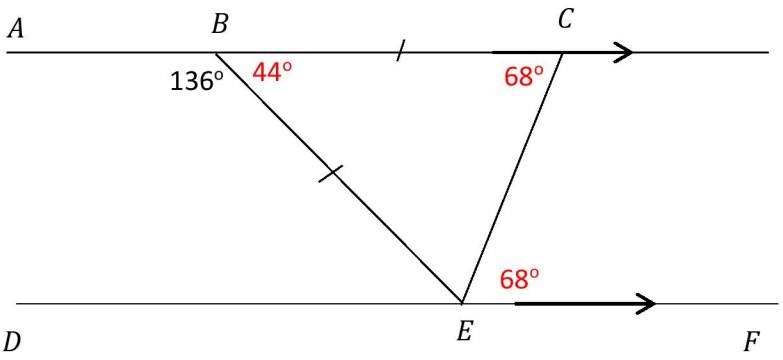
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

1) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

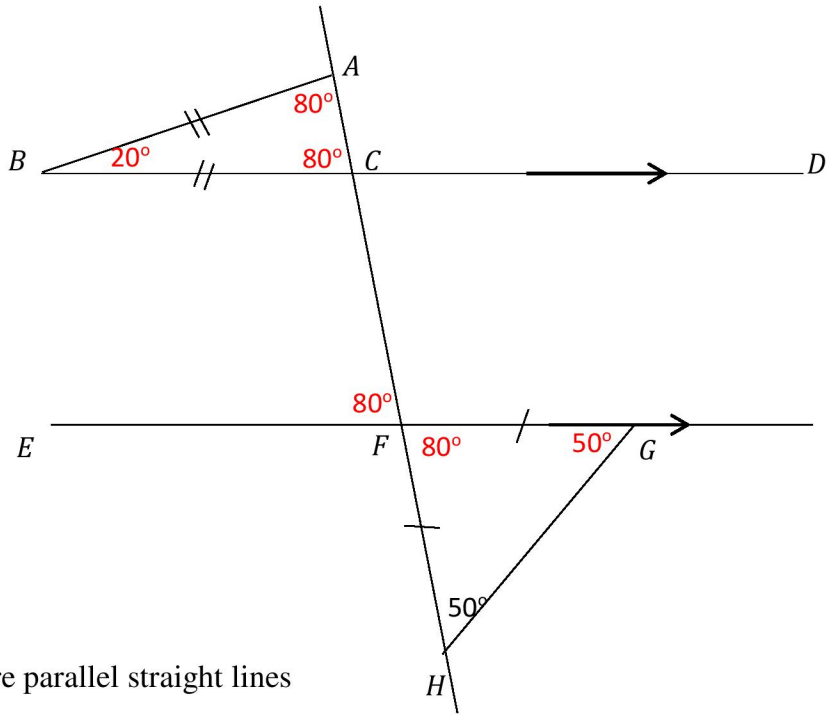
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

1) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

2) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$: $m - 3n = 2p$

$\div 2$: $\frac{m-3n}{2} = p$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$: $a + 4 = 3c$

$\div 3$: $\frac{a+4}{3} = c$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$: $P - 2a = 2b$

$\div 2$: $\frac{P-2a}{2} = b$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$: $\frac{P}{2} = a + b$

$-a$: $\frac{P}{2} - a = b$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

2) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

2) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

$-10 \quad P - 10 = 2q \quad -10$

$\div 2 \quad \frac{P-10}{2} = q \quad \div 2$

$q = \frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square $\quad d^2 = \frac{3h}{2} \quad$ square

$\times 2 \quad 2d^2 = 3h \quad \times 2$

$\div 3 \quad \frac{2d^2}{3} = h \quad \div 3$

$h = \frac{2d^2}{3}$

(Total 2 marks)

3) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

3) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

$£236.25 \div 0.75^2$

= £420

…… **(3)**

3) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

4) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

_____12.5_____miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

_____16_____Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

_____80_____minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

_____48_____Km

(2 Marks)

---

4) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

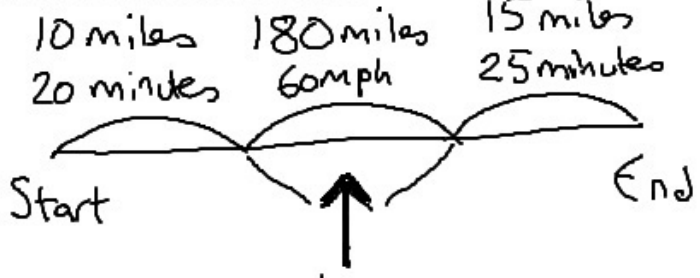
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



T = D/S

T = 180/60 = 3 hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

4) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70 mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

5) Circle Theorems: Easier

1.

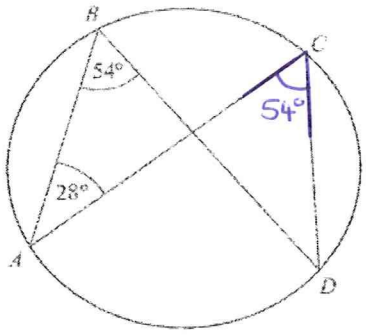


Diagram NOT accurately drawn

A, B, C and D are points on the circumference of a circle.
Angle $ABD = 54°$.
Angle $BAC = 28°$.

(i) Find the size of angle ACD.

54 °

(ii) Give a reason for your answer.

Angles in the same segment are equal

(3 marks)

2.

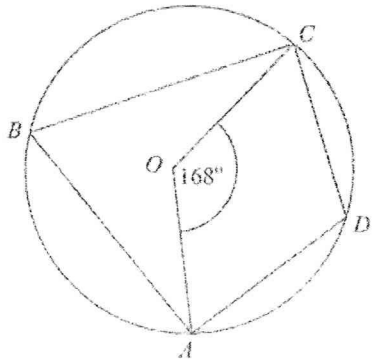


Diagram **NOT** accurately drawn

A, B, C and D are points on the circumference of a circle, centre O.

Angle $AOC = 168°$

Work out the size of angle ADC.
You must give reasons for your working.

$\angle ABC = \frac{1}{2}(168) = 84°$ Angles at the centre are twice angles at the circumference.

$\angle ADC = 180 - \angle ABC$
$= 180 - 84$ Opposite angles in a cyclic quadrilateral have a sum of 180°.
$= 96°$

(4 marks)

5) Circle Theorems: Medium

3.

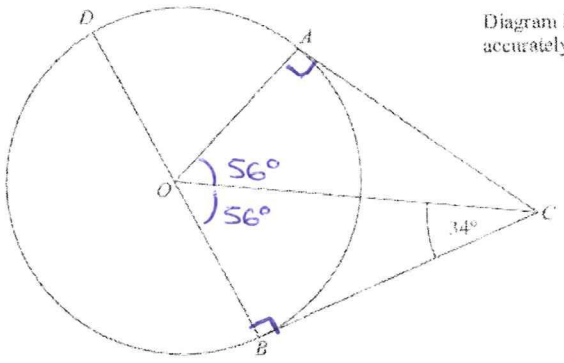


Diagram **NOT** accurately drawn

A, B and D are points on the circumference of a circle, centre O.
BOD is a diameter of the circle.
BC and AC are tangents to the circle.
Angle $OCB = 34°$.

Work out the size of angle DOA.

$\angle CBO = 90°$ A radius and tangent meet at 90° on the circumference of a circle.

$\angle BOC = 180 - (34+90)$ Angles in a triangle have a sum of 180°.
$= 180 - 124$
$= 56°$

$\angle BOC = \angle COA$ as $\triangle BOC$ and $\triangle AOC$ are congruent

$\angle DOA = 180 - (\angle BOC + \angle COA)$ Angles on a straight line have a sum of 180°
$= 180 - (56+56) = 68°$

68 °

(4 marks)

4.

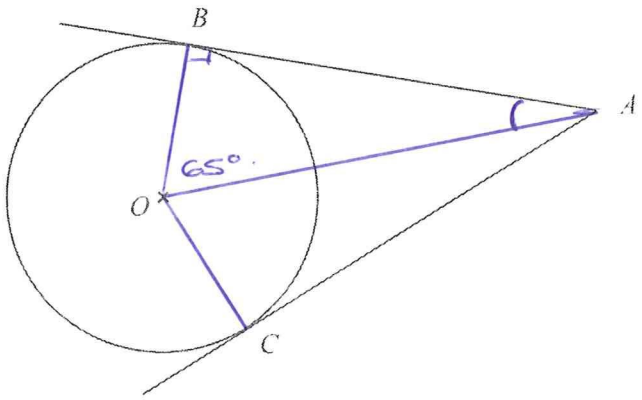


Diagram **NOT** accurately drawn

B and C are points on a circle, centre O.
AB and AC are tangents to the circle.
Angle $BOC = 130°$.

Work out the size of angle BAO.

$\angle BOA = \frac{1}{2}\angle BOC = \frac{1}{2}(130) = 65°$

$\angle OBA = 90°$ Tangent and radius meet at circumference

$\angle BAO = 180 - (65+90)$
$= 180 - 155$
$= 25°$

°

(4 marks)

5) Circle Theorems: Harder

***14.**

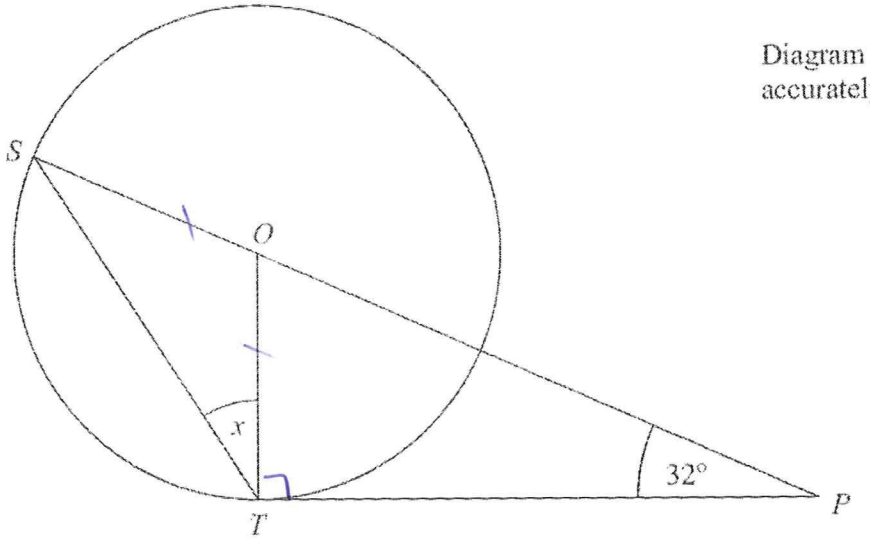


Diagram **NOT** accurately drawn

S and *T* are points on the circumference of a circle, centre *O*.
PT is a tangent to the circle.
SOP is a straight line.

Angle *OPT* = 32°.

Work out the size of the angle marked *x*.
Give reasons for your answer.

$\angle PTO = 90°$ Tangent and radius meet at 90° on the circumference of a circle.

$\angle POT = 180 - (90 + 32)$ Angles in a triangle have a sum of 180°.
$= 180 - 122$
$= 58°$

$\angle TOS = 180 - 58$ Angles on a straight line have a sum of 180°.
$= 122°$

$\triangle OTS$ is isosceles as OS = OT (both radii) so $\angle OST = \angle STO$

$122 + 2x = 180$
$2x = 58$
$x = 29°$

29 .....°

(Total 5 marks)

TYSON Phoebe

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	13 from 38	0 from 3	2 from 9	6 from 8	5 from 14	0 from 4
A02 and 3	5 from 42	1 from 7	0 from 19	3 from 4	1 from 9	0 from 3
Total	18 from 80	1 from 10	2 from 28	9 from 12	6 from 23	0 from 7

Your Pinpoint Topics

(1) Inequalities. MWatch: 139, Hegarty:

(2) Averages from Frequency Tables. MWatch: 130, Hegarty:

(3) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(4) Changing the Subject of a Formula. MW: 136, Hgrty:

(5) Loci and Construction. MWatch: 165, Hegarty:

1) Inequalities: Easier

1. $-1 \leq n < 4$

n is an integer.

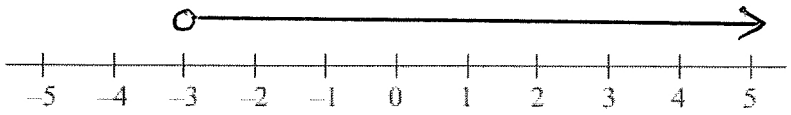
Write down all the possible values of n.

$-1, 0, 1, 2, 3$

(2 marks)

2. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y - 34 \leq 8$

$7y - 34 \leq 8$

$+34$ $7y \leq 42$

$\div 7$ $y \leq 6$

$y \leq 6$

(2)

(c) Write down the integer values of x that satisfy the inequality

$-2 \leq x < 3$

$-2, -1, 0, 1, 2$

(2)

(6 marks)

1) Inequalities: Medium

3. $-2 \leq n < 5$

n is an integer.

(a) Write down all the possible values of n.

$-2, -1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $4x + 1 > 11$

$4x + 1 > 11$

-1 $\quad 4x > 10$

$\div 4$ $\quad x > \frac{10}{4}$

$x > 2.5$

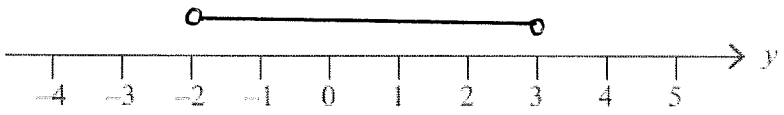
$x > 2.5$

(2)

(4 marks)

---

4. (a) On the number line below, show the inequality $-2 < y < 3$



(1)

(b) Here is an inequality, in x, shown on a number line.

Write down the inequality.

$-3 < x \leq 4$

(2)

(c) Solve the inequality $4t - 5 > 11$

$4t - 5 > 11$

$+5$ $\quad 4t > 16$

$\div 4$ $\quad t > 4$

$t > 4$

(2)

(5 marks)

1) Inequalities: Harder

11. (a) Solve $5x + 12 < 17$

(2)

$5x + 12 < 17$
-12 $5x < 5$
$\div 5$ $x < 1$

$x < 1$

(b) Solve the inequality $3(2y + 1) > 10$

(2)

$6y + 3 > 10$
-3 $6y > 7$
$\div 6$ $y > 7/6$

$y > 7/6$ or $y > 1.16$

(4 marks)

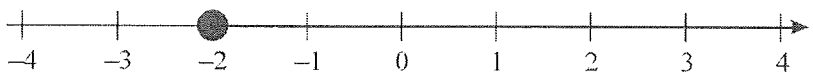
12. (a) Solve the inequality $4x - 3 < 7$

$4x - 3 < 7$
$+3$ $4x < 10$
$\div 4$ $x < 2.5$

$x < 2.5$

(2)

An inequality is shown on the number line.



(b) Write down the inequality.

$x \geq -2$

(2)

(c) n is a whole number such that

$$6 \leq 3n < 15$$

List all the possible values of n.

$\div 3$ $6 \leq 3n < 15$

$2 \leq n < 5$

2, 3, 4 **(2)**

(6 marks)

2) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

2) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked.

22

(2)

(b) Work out the mean number of cups of coffee drunk.

DRAW 3rd COLUMN

4·59 (2dp)

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

1

(1)

(b) Work out the range of the number of goals scored.

4 − 1

3

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

2·1

(3)

(5 marks)

2) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g

(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90

(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90

(2)

(d) Why is your answer to part (a) and estimate?

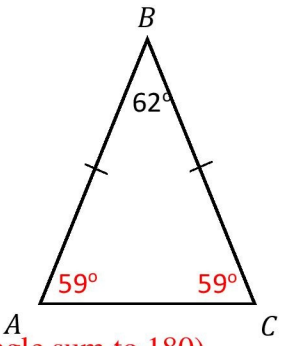
Data is grouped and so we don't know actual values

(1)

(7 marks)

3) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°



Calculate the size of angle *BAC*.

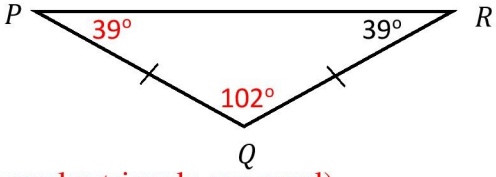
Give a reason for each stage in your working.

Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°



Calculate the size of angle *PQR*.

Give a reason for each stage in your working.

Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

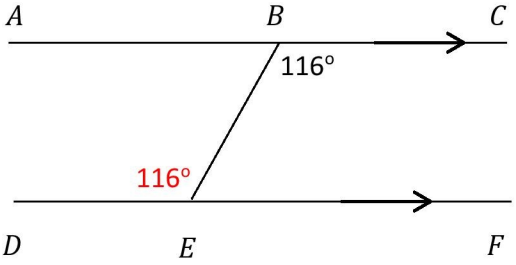
Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°



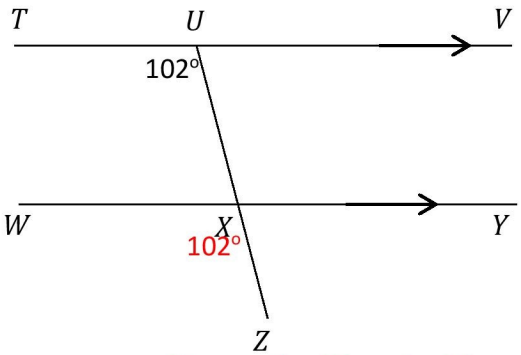
Calculate the size of angle *DEB*.

Give a reason for your answer.

Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°



Calculate the size of angle *WXZ*.

Give a reason for your answer.

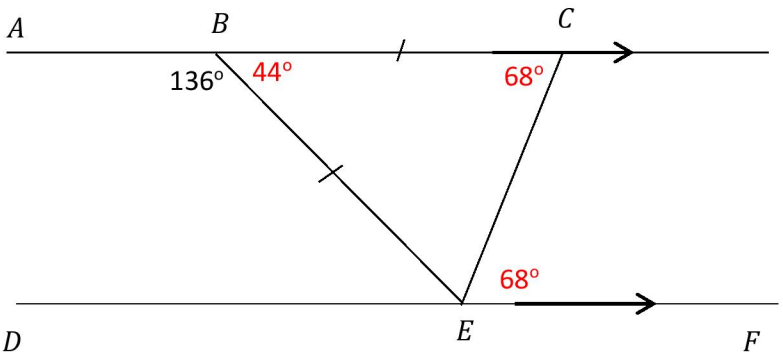
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

3) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

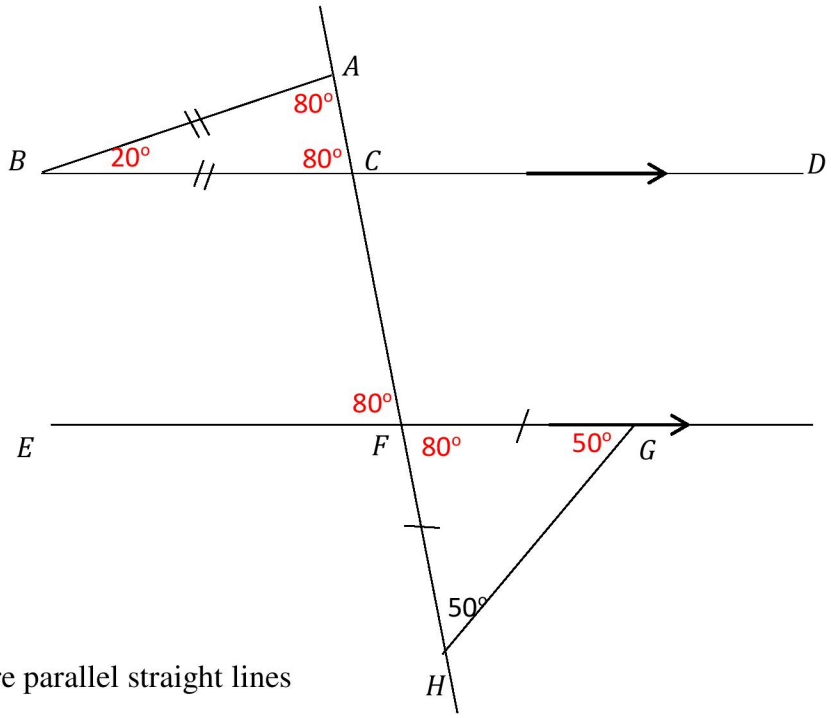
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

3) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

4) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$: $m - 3n = 2p$

$\div 2$: $\frac{m-3n}{2} = p$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$: $a + 4 = 3c$

$\div 3$: $\frac{a+4}{3} = c$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$: $P - 2a = 2b$

$\div 2$: $\frac{P-2a}{2} = b$

or

$P = 2a + 2b$

$P = 2(a + b)$

$\div 2$: $\frac{P}{2} = a + b$

$-a$: $\frac{P}{2} - a = b$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

4) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c =$ $\frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t =$ $\frac{u-30}{7}$

(Total 2 marks)

4) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

$-10 \quad P - 10 = 2q \quad -10$

$\div 2 \quad \frac{P-10}{2} = q \quad \div 2$

$q = \frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square $\quad d^2 = \frac{3h}{2} \quad$ square

$\times 2 \quad 2d^2 = 3h \quad \times 2$

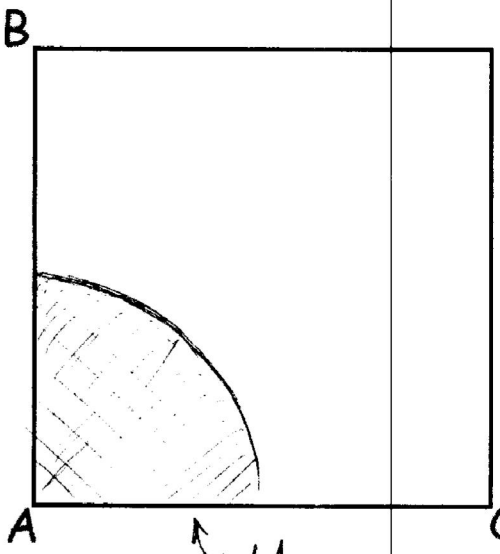
$\div 3 \quad \frac{2d^2}{3} = h \quad \div 3$

$h = \frac{2d^2}{3}$

(Total 2 marks)

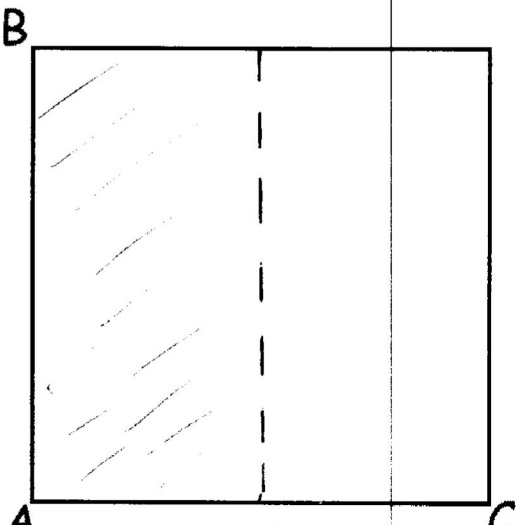
5) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:



Use compass at 3cm

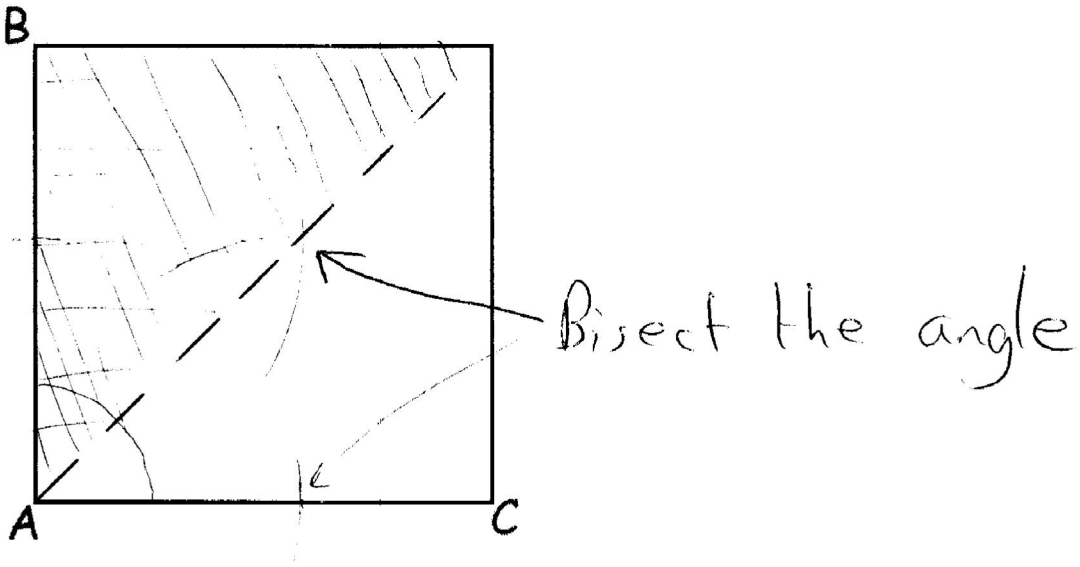
2) Shade the area closer than 3cm to the line AB within the square below:



Just measure 3cm with your ruler

5) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

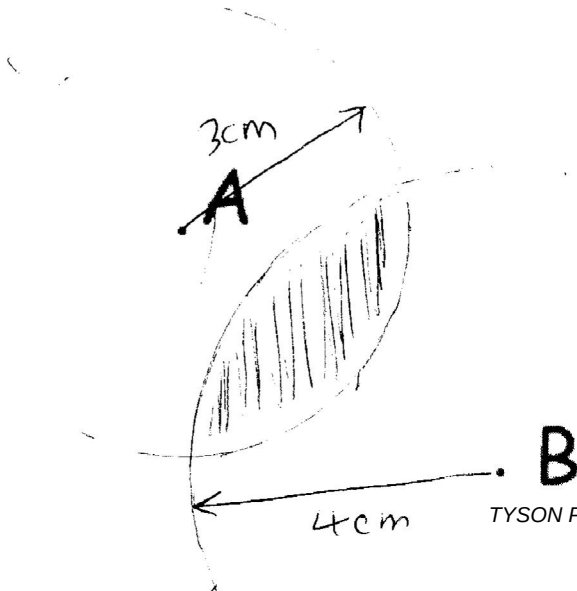


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 5 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

5) Loci and Construction: Harder

5) Mariam wants to plant a flower:

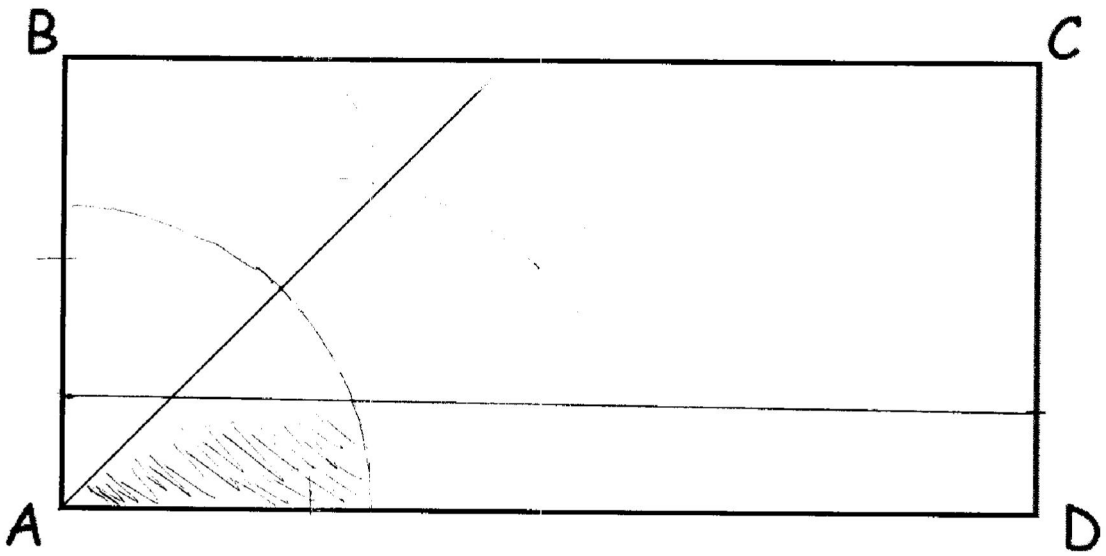
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

WARD Bronte

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	15 from 38	0 from 3	3 from 9	6 from 8	5 from 14	1 from 4
A02 and 3	7 from 42	0 from 7	3 from 19	2 from 4	2 from 9	0 from 3
Total	22 from 80	0 from 10	6 from 28	8 from 12	7 from 23	1 from 7

Your Pinpoint Topics

(1) Sequences. MWatch: 103, Hegarty:

(2) Averages from Frequency Tables. MWatch: 130, Hegarty:

(3) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(4) Changing the Subject of a Formula. MW: 136, Hgrty:

(5) Reverse Percentage. MWatch: 110, Hegarty:

1) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

$5n + 1$

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3, 8, 13, 18, 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126, 122, 118, 114, 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

1) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 −4 ....46.....

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

+4 +4

(a) Work out the 8th term of the number sequence.

6th = 23
7th = 27
8th = 31

.....31.....

(1)

(b) Write down an expression, in terms of n, for the nth term of the number sequence.

4n
Compare to 4 x table

−1 −1 −1
3, 7, 11

..... 4n − 1 .....

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

+7 +7 +7 +7

Find, in terms of n, an expression for the nth term of this sequence.

−5 −5
7 14 21
2 9 16

..... 7n − 5 .....

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

+5 +5

Write down, in terms of n, an expression for the nth term of this sequence.

−3 −3
5 10 15 20
2 7 12 22

..... 5n − 3 .....

(Total 2 marks)

1) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

n is not an integer values, therefore, there will not be a shape with 242 blocks.

2) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

2) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked.

22

(2)

(b) Work out the mean number of cups of coffee drunk.

DRAW 3rd COLUMN

4·59 (2dp)

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

1

(1)

(b) Work out the range of the number of goals scored.

4 − 1

3

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

2·1

(3)

(5 marks)

2) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g

(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90

(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90

(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

(1)

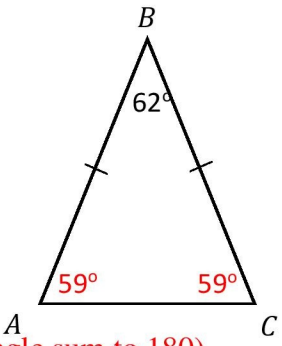
(7 marks)

3) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

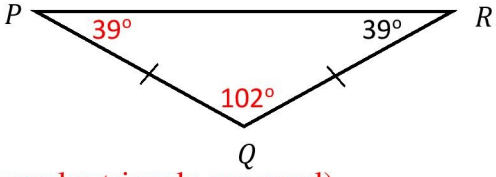
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

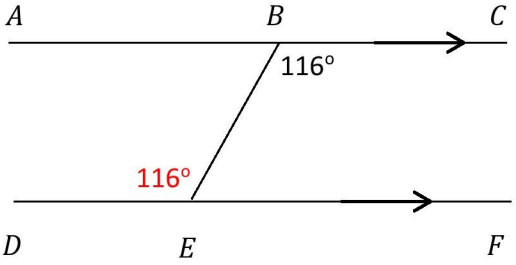
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



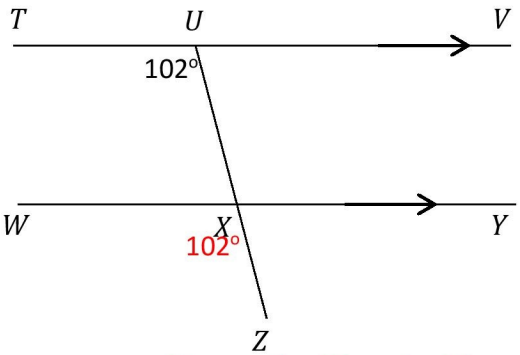
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



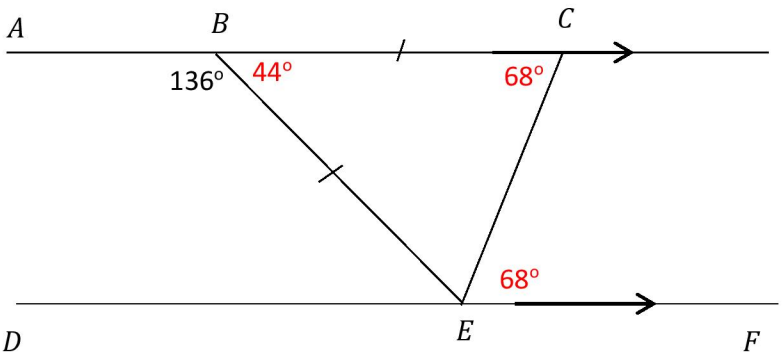
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

3) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

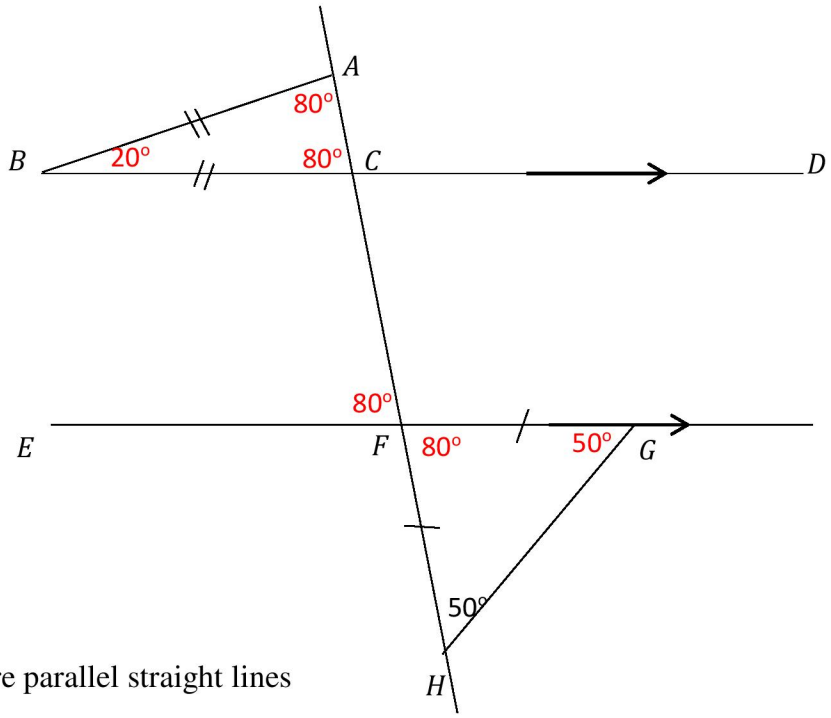
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

3) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

4) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$m - 3n = 2p$ (−3n)

$\frac{m-3n}{2} = p$ (÷2)

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$a + 4 = 3c$ (+4)

$\frac{a+4}{3} = c$ (÷3)

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$P - 2a = 2b$ (−2a)

$\frac{P-2a}{2} = b$ (÷2)

or

$P = 2a + 2b$

$P = 2(a + b)$

$\frac{P}{2} = a + b$ (÷2)

$\frac{P}{2} - a = b$ (−a)

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

4) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4$ | $f + 4 = 3c$ | $+4$

$\div 3$ | $\frac{f+4}{3} = c$ | $\div 3$

$c =$ $\frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

-30 | $u - 30 = 7t$ | -30

$\div 7$ | $\frac{u-30}{7} = t$ | $\div 7$

$t =$ $\frac{u-30}{7}$

(Total 2 marks)

4) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q = \frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h = \frac{2d^2}{3}$

(Total 2 marks)

5) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

5) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

£236.25÷ 0.75^2

= £420

…… **(3)**

5) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

WREN Francesca

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	13 from 38	0 from 3	5 from 9	4 from 8	4 from 14	0 from 4
A02 and 3	10 from 42	2 from 7	4 from 19	1 from 4	3 from 9	0 from 3
Total	23 from 80	2 from 10	9 from 28	5 from 12	7 from 23	0 from 7

Your Pinpoint Topics

(1) Averages from Frequency Tables. MWatch: 130, Hegarty:

(2) Triangles and Parallel Lines. MWatch: 33, Hegarty:

(3) Frequency trees. MWatch: 57, Hegarty:

(4) Reverse Percentage. MWatch: 110, Hegarty:

(5) Speed. MWatch: 142, Hegarty:

1) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 − 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 .....30.2.....

(3 marks)

1) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked.

22

(2)

(b) Work out the mean number of cups of coffee drunk.

DRAW 3rd COLUMN

4·59 (2dp)

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

1

(1)

(b) Work out the range of the number of goals scored.

4 − 1

3

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

2·1

(3)

(5 marks)

1) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g
(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90
(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90
(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

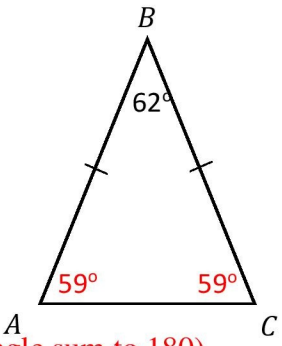
(1)
(7 marks)

2) Triangles and Parallel Lines: Easier

1) (a) *ABC* is an isosceles triangle with *AB* = *BC*
Angle *ABC*= 62°

Calculate the size of angle *BAC*.

Give a reason for each stage in your working.



Missing angles total: 180 – 62 = 118 (angles in a triangle sum to 180)

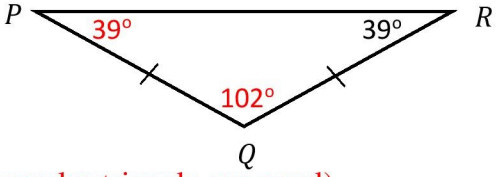
Angle *BAC*: 118 ÷ 2 = 59 (base angles in an isosceles triangle are equal)

.....59° .....

(b) *PQR* is an isosceles triangle with *PQ* = *QR*
Angle *PRQ* = 39°

Calculate the size of angle *PQR*.

Give a reason for each stage in your working.



Base angles sum: 39 + 39 = 78 (base angles in a isosceles triangle are equal)

Angle *PQR*: 180 – 78 = 102 (angles in a triangle sum to 180)

.....102°.....

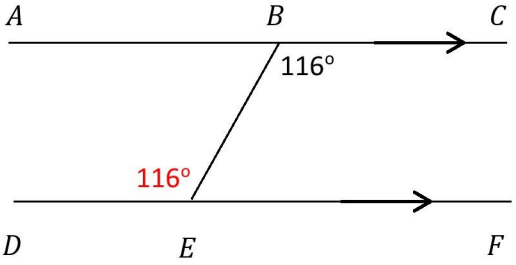
(4 Marks)

---

2) (a) *ABC* and *DEF* are parallel straight lines
Angle *CBE*= 116°

Calculate the size of angle *DEB*.

Give a reason for your answer.



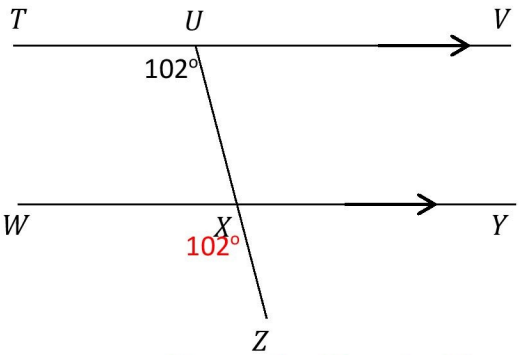
Angle *DEB* and angle *CBE* are equal because alternate angles (Z-angles) in parallel lines are equal.

.....116°.....

(b) *TUV* and *WXY* are parallel straight lines
Angle *TUX*= 102°

Calculate the size of angle *WXZ*.

Give a reason for your answer.



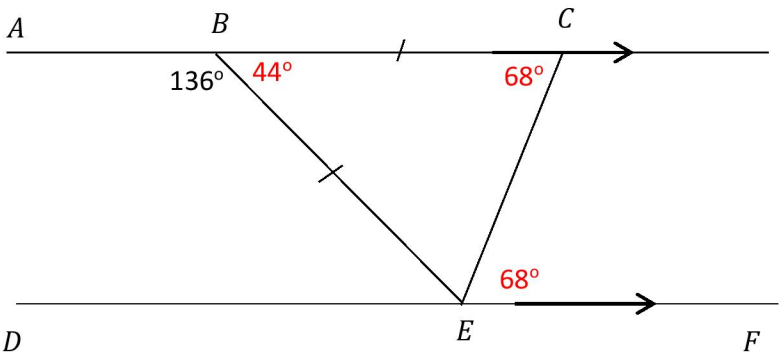
Angle *WXZ* and angle *TUX* are equal because corresponding angles (F-angles) in parallel lines are equal.

.....102° .....

(2 Marks)

2) Triangles and Parallel Lines: Medium

3)



ABC and *DEF* are parallel straight lines

BCE is an isosceles triangle with *BC* = *BE*

Angle *ABE*= 136°

Calculate the size of angle *CEF*.

Give a reason for each stage in your working.

Angle *CBE* = 180-136 = 44° because angles on a straight line sum to 180°

Angle *BCE* = (180-44) ÷ 2 =68° because angles in a triangle sum to 180° and base angles in an isosceles triangle are equal.

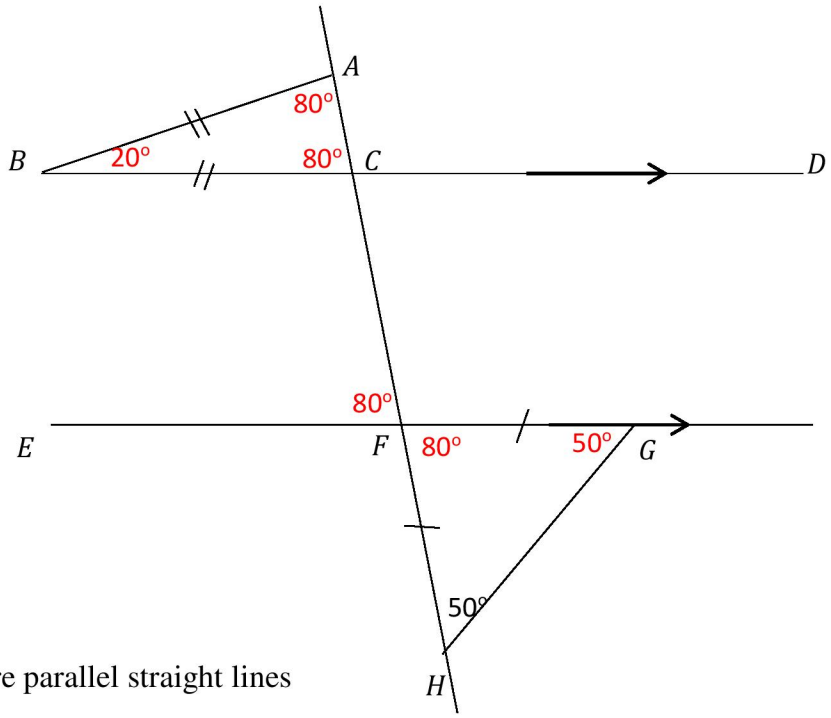
Angle *CEF* = 68° alternate angles (Z-angles) are equal.

……68° ……

(3 Marks)

2) Triangles and Parallel Lines: Harder

4)



BCD and *EFG* are parallel straight lines

ABC is an isosceles triangle with $AB = BC$

FGH is an isosceles triangle with $FH = FG$

Angle $FHG = 50^o$

Calculate the size of angle *ABC*.

Give a reason for each stage in your working.

Angle $FGH = 50^o$ because base angles in an isosceles triangle are equal

Angle $HFG = 180 - (50 + 50) = 180\text{-}100 = 80^o$ because angles in a triangle sum to 180^o

Angle $EFC = 80^o$ because vertically opposite angles are equal

Angle $ACB = 80^o$ because corresponding angles in parallel lines are equal

Angle $BAC = 80^o$ because base angles in an isosceles triangle are equal

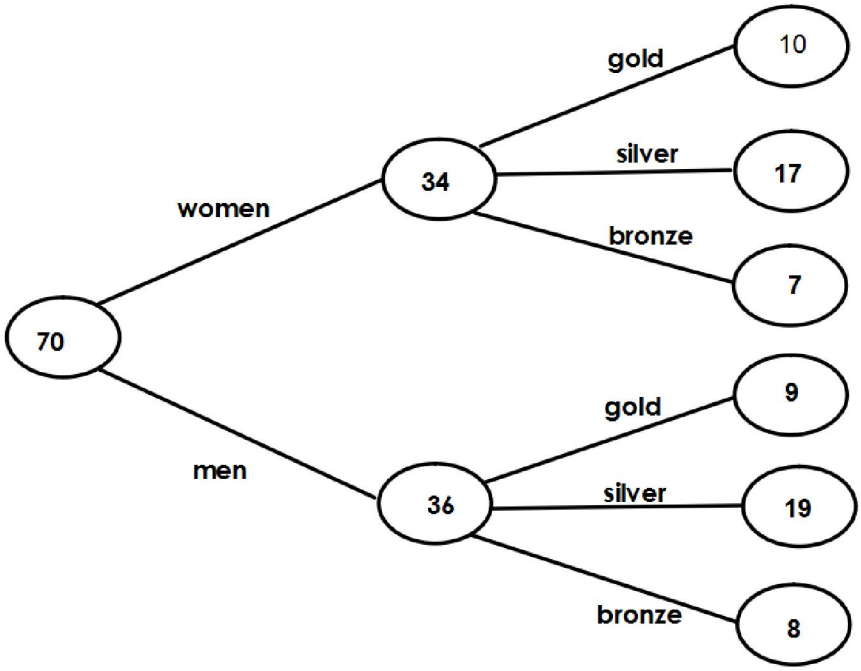
Angle $ABC = 180 - (80 + 80) = 180\text{-}160 = 20^o$ because angles in a triangle sum to 180^o

……20^o ……

(6 Marks)

3) Frequency trees: Easier

1) The frequency tree below shows the results of an athletics competition.



a) How many women received medals in the competition? 34

_____

(1 Mark)

b) How many gold medals were awarded to men?

9

_____

(1 Mark)

c) How many people won medals in the competition?

70

_____

(1 Mark)

d) How many bronze medals were awarded?

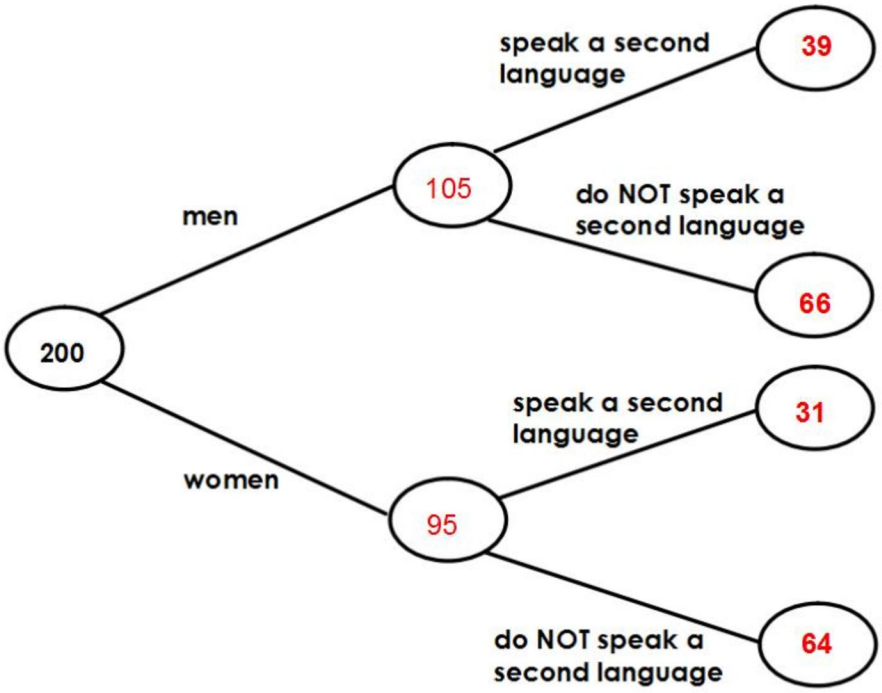
7+8=15 15

_____

(1 Mark)

3) Frequency trees: Medium

2) In an office, there are 200 employees. 105 are men. Employees are asked if they speak a second language. 70 employees say they speak a second language. 31 women speak a second language. Fill in the frequency tree.



(3 marks)

b) A woman is chosen at random. Use your frequency tree to write down the probability that she speaks a second language.

$\frac{31}{95}$

(1 Mark)

c) An employee is chosen at random. Use your frequency tree to write down the probability that they do not speak a second language.

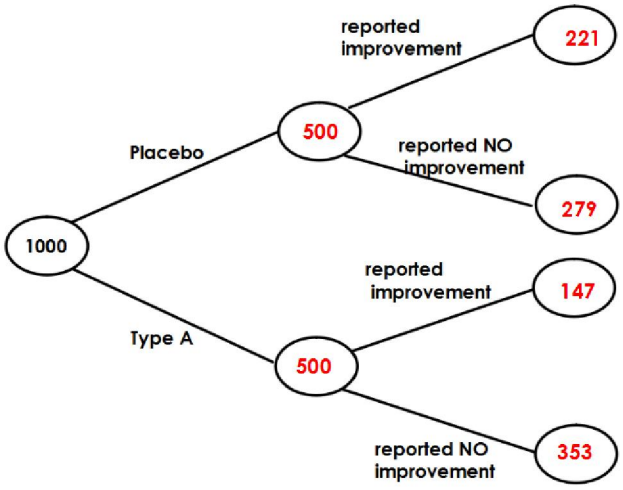
64+66=130

$\frac{130}{200}$

(1 Mark)

3) Frequency trees: Harder

3) 1000 people take part in a clinical trial. 500 were given the placebo drug. The rest were given Type A. Of the patients given Type A, 221 patients reported improvement. Overall, 368 patients reported an improvement. Complete the frequency tree.

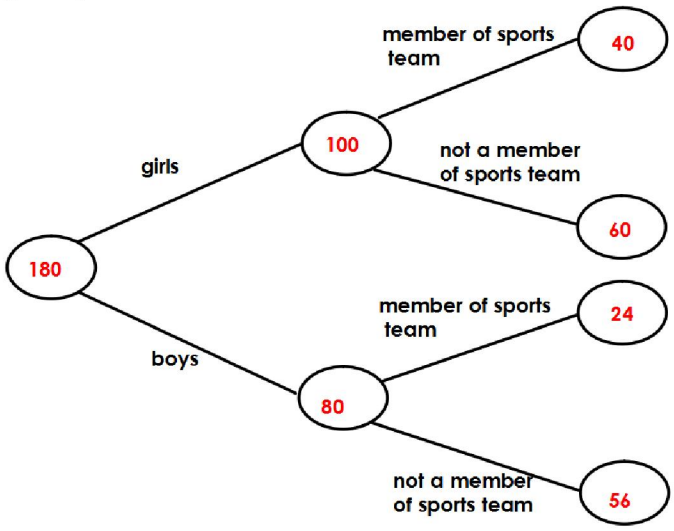


b) What is the ratio of patients that reported improvement to those who reported no improvement. 368:632

46:79

(1 Mark)

4) In a year group in a school there are 180 pupils. The ratio of boys to girls is 4:5 30% of the boys are part of a sports team. 40% of the girls are part of a sports team. Complete the frequency tree.



(4 Marks)

4) Reverse Percentage: Easier

1. A shop offers 25% discount on its products in the January Sale. A Sofa costs £450 in the sale. How much did it cost originally?

$$450 \div 0.75 = 600$$

£600

…… **(3)**

2. A low fat yoghurt claims to have 20% less fat than its full fat equivalent. The low fat yoghurt has 12g of fat. How much does the full fat equivalent have?

$$12g \div 0.8 = 15g$$

$15g$

…… **(3)**

3. A telephone company comes up with a strategy that reduces their customers wait time by 30%. After they have implemented the strategy a customer waits for 14 minutes. How long would they have waited for before the strategy was implemented?

$$14 \div 0.7 = 20\ mins$$

$20\ mins$

…… **(3)**

4) Reverse Percentage: Medium

4. A tax on sugary products at 5% is implemented by a new government. After the tax a chocolate bar costs 84p. How much has is increased by in pence?4

$84 \div 1.05 = 80p$

84 - 80 = 4p

4p

…… **(3)**

5. A smartphone depreciates in value every year by 25%. After 2 years the value of the smartphone is £236.25. What was its value when new?

$£236.25 \div 0.75^2$

= £420

…… **(3)**

4) Reverse Percentage: Harder

*6. Two cities have different population growths

CITY A	CITY B
Growth 2% per year	Growth 5% Per year

At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**

5) Speed: Easier

1) Pete drove 50 miles in 4 hours
Work out his average speed in miles per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{50}{4} = \frac{25}{2} = 12.5 \text{ mph}$$

_____12.5_____miles/hour

(2 Marks)

---

2) Dave cycled 8km in 30 minutes.
Work out Dave's average speed in km/h.

30 mins = 0.5 hours

$$\text{speed} = \frac{8}{0.5} = 16 \text{ km/h}$$

_____16_____Km/h

(3 Marks)

---

3) Jess travels 400km at an average speed of 300 km/h.
How long was she travelling for? Give your answer in minutes.

$$s = \frac{d}{t} \quad \text{so} \quad t = \frac{d}{s} = \frac{400}{300} = \frac{4}{3} = 1\tfrac{1}{3} \text{ h}$$

1 h = 60 mins so $\frac{1}{3}$ h = 20 mins

so total time = 60 + 20 = 80 mins

_____80_____minutes

(3 Marks)

---

4) Jeff set off for work at 3pm. He arrived at his destination at 5pm.
If Jeff travelled at a constant speed of 24 Km/h, how far did he travel?

t = 2 hours

$$s = \frac{d}{t} \quad \text{so} \quad d = s \times t = 24 \times 2 = 48 \text{ km}$$

_____48_____Km

(2 Marks)

---

5) Speed: Medium

Pete needs to catch a ferry.

Pete leaves his home and drives

10 miles towards the motorway

180 miles on the motorway

15 miles from the motorway to the ferry port

Pete

Takes 20 minutes to get to the motorway

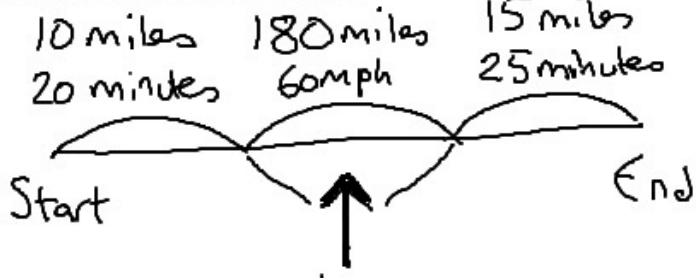
Drives at an average speed of 60mph whilst on the motorway

Takes 25 minutes to get from the motorway to the ferry port.

Pete has to arrive at the ferry port no later than midday.

What is the latest time Pete can leave his house?

You must show all your working.



T = D/S

T = 180/60 = 3 hours

Total time

3 hours

25 minutes

20 minutes +

3hrs 45 mins

Midday = 12:00pm

3hrs 45 mins

Answer = 8:15am

5) Speed: Harder

Abigail is on a bus going into the city.

The bus picks her up and drives

4 miles towards a motorway

45 miles on the motorway

6 miles from the motorway to the city bus depot

The bus

Takes 10 minutes to get to the main road

Drives at an average speed of 60mph whilst on the motorway

Takes 15 minutes to get from the motorway to the bus depot

Abigail gets on the bus at 10:19am. What time will she get off the bus?

You must show all your working.

4miles 10mins | 45mins 60mph | 6miles 15mins

Start — End

$T = D/S$

$T = 45/60 = \frac{3}{4}$

$= 45$mins

Total time taken

45
15
10
70mins
or 1hr 10mins

10:19 + 1hr 10mins

11:29am

RIDDELL Jake

9to1_AQA_Nov2017_GCSE_3H

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Your Exam Statistics

Strand	Overall	Number	Algebra	Data	Shape	Ratio
AO1	26 from 38	0 from 3	4 from 9	7 from 8	11 from 14	4 from 4
A02 and 3	10 from 42	0 from 7	4 from 19	2 from 4	4 from 9	0 from 3
Total	36 from 80	0 from 10	8 from 28	9 from 12	15 from 23	4 from 7

Your Pinpoint Topics

(1) Sequences. MWatch: 103, Hegarty:

(2) Averages from Frequency Tables. MWatch: 130, Hegarty:

(3) Changing the Subject of a Formula. MW: 136, Hgrty:

(4) Loci and Construction. MWatch: 165, Hegarty:

(5) Reverse Percentage. MWatch: 110, Hegarty:

1) Sequences: Easier

1. Here are the first 5 terms of an arithmetic sequence.

5 10 15

6, 11, 16, 21, 26

+5 +5

Find an expression, in terms of n, for the nth term of the sequence.

5n + 1

(Total 2 marks)

2. Here are the first five terms of a number sequence.

3, 8, 13, 18, 23

+5 +5

(a) Write down the next **two** terms of the sequence.

28, 33

(2)

(b) Explain how you found your answer.

The sequence goes up by 5 each time

(1)

(c) Explain why 387 is **not** a term of the sequence.

Because every term ends in either 3 or 8 and 387 ends in a 7.

(1)

(Total 4 marks)

3. Here are the first five terms of a number sequence.

126, 122, 118, 114, 110

−4 −4

(a) Write down the next two terms of the number sequence.

106, 102

(1)

(b) Explain how you found your answer.

I took away 4 from the previous term

(1)

1) Sequences: Medium

The 20th term of the number sequence is 50

(c) Write down the 21st term of the number sequence.

50 −4 ....46.....

(1)

(Total 3 marks)

4. Here are the first five terms of a number sequence.

3 7 11 15 19

+4 +4

(a) Work out the 8th term of the number sequence.

6th = 23
7th = 27
8th = 31

.....31.....

(1)

(b) Write down an expression, in terms of n, for the nth term of the number sequence.

4n
Compare to 4 x table

−1 −1 −1 −1
3, 7, 11

..... 4n − 1 .....

(2)

(Total 3 marks)

5. The first five terms of an arithmetic sequence are

2 9 16 23 30

+7 +7 +7 +7

Find, in terms of n, an expression for the nth term of this sequence.

−5 7 14 21
2 9 16

..... 7n − 5 .....

(Total 2 marks)

6. The first five terms of an arithmetic sequence are

2 7 12 17 22

+5 +5

Write down, in terms of n, an expression for the nth term of this sequence.

−3 5 10 15 20
2 7 12 22

..... 5n − 3 .....

(Total 2 marks)

1) Sequences: Harder

Solutions for Question 1:

a) Pebbles in each shape: 1 5 9 13
Nth term of a sequence is given: $?n+?$
Each term is larger than the previous term by 4: $4n+?$
Compare the 4 times table with our rule:

4	8	12	16
1	5	9	13

The sequence is 3 less than the 4 times table: $4n-3$

b) For number of pebbles in the next 3 shapes:
$13+4=17$
$17+4=21$
$21+4=25$

c) Substitute 25 into $4n-3$:
$4(25)-3$
97

d) Form equation: $4n-3=117$
Add 3 to both sides: $4n=120$
Dividing both sides by 4 gives: $n=30$

Solutions for Question 2:

a) Blocks in each shape: 5 7 9
Each term is larger than the previous term by 2
Number of blocks in the next 2 shapes:
$9+2=11$
$11+2=13$

b) Each term is larger than the previous term by 2: $2n+?$
Compare the 2 times table with our rule:

2	4	6
5	7	9

The sequence is 3 more than the 2 times table: $2n+3$

c) Substitute 30 into $2n+3$:
$2(30)+3$
63

d) Form equation: $2n+3=242$
Take away 3 from both sides: $2n=239$
Dividing both sides by 2 gives: $n=\frac{239}{2}$

n is not an integer values, therefore, there will not be a shape with 242 blocks.

2) Averages from Frequency Tables: Easier

1. Amanda collected 20 leaves and wrote down their lengths, in cm.

Here are her results.

5 6 5 2 4 5 8 7 5 4

7 6 4 3 5 7 6 4 8 5

(a) Complete the frequency table to show Amanda's results.

Length in cm	Tally	Frequency
2	|	1
3	|	1
4	||||	4
5	𝍸 |	6
6	|||	3
7	|||	3
8	||	2

(2)

(b) Write down the modal length → highest frequency 5 .....cm **(1)**

(c) Work out the range. 6 .....cm **(1)**

8 - 2

(4 marks)

2. Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

Number of drawing pins	Frequency	Number × freq
29	2	58
30	5	150
31	2	62
32	1	32
	10	302

TOTAL NUMBER OF PINS

Work out the mean number of drawing pins in a box.

302 ÷ 10 30·2 .....

(3 marks)

2) Averages from Frequency Tables: Medium

3. Andy did a survey of the number of cups of coffee some pupils in his school had drunk yesterday.

The frequency table shows his results.

Number of cups of coffee	Frequency	No. x FREQ
2	1	2
3	3	9
4	5	20
5	8	40
6	5	30
		22

TOTAL FREQUENCY → 10 1

(a) Work out the number of pupils that Andy asked.

22

(2)

(b) Work out the mean number of cups of coffee drunk.

DRAW 3rd COLUMN

4·59 (2dp)

(3)

(5 marks)

4. 20 students scored goals for the school hockey team last month.
The table gives information about the number of goals they scored.

Goals scored	Number of students	Goals x students
1	9	9
2	3	6
3	5	15
4	3	12
		42

TOTAL

(a) Write down the modal number of goals scored.

GROUP WITH HIGHEST FREQ.

1

(1)

(b) Work out the range of the number of goals scored.

4 − 1

3

(1)

(c) Work out the mean number of goals scored.

42 ÷ 20

2·1

(3)

(5 marks)

2) Averages from Frequency Tables: Harder

9. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency	Midpoint	f × m
$50 \leq w < 60$	5	55	275
$60 \leq w < 70$	9	65	585
$70 \leq w < 80$	22	75	1650
$80 \leq w < 90$	27	85	2295
$90 \leq w < 100$	17	95	1615
	80		6420

(a) Work out an estimate for the mean weight of the pebbles.

6420 ÷ 80

80.25g
(3)

(b) Write down the modal class interval.

group with highest freq

80≤w<90
(1)

(c) Find the class interval that contains the median.

80 → median between 40 and 41

5+9=16
16+22=38
38+27=65 (median in here)

80≤w<90
(2)

(d) Why is your answer to part (a) and estimate?

Data is grouped and so we don't know actual values

(1)
(7 marks)

3) Changing the Subject of a Formula: Easier

1. Make p the subject of the formula $m = 3n + 2p$

$m = 3n + 2p$

$-3n$ | $m - 3n = 2p$ | $-3n$

$\div 2$ | $\frac{m-3n}{2} = p$ | $\div 2$

$p = \frac{m-3n}{2}$

(Total 2 marks)

2. Make c the subject of the formula $a = 3c - 4$

$a = 3c - 4$

$+4$ | $a + 4 = 3c$ | $+4$

$\div 3$ | $\frac{a+4}{3} = c$ | $\div 3$

$c = \frac{a+4}{3}$

(Total 2 marks)

3. Make b the subject of the formula $P = 2a + 2b$

$P = 2a + 2b$

$-2a$ | $P - 2a = 2b$ | $-2a$

$\div 2$ | $\frac{P-2a}{2} = b$ | $\div 2$

or

$P = 2a + 2b$

$\div 2$ | $P = 2(a+b)$ | $\div 2$

$-a$ | $\frac{P}{2} = a + b$ | $-a$

$b = \frac{P-2a}{2}$ or $b = \frac{P}{2} - a$

(Total 2 marks)

3) Changing the Subject of a Formula: Medium

4. Make c the subject of the formula $f = 3c - 4$

$f = 3c - 4$

$+4 \quad f + 4 = 3c \quad +4$

$\div 3 \quad \frac{f+4}{3} = c \quad \div 3$

$c = \frac{f+4}{3}$

(Total 2 marks)

5. Make t the subject of the formula

$$u = 7t + 30$$

$u = 7t + 30$

$-30 \quad u - 30 = 7t \quad -30$

$\div 7 \quad \frac{u-30}{7} = t \quad \div 7$

$t = \frac{u-30}{7}$

(Total 2 marks)

3) Changing the Subject of a Formula: Harder

14. Make q the subject of the formula $P = 2q + 10$

$P = 2q + 10$

-10 | $P - 10 = 2q$ | -10

$\div 2$ | $\frac{P-10}{2} = q$ | $\div 2$

$q =$ $\frac{P-10}{2}$

(Total 2 marks)

15. When you are h feet above sea level, you can see d miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

Make h the subject of the formula $d = \sqrt{\frac{3h}{2}}$

$d = \sqrt{\frac{3h}{2}}$

square | $d^2 = \frac{3h}{2}$ | square

$\times 2$ | $2d^2 = 3h$ | $\times 2$

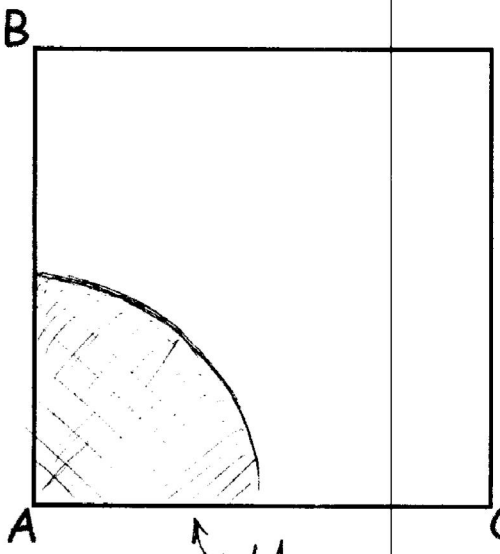
$\div 3$ | $\frac{2d^2}{3} = h$ | $\div 3$

$h =$ $\frac{2d^2}{3}$

(Total 2 marks)

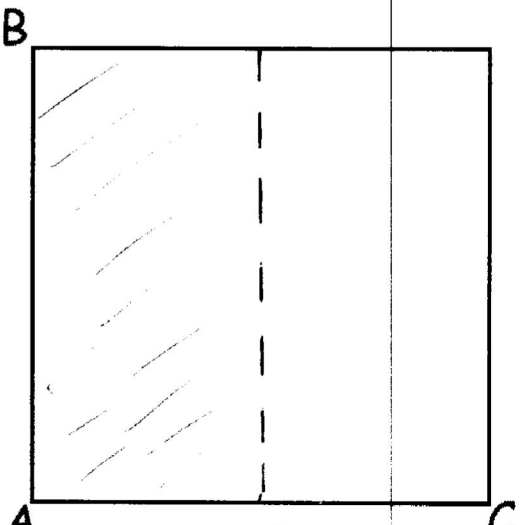
4) Loci and Construction: Easier

1) Shade the area closer than 3cm to point A within the square below:



Use compass at 3cm

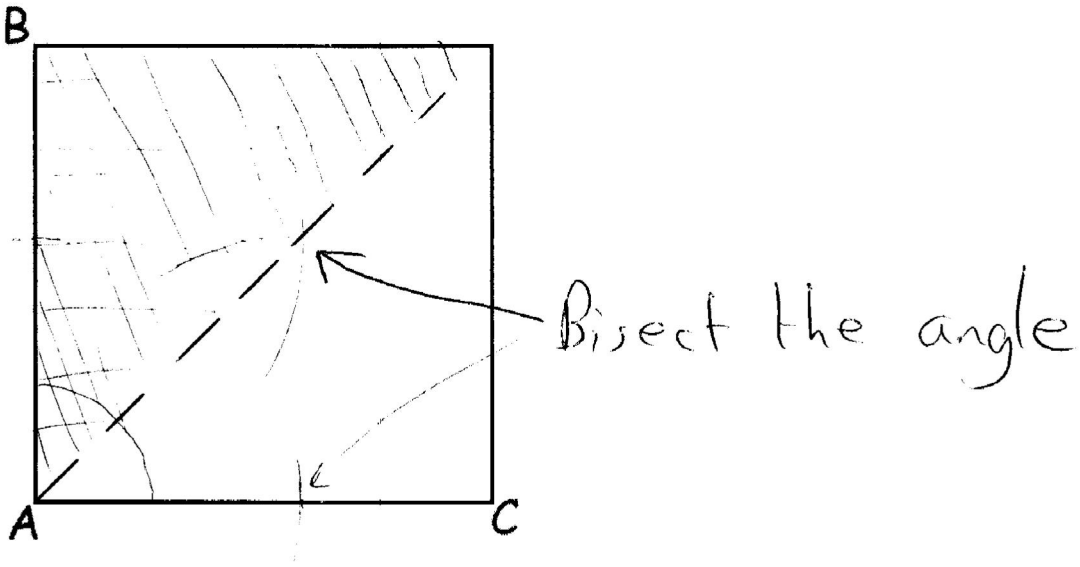
2) Shade the area closer than 3cm to the line AB within the square below:



Just measure 3cm with your ruler

4) Loci and Construction: Medium

3) Shade the area closer to the line AB than AC within the square below:

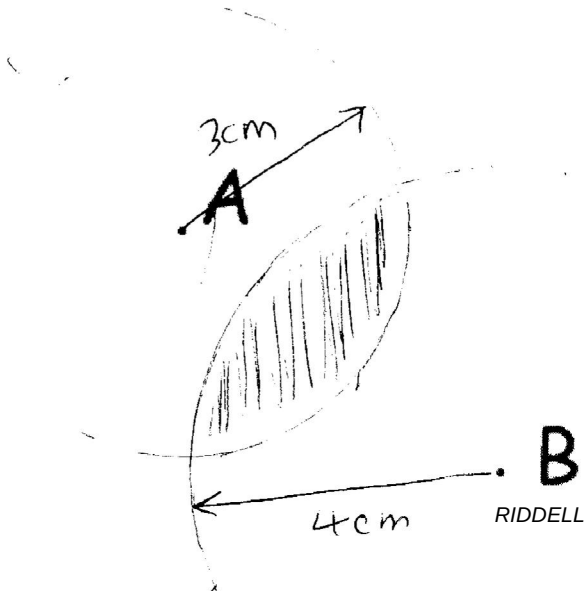


4) Two mobile phone stations transmit a signal.

Mobile phone station A transmits its signal 3 miles.

Mobile phone station B transmits its signal 4 miles.

When you can receive both signals you experience interference on your phone. Shade below the area of interference.



Scale: 1 cm represents 1 mile

4) Loci and Construction: Harder

5) Mariam wants to plant a flower:

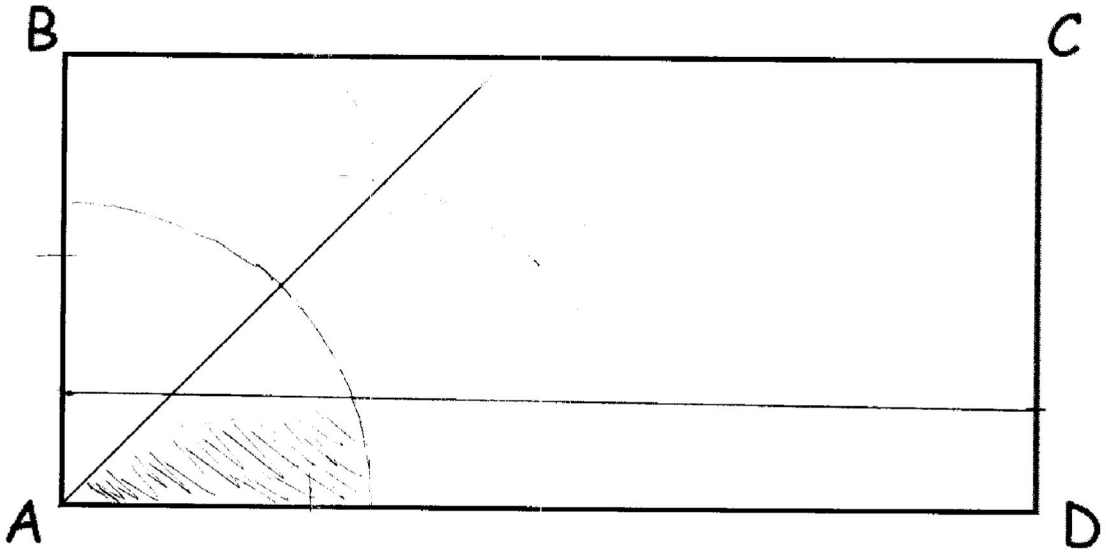
Within 4m of A

Closer to AD than AB

Less than 1.5m from AD.

Shade below the region where Mariam should plant her flower.

Show any construction lines your draw.



Scale: 1 cm represents 1 metre

5) Reverse Percentage: Easier

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£600

…… **(3)**

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…… **(3)**

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$20\ mins$

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4p

…… **(3)**

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…… **(3)**

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At the end of 2015 the population of City A was 20400, and the population of City B was 20475. By how much did the populations differ at the end of 2014?

CITY A

$$20400 \div 1.02 = 20000$$

CITY B

$$20475 \div 1.05 = 19500$$

$$20000 - 19500 = 500$$

There was a difference of 500 people at the end of 2014

…… **(4)**