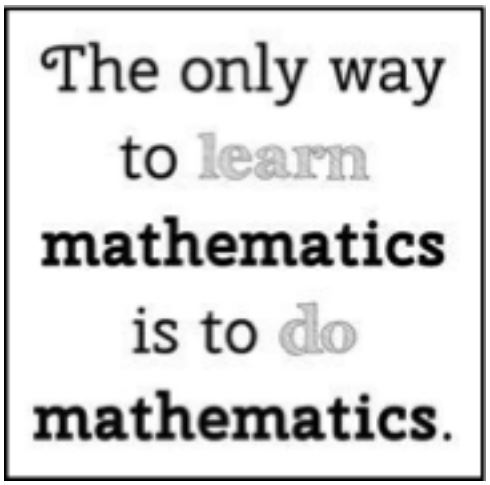
Yr11 Preparations

Effort		
R	A	G

GCSE Maths



Non-Calculator Practice Booklet (H)

Name: _____

Paper 1 – Non Calculator

Week	Topics	R	A	G
Number				
1	Rounding & Estimating			
	Limits of Accuracy			
	Product of Primes, HCF & LCM			
	Fractions - Four Operations			
	Percentage Increase / Decrease Change			
	Product Rule for Counting			
	Rules of Indices			
	Surds			
Algebra				
2	Expanding Brackets			
	Quadratic Graphs			
	Simultaneous Equations			
	Quadratic Equations			
Ratio & Proportion				
3	Ratio Problems, Ratios to Fractions			
	Share in a Given Ratio			
	Recipe Problems			
	Direct & Inverse Proportion - Algebraically			
Geometry				
4	Area & Perimeter of 2D Shapes			
	Area & Volume			
	Plans & Elevations			
	Transformations			
	Trigonometry			
Statistics & Probability				
5	Cumulative Frequency Graphs			
	Box Plots			
	Averages & Quartiles			
	Frequency Polygons			
	Mutually Exclusive Events			
	Probability Trees			
	Conditional Probability			

Topics -

Number

Rounding & Estimating

Question 1

Round 0.005 694 to 3 significant figures.

.....

(1 mark)

Question 2

Use approximations to estimate the value of

$$\frac{21.6 \times 98}{34 + 18.6}$$

.....

(3 marks)

Question 3

A plane travels at a speed of 213 miles per hour.

Work out an estimate for the number of seconds the plane takes to travel 1 mile.

..... seconds

(3 marks)

Question 4

Kelly runs a distance of 100 metres in a time of 10.52 seconds.
The distance of 100 metres was measured to the nearest metre.

The time of 10.52 seconds was measured to the nearest hundredth of a second.

(a) Write down the upper bound for the distance of 100 metres.

..... metres

(1 mark)

Question 5

The width of a bench, b, is 984.8 cm correct to one decimal place.

Write down the error interval for the width of the bench.

.....

(2 marks)

Question 6

$$y = \frac{2a}{b - c}$$

$a = 42$ correct to 2 significant figures.

$b = 24$ correct to 2 significant figures.

$c = 14$ correct to 2 significant figures.

Work out the lower bound for the value of y.
Give your answer correct to 2 significant figures.

$y =$ .....

(3 marks)

Question 7

Write 525 as a product of its prime factors.

.....

(3 marks)

Question 8

Find the Lowest Common Multiple of 64 and 80

.....

(2 marks)

Question 9

$$A = 3^5 \times 5 \times 7^3$$

$$B = 2^3 \times 3 \times 7^4$$

$$C = 2^p \times 5^q \times 7^r$$

Given that

the HCF of B and C is $2^3 \times 7$

the LCM of A and C is $2^4 \times 3^5 \times 5^2 \times 7^3$

find the value of p, the value of q and the value of r.

.....

(2 marks)

Question 10

Evaluate $2\frac{1}{3}+\frac{4}{5}$.

.....

(2 marks)

Question 11

Work out

$$2\frac{2}{3}\times 1\frac{3}{4}$$

.....

(3 marks)

Question 12

Work out

$$4\frac{3}{8}\div 5\frac{1}{4}$$

Give your answer as a fraction in its simplest form.

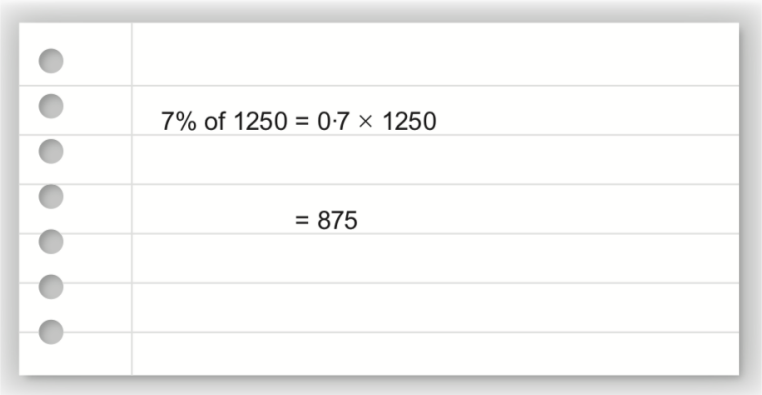
.....

(3 marks)

Question 13

Anoosha tries to calculate 7% of 1250.

She writes the following:



Anoosha is incorrect.

What multiplication should she have written and what is the correct answer?

..... x 1250

= .....

(2 marks)

Question 14

h is 60% of m.

Write an equation connecting h and m.

$h =$ .....

(1 mark)

Question 15

A company bought a new truck.
Each year the value of the truck depreciates by 20%.
The value of the new truck can be multiplied by a single number to find its value at the end of four years.

Find this single number as a decimal.

.....

(2 marks)

Product Rule for Counting-670 – 673

Question 16

A 5-course banquet has 3 options for each course.
The number of possible 5-course meals is m.

Find the value of m.

$m =$ .....

(2 marks)

Question 17

A 5-course banquet has 3 options for each course.

The caterer for the banquet decides to change the menu so that there are only 2 options for the first course. The options for the other course remain the same.

The number of possible 5-course meals is now pm where $m = 243$

Find the value of p.

$p =$ .....

(2 marks)

Question 18

Simplify fully

$$(3x^2y^4)^2$$

.....

(2 marks)

Question 19

Work out

$$64^{\frac{2}{3}}$$

.....

(2 marks)

Question 20

$x^{\frac{1}{2}} = 6$ and $y^{-3} = 64$

Work out the value of $\frac{x}{y}$

$\frac{x}{y} =$ .....

(4 marks)

Question 21

Select the value that is equivalent to $\sqrt{50} + \sqrt{32}$

[ ] $9\sqrt{2}$

[ ] 41

[ ] $\sqrt{82}$

[ ] $2\sqrt{41}$

(1 mark)

Question 22

Expand and simplify

$$(3 + \sqrt{2})(5 - \sqrt{2})$$

.....

(2 marks)

Question 23

Rationalise the denominator and simplify

$$\frac{5\sqrt{5} - 2}{2\sqrt{5} - 3}$$

.....

(4 marks)

Algebra

Expanding Brackets- 161 - 164, 166

Question 24

Expand and simplify

$$5(4x + 3) - (3x - 1)$$

.....

(2 marks)

Question 25

Expand and simplify

$$(2x + 1)(x - 3)$$

.....

(2 marks)

Question 26

Expand and simplify

$$(x + 2)(2x - 3)(3x + 1)$$

.....

(3 marks)

Complete the table of values for $y = x^2 - 5x + 6$

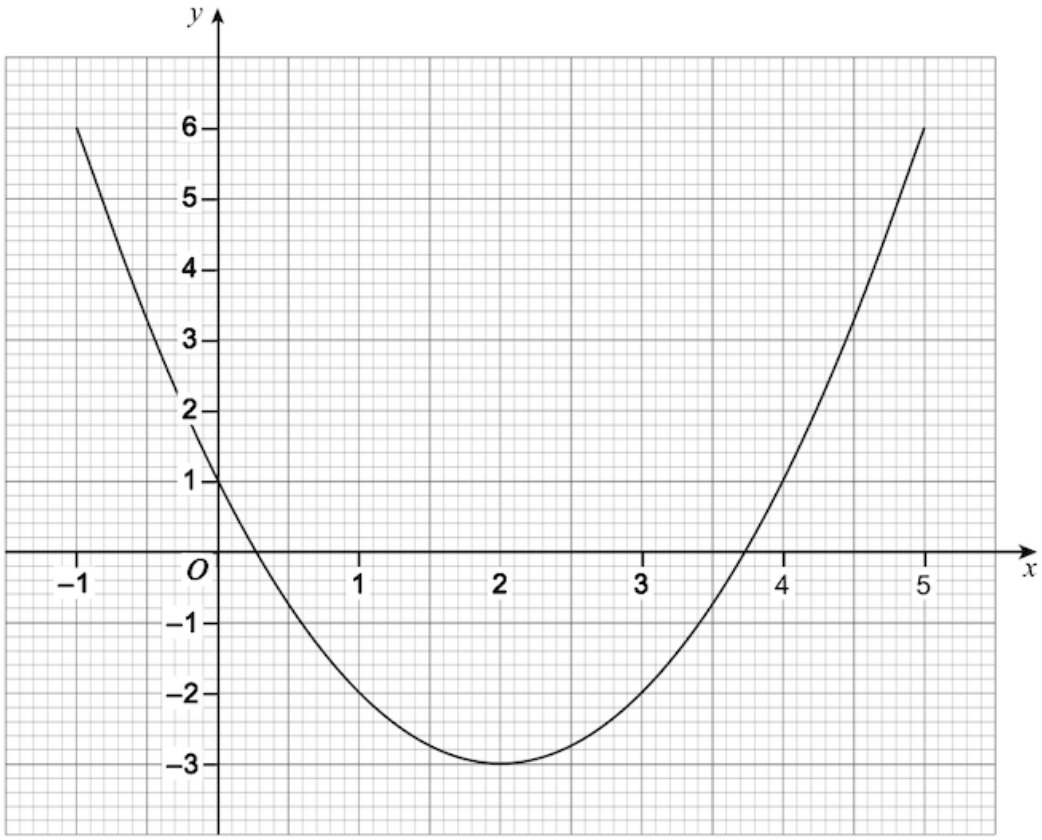
x	0	1	2	3	4	5
y	6	.....	0	0	2	.....

(1 mark)

Question 28

The function $f(x) = x^2 - 4x + 1$ has domain $-1 \leq x \leq 5$

Here is the graph of $y = f(x)$



Write down the equation of the line of symmetry of the graph.

.....

(1 mark)

Question 29

You are given that $x^2 + 6x + 2 \equiv (x + 3)^2 - 7$

Write down the coordinates of the minimum point on the curve $y = x^2 + 6x + 2$

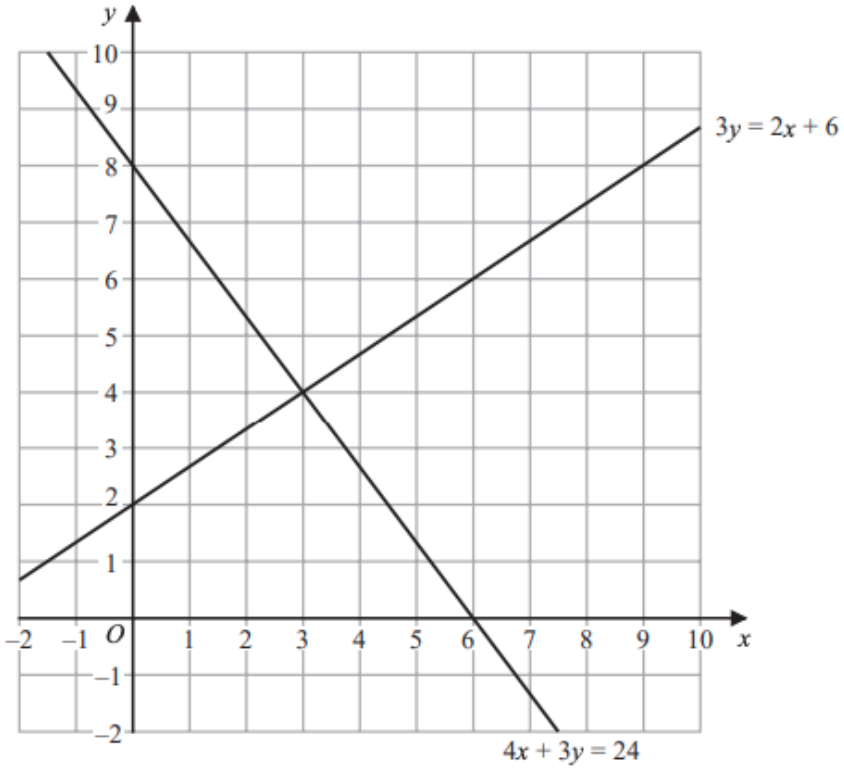
.....

(1 mark)

Simultaneous Equations

Question 30

The diagram shows two straight lines drawn on a grid.



Write down the solution of the simultaneous equations

$$3y = 2x + 6$$

$$4x + 3y = 2$$

.....

(1 mark)

Question 31

Brian and Bob visit a ski resort. Brian buys 3 full passes and 4 restricted passes. The total cost of his passes is £185.
This can be illustrated by the equation $3f + 4r = 185$.

Bob buys 2 full passes and 3 restricted passes. The total cost of his passes is £130.
This can be illustrated by the equation $2f + 3r = 130$.

Find the cost of a restricted pass and the cost of a full pass.

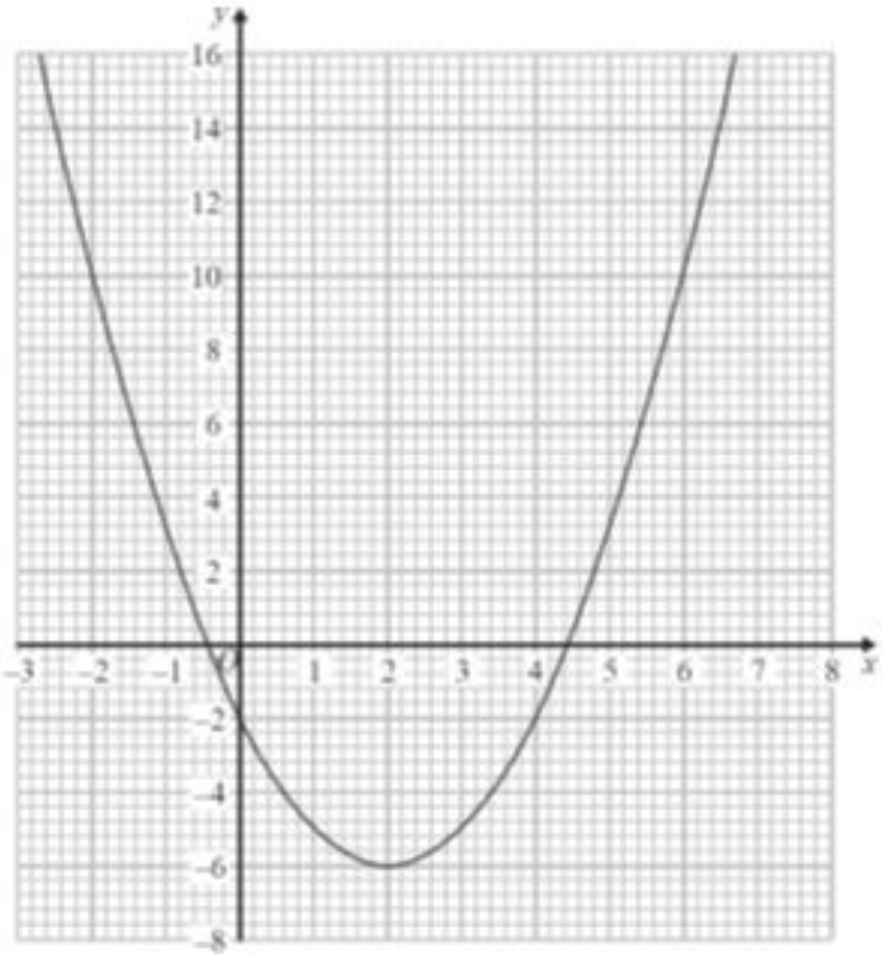
A restricted pass costs £ .....

A full pass costs £ .....

(3 marks)

Question 32

The diagram shows the graph of $y = x^2 - 4x - 2$



Use the graph to find estimates for the values of *x* that satisfy the simultaneous equations

$$y = x^2 - 4x$$

$$-2x + y = 6$$

$x =$ **.....**

$x =$ **.....**

(3 marks)

Question 33

Solve

$$x^2 - 11x + 24 = 0$$

.....

(2 marks)

Question 34

Work out the values of a and b such that

$$x^2 - 6x + 5 \equiv (x + a)^2 + b$$

.....

(2 marks)

Question 35

Joy is solving a quadratic equation of the form $x^2 + bx + c = 0$ where b and c are integers.

She correctly solves the equation to get $x = 3 \pm \sqrt{13}$

Work out the values of b and c.

.....

(3 marks)

In a box of mixed nuts, the total number of almonds, cashews and peanuts is 1025.
The ratio of almonds to cashews is 1 : 3.
The ratio of cashews to peanuts is 5 : 7.

Calculate the number of cashews in the box.

..... cashews

(4 marks)

Question 43

Joseph's flock has 55% more sheep than goats.

What is the ratio of goats to sheep in the flock? Leave your ratio in its simplest form.

..... : .....

Question 44

In a box of pens, there are

three times as many red pens as green pens
and two times as many green pens as blue pens.

For the pens in the box, write down
the ratio of the number of red pens to the number of green pens to the number of blue pens.

..... : ..... : .....

Question 45

Here are the ingredients for chocolate ice cream.

cream	400 ml
milk	500 ml
egg yolks	4
chocolate	120 g
sugar	100 g

Stefan has only 300ml of cream to make chocolate ice cream.

How much **chocolate** should he use?

..... g

Question 46

Here is a list of ingredients for making a trifle for 4 people.

Trifle for 4 people
120g of raspberry jelly. 8 sponge fingers 420ml of custard 180g of tinned fruit

Rob is going to make a trifle for 6 people.
Work out the amount of each ingredient he needs.

..... g of raspberry jelly

..... sponge fingers

..... ml of custard

..... g of tinned fruit

Question 47

Here is the list of ingredients for making 30 biscuits.

Ingredients for 30 biscuits
225 g butter
110 g caster sugar
275 g plain flour
75 g chocolate chips

Lucas has the following ingredients.

900 g butter
1000 g caster sugar
1000 g plain flour
225 g chocolate chips

What is the greatest number of biscuits Lucas can make?

..... biscuits

(3 marks)

Direct & Inverse Proportion - Algebraically-343 - 347

Question 48

It is known that y varies inversely as the cube root of x and that $y = 2$ when $x = 27$.

Find a formula for y in terms of x

.....

(3 marks)

Question 49

y is inversely proportional to the square of x.

$y = 1$ when $x = 10$

Find the value of y when $x = 5$

.....

(3 marks)

Question 50

T is directly proportional to the cube of r

$T = 21.76$ when $r = 4$

Find a formula for T in terms of r.

$T =$ .....

(3 marks)

Geometry

Area & Perimeter of 2D Shapes

The diagram shows the pentagon $ABCDE$.

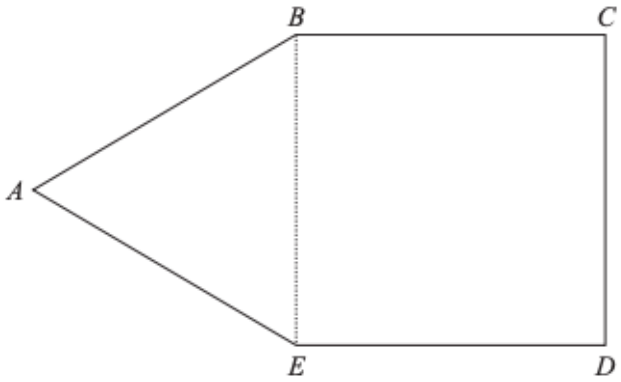


Diagram **NOT** accurately drawn

$ABE$is an equilateral triangle.$BCDE$ is a square with area 169 cm ^{2}

Work out the perimeter of $ABCDE$.

..... cm

(3 marks)

Question 52

Here is a rectangle.

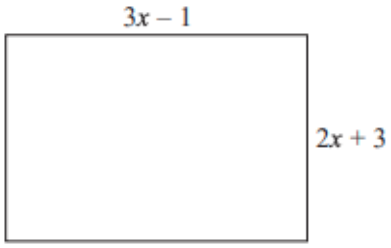


Diagram **NOT** accurately drawn

All measurements are in centimetres.
The perimeter of the rectangle is 39 cm.

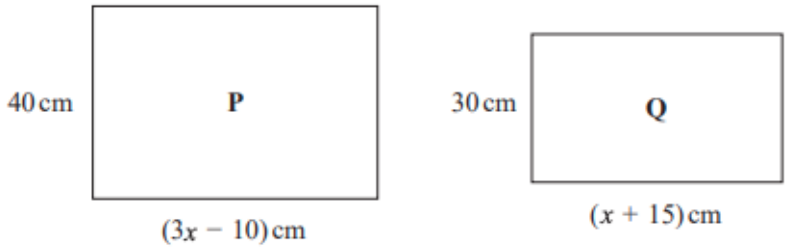
Work out the area of the rectangle.

..... cm ^{2}

(5 marks)

Question 53

The diagram gives information about two paintings, P and Q.
Each painting is in the shape of a rectangle.



Painting P has an area 1400 cm ^{2} more than the area of painting Q.

Work out the area of painting P.

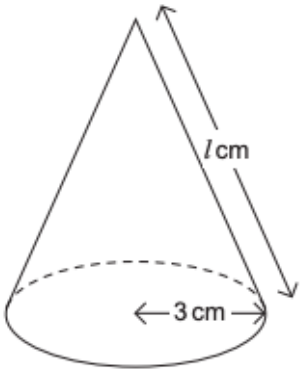
..... cm ^{2}

(4 marks)

Area & Volume

Question 54

The cone below has radius 3 cm and slant height l cm.



The **total** surface area, including the base, is 24π cm ^{2}.

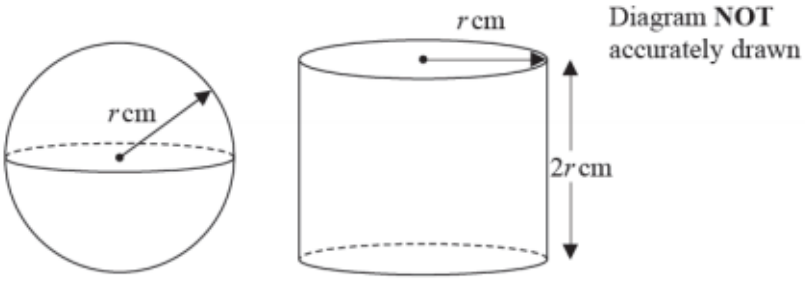
Work out the length l.

$l =$ ..... cm

(3 marks)

Question 55

Here is a solid sphere and a solid cylinder.



The radius of the sphere is $r$cm.
The radius of the cylinder is $r$cm.
The height of the cylinder is $2r$ cm.

The total surface area of the cylinder is $k\pi$ cm ^{2}.

It can be shown that $k = 6r^2$

Show that the ratio

total surface area of the cylinder : total surface area of the sphere

is the same as the ratio

volume of the cylinder : volume of the sphere

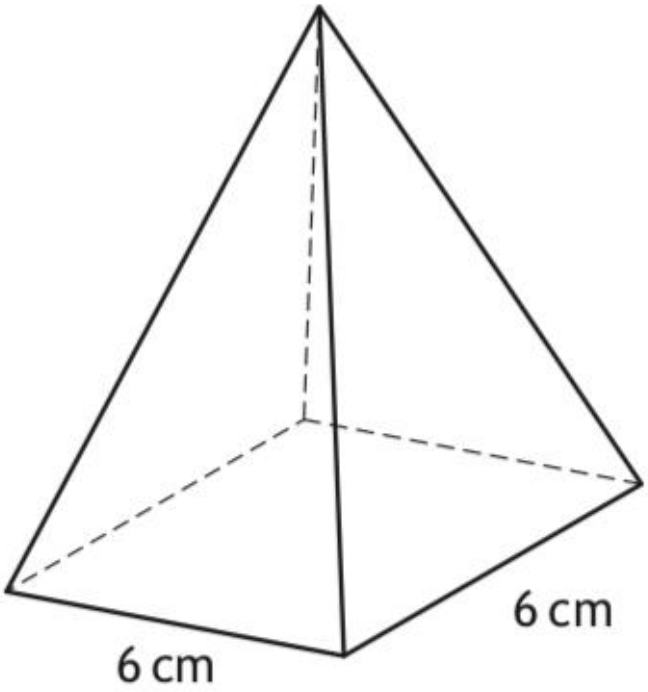
Input note: write down this ratio in its simplest form.

..... : .....

(3 marks)

Question 56

A square based pyramid is shown in the diagram below.



The square base has length 6 centimetres.
The volume is 138 cubic centimetres.
Calculate the height of the pyramid.

height = ... centimetres

(3 marks)

Question 57

The diagram shows the plan and side elevation of another 3D shape.

Choose the correct name for the 3D shape shown.

[ ] cylinder

[ ] circle

[ ] pyramid

[ ] cone

[ ] sphere

(1 mark)

Question 58

Halima makes a shape by joining 5 cubes.

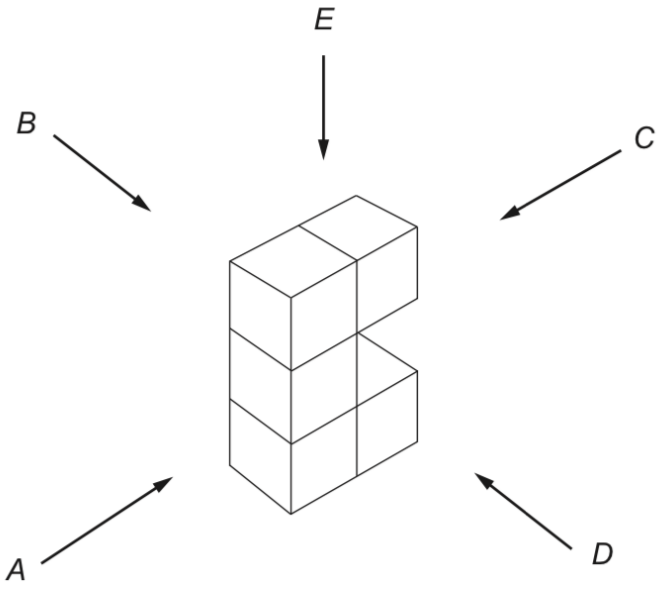
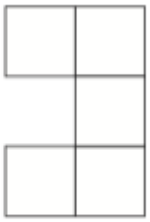


Diagram not drawn to scale

Here is what Halima sees from one of her positions.



Which position is this?

[ ] A

[ ] B

[ ] C

[ ] D

[ ] E

(1 mark)

Question 59

Here is a diagram of Pete's garage.

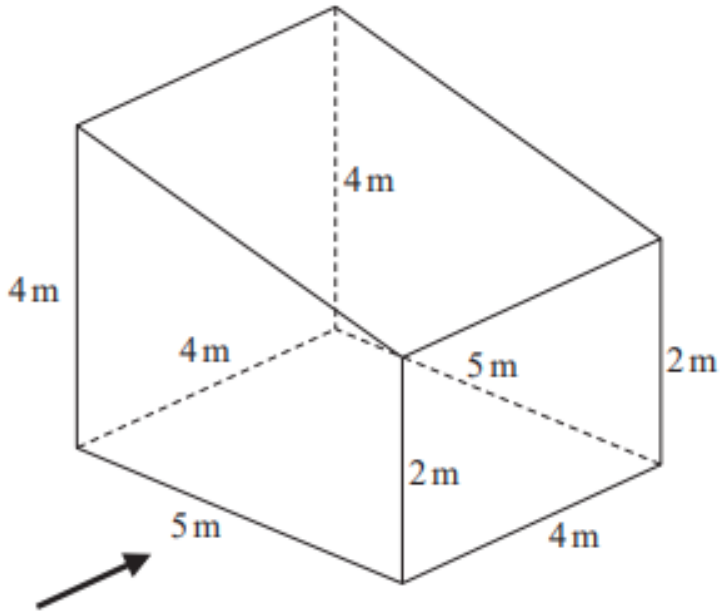


Diagram **NOT** accurately drawn

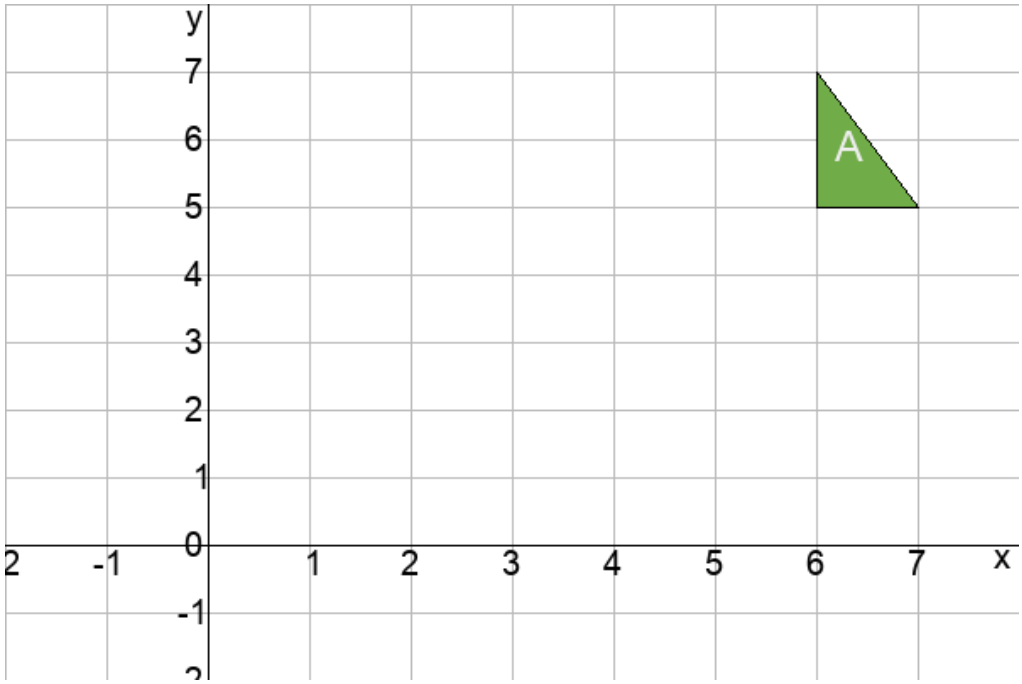
The floor of the garage is horizontal.
All the walls are vertical.

Draw the side elevation of the garage from the direction of the arrow.
Use a scale of 1 cm to 1 m.

Input note: start your bottom left corner from the dot.

(2 marks)

On the grid, translate triangle **A** by the vector $\begin{pmatrix} -2 \\ -1 \end{pmatrix}$

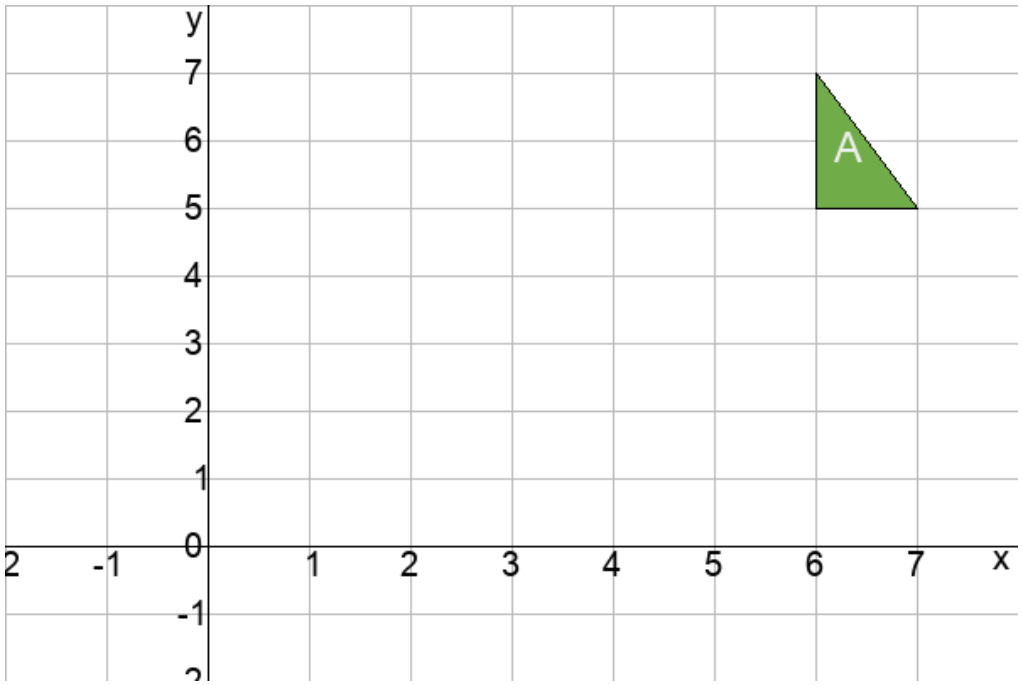


(1 mark)

Question 61

Here is a triangle A drawn on a grid of squares.

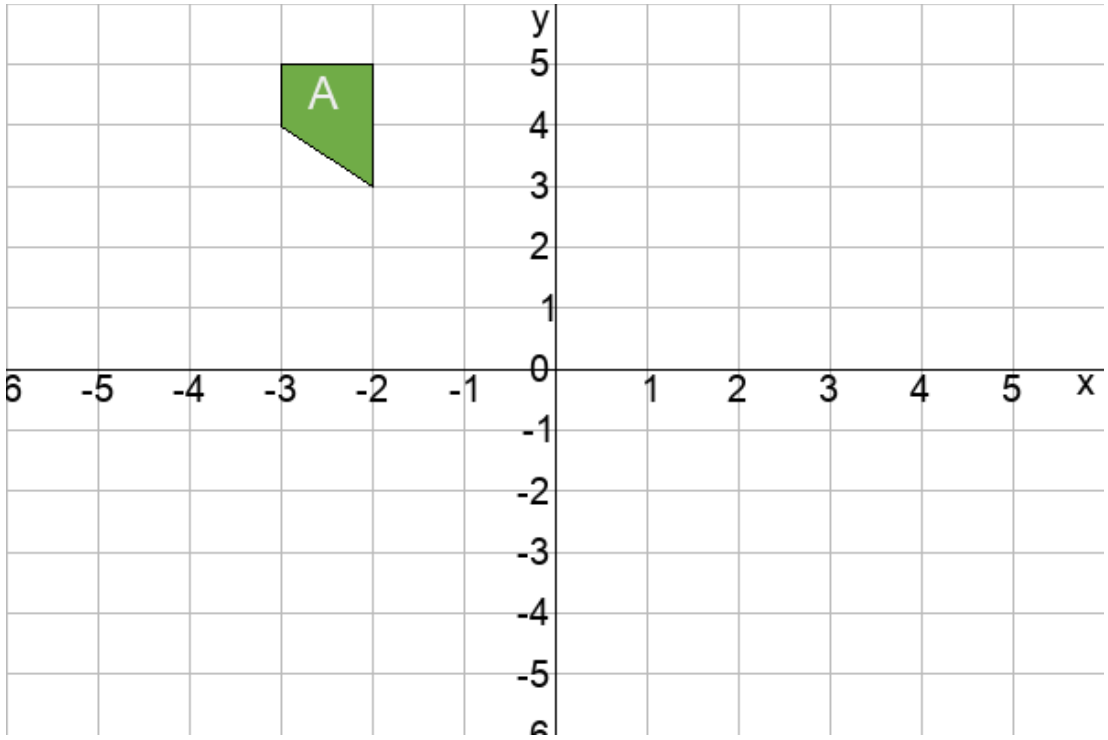
On the grid, reflect triangle A in the line with equation $x = 5$



(2 marks)

Question 62

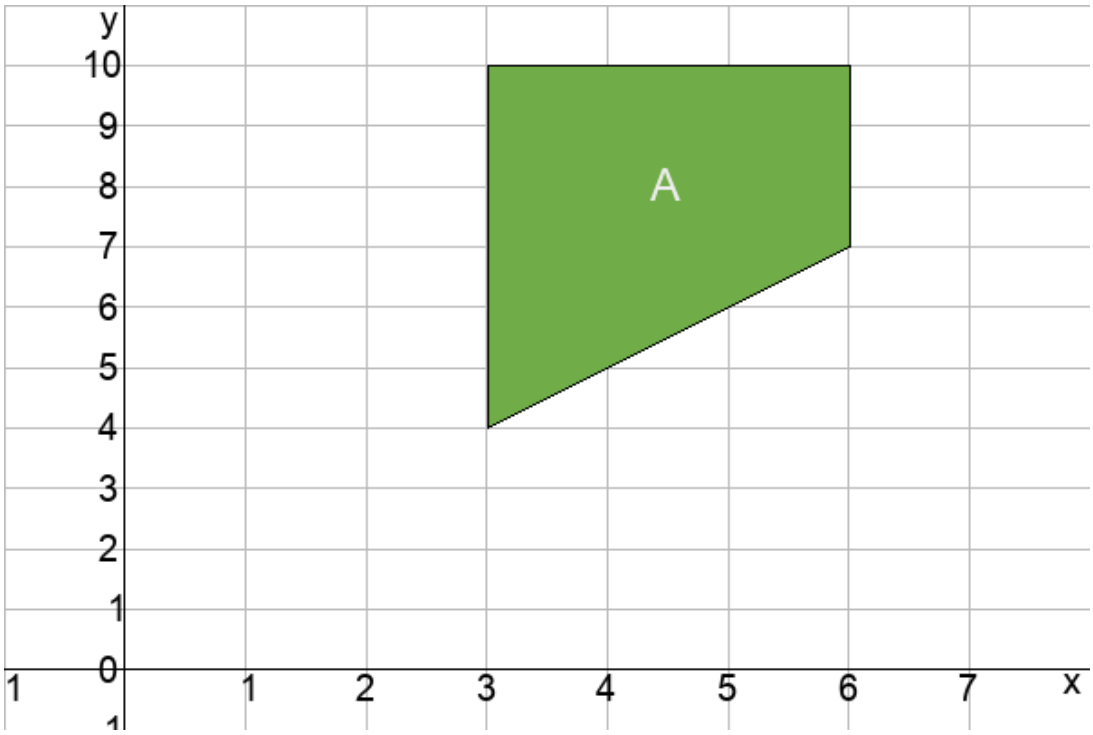
Rotate shape A 180° about $(1,0)$.



(2 marks)

Question 63

Enlarge shape A by scale factor $\frac{1}{3}$ centre $(0,1)$



(2 marks)

Question 64

Given that $cos\ 60^\circ = 0.5$, state the value of $cos\ 240^\circ$.

$cos\ 240^\circ =$ **.....**

(1 mark)

Question 65

Write down the exact value of $tan\ 45^\circ$

.....

(1 mark)

Question 66

Here is triangle ABD.

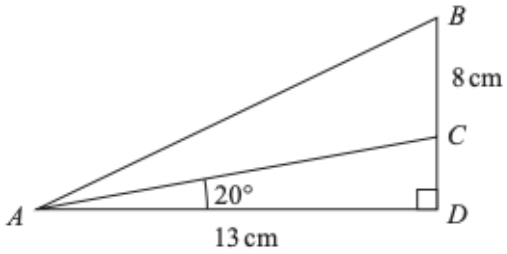


Diagram **NOT** accurately drawn

The point C lies on BD. $AD = 13$ cm $BC = 8$ cm angle $ADB = 90^\circ$ angle $CAD = 20^\circ$

Calculate the size of angle BAC.

Give your answer correct to 1 decimal place.

..... $^\circ$

(5 marks)

Cumulative Frequency Graph

The table gives some information about the delays, in minutes, of 80 flights.

Delay (n minutes)	Frequency
$0 < n \leqslant 20$	16
$20 < n \leqslant 30$	26
$30 < n \leqslant 40$	23
$40 < n \leqslant 50$	10
$50 < n \leqslant 60$	5

(a) Write down the modal class interval.

.....

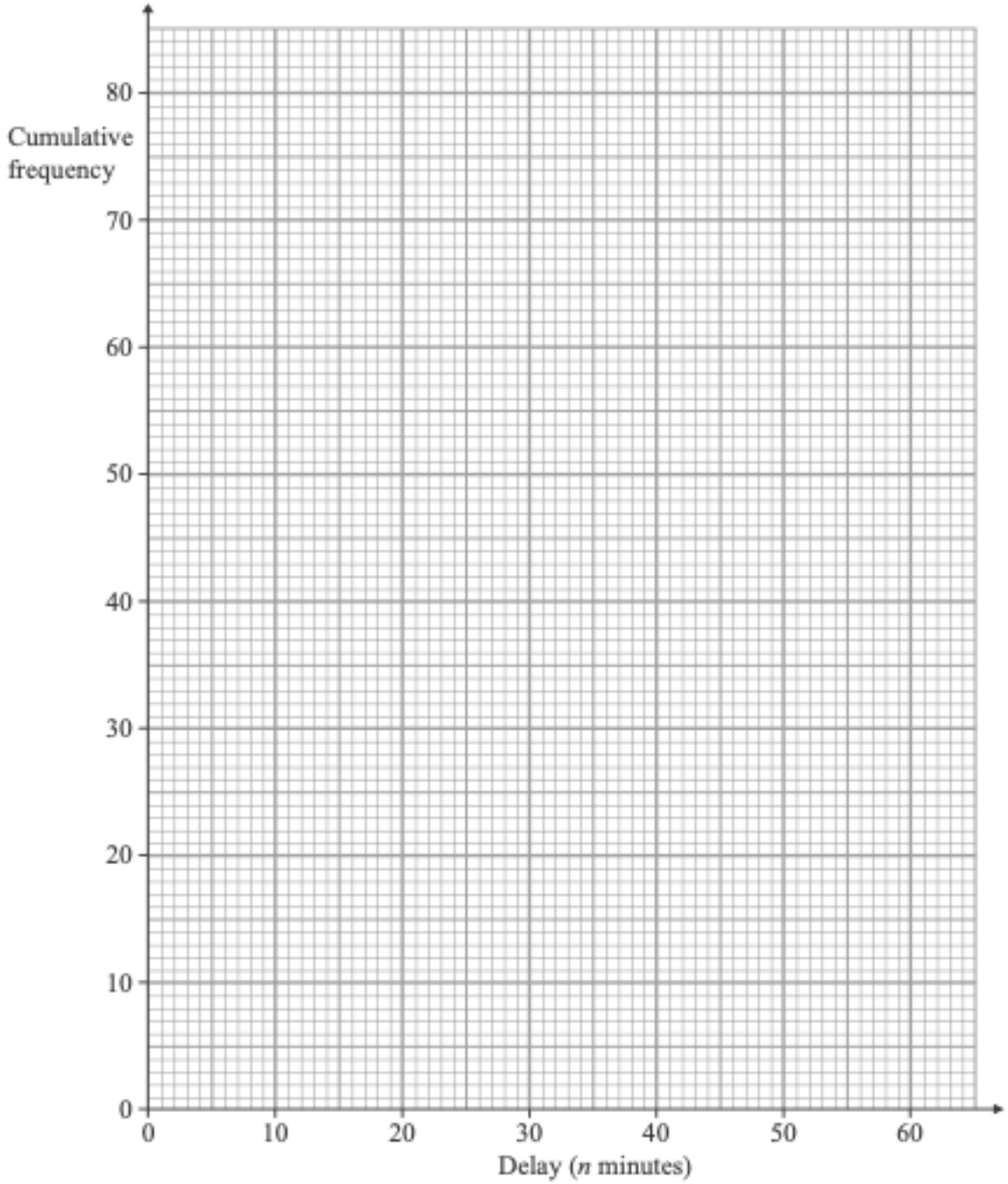
(1)

(b) Complete the cumulative frequency table.

Delay (n minutes)	Cumulative Frequency
$0 < n \leqslant 20$	
$0 < n \leqslant 30$	
$0 < n \leqslant 40$	
$0 < n \leqslant 50$	
$0 < n \leqslant 60$	

(1)

(c) On the grid, draw a cumulative frequency diagram for your table. (2)



(d) Use your graph to find an estimate for the **median** delay,

.....

(1)

(e) Use your graph to find an estimate for the **interquartile range.**

.....

(2)

There are 200 workers at a factory.

The cumulative frequency table gives information about their ages.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	25
$0 < a \leqslant 30$	70
$0 < a \leqslant 40$	138
$0 < a \leqslant 50$	175
$0 < a \leqslant 60$	186
$0 < a \leqslant 70$	194
$0 < a \leqslant 80$	200

(a) On the grid opposite, draw a cumulative frequency graph for this information. (2)

(b) Graham says,

"10% of workers at the factory are older than 65"

Is Graham correct?
You must show how you get your answer.

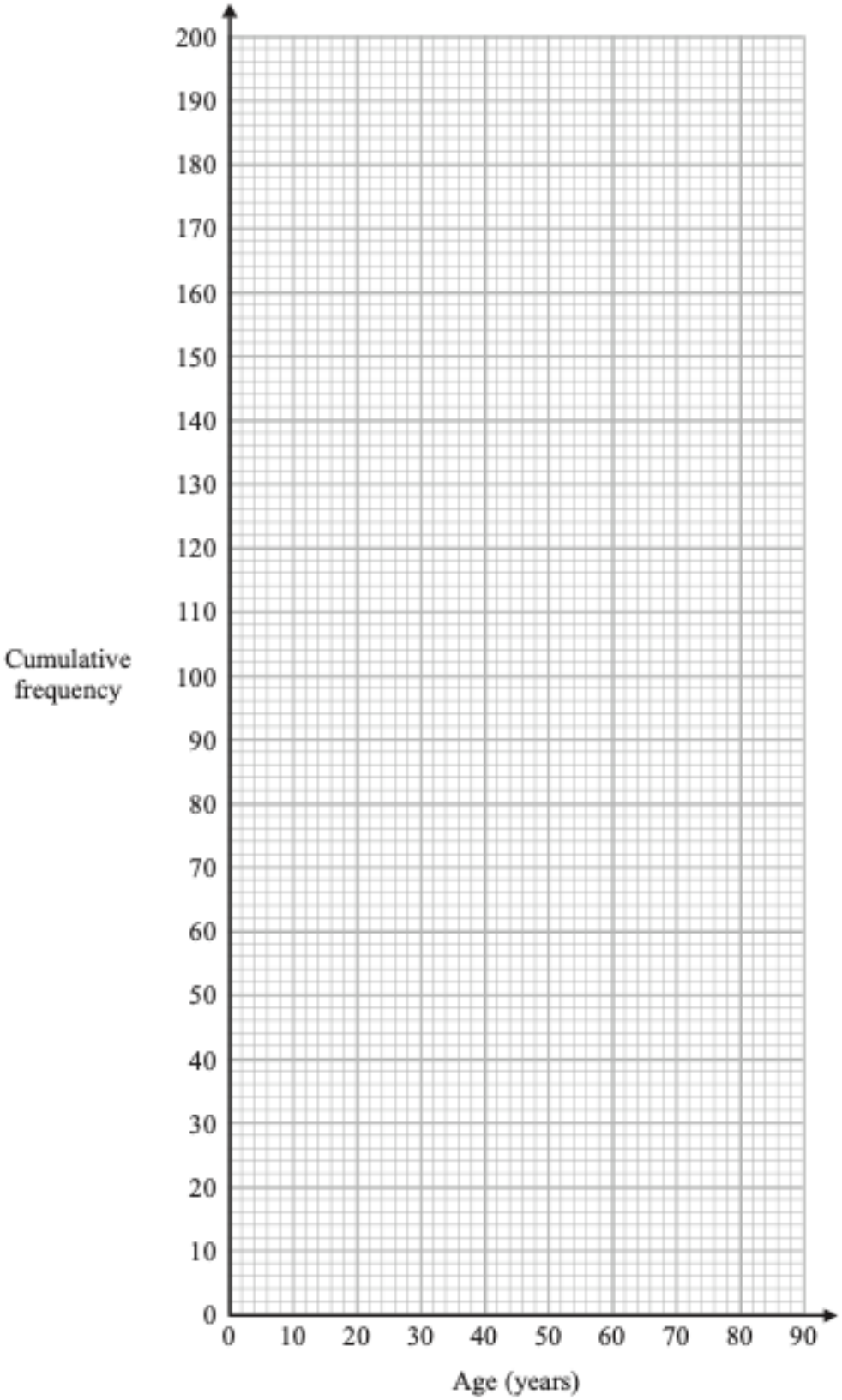
.....

.....

.....

.....

(2)


Cumulative frequency
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
Age (years)

.....

(2)

The table shows information about the times taken by 100 people in a fun run.

Time (t minutes)	Frequency
$20 < t \leqslant 30$	4
$30 < t \leqslant 40$	16
$40 < t \leqslant 50$	36
$50 < t \leqslant 60$	24
$60 < t \leqslant 70$	14
$70 < t \leqslant 80$	6

(a) Complete the cumulative frequency table for this information.

Time (t minutes)	Cumulative frequency
$20 < t \leqslant 30$	
$20 < t \leqslant 40$	
$20 < t \leqslant 50$	
$20 < t \leqslant 60$	
$20 < t \leqslant 70$	
$20 < t \leqslant 80$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.

Box Plot

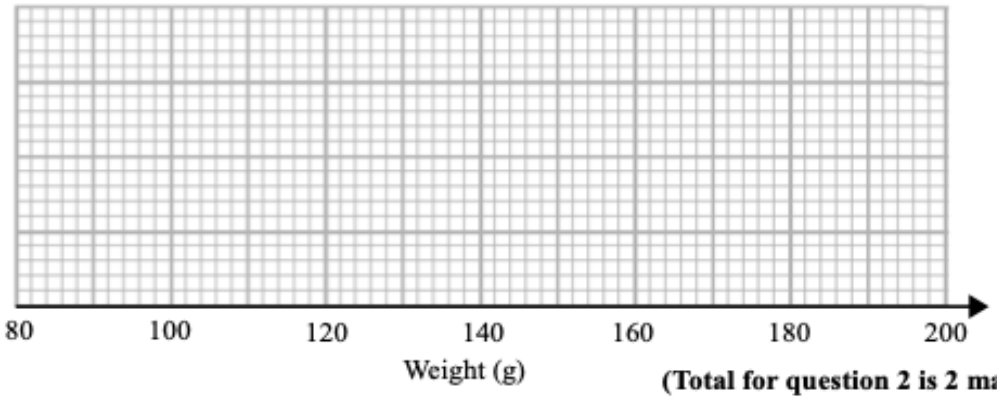
Lower & Upper Quartiles

Compare Distributions

The table shows some information about the weights, in grams, of some potatoes.

Range	Lower Quartile	Median	Upper Quartile	Maximum
100	120	134	160	190

Draw a box plot for this information.

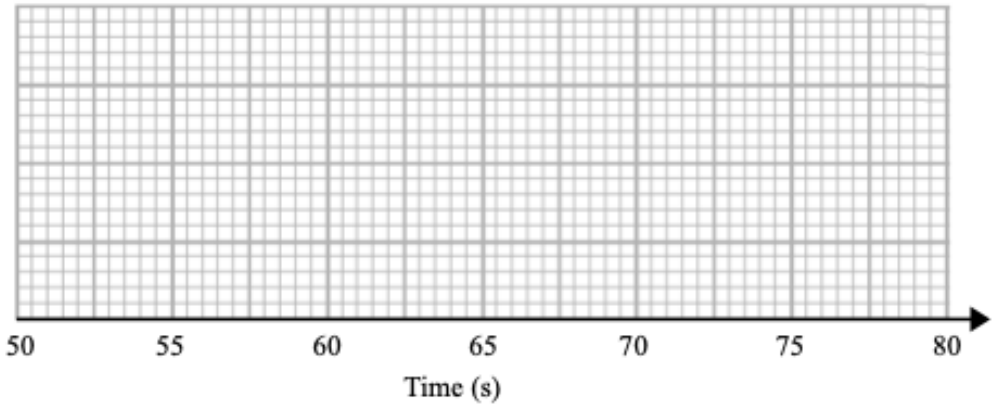


(Total for question 2 is 2 marks)

The times, in seconds, of 15 students running a race are recorded below.

55 54 55 55 58 58 59 60 60 61 61 63 67 70 78

Draw a box plot for this information.



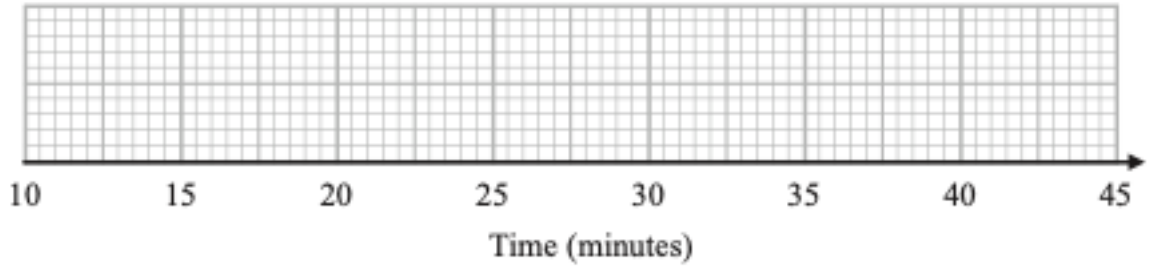
(Total for question 3 is 2 marks)

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.

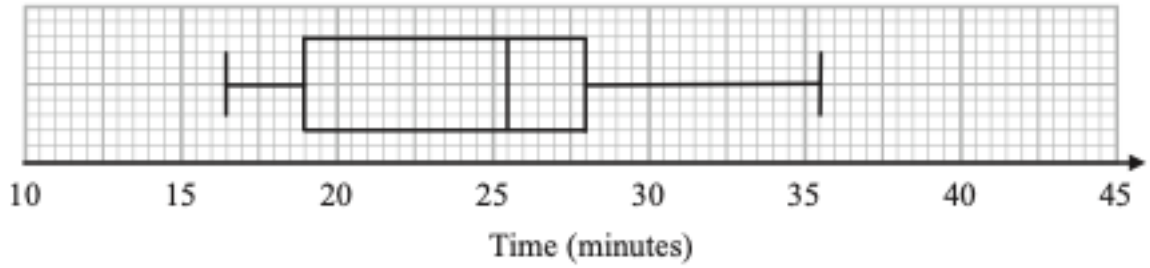
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

(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.

.....

.....

.....

.....

(2)

The table shows information about water used in a household.
The value for April is missing.

Month	Water used (m^3)
January	16.2
February	18.1
March	15.9
April	
May	17.8
June	21.0

The mean monthly water used for the six months is 18 m^3

Work out the value for April.

..... m^3

(3 marks)

Question 68

There are 15 children at a birthday party.
The mean age of the 15 children is 7 years.

9 of the 15 children are boys.
The mean age of the boys is 5 years.

Work out the mean age of the girls.

..... years

(3 marks)

Question 69

The midday temperatures in Grantford were recorded over a nine day period.

The temperatures, in $^{\circ}$C, were

$$4 \; quad \; 7 \; quad \; 4 \; quad \; 3 \; quad \; 6 \; quad \; 10 \; quad \; 9 \; quad \; 5 \; quad \; 3$$

Over the same nine day period the midday temperatures in Endoch were also recorded. The median temperature was 8 $^{\circ}$C, and the semi-interquartile range was 1.5 $^{\circ}$C.

Select two valid comments comparing the midday temperatures of Grantford and Endoch during this period.

[ ] Temperatures in Grantford are more consistent, since the SIQR is higher.

[ ] Temperatures in Grantford are less consistent, since the SIQR is higher.

[ ] On average, temperatures in Endoch are lower, since the median is lower.

[ ] On average, temperatures in Grantford are lower, since the median is lower.

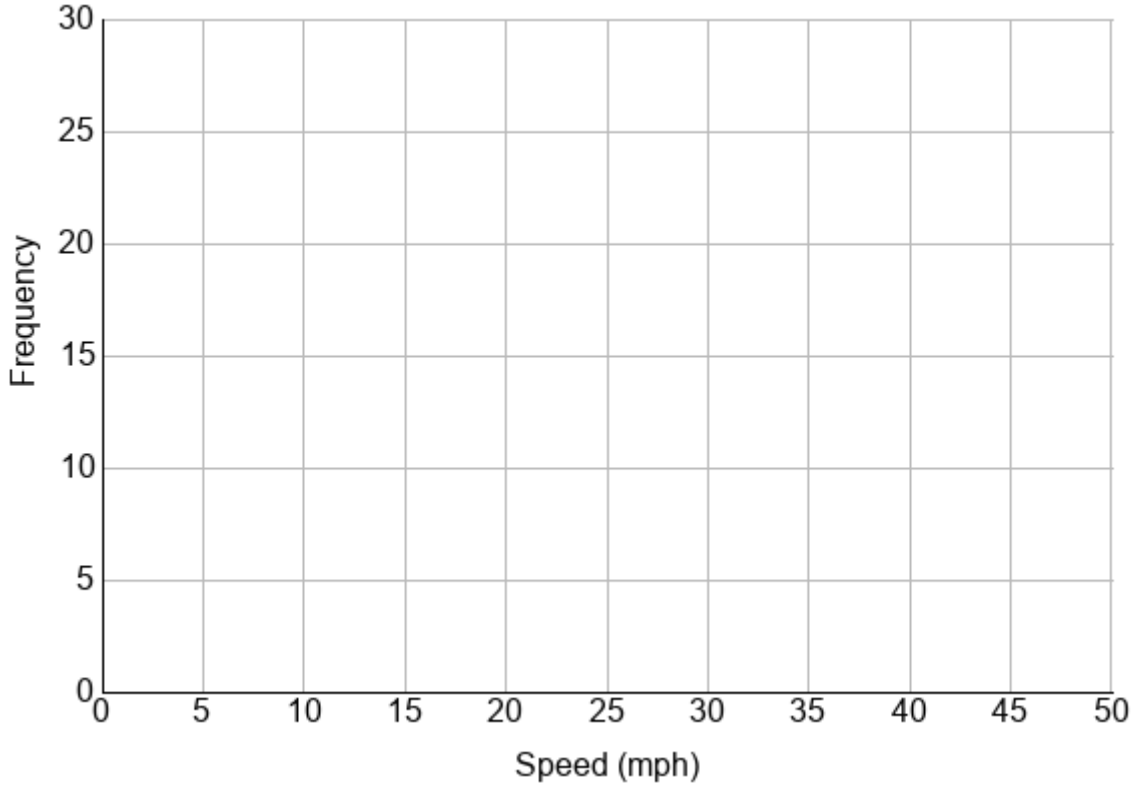
(2 marks)

Question 70

The table gives information about the speeds of 70 cars.

Speed (s mph)	Frequency
$0 < s \leqslant 10$	14
$10 < s \leqslant 20$	18
$20 < s \leqslant 30$	26
$30 < s \leqslant 40$	12

Draw a frequency polygon for this information.



(2 marks)

Question 71

The probability that a biased dice will land on a four is 0.2
The probability that the biased dice will land on a six is 0.4
Ted rolls the biased dice once.

Work out the probability that the dice will land on either a four or a six.

.....

(2 marks)

Question 72

In a supermarket, the probability that John buys fruit is 0.7.

In the same supermarket, the probability that John independently buys vegetables is 0.4.

Work out the probability that John buys fruit or buys vegetables or buys both.

.....

(3 marks)

Question 73

There are only red counters, blue counters and purple counters in a bag.
The ratio of the number of red counters to the number of blue counters is $3:17$

Sam takes at random a counter from the bag.
The probability that the counter is purple is 0.2

Work out the probability that Sam takes a red counter.

.....

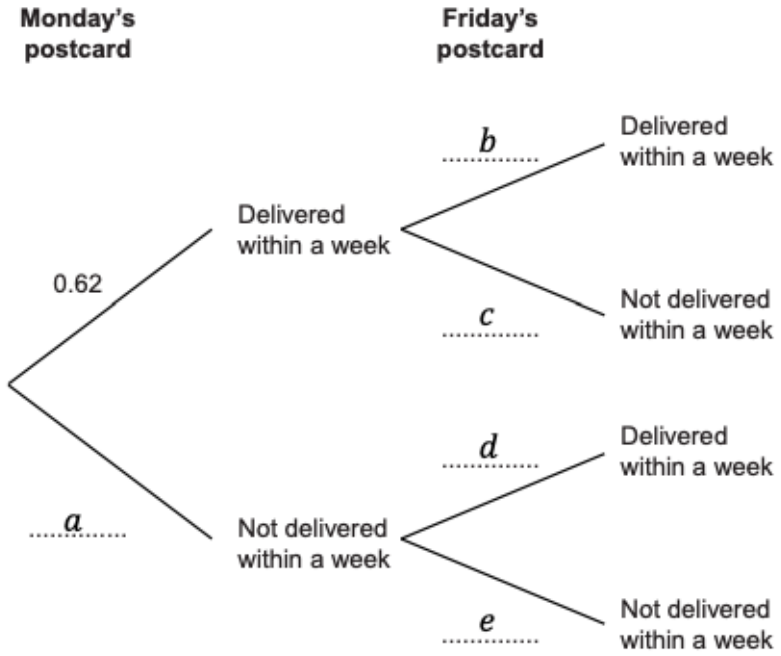
(3 marks)

Question 74

The probability that any postcard posted in Portugal on Monday is delivered to the UK within a week is 0.62.
The probability that any postcard posted in Portugal on Friday is delivered to the UK within a week is 0.41.

Sergio is in Portugal.
He posts one postcard to the UK on Monday.
He posts another postcard to the UK on Friday.

Complete the probability tree to show the possible outcomes for the postcards.



.....

(2 marks)

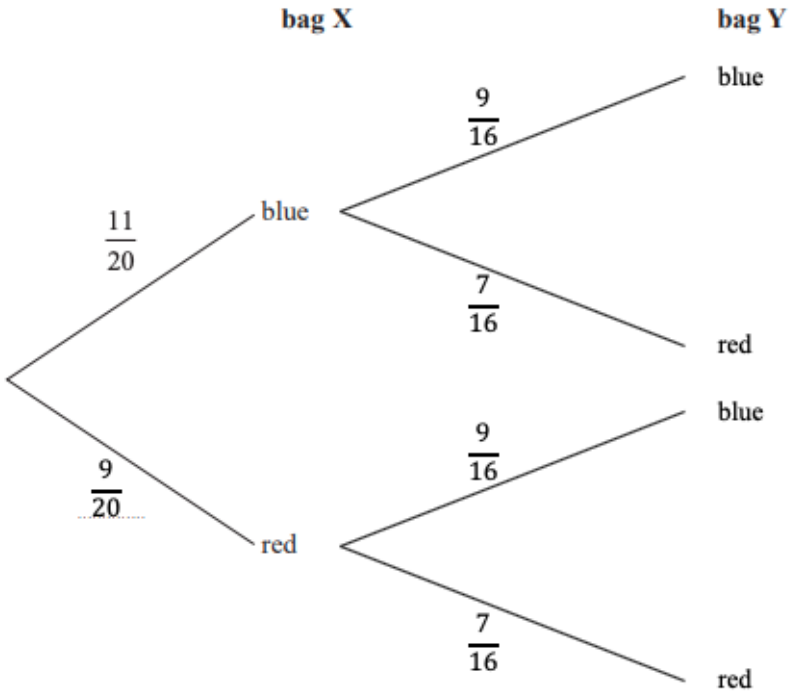
Question 75

There are two bags of counters, bag X and bag Y.

There are 20 counters in bag X.
11 of the counters are blue and the rest are red.

There are 16 counters in bag Y.
9 of the counters are blue and the rest are red.

Arkady takes at random a counter from bag X and takes at random a counter from bag Y.



Work out the probability that the two counters are both red or are both blue

.....

(3 marks)

Question 76

There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,
5 cheese sandwiches
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

.....

(5 marks)

Question 77

There are only green pens and blue pens in a box.

There are three more blue pens than green pens in the box.
There are more than 12 pens in the box.

Simon is going to take at random two pens from the box.

The probability that Simon will take two pens of the same colour is $\frac{27}{55}$

Work out the number of green pens in the box.

..... green pens

(6 marks)

Question 78

There are $n$sweets in a bag.
6 of the sweets are orange.
The rest of the sweets are yellow.

Hannah takes at random a sweet from the bag.
She eats the sweet.

Hannah then takes at random another sweet from the bag.
She eats the sweet.

The probability that Hannah eats two orange sweets is $\frac{1}{3}$.

It can be shown that $n^2 + an + b = 0$, where a and b are integers. Determine the values of a and b.

.....

(3 marks)