

Write your name here

Surname

Correction

Other names

M. Semar -

Centre Number

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Candidate Number

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Edexcel GCSE

Mathematics A

Paper 1 (Non-Calculator)

Higher Tier

Mock Paper

Time: 1 hour 45 minutes

Paper Reference

1MA0/1H

You must have:

Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks



Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators must not be used.**

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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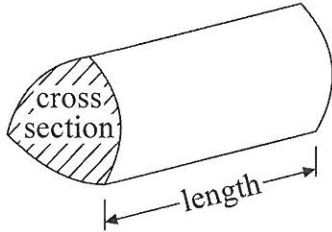
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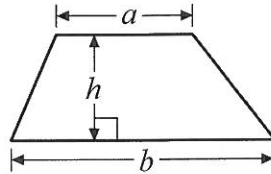
Formulae – Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section \times length

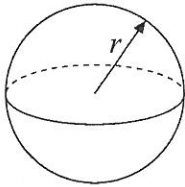


Area of trapezium = $\frac{1}{2}(a+b)h$



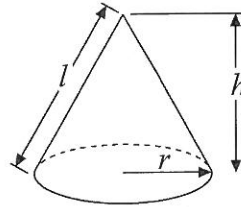
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

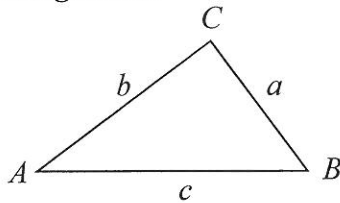


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

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

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1 Write 32 out of 80 as a percentage.

$$\frac{32}{80} \times 100 = \frac{32}{8} \times 10$$
$$= 40$$

..... 40 %

(Total for Question 1 is 2 marks)

- 2 Jack sows 300 wildflower seeds.
The probability of a seed flowering is 0.7

Work out an estimate for the number of these seeds that will flower.

$$P(\text{flower}) = 0.7$$

$$\text{Number} = 0.7 \times 300$$

$$= \frac{7}{10} \times 300 = 210$$

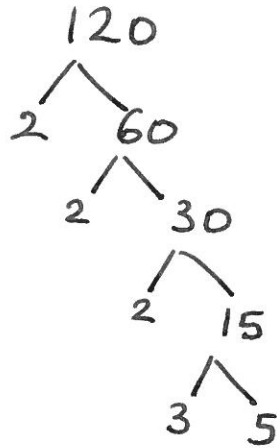
..... 210

(Total for Question 2 is 2 marks)



3 (a) Express 120 as a product of its prime factors.

(2)

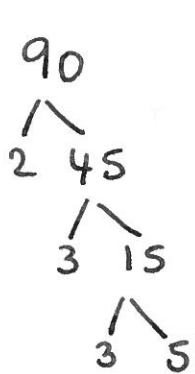


$$120 = 2 \times 2 \times 2 \times 3 \times 5$$

$$\underline{2^3 \times 3 \times 5}$$

(b) Find the highest common factor (HCF) of 90 and 120

(1)



$$90 = 2 \times 3 \times 3 \times 5$$

$$\text{HCF of } \begin{cases} 120 = 2 \times 2 \times 2 \times 3 \times 5 \\ 90 = 2 \times 3 \times 3 \times 5 \end{cases}$$

$$\text{HCF} = 2 \times 3 \times 5$$

$$\underline{30}$$

(Total for Question 3 is 3 marks)



4 Here is a list of ingredients for making 12 small cakes.

Ingredients for 12 small cakes

180 g margarine

180 g sugar

200 g plain flour

1 teaspoon baking powder

2 eggs

Joe is going to make 24 of the small cakes.

(a) Work out how much margarine he needs.

$$2 \times \begin{array}{l} \text{Cakes} \\ 12 \\ 24 \end{array} \quad \begin{array}{l} \text{Margarine} \\ 180 \\ 360 \end{array} \times 2$$

(2)

360

g

Sharon is going to make 18 of the small cakes.

(b) Work out how much flour she needs.

$$\begin{array}{l} \text{Cakes} \\ 12 \\ 6 \\ 18 \end{array} \quad \begin{array}{l} \text{Flour} \\ 200\text{g} \\ 100\text{g} \\ 300\text{g} \end{array} \begin{array}{l} \div 2 \\ \div 2 \\ \times 3 \end{array}$$

(2)

OR $\frac{18}{12} \times 200 = 300\text{g}$

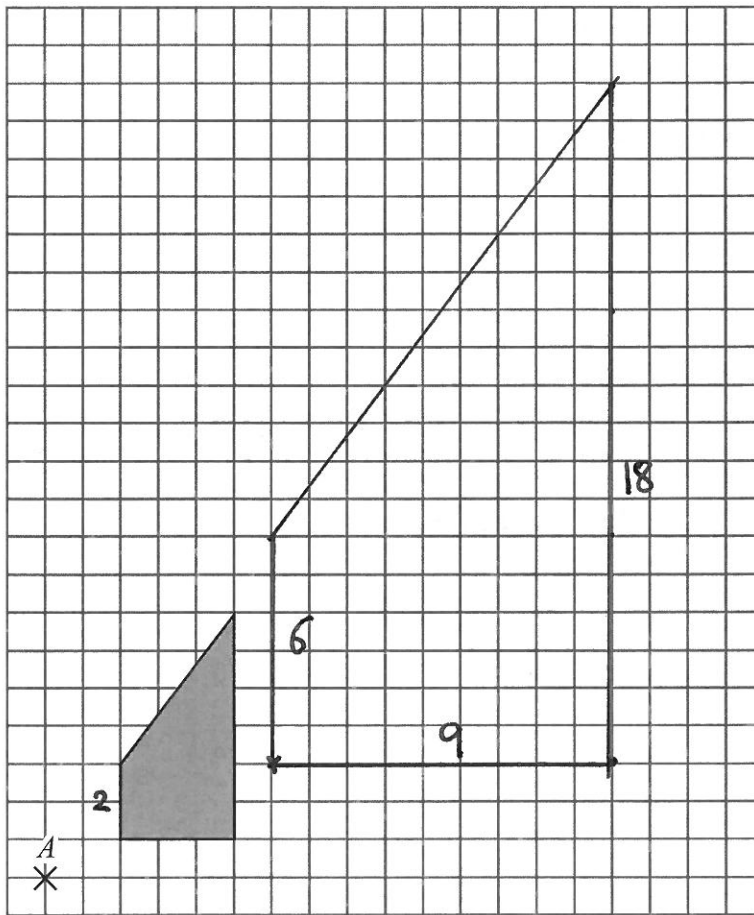
300

g

(Total for Question 4 is 4 marks)



5



On the grid, enlarge the shaded shape by a scale factor of 3, centre A .

(Total for Question 5 is 3 marks)

$$(2,1) \xrightarrow{\times 3} (6,3)$$

11/20



6 $V = 3b + 2b^2$

(a) Find the value of V when $b = -4$

(2)

$$V = 3 \times (-4) + 2(-4)^2$$

$$= -12 + 2(16) = -12 + 32$$

$$= 20$$

20

(b) Simplify $m^6 \times m^7$

(1)

$$m^{6+7} = m^{13}$$

m^{13}

(c) Simplify x^0

(1)

$$x^0 = x^{-1+1} = x^1 \times x^{-1}$$

$$= \frac{x^1}{x^1} = 1$$

1

(d) Simplify $(16y^6)^{\frac{1}{2}}$

(2)

$$16^{\frac{1}{2}} \times (y^6)^{\frac{1}{2}} = 4 \times y^{6/2}$$

$$= 4y^3$$

$4y^3$

(Total for Question 6 is 6 marks)

7 Guy wants to find out how much time people spend watching television. He will design a questionnaire.

Design a suitable question for Guy's questionnaire.

How many hours of TV do you watch per day?

0-1 hr

1+ - 2hrs

2+ - 3hrs

over 3hrs

(Total for Question 7 is 2 marks)



- 8 A school canteen offers four different meal choices.
Students can choose salad or pizza or meat pie or fish.

The table shows the probability that a student will choose salad or meat pie or fish.

Meal	Salad	Pizza	Meat pie	Fish
Probability	0.2		0.23	0.16

One student is chosen at random from these students who are going to use the canteen.

Work out the probability that the student

- (i) chooses meat pie or fish,

$$P(\text{Pie or fish}) = P(\text{pie}) + P(\text{Fish}) = 0.23 + 0.16$$

0.39

- (ii) chooses pizza.

$$P(\text{Pizza}) = 1 - [P(\text{salad}) + P(\text{Pie}) + P(\text{Fish})]$$

$$= 1 - (0.2 + 0.23 + 0.16)$$

0.41

(Total for Question 8 is 3 marks)

- 9 Janice asks 100 students if they like biology or chemistry or physics best.

38 of the students are girls.

21 of these girls like biology best.

18 boys like physics best.

7 out of the 23 students who like chemistry best are girls.

(...) = worked out answers -

Work out the number of students who like biology best.

	Biology	Chemistry	Physics	
Boys	(28)	(16)	18	62
Girls	21	7	(10)	38
	(49)	23	(28)	100

49 students

(Total for Question 9 is 4 marks)



- 10 Mrs Miller is planning a party for 70 children.
She will give each child a party bag to take home.
She will put a hat and a toy in each party bag.

Party bags are sold in packs of 12

Hats are sold in packs of 8

Toys are sold in packs of 9

Mrs Miller buys the smallest possible number of packs of hats, toys and bags.

Mrs Miller can fill more party bags than she needs.

How many more?

$$\text{Party bag} = 1 \text{ hat} + 1 \text{ Toy}.$$

70 children means 70 Partybags are needed.

$$70 \text{ party bags} = 70 \text{ hats} + 70 \text{ toys}.$$

$$\begin{array}{ccccccc} 12 \times 6 & = & 8 \times 9 & + & 9 \times 8 & & \\ \text{Party} & & \text{Hats} & & \text{toys} & & \\ \text{bags} & & & & & & \\ \downarrow & & \downarrow & & \downarrow & & \\ \text{number of} & & \text{number} & & \text{number of} & & \\ \text{packs} & & \text{of} & & \text{packs} & & \\ & & \text{packs} & & & & \end{array}$$

(Total for Question 10 is 4 marks)

$$72 \text{ party bags} = 72 \text{ hats} + 72 \text{ toys}.$$

Mrs Miller can fill in 2 more party bags.



11 Last year Kerry's take home pay was £15 000
She spent 40% of her take home pay on rent.

She used the rest of her take home pay for living expenses, clothes and entertainment
in the ratio 3 : 1 : 2

How much did Kerry spend on entertainment last year?

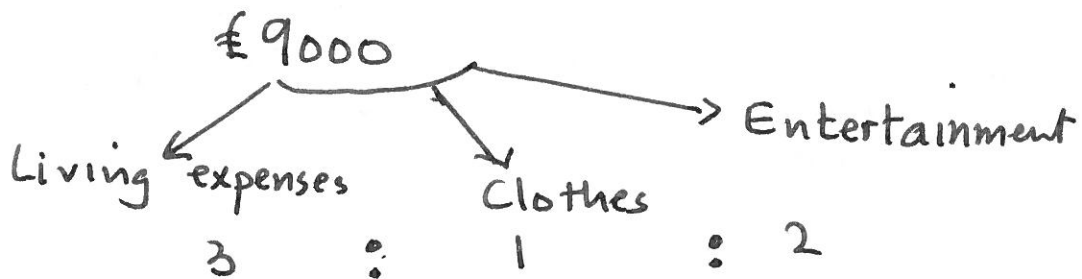
$$\text{Take home pay} = \text{Rent} + (\text{living expenses} + \text{clothes} + \text{entertainment}).$$

$$\text{Rent} : 40\% \text{ of } 15000 = \frac{40}{100} \times 15000$$

$$= 40 \times 150 = 6000$$

$$\text{Rent} : \text{£}6000$$

$$\text{Rest} : 15000 - 6000 = \text{£}9000$$



$$\text{Total shares} = 3 + 1 + 2 = 6$$

$$\text{Each share is worth} : 9000 \div 6 = 1500$$

Entertainment is worth 2 shares \therefore

$$1500 \times 2 = \text{£}3000$$

£ 3000

(Total for Question 11 is 4 marks)



12 (a) Expand $3(4x + y)$

$$3 \times 4x + 3 \times y$$

(2)

$$\underline{12x + 3y}$$

(b) Expand $5p(p - 3)$

$$5p \times p - 5p \times 3$$
$$5p^2 - 15p$$

(1)

$$\underline{5p^2 - 15p}$$

(c) Expand and simplify $(y + 8)(y - 3)$

$$y(y - 3) + 8(y - 3)$$
$$y^2 - 3y + 8y - 24$$

(2)

$$\underline{y^2 + 5y - 24}$$

(d) Expand and simplify $(2t - 3)^2$

$$(2t - 3)(2t - 3) = 4t^2 + 9 - 12t$$

(2)

$$\underline{4t^2 - 12t + 9}$$

(Total for Question 12 is 7 marks)

13 Make m the subject of the formula $p = h + 6m$

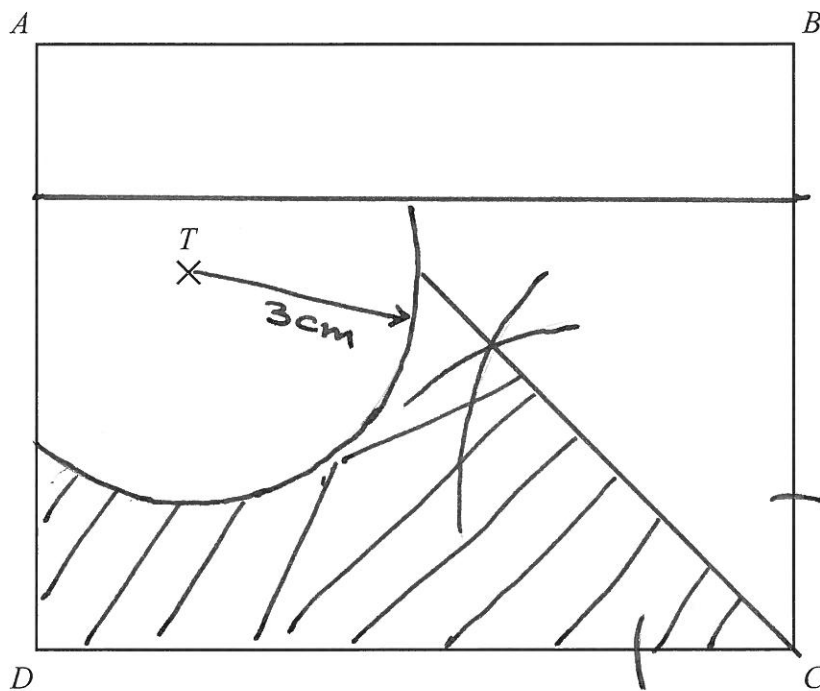
$$h + 6m = p$$
$$h - h + 6m = p - h$$
$$6m = p - h$$
$$m = \frac{p - h}{6}$$

$$\underline{m = \frac{p - h}{6}}$$

(Total for Question 13 is 2 marks)



- 14 Mary is going to put a bird bath in her garden.
The diagram shows a plan of Mary's garden.



Scale 1 cm represents 1 m

There is a wall along AB .

There are hedges along the other three sides of the garden.

Mary wants to put her bird bath

at least 2 m away from the wall AB , (Parallel line to AB , 2 cm away)
more than 3 m away from the tree at T , Arc radius 3 cm.

and closer to the hedge along DC than to the hedge along CB . angle bisector \widehat{DCB} .

Complete an accurate the plan of the garden to show the region where Mary can put her bird bath.

(Total for Question 14 is 4 marks)



15 The diagram shows a trapezium.

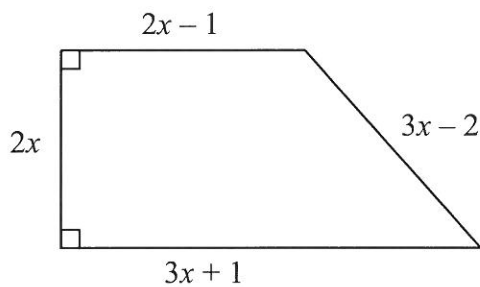


Diagram NOT
accurately drawn

In the diagram, all measurements are in centimetres.

The perimeter of the trapezium is 38 cm.

Work out the area of the trapezium.

$$\text{Perimeter of shap} = (3x+1) + 2x + (2x-1) + (3x-2).$$

$$\begin{aligned} \text{Perimeter} &= 3x + 2x + 2x + 3x + 1 - 1 - 2. \\ &= 10x - 2. \quad (\text{in terms of } x). \end{aligned}$$

Perimeter = 38 cm means that

$$10x - 2 = 38$$

$$10x = 40$$

$$x = 4$$

$$\text{Area of trapezium} = \frac{a + b}{2} \times \text{height}$$

$$= \frac{(3x+1) + (2x-1)}{2} \times 2x$$

$$\text{Area} = \frac{(3(4)+1) + (2(4)-1)}{2} \times 2x(4).$$

$$= \frac{13 + 7}{2} \times 8 = \frac{20}{2} \times 8$$

80

..... cm²

(Total for Question 15 is 5 marks)



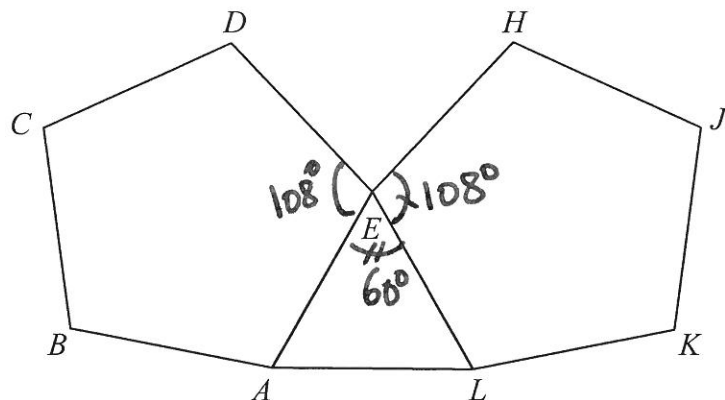


Diagram NOT
accurately drawn

$ABCDE$ and $EHJKL$ are regular pentagons.
 AEL is an equilateral triangle.

Work out the size of angle DEH .

• $ABCDE$ regular polygon exterior angle = $\frac{360}{5} = 72^\circ$
 Interior angle + exterior angle = 180° .
 Interior angle = $180 - 72 = 108^\circ$
 Therefore $\angle DEA = 108^\circ$.

Number
of
Sides

• $EHJKL$ regular polygon (Pentagon)

$$\angle HEL = 108^\circ$$

• $\angle AEL = 60^\circ$ Triangle AEL equilateral.

• Angles at point E add up to 360°

$$\angle DEH = 360 - (60 + 108 + 108)$$

$$\angle DEH = 360 - 276$$

$$84^\circ$$

(Total for Question 16 is 4 marks)



*17 Henry wants to invest £4000 for 2 years.
He can choose between two different banks.

Bank A
Earns 3% per annum
compound interest

Bank B
Earns 3.2 % per annum
simple interest
Each year's interest
is paid by cheque

Henry wants to earn as much interest on his investment as possible.

Which bank should Henry choose?

You must show your working.

Bank A: (Interest on balance)

End of year 1 : interest = $\frac{3}{100} \times 4000 = \pounds 120$

Start of year 2 :

Balance = $4000 + 120 = \pounds 4120$

End of year 2 : interest = $\frac{3}{100} \times 4120 = \pounds 123.60$

Total interest for 2 years = $120 + 123.60 = \pounds \underline{\underline{243.60}}$

Bank B: (interest on original amount).

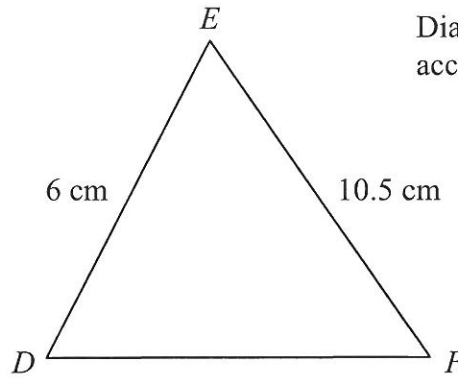
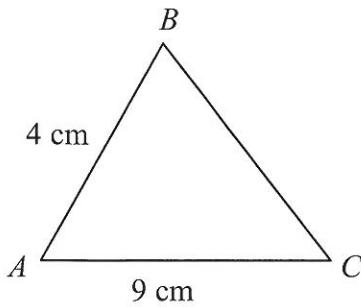
End of year 1 : interest = $\frac{3.2}{100} \times 4000 = 32 \times 4 = \pounds 128$

Total interest for 2 years = $128 \times \underset{\substack{\uparrow \\ \text{2 years}}}{2} = \pounds \underline{\underline{256}}$.

Henry should choose Bank B.

(Total for Question 17 is 5 marks)





Diagrams **NOT**
accurately drawn

Triangles ABC and DEF are similar.

$$AB = 4 \text{ cm.}$$

$$AC = 9 \text{ cm.}$$

$$DE = 6 \text{ cm.}$$

$$EF = 10.5 \text{ cm.}$$

Sf = Scale factor

(a) Work out the length of DF .

$$DE = sf \times AB \quad (2)$$

$$sf = \frac{6}{4} = \frac{3}{2} = 1.5$$

$$DF = sf \times AC$$

$$DF = 1.5 \times 9 = 13.5 \text{ cm}$$

13.5

..... cm

(b) Work out the length of BC .

$$BC \times sf = EF \quad (2)$$

$$BC = \frac{EF}{sf}$$

$$BC = \frac{10.5}{1.5} = \frac{105}{15} = 7$$

7

..... cm

(Total for Question 18 is 4 marks)



19 Solve the simultaneous equations

$$\begin{cases} 2x \} 5x - 2y = 13 \\ 1x \} 7x + 4y = 8 \end{cases}$$

$$\therefore \begin{cases} 10x - 4y = 26 & (1) \\ 7x + 4y = 8 & (2) \end{cases}$$

$$(1) + (2) : 10x + 7x - 4y + 4y = 26 + 8$$

$$17x = 34$$

$$x = 2$$

Substitute $x = 2$ into (1).

$$5(2) - 2y = 13$$

$$10 - 2y = 13$$

$$10 = 13 + 2y$$

$$-3 = 2y$$

$$y = -\frac{3}{2}$$

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

$$y = -\frac{3}{2} \dots\dots\dots$$

(Total for Question 19 is 4 marks)



*20 80 students took a maths exam.
The exam had two papers.

The cumulative frequency table gives information about the marks scored on Paper 1

Mark (m)	Cumulative frequency
$0 < m \leq 10$	8
$10 < m \leq 20$	21
$20 < m \leq 30$	46
$30 < m \leq 40$	67
$40 < m \leq 50$	76
$50 < m \leq 60$	80

(a) On the grid opposite, draw a cumulative frequency graph for the data in the table. (2)

The lowest mark scored on Paper 1 was 9
The highest mark scored on Paper 1 was 52

(b) In the space provided on the grid draw a box plot for the marks scored on Paper 1 (3)

The box plot shown has been drawn for the marks scored by the same students on Paper 2

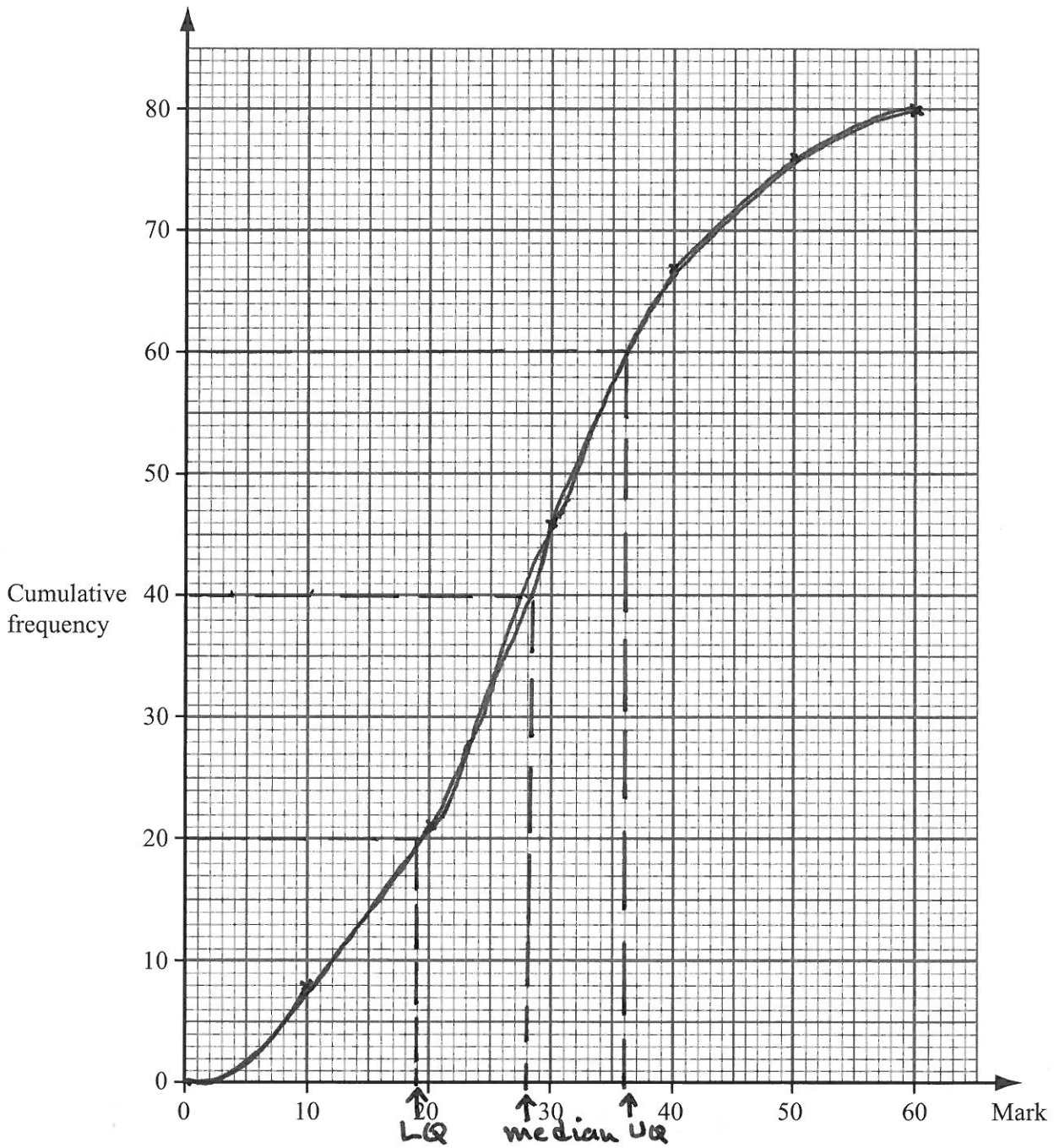
(c) Compare the marks scored by students on Paper 1 with the marks scored by the students on Paper 2. (2)

• IQR (paper 2) higher than IQR (paper 1)

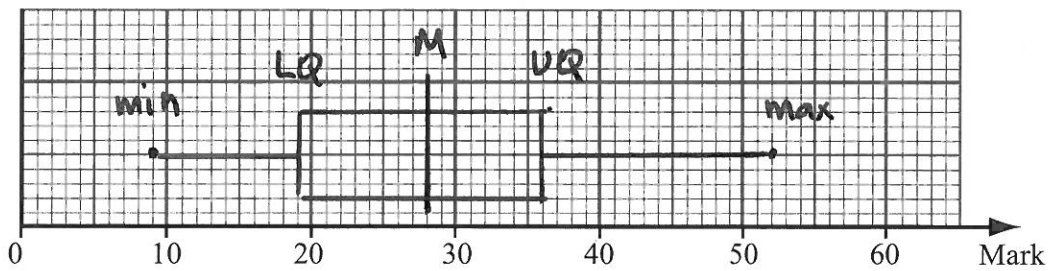
• Median (paper 2) higher than median (paper 1)

(Total for Question 20 is 7 marks)

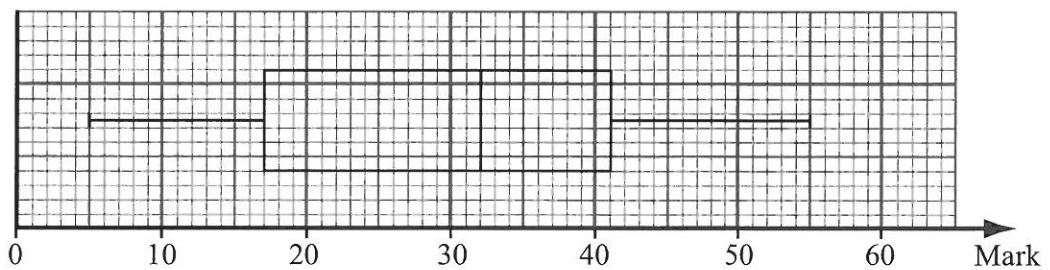




Marks on Paper 1



Marks on Paper 2



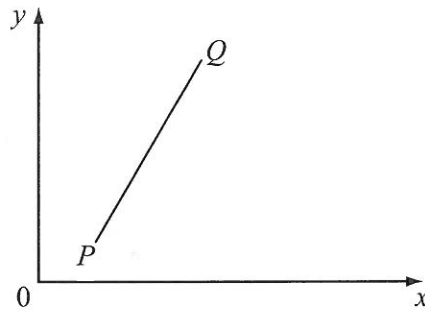


Diagram NOT
accurately drawn

P is the point with coordinates $(2, 1)$.

Q is the point with coordinates $(14, k)$.

The gradient of PQ is $\frac{3}{2}$

Work out the value of k .

$$\text{Gradient} = \frac{\text{Rise}}{\text{Run}}$$

$$\text{Gradient} = \frac{k-1}{14-2} = \frac{k-1}{12}$$

$$\text{Gradient} = \frac{3}{2} \quad \therefore$$

$$\frac{3}{2} = \frac{k-1}{12}$$

$$2(k-1) = 3 \times 12$$

$$2k-2 = 36$$

$$2k = 38$$

$$k = 19$$

$$k = \underline{19}$$

(Total for Question 21 is 3 marks)



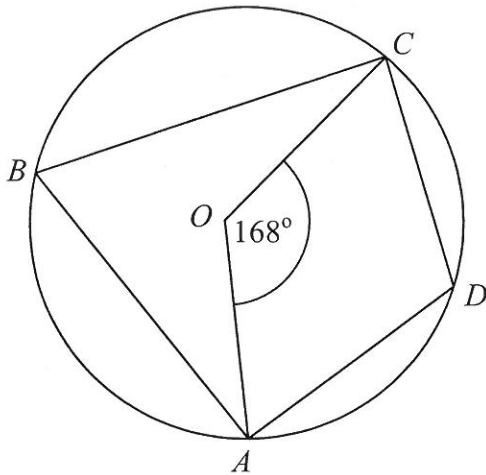


Diagram **NOT**
accurately drawn

A, B, C and D are points on the circumference of a circle, centre O .

Angle $AOC = 168^\circ$

Work out the size of angle ADC .

You must give reasons for your working.

Quadrilateral $ABCD$ is a cyclic quadrilateral,

$$\text{So } \angle CBA + \angle ADC = 180^\circ$$

(opposite angles add up to 180°).

$$\cdot \angle CBA = \frac{1}{2} \angle COA = \frac{1}{2} \times 168^\circ = 84^\circ$$

(angle at centre is twice angle at circumference)

$$\therefore \angle CBA + \angle ADC = 180^\circ$$

$$\angle ADC = 180 - \angle CBA.$$

$$\angle ADC = 180 - 84$$

$$\angle ADC = 96^\circ$$

..... 96°

(Total for Question 22 is 4 marks)



23 Sally has a bag of 9 sweets.

In the bag, there are

3 orange flavoured sweets,
4 strawberry flavoured sweets
and 2 lemon flavoured sweets.

Orange = O
Strawberry = S
Lemon = L

Sally takes, at random, two of the sweets.
She eats the sweets.

Work out the probability that the two sweets Sally eats are not of the same flavour.

Sally can eat:

(O,S) (O,L) (S,O) (S,L) (L,O) (L,S).

$$\frac{3}{9} \times \frac{4}{8} + \frac{3}{9} \times \frac{2}{8} + \frac{4}{9} \times \frac{3}{8} + \frac{4}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{3}{8} + \frac{2}{9} \times \frac{4}{8}$$

$$P(\text{not same flavour}) = \frac{12}{72} + \frac{6}{72} + \frac{12}{72} + \frac{8}{72} + \frac{6}{72} + \frac{8}{72}.$$

$$= \frac{52}{72} = \frac{13}{18}$$

$$\frac{13}{18} = 0.72$$

(Total for Question 23 is 4 marks)



24 Solve $\frac{3}{x-2} + \frac{8}{x+3} = 2$

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

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

$$\frac{3x+9+8x-16}{(x-2)(x+3)} = 2$$

$$11x - 7 = 2(x-2)(x+3)$$

$$11x - 7 = 2(x^2 + 3x - 2x - 6)$$

$$11x - 7 = 2x^2 + 2x - 12$$

$$2x^2 + 2x - 12 = 11x - 7$$

$$2x^2 + 2x - 12 - 11x + 7 = 0$$

$$2x^2 - 9x - 5 = 0$$

$$a = 2$$

$$b = -9$$

$$c = -5$$

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

$$x = \frac{9 \pm \sqrt{81 - 4(2)(-5)}}{4}$$

$$x = \frac{9 \pm \sqrt{81 + 40}}{4}$$

$$x = \frac{9 \pm \sqrt{121}}{4}$$

$$x_1 = \frac{9+11}{4} = 5$$

$$x_2 = \frac{9-11}{4} = -\frac{1}{2}$$

$$\left\{ \begin{array}{l} x = 5 \\ \text{or} \\ x = -\frac{1}{2} \end{array} \right.$$

(Total for Question 24 is 5 marks)



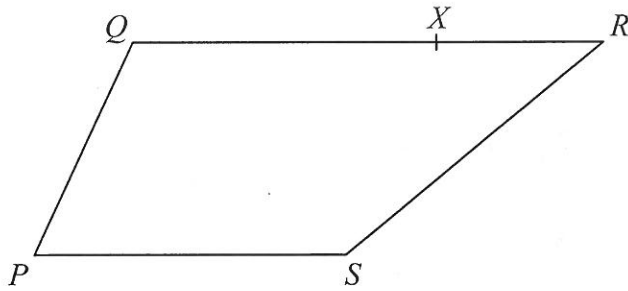


Diagram NOT
accurately drawn

$PQRS$ is a trapezium.

PS is parallel to QR .

$$\underline{\underline{QR = 2PS}}$$

$$\underline{\underline{\vec{PQ}}} = \mathbf{a}$$

$$\vec{PS} = \mathbf{b}$$

X is the point on QR such that $QX : XR = 3 : 1$

Express in terms of \mathbf{a} and \mathbf{b} .

(i) \vec{PR}

$$\begin{aligned} \vec{PR} &= \vec{PQ} + \vec{QR} & (2) \\ &= \vec{PQ} + 2\vec{PS} \\ &= \mathbf{a} + 2\mathbf{b} \end{aligned}$$

$$\underline{\underline{\mathbf{a} + 2\mathbf{b}}}$$

(ii) $\vec{SX} = \vec{SP} + \vec{PQ} + \vec{QX}$

$$\vec{PS} = \mathbf{b} \quad \therefore \vec{SP} = -\mathbf{b} \quad (3)$$

$$\vec{PQ} = \mathbf{a}$$

$$\vec{QX} = \frac{3}{4} \vec{QR} = \frac{3}{4} \times 2 \times \vec{PS} = \frac{3}{2} \vec{PS} = \frac{3}{2} \mathbf{b}$$

$$\vec{SX} = -\mathbf{b} + \mathbf{a} + \frac{3}{2} \mathbf{b}$$

$$\vec{SX} = \frac{1}{2} \mathbf{b} + \mathbf{a}$$

$$\underline{\underline{\frac{1}{2} \mathbf{b} + \mathbf{a}}}$$

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER is 100 MARKS

