

International GCSE

Mathematics (Specification A) (9–1)

(Modular)

Sample Assessment Materials

Pearson Edexcel International GCSE in Mathematics (Specification A)
(Modular) (4XMAF/4XMAH)

First teaching September 2024

First examination June 2025

First certification August 2025

Issue 1



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Introduction

The Pearson Edexcel International GCSE (9-1) in Mathematics (Specification A) (Modular) (4XMAF/4XMAH) is designed for use in schools and colleges. It is part of a suite of International GCSE modular qualifications offered by Pearson.

These sample assessment materials have been developed to support this qualification and will be used as the benchmark to develop the assessment students will take.

The sample assessment materials in this document are derived from the existing Edexcel International GCSE (9-1) in Mathematics (Specification A) qualification, which is linear in design.

Both linear and modular routes are designed to provide the same level of demand overall while offering candidates a choice of assessment options. In the modular qualification, candidates are able to sit and resit individual units in different series.

Note: Within International GCSE (9-1) in Mathematics (Specification A) (Modular), assessments are referred to as units. This is to support the modular nature of the qualification as each individual assessment is entered for as a separate unit.

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked **unless** the candidate has replaced it with an alternative response.

Guidance on the use of abbreviations

M	method mark awarded for a correct method or partial method
B	unconditional accuracy mark (no method needed)
A	accuracy mark
SC	special case
awrt	answer which rounds to
cao	correct answer only
dep	dependent (on a previous mark)
indep	independent
dp	decimal place
sf	significant figure
ft	follow through (when appropriate as per mark scheme)
isw	ignore subsequent working
oe	or equivalent and appropriate)

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching September 2024

Time 2 hours

Paper

reference

4WM1F/01

Mathematics A (Modular)

UNIT 1F

Foundation Tier



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this unit 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.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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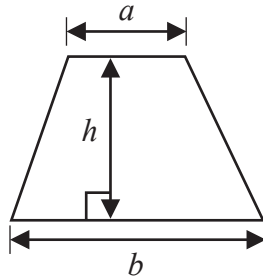


Pearson

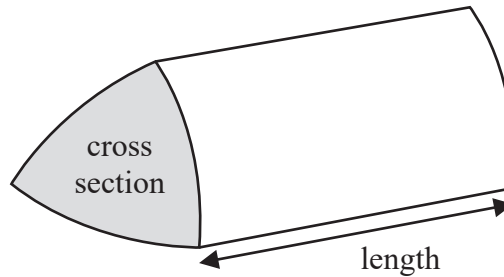
International GCSE Mathematics

Formulae sheet – Foundation Tier

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

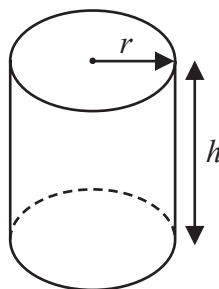


Volume of prism = area of cross section \times length



Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$



DO NOT WRITE IN THIS AREA

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DO NOT WRITE IN THIS AREA

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Nav found the following table that shows the age, in years, of each of seven cities.

City	Age (years)
Cadiz	3124
Suzhou	2534
Jenin	4469
Nanjing	2516
Gaziantep	5669
Alexandria	2351

- (a) Write down the name of the city with the greatest age.

.....
(1)

- (b) Write the number 2534 in words.

.....
(1)

- (c) Write the number 2351 correct to the nearest ten.

.....
(1)

- (d) Work out the difference between the age of Cadiz and the age of Nanjing.

..... years
(1)

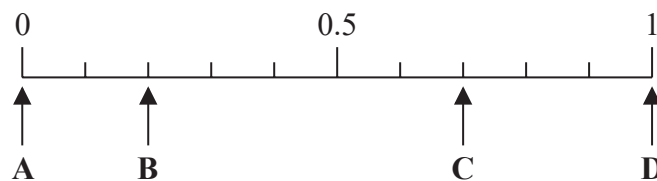
A millennium is 1000 years.

- (e) What is the age of Jenin in whole millenniums?

..... millenniums
(1)

(Total for Question 1 is 5 marks)

2 Here is a probability scale.



In a fruit bowl, there are only

3 bananas

7 pears

Tarek is going to take at random one of the fruits from the bowl.

(a) Write down the letter of the arrow that points to the probability that Tarek will take

(i) a pear,

.....
(1)

(ii) a grape.

.....
(1)

Emma has some carrots, some potatoes and some onions in a bag.

She says that the probability of taking at random a carrot from the bag is 1.4

Emma is not correct.

(b) Explain why.

.....
.....
(1)

(Total for Question 2 is 3 marks)

3 (a) Write 0.3 as a percentage.

..... %
(1)

(b) Write $\frac{29}{100}$ as a decimal.

.....
(1)

(c) Write $\frac{17}{20}$ as a decimal.

.....
(1)

(d) Write these numbers in order of size.
Start with the smallest number.

-7 8 -9 16 -3

.....
(1)

(e) Write these numbers in order of size.
Start with the smallest number.

0.044 0.104 0.04 0.009 0.2

.....
(1)

There are 400 cars in a car park.

$\frac{3}{10}$ of the cars are grey.

(f) Work out how many of the cars in the car park are **not** grey.

.....
(2)

(Total for Question 3 is 7 marks)

4 Here is a list of numbers.

3 6 7 8 11 25 27

(a) From the numbers in the list, write down

(i) an even number

.....
(1)

(ii) a multiple of 9

.....
(1)

(iii) a square number

.....
(1)

(iv) a prime number

.....
(1)

(b) Use brackets to make the statement correct.

You may use more than one pair of brackets in the statement.

$$2^2 + 5 \times 2 + 3^2 = 99$$

(1)

(Total for Question 4 is 5 marks)

5 The table gives information about the costs of sending parcels of different weights.

Weight (w kg)	Cost of sending a parcel
$0 < w \leq 1$	£6.00
$1 < w \leq 2$	£9.02
$2 < w \leq 5$	£15.85
$5 < w \leq 10$	£21.90

Dani has one parcel of weight 1.3 kg and another parcel of weight 8 kg to send to two different places.

(a) Work out the total cost of sending these two parcels.

£.....
(2)

Lucas sends 3 parcels each to a different place.

One of the parcels has a weight of 1.5 kg and another of the parcels has a weight of 2.8 kg

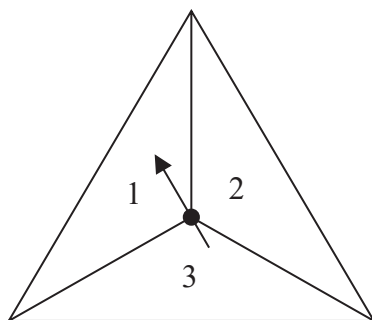
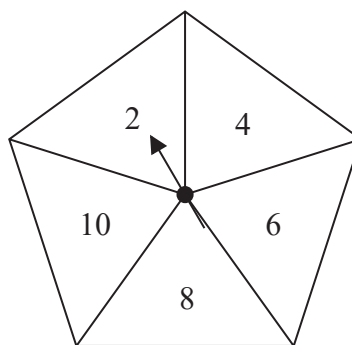
The total cost of sending the 3 parcels is £33.89

(b) Work out the greatest possible weight of the third parcel.

..... kg
(3)

(Total for Question 5 is 5 marks)

- 6 Jian has two fair spinners.
 Spinner **A** is 3-sided and can land on 1, 2 or 3
 Spinner **B** is 5-sided and can land on 2, 4, 6, 8 or 10

Spinner **A**Spinner **B**

Jian spins each spinner once.

He adds together the number that spinner **A** lands on and the number that spinner **B** lands on to get his total score.

- (a) Complete the table to show all possible total scores.
 Five of the total scores have been done for you.

Spinner **A**

		1	2	3
Spinner B	2	3		
	4			7
	6	7		
	8		10	
	10		12	

(2)

- (b) Find the probability that

- (i) Jian's total score is an odd number

.....
(1)

- (ii) Jian's total score is less than 9

.....
(1)

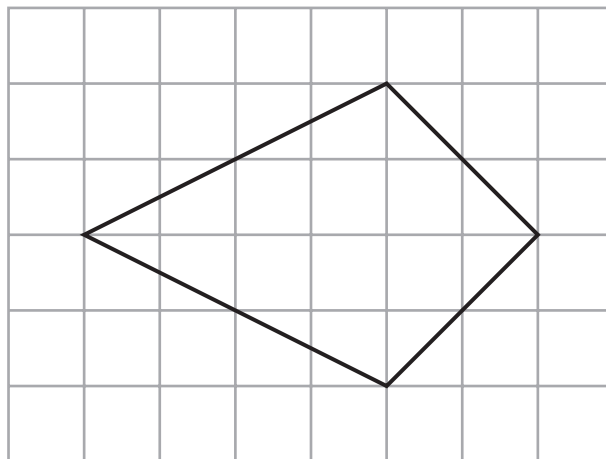
(Total for Question 6 is 4 marks)

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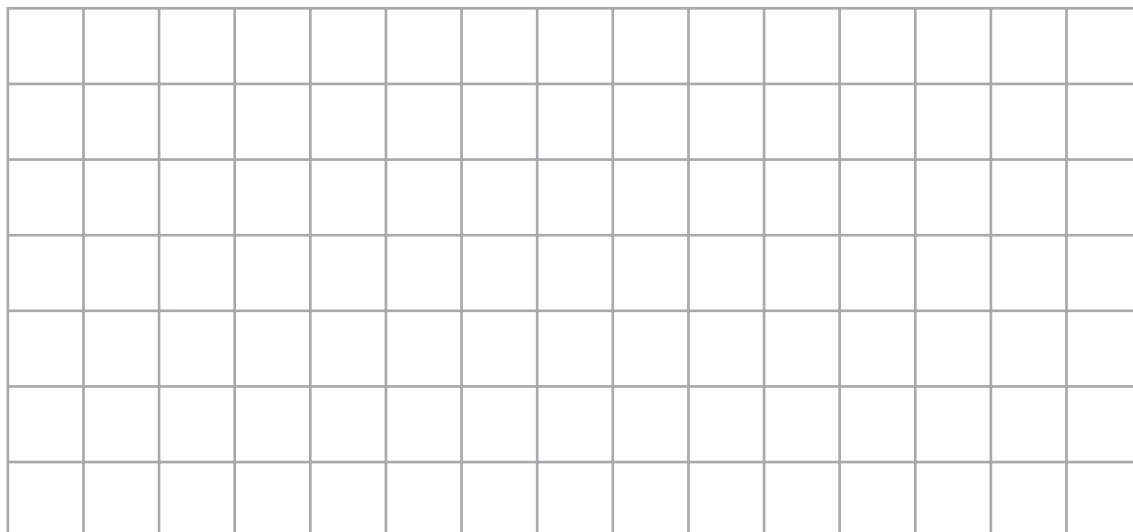
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7 The diagram shows a kite drawn on a centimetre grid.



On the centimetre grid below, draw a rectangle that has the same area as the kite.



(Total for Question 7 is 3 marks)

8 (a) Simplify $12g - 8e - 5g + 6e$

.....
(2)

$$A = 3b - 5c$$

(b) Work out the value of A when $b = 12$ and $c = 4$

$A =$
(2)

(c) Solve $4p + 9 = 24$

$p =$
(2)

(Total for Question 8 is 6 marks)

9 Iman wants to go on a boat at the seaside.

At the seaside there are 20 boats.

Of these boats

2 are white

5 are blue

7 are green

6 are yellow

Iman selects at random one of these boats.

Write down the probability that she selects

(a) a green boat,

.....
(1)

(b) a white boat or a yellow boat.

.....
(2)

(Total for Question 9 is 3 marks)

10 Sophia spends a total of £6.30 on cheese.

She buys 500 g of Cheddar cheese and 200 g of Stilton cheese.

The cost of the Cheddar cheese is £9.20 for 1 kg

Work out the cost of 1 kg of the Stilton cheese.

£.....

(Total for Question 10 is 4 marks)

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11 Caroline buys a bag in Sweden.

The price of the bag is 1342 Swedish Krona.

The price of an identical bag in Finland is 125 euros.

Using an exchange rate of

$$1 \text{ euro} = 11 \text{ Swedish Krona}$$

work out how much cheaper the bag is in Sweden than it is in Finland.

You must give the units of your answer.

.....
(Total for Question 11 is 3 marks)

12 The diagram shows two parallel lines AB and DEF

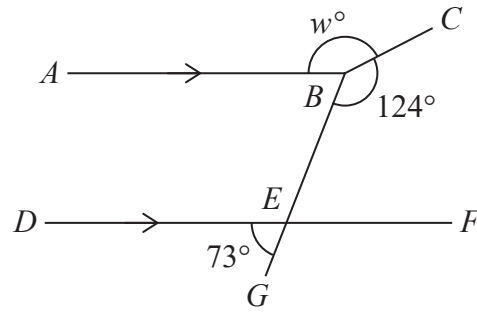


Diagram NOT accurately drawn

BEG is a straight line.

$$\text{angle } DEG = 73^\circ \quad \text{angle } EBC = 124^\circ \quad \text{angle } ABC = w^\circ$$

Work out the value of w

Give reasons for each stage of your working.

$$w = \dots\dots\dots$$

(Total for Question 12 is 4 marks)

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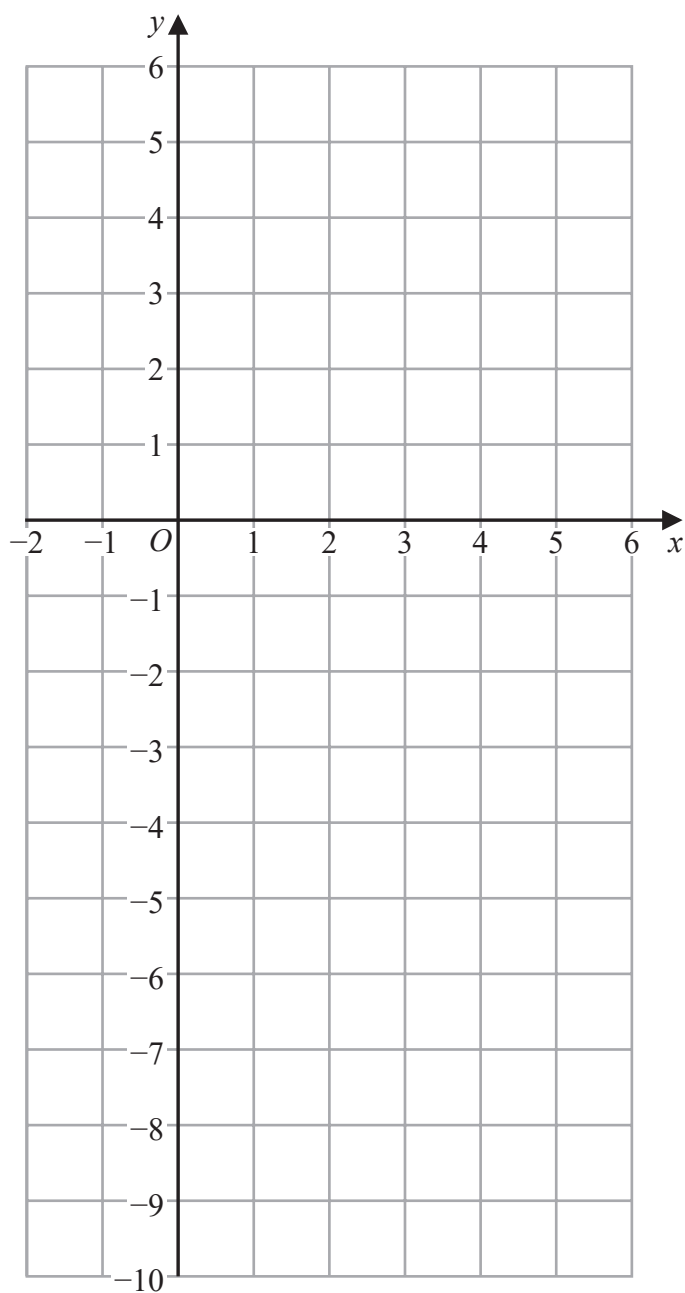
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13 On the grid, draw the graph of $y = -2x + 3$ for values of x from -1 to 5



(Total for Question 13 is 3 marks)

14 Use your calculator to work out the value of

$$\frac{5.21 + 6.37}{9.8} + 8.3^2$$

Write down all the figures on your calculator display.

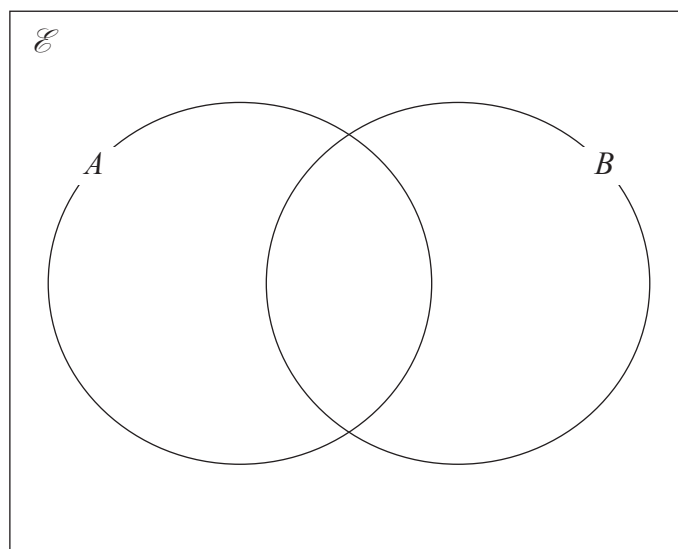
.....
(Total for Question 14 is 2 marks)

15 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$$A = \{2, 3, 7, 8, 9\}$$

$$B = \{1, 2, 4, 5, 7, 8, 10\}$$

Complete the Venn diagram for this information.



(Total for Question 15 is 3 marks)

16 The weight of a cake is 2.75 kg, correct to 2 decimal places.

Write down the lower bound of the weight of the cake.

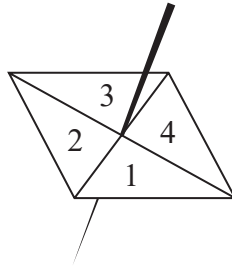
..... kg

(Total for Question 16 is 1 mark)

17 Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

(Total for Question 17 is 3 marks)

18 Here is a biased 4-sided spinner.



The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26		0.18	

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Priya is going to spin the spinner 250 times.

Work out an estimate for the number of times the spinner will land on a 1 or a 2

(Total for Question 18 is 4 marks)

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19 (a) Expand and simplify $(n - 6)(n + 4)$

.....
(2)

(b) Solve $2x - 3 = \frac{3x - 5}{4}$

Show clear algebraic working.

$x =$
(3)

(Total for Question 19 is 5 marks)

20 A plane flies from New York City to Los Angeles.

The plane flies a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the plane.

Give your answer in kilometres per hour correct to the nearest whole number.

..... kilometres per hour

(Total for Question 20 is 3 marks)

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21 The diagram shows an 8-sided shape $ABCDEFGH$

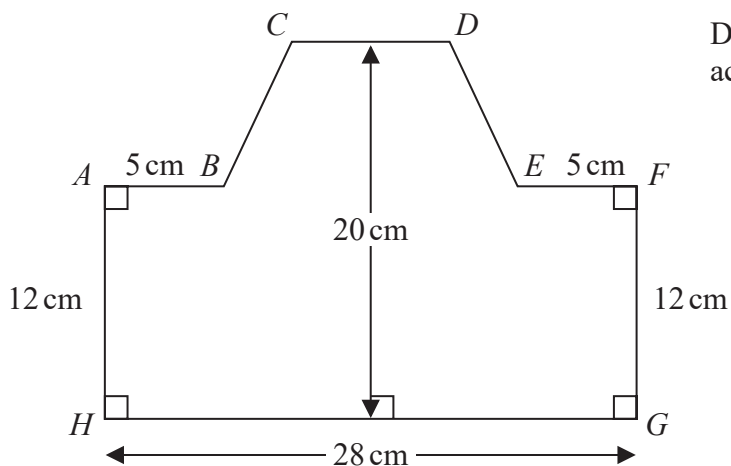


Diagram **NOT** accurately drawn

$HG = 28 \text{ cm}$ $AH = FG = 12 \text{ cm}$ $AB = EF = 5 \text{ cm}$

The height of the shape is 20 cm

CD is parallel to HG

The area of shape $ABCDEFGH$ is 434 cm^2

Find the length of CD

..... cm

(Total for Question 21 is 4 marks)

22 (a) Simplify $8 \times (4t)^0$

.....
(1)

$$x^6 \div x^{-5} = x^p$$

(b) Find the value of p

$p =$
(1)

(c) Simplify fully $(2k^2m^4)^3$

.....
(2)

(Total for Question 22 is 4 marks)

23 Change a speed of 81 kilometres per hour to a speed in metres per second.

..... metres per second

(Total for Question 23 is 3 marks)

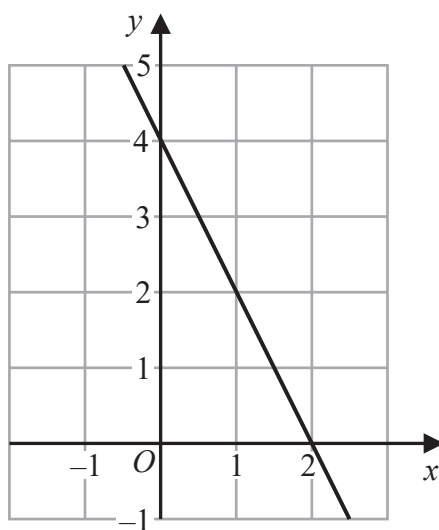
24 (a) Simplify $3a^4b^5 \times 4a^7b^2$

.....
(2)

(b) Factorise fully $14x^2y^4 + 21x^3y^2$

.....
(2)

The diagram shows a straight line drawn on a grid.



(c) Find an equation of the line.

.....
(2)

A different straight line has equation $y = 3x - 5$

(d) Write down the coordinates of the point at which the line crosses the y -axis.

(.....,.....)
(1)

(Total for Question 24 is 7 marks)

25 The diagram shows a quadrilateral $ABCD$

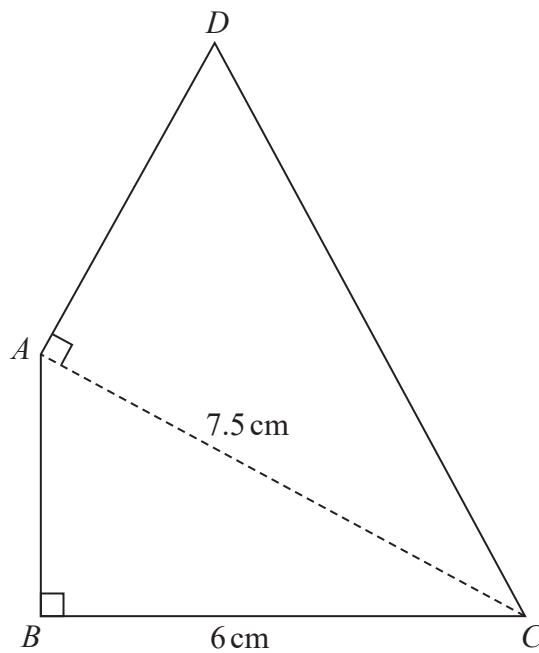


Diagram **NOT** accurately drawn

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In the diagram, ABC and DAC are right-angled triangles.

$$BC = 6 \text{ cm} \quad AC = 7.5 \text{ cm}$$

The area of quadrilateral $ABCD$ is 31.5 cm^2

(a) Work out the length of AB

..... cm
(2)

(b) Work out the length of AD

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..... cm

(4)

(Total for Question 25 is 6 marks)

TOTAL FOR UNIT IS 100 MARKS

Unit 1 Foundation Tier
Mark scheme

Apart from where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1 (a)		Gaziantep	1	B1
(b)		Two thousand, five hundred and thirty four	1	B1
(c)		2350	1	B1 cao
(d)		608	1	B1 Accept -608
(e)		4	1	B1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
2 (a)(i)		C	1	B1 cao
(ii)		A	1	B1 cao
(b)		Correct reason	1	B1 eg for probability cannot be more than 1 oe It adds to 1 oe It has to be below 1 oe Scale goes to 1 oe
				Total 3 marks

Question	Working	Answer	Mark	Notes
3 (a)		30	1	B1
(b)		0.29	1	B1
(c)		0.85	1	B1
(d)		-9, -7, -3, 8, 16	1	B1
(e)		0.009, 0.04, 0.044, 0.104, 0.2	1	B1 extra zeros at the end are fine and the numbers may be separated by any signs eg < or , etc
(f)	$1 - \frac{3}{10} \left(= \frac{7}{10} \right)$ oe or $\frac{3}{10} \times 400 (= 120)$ oe		2	M1 or use of $\frac{7}{10}$ eg $\frac{400}{10} \times 7$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	280		A1 cao
				Total 7 marks

Question	Working	Answer	Mark	Notes
4 (a)(i)		6 or 8	1	B1 allow 6 and 8
(ii)		27	1	B1 cao
(iii)		25	1	B1 cao
(iv)		3 or 7 or 11	1	B1 allow two or more of 3, 7, 11
(b)	$(2^2 + 5) \times (2 + 3^2) = 99$	Two correct pairs of brackets	1	B1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
5 (a)	$9.02 + 21.90$		2	M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	30.92		A1
(b)	$9.02 + 15.85 (= 24.87)$ or $33.89 - 9.02 (= 24.87)$ or $33.89 - 15.85 (= 18.04)$		3	M1 allow for one correct and any incorrect cost added and then the total subtracted from 33.89 or 9.02 or 15.85 subtracted from 33.89 after subtraction of an incorrect cost
	$33.89 - "24.87" (= 9.02)$ or $33.89 - 15.85 - 9.02 (= 9.02)$			M1 a fully correct method to find the cost of the 3rd parcel
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	2		A1 cao must come from correct working eg 9.02 from clear method If no marks awarded, SCB1 for any 2 costs from table subtracted from 33.89
				Total 5 marks

Question	Working	Answer	Mark	Notes																								
6 (a)	<table border="1"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> <tr> <td>8</td> <td>9</td> <td>10</td> <td>11</td> </tr> <tr> <td>10</td> <td>11</td> <td>12</td> <td>13</td> </tr> </table>		1	2	3	2	3	4	5	4	5	6	7	6	7	8	9	8	9	10	11	10	11	12	13		2	B2 For all 10 entries correct in table (B1 for 6, 7, 8 or 9 correct entries)
	1	2	3																									
2	3	4	5																									
4	5	6	7																									
6	7	8	9																									
8	9	10	11																									
10	11	12	13																									
(b)(i)		$\frac{10}{15}$	1	B1 ft oe eg $\frac{2}{3}$ or 0.66, 0.67, 0.666, 0.667 etc																								
(ii)		$\frac{8}{15}$	1	B1 ft 0.53(333...) (SC B1 (marks in (ii)) if both parts using “correct values” but incorrect probability notation eg 10 : 15, 8 : 15)																								
				Total 4 marks																								

Question	Working	Answer	Mark	Notes
7	(Area of kite =) 12		3	B1 for a correct area of the kite – may be implied by their diagram
				M1 for any rectangle
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>			A1 ft for a correct rectangle or ft for a rectangle with their stated area of the kite
				Total 3 marks

Question	Working	Answer	Mark	Notes
8 (a)		$7g - 2e$	2	B2 or $-2e + 7g$ If not B2 then award B1 for $7g$ or $-2e$
(b)	$3 \times 12 (= 36)$ and $5 \times 4 (= 20)$		2	M1
		16		A1 SC B1 for an answer of 56 or -16
(c)	$4p = 24 - 9$ or oe $4p = 15$ oe or $p + \frac{9}{4} = \frac{24}{4}$ oe or $(24 - 9) \div 4$ or $15 \div 4$		2	M1 for a correct first step or for a calculation for p
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{15}{4}$		A1 oe eg 3.75 or $3\frac{3}{4}$
				Total 6 marks

Question	Working	Answer	Mark	Notes
9 (a)		$\frac{7}{20}$	1	B1 oe
(b)	$\frac{2+6}{20}$ oe or $1 - \frac{5+7}{20}$ oe		2	M1 ft their (i)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{8}{20}$		A1 oe penalise incorrect notation only once
				Total 3 marks

Question	Working	Answer	Mark	Notes
10	$9.2 \times \frac{500}{1000}$ or $9.2 \div 2 (= 4.6)$ oe		4	M1 for a method to find the cost of 500g of Cheddar
	$6.3 - "4.6" (= 1.7)$			M1 for a method to find the cost of 200g of Stilton
	$1.7 \times \frac{1000}{200}$ or $"1.7" \times 5$ oe			M1 for a complete method to find the cost of 1kg of Stilton
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	8.5(0)		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
11	$1342 \div 11(=122)$ or $125 \times 11 (=1375)$		3	M1
	$125 - "122" (=3)$ or $"1375" - 1342(=33)$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	3 euros or 33 (Swedish) Krona		A1 Answer must have correct units which may be shortened eg € or SK or krona
				Total 3 marks

Question	Working	Answer	Mark	Notes
12	angle $ABE = 73$ or angle $BEF = 73$ or angle $GEF = 180 - 73 (=107)$ or angle $DEB = 180 - 73 (=107)$ or $360 - 73 - 124$ or $180 - (124 - "107")$		4	M1 could be on diagram
	<i>A correct angle scores 2 marks</i>	163		A1
				B2 dep on M1 and a complete method for all reasons appropriate for their method (B1 dep on M1 for one reason appropriate for their method) eg Angles on a straight line sum to 180° Angles on a straight line sum to 180° Vertically opposite angles are equal. Vertically opposite angles are equal. Corresponding angles are equal. Alternate angles are equal Allied angles sum to 180° (or co-interior angles) Angles at a point (or full turn) add up to 360° (or angles at a point)
				Total 4 marks

Question	Working								Answer	Mark	Notes
13	x	-1	0	1	2	3	4	5	Correct line between $x = -1$ and $x = 5$	3	B3 for a correct line between $x = -1$ and $x = 5$
	y	5	3	1	-1	-3	-5	-7			
	(-1, 5) (0, 3) (1, 1) (2, -1) (3, -3) (4, -5) (5, -7)										(B2 for a correct straight line segment through at least 3 of (-1, 5) (0, 3) (1, 1) (2, -1) (3, -3) (4, -5) (5, -7) or for all of (-1, 5) (0, 3) (1, 1) (2, -1) (3, -3) (4, -5) (5, -7) plotted but not joined)
											(B1 for at least 2 correct points stated (may be in a table) or plotted or for a line drawn with a negative gradient through (0, 3) or for a line with a gradient of -2) Ignore anything outside the range.
Total 3 marks											

Question	Working	Answer	Mark	Notes
14	$\frac{579}{490}$ or 1.18163		2	M1 or 70.1, 70.07, 70.071, 70.072, 70.0716
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	70.07163(265.....)		A1 at least 5 dp truncated or rounded
Total 2 marks				

Question	Working	Answer	Mark	Notes
15			3	B3 For all 4 regions of Venn diagram correct (B2 for 2 or 3 regions correct, B1 for 1 region correct) numbers must not be repeated in a region
				Total 3 marks

Question	Working	Answer	Mark	Notes
16		2.745	1	B1
				Total 1 mark

Question	Working	Answer	Mark	Notes
17	$\frac{16}{3} - \frac{20}{7}$ or $(5)\frac{7}{21} - (2)\frac{18}{21}$ or $(5)\frac{7a}{21a} - (2)\frac{18a}{21a}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator
	$\frac{112}{21} - \frac{60}{21}$ or $\frac{112a}{21a} - \frac{60a}{21a}$ or $5\frac{7}{21} - 2\frac{18}{21} = 3 - \frac{11}{21}$ oe or $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{11} - 2\frac{18}{21}$			M1 for correct fractions with a common denominator with minus sign or mixed numbers to the stage shown
	$\frac{112}{21} - \frac{60}{21} = \frac{52}{21} = 2\frac{10}{21}$ oe or $3 - \frac{11}{21} = 2\frac{10}{21}$ $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{11} - 2\frac{18}{21} = 2\frac{10}{21}$ <i>Working required</i>	Shown		A1 Dep on M2 for a correct answer from fully correct working If all 3 fractions turned into improper fractions on the first line $\frac{16}{3} - \frac{20}{7} = \frac{52}{21}$ then the student clearly needs to show that the LHS = $\frac{52}{21}$
				Total 3 marks

Question	Working	Answer	Mark	Notes
18	$1 - (0.26 + 0.18) (= 0.56)$ oe or 0.28 oe or $x + x = 1 - (0.26 + 0.18)$ oe		4	M1 0.28 oe may be seen in the table
	“0.28” + 0.26 (= 0.54)			M1 adding the two required probabilities
	“0.54” × 250 oe eg “0.28” × 250 + 0.26 × 250			M1 for multiplying the probabilities by 250
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	135		A1 cao
				Total 4 marks

Question	Working	Answer	Mark	Notes
19 (a)	$n^2 - 6n + 4n - 24$		2	M1 for any 3 correct terms or for 4 out of 4 correct terms ignoring signs or for $n^2 - 2n \dots$ or for $\dots - 2n - 24$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$n^2 - 2n - 24$		A1 oe
(b)	$8x - 12$ or $\frac{3}{4}x - \frac{5}{4}$ oe or $0.75x - 1.25$ oe		3	M1 for correct multiplication by 4 or separate fractions on the RHS
	$8x - 3x = -5 + 12$ oe or $5x = 7$ oe or $2x - \frac{3}{4}x = -\frac{5}{4} + 3$ or $2x - 0.75x = -1.25 + 3$ oe			M1 ft (dep on 4 terms) for terms in x on one side of equation and number terms on the other
	<i>Working required</i>	$\frac{7}{5}$		A1 oe dep on M1 1.4 or $1\frac{2}{5}$ oe
				Total 5 marks

Question	Working	Answer	Mark	Notes
20	For sight of 5 hrs 24 mins = 5.4 (hrs) or $5\frac{24}{60}$ ($= 5\frac{2}{5}$) oe or 324 (mins)		3	B1
	$3980 \div 5.4$ oe or $\frac{3980}{324} \times 60$			M1 For distance \div time that should give a speed in km/h (SC allow $3980 \div 5.24 (= 759.5\dots)$ or 760) for this mark unless mark has been awarded for 324 minutes or 5.4 hours oe)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	737		A1 awrt 737 (if no working shown, 738 gets SCB2)
				Total 3 marks

Question	Working	Answer	Mark	Notes
21	$28 \times 12 (=336)$ or $5 \times 12 (= 60)$ or $18 \times 12 (= 216)$ or $28 \times 20 (=560)$ or $\frac{1}{2}("CD"+"18")"8"$ oe eg 72 $+4CD$ [numbers in “ ” come from correct working] Check diagram for areas		4	M1 For a correct method to find the area of a rectangle (may be seen as part calculation) or a correct expression for the area of the trapezium with numbers substituted. Allow for other correct method to find area linked to this shape.
	$"336" + 0.5("18" + CD)"8" = 434$ oe eg $4("18" + CD) = 98$ or eg $0.5("18" + CD)"8" = "98"$ oe eg $\frac{1}{2}("CD"+"18") = 12.25$ or $"560" - 2(0.5(5 + x)"8") = 434$ oe (where x is horizontal from D to perp with AF) [numbers in “ ” come from correct working]			M1 correct use of their values from correct working for an equation involving CD (CD could be labelled with any letter)
	eg $(CD =) \frac{196 - 144}{8} \left(= \frac{52}{8} \right)$ or $(CD =) \frac{98 - 72}{4} \left(= \frac{26}{4} \right)$ or $(CD =) \frac{434 + 152 - 560}{4}$ or $(CD =) 2 \times 12.25 - 18$ or $98 \times (= 196), "196" \div 8 (= 24.5), "24.5" - 18$			M1 a correct process to solve a correct equation or a correct process to find CD using correct values
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	6.5		A1 oe
				Total 4 marks

Question	Working	Answer	Mark	Notes
22 (a)		8	1	B1
(b)		11	1	B1 accept x^{11}
(c)		$8k^6m^{12}$	2	B2 for all correct B1 for two correct from 8 or k^6 or m^{12}
				Total 4 marks

Question	Working	Answer	Mark	Notes
23	$\times 1000$ $(\div 60 \div 60)$ or $\div 3600$ or sight of 81 000 or 1350 or 0.0225		3	M1 For one of $\times 1000$ (eg sight of 81 000) or $(\div 60 \div 60)$ or $\div 3600$ oe
	$\frac{81 \times 1000}{60 \times 60}$ oe eg $\frac{81}{3.6}$ or $81 \times \frac{5}{18}$ oe			M1 For a fully correct method with correct use of brackets eg $81000 \div 60 \times 60$ is M1 only if not recovered
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	22.5		A1 oe eg $\frac{45}{2}$
				Total 3 marks

Question	Working	Answer	Mark	Notes
24 (a)		$12a^{11}b^7$	2	B2 for fully correct (B1 for 2 correct terms in a product)
(b)		$7x^2y^2(2y^2 + 3x)$	2	B2 (B1 for a correct factorisation with at least 2 terms outside the bracket eg $xy(14xy^3 + 21x^2y)$ or for the correct common factor with only one error in the bracket)
(c)		$y = -2x + 4$	2	B2 for $y = -2x + 4$ oe (B1 for $y = -2x + c$ or clearly showing the gradient is -2 or $y = mx + 4$ or $-2x + 4$)
(d)		$(0, -5)$	1	B1
				Total 7 marks

Question	Working	Answer	Mark	Notes
25 (a)	$\sqrt{7.5^2 - 6^2}$ or $(BAC =) \sin^{-1}\left(\frac{6}{7.5}\right) (= 53.1)$ and $\frac{6}{\tan 53.1}$ or $(BCA =) \cos^{-1}\left(\frac{6}{7.5}\right) (= 36.9)$ and $6 \times \tan 36.9$		2	M1 For a correct method to find AB
		4.5		
(b)	(area $ABC =$) $0.5 \times 6 \times "4.5" (= 13.5)$ oe		4	M1 ft their value of AB
	(area $ADC =$) $31.5 - "13.5" (= 18)$			M1 For a method to find area ADC
	($AD =$) (" 18 " $\div 7.5$) $\div 0.5$ oe			M1 For a complete method to find AD
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	4.8		A1 cao
				Total 6 marks

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching September 2024

Time 2 hours

Paper
reference

4WM2F/01

Mathematics A (Modular)

UNIT 2F

Foundation Tier



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this unit 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.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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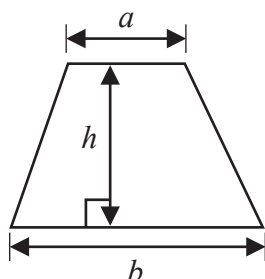


Pearson

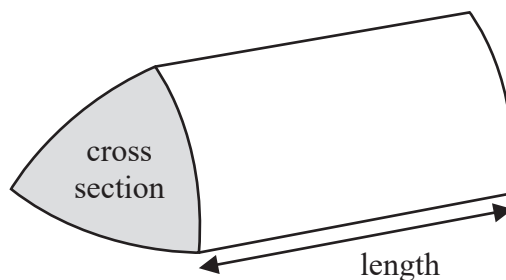
International GCSE Mathematics

Formulae sheet – Foundation Tier

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

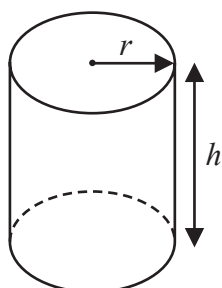


Volume of prism = area of cross section \times length



Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$



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Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (a) Simplify $12a + 3a - 7a$

.....
(1)

(b) Simplify $8 \times 3b$

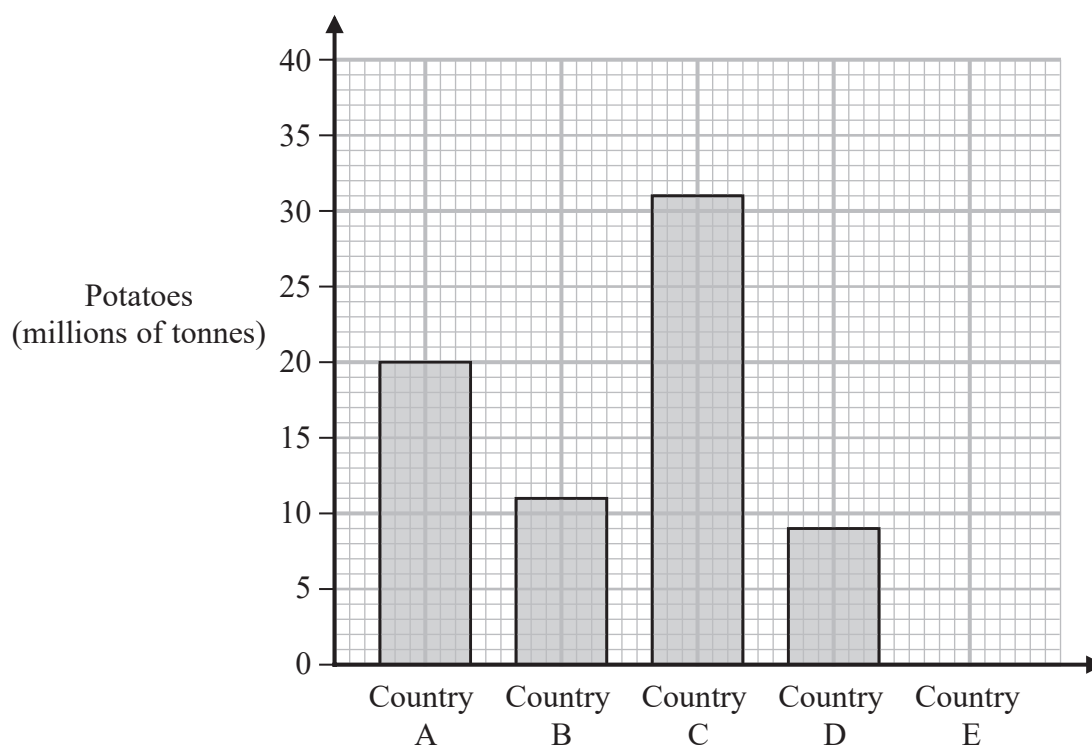
.....
(1)

(c) Solve $\frac{c}{3} = 9$

$c =$
(1)

(Total for Question 1 is 3 marks)

- 2 The bar chart shows information about the weight, in millions of tonnes, of the potatoes produced by each of four countries in 2016



In 2016, one of these four countries produced 11 million tonnes of potatoes.

- (a) Which country?

.....
(1)

In 2016, Country E produced 7 million tonnes of potatoes.

- (b) Draw a bar on the bar chart to show this information.

(1)

In 2016, the weight of potatoes produced by Country C was greater than the weight of potatoes produced by Country A

- (c) How many million tonnes greater?

..... million tonnes
(1)

(Total for Question 2 is 3 marks)

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

7 13 19 25 31

(a) (i) Write down the next term of the sequence.

.....
(1)

(ii) Explain how you found your answer to part (a)(i)

.....
(1)

The 30th term of the sequence is 181

(b) Work out the 28th term of the sequence.

.....
(1)

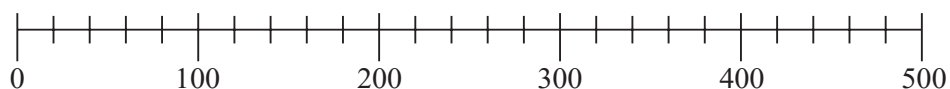
Brian says that 96 is a number in the sequence.
Brian is wrong.

(c) Explain why.

.....
.....
(1)

(Total for Question 3 is 4 marks)

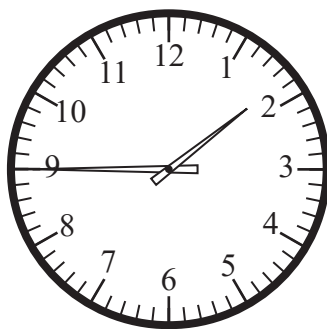
4 Here is a scale.



(a) On the scale, mark with an arrow (\uparrow) the number 360

(1)

Here is a clock face.



(b) Write down the time shown on the clock face.

.....
(1)

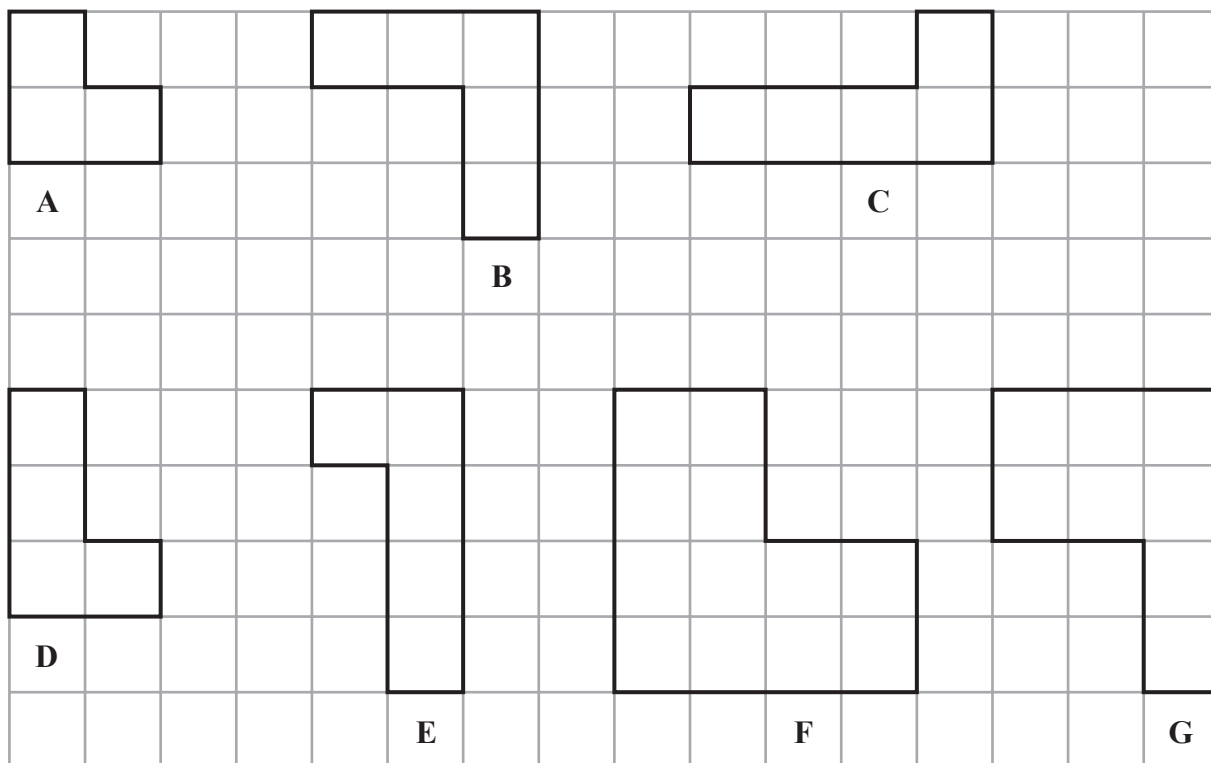
(c) Complete the following sentence by writing a suitable metric unit on the dotted line.

The length of a pen is 14

(1)

(Total for Question 4 is 3 marks)

5 Here are seven shapes on a centimetre grid.



(a) Write down the letters of the two shapes that are congruent.

..... and
(1)

One of the shapes is an enlargement, scale factor 2, of shape A

(b) Write down the letter of this shape.

.....
(1)

Shape F has exactly one line of symmetry.

(c) On shape F on the grid, draw this line of symmetry.

(1)

(d) Work out the perimeter of shape B

..... cm
(1)

(e) Work out the area of shape G

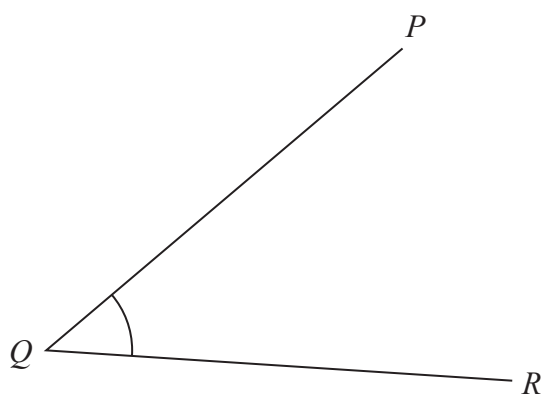
..... cm²
(1)

(Total for Question 5 is 5 marks)

6 (a) In the space below, draw a line of length 6.5 cm

(1)

The diagram shows the straight lines QP and QR



(b) Measure the size of angle PQR

.....°

(1)

(Total for Question 6 is 2 marks)

7 Aya started watching television at 10 50 am

Aya watched

a comedy programme lasting 45 minutes

a sports programme lasting 1 hour 10 minutes

a history programme

There were no breaks and no advertisements between the programmes.

Aya finished watching television at 2 20 pm

How long did the history programme last?

Give your answer in minutes.

..... minutes

(3)

(Total for Question 7 is 3 marks)

8 Here are two special offers for buying dog food.

Special offer A

Normally
\$1.40 a tin

Special offer

Buy 1 tin, get 1 tin half price

Special offer B

Normally
pack of 6 tins for \$7.20

Special offer

20% off each pack of 6 tins

Mateo buys 24 tins of dog food using special offer **A**

Anna buys 24 tins of dog food using special offer **B**

Work out the difference between the amount that Mateo pays and the amount that Anna pays.

\$.....

(Total for Question 8 is 4 marks)

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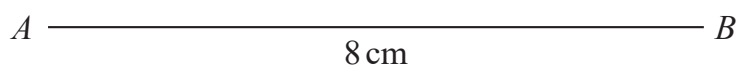
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- 9 ABC is a triangle.
 $AB = 8$ cm, $AC = 6$ cm and $BC = 9$ cm

Use a ruler and compasses to construct the triangle ABC
The side AB has been drawn for you.
You must show all your construction lines.



(Total for Question 9 is 2 marks)

- 10** 3 cups each contain 200 millilitres of water.
4 jugs each contain x millilitres of water.

Ali pours all the water from the 3 cups and the 4 jugs into a container.
The total amount of water that Ali pours into the container from the 3 cups and 4 jugs is 3.5 litres.

Work out the value of x

$$x = \dots\dots\dots$$

(Total for Question 10 is 4 marks)

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11 Jordan buys 256 notebooks.

He buys the notebooks in packs of 8 notebooks.
Each pack of 8 notebooks costs £2.48

Work out how much the 256 notebooks cost Jordan.

£.....

(Total for Question 11 is 3 marks)

12 (a) Simplify $6p + 2t + p - 3t$

.....
(2)

$$A = 8x - 3y$$

(b) Work out the value of A when $x = 5$ and $y = 4$

$A =$
(2)

(Total for Question 12 is 4 marks)

13 In 2001, the total number of cars produced in the world was 39.8 million.

In 2006, the total number of cars produced in the world was 10.1 million greater than the total number produced in 2001

- (a) Express 10.1 million as a percentage of 39.8 million.
Give your answer correct to one decimal place.

..... %
(2)

In 2011, the total number of cars produced in the world was 59.9 million.

In 2016, the total number of cars produced in the world was 21% greater than the total number produced in 2011

In 2016, the total number of cars produced in the world was N million.

- (b) Work out the value of N
Give your answer correct to the nearest whole number.

$N =$
(3)

(Total for Question 13 is 5 marks)

- 14 Zilin uses this number machine to work out the amount of tax that she has to pay on the money she earns.



When Zilin works n hours the amount of tax she has to pay is £ T
Find a formula for T in terms of n

.....
(Total for Question 14 is 3 marks)

15 Karim wants to make some small cakes.

He finds a recipe that says he needs 360 grams of flour to make 15 small cakes.

Karim has 0.85 kg of flour.

Karim works out how much flour he would need to make 38 small cakes, using the information given in the recipe.

Does Karim have enough flour, according to the recipe, to make 38 small cakes?
Show your working clearly.

(Total for Question 15 is 4 marks)

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- 16 The table gives information about the number of gold stars won by each of 25 students in class 7T last week.

Number of gold stars	Number of students
0	6
1	5
2	4
3	7
4	3

- (a) Work out the mean number of gold stars won.

.....
(3)

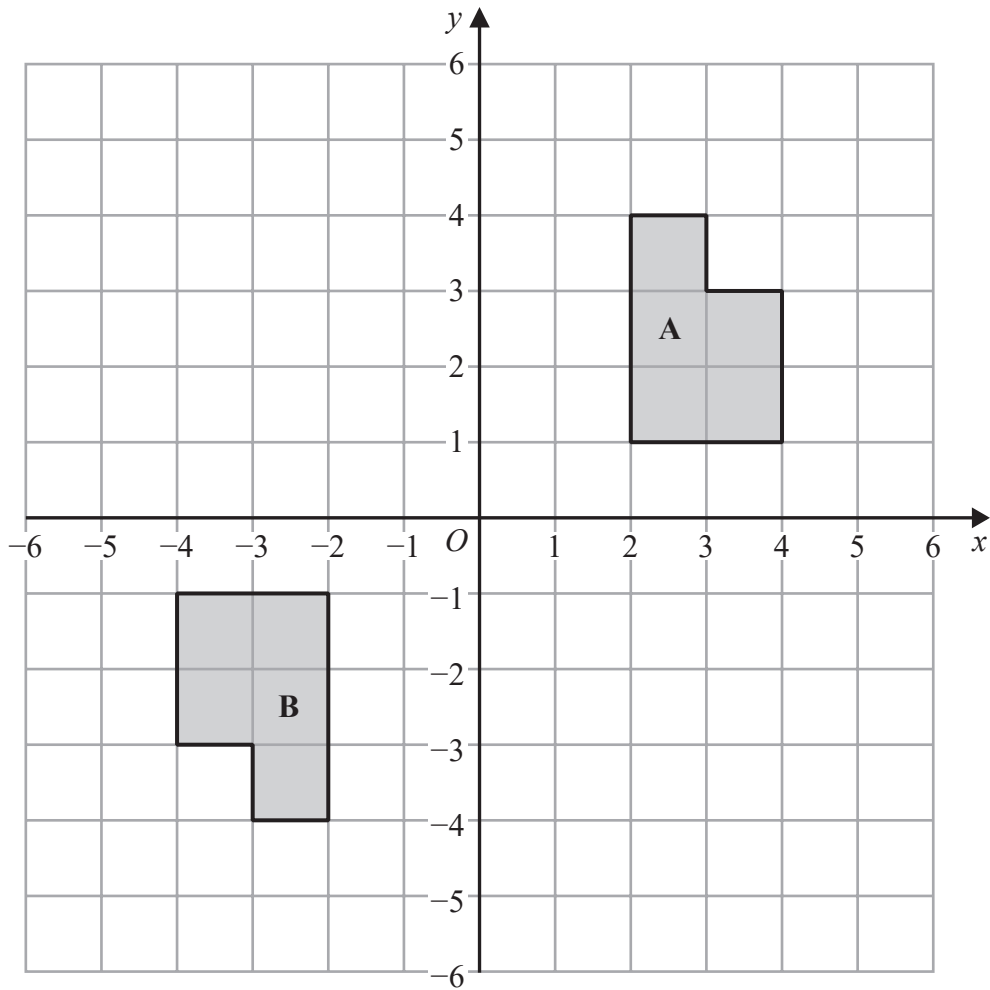
A student in class 8R is to be chosen at random.

The probability that this student won at least one gold star last week is 0.39

- (b) Work out the probability that this student did **not** win at least one gold star last week.

.....
(1)

(Total for Question 16 is 4 marks)



- (a) Describe fully the single transformation that maps shape **A** onto shape **B**

.....

 (2)

- (b) On the grid, reflect shape **A** in the line with equation $x = -1$

(2)

(Total for Question 17 is 4 marks)

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18 Here are five cards, where x represents a number.

15

7

-2

23

x

The mean of the five numbers is 12

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 18 is 3 marks)

19 (a) Find the highest common factor (HCF) of 56 and 84
Show your working clearly.

.....
(2)

(b) Find the lowest common multiple (LCM) of 60 and 72
Show your working clearly.

.....
(2)

(Total for Question 19 is 4 marks)

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20 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x = \dots\dots\dots$

(Total for Question 20 is 2 marks)

21 The diagram shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

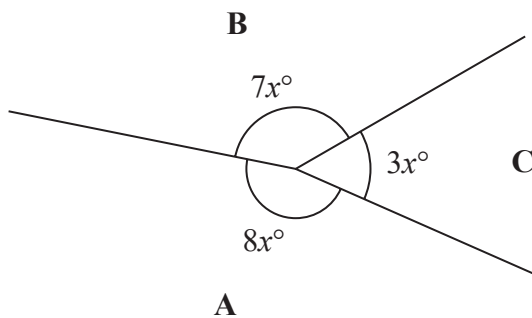


Diagram **NOT** accurately drawn

Polygon **B** has n sides.
Work out the value of n

$n = \dots\dots\dots$

(Total for Question 21 is 4 marks)

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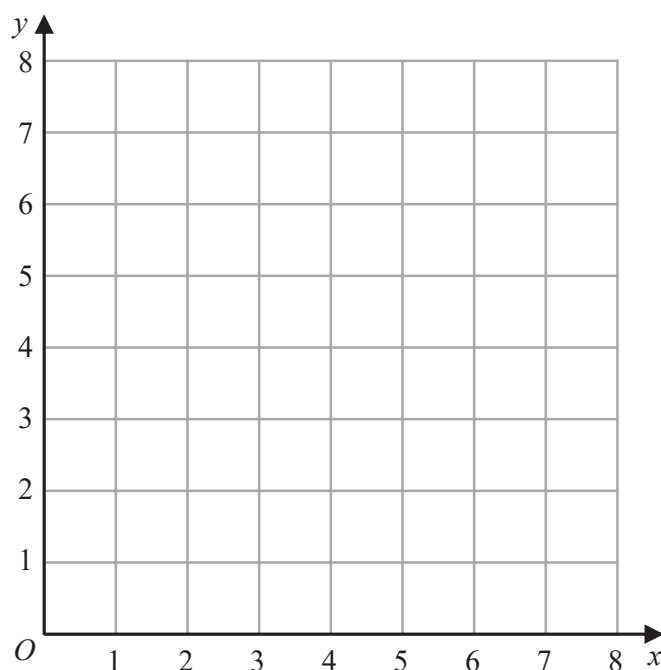
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22 (a) On the grid, draw and label with its equation the straight line with equation

(i) $y = 1$ (ii) $x = 2$ (iii) $x + y = 7$



(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$y \geq 1$ $x \geq 2$ $x + y \leq 7$

Label the region **R**

(1)

(Total for Question 22 is 4 marks)

23 Here are some integers where $a < b < c < d$

a b c d d d

The mode of the integers is 9

The range of the integers is 4

The median of the integers is 8

Work out the value of a , the value of b , the value of c and the value of d

$a =$

$b =$

$c =$

$d =$

(Total for Question 23 is 3 marks)

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24 A cylinder is placed on the ground.

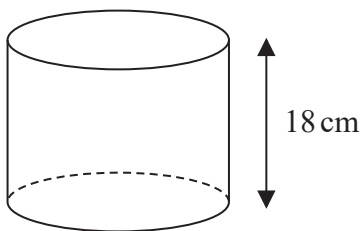


Diagram **NOT** accurately drawn

The height of the cylinder is 18 cm

The force exerted by the cylinder on the ground is 72 newtons.

The pressure on the ground due to the cylinder is 1.4 newtons/cm²

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the volume of the cylinder.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 24 is 4 marks)

25 In 2021, the value of Asha's apartment was 634 400 euros.
The value of Asha's apartment had increased by 4% from its value in 2020

(a) Work out the value of Asha's apartment in 2020

..... euros
(3)

Pam bought a boat.

In each year after Pam bought the boat, the value of the boat depreciated by 15%

(b) Work out the total percentage by which the value of the boat had depreciated by the end of the second year after Pam bought the boat.

..... %
(3)

(Total for Question 25 is 6 marks)

26 (a) Write 0.000 089 in standard form.

.....
(1)

(b) Write 8.34×10^4 as an ordinary number.

.....
(1)

(Total for Question 23 is 2 marks)

27 Payel makes 300 celebration cards so that

$$\begin{array}{l} \text{number of} \\ \text{birthday cards} \end{array} : \begin{array}{l} \text{number of} \\ \text{anniversary cards} \end{array} : \begin{array}{l} \text{number of} \\ \text{congratulations cards} \end{array} = 7 : 5 : 3$$

$\frac{2}{5}$ of the birthday cards have numbers on them.

36% of the anniversary cards have numbers on them.

None of the congratulations cards have numbers on them.

Work out what fraction of the 300 cards have numbers on them.

Give your answer in its simplest form.

.....
(Total for Question 27 is 5 marks)

28 Solve the simultaneous equations

$$7x + 3y = 3$$

$$3x - y = 7$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 28 is 3 marks)

TOTAL FOR UNIT IS 100 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Unit 2 Foundation Tier
Mark scheme

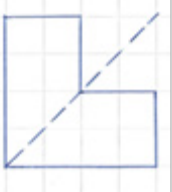
Apart from questions where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1 (a)		$8a$	1	B1 cao
(b)		$24b$	1	B1 cao
(c)		27	1	B1 cao
				Total 3 marks

Question	Working	Answer	Mark	Notes
2 (a)		B	1	B1 Accept b or 'Country B' allow incorrect spelling if meaning is clear
(b)		bar at height of 7	1	B1 any width is acceptable
(c)		11	1	B1 Allow 11 million or 11 000 000 in the answer space
				Total 3 marks

Question	Working	Answer	Mark	Notes
3 (a)(i)		37	1	B1
(ii)		+6	1	B1 oe eg 'added 6' or 'plus 6' or $6n + 1$ allow $31 + 6 = 37$ increase by 6 / goes up by 6
(b)		169	1	B1
(c)		All the numbers in the sequence are odd numbers	1	B1 96 is not odd / 96 is even 96 is a multiple of 6 (and terms are not multiples of 6) or No numbers in the sequence end in 6 / all end in 1, 3, 5, 7, 9 or the sequence is $6n + 1$ or it goes ...91, 97, ... oe or it should be 97 They need to add 1
				Total 4 marks

Question	Working	Answer	Mark	Notes
4 (a)		Marked at 360	1	B1
(b)		145	1	B1 oe eg 1345, quarter to two/2 Ignore any am or pm
(c)		centimetres	1	B1 or cm
				Total 3 marks

Question	Working	Answer	Mark	Notes
5 (a)		C, E	1	B1 accept E and C as order does not matter
(b)		F	1	B1 an answer of F only
(c)		Correct line	1	B1 correct line with no other lines
(d)		12	1	B1
(e)		8	1	B1
				Total 5 marks

Question	Working	Answer	Mark	Notes
6 (a)		line of length 6.5 cm drawn	1	B1 ± 2 mm
(b)		44	1	B1 Accept answers in the range 42-46 including decimals and fractions
				Total 2 marks

Question	Working	Answer	Mark	Notes
7	eg 10:50am + 45mins = 11:35am or 10:50am + 1hr10mins = 12:00pm or 2:20pm – 45mins = 1:35pm or 2:20pm – 1hr10mins = 1:10pm or 45mins + 1hr10mins = 1hr55mins or 115mins or 10:50am to 2:20pm = 3hr30mins or 210mins		3	M1 for correctly working with two times condone missing am or pm
	eg 10:50am + 45mins + 1hr10mins = 12:45pm or 10:50am + 1hr55mins = 12:45pm or 2:20pm – 45mins – 1hr10mins = 12:25pm or 2:20pm – 1hr55mins = 12:25pm			M1 ft for getting to a time one step from the answer or 1hr35mins or a correct ft from a previous error condone missing am or pm
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	95		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
8	$12 \times 1.40 + 12 \times 0.5 \times 1.40 (= 25.20)$ oe eg $(1.4 + 0.7) \times 12 (= 25.20)$		4	M1 correct method to find the cost for offer A
	$0.8 \times 7.20 \times "4" (=23.04)$ oe or $"4" \times 7.20 - 0.2 ("4" \times 7.20)$ oe eg $28.80 - 5.76 (= 23.04)$ where $4 = 24 \div 6$			M1 indep correct method to find the cost for offer B
	$12 \times 1.40 + 12 \times 0.5 \times 1.40 - 0.8 \times 7.20 \times 4$ or "25.20" – "23.04"			M1 dep on M2 A fully correct method to find the difference
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	2.16		A1 allow –2.16
				Total 4 marks

Question	Working	Answer	Mark	Notes
9	Triangle drawn with intersecting arcs 6 cm from <i>B</i> and 9 cm from <i>A</i>	Triangle drawn with correct intersecting arcs 6 cm from <i>A</i> and 9 cm from <i>B</i>	2	B2 for triangle drawn with correct intersecting arcs 6 cm from <i>A</i> and 9 cm from <i>B</i> within the overlay (B1 for two intersecting arcs within the overlay or accurate triangle drawn with no arcs)
				Total 2 marks

Question	Working	Answer	Mark	Notes
10	200 (ml) written as 0.2 (l) or 3.5 (l) written as 3500 (ml)		4	B1 for a correct conversion
	$3 \times "0.2" (= 0.6)$ oe eg $0.2 + 0.2 + 0.2$ or $3 \times 200 (= 600)$ oe eg $-200-200-200$ or $3500 - 600 (= 2900)$			M1 A correct calculation for the total amount of water in the 3 cups or the 4 jugs
	$\frac{3.5 - "0.6"}{4}$ or $\frac{"3500" - "600"}{4}$			M1 For a fully correct method or for an answer of 0.725 (this alone gains B1M2)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	725		A1 (SCB1M1 (no other marks) for $(3.5 - 0.2) \div 4 (= 0.825)$ or $(3500 - 200) \div 4 (= 825)$)
				Total 4 marks

Question	Working	Answer	Mark	Notes
11	$256 \div 8 (= 32)$ or $8 \times 32 = 256$ or $2.48 \div 8 (= 0.31)$		3	M1 for a correct first step
	“32” \times 2.48 or $256 \times$ “0.31”			M1 for a complete method or $\frac{1984}{25}$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	79.36		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
12 (a)		$7p - t$	2	B2 Fully correct answer (allow $-1t$) (B1 for $7p$ or $-t$)
(b)	eg $8 \times 5 - 3 \times 4$ or $40 - 12$		2	M1 for a complete method
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	28		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
13 (a)	$\frac{10.1}{39.8} \times 100$ oe or $\frac{10\ 100\ 000}{39\ 800\ 000} \times 100$		2	M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	25.4		A1 awrt
(b)	$\frac{21}{100} \times 59.9 (= 12.579)$ oe or $\frac{21}{100} \times 59\ 900\ 000 (= 12\ 579\ 000)$ oe		3	M1 $\frac{21}{100} \times 59.9$ oe or $\frac{21}{100} \times 59\ 900\ 000$ oe
	$59.9 +$ “12.579” (= 72.479) or $59\ 900\ 000 + 12\ 579\ 000 (= 72\ 479\ 000)$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	72		A1 Accept 72 – 73 or 72 000 000 – 73 000 000
				Total 5 marks

Question	Working	Answer	Mark	Notes
14		$T = 0.2(12n + 50)$ oe	3	B3 for $T = 0.2(12n + 50)$ oe or $T = 0.2 \times (12n + 50)$ oe for $T = 0.2 \times (12 \times n + 50)$ oe or $T = \frac{12n + 50}{5}$ oe or $T = 2.4n + 10$
				(B2 for $0.2(12n + 50)$ oe or $0.2 \times (12n + 50)$ oe or $T = 0.2 \times 12n + 50$ oe or $T = n \times 12 + 50 \times 0.2$ or $T = 12n + 50 \div 5$ oe or $T = n(12) + 50(0.2)$ oe)
				(B1 for $n \times 12 + 50 \times 0.2$ oe or $12n + 50 \div 5$ oe or $n(12) + 50(0.2)$ oe or $T =$ a linear expression in n eg $T = n$)
				Total 3 marks

Question	Working	Answer	Mark	Notes
15	$0.85 \times 1000 (= 850)$ or $360 \div 1000 (= 0.36)$		4	M1 for a correct conversion of kg to g or g to kg
	$360 \div 15 (= 24)$ or $"0.36" \div 15 (= 0.024)$ or $"850" \div 38 (= 22.368\dots)$ or $0.85 \div 38 (= 0.022368\dots)$ or $"850" \div 360 (= \frac{85}{36} = 2.3(6\dots))$ or $\left(\frac{38}{15}\right) 2 \frac{8}{15} (= 2.5\dots)$			M1 oe
	$360 \div 15 (= 24)$ and $"850" \div 38 (= 22.368\dots)$ or $"0.36" \div 15 (= 0.024)$ and $0.85 \div 38 (= 0.022368\dots)$ or $360 \div 15 (= 24)$ and $"850" \div 24 (= 35.4\dots)$ or $"0.36" \div 15 (= 0.024)$ and $0.85 \div '0.024' (= 35.4\dots)$ or $"850" \div 360 (= \frac{85}{36} = 2.3(6\dots))$ and $"2.3(6\dots)" \times 15$ $(= 35.4)$ or $\left(\frac{38}{15}\right) 2 \frac{8}{15} (= 2.5\dots)$ and $"2 \frac{8}{15}" \times "0.36" (= 0.912)$ or $\left(\frac{38}{15}\right) 2 \frac{8}{15} (= 2.5\dots)$ and $"2 \frac{8}{15}" \times "360" (= 912)$ or $360 \div 15 (= 24)$ and $"24" \times 38 (= 912)$ or $"0.36" \div 15 (= 0.024)$ and $"0.024" \times 38 (= 0.912)$			M1 calculations that compare the same amounts eg How much flour is needed for recipe and how much Johan has for each cake or Working out how many cakes Johann can make with his flour to compare with 38 cakes or Working out how much flour is needed to enable comparison with given figure of 0.85 kg
	<i>Working required</i>	No and correct figures seen		A1 No or statement that clearly states that there is not enough flour to make 38 cakes

				<p>and correct figures - figures may be rounded in working and produce slightly different results which are acceptable eg “2.3(6...)” × 15 allow 34 – 36 Must compare 912 with 850 or implied by 62 seen</p>
				Total 4 marks

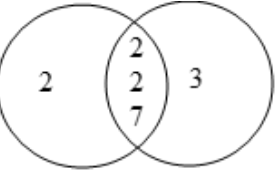
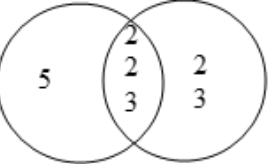
Question	Working	Answer	Mark	Notes
15 ALT	$0.85 \times 1000 (= 850)$		4	M1
	eg $15 + 15 (= 30)$ or $15 \div 2 (= 7(.5)$ or 8)			M1
	eg $15 + 15 + 7(.5) (= 37(.5))$ or $15 + 15 + 8 (= 38)$			M1
	<i>Working required</i>	No and 37(.5) or 38 seen		A1 oe No and 37(.5) or 38 seen
				Total 4 marks

Question	Working	Answer	Mark	Notes																		
15 ALT	$0.85 \times 1000 (= 850)$		4	M1																		
	$360 \div 15 (= 24)$			M1																		
	<table border="1"> <tr><td>(360)</td><td>15</td></tr> <tr><td>(360)</td><td>15</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(24)</td><td>1</td></tr> <tr><td>(864)</td><td>36</td></tr> </table>	(360)	15	(360)	15	(24)	1	(24)	1	(24)	1	(24)	1	(24)	1	(24)	1	(864)	36			M1
(360)	15																					
(360)	15																					
(24)	1																					
(24)	1																					
(24)	1																					
(24)	1																					
(24)	1																					
(24)	1																					
(864)	36																					
	eg for a build-up method																					
		No and 36 seen		A1 oe No and 36 seen																		
				Total 4 marks																		

Question	Working	Answer	Mark	Notes
16 (a)	$(0 \times 6) + (1 \times 5) + (2 \times 4) + (3 \times 7) + (4 \times 3) (= 46)$ or $0 + 5 + 8 + 21 + 12 (= 46)$		3	M1 for at least 4 products added or intention to add (need not be evaluated)
	'46' \div 25			M1 dep on M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	1.84		A1 SC B1 for answer only of 2.08 oe
(b)		0.61	1	B1 oe 61% or $\frac{61}{100}$ oe
				Total 4 marks

Question	Working	Answer	Mark	Notes
17 (a)	Rotation, rotate, rotated (not turn)	rotation	2	B1 oe with no mention of reflection, translation, enlargement, move, flip etc
		180° about (0, 0) or <i>O</i>		B1 oe with no mention of a line, column vector or SF (SCB1 for 'half turn about (0, 0) or <i>O</i> ' with no contradictory statements) Alternative: B2 for enlargement with centre <i>O</i> and SF -1 (B1 for enlargement with no mention of other transformation, B1 for centre <i>O</i> and SF -1)
(b)	(-4, 1)(-6, 1)(-6, 3)(-5, 3)(-5, 4)(-4, 4)	A correct shape	2	B2 (B1 for a 'correct' shape reflected in any vertical line or a correct reflection in the line $y = -1$ or reflection of shape B in the line $x = -1$)
				Total 4 marks

Question	Working	Answer	Mark	Notes
18	$5 \times 12 (= 60)$ or $\frac{15 + 7 - 2 + 23 + x}{5} = 12$ oe or $\frac{x + "43"}{5} = 12$		3	M1 for a method to find the total of the 5 numbers or setting up an equation in x "43" comes from $15 + 7 - 2 + 23$
	$x + 15 + 7 - 2 + 23 = "60"$ or $x + "43" = "60"$ or $"60" - (15 + 7 - 2 + 23)$			M1 for forming an equation with their 60 or for a complete calculation to find the value of x "43" comes from $15 + 7 - 2 + 23$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	17		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes															
19 (a)	<p>1, 2, 4, 7, 8, 14, 28, 56 and 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84</p> <p>or</p> <p>2 2 2 7 and 2 2 3 7</p>  <p>or</p> <p>eg</p> <table border="1"> <tr> <td>28</td> <td>56</td> <td>84</td> </tr> <tr> <td></td> <td>2</td> <td>3</td> </tr> </table>	28	56	84		2	3		2	<p>M1 for any correct valid method and no errors eg</p> <p>for starting to list at least four different factors of each number and no errors</p> <p>or</p> <p>2 2 2 7 and 2 2 3 7 seen (may be in a factor tree or a ladder diagram and ignore 1)</p> <p>or a fully correct Venn diagram</p> <p>or other clear method, eg table</p>									
28	56	84																	
	2	3																	
	<i>Working required</i>	28		A1 dep M1 accept $2^2 \times 7$ oe															
(b)	<p>60, 120, 180, 240... and 72, 144, 216, 288...</p> <p>or</p> <p>2 2 3 5 and 2 2 2 3 3</p> <table border="1"> <tr> <td>2</td> <td>60</td> <td>72</td> </tr> <tr> <td>2</td> <td>30</td> <td>36</td> </tr> <tr> <td>3</td> <td>15</td> <td>18</td> </tr> <tr> <td>2</td> <td>5</td> <td>6</td> </tr> <tr> <td></td> <td></td> <td>3</td> </tr> </table> <p>or</p>  <p>or $\frac{60 \times 72}{12}$ or 2, 2, 2, 3, 3, 5 oe</p>	2	60	72	2	30	36	3	15	18	2	5	6			3		2	<p>M1 for any correct valid method and no errors eg</p> <p>for starting to list at least four multiples of each number</p> <p>or</p> <p>2 2 3 5 and 2 2 2 3 3 seen (may be in a factor tree or a ladder diagram and ignore 1)</p> <p>or a fully correct Venn diagram</p> <p>or other clear method, eg table</p>
2	60	72																	
2	30	36																	
3	15	18																	
2	5	6																	
		3																	
	<i>Working required</i>	360		A1 dep M1 accept $2^3 \times 3^2 \times 5$ oe															
				Total 4 marks															

Question	Working	Answer	Mark	Notes
20	$(4^n =)(2^2)^n$ or $(4^n =)2^{2n}$ oe eg $2^k \div 2^{2n} = 2^x$ or $2^k = 4^{\frac{1}{2}k}$ and $2^x = 4^{\frac{1}{2}x}$ oe eg $\frac{4^{\frac{1}{2}k}}{4^n} = 4^{\frac{1}{2}x}$		2	M1 for writing 4^n as $(2^2)^n$ or 2^{2n} or for writing each term in terms of 4 ie $2^k = 4^{\frac{1}{2}k}$ and $2^x = 4^{\frac{1}{2}x}$ If these things are seen in working, award this mark even if followed by incorrect working – if not a choice of methods.
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$k - 2n$		A1 allow 2^{k-2n}
				Total 2 marks

Question	Working	Answer	Mark	Notes
21	$7x + 3x + 8x = 360$ oe		4	M1 M2 for $7x = 140$
	$(x =) 360 \div 18 (= 20)$			M1 (140 can be on diagram)
	$360 \div (180 - 7 \times "20")$ oe or $360 \div (180 - "140")$ $\frac{(n-2) \times 180}{n} = 7 \times "20"$ oe or $360 \div 40$			M1 for $360 \div$ exterior angle
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	9		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
22 (a)(i) (ii) (iii)	<p>Line length 2cm + but shaded area must be enclosed for the mark in (b)</p>		3	B1 $y = 1$ drawn B1 $x = 2$ drawn B1 $x + y = 7$ drawn Allow dashed lines or solid lines for graphs condone lack of labels if unambiguous
(b)			1	B1 correct region shaded – shaded in or out – labelled R or clear intention to be the required region (ft only for one vertical line, one horizontal line and one line with a negative gradient)
				Total 4 marks

Question	Working	Answer	Mark	Notes
23			3	M1 for $d = 9$ or $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) or $d - a = 4$ (algebraically or clearly labelled integers)
				M1 for two of $a = 5$ or $c = 7$ or $d = 9$ or $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) or $d - a = 4$ (algebraically or clearly labelled integers)
		$a = 5, b = 6, c = 7, d = 9$		A1 All correct
				Total 3 marks

Question	Working	Answer	Mark	Notes
24	$1.4 = \frac{72}{(\text{area})}$ oe		4	M1
	$(\text{area} =) \frac{72}{1.4}$ ($= \frac{360}{7} = 51.4\dots$) oe			M1 (51.4 or better)
	“51.4...” $\times 18$ or $r = \sqrt{\frac{“51.4\dots”}{\pi}}$ ($= 4.046\dots$) and $\pi \times “4.046”^2 \times 18$			M1 allow use of πr^2 to find the radius and then using $\pi r^2 h$ to find the volume
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	926		A1 Allow 925 – 928
				Total 4 marks

Question	Working	Answer	Mark	Notes
25 (a)	$1 + 0.04 (= 1.04)$ or $100(\%) + 4(\%) (= 104(\%))$ or $(= 6100)$ oe		3	M1
	$634\,400 \div "1.04"$ or $634\,400 \div "104" \times 100$ or $634\,400 \times 100 \div "104"$ oe			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	610 000		A1
(b)	$"0.85" \times "0.85" (= 0.7225)$ oe or $"0.85" - ("0.85" \times 0.15) (= 0.7225)$ or $\frac{"85" \times "85"}{100} (= 72.25)$ oe or [0.85 and 85 must come from correct working]		3	M1 allow use of their amount eg $200 \times "0.85" \times "0.85" (= 144.5)$
	$1 - "0.7225"$ or 0.2775 or $100 - "72.25"$			M1 eg $\frac{200 - "144.5"}{200} (\times 100)$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	27.75		A1 oe allow 27.8 or 28
				Total 6 marks

Question	Working	Answer	Mark	Notes
26 (a)		8.9×10^{-5}	1	B1
(b)		83 400	1	B1
				Total 2 marks

Question	Working	Answer	Mark	Notes
27	$300 \div (7 + 5 + 3) (= 20)$ clear correct use of $7 + 5 + 3 (= 15)$ eg division at the end by 15 $\left(\frac{"2.8"+"1.8"}{15}\right)$ or correct use of 15 in a fraction eg $\frac{2}{5} \times \frac{7}{15}$		5	M1 (no mark for "15" unless it is used correctly) use of 7×20 or 140 or 5×20 or 100 in further work assumes this mark
	$\frac{2}{5} \times (7 \times "20") (= 56)$ oe eg $0.4 \times 140 (= 56)$ or $\frac{2}{5} \times 7 \left(= \frac{14}{5} = 2.8 \right)$ or eg $\frac{2}{5} \times \frac{7}{15} \left(= \frac{14}{75} = 0.186\dots \right)$			M1 finding $\frac{2}{5}$ of the number of birthday cards or $\frac{2}{5}$ of the share of 7 or $\frac{2}{5}$ of fraction of amount
	$0.36 \times (5 \times "20") (= 36)$ or $0.36 \times 5 (= 1.8)$ or eg $\frac{36}{100} \times \frac{5}{15} \left(= \frac{180}{1500} = 0.12 \right)$ oe			M1 finding 36% of anniversary cards or 36% of the share of 5 or 36% of fraction of amount
	$\frac{"56"+"36"}{300}$ or eg $\left(\frac{"2.8"+"1.8"}{15}\right)$ or $\frac{14}{5} + \frac{9}{5}$ $\frac{"14"}{75} + \frac{"180"}{1500}$			M1 for any fraction from correct working that isn't simplified or 30.66..% or 0.3066...
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{23}{75}$		A1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
28	eg $\begin{array}{r} +7x+3y=3 \\ +21x+9y=9 \end{array}$ or $\begin{array}{r} +21x+9y=9 \\ +21x-7y=49 \end{array}$ or eg $7x+3(3x-7)=3 \text{ or } 7\left(\frac{7+y}{3}\right)+3y=3$		3	M1 a correct method to eliminate x or y – multiplying one or both equations so that one variable can be eliminated (allow a total of one error in multiplication) and the correct operation to eliminate or for substitution of one variable into the other equation.
	If first M1 gained then they can substitute an incorrect value if from ‘correct’ method to gain this mark.			M1 dep on M1 for a correct method to calculate the value of other letter eg substitution or starting again with elimination
	<i>Working required</i>	$x = 1.5, y = -2.5$		A1 oe dep on M1
				Total 3 marks

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching September 2024

Time 2 hours

Paper

reference

4WM1H/01

Mathematics A (Modular)

UNIT 1H

Higher Tier



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this unit 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.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

S81551A

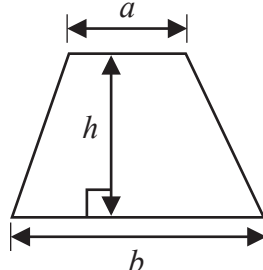
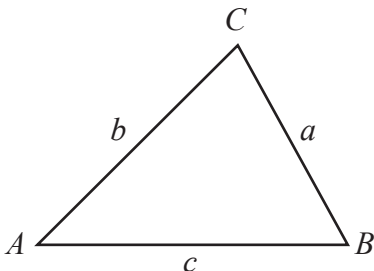
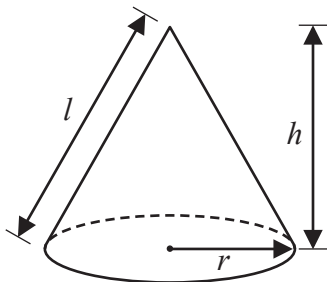
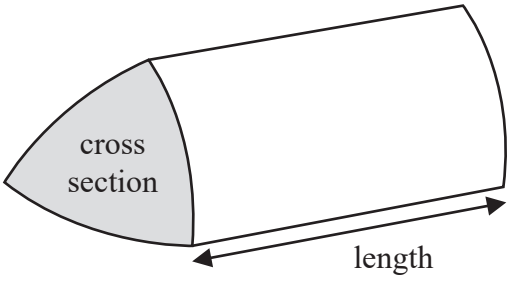
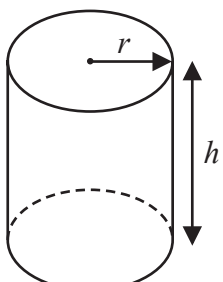
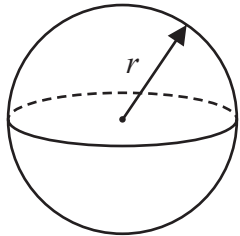
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International GCSE Mathematics

Formulae sheet – Higher Tier

<p>Arithmetic series Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$</p>	<p>Area of trapezium = $\frac{1}{2}(a + b)h$</p>
<p>The quadratic equation The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p>	
<p>Trigonometry</p> 	<p>In any triangle ABC 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 = $\frac{1}{2}ab \sin C$</p>
<p>Volume of cone = $\frac{1}{3}\pi r^2 h$ Curved surface area of cone = $\pi r l$</p> 	<p>Volume of prism = area of cross section \times length</p> 
<p>Volume of cylinder = $\pi r^2 h$ Curved surface area of cylinder = $2\pi r h$</p> 	<p>Volume of sphere = $\frac{4}{3}\pi r^3$ Surface area of sphere = $4\pi r^2$</p> 

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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1** The weight of a cake is 2.75 kg, correct to 2 decimal places.

Write down the lower bound of the weight of the cake.

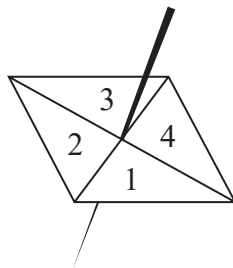
..... kg

(Total for Question 1 is 1 mark)

- 2** Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

(Total for Question 2 is 3 marks)

3 Here is a biased 4-sided spinner.



The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26		0.18	

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Priya is going to spin the spinner 250 times.

Work out an estimate for the number of times the spinner will land on a 1 or a 2

(Total for Question 3 is 4 marks)

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4 (a) Expand and simplify $(n - 6)(n + 4)$

.....
(2)

(b) Solve $2x - 3 = \frac{3x - 5}{4}$

Show clear algebraic working.

$x =$
(3)

(Total for Question 4 is 5 marks)

5 A plane flies from New York City to Los Angeles.

The plane flies a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the plane.

Give your answer in kilometres per hour correct to the nearest whole number.

..... kilometres per hour

(Total for Question 5 is 3 marks)

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6 The diagram shows an 8-sided shape $ABCDEFGH$

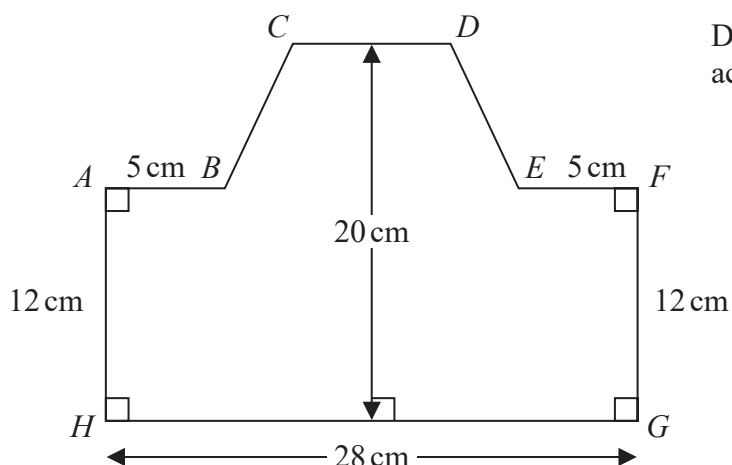


Diagram **NOT** accurately drawn

$HG = 28 \text{ cm}$ $AH = FG = 12 \text{ cm}$ $AB = EF = 5 \text{ cm}$

The height of the shape is 20 cm

CD is parallel to HG

The area of shape $ABCDEFGH$ is 434 cm^2

Find the length of CD

..... cm

(Total for Question 6 is 4 marks)

7 (a) Simplify $8 \times (4t)^0$

.....
(1)

$$x^6 \div x^{-5} = x^p$$

(b) Find the value of p

$p =$
(1)

(c) Simplify fully $(2k^2m^4)^3$

.....
(2)

(Total for Question 7 is 4 marks)

8 Change a speed of 81 kilometres per hour to a speed in metres per second.

..... metres per second

(Total for Question 8 is 3 marks)

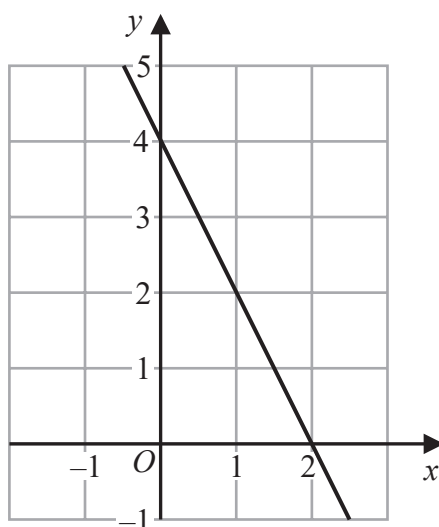
9 (a) Simplify $3a^4b^5 \times 4a^7b^2$

.....
(2)

(b) Factorise fully $14x^2y^4 + 21x^3y^2$

.....
(2)

The diagram shows a straight line drawn on a grid.



(c) Find an equation of the line.

.....
(2)

A different straight line has equation $y = 3x - 5$

(d) Write down the coordinates of the point at which the line crosses the y-axis.

(.....,)
(1)

(Total for Question 9 is 7 marks)

10 The diagram shows a quadrilateral $ABCD$

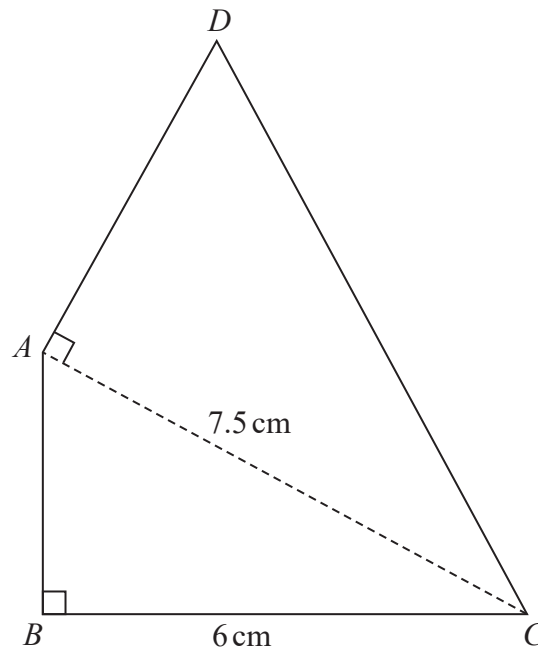


Diagram **NOT** accurately drawn

In the diagram, ABC and DAC are right-angled triangles.

$$BC = 6 \text{ cm} \quad AC = 7.5 \text{ cm}$$

The area of quadrilateral $ABCD$ is 31.5 cm^2

(a) Work out the length of AB

..... cm
(2)

(b) Work out the length of AD

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..... cm

(4)

(Total for Question 10 is 6 marks)

(c) Work out the probability that the two beads are of different colours.

.....
(3)

(Total for Question 11 is 6 marks)

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12 (a) Factorise $9x^2 - 4y^2$

.....
(2)

(b) Express $\frac{7}{8} - \frac{x+3}{4x}$ as a single fraction in its simplest form.

.....
(3)

(Total for Question 12 is 5 marks)

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13 (a) Expand and simplify $(3x - 1)(x + 2)(3x + 1)$

.....
(3)

(b) Simplify fully $\left(\frac{2x^5}{8xy^2}\right)^{-2}$

.....
(3)

(Total for Question 13 is 6 marks)

14 100 farmers are asked if they have goats (G), sheep (S) or chickens (C) on their farms.

Of these farmers

31 have sheep

53 have chickens

6 have goats, sheep and chickens

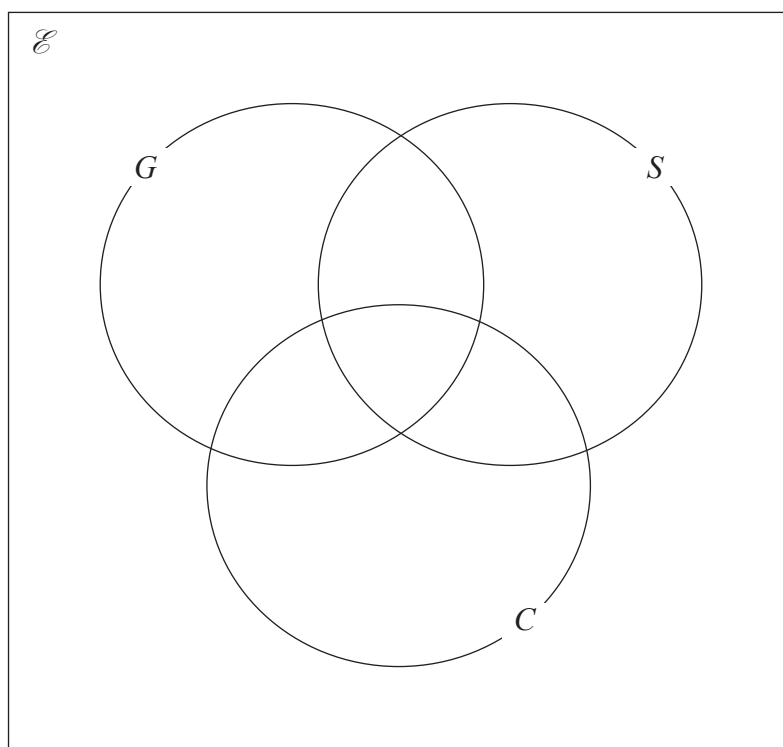
11 have sheep and goats

17 have sheep and chickens

18 have goats and chickens

20 do not have any goats, sheep or chickens

(a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(3)

(b) Find

(i) $n(G)$

.....
(1)

(ii) $n([G \cup S]')$

.....
(1)

(iii) $n(G' \cap C)$

.....
(1)

One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

.....
(2)

(Total for Question 14 is 8 marks)

15 Martin and Lucia went on two different car journeys.

For Martin's journey

distance = 80 km correct to the nearest 5 km

time = 2.7 hours correct to 1 decimal place

For Lucia's journey

distance = 33 km correct to 2 significant figures

time = 1 hour correct to the nearest 0.1 hour

Martin says,

“My average speed could have been greater than Lucia's average speed.”

By considering bounds, show that Martin is correct.
Show your working clearly.

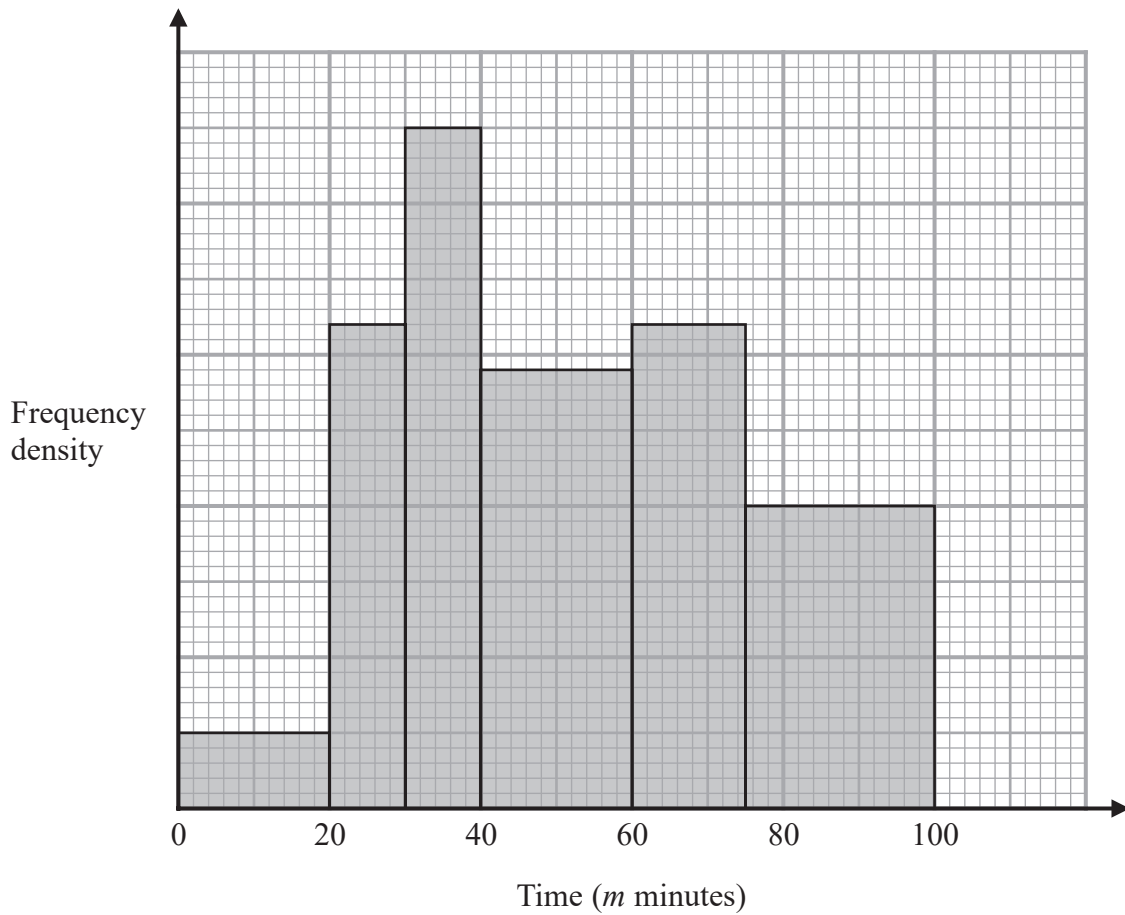
(Total for Question 15 is 4 marks)

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16 The histogram shows information about the total time, m minutes, taken by each child in a school to walk to school every day for one week.



There are no children for whom $m > 100$

There are 10 children for whom $m \leq 20$

Work out an estimate for the number of children for whom $50 < m \leq 80$

(Total for Question 16 is 3 marks)

17 Express $\frac{3 + \sqrt{8}}{(\sqrt{2} - 1)^2}$ in the form $p + \sqrt{q}$ where p and q are integers.

Show clearly each stage of your working.

.....
(Total for Question 17 is 4 marks)

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18 The diagram shows two identical circles drawn inside a rectangle.

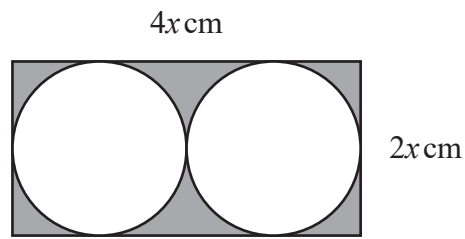


Diagram NOT accurately drawn

The length of the rectangle is $4x$ cm and the width of the rectangle is $2x$ cm
Each circle has a radius of x cm

The circles touch each other and each circle touches three sides of the rectangle.

The region inside the rectangle that is outside the circles, shown shaded in the diagram, has a total area of 20 cm^2

Work out the perimeter of the rectangle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 18 is 4 marks)

19 The diagram shows a triangular prism, $ABCDEF$, with a rectangular base $ABCD$

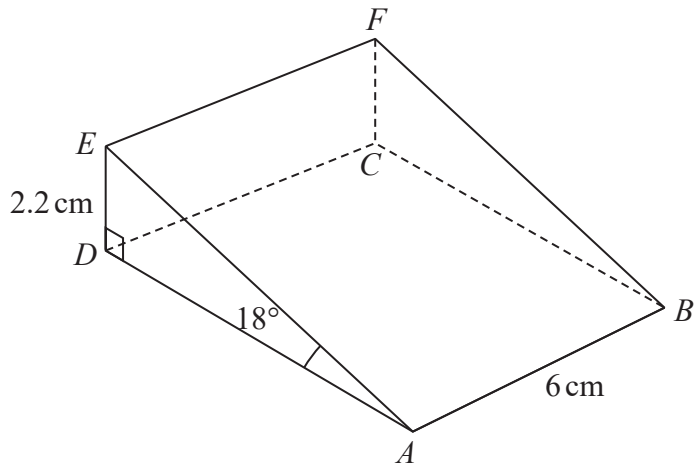


Diagram **NOT** accurately drawn

$AB = 6 \text{ cm}$ $DE = 2.2 \text{ cm}$ angle $DAE = 18^\circ$ angle $ADE = 90^\circ$

Work out the angle that BE makes with the plane $ABCD$
Give your answer correct to one decimal place.

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(Total for Question 19 is 4 marks)

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20 Find the values of a , b and c so that

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

is written as $a - b(x - c)^2$

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots$$

(Total for Question 20 is 4 marks)

21 Express $\left(\frac{20}{x^2 - 36} - \frac{2}{x - 6}\right) \times \frac{1}{4 - x}$ as a single fraction in its simplest form.

Show clear algebraic working.

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.....
(Total for Question 21 is 3 marks)

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22 $\frac{18 \times (\sqrt{27})^{4n+6}}{6 \times 9^{2n+8}} = 3^x$

Express x in terms of n

Show your working clearly and simplify your expression.

$x = \dots\dots\dots$

(Total for Question 22 is 3 marks)

23 $ABCD$ is a kite.

$$AB = AD \text{ and } CB = CD$$

The point B has coordinates $(k, 1)$ where k is a negative constant.

The point D has coordinates $(8, 7)$

The straight line L passes through the points B and D and has a gradient of $\frac{3}{5}$

Find an equation of AC

Give your answer in the form $px + qy = r$ where p, q and r are integers.

Show your working clearly.

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.....
(Total for Question 23 is 6 marks)

TOTAL FOR UNIT IS 100 MARKS

Unit 1 Higher Tier
Mark scheme

Apart from questions where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1		2.745	1	B1
				Total 1 mark

Question	Working	Answer	Mark	Notes
2	$\frac{16}{3} - \frac{20}{7}$ or $(5)\frac{7}{21} - (2)\frac{18}{21}$ or $(5)\frac{7a}{21a} - (2)\frac{18a}{21a}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator
	$\frac{112}{21} - \frac{60}{21}$ or $\frac{112a}{21a} - \frac{60a}{21a}$ or $5\frac{7}{21} - 2\frac{18}{21} = 3 - \frac{11}{21}$ oe or $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{11} - 2\frac{18}{21}$			M1 for correct fractions with a common denominator with minus sign or mixed numbers to the stage shown
	$\frac{112}{21} - \frac{60}{21} = \frac{52}{21} = 2\frac{10}{21}$ oe or $3 - \frac{11}{21} = 2\frac{10}{21}$ $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{11} - 2\frac{18}{21} = 2\frac{10}{21}$	Shown		A1 Dep on M2 for a correct answer from fully correct working If all 3 fractions turned into improper fractions on the first line $\frac{16}{3} - \frac{20}{7} = \frac{52}{21}$ then the student clearly needs to show that the LHS = $\frac{52}{21}$
				Total 3 marks

Question	Working	Answer	Mark	Notes
3	$1 - (0.26 + 0.18) (= 0.56)$ oe or 0.28 oe or $x + x = 1 - (0.26 + 0.18)$ oe		4	M1 0.28 oe may be seen in the table
	“0.28” + 0.26 (= 0.54)			M1 adding the two required probabilities
	“0.54” \times 250 oe eg “0.28” \times 250 + 0.26 \times 250			M1 for multiplying the probabilities by 250
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	135		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
4 (a)	$n^2 - 6n + 4n - 24$		2	M1 for any 3 correct terms or for 4 out of 4 correct terms ignoring signs or for $n^2 - 2n \dots$ or for $\dots - 2n - 24$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$n^2 - 2n - 24$		A1 oe
(b)	$x - 12$ or $\frac{3}{4}x - \frac{5}{4}$ oe or $0.75x - 1.25$ oe		3	M1 for correct multiplication by 4 or separate fractions on the RHS
	$x - 3x = -5 + 12$ oe or $5x = 7$ oe or $2x - \frac{3}{4}x = -\frac{5}{4} + 3$ or $2x - 0.75x = -1.25 - 3$ oe			M1 ft (dep on 4 terms) for terms in x on one side of equation and number terms on the other
	<i>Working required</i>	$\frac{7}{5}$		A1 oe dep on M1 1.4 or $1\frac{2}{5}$ oe
				Total 5 marks

Question	Working	Answer	Mark	Notes
5	For sight of 5 hrs 24 mins = 5.4 (hrs) or $5 \frac{24}{60} \left(= 5 \frac{2}{5} \right)$ oe or 324 (mins)		3	B1
	$3980 \div 5.4$ oe or $\frac{3980}{324} \times 60$			M1 For distance \div time that should give a speed in km/h. (SC allow $3980 \div 5.24 (= 759.5\dots)$ or 760) for this mark unless mark has been awarded for 324 minutes or 5.4 hours oe)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	737		A1 awrt 737 (if no working shown, 738 gets SCB2)
				Total 3 marks

Question	Working	Answer	Mark	Notes
6	$28 \times 12 (=336)$ or $5 \times 12 (= 60)$ or $18 \times 12 (= 216)$ or $28 \times 20 (=560)$ or $\frac{1}{2}("CD" + "18")"8"$ oe eg 72 $+4CD$ [numbers in “ ” come from correct working] Check diagram for areas		4	M1 For a correct method to find the area of a rectangle (may be seen as part calculation) or a correct expression for the area of the trapezium with numbers substituted. Allow for other correct method to find area linked to this shape.
	$"336" + 0.5 ("18" + CD)"8" = 434$ oe eg $4("18" + CD) = 98$ or eg $0.5("18" + CD)"8" = "98"$ oe eg $\frac{1}{2}("CD" + "18") = 12.25$ or $"560" - 2(0.5(5 + x)"8") = 434$ oe (where x is horizontal from D to perp with AF) [numbers in “ ” come from correct working]			M1 correct use of their values from correct working for an equation involving CD (CD could be labelled with any letter)
	eg $(CD =) \frac{196 - 144}{8} \left(= \frac{52}{8} \right)$ or $(CD =) \frac{98 - 72}{4} \left(= \frac{26}{4} \right)$ or $(CD =) \frac{434 + 152 - 560}{4}$ or $(CD =) 2 \times 12.25 - 18$ or $98 \times (= 196), "196" \div 8 (= 24.5), "24.5" - 18$			M1 a correct process to solve a correct equation or a correct process to find CD using correct values
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	6.5		A1 oe
				Total 4 marks

Question	Working	Answer	Mark	Notes
7 (a)		8	1	B1
(b)		11	1	B1 accept x^{11}
(c)		$8k^6m^{12}$	2	B2 for all correct B1 for two correct from 8 or k^6 or m^{12}
				Total 4 marks

Question	Working	Answer	Mark	Notes
8	1000 ($\div 60 \div 60$) or $\div 3600$ or sight of 81 000 or 1350 or 0.0225		3	M1 For one of $\times 1000$ (eg sight of 81 000) or ($\div 60 \div 60$) or $\div 3600$ oe
	$\frac{81 \times 1000}{60 \times 60}$ oe eg $\frac{81}{3.6}$ or $81 \times \frac{5}{18}$ oe			M1 For a fully correct method with correct use of brackets eg $81000 \div 60 \times 60$ is M1 only if not recovered
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	22.5		A1 $\frac{45}{2}$ oe eg $\frac{45}{2}$
				Total 3 marks

Question	Working	Answer	Mark	Notes
9 (a)		$12a^{11}b^7$	2	B2 Fully correct (B1 for 2 correct terms in a product)
(b)		$7x^2y^2(2y^2 + 3x)$	2	B2 (B1 for a correct factorisation with at least 2 terms outside the bracket eg $xy(14xy^3 + 21x^2y)$ or for the correct common factor with only one error in the bracket)
(c)		$y = -2x + 4$	2	B2 for $y = -2x + 4$ oe (B1 for $y = -2x + c$ or clearly showing the gradient is -2 or $y = mx + 4$ or $-2x + 4$)
(d)		(0, -5)	1	B1
				Total 7 marks

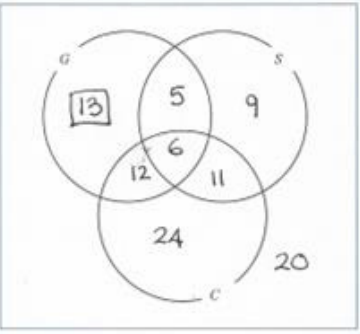
Question	Working	Answer	Mark	Notes
10 (a)	$\sqrt{7.5^2 - 6^2}$ or $(BAC =) \sin^{-1}\left(\frac{6}{7.5}\right) (= 53.1)$ and $\frac{6}{\tan 53.1}$ or $(BCA =) \cos^{-1}\left(\frac{6}{7.5}\right) (= 36.9)$ and $6 \times \tan 36.9$		2	M1 For a correct method to find AB
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	4.5		A1 oe
(b)	(area ABC =) $0.5 \times 6 \times "4.5"$ (= 13.5) oe		4	M1 ft their value of AB
	(area ADC =) $31.5 - "13.5"$ (= 18)			M1 For a method to find area ADC
	(AD =) (" $18 \div 7.5$ ") $\div 0.5$ oe			M1 For a complete method to find AD
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	4.8		A1 cao
				Total 6 marks

Question	Working	Answer	Mark	Notes
11 (a)		$\frac{4}{10}, \frac{6}{10}$	1	B1 oe both probabilities correct.
(b)	$\frac{4}{11} \times \frac{3}{10}$		2	M1
		$\frac{12}{110}$		A1 oe $\frac{6}{55}$ oe eg 0.109....
(c)	$\frac{4}{11} \times \frac{7}{10}$ or $\frac{7}{11} \times \frac{4}{10}$		3	M1ft Ft their tree diagram as long as given values are less than 1
	$\frac{4}{11} \times \frac{7}{10} + \frac{7}{11} \times \frac{4}{10}$			M1ft
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{56}{110}$		A1oe $\frac{28}{55}$ oe eg 0.509.....
				Total 6 marks

Question	Working	Answer	Mark	Notes
12 (a)	$(3x \pm 2y)(3x \pm 2y)$ or $(3x)^2 - (2y)^2$		2	M1
		$(3x + 2y)(3x - 2y)$		A1
(b)	$\frac{7(4x)}{32x} - \frac{8(x+3)}{32x}$ oe or $\frac{7(4x)}{8(4x)} - \frac{8(x+3)}{8(4x)}$ oe or $\frac{28x}{32x} - \frac{8(x+3)}{32x}$ oe or $\frac{28x}{32x} - \frac{8x+24}{32x}$ oe or $\frac{28x - 8(x+3)}{32x}$ oe or $\frac{7x}{8x} - \frac{2(x+3)}{8x}$ oe or $\frac{7x - 2(x+3)}{8x}$		3	M1 for two correct fractions with common denominator or a single correct fraction
	$\frac{28x - 8x - 24}{32x}$ oe or $\frac{20x - 24}{32x}$ oe or $\frac{7x - 2x - 6}{8x}$ oe or $\frac{20x}{32x} - \frac{24x}{32x}$ oe or $\frac{28x}{32x} - \frac{8x}{32x} - \frac{24}{32x}$			M1 for correct fraction(s) with bracket(s) expanded and dealing with the negative signs
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{5x - 6}{8x}$		A1 or $\frac{-6 + 5x}{8x}$
				Total 5 marks

Question	Working	Answer	Mark	Notes
13 (a)	$(3x-1)(x+2) = 3x^2 + 6x - x - 2 (= 3x^2 + 5x - 2)$ or $(3x-1)(3x+1) = 9x^2 + 3x - 3x - 1 (= 9x^2 - 1)$ or $(x+2)(3x+1) = 3x^2 + x + 6x + 2 (= 3x^2 + 7x + 2)$		3	M1 for a correct intention to multiply all 3 factors by multiplying 2 factors only, allow one error
	$[(3x^2 + 5x - 2)(3x + 1) =] 9x^3 + 15x^2 - 6x + 3x^2 + 5x - 2$ or $[(9x^2 - 1)(x + 2) =] 9x^3 + 18x^2 - x - 2$ or $[(3x^2 + 7x + 2)(3x - 1) =] 9x^3 + 21x^2 + 6x - 3x^2 - 7x - 2$			M1 (dep) ft for expanding by the third factor, allow one error
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$9x^3 + 18x^2 - x - 2$		A1
	ALTERNATIVE			
	$9x^3 + 3x^2 + 18x^2 + 6x - 3x^2 - x - 6x - 2$		3	M2 for a complete expansion with 8 terms present, at least 4 of which must be correct
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$9x^3 + 18x^2 - x - 2$		A1
(b)	$\left(\frac{8xy^2}{2x^5}\right)^2$ or $\left(\frac{x^4}{4y^2}\right)^{-2}$ or $\left(\frac{4x^{10}}{64x^2y^4}\right)^{-1}$		3	M1 for one of reciprocating or simplifying or squaring
	$\left(\frac{4y^2}{x^4}\right)^2$ or $\left(\frac{x^8}{16y^4}\right)^{-1}$ or $\frac{64x^2y^4}{4x^{10}}$ or $\frac{\frac{1}{4}x^{-10}}{\frac{1}{64}x^{-2}y^{-4}}$			M1 for two of reciprocating or simplifying or squaring
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{16y^4}{x^8}$		A1

	ALTERNATIVE			accept $16y^4x^{-8}$ or $\frac{16}{y^{-4}x^8}$ or $\frac{16x^{-8}}{y^{-4}}$ oe
			3	M2 for 2 correct terms (M1 for 1 correct term)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{16y^4}{x^8}$		A1 accept $16y^4x^{-8}$ or $\frac{16}{y^{-4}x^8}$ or $\frac{16x^{-8}}{y^{-4}}$ oe
				Total 6 marks

Question	Working	Answer	Mark	Notes
14 (a)		Fully correct Venn diagram	3	B1 For 13 correct in G only B2 For all 7 others correct (B1 for 4, 5 or 6 others correct (does not need to be complete for this))
(b)(i)		36	1	B1 ft from a diagram where values are present in the required regions
(ii)		44	1	B1ft If these 3 parts are given as probabilities, please mark incorrect the first time but award marks from there on if the numerator is correct
(iii)		35	1	B1ft
(c)		$\frac{18}{53}$	2	B2 ft oe 0.33(96...) or 33(.96...) % ft their Venn diagram or (B1 for $\frac{18}{m}$ where $m > 18$ or $\frac{n}{53}$ where $n > 53$ or for 18 : 53 or other incorrect notation) or B1ft their Venn diagram for "18" $\frac{18}{m}$ where $m > "18"$ or $\frac{n}{53}$ where $n > "53"$
				Total 8 marks

Question	Working	Answer	Mark	Notes
15	77.5 or 82.5 or 2.65 or 2.75 or 32.5 or 33.5 or 0.95 or 1.05 or 77500 or 82500 or 159 or 165 or 32500 or 33500 or 57 or 63		4	B1 For a <i>UB</i> or <i>LB</i> for one of the distances or times in hours or in minutes
	eg $82.5 \div 2.65 (= 31.13\dots)$ or $82500 \div 159 (= 518.867\dots)$ or km/min or m/h			M1 for a method to find the upper bound of Martin's average speed eg $UB_K \div LB_K$ where $80 < UB_K \leq 82.5$ and $2.65 \leq LB_K < 2.7$ or use of m/min to find upper bound for Martin's average speed eg $UB_K \div LB_K$ where $80\,000 < UB_K \leq 82\,500$ and $159 \leq LB_K < 162$ can use km/min or m/h
	eg $32.5 \div 1.05 (= 30.95\dots)$ or $32500 \div 63 (= 515.873\dots\dots)$ or km/min or m/h			M1 indep for a method to find the lower bound of Lucia's average speed eg $LB_S \div UB_S$ where $32.5 < LB_S \leq 33$ and $1 < UB_S \leq 1.05$ or use of m/min to find lower bound for Lucia's average speed $LB_S \div UB_S$ where $32\,500 < UB_S \leq 33\,000$ and $60 < UB_S \leq 63$ can use km/min or m/h
	$UB_K = 31132\dots\dots$ m/h $LB_S = 30952\dots\dots$ m/h	Shown		A1 shown with accurate figures in the same units – sufficient figures for comparison

	$UB_K = 0.51886\dots\text{km/min}$ $LB_S = 0.51587\dots\text{km/min}$			(can be truncated) but must be from correct working and UB for Martin and LB for Lucia selected eg UB Martin = 31.13... (km/h) and LB Lucia = 30.95...(km/h) or UB Martin= 518.867...(m/min) and LB Lucia = 515.873...(m/min) (dep on correct method)
	<i>Working required</i>			Total 4 marks

Question	Working	Answer	Mark	Notes
16	$10 \div 20 (= 0.5)$ or a correct value on the FD scale and no errors or 25 small squares = 5 children or 5 small squares = 1 child oe or 1 small square = 0.2 children oe or 29 oe or 48 oe or 10 (associated with 75-80 bar)		3	M1
	$(10 \times 2.9) + (15 \times 3.2) + (5 \times 2)$ or $29 + 48 + 10$ or $(5.8 + 9.6 + 2) \times 5$ oe or $(145 + 240 + 50) \times 0.2$ oe			M1 for a fully correct method
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	87		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
17	$(\sqrt{2}-1)^2 = 2 - \sqrt{2} - \sqrt{2} + 1 (= 3 - 2\sqrt{2})$	$\frac{(3+\sqrt{8})}{(\sqrt{2}-1)^2} \times \frac{(\sqrt{2}+1)^2}{(\sqrt{2}+1)^2}$	4	M1 expand the denominator (accept $2 - 2\sqrt{2} + 1$ - must see expansion) or method to rationalise using $(\sqrt{2}+1)^2$
	$\frac{(3+\sqrt{8})^2}{(3-2\sqrt{2})} \times \frac{(3+2\sqrt{2})}{(3+2\sqrt{2})}$	$(\sqrt{2}-1)^2 = 2 - \sqrt{2} - \sqrt{2} + 1 (= 3 - 2\sqrt{2})$ or $(\sqrt{2}+1)^2 = 2 + \sqrt{2} + \sqrt{2} + 1 (= 3 + 2\sqrt{2})$ or $(\sqrt{2}+1)(\sqrt{2}-1) = 2 - \sqrt{2} + \sqrt{2} + 1 (= 1)$		M1 oe ft $3 - 2\sqrt{2}$ method to rationalise or expansion of $(\sqrt{2}-1)^2$ (accept $2 - 2\sqrt{2} + 1$) or $(\sqrt{2}-1)^2$ (accept $2 + 2\sqrt{2} + 1$) or $(\sqrt{2}+1)(\sqrt{2}-1)$
	eg $\frac{9+6\sqrt{2}+3\sqrt{8}+8}{9-6\sqrt{2}+-6\sqrt{2}-8}$ or $\frac{9+12\sqrt{2}+8}{9-8}$ or $\frac{9+6\sqrt{2}+3\sqrt{8}+8}{1}$ or $\frac{9+12\sqrt{2}+8}{1}$			M1 dep on 2nd M1 correct expansion of brackets
	<i>Working required</i>	$17 + \sqrt{288}$		A1 or $p=17, q=288$ answer from fully correct working with intermediate steps of working seen
				Total 4 marks

Question	Working	Answer	Mark	Notes
18	$4x \times 2x - 2 \times \pi \times x^2 (= 20)$ oe or $2r \times 2r - \pi \times r^2 (= 10)$ oe		4	M1 oe a correct expression or a correct equation for the shaded area (must be in one unknown only but x could be r or other letter)
	$\sqrt{\frac{20}{8-2\pi}} (= 3.413\dots)$ or $\sqrt{\frac{10}{4-\pi}} (= 3.413\dots)$			M1 oe a correct expression for x or r or whatever letter is used
	(perimeter =) $12 \times "3.413\dots"$ oe			M1 ft dep on first M1 For substituting values into a calculation for the perimeter use of their r or x
		41		A1 awrt 41
				Total 4 marks

Question	Working	Answer	Mark	Notes
19	$(AD =) \frac{2.2}{\tan 18} (= 6.77\dots)$ or $(EA =) \frac{2.2}{\sin 18} (= 7.11\dots)$		4	M1 a correct method to find <i>AD</i> or <i>AE</i>
	$(DB =) \sqrt{6.77^2 + 6^2} (= 9.04\dots)$ or $(EB =) \sqrt{7.11^2 + 6^2} (9.31\dots)$ or $(EB =) \sqrt{6^2 + 6.77^2 + 2.2^2} (9.31\dots)$			M1 a correct method to find <i>DB</i> or <i>EB</i>
	$\tan DBE = \frac{2.2}{9.04\dots}$ or $\sin DBE = \frac{2.2}{9.31\dots}$ or $\sin DBE = \frac{2.2 \sin 90}{9.31\dots}$ $\cos DBE = \frac{9.04\dots}{9.31\dots}$ or use of cosine rule			M1 complete method to find one of $\tan DBE$ or $\sin DBE$ or $\cos DBE$ – NB: if using cosine, the student will need to have found <i>DB</i> and <i>EB</i> previously
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	13.7		A1 Allow answers in range 13.59 – 13.8
				Total 4 marks

Question	Working	Answer	Mark	Notes
20	eg $-2(x^2 - 6x)$ oe		4	M1 for a correct factorisation of the expression involving the x parts
	eg $-2(x - 3)^2 \dots$ oe			M1 ft for starting the correct process to complete the square on their factorised expression – allow this mark even if the factorisation is incorrect
	eg $-2[(x - 3)^2 - 9] \dots$ oe			M1 ft for a complete process of completing the square for their factorised expression.
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$a = 25$ $b = 2$ $c = 3$		A1 oe allow $25 - 2(x - 3)^2$
				Total 4 marks

Question	Working	Answer	Mark	Notes
20 ALT	$a - bx^2 + 2bcx - bc^2$ oe or		4	M1 for correctly multiplying out $a - b(x - c)^2$
	$2bc = 12$ or $a - bc^2 = 7$ or $b = 2$			M1 for correctly equating coefficients
	For the correct values for 2 of a, b or c			M1 2 correct values from a or b or c
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$a = 25$ $b = 2$ $c = 3$		A1 oe allow $25 - 2(x - 3)^2$
				Total 4 marks

Question	Working	Answer	Mark	Notes
21	eg $\frac{20}{x^2-36} - \frac{2(x+6)}{x^2-36}$ oe or $\frac{20}{(x-6)(x+6)} - \frac{2(x+6)}{(x-6)(x+6)}$ oe or $\frac{20(x-6)}{(x^2-36)(x-6)} - \frac{2(x+6)(x-6)}{(x^2-36)(x-6)}$ or $\frac{20-2(x+6)}{(x^2-36)(4-x)}$ oe		3	M1 for writing the first two fractions with a common denominator (may be a single denominator) or multiplying both fractions by $\frac{1}{4-x}$ and writing over a common denominator
	eg $\frac{8-2x}{x^2-36} \times \frac{1}{4-x}$ or $\frac{8-2x}{(x+6)(x-6)} \times \frac{1}{4-x}$ or $\frac{20x-2x^2-48}{(x^2-36)(x-6)} \times \frac{1}{4-x}$ oe $\frac{8-2x}{(x^2-36)(4-x)}$ oe			M1 for simplifying first 2 fractions to a single fraction and expanding and simplifying numerator – must be correct, and showing intention to multiply by $\frac{1}{4-x}$ or expanding the numerator of the full solution and writing as a single fraction
	<i>Working required</i>	$\frac{2}{x^2-36}$		A1 oe eg $\frac{2}{(x+6)(x-6)}$ dep on M2
				Total 3 marks

Question	Working	Answer	Mark	Notes
22	$\text{eg } \frac{2 \times 3 \times 3 \times \left(3^{\frac{3}{2}}\right)^{4n+5}}{2 \times 3 \times 3^{2(2n+8)}} \text{ or } \frac{3 \times 3^{\frac{3}{2}(4n+6)}}{3^{2(2n+8)}}$ <p>$\sqrt{27}$ to be changed to a power of 3 and not $3\sqrt{3}$ unless recovered</p>		3	M1 For 2 of: <ul style="list-style-type: none"> • writing 18 as 2×3^2 oe and 6 as 2×3 or cancelling 6 & 18 fully • writing $\sqrt{27}$ as $3^{\frac{3}{2}}$ or $3 \times 3^{\frac{3}{2}}$ or $(\sqrt{27})^{4n+6}$ as $(3^3)^{2n+3}$ or 3^{6n+9} • writing 9 as 3^2 or 9^{2n+8} as $3^{2(2n+8)}$ or 3^{4n+16}
	$\text{eg } \frac{3 \times 3^{6n+9}}{3^{4n+16}} \text{ or } \frac{3^{6n+10}}{3^{4n+16}} \text{ or } \frac{3 \times 3^{1.5(4n+6)}}{3^{2(2n+8)}} \text{ or } \frac{3^2 \times 3^{6n+9}}{3 \times 3^{4n+16}} \text{ or } \frac{3^{6n+11}}{3^{4n+17}} \text{ oe or } \text{eg } 3^{6n+11} = 3^x \times 3^{4n+17} \text{ oe}$			M1 For a correct expression or equation using only powers of 3 (powers of 3 but not necessarily a single power)
	<i>Working required</i>	$2n - 6$		A1 oe eg $2(n - 3)$ dep on M1
				Total 3 marks

Question	Working	Answer	Mark	Notes
23	eg $\frac{3}{5} = \frac{7-1}{8-k}$ oe eg $24 - 3k = 30$		6	M1 for correct equation linking the gradient to the given coordinates
	$k = -2$			A1 for $k = -2$
	$\left(\frac{-2+8}{2}, \frac{1+7}{2}\right)$ oe or (3, 4)			M1 for finding the midpoint (use of their k where $k < 0$)
	$\frac{3}{5}m = -1$ or $(m =) -\frac{5}{3}$ oe			M1 ft their gradient for use of $m_1 \times m_2 = -1$ Allow $-\frac{5}{3} = -1.67$ or better
	"4" = $-\frac{5}{3}$ "3" + c or $c = 9$ or $y - "4" = -\frac{5}{3}(x - "3")$			M1 dep on M3
	Working required	$5x + 3y = 27$		A1 allow equation in any form where p, q and r are integers
				Total 6 marks

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching September 2024

Time 2 hours

Paper

reference

4WM2H/01

Mathematics A (Modular)

UNIT 2H

Higher Tier



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this unit 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.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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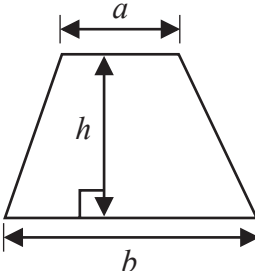
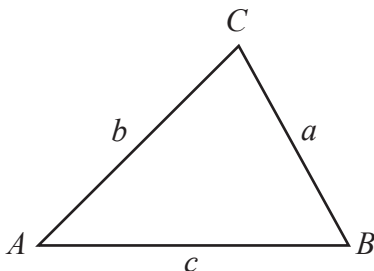
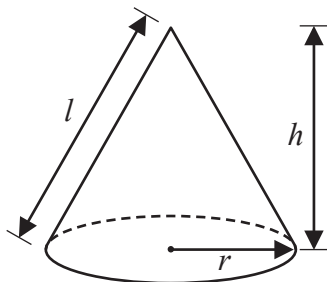
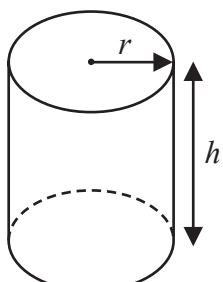
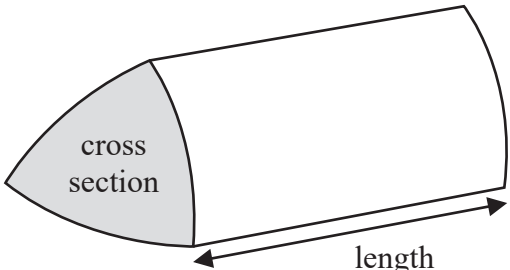
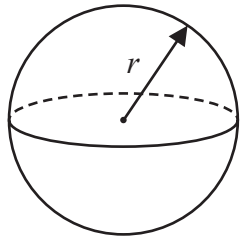


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Pearson

International GCSE Mathematics
Formulae sheet – Higher Tier

<p>Arithmetic series</p> <p>Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$</p>	<p>Area of trapezium = $\frac{1}{2}(a + b)h$</p> <div style="text-align: center;">  </div>
<p>The quadratic equation</p> <p>The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	<p>In any triangle ABC</p> <p>Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</p> <p>Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$</p> <p>Area of triangle = $\frac{1}{2}ab \sin C$</p>
<p>Trigonometry</p> <div style="text-align: center;">  </div>	<p>Volume of cone = $\frac{1}{3}\pi r^2 h$</p> <p>Curved surface area of cone = $\pi r l$</p> <div style="text-align: center;">  </div>
<p>Volume of cylinder = $\pi r^2 h$</p> <p>Curved surface area of cylinder = $2\pi r h$</p> <div style="text-align: center;">  </div>	<p>Volume of prism = area of cross section \times length</p> <div style="text-align: center;">  </div> <p>Volume of sphere = $\frac{4}{3}\pi r^3$</p> <p>Surface area of sphere = $4\pi r^2$</p> <div style="text-align: center;">  </div>

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Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1** Here are five cards, where x represents a number.

15

7

-2

23

x

The mean of the five numbers is 12

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 1 is 3 marks)

- 2 (a) Find the highest common factor (HCF) of 56 and 84
Show your working clearly.

.....
(2)

- (b) Find the lowest common multiple (LCM) of 60 and 72
Show your working clearly.

.....
(2)

(Total for Question 2 is 4 marks)

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3 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x = \dots\dots\dots$

(Total for Question 3 is 2 marks)

4 The diagram shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

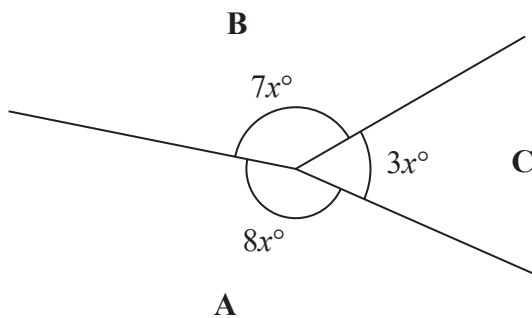


Diagram **NOT** accurately drawn

Polygon **B** has n sides.
Work out the value of n

$n = \dots\dots\dots$

(Total for Question 4 is 4 marks)

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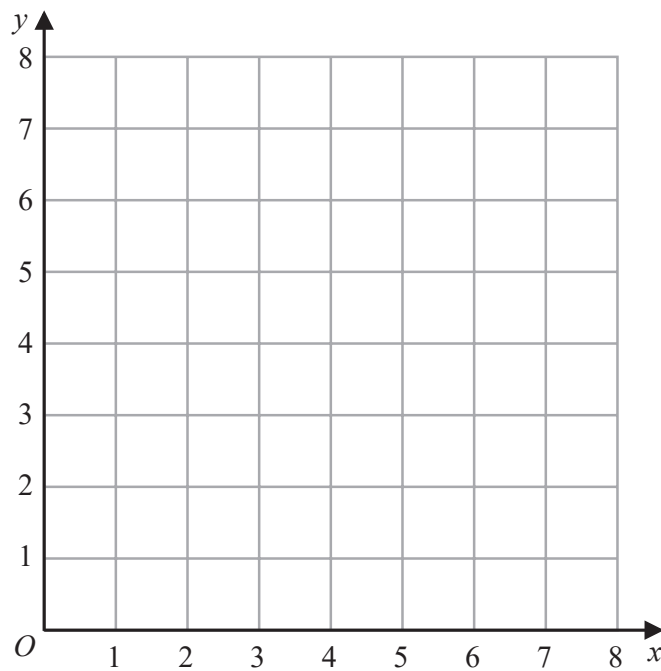
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5 (a) On the grid, draw and label with its equation the straight line with equation

(i) $y = 1$ (ii) $x = 2$ (iii) $x + y = 7$



(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$y \geq 1$ $x \geq 2$ $x + y \leq 7$

Label the region **R**

(1)

(Total for Question 5 is 4 marks)

6 Here are some integers where $a < b < c < d$

a b c d d d

The mode of the integers is 9

The range of the integers is 4

The median of the integers is 8

Work out the value of a , the value of b , the value of c and the value of d

$a =$

$b =$

$c =$

$d =$

(Total for Question 6 is 3 marks)

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7 A cylinder is placed on the ground.

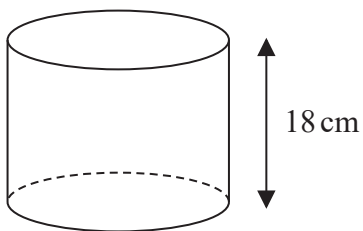


Diagram **NOT** accurately drawn

The height of the cylinder is 18 cm

The force exerted by the cylinder on the ground is 72 newtons.

The pressure on the ground due to the cylinder is 1.4 newtons/cm²

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the volume of the cylinder.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 7 is 4 marks)

- 8 In 2021, the value of Asha's apartment was 634 400 euros.
The value of Asha's apartment had increased by 4% from its value in 2020

(a) Work out the value of Asha's apartment in 2020

..... euros
(3)

Pam bought a boat.

In each year after Pam bought the boat, the value of the boat depreciated by 15%

(b) Work out the total percentage by which the value of the boat had depreciated by the end of the second year after Pam bought the boat.

..... %
(3)

(Total for Question 8 is 6 marks)

9 (a) Write 0.000 089 in standard form.

.....
(1)

(b) Write 8.34×10^4 as an ordinary number.

.....
(1)

(Total for Question 9 is 2 marks)

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10 Payel makes 300 celebration cards so that

$$\begin{array}{l} \text{number of} \\ \text{birthday cards} \end{array} : \begin{array}{l} \text{number of} \\ \text{anniversary cards} \end{array} : \begin{array}{l} \text{number of} \\ \text{congratulations cards} \end{array} = 7 : 5 : 3$$

$\frac{2}{5}$ of the birthday cards have numbers on them.

36% of the anniversary cards have numbers on them.

None of the congratulations cards have numbers on them.

Work out what fraction of the 300 cards have numbers on them.

Give your answer in its simplest form.

.....
(Total for Question 10 is 5 marks)

11 Solve the simultaneous equations

$$7x + 3y = 3$$

$$3x - y = 7$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 11 is 3 marks)

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12 Zimo is going on holiday.
He makes 3 separate payments to cover the total cost of his holiday.

The following table shows how much money Zimo pays to the holiday company.

Payment	Amount paid
Payment 1	$\frac{2}{5}$ of the total cost
Payment 2	45% of the total cost
Payment 3	\$405

Work out how much Zimo has to pay for Payment 2

\$.....

(Total for Question 12 is 5 marks)

13 The function f is defined as

$$f : x \mapsto \frac{2x}{x - 6}$$

(a) Find $f(10)$

.....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \dots$

$f^{-1} : x \mapsto$
(3)

(Total for Question 13 is 4 marks)

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14 A, B, C and D are points on a circle, centre O

EBF is the tangent to the circle at B

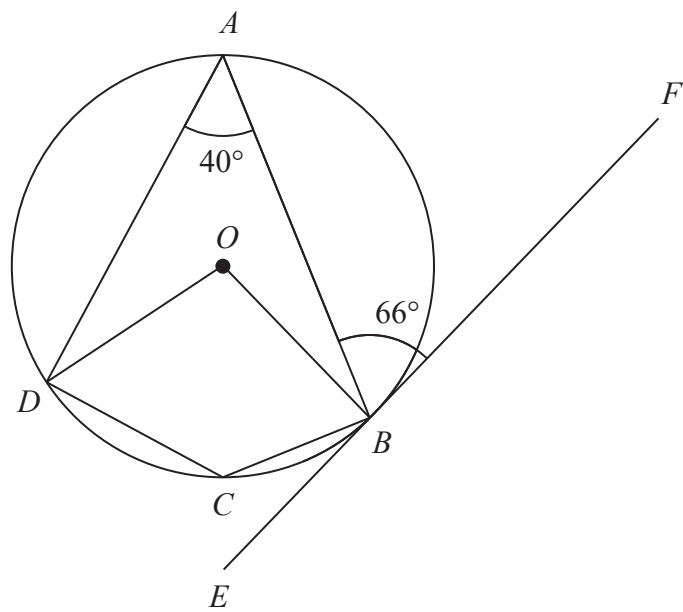


Diagram **NOT** accurately drawn

(a) (i) Work out the size of angle DCB

.....
(1)

(ii) Give a reason for your answer to (a)(i)

.....
.....
(1)

(b) Work out the size of angle ADO

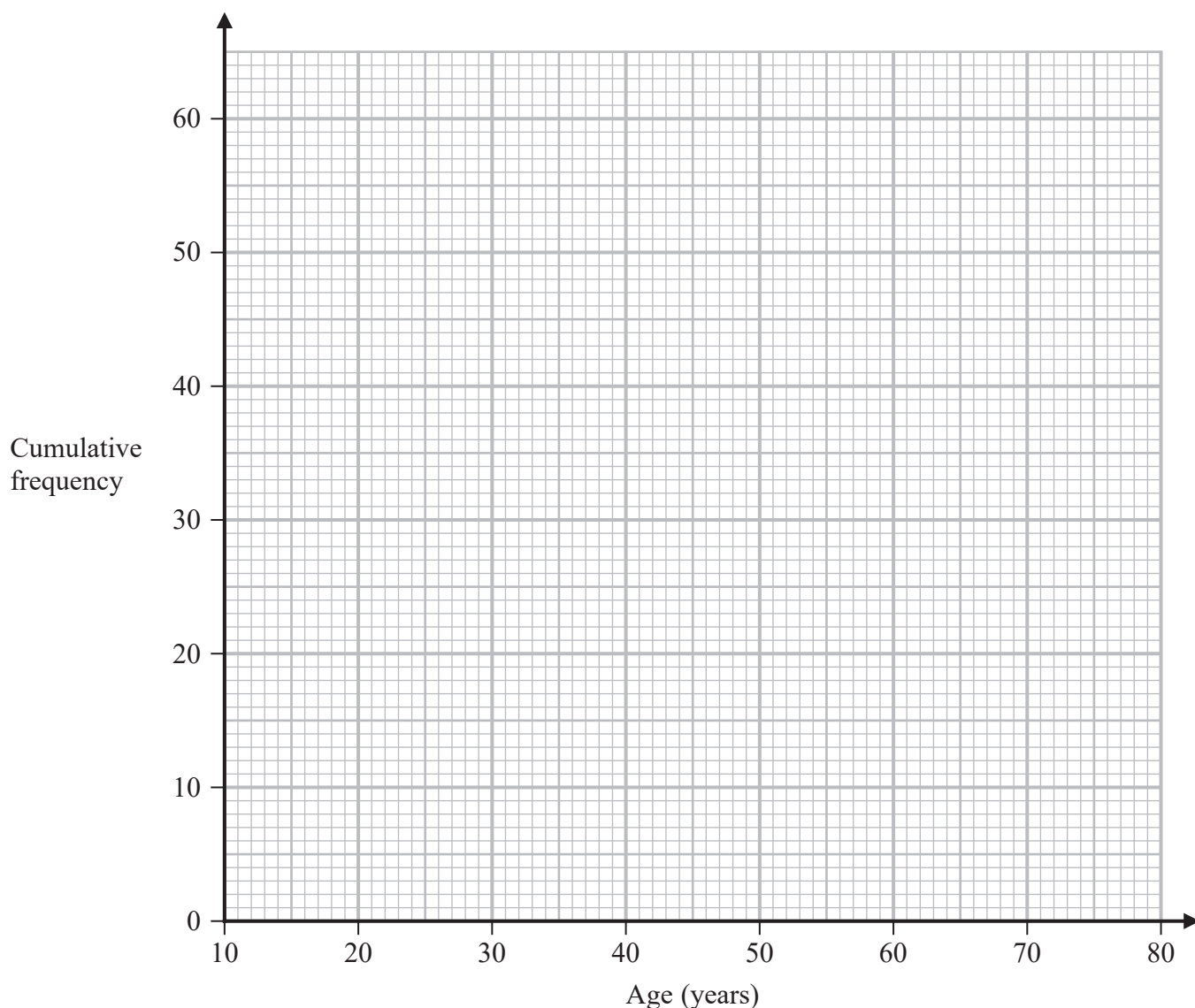
.....°
(3)

(Total for Question 14 is 5 marks)

15 The cumulative frequency table shows information about the ages of 60 people who went to a gym on Saturday.

Age (a years)	Cumulative frequency
$10 < a \leq 20$	13
$10 < a \leq 30$	36
$10 < a \leq 40$	42
$10 < a \leq 50$	47
$10 < a \leq 60$	52
$10 < a \leq 70$	56
$10 < a \leq 80$	60

(a) On the grid, draw a cumulative frequency graph for the information in the table.



(2)

(b) Use your graph to find an estimate for the median of the ages of these people.

..... years
(1)

(c) Use your graph to find an estimate for the interquartile range of the ages of these people.

..... years
(2)

(d) Use your graph to find an estimate for the number of these people who are older than 55 years.

.....
(2)

(Total for Question 15 is 7 marks)

16 M is directly proportional to h^3

$M = 4$ when $h = 0.5$

Find the value of h when $M = 500$

$h = \dots\dots\dots$

(Total for Question 16 is 4 marks)

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DO NOT WRITE IN THIS AREA

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

17 A particle P moves along a straight line.
The fixed point O lies on this line.

The displacement of P from O at time t seconds, $t \geq 1$, is s metres where

$$s = 4t^2 + \frac{125}{t}$$

The velocity of P at time t seconds, $t \geq 1$, is v m/s

Work out the distance of P from O at the instant when $v = 0$

..... m

(Total for Question 17 is 5 marks)

18 Solve the inequality $2y^2 - 7y - 30 \leq 0$
Show your working clearly.

.....
(Total for Question 18 is 3 marks)

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DO NOT WRITE IN THIS AREA

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DO NOT WRITE IN THIS AREA

19 The diagram shows two similar metal statues.



A



B

Diagram **NOT**
accurately drawn

The volume of statue **B** is 20% less than the volume of statue **A**
The surface area of statue **B** is $k\%$ less than the surface area of statue **A**

Work out the value of k
Give your answer correct to 3 significant figures.

$k = \dots\dots\dots$

(Total for Question 19 is 4 marks)

20 Solve the simultaneous equations

$$\begin{aligned}x - 2y &= 3 \\x^2 - y^2 + 2x &= 10\end{aligned}$$

Show clear algebraic working.

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

.....
(Total for Question 20 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

21 $a = \frac{14}{3x - 7}$ $x = \frac{7}{4y - 3}$

Express a in the form $\frac{py + q}{ry + s}$ where p, q, r and s are integers.

Give your answer in its simplest form.

$a = \dots\dots\dots$

(Total for Question 21 is 3 marks)

22 A solid is made from a cone and a hemisphere.

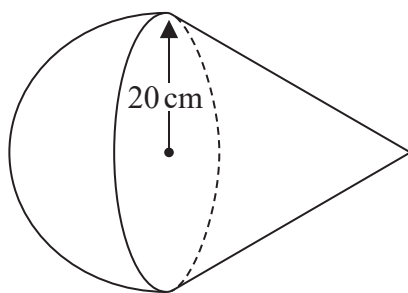


Diagram **NOT**
accurately drawn

The circular plane face of the hemisphere coincides with the circular base of the cone.
The radius of the hemisphere and the radius of the circular base of the cone are both 20 cm

The curved surface area of the cone is $580\pi \text{ cm}^2$

The volume of the solid is $k\pi \text{ cm}^3$

Work out the exact value of k

DO NOT WRITE IN THIS AREA

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$$k = \dots\dots\dots$$

(Total for Question 22 is 5 marks)

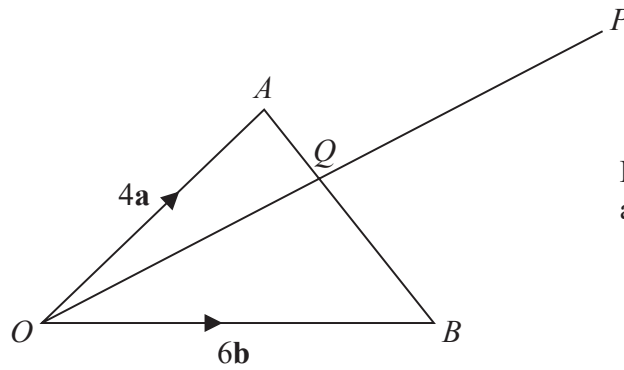


Diagram **NOT**
accurately drawn

OAB is a triangle.

Q is the point on AB such that OQP is a straight line.

$$\vec{OA} = 4\mathbf{a}$$

$$\vec{OB} = 6\mathbf{b}$$

$$\vec{AP} = 2\mathbf{a} + 8\mathbf{b}$$

Using a vector method, find the ratio $AQ : QB$

$$AQ : QB = \dots\dots\dots$$

(Total for Question 23 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

24 The sum of the first 10 terms of an arithmetic series is 4 times the sum of the first 5 terms of the same series.

The 8th term of this series is 45

Find the first term of this series.

Show clear algebraic working.

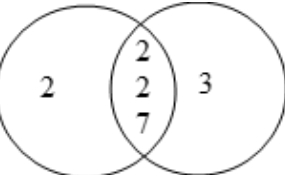
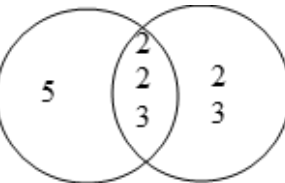
.....
(Total for Question 24 is 5 marks)

TOTAL FOR UNIT IS 100 MARKS

Unit 2 Higher Tier
Mark scheme

Apart from questions where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1	$5 \times 12 (= 60)$ or $\frac{15 + 7 - 2 + 23 + x}{5} = 12$ oe or $\frac{x + "43"}{5} = 12$		3	M1 for a method to find the total of the 5 numbers or setting up an equation in x "43" comes from $15 + 7 - 2 + 23$
	$x + 15 + 7 - 2 + 23 = "60"$ or $x + "43" = "60"$ or $"60" - (15 + 7 - 2 + 23)$			M1 for forming an equation with their 60 or for a complete calculation to find the value of x "43" comes from $15 + 7 - 2 + 23$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	17		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes															
2 (a)	<p>1, 2, 4, 7, 8, 14, 28, 56 and 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84 or 2 2 2 7 and 2 2 3 7</p>  <p>or</p> <table border="1"> <tr> <td colspan="3">eg</td> </tr> <tr> <td>28</td> <td>56</td> <td>84</td> </tr> <tr> <td></td> <td>2</td> <td>3</td> </tr> </table>	eg			28	56	84		2	3		2	<p>M1 for any correct valid method and no errors eg for starting to list at least four different factors of each number and no errors or</p> <p>2 2 2 7 and 2 2 3 7 seen (may be in a factor tree or a ladder diagram and ignore 1) or a fully correct Venn diagram or other clear method, e.g, table</p>						
eg																			
28	56	84																	
	2	3																	
	<i>Working required</i>	28		A1 dep M1 accept $2^2 \times 7$ oe															
(b)	<p>60, 120, 180, 240... and 72, 144, 216, 288... or 2 2 3 5 and 2 2 2 3 3</p> <table border="1"> <tr> <td>2</td> <td>60</td> <td>72</td> </tr> <tr> <td>2</td> <td>30</td> <td>36</td> </tr> <tr> <td>3</td> <td>15</td> <td>18</td> </tr> <tr> <td>2</td> <td>5</td> <td>6</td> </tr> <tr> <td></td> <td></td> <td>3</td> </tr> </table> <p>or</p>  <p>or $\frac{60 \times 72}{12}$ or 2, 2, 2, 3, 3, 5 oe</p>	2	60	72	2	30	36	3	15	18	2	5	6			3		2	<p>M1 for any correct valid method and no errors eg for starting to list at least four multiples of each number or</p> <p>2 2 3 5 and 2 2 2 3 3 seen (may be in a factor tree or a ladder diagram and ignore 1) or a fully correct Venn diagram or other clear method, eg, table</p>
2	60	72																	
2	30	36																	
3	15	18																	
2	5	6																	
		3																	
	<i>Working required</i>	360		A1 dep M1 accept $2^3 \times 3^2 \times 5$ oe															
				Total 4 marks															

Question	Working	Answer	Mark	Notes
3	$(4^n =) (2^2)^n$ or $(4^n =) 2^{2n}$ oe eg $2^k \div 2^{2n} = 2^x$ or $2^k = 4^{\frac{1}{2}k}$ and $2^x = 4^{\frac{1}{2}x}$ oe eg $\frac{4^{\frac{1}{2}k}}{4^n} = 4^{\frac{1}{2}x}$		2	M1 for writing 4^n as $(2^2)^n$ or 2^{2n} or for writing each term in terms of 4 ie $2^k = 4^{\frac{1}{2}k}$ and $2^x = 4^{\frac{1}{2}x}$ If these things are seen in working, award this mark even if followed by incorrect working – if not a choice of methods
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$k - 2n$		A1 allow 2^{k-2n}
				Total 2 marks

Question	Working	Answer	Mark	Notes
4	$7x + 3x + 8x = 360$ oe $(x =) 360 \div 18 (= 20)$		4	M1 M2 for $7x = 140$
	$360 \div (180 - 7 \times "20")$ oe or $360 \div (180 - "140")$ $\frac{(n-2) \times 180}{n} = 7 \times "20"$ oe or $360 \div 40$			M1 (140 can be on diagram) M1 for $360 \div$ exterior angle
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	9		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
5 (a)(i) (ii) (iii)	<p>Line length 2cm + but shaded area must be enclosed for the mark in (b)</p>		3	B1 $y = 1$ drawn B1 $x = 2$ drawn B1 $x + y = 7$ drawn Allow dashed lines or solid lines for graphs condone lack of labels if unambiguous
(b)			1	B1 correct region shaded – shaded in or out – labelled R or clear intention to be the required region (ft only for one vertical line, one horizontal line and one line with a negative gradient)
Total 4 marks				

Question	Working	Answer	Mark	Notes
6			3	M1 for $d = 9$ or $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) or $d - a = 4$ (algebraically or clearly labelled integers)
				M1 for two of $a = 5$ or $c = 7$ or $d = 9$ or $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) or $d - a = 4$ (algebraically or clearly labelled integers)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$a = 5, b = 6,$ $c = 7, d = 9$		A1 All correct
				Total 3 marks

Question	Working	Answer	Mark	Notes
7	$1.4 = \frac{72}{(\text{area})}$ oe		4	M1 $1.4 = \frac{72}{(\text{area})}$ oe
	$(\text{area} =) \frac{72}{1.4} (= \frac{360}{7} = 51.4\dots)$ oe			M1 $(\text{area} =) \frac{72}{1.4} (= \frac{360}{7} = 51.4\dots)$ oe
	<p>“51.4...” × 18 or</p> $r = \sqrt{\frac{51.4\dots}{\pi}}$ (= 4.046...) and $\pi \times 4.046^2 \times 18$			M1 “51.4...” × 18 or $r = \sqrt{\frac{51.4\dots}{\pi}}$ (= 4.046...) and $\pi \times 4.046^2 \times 18$
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	926		A1 Allow 925 – 928
				Total 4 marks

Question	Working	Answer	Mark	Notes
8 (a)	$1 + 0.04 (= 1.04)$ or $100(\%) + 4(\%) (= 104(\%))$ or $\frac{634\,400}{104} (= 6100)$ oe		3	M1
	$634\,400 \div "1.04"$ or $634\,400 \div "104" \times 100$ or $634\,400 \times 100 \div "104"$ oe			M1
		610 000		A1
(b)	$"0.85" \times "0.85" (= 0.7225)$ oe or $"0.85" - ("0.85" \times 0.15) (= 0.7225)$ or $\frac{"85" \times "85"}{100} (= 72.25)$ oe or [0.85 and 85 must come from correct working]		3	M1 allow use of their amount eg $200 \times "0.85" \times "0.85" (= 144.5)$ M2 for $15 + (0.15 \times "85")$ or $15 + 12.75$
	$1 - "0.7225"$ or 0.2775 or $100 - "72.25"$			M1 eg $\frac{200 - "144.5"}{200} (\times 100)$
		27.75		A1 oe allow 27.8 or 28
				Total 6 marks

Question	Working	Answer	Mark	Notes
9 (a)		8.9×10^{-5}	1	B1
(b)		83 400	1	B1
				Total 2 marks

Question	Working	Answer	Mark	Notes
10	$300 \div (7 + 5 + 3) (= 20)$ clear correct use of $7 + 5 + 3 (= 15)$ eg division at the end by 15 $\left(\frac{"2.8"+"1.8"}{15}\right)$ or correct use of 15 in a fraction eg $\frac{2}{5} \times \frac{7}{15}$		5	M1 (no mark for "15" unless it is used correctly) use of 7×20 or 140 or 5×20 or 100 in further work assumes this mark
	$\frac{2}{5} \times (7 \times "20") (= 56)$ oe eg $0.4 \times 140 (= 56)$ or $\frac{2}{5} \times 7 \left(= \frac{14}{5} = 2.8 \right)$ or eg $\frac{2}{5} \times \frac{7}{15} \left(= \frac{14}{75} = 0.186\dots \right)$			M1 finding $\frac{2}{5}$ of the number of birthday cards or $\frac{2}{5}$ of the share of 7 or $\frac{2}{5}$ of fraction of amount
	$0.36 \times (5 \times "20") (= 36)$ or $0.36 \times 5 (= 1.8)$ or eg $\frac{36}{100} \times \frac{5}{15} \left(= \frac{180}{1500} = 0.12 \right)$ oe			M1 finding 36% of anniversary cards or 36% of the share of 5 or 36% of fraction of amount
	$\frac{"56"+"36"}{300}$ or eg $\left(\frac{"2.8"+"1.8"}{15}\right)$ or $\frac{\frac{14}{5} + \frac{9}{5}}{15}$ $\frac{"14"}{75} + \frac{"180"}{1500}$			M1 for any fraction from correct working that isn't simplified or 30.66..% or 0.3066...
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{23}{75}$		A1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
11	eg $\begin{array}{r} +7x+3y=3 \\ 9x-3y=21 \end{array}$ or eg $\begin{array}{r} +21x+9y=9 \\ 21x-7y=49 \end{array}$ or eg $7x+3(3x-7)=3 \quad \text{or} \quad 7\left(\frac{7+y}{3}\right)+3y=3$		3	M1 a correct method to eliminate x or y – multiplying one or both equations so that one variable can be eliminated (allow a total of one error in multiplication) and the correct operation to eliminate or for substitution of one variable into the other equation.
	If first M1 gained then they can substitute an incorrect value if from ‘correct’ method to gain this mark.			M1 dep on M1 for a correct method to calculate the value of other letter eg substitution or starting again with elimination
	<i>Working required</i>	$x = 1.5, y = -2.5$		A1 oe dep on M1
				Total 3 marks

Question	Working	Answer	Mark	Notes
12	$\frac{2}{5}x + 0.45x + 405$ oe		5	M1 Do NOT award M1 for eg $\frac{2}{5} + 45(\%) + 405 (= \dots)$ oe
	$\frac{2}{5}x + 0.45x + 405 = x$ oe			M1 for a correct equation
	$(x =) \frac{405}{1 - \frac{2}{5} - 0.45} \left(\frac{405}{\frac{3}{20}} = 2700 \right)$			M1
	$0.45 \times "2700"$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	1215		A1
				Total 5 marks

Question	Working		Answer	Mark	Notes
13 (a)			5	1	B1 cao
(b)	$y(x - 6) = 2x$ or $yx - 6y = 2x$	$x(y - 6) = 2y$ or $xy - 6x = 2y$		3	M1 for multiplying the denominator
	$x(x - 2) = 6y$	$y(x - 2) = 6x$			M1 for isolating the x or y terms and factorising
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>		$\frac{6x}{x - 2}$		A1 accept $\frac{-6x}{2 - x}$ (must be a function of x)
					Total 4 marks

Question	Working	Answer	Mark	Notes
14 (a)(i)		140	1	B1
(ii)		opposite angles of a cyclic quadrilateral (add to 180°) oe	1	B1 dep on B1 in (a)(i) or seeing 180 – 40 with no contradiction oe eg angle at centre is double (2 ×) angle at circumference oe and angles around a point (or point 360)
(b)	$ADB = 66$ or $ABO = 90 - 66 (=24)$ or $BAO = 90 - 66 (=24)$ or $ODB = \frac{180-80}{2} (=50)$ or DOB reflex = 280		3	M1 Clearly labelled in working or shown on diagram
	For 2 of: $ADB = 66$ or $ABO = 90 - 66 (=24)$ or $BAO = 90 - 66 (=24)$ or $ODB = \frac{180-80}{2} (=50)$ DOB reflex = 280			M1 award M2 for 360 – (280 + 40 + 24) oe
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	16		A1
				Total 5 marks

Question	Working	Answer	Mark	Notes
15 (a)	<i>If a graph is ascending, you can ft for the marks in parts (b), (c) and (d) – method should be shown by way of marks on the axes for all but the median in part (b).</i>	Correct cf graph	2	B2 (use overlay) Fully correct cf graph – points at ends of intervals and joined with curve or line segments.
				B1 for 6 or 7 points plotted correctly at ends of intervals not joined or for 6 or 7 points from table plotted consistently within each interval (eg at lower bound of interval or midpoint of interval) at their correct heights and joined with smooth curve or line segments. ignore the curve < age 20
(b)		26 – 28	1	B1 ft If out of range ft their graph
(c)	eg readings at 15 and 45 from the vertical axis eg LQ = 19 – 21 eg UQ = 45 - 47 (the reading at 45 is 45/46 so be careful with the award of this mark)		2	M1 ft For use of 15 and 45 or 15.25 and 45.75 (eg reading of 21 and 46 stated or indicated by marks on horizontal axis that correspond to 15 (or 15.25) and 45 (or 45.75) on the vertical axis or correct readings ft their cf graph provided method to show readings is shown)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	24 - 28		A1 ft Any value in range (if out of range ft their cf graph reading across at 15 and 45 oe but method must be shown)
(d)	eg reading of 49 or 50 from cf axis		2	M1 ft For correct reading at 55 eg 50 (ft from incorrect graph if method shown (lines up and across))
	must be a whole number <i>Correct answer scores full marks (unless from obvious incorrect working).</i>	10 or 11		A1 If out of range ft their cf curve if method shown
				Total 7 marks

Question	Working	Answer	Mark	Notes
16	$M = kh^3$ oe or $4 = k \times 0.5^3$ oe		4	M1 $k \neq 1$ and where k could be any letter
	$k = \frac{4}{0.5^3}$ or $k = \frac{4}{0.125}$ or $k = 32$			M1 Allow this for M2 if $M = kh^3$ is not written
	$h = \sqrt[3]{\frac{500}{"0.32"}}$ or $h = \sqrt[3]{\frac{500 \times 0.5^3}{4}}$ or $h = \sqrt[3]{15.625}$ or $h = 5 \times 0.5$			M1 for a correct expression for h using correct values or a value of k from a completely correct method
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	2.5		A1 oe
				Total 4 marks

Question	Working	Answer	Mark	Notes
17	$8t$ or $\pm 125t^{-2}$ oe		5	M1 for differentiating one term correctly
	$8t - 125t^{-2}$ oe or $8t - \frac{125}{t^2}$ oe			A1 for both terms correct
	$8t - 125t^{-2} = 0$ and $(t =) \sqrt[3]{\frac{125}{8}}$ (= 2.5)			M1 for equating their $8t \pm at^{-2}$ oe or $bt \pm 125t^{-2}$ oe to zero and solving for t ie must have correct powers of t and at least one correct coefficient and correct isolation of t
	$4("2.5") + \frac{125}{"2.5"}$			M1 dep on previous M mark for substituting into s
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	75		A1
				Total 5 marks

Question	Working	Answer	Mark	Notes
18	$(2y + 5)(y - 6)$ or $\frac{- -7 \pm \sqrt{(-7)^2 - 4 \times 2 \times -30}}{2 \times 2}$ $2 \left[\left(y - \frac{7}{4} \right)^2 - \frac{49}{16} \right] - 30 (= 0)$ oe		3	M1 A correct method to solve the quadratic - allow factorisation that gives 2 out of 3 terms correct when expanded or use of quadratic formula – if using formula, allow one sign error and allow if simplified as far as $\frac{7 \pm \sqrt{49^2 + 240}}{4}$ or use of completing the square with one sign error as far as shown
	$(y =) 6, (y =) -2.5$ <i>Working required</i>	$-2.5 \leq y \leq 6$		A1 Correct critical values dep on M1 A1 oe eg $y \geq -2.5$ (and) $y \leq 6$ or $[-2.5, 6]$ (do not penalise change of variable eg y to x) dep on M1
				Total 3 marks

Question	Working	Answer	Mark	Notes
19	(Length sf \Rightarrow) $\sqrt[3]{0.8}$ ($= 0.928\dots$) or $\sqrt[3]{1.25}$ ($= 1.07\dots$) or $\sqrt[3]{4} : \sqrt[3]{5}$ oe		4	M1 for a correct linear scale factor
	(Area sf \Rightarrow) $(\sqrt[3]{0.8})^2$ ($0.861\dots$) or $86.1\dots(\%)$ or $(\sqrt[3]{1.25})^2$ ($= 1.16\dots$) or $116\dots(\%)$ or $(\sqrt[3]{4})^2 : (\sqrt[3]{5})^2$ oe			M1 for a correct area scale factor
	eg $(k =)(1 - "0.861\dots") \times 100$ or $(100 - "86.1\dots")$ or $100 - \frac{100}{"1.16"}$ or $100 - \frac{100}{"116"} \times 100$ or $100 - 100 \times \frac{(\sqrt[3]{4})^2}{(\sqrt[3]{5})^2}$			M1 for a method to find the percentage reduction
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	13.8		A1 accept 13.7 – 13.9
				Total 4 marks

Question	Working	Answer	Mark	Notes
20	$(3+2y)^2 - y^2 + 2(3+2y) = 10$	$x^2 - \left(\frac{x-3}{2}\right) + 2x = 10$	5	M1 for using correct substitution of a linear equation into the quadratic – all terms shown correctly
	eg $3y^2 + 16y + 5 (= 0)$	eg $3x^2 + 14x - 49 (= 0)$ $3x^2 + 14x = 49$		A1 for a correct 3 term quadratic
	eg $(3y+1)(y+5) (= 0)$ or $\frac{-16 \pm \sqrt{16^2 - 4 \times 3 \times 5}}{2 \times 3}$ or $3 \left[\left(y + \frac{8}{3}\right)^2 - \left(\frac{8}{3}\right)^2 \right] + 5 (= 0)$ (should give $\left(y = -\frac{1}{3}, -5\right)$)	eg $(3x-7)(x+7) (= 0)$ or $\frac{-14 \pm \sqrt{14^2 - 4 \times 3 \times (-49)}}{2 \times 3}$ or $3 \left[\left(x + \frac{7}{3}\right)^2 - \left(\frac{7}{3}\right)^2 \right] - 49 (= 0)$ (should give $\left(x = -\frac{7}{3}, -7\right)$)		M1 dep on M1 method to solve their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as eg $\frac{-16 \pm \sqrt{256 - 60}}{6}$ or $\frac{-14 \pm \sqrt{196 + 588}}{6}$ or if factorising allow brackets which expanded give 2 out of 3 terms correct) or correct values for x or correct values for y
	eg $x = 3 + 2 \times -5$ and $x = 3 + 2 \times -\frac{1}{3}$	eg. $\frac{7}{3} - 2 \times y = 3$ $-7 - 2 \times y = 3$		M1 ft dep on previous M1 for substituting their 2 found values of x or y in a suitable equation (use 2dp or better for substitution) or fully correct values for the other variable (correct labels for x / y)
	<i>Working required</i>	$x = \frac{7}{3}, y =$ $-\frac{1}{3}$ $x = -7, y =$ -5		A1 dep on M1 (allow coordinates) must be paired correctly allow $x = -7, y = -5$ $x = 2.33(3...), y = -0.33(3...)$
				Total 5 marks

Question	Working	Answer	Mark	Notes
21	$(a =) \frac{14}{3 \times \frac{7}{4y-3} - 7}$		3	M1 For a correct substitution
	$(a =) \frac{14(4y-3)}{21-7(4y-3)}$ oe eg $\frac{56y-42}{21-28y+21}$			M1 or for a correct but unsimplified answer in the form $\frac{m}{n}$ ie the denominator should be simplified to remove the fraction
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{4y-3}{3-2y}$		A1 oe but must be simplified
				Total 3 marks

Question	Working	Answer	Mark	Notes
21 ALT	$x = \frac{14+7a}{3a}$ and $\frac{14+7a}{3a} = \frac{7}{4y-3}$		3	M1 For rearranging 'x' to be in terms of <i>a</i> and equating two expressions for <i>a</i>
	$a(42-28y) = 56y-42$ oe eg $(a =) \frac{56y-42}{21-28y+21}$			M1 or for a correct but unsimplified answer in the form $\frac{m}{n}$
	$(a =) \frac{56y-42}{21-28y+21}$	$\frac{4y-3}{3-2y}$		A1 oe but must be simplified
				Total 3 marks

Question	Working	Answer	Mark	Notes
22	$580\pi = \pi \times 20 \times l$ oe		5	M1 for correct substitution into $A = \pi rl$
	$(l =) \frac{580\pi}{20\pi} (= 29)$			M1
	$\sqrt{29^2 - 20^2} (= \sqrt{441} - 21)$			M1
	$\left(\frac{1}{2} \times \frac{4}{3} \times \pi \times 20^3\right) + \left(\frac{1}{3} \times \pi \times 20^2 \times "21"\right)$ or $\frac{16\,000}{3}\pi + \frac{8400}{3}\pi$ or $\frac{16\,000}{3}\pi + 2800\pi$			M1 for a complete method (Award M4 for 8133.3..... if $\frac{24\,400}{3}$ is not seen)
	<i>Correct answer scores full marks (unless from obvious incorrect working).</i>	$\frac{24\,400}{3}$		A1 8133. $\dot{3}$ or $8133\frac{1}{3}$ (as exact form was requested) SC B4 for an answer of 25551(.62....) if no method shown
				Total 5 marks

Question	Working	Answer	Mark	Notes
23	$\overrightarrow{OP} = 4\mathbf{a} + 2\mathbf{a} + 8\mathbf{b} (= 6\mathbf{a} + 8\mathbf{b})$ oe or $\overrightarrow{PO} = -6\mathbf{a} - 8\mathbf{b}$ oe or $\overrightarrow{AB} = 6\mathbf{b} - 4\mathbf{a}$ oe or $\overrightarrow{BA} = 4\mathbf{a} - 6\mathbf{b}$ oe or $\overrightarrow{BP} = 6\mathbf{a} + 2\mathbf{b}$ oe or $\overrightarrow{PB} = -6\mathbf{a} - 2\mathbf{b}$ oe		5	M1 oe for one of \overrightarrow{OP} or \overrightarrow{PO} or \overrightarrow{AB} or \overrightarrow{BA} or \overrightarrow{BP} or \overrightarrow{PB} (may be seen as part of another vector calculation)
	$\overrightarrow{OQ} = 4\mathbf{a} + \lambda(6\mathbf{b} - 4\mathbf{a})$ oe or $6\mathbf{b} + \lambda(4\mathbf{a} - 6\mathbf{b})$ oe or $x(6\mathbf{a} + 8\mathbf{b})$ oe or $\overrightarrow{BQ} = \mu(4\mathbf{a} - 6\mathbf{b})$ oe or $-6\mathbf{b} + \lambda(6\mathbf{a} + 8\mathbf{b})$ oe or $4\mathbf{a} - 6\mathbf{b} + x(6\mathbf{b} - 4\mathbf{a})$ oe or $\overrightarrow{AQ} = y(6\mathbf{b} - 4\mathbf{a})$ oe or $-4\mathbf{a} + x(6\mathbf{a} + 8\mathbf{b})$ oe or $6\mathbf{b} - 4\mathbf{a} + \mu(4\mathbf{a} - 6\mathbf{b})$ oe or $2\mathbf{a} + 8\mathbf{b} + m(6\mathbf{a} + 8\mathbf{b})$ or $\overrightarrow{QP} = \lambda(6\mathbf{a} + 8\mathbf{b})$ oe or $\mu(4\mathbf{a} - 6\mathbf{b}) + 2\mathbf{a} + 8\mathbf{b}$ oe			M1 for one of \overrightarrow{OQ} or \overrightarrow{QO} or \overrightarrow{BQ} or \overrightarrow{QB} or \overrightarrow{AQ} or \overrightarrow{QA} or \overrightarrow{QP} or \overrightarrow{PQ}
				M1 for a second correct expression for the same vector or for two correct expressions for parallel vectors eg 2 of \overrightarrow{OQ} , \overrightarrow{OP} , \overrightarrow{QP} oe and using ratios to form an equation in one variable that can lead to a solution eg $\overrightarrow{OQ} = 4\mathbf{a} + k(6\mathbf{b} - 4\mathbf{a})$ and $\overrightarrow{QP} = 2\mathbf{a} + 8\mathbf{b} - k(6\mathbf{b} - 4\mathbf{a})$

				and $\frac{4-4k}{2+4k} = \frac{6k}{8-6k}$
	eg $\lambda = \frac{8}{17}$ or $\mu = \frac{9}{17}$ or $AQ:QB = \frac{4x}{3} : \frac{3x}{2}$ oe			A1 oe
	<i>Working required</i>	8 : 9		A1 oe
				Total 5 marks

Question	Working	Answer	Mark	Notes
24	$(S_{10} =) \frac{10}{2}(2a + 9d)$ or $(S_5 =) \frac{5}{2}(2a + 4d)$ oe or $a + 7d = 45$		5	M1 for a correct expression for the sum of the first 10 terms (S_{10}) or the first 5 terms (S_5) or a correct equation for the 8 th term Take 9 as their 10 – 1 and 4 as their 5 – 1 and 7 as their 8 – 1
	$\frac{10}{2}(2a + 9d) = 4 \times \frac{5}{2}(2a + 4d)$ oe			M1 for a correct equation relating S_{10} and S_5
	eg $d = 2a$ oe or $a = \frac{d}{2}$ oe or $a + 7d = 45$ oe and eg $10a - 5d = 0$ oe or eg $\frac{10}{2}(2(45 - 7d) + 9d) = 4 \times \frac{5}{2}(2(45 - 7d) + 4d)$ oe or $5d = 10(45 - 7d)$ oe			M1 (dep on M1) for d in terms of a , or vice-versa (must be correct) or for $a + 7d = 45$ oe and correctly reducing the equation relating S_{10} and S_5 to an equation with one term in a and one term in d eg $10a - 5d = 0$ oe or substituting a correct expression into their correct equation to obtain an equation in just d
	eg $a + 7(2a) = 45$ or $d = 6$ or eg $70a - 35d = 0$ or $5a + 35d = 225$ or Adding $(75a = 225)$ or $10a - 5d = 0$ $10a + 70d = 450$ Subtracting $(-75d = -450)$			M1 (dep on M2) for a correct equation in just a or for $d = 6$ or for a correct method to eliminate a or d : coefficients of a or d the same and correct operation to eliminate selected variable (condone 1 arithmetical error)
	<i>Working required</i>	3		A1 Dep on M3
				Total 5 marks

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