edexcel

INTERNATIONAL GCSE

Mathematics (Specification A) (9-1)

SAMPLE ASSESSMENT MATERIALS

Pearson Edexcel International GCSE in Mathematics (Specification A) (4MA1)

For first teaching September 2016
First examination June 2018
Issue 2

Pearson

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Summary of Pearson Edexcel International GCSE in Mathematics A SAMs Issue 2 changes

Summary of changes made between previous issue and this current issue	Page number/s
Paper codes 4MA1/**3H** changed to 4MA1/**1H**	Contents page, 67, 87,
Paper codes 4MA1/**4H** changed to 4MA1/**2H**	Contents page, 99, 123

Earlier issues show previous changes.

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

Contents

Introduction	1
General marking guidance	3
Foundation Tier: Paper 1F – sample question paper	5
Foundation Tier: Paper 1F – sample mark scheme	25
Foundation Tier: Paper 2F – sample question paper	35
Foundation Tier: Paper 2F – sample mark scheme	59
Higher Tier: Paper 1H – sample question paper	67
Higher Tier: Paper 1H – sample mark scheme	87
Higher Tier: Paper 2H – sample question paper	99
Higher Tier: Paper 2H – sample mark scheme	123

Introduction

The Pearson Edexcel International GCSE in Mathematics (Specification A) is designed for use in schools and colleges. It is part of a suite of International GCSE 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.

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.

Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Level 1/2
Paper 1F

Foundation Tier

Sample assessment material for first teaching September 2016

Time: 2 hours

Paper Reference

4MA1/1F

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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 paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

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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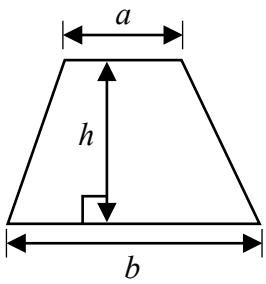
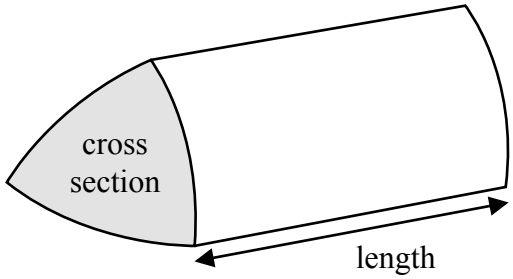
International GCSE Mathematics

Formulae sheet – Foundation Tier

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

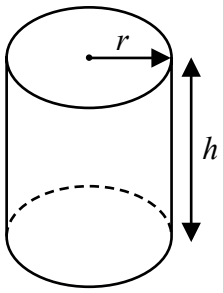


Volume of prism = area of cross section × length



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

Curved surface area of cylinder = $2\pi rh$



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Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Here is a list of numbers.

2 8 15 24 31 36 40 64

From this list, write down

(a) an odd number

.....
(1)

(b) a multiple of 6

.....
(1)

(c) a square number

.....
(1)

(d) a prime number

.....
(1)

(Total for Question 1 is 4 marks)

---

2 (a) Write 64% as a fraction.

Give your fraction in its simplest form.

.....
(2)

(b) Write 9% as a decimal.

.....
(1)

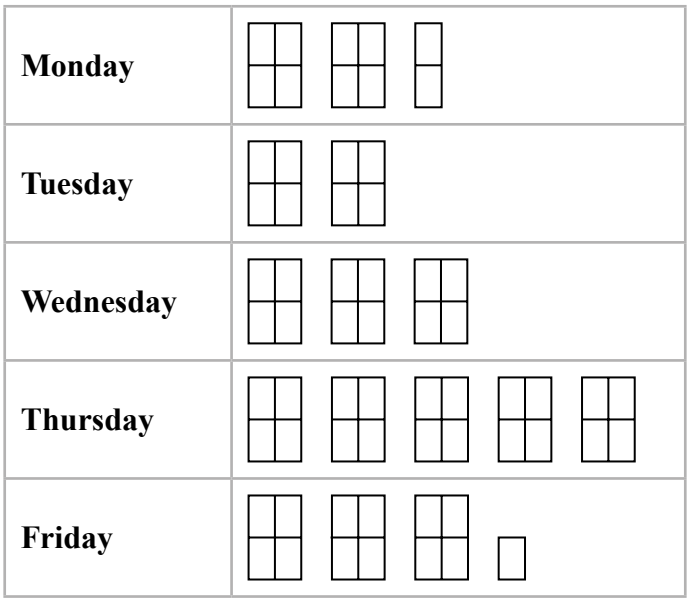
(c) Work out $\frac{1}{6}$ of 84 kg.

.....kg
(1)

(Total for Question 2 is 4 marks)

---

3 The pictogram shows some information about the number of calculators sold in a shop on each of five days.



(a) On which day did the shop sell the greatest number of calculators?

.....

(1)

The shop sold 24 calculators on Wednesday.

(b) Find the number of calculators sold on Thursday.

.....

(2)

(c) Find the ratio of the number of calculators sold on Tuesday to the number of calculators sold on Friday.

Give your ratio in its simplest form.

.....

(2)

(Total for Question 3 is 5 marks)

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

2 6 10 14 18

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

....., ...

(1)

(b) Explain how you worked out your answer.

.....

(1)

(c) Find the 11th term of the sequence.

.....

(1)

(d) Explain why 95 cannot be a term of the sequence.

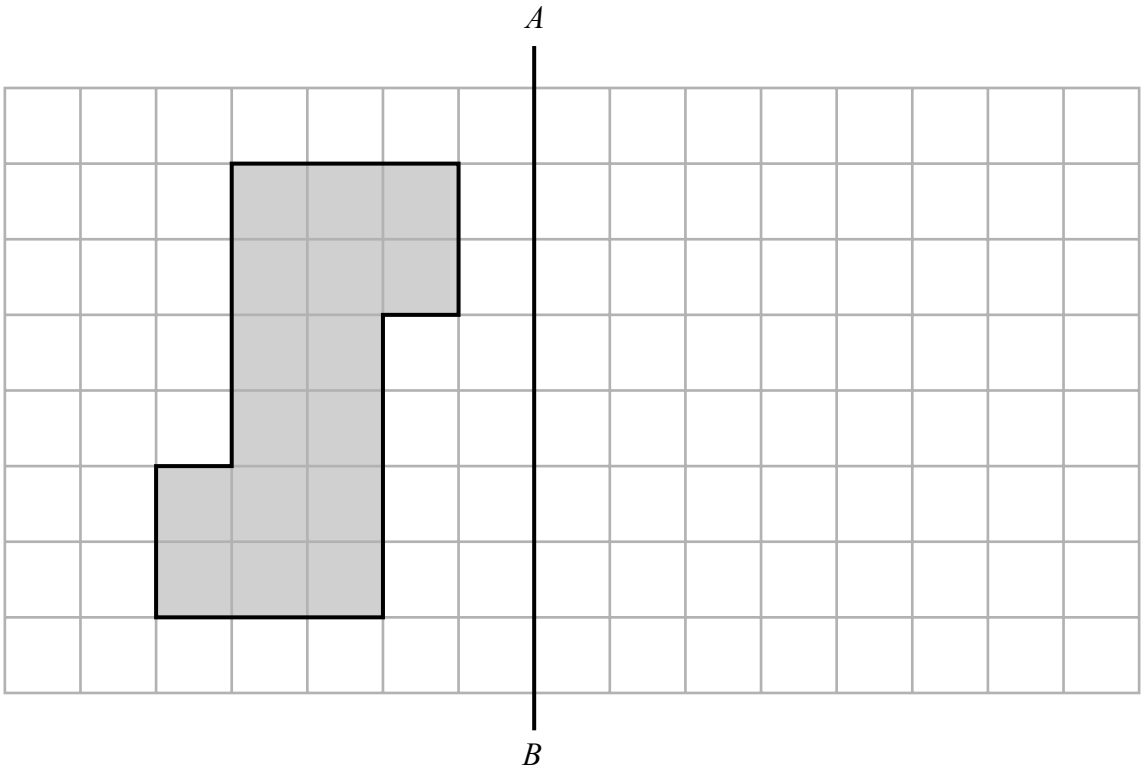
.....

.....

(1)

(Total for Question 4 is 4 marks)

5 The diagram shows a shaded shape drawn on a centimetre grid and a line *AB*.



(a) Write down the order of rotational symmetry of the shape.

.....

(1)

(b) Work out the perimeter of the shape.

.....cm

(1)

(c) Work out the area of the shape.

.....cm^2

(1)

(d) Reflect the shape in the line *AB*.

(2)

(Total for Question 5 is 5 marks)

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6 Rhianna has £25 to spend on plants.
Each plant costs £3.95
She buys as many plants as she can.

How much change should Rhianna receive from £25?

£.....

(Total for Question 6 is 3 marks)

7 (a) Simplify $8c + 7m - 5c + 2m$

.....

(2)

(b) Solve $5x - 9 = 4$

$x =$ .....

(2)

(Total for Question 7 is 4 marks)

8 This rule can be used to work out the shortest distance from the screen a viewer should sit to watch TV.

Multiply the width of the screen by 3

Greg is going to watch his TV.
The width of the screen is 65 cm.

(a) Work out the shortest distance from the screen he should sit.

.....cm
(1)

Rashida is going to watch her TV.
The shortest distance from the screen she should sit is 249 cm.

(b) Work out the width of the screen.

.....cm
(2)

The width of a TV screen is w cm.
The shortest distance from the screen a viewer should sit to watch this TV is d cm.

(c) Write down a formula for d in terms of w.

.....
(2)

(Total for Question 8 is 5 marks)

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9 *ABC* is an isosceles triangle.

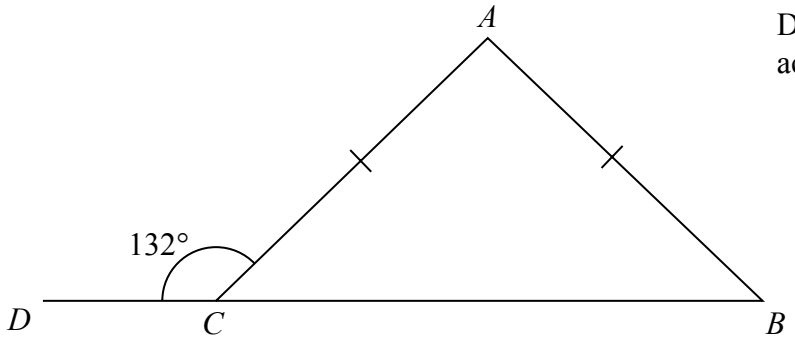

Diagram **NOT** accurately drawn

DCB is a straight line.
AC = *AB*.
Angle *DCA* = 132°

Work out the size of angle *CAB*.
Give a reason for each stage in your working.

.....°

(Total for Question 9 is 5 marks)

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10

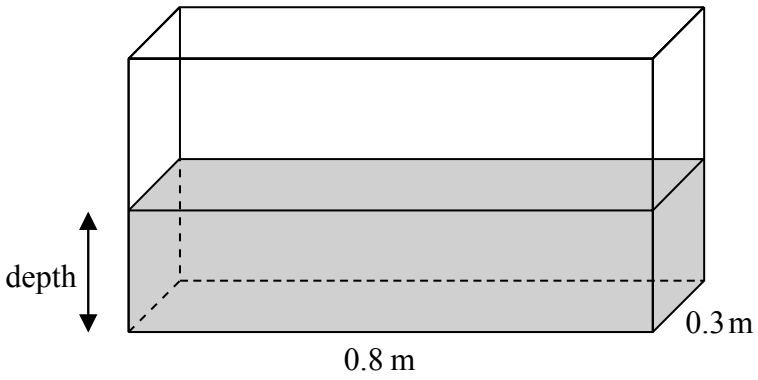

Diagram **NOT** accurately drawn

A fish tank is in the shape of a cuboid.
The length of the fish tank is 0.8 m and the width is 0.3 m.
The volume of water in the fish tank is 108 litres.

$1\ m^3 = 1000$ litres.

Work out the depth of the water in the fish tank.

.....m

(Total for Question 10 is 3 marks)

11 (a) Work out the value of $\dfrac{51.7 \times 2.8}{9 + \sqrt{3}}$

Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 3 significant figures.

.....

(1)

(Total for Question 11 is 3 marks)

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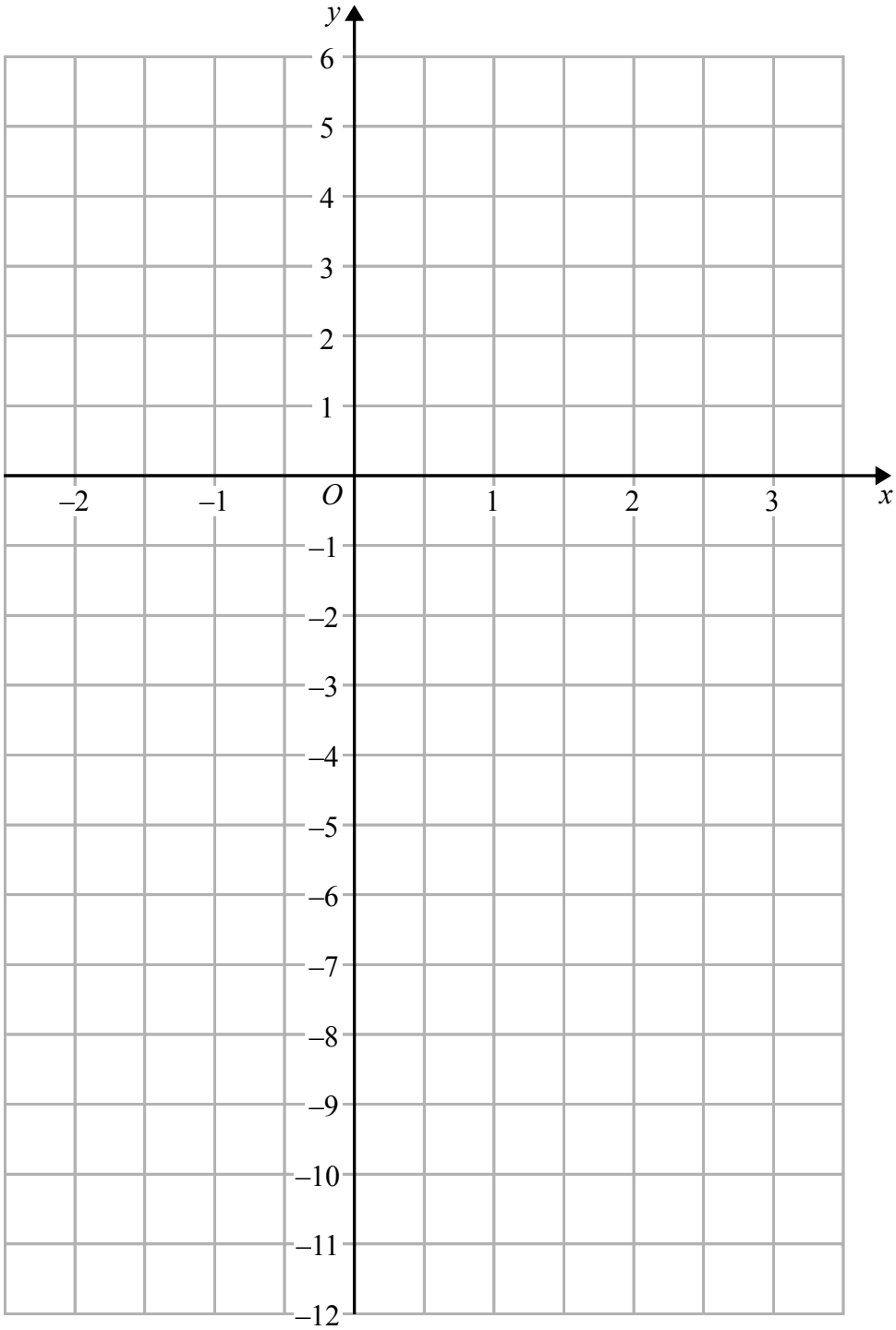
12 On the grid, draw the graph of $y = 3x - 4$ for values of x from -2 to 3



(Total for Question 12 is 4 marks)

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13 A box contains four different kinds of sweets.
Debbie takes at random a sweet from the box.
The table shows the probabilities that Debbie takes an orange sweet or a cola sweet or a lemon sweet.

Sweet	Probability
orange	0.15
cola	0.40
lemon	0.35
strawberry	

(a) Work out the probability that Debbie takes a strawberry sweet.

.....
(2)

There are 40 sweets in the box.

(b) How many of the sweets in the box are lemon?

.....
(2)

(Total for Question 13 is 4 marks)

14 (a) Expand $5(2g+7)$

.....
(1)

x is an integer.

(b) Write down all the values of x that satisfy $-3 < x \leqslant 2$

.....
(2)

(Total for Question 14 is 3 marks)

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15 Anil lives in England.
He does a search on the internet and sees the same type of camera on sale in Spain and in America.

In Spain, the camera costs 149 euros.
In America, the camera costs $164.78

Anil finds out these exchange rates.

Exchange rates
1 euro = £0.76
£1 = $1.54

How much cheaper is the camera in America than in Spain?
Give your answer in pounds (£).

£.....

(Total for Question 15 is 4 marks)

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16 Yoko flew on a plane from Tokyo to Sydney.
The plane flew a distance of 7800 km.
The flight time was 9 hours 45 minutes.

Work out the average speed of the plane in kilometres per hour.

.....km/h

(Total for Question 16 is 3 marks)

17 Penny, Amjit and James share some money in the ratio 3 : 6 : 4
Amjit gets $28 more than James.

Work out the amount of money that Penny gets.

$.....

(Total for Question 17 is 3 marks)

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18 A factory has 60 workers.

The table shows information about the distances, in km, the workers travel to the factory each day.

Distance (d km)	**Frequency**
$0 < d \leqslant 5$	12
$5 < d \leqslant 10$	6
$10 < d \leqslant 15$	4
$15 < d \leqslant 20$	6
$20 < d \leqslant 25$	14
$25 < d \leqslant 30$	18

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean distance travelled to the factory each day.

.....km

(4)

One of these workers is chosen at random.

(c) Write down the probability that this worker travels more than 20 km to the factory each day.

.....

(2)

(Total for Question 18 is 7 marks)

19 Nigel bought 12 boxes of melons.
He paid \$15 for each box.
There were 12 melons in each box.

Nigel sold $\frac{3}{4}$ of the melons for \$1.60 each.

He sold all the other melons at a reduced price.

He made an overall profit of 15%

Work out how much Nigel sold each reduced price melon for.

\$.....

(Total for Question 19 is 5 marks)

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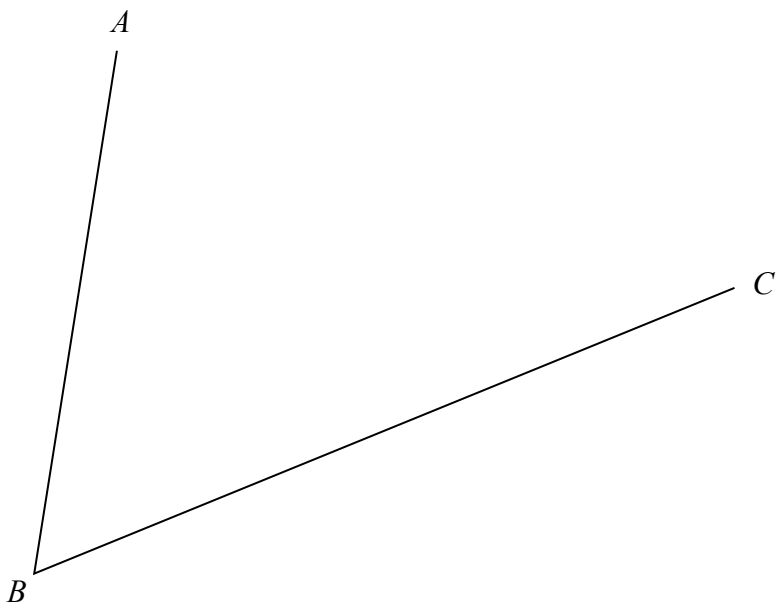
20 Use ruler and compasses to construct the bisector of angle ABC.
You must show all your construction lines.



(Total for Question 20 is 2 marks)

21 (a) Factorise fully $18e^3f + 45e^2f^4$

.....

(2)

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

.....

(3)

(Total for Question 21 is 5 marks)

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22

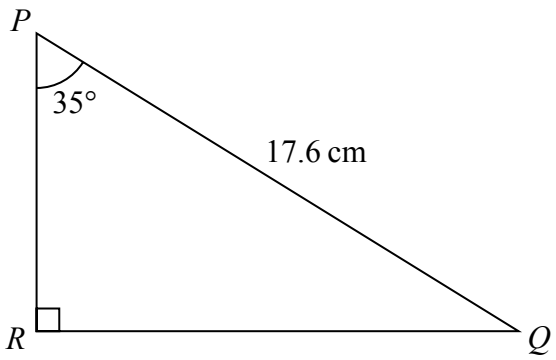

Diagram **NOT** accurately drawn

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

.....cm

(Total for Question 22 is 3 marks)

23 In a sale, all normal prices are reduced by 15%
The normal price of a mixer is reduced by 22.50 dollars.

Work out the normal price of the mixer.

.....dollars

(Total for Question 23 is 3 marks)

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24 The table shows the diameters, in kilometres, of five planets.

Planet	**Diameter (km)**
Venus	1.2×10^4
Jupiter	1.4×10^5
Neptune	5.0×10^4
Mars	6.8×10^3
Saturn	1.2×10^5

(a) Write 1.4×10^5 as an ordinary number.

.....

(1)

(b) Which of these planets has the smallest diameter?

.....

(1)

(c) Calculate the difference, in kilometres, between the diameter of Saturn and the diameter of Neptune.
Give your answer in standard form.

.....km

(2)

(Total for Question 24 is 4 marks)

25

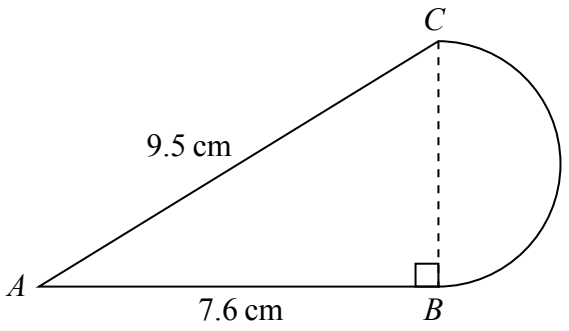

Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.
Triangle *ABC* is right-angled at *B*.

AB = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

.....cm^2

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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International GCSE in Mathematics A - Paper 1F mark scheme

Question		Working	Answer	Mark	AO		Notes
1	**a**		15 or 31	4	AO1	B1	for 15 or 31 or both
	b		24 or 36		AO1	B1	for 24 or 36 or both
	c		36 or 64		AO1	B1	for 36 or 64 or both
	d		2 or 31		AO1	B1	for 2 or 31 or both
2	**a**	$\frac{64}{100}$			AO1	M1	any fraction equivalent to $\frac{64}{100}$
			$\frac{16}{25}$	2		A1	
	b		0.09	1	AO1	B1	
	c		14	1	AO1	B1	
3	**a**		Thursday	1	AO3	B1	
	b	24 ÷ 3 × 5			AO3	M1	for 24 ÷ 3 (=8)
			40	2		A1	
	c	2 : 3.25 oe **or** 2×'8' : 3.25 ×'8'			AO1	M1	any correct ratio ft from '8' in (b)
			8:13	2		A1	accept 1 : $\frac{13}{8}$ oe
4	**a**		22, 26	1	AO1	B1	
	b		add 4	1	AO1	B1	
	c		42	1	AO1	B1	
	d		reason	1	AO1	B1	e.g. no numbers in sequence are odd numbers; $4n - 2 = 95$ gives $n = 24.25$ which is not an integer;

Question		Working	Answer	Mark	AO		Notes
5	**a**		2	1	AO2	B1	
	b		20	1	AO2	B1	
	c		16	1	AO2	B1	
	d		correct reflection	2	AO2	B2	B1 for reflection in a different vertical line
6		25 ÷ 3.95 (=6.32…)			AO1	M1	accept repeated addition or repeated subtraction from 25
		25 – '6' × 3.95				M1	
			1.3(0)	3		A1	
7	**a**				AO1	M1	for $3c$ or $9m$
			$3c + 9m$	2		A1	for $3c + 9m$ or $3(c + 3m)$
	b	$5x = 4 + 9$			AO1	M1	
			2.6 oe	2		A1	
8	**a**		195	1	AO1	B1	cao
	b	249 ÷ 3		2	AO1	M1	
			83			A1	cao
	c		$d = 3w$	2	AO1	B2	B1 for d = linear expression in w B1 for $3w$ oe SC: B1 for $w = \frac{d}{3}$ oe

Question	Working	Answer	Mark	AO		Notes
9	180 – 132 (=48) 180 – 2×'48'	84	5	AO2	M1 M1 A1 B2	 Angles in a triangle sum to 180°, base angles of an isosceles triangle are equal, angles on a straight line sum to 180° (B1 for any correct reason)
10	0.8 × 0.3 = 0.24 **or** 108 ÷ 1000 (=0.108) '0.108' ÷ '0.24'	0.45	3	AO2	M1 M1 A1	 dep
11 a		13.488(56…)	2	AO1	B2	B1 for 144.76 **or** 10.73…
b		13.5	1	AO1	B1	ft from (a) from 4 or more sig figs

Question	Working	Answer	Mark	AO	Notes
12	x: −2, −1, 0, 1, 2, 3 y: −10, −7, −4, −1, 2, 5	$y = 3x - 4$ drawn from $x = -2$ to $x = 3$	4	AO1	B4 For a correct line between $x = -2$ and $x = 3$ B3 For a correct straight line segment through at least 3 of (−2, −10) (−1, −7) (0, −4) (1, −1) (2, 2) (3, 5) **OR** for all of (−2, −10) (−1, −7) (0, −4) (1, −1) (2, 2) (3, 5) plotted but not joined B2 For at least 2 correct points plotted **OR** for a line drawn with a positive gradient through (0, −4) and clear intention to use of a gradient of 3 (eg. a line through (0, -4) and (0.5, −1) B1 For at least 2 correct points stated (may be in a table) **OR** for a line drawn with a positive gradient through (0, −4) **but not** a line joining (0, −4) and (3, 0) **OR** a line with gradient 3

Question		Working	Answer	Mark	AO		Notes	
13	**a**	1 – (0.15 + 0.4 + 0.35) **or**			AO3	M1		
		1 – 0.9						
			0.1 oe	2		A1		
	b	0.35 × 40			AO3	M1		
			14	2		A1		
14	**a**		10*g* + 35	1	AO1	B1		
	b		−2, −1, 0, 1, 2	2	AO1	B2	B1 for −3, −2, −1, 0, 1, 2 **or** −2, −1, 0, 1	
15		149 × 0.76 (=113…) **or** 113.24			AO1	M1		M1 for 149 × 0.76 × 1.54 (=174…)
		164.78 ÷ 1.54 (=107)				M1		M1 for "174…" – 164.78 (=9.6096)
		"113.24" − "107"				M1	dep on at least **one** previous M mark ; accept "107" – "113.24"	M1 for "9.6096" ÷ 1.54
			6.24	4		A1		
16		7800 ÷ 9.75 or 7800 ÷ 585 x 60			AO2	M2	M1 for 7800 ÷ 9.45 or 7800 ÷ 585 or 13.3....	
			800	3		A1		

Question		Working	Answer	Mark	AO		Notes
17		28÷ (6 − 4) (=14)			AO1	M1	or use of cancelled ratios (eg 3 : 6 : 4 = 0.75 : 1.5 : 1)
		"14" × 3 (=42)				M1 (dep)	28÷0.5(=56) or cancelled ratios, (e.g. 56 × 0.75) or M2 for 28 ÷ $\frac{2}{3}$ oe
			42	3		A1	
18	**a**		$25 < d \leq 30$	1	AO3	B1	B1 identifies 25 → 30 class
	b	(12 × 2.5) + (6 × 7.5) + (4 × 12.5) + (6 × 17.5) + (14 × 22.5) + (18 × 27.5) **or** 30 + 45 + 50 + 105 + 315 + 495 **or** 1040			AO3	M2	M1 for frequency × consistent value within interval NB. Products do not need to be added Condone one error
		'1040' ÷ 60				M1	
			$17\frac{1}{3}$	4		A1	accept 17.3(33…)
	c				AO3	M1	for $\frac{a}{60}$ with $a < 60$ **or** $\frac{32}{b}$ with $b > 32$
			$\frac{32}{60}$ oe	2		A1	

Question	Working	Answer	Mark	AO		Notes
19	**<u>Working with all 12 boxes</u>** 12×15 (=180) **or** 12×12 (=144) $12 \times 12 \times \frac{3}{4} \times 1.6$ oe (=172.8) $12 \times 15 \times 1.15$ oe (=207) **or** 180×0.15 oe (=27) $\frac{'207' - '172.8'}{36}$ **or** $\frac{34.2}{36}$ **or** $\frac{'27' + ('180' - '172.8')}{36}$	0.95	5	AO1	M1 M1 M1 M1 A1 cao	for correct total cost or correct total number of melons (either may appear as part of another calculation) for revenue from all full price melons sold for total revenue or total profit dep on M3
	<u>Alternative – working with one box</u> $15 \div 12$ (=1.25) **or** $12 \times \frac{3}{4}$ (=9) $12 \times \frac{3}{4} \times 1.6$ oe (=14.4) 15×1.15 (=17.25) $\frac{"17.25" - "14.4"}{3}$ **or** $\frac{2.85}{3}$	0.95	5		M1 M1 M1 M1 A1 cao	for price of 1 melon **or** number of full price melons for revenue from all full price melons sold for total revenue from one box dep on M3

Question	Working	Answer	Mark	AO		Notes
20	Circular arc, centre B, to intersect both lines AB and BC Equal length arcs, from intersections on each line, meeting to give a point on the bisector	correct bisector	2	AO2	M1 A1	dep on M1. Full construction shown.
21 a		$9e^2f(2e + 5f^3)$	2	AO1	M1 A1	Any correct partially factorised expression
b	$(x \pm 6)(x \pm 2)$ $(x - 6)(x + 2)$	6, −2	3	AO1	M1 M1 A1	or correct substitution into quadratic formula (condone one sign error) or $\frac{4 \pm \sqrt{64}}{2}$ dep. on at least M1
22	$\cos 35 = \frac{PR}{17.6}$ $17.6 \times \cos 35$	14.4	3	AO2	M1 M1 A1	14.4 ~ 14.42
23	22.50 ÷ 15 (=1.5) **or** 100 ÷ 15 (=6.6….) '1.5' × 100 (=150) **or** '6.6…' × 22.5(0)	150	3	AO1	M1 M1 A1	dep } M2 for 22.5 ÷ 0.15

Question		Working	Answer	Mark	AO		Notes
24	**a**		140 000	1	AO1	B1	
	b		Mars	1	AO1	B1	
	c	$1.2 \times 10^5 - 5 \times 10^4$ **or** 120000 – 50000 **or** 70000 oe	7×10^4	2	AO1	M1 A1	
25		$\sqrt{9.5^2 - 7.6^2}$ **or** $\sqrt{90.25 - 57.76}$ **or** $\sqrt{32.49}$ **or** $\sqrt{32.5}$			AO2	M1	
		$(BC =)$ 5.7				A1	
		$\frac{1}{2} \times 7.6 \times '5.7'$ **or** 21.6(6) **or** 21.7				M1	dep on first M1 or eg. $ACB = \sin^{-1}\left(\frac{7.6}{9.5}\right)(= 53.1...)$ **and** $\frac{1}{2} \times 9.5 \times '5.7' \times \sin '53.1'$
		$\frac{1}{2} \times \pi \times \left(\frac{'5.7'}{2}\right)^2$ **or** 12.7(587...) **or** 12.8				M1	dep on first M1
			34.4	5		A1	for answer rounding to 34.4 ($\pi \rightarrow$ 34.4187... 3.14$\rightarrow$34.4123...)

Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Level 1/2
Paper 2F

Foundation Tier

Sample assessment material for first teaching September 2016

Time: 2 hours

Paper Reference

4MA1/2F

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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 paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

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

Turn over

S51831A

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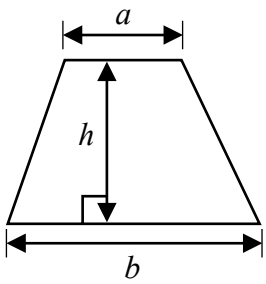
PEARSON

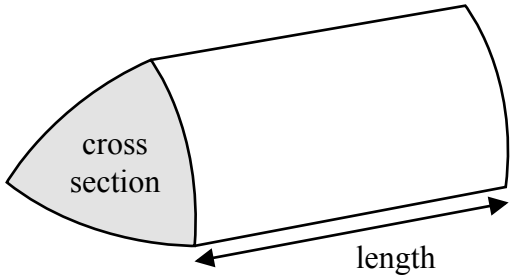
International GCSE Mathematics

Formulae sheet – Foundation Tier

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

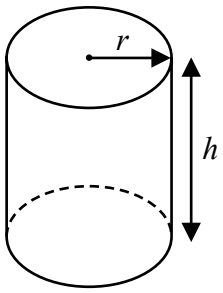


Volume of prism = area of cross section × length



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

Curved surface area of cylinder = $2\pi rh$



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Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The table shows the distance from Delhi to each of six cities.

City	Distance (km)
Bengaluru	2061
Chennai	2095
Hyderabad	1499
Kolkata	1461
Mumbai	1407
Pune	1417

(a) Which number in the table is the smallest number?

.....

(1)

(b) Which number in the table is a multiple of 5?

.....

(1)

(c) Write down the value of the 6 in the number 1461

.....

(1)

(d) Write the number 1499 correct to the nearest thousand.

.....

(1)

(Total for Question 1 is 4 marks)

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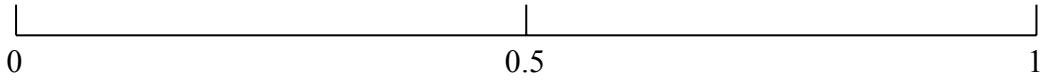
2 On the probability scale, mark with a cross (×) the probability that

(a) a fair 6-sided dice will land on a number less than 7
Label this cross **A**.

(1)

(b) a fair 6-sided dice will show an even number when thrown.
Label this cross **B**.

(1)



(Total for Question 2 is 2 marks)

3 The table shows midday temperatures in five cities one day in winter.

City	Midday temperature (°C)
Paris	2
Cardiff	–5
London	–3
Edinburgh	–1
Berlin	–8

(a) Which city had the lowest midday temperature?

.....

(1)

The midday temperature in Exeter is 6 °C higher than the midday temperature in Cardiff.

(b) Work out the midday temperature in Exeter.

..... °C

(1)

By midnight, the temperature in London had fallen by 4 °C.

(c) Work out the midnight temperature in London.

..... °C

(1)

The midday temperature in Glasgow is halfway between the midday temperature in Paris and the midday temperature in Berlin.

(d) Work out the midday temperature in Glasgow.

..... °C

(2)

(Total for Question 3 is 5 marks)

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4 There are 30 counters in a bag.
1 of the counters is yellow.
The rest of the counters are either blue or green.

Sharita takes a counter from the bag at random.

(a) Write down the probability that she will take

(i) a yellow counter

.....
(1)

(ii) a red counter

.....
(1)

The probability that Sharita will take a blue counter from the bag is $\frac{3}{10}$

(b) Find the probability that she will **not** take a blue counter.

.....
(1)

(Total for Question 4 is 3 marks)

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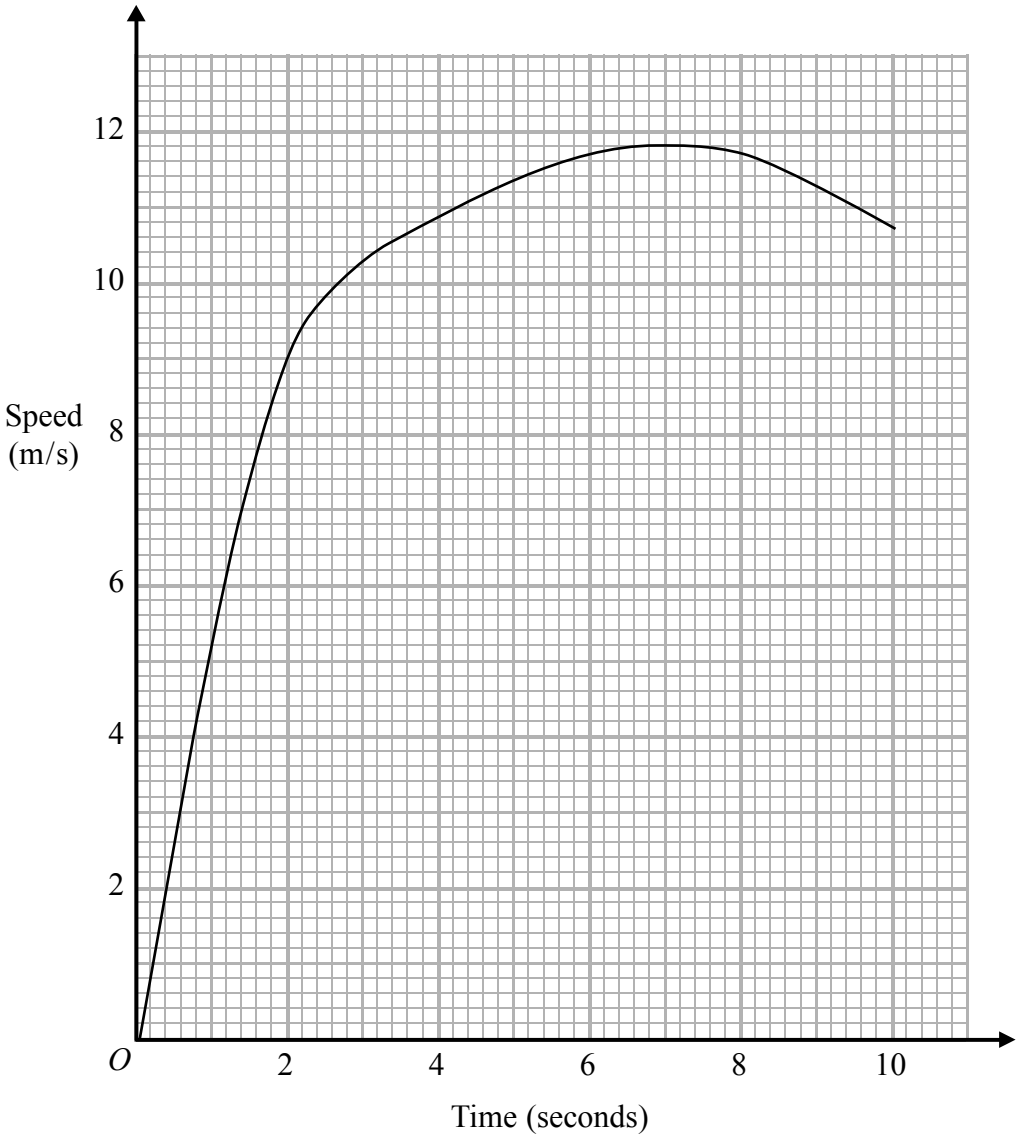
5 Jason runs in a race.
The graph shows his speed, in metres per second (m/s), during the first 10 seconds of the race.



(a) Write down Jason's speed at 2 seconds.

.....m/s
(1)

(b) Write down Jason's greatest speed.

.....m/s
(1)

(c) Write down the time at which Jason's speed was 3 m/s.

.....seconds
(1)

(Total for Question 5 is 3 marks)

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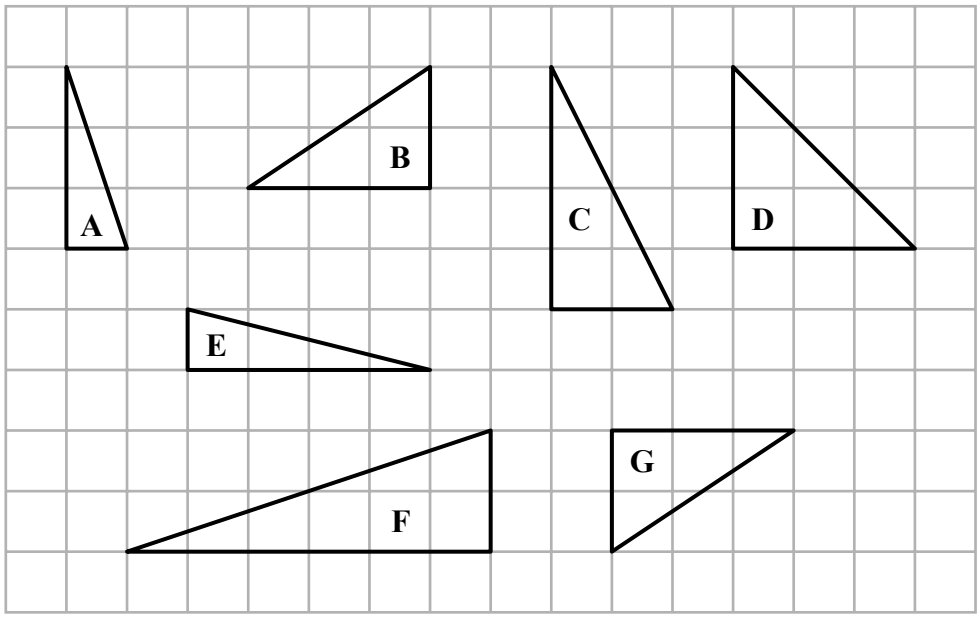
6 Here are seven triangles drawn on a square grid.



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

.....,.....

(1)

(b) One of the triangles is similar to triangle **A**.
Write down the letter of this triangle.

.....

(1)

(c) One of the triangles is isosceles.
Write down the letter of this triangle.

.....

(1)

(Total for Question 6 is 3 marks)

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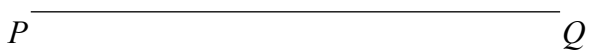
7 PQR is a triangle.
$PQ = 7$ cm and $QR = 7.5$ cm.
Angle $QPR = 50°$

Draw accurately the triangle PQR with PQ as its base.



(Total for Question 7 is 2 marks)

8 (a) Find the value of $\sqrt{46.24}$

.....
(1)

(b) Find the value of 9^3

.....
(1)

(c) Find the cube root of 19.683

.....
(1)

(Total for Question 8 is 3 marks)

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9 (a) Simplify $3m + 2m - m$

.....

(1)

(b) Simplify $6k \times 3p$

.....

(1)

(c) Solve $7e = 28$

$e =$ .....

(1)

$P = 4r - 3q$

(d) Work out the value of P when $r = -7$ and $q = 5$

$P =$ .....

(2)

$P = 4r - 3q$

(e) Work out the value of r when $P = 9$ and $q = 8$

$r =$ .....

(3)

(f) Factorise $5c + 30$

.....

(1)

(Total for Question 9 is 9 marks)

10 Umar buys 7 first-class tickets and 9 second-class tickets for the train journey from Colombo to Kandy.
The total cost is 4500 Sri Lankan rupees.
The cost of each first-class ticket is 360 Sri Lankan rupees.

(a) Work out the cost of each second-class ticket.

.....Sri Lankan rupees
(3)

The train left Colombo at 16 : 55
The train arrived in Kandy at 20 : 15

(b) How long did the train take to get from Colombo to Kandy?

.....
(2)

(Total for Question 10 is 5 marks)

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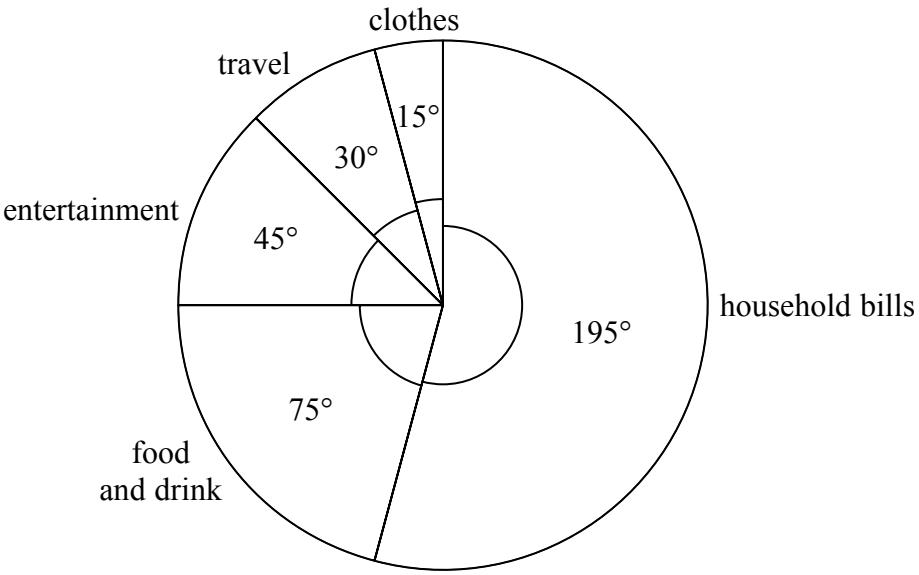
11 The pie chart shows information about Andrew's spending last month.



Andrew spent \$80 on travel last month.

(a) Work out the amount Andrew spent on household bills last month.

\$.....

(3)

A second pie chart is to be drawn for Cathy's spending.
Cathy spent a total of \$800 last month.
She spent \$120 on entertainment last month.

(b) Calculate the size of the angle for entertainment in the second pie chart.

.....°

(2)

(Total for Question 11 is 5 marks)

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12 The diagram shows the floor plan of a room in Kate's house.

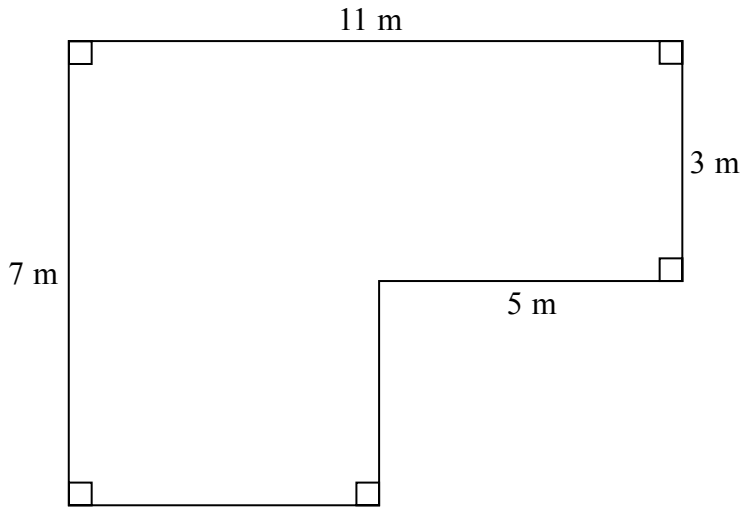

Diagram **NOT** accurately drawn

Kate is going to cover the floor with tiles.
She is going to buy some packs of tiles.

The tiles in each pack of tiles cover $2\,m^2$ of floor.
Each pack of tiles costs £24.80

Work out how much it will cost Kate to buy the packs of tiles she needs.

£.....

(Total for Question 12 is 5 marks)

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13 A ship has a length of 345 metres.
A scale model is made of the ship.
The scale of the model is 1 : 200

Work out the length of the scale model of the ship.
Give your answer in centimetres.

.....cm

(Total for Question 13 is 3 marks)

---

14 A has coordinates (3, 6)
B has coordinates (−5, 8)

Work out the coordinates of the midpoint of AB.

(....., ...)

(Total for Question 14 is 2 marks)

---

15 Here is a list of the ingredients needed to make leek and potato soup for 6 people.

Leek and Potato Soup	
Ingredients for 6 people	
900 ml	chicken stock
900 ml	water
750 g	leeks
350 g	potatoes
350 g	onions

Paul wants to make leek and potato soup for 15 people.

(a) Work out the amount of chicken stock he needs.

.....ml

(2)

Mary makes leek and potato soup for a group of people.
She uses 3 kg of leeks.

(b) Work out the number of people in the group.

.....

(2)

(Total for Question 15 is 4 marks)

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16 Find the lowest common multiple (LCM) of 20, 30 and 45

.....

(Total for Question 16 is 3 marks)

17 The first four terms of an arithmetic sequence are

2 9 16 23

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

.....

(Total for Question 17 is 2 marks)

18

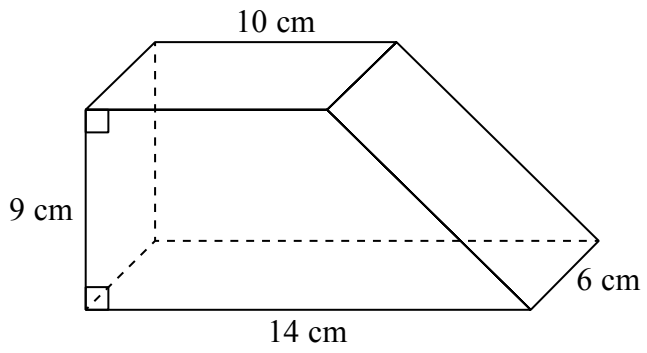

Diagram **NOT** accurately drawn

The diagram shows a solid prism.
The cross section of the prism is a trapezium.

The prism is made from wood with density 0.7 g/cm^3

Work out the mass of the prism.

.....g

(Total for Question 18 is 4 marks)

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19 (a) Simplify $p^5 \times p^4$

.....

(1)

(b) Simplify $(m^4)^{-3}$

.....

(1)

(c) Write down the value of c^0

.....

(1)

(d) Solve $5(x + 7) = 2x - 10$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 19 is 6 marks)

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20 On 1 May 2012, the cost of 5 grams of gold was 14 000 rupees.
The cost of gold decreased by 7.5% from 1 May 2012 to 1 May 2013

Work out the cost of 20 grams of gold on 1 May 2013

.....rupees

(Total for Question 20 is 4 marks)

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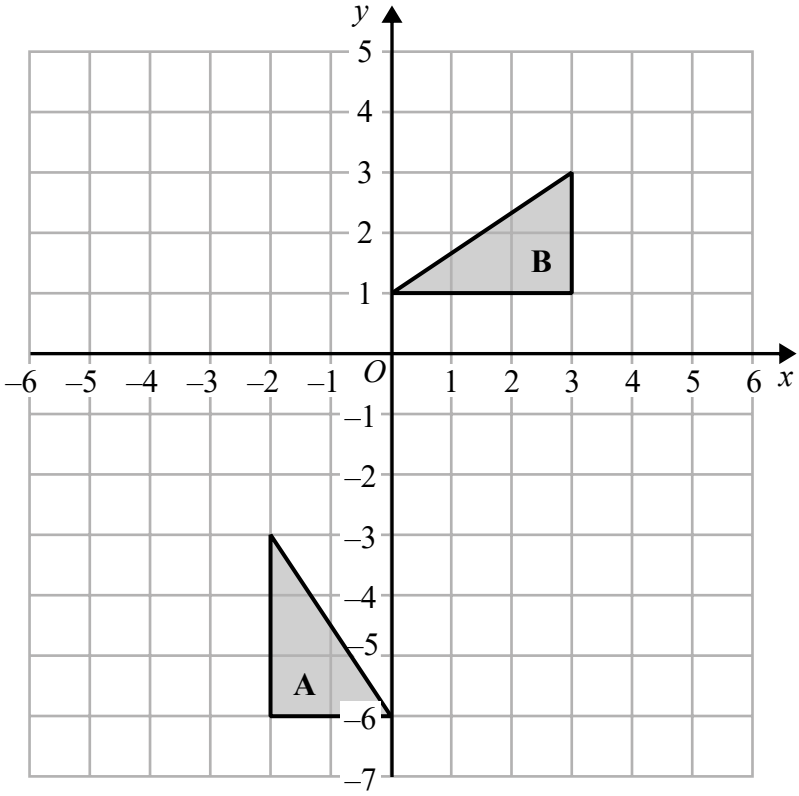
21



(a) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

(1)

(b) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

.....

(3)

(Total for Question 21 is 4 marks)

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22 a, b, c and d are 4 integers written in order of size, starting with the smallest integer.

The mean of a, b, c and d is 15
The sum of a, b and c is 39

(a) Find the value of d.

$d =$ .....

(2)

Given also that the range of a, b, c and d is 10

(b) work out the median of a, b, c and d.

.....

(2)

(Total for Question 22 is 4 marks)

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23 Kwo invests HK$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

HK$.....

(Total for Question 23 is 3 marks)

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24 Solve the simultaneous equations

$$3x + y = 13$$
$$x - 2y = 9$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 24 is 3 marks)

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25 (a) Show that $\frac{5}{9} + \frac{1}{6} = \frac{13}{18}$

(2)

(b) Show that $4\frac{2}{3} \div 3\frac{5}{9} = 1\frac{5}{16}$

(3)

(Total for Question 25 is 5 marks)

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26

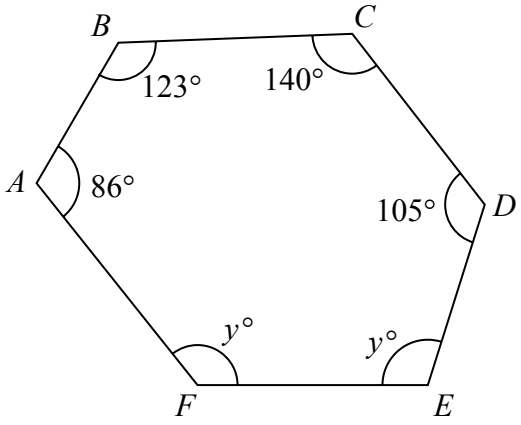

Diagram **NOT** accurately drawn

ABCDEF is a hexagon.

Work out the value of *y*.

y = ...

(Total for Question 26 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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International GCSE in Mathematics A - Paper 2F mark scheme

Question		Working	Answer	Mark	AO		Notes
1	**a**		1407	1	AO1	B1	
	b		2095	1	AO1	B1	
	c		60	1	AO1	B1	accept tens, sixty
	d		1000	1	AO1	B1	
2	**a**		× at 1	1	AO3	B1	
	b		× at 0.5	1	AO3	B1	
3	**a**		Berlin	1	AO1	B1	
	b		1	1	AO1	B1	
	c		-7	1	AO1	B1	
	d	(2 + −8) ÷ 2 oe			AO1	M1	method to find midpoint
			−3	2		A1	
4	**ai**		$\frac{1}{30}$ oe	1	AO3	B1	
	aii		0	1	AO3	B1	
	b		$\frac{7}{10}$ oe	1	AO3	B1	
5	**a**		9	1	AO1	B1	
	b		11.8	1	AO1	B1	
	c		0.6	1	AO1	B1	

Question		Working	Answer	Mark	AO	Notes	
6	**a**		B, G	1	AO2	B1	
	b		F	1	AO2	B1	
	c		D	1	AO2	B1	
7		Line from P at 50° to base **or** arc from Q of length 7.5 cm			AO2	M1	
			correct triangle	2		A1	
8	**a**		6.8	1	AO1	B1	
	b		729	1	AO1	B1	
	c		2.7	1	AO1	B1	
9	**a**		$4m$	1	AO1	B1	
	b		$18kp$	1	AO1	B1	
	c		4	1	AO1	B1	
	d	$4\times-7-3\times5$ **or** -28 and -15			AO1	M1	
			-43	2		A1	
	e	$9 = 4r - 3\times8$ **or** $9 = 4r - 24$			AO1	M1	
		$9 + 24 = 4r$				M1	isolate term in r
			8.25 oe	3		A1	
	f		$5(c + 6)$	1	AO1	B1	

Question		Working	Answer	Mark	AO		Notes
10	**a**	360 × 7 (=2520)			AO1	M1	
		(4500 – '2520')÷9				M1	dep
			220	3		A1	
	b				AO2	M1	clear evidence of method to work out time interval
			3 hours 20 mins	2		A1	accept 200 minutes
11	**a**	80 ÷ 30 (=2.66…)			AO3	M1	
		80 ÷ 30 × 195				M1	
			520	3		A1	
	b	$\frac{120}{800} \times 360$ oe			AO3	M1	
			54	2		A1	
12		5 × 3 (=15) **or** 7 × (11 – 5)(=42) **or** 11 × 7 (=77) **or** 5×(7-3)(=20)			AO1, AO2	M1	method to find area of part of floor
		or 11×3(=33) **or** (11-5)×(7-3)(=24)					
		5 × 3 + 7 × (11 – 5)(=57) **or**				M1	complete method to find area
		11 × 7 − 5×(7-3)(=57) **or**					
		11 × 3 + (11-5)×(7-3)(=57)					
		'57' ÷ 2 (28.5)				M1	dep on at least M1
		'29' × 24.8				M1	
			719.20	5		A1	

Question	Working	Answer	Mark	AO		Notes
13	345 ÷ 200 (=1.725) **or** 345 × 100 (=34500)			AO2	M1	Division by 200 or conversion of units
	'1.725' × 100 **or** '34500' ÷ 200				M1	Division by 200 and conversion of units
		172.5	3		A1	
14	(6 + 8) ÷ 2 (=7) **or** (−5 + 3) ÷2 (= −1)			AO1	M1	
		(−1, 7)	2		A1	
15 a	900 ÷ 6 × 15 oe			AO1	M1	
		2250	2		A1	
b	3 × 1000 ÷ 750 × 6			AO1	M1	
		24	2		A1	
16	2 × 2 × 5 or 2 × 3 × 5 or 3 × 3 × 5 or two of 20, 40, 60 … 30, 60, 90 … 45, 90, 105			AO1	M1	for one of 20, 30, 45 written as product of prime factors or list of at least 3 multiples of any two of 20, 30, 45
	2 × 2 × 5 and 2 × 3 × 5 and 3 × 3 × 5 or all of 20, 40, 60 , 80 … 180 30, 60, 90 … 180 45, 90, 105 … 180				M1	
		180	3		A1	for 180 or 2 × 2 × 3 × 3 × 5 oe

Question	Working	Answer	Mark	AO		Notes
17				AO1	M1	for 7n + k (k may be zero)
		7n – 5 oe	2		A1	
18	$\frac{1}{2}\times(10+14)\times 9$ oe (= 108)			AO2	M1	for area of cross section
	'108' × 6 (=648)				M1	(dep on previous M1) for volume of prism
	'648' × 0.7				M1	(independent)
		453.6	4		A1	accept 454
19 a		p^9	1	AO1	B1	
b		m^{-12}	1	AO1	B1	
c		1	1	AO1	B1	
d	5x + 35 = 2x – 10 or			AO1	M1	for removing bracket or dividing all terms by 5
	$x+7=\frac{2x}{5}-\frac{10}{5}$					
	eg. 5x – 2x = −10 – 35 or				M1	for isolating x terms in a correct equation
	$7+\frac{10}{5}=\frac{2x}{5}+x$					
		−15	3		A1	dep on M1

Question	Working	Answer	Mark	AO		Notes
20	14000 × 4 (=56000)			AO1	M1	NB. multiplication by 4 may occur before or after percentage decrease
	0.075 × '56000' (=4200) **or** 0.075 × 14000 (=1050)				M1	M2 for 0.925 × '56000'**or** 0.925 × 14000
	'56000' – '42000' **or** 14000 – '1050'				M1	(dep)
		51 800	4		A1	
21 **a**		triangle with vertices (3, -1) (3, -4) (5, -4)	1	AO2	B1	
b		Rotation		AO2	B1	
		centre (-3, 0)			B1	
		90° anticlockwise	3		B1	accept +90°, 270° clockwise, −270° NB. If more than one transformation then no marks can be awarded

Question	Working	Answer	Mark	AO	Notes
22 **a**	4×15 (=60) **or** $\frac{a+b+c+d}{4} = 15$ **or** $4 \times 15 - 39$	21	2	AO3	M1 A1
b	$d - a = 10$ **or** $a = 11$ **or** $a =$ "21" $- 10$ **or** $b + c = 39 - 11 = 28$	14	2	AO3	M1 ft from (a) (can be implied by 11, b, c, 21 **OR** a, b, c, d with $b + c = 28$) A1 cao
23	$0.02 \times 40\,000$ (=800) **or** $1.02 \times 40\,000$ (=40800) **or** 2400 "40800"×0.02(=816) **and** "41616"×0.02(=832.32) **OR** 2448.32	42448.32	3	AO1	M1 M1 (dep) method to find interest for year 2 **and** year 3 } M2 for $40\,000 \times 1.02^3$ A1
24	$3x + y = 13$ **or** $6x + 2y = 26$ $-\ 3x - 6y = 27$ $+\ x - 2y = 9$ eg. $3x - 2 = 13$ **or** $15 + y = 13$	5,−2	3	AO1	M1 multiplication of one equation with correct operation selected **or** rearrangement of one equation with substitution into second M1 (dep) correct method to find second variable A1 for both solutions dependent on correct working

Question		Working	Answer	Mark	AO		Notes
25	**a**	e.g. $\frac{10}{18}+\frac{3}{18}$ **or** $\frac{30}{54}+\frac{9}{54}$			AO1	M1	for two fractions with common denominator with at least one numerator correct
			answer given	2		A1	correct answer from correct working
	b	$\frac{14}{3}\div\frac{32}{9}$			AO1	M1	
		$\frac{14}{3}\times\frac{9}{32}$ **or** $\frac{126}{27}\div\frac{96}{27}$ **or** $\frac{42}{9}\div\frac{32}{9}$				M1	
			answer given	3		A1	correct answer from correct working
26		(6 – 2) × 180 (=720)			AO2	M1	complete method to find sum of interior angles
		'720' – (86 + 123 + 140 + 105) (=266) **or** '720' – 454 (=266)				M1	dep on 1st method mark
		'266' ÷ 2				M1	dep on 1st method mark
			133	4		A1	

Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Level 1/2
Paper 1H

Higher Tier

Sample assessment material for first teaching September 2016

Time: 2 hours

Paper Reference

4MA1/1H

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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 paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

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

Turn over

S51832A

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1/2/1/

S 5 1 8 3 2 A 0 1 2 0

PEARSON

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

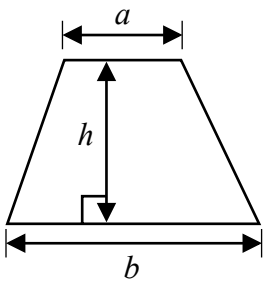
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

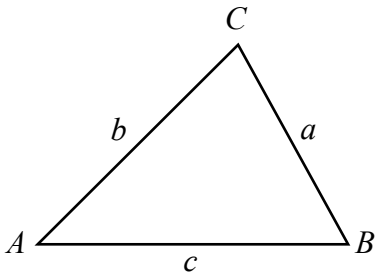
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle *ABC*

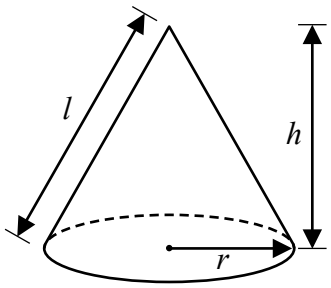
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

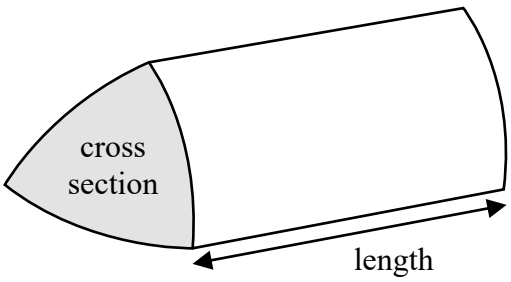
Area of triangle $= \frac{1}{2}ab\sin C$

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

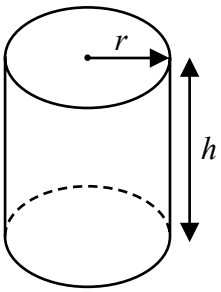
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

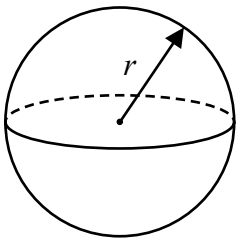


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



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

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



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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 Yoko flew on a plane from Tokyo to Sydney.
The plane flew a distance of 7800 km.
The flight time was 9 hours 45 minutes.

Work out the average speed of the plane in kilometres per hour.

.....km/h

(Total for Question 1 is 3 marks)

---

2 Penny, Amjit and James share some money in the ratios 3 : 6 : 4
Amjit gets $28 more than James.

Work out the amount of money that Penny gets.

$ .....

(Total for Question 2 is 3 marks)

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3 A factory has 60 workers.

The table shows information about the distances, in km, the workers travel to the factory each day.

Distance (d km)	**Frequency**
$0 < d \leqslant 5$	12
$5 < d \leqslant 10$	6
$10 < d \leqslant 15$	4
$15 < d \leqslant 20$	6
$20 < d \leqslant 25$	14
$25 < d \leqslant 30$	18

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean distance travelled to the factory each day.

.....km

(4)

One of these workers is chosen at random.

(c) Write down the probability that this worker travels more than 20 km to the factory each day.

.....

(2)

(Total for Question 3 is 7 marks)

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4 Nigel bought 12 boxes of melons.
He paid \$15 for each box.
There were 12 melons in each box.

Nigel sold $\frac{3}{4}$ of the melons for \$1.60 each.

He sold all the other melons at a reduced price.

He made an overall profit of 15%

Work out how much Nigel sold each reduced price melon for.

\$ .....

(Total for Question 4 is 5 marks)

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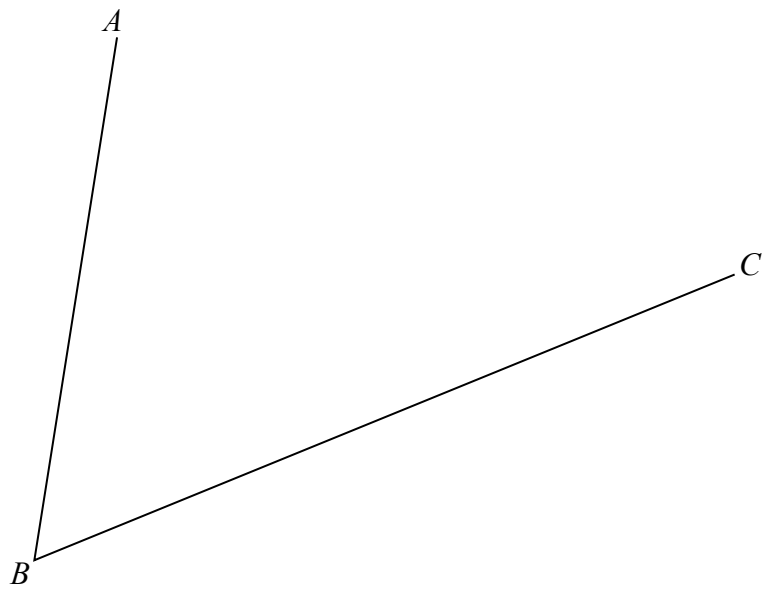
5 Use ruler and compasses to construct the bisector of angle ABC.
You must show all your construction lines.



(Total for Question 5 is 2 marks)

6 (a) Factorise fully $18e^3f + 45e^2f^4$

.....

(2)

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

.....

(3)

(Total for Question 6 is 5 marks)

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7

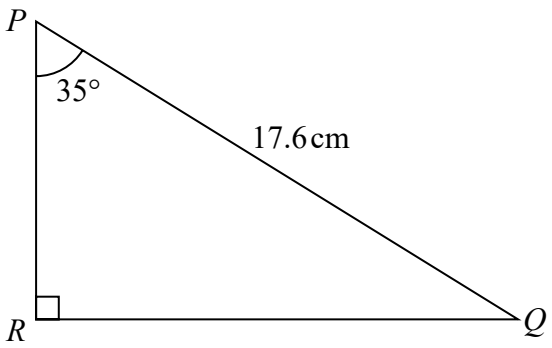

Diagram **NOT** accurately drawn

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

.....cm

(Total for Question 7 is 3 marks)

8 In a sale, all normal prices are reduced by 15%
The normal price of a mixer is reduced by 22.50 dollars.

Work out the normal price of the mixer.

.....dollars

(Total for Question 8 is 3 marks)

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9 The table shows the diameters, in kilometres, of five planets

Planet	Diameter (km)
Venus	1.2×10^4
Jupiter	1.4×10^5
Neptune	5.0×10^4
Mars	6.8×10^3
Saturn	1.2×10^5

(a) Write 1.4×10^5 as an ordinary number.

.....

(1)

(b) Which of these planets has the smallest diameter?

.....

(1)

(c) Calculate the difference, in kilometres, between the diameter of Saturn and the diameter of Neptune.
Give your answer in standard form.

.....km

(2)

The diameter of the Moon is 3.5×10^3km.
The diameter of the Sun is 1.4×10^6km.

(d) Calculate the ratio of the diameter of the Moon to the diameter of the Sun.
Give your ratio in the form $1 : n$

.....

(2)

(Total for Question 9 is 6 marks)

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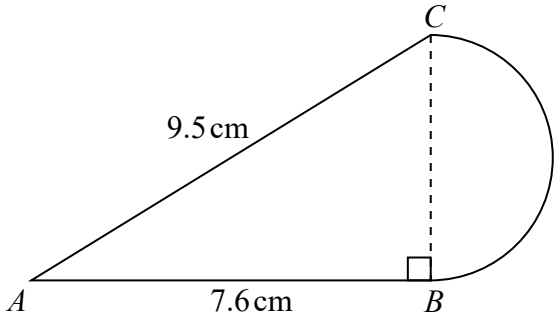

Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.
Triangle *ABC* is right-angled at *B*.

AB = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

.....cm^2

(Total for Question 10 is 5 marks)

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11 Expand and simplify $(x + 5)(x - 3)(x + 3)$

.....

(Total for Question 11 is 3 marks)

12 Here are the points that Carmelo scored in his last 11 basketball games.

23 20 14 23 17 24 24 18 16 22 21

(a) Find the interquartile range of these points.

.....

(3)

Kobe also plays basketball.
The median number of points Kobe has scored in his last 11 games is 18.5
The interquartile range of Kobe's points is 10

(b) Which of Carmelo or Kobe is the more consistent points scorer?
Give a reason for your answer.

.....

.....

(1)

(Total for Question 12 is 4 marks)

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13 (a) Find an equation of the line that passes through the points (−3, 5) and (1, 2)
Give your answer in the form $ax + by = c$ where a, b and c are integers.

.....

(4)

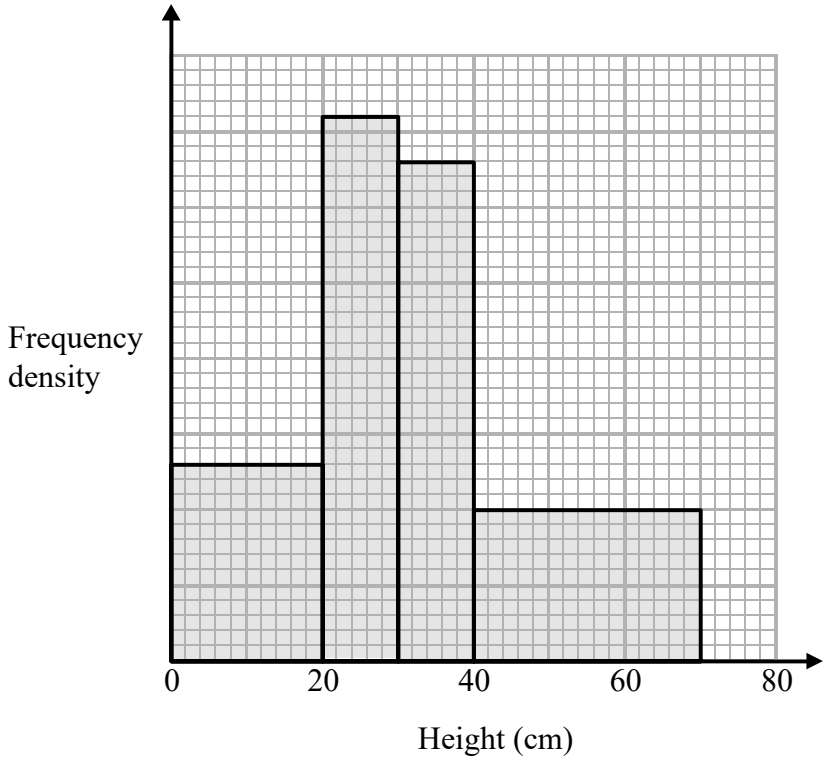
Line $\mathbf{L_1}$ has equation $y = 3x + 5$
Line $\mathbf{L_2}$ has equation $6y + 2x = 1$

(b) Show that $\mathbf{L_1}$ is perpendicular to $\mathbf{L_2}$

(2)

(Total for Question 13 is 6 marks)

14 The histogram shows information about the heights of some tomato plants.



26 plants have a height of less than 20 cm.

Work out the total number of plants.

.....

(Total for Question 14 is 3 marks)

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15 A rectangular lawn has a length of $3x$ metres and a width of $2x$ metres.
The lawn has a path of width 1 metre on three of its sides as shown in the diagram.

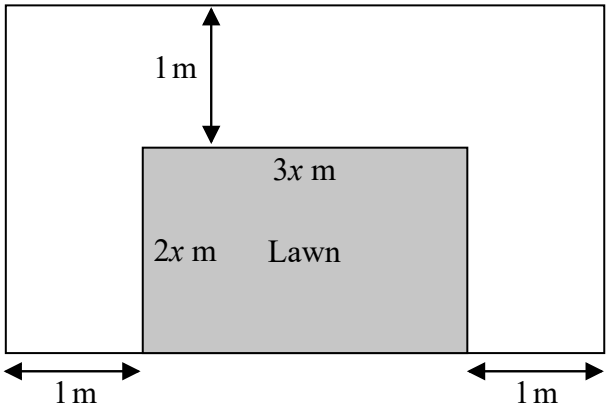

Diagram **NOT** accurately drawn

The total area of the lawn and the path is $100\,\text{m}^2$

(a) Show that $6x^2 + 7x - 98 = 0$

(2)

(b) Calculate the area of the lawn.
Show clear algebraic working.

.....m^2

(5)

(Total for Question 15 is 7 marks)

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16

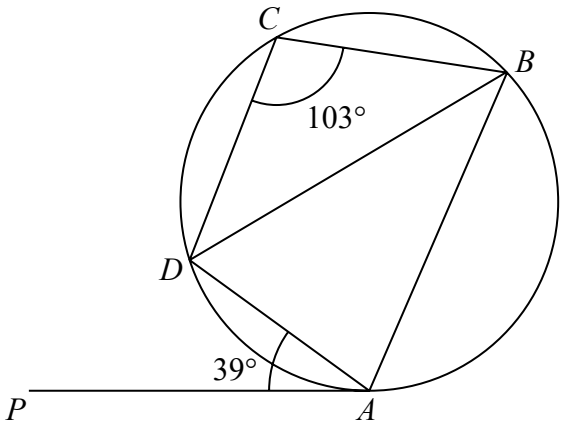

Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle.
PA is a tangent to the circle.
Angle *PAD* = 39°
Angle *BCD* = 103°

Calculate the size of angle *ADB*.
Give a reason for each stage of your working.

..... °

(Total for Question 16 is 5 marks)

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17 $y = \dfrac{2a}{b - c}$

$a = 42$ correct to 2 significant figures.
$b = 24$ correct to 2 significant figures.
$c = 14$ correct to 2 significant figures.

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

.....

(Total for Question 17 is 3 marks)

18 Show that $3 - (x - 1) \div \left(\dfrac{x^2 - 1}{3x + 2}\right)$ can be written as $\dfrac{a}{x + b}$ where a and b are integers.

(Total for Question 18 is 4 marks)

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19

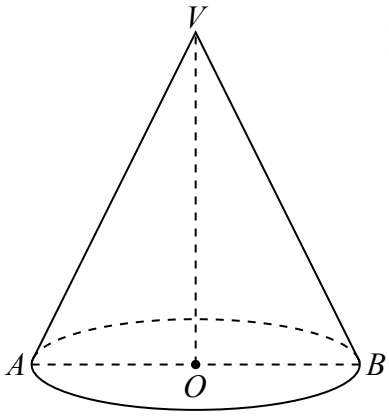

Diagram **NOT** accurately drawn

The diagram shows a solid cone.
The base of the cone is a horizontal circle, centre O, with radius 4.5 cm.
AB is a diameter of the base and OV is the vertical height of the cone.
The curved surface area of the cone is 130 cm^2

Calculate the size of the angle AVB.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 19 is 4 marks)

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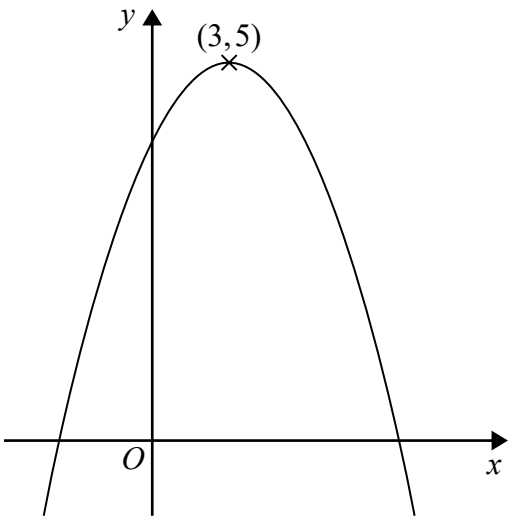
20



The diagram shows part of the curve with equation $y = f(x)$
The coordinates of the maximum point of the curve are (3, 5)

(a) Write down the coordinates of the maximum point of the curve with equation

(i) $y = f(x + 3)$

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

(ii) $y = 2f(x)$

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

(iii) $y = f(3x)$

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

The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) - 4$

(b) Describe the transformation.

.....

(1)

(Total for Question 20 is 4 marks)

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21 The curve with equation $y = 8x^2 + \frac{2}{x}$ has one stationary point.

Find the co-ordinates of this stationary point.
Show your working clearly.

(..... , ...)

(Total for Question 21 is 5 marks)

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22

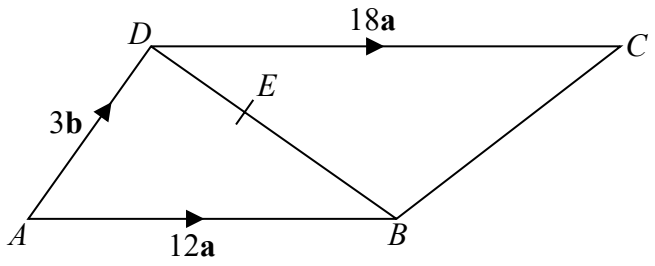

Diagram **NOT** accurately drawn

ABCD is a trapezium.
AB is parallel to *DC*.

$\overrightarrow{AB} = 12\mathbf{a}$

$\overrightarrow{AD} = 3\mathbf{b}$

$\overrightarrow{DC} = 18\mathbf{a}$

E is the point on the line *DB* such that $DE : EB = 1 : 2$

Show by a vector method that *BC* is parallel to *AE*.

(Total for Question 22 is 5 marks)

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23 The 4th term of an arithmetic series is 17
The 10th term of the same arithmetic series is 35

Find the sum of the first 50 terms of this arithmetic series.

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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International GCSE in Mathematics A - Paper 1H mark scheme

Question		Working	Answer	Mark	AO		Notes
1		7800 ÷ 9.75 or 7800 ÷ 585 × 60			AO2	M2	M1 for 7800 ÷ 9.45 or 7800 ÷ 585 or 13.3....
			800	3		A1	
2		28÷ (6 − 4) (=14)			AO1	M1	or use of cancelled ratios
							(e.g. 3 : 6 : 4 = 0.75 : 1.5 : 1)
		'14' × 3 (=42)				M1 (dep)	28÷0.5(=56)
							or cancelled ratios, (e.g. 56×0.75)
							or M2 for 28 ÷ $\frac{2}{3}$ oe
			42	3		A1	
3	**a**		25 < d ≤ 30	1	AO3	B1	B1 identifies 25 → 30 class
	b	(12 × 2.5) + (6 × 7.5) + (4 × 12.5) + (6 × 17.5) + (14 × 22.5) + (18 × 27.5) **or**			AO3	M2	M1 for frequency × consistent value within interval
		30 + 45 + 50 + 105 + 315 + 495 **or** 1040					NB. Products do not need to be added
							Condone one error
		'1040' ÷ 60				M1	
			$17\frac{1}{3}$	4		A1	accept 17.3(33…)
	c				AO3	M1	for $\frac{a}{60}$ with $a < 60$ **or** $\frac{32}{b}$ with $b > 32$
			$\frac{32}{60}$ oe	2		A1	

Question	Working	Answer	Mark	AO		Notes
4	**<u>Working with all 12 boxes</u>** 12×15 (=180) **or** 12×12 (=144) $12 \times 12 \times \frac{3}{4} \times 1.6$ oe (= 172.8) $12 \times 15 \times 1.15$ oe (=207) **or** 180×0.15 oe (=27) $\frac{'207' - '172.8'}{36}$ **or** $\frac{34.2}{36}$ **or** $\frac{'27' + ('180' - '172.8')}{36}$	0.95	5	AO1	M1 M1 M1 M1 A1 cao	for correct total cost or correct total number of melons (either may appear as part of another calculation) for revenue from all full price melons sold for total revenue or total profit dep on M3
	<u>Alternative – working with one box</u> $15 \div 12$ (=1.25) **or** $12 \times \frac{3}{4}$ (= 9) $12 \times \frac{3}{4} \times 1.6$ oe (= 14.4) 15×1.15 (=17.25) $\frac{'17.25' - '14.4'}{3}$ **or** $\frac{2.85}{3}$	0.95	5		M1 M1 M1 M1 A1 cao	for price of 1 melon **or** number of full price melons for revenue from all full price melons sold for total revenue from one box dep on M3

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Question	Working	Answer	Mark	AO		Notes
5	Circular arc, centre B, to intersect both lines AB and BC Equal length arcs, from intersections on each line, meeting to give a point on the bisector	correct bisector	2	AO2	M1 A1	 dep on M1 Full construction shown.
6 a		$9e^2f(2e + 5f^3)$	2	AO1	M1 A1	Any correct partially factorised expression
b	$(x \pm 6)(x \pm 2)$ $(x - 6)(x + 2)$	6, −2	3	AO1	M1 M1 A1	or correct substitution into quadratic formula (condone one sign error) or $\frac{4 \pm \sqrt{64}}{2}$ dep. on at least M1
7	$\cos 35 = \frac{PR}{17.6}$ $17.6 \times \cos 35$	14.4	3	AO2	M1 M1 A1	 14.4 ~ 14.42
8	22.50 ÷ 15 (=1.5) **or** 100 ÷ 15 (=6.6….) "1.5" × 100 (=150) **or** "6.6…" × 22.5(0)	150	3	AO1	M1 M1 A1	 dep } M2 for 22.5 ÷ 0.15

Question		Working	Answer	Mark	AO		Notes
9	**a**		140 000	1	AO1	B1	
	b		Mars	1	AO1	B1	
	c	$1.2 \times 10^5 - 5 \times 10^4$ **or** 120000 – 50000 **or** 70000 oe			AO1	M1	
			7×10^4	2		A1	
	d	$3.5 \times 10^3 : 1.4 \times 10^6$			AO1	M1	
			1 : 400	2		A1	
10		$\sqrt{9.5^2 - 7.6^2}$ **or** $\sqrt{90.25 - 57.76}$ **or** $\sqrt{32.49}$ **or** $\sqrt{32.5}$			AO2	M1	
		$(BC =)$ 5.7				A1	
		$\frac{1}{2} \times 7.6 \times$"5.7" **or** 21.6(6) **or** 21.7				M1	dep on first M1
							or e.g. $ACB = \sin^{-1}\left(\frac{7.6}{9.5}\right) (= 53.1...)$ **and** $\frac{1}{2} \times 9.5 \times$"5.7"$\times \sin$"53.1"
		$\frac{1}{2} \times \pi \times \left(\frac{"5.7"}{2}\right)^2$ **or** 12.7(587...) **or** 12.8				M1	dep on first M1
			34.4	5		A1	for answer rounding to 34.4 ($\pi \rightarrow$ 34.4187... 3.14$\rightarrow$34.4123...)

Question		Working	Answer	Mark	AO		Notes
11		e.g. $(x^2 + 5x - 3x - 15)(x + 3)$ **or** $(x^2 + 2x - 15)(x + 3)$ **or** $(x - 5)(x^2 + 3x - 3x - 9)$ **or** $(x - 5)(x^2 - 9)$			AO1	M1	expansion of any two of the three brackets – at least 3 correct terms
		E.g. $x^3 + 3x^2 + 2x^2 + 6x - 15x - 45$ **or** $x^3 + 5x^2 - 9x - 45$				M1	(dep) ft for at least 3 correct terms in second expansion
			$x^3 + 5x^2 - 9x - 45$	3		A1	
12	**a**	14 16 17 18 20 21 22 23 23 24 24 (14 16 17 18 20 <u>21</u> 22 23 23 24 24) (14 16 <u>17</u> 18 20) and (22 23 <u>23</u> 24 24) 23 - 17			AO3	M1	arrange in order **or** One of 21(median), 17(LQ), 23(UQ) identified
						M1	Identify any **two** of 21, 17 and 23
			6	3		A1 cao	
	b		Carmelo **and** reason using IQR	1	AO3	B1	ft from (a) Carmelo - he has a lower IQR oe (IQR must be part of the statement)

Question		Working	Answer	Mark	AO		Notes
13	**a**	$m = \frac{5-2}{-3-1}$ **or** $-\frac{3}{4}$ oe			AO1	M1	for gradient
						M1	for method to find c
		eg. $2 = -\frac{3}{4} \times 1 + c$ **or**					
		$y - 2 = -\frac{3}{4}(x-1)$					
		$y = -\frac{3}{4}x + \frac{11}{4}$				M1	found values of m and c substituted in $y = mx + c$
			$3x + 4y = 11$	4		A1	
	b	$y = \frac{1-2x}{6}$ **or** $m = -\frac{1}{3}$ oe			AO1	M1	
			shown	2		A1	for conclusion from correct gradients
14		26÷20 (=1.3) **or**			AO3	M1	Any one frequency density (without contradiction) or,
		3.6×10 or 3.3×10 or 1×30 **or**					e.g. $1\text{cm}^2 = 5$ **or**
		36 or 33 or 30 **or** $\frac{26}{130}\left(=\frac{1}{5}\right)$					clear association of area with frequency
		26 + 3.6×10 + 3.3×10 + 1×30 **or**				M1	Any fully correct complete method;
		26 + 36 + 33 + 30 **or** $625 \times \frac{1}{5}$ **or**					condone one error in bar width or bar height
		$(130 + 180 + 165 + 150) \times \frac{1}{5}$					
			125	3		A1	

Question		Working	Answer	Mark	AO		Notes
15	**a**	$(3x + 2)(2x + 1) = 100$			AO1, AO2	M1	or $(2x \times 3x) + 2(2x + 1) + 3x = 100$ oe or $(2x \times 3x) + (2 \times 2x\ (\times 1)) + 1) + 3x + 1 + 1 = 100$ oe other partitions are acceptable but partitioning must go on to form a correct equation.
			$6x^2 + 7x - 98 = 0$ *	2		A1	Accept $6x^2 + 7x + 2 = 100$ if M1 awarded * Answer given
	b	$(3x + 14)(2x - 7)\ (= 0)$			AO1	M2	or $(x =)\dfrac{-7 \pm \sqrt{49 + 2352}}{12}$ or $(x =)\dfrac{-7 \pm \sqrt{2401}}{12}$ If not M2 then M1 for $(3x \pm 14)(2x \pm 7)$ or $(x =)\dfrac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6}$
		$x = 3.5$				A1	Dependent on at least M1 Ignore negative root
		(Area =) $6 \times$ '3.5'^{2} or $(3 \times$ '3.5'$) \times (2 \times$ '3.5'$)$				M1 ft	Dependent on at least M1 and x > 0
			73.5	5		A1	

Question	Working	Answer	Mark	AO		Notes
16	180 − 77 − 39 **or** $\angle BAD = 77°$ **and** $\angle ABD = 39°$ **or** $\angle BA''X'' = 64°$ where X is on PA produced **or** a fully correct method to find angle ADB	64	5	AO2	M2 B1 B1 A1	also accept 103 −39 M1 for $\angle BAD = 77°$ **or** $\angle ABD = 39°$ (angles may be stated or marked on diagram) Opposite angles in a cyclic quadrilateral add up to 180° Alternate segment theorem oe cao
17	41.5 **or** 42.5 **or** 24.5 **or** 23.5 **or** 14.5 **or** 13.5 $(y =)\dfrac{2 \times 41.5}{24.5 - 13.5}$	7.5	3	AO1	B1 M1 A1	 A1 accept $\dfrac{83}{11}$ or 7.55 or $7.\dot{5}\dot{4}$ (depending on M1) NB. Answer **must** come from correct working

Question	Working	Answer	Mark	AO		Notes
18	$(x-1)\times\frac{(3x+2)}{(x^2-1)}$			AO1	M1	correct method for divsion
	$(x+1)(x-1)$				M1	correct factorisation of x^2-1
	eg $\frac{3(x+1)-(3x+2)}{(x+1)}$				M1	correct single fraction
		$\frac{1}{x+1}$	4		A1	
19	$130=\pi\times4.5\times l$			AO2	M1	
	$l=\frac{130}{4.5\pi}$ or $l=9.1956$				M1	For exact expression or answer which rounds to 9.2
	sin (AVO) = 4.5/"9.20" (= 0.489..)				M1	For a correct expression for sin AVO or cos AVB cos (AVB) = ("9.2"^{2} + "9.2"^{2} – 9^2)/(2 × "9.2" × "9.2") (=0.521...)
		58.6	4		A1	awrt 58.6
20 ai		(0, 5)	1	AO1	B1	
aii		(3, 10)	1		B1	
aiii		(1, 5)	1		B1	
b		translation $\begin{pmatrix}0\\-4\end{pmatrix}$	1	AO1	B1	

Question	Working	Answer	Mark	AO		Notes
21	$\left(\frac{dy}{dx}\right) = 2 \times 8x - 2x^{-2}$			AO1	M2	(M1 for one term differentiated correctly)
	$2 \times 8x - 2x^{-2} = 0$				M1	dep on M1
	$x^3 = \frac{1}{8}$ or $x = 0.5$ oe				M1	
		(0.5, 6)	5		A1	
22	$\overrightarrow{AE} = \overrightarrow{AD} + \overrightarrow{DE}$ oe			AO2	M1	may be fully or partially in terms of **a** and/or **b**
	eg. $\overrightarrow{DE} = \frac{1}{3}\overrightarrow{DB}$ **or** $\overrightarrow{BE} = \frac{2}{3}\overrightarrow{BD}$				M1	correct use of ratio
	$\overrightarrow{AE} = 2\mathbf{b} + 4\mathbf{a}$				A1	
	$\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AD} + \overrightarrow{DC}$ (=3**b** + 6**a**)				M1	may be fully or partially in terms of **a** and/or **b**
		eg. $\overrightarrow{AE} = 2(\mathbf{b} + 2\mathbf{a})$ **and** $\overrightarrow{BC} = 3(\mathbf{b} + 2\mathbf{a})$	5		A1	**NB** Correct expressions for $\overrightarrow{BC}$ and $\overrightarrow{AE}$ must be given

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Question	Working	Answer	Mark	AO	Notes	
23	$a + 3d = 17$ **or** $a + 9d = 35$ **or**			AO1	M1	M1 for $17 = 4p + q$ **and** $35 = 10p + q$
	$35 - 17 = 6d$					
	$d = 3$				A1	$p = 3$ and $q = 5$
	$a = 8$				A1 ft from $d = 3$	$u_1 = 8$ and $u_{50} = 155$
	$\frac{50}{2}(2\times'8'+(50-1)\times'3')$ oe				M1	$\frac{1}{2}\times 50(8+155)$
		4075	5		A1	

Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Level 1/2
Paper 2H

Higher Tier

Sample assessment material for first teaching September 2016

Time: 2 hours

Paper Reference

4MA1/2H

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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 paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

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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International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

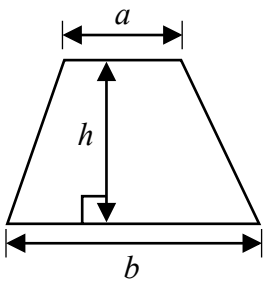
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

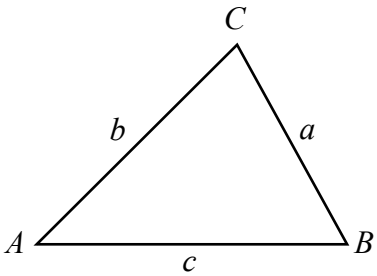
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle *ABC*

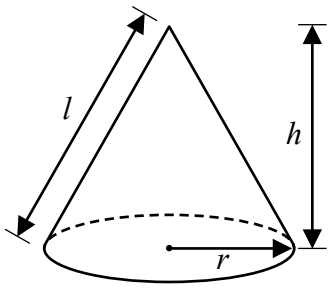
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

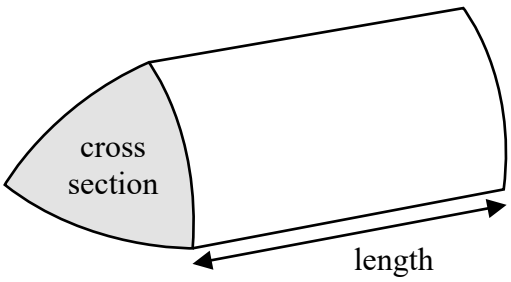
Area of triangle $= \frac{1}{2}ab\sin C$

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

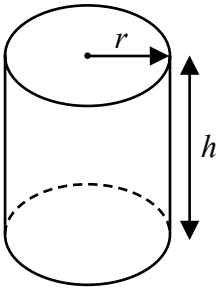
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

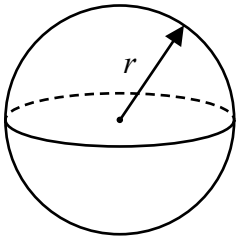


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



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

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



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Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Find the lowest common multiple (LCM) of 20, 30 and 45

.....

(Total for Question 1 is 3 marks)

2 The first four terms of an arithmetic sequence are

2 9 16 23

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

.....

(Total for Question 2 is 2 marks)

3

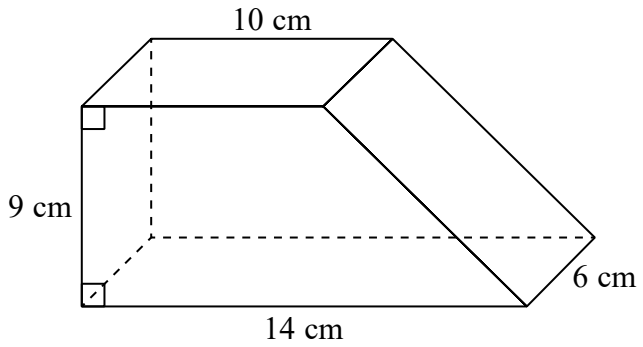

Diagram **NOT** accurately drawn

The diagram shows a solid prism.
The cross section of the prism is a trapezium.

The prism is made from wood with density 0.7 g/cm^3

Work out the mass of the prism.

.....g

(Total for Question 3 is 4 marks)

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4 (a) Simplify $p^5 \times p^4$

.....

(1)

(b) Simplify $(m^4)^{-3}$

.....

(1)

(c) Write down the value of c^0

.....

(1)

(d) Write $\sqrt[3]{2}$ as a power of 2

.....

(1)

(e) Solve $5(x + 7) = 2x - 10$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 4 is 7 marks)

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5 On 1 May 2012, the cost of 5 grams of gold was 14 000 rupees.
The cost of gold decreased by 7.5% from 1 May 2012 to 1 May 2013

Work out the cost of 20 grams of gold on 1 May 2013

.....rupees

(Total for Question 5 is 4 marks)

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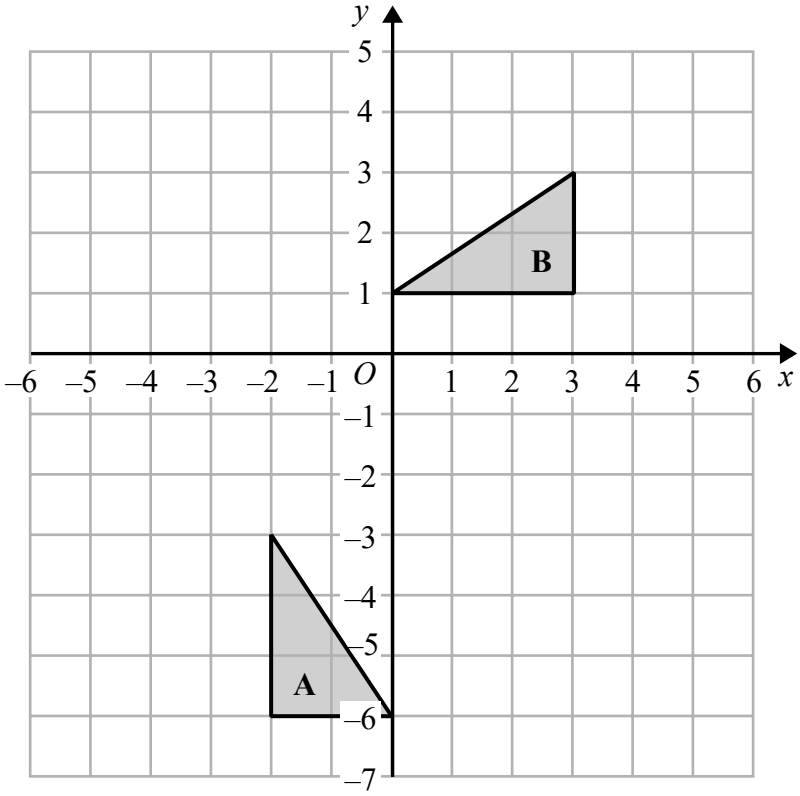
6



(a) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

(1)

(b) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

.....

(3)

(Total for Question 6 is 4 marks)

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7 a, b, c and d are 4 integers written in order of size, starting with the smallest integer.

The mean of a, b, c and d is 15
The sum of a, b and c is 39

(a) Find the value of d.

d = ...
(2)

Given also that the range of a, b, c and d is 10

(b) work out the median of a, b, c and d.

.....
(2)

(Total for Question 7 is 4 marks)

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8 Kwo invests HK$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

HK$.....

(Total for Question 8 is 3 marks)

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9 Solve the simultaneous equations

$$3x + y = 13$$
$$x - 2y = 9$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 9 is 3 marks)

10 Show that $4\frac{2}{3} \div 3\frac{5}{9} = 1\frac{5}{16}$

(Total for Question 10 is 3 marks)

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11

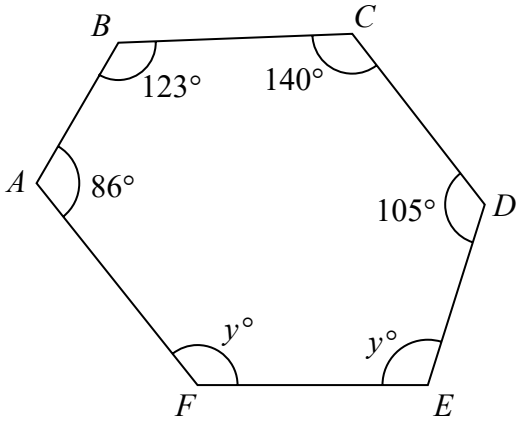

Diagram **NOT** accurately drawn

ABCDEF is a hexagon.

Work out the value of y.

y = ...

(Total for Question 11 is 4 marks)

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12 The table shows information about the amount of money that 120 people spent in a shop.

Amount of money (£*m*)	**Frequency**
$0 < m \leqslant 10$	8
$10 < m \leqslant 20$	17
$20 < m \leqslant 30$	25
$30 < m \leqslant 40$	40
$40 < m \leqslant 50$	22
$50 < m \leqslant 60$	8

(a) Complete the cumulative frequency table.

Amount of money (£*m*)	**Cumulative frequency**
$0 < m \leqslant 10$	
$0 < m \leqslant 20$	
$0 < m \leqslant 30$	
$0 < m \leqslant 40$	
$0 < m \leqslant 50$	
$0 < m \leqslant 60$	

(1)

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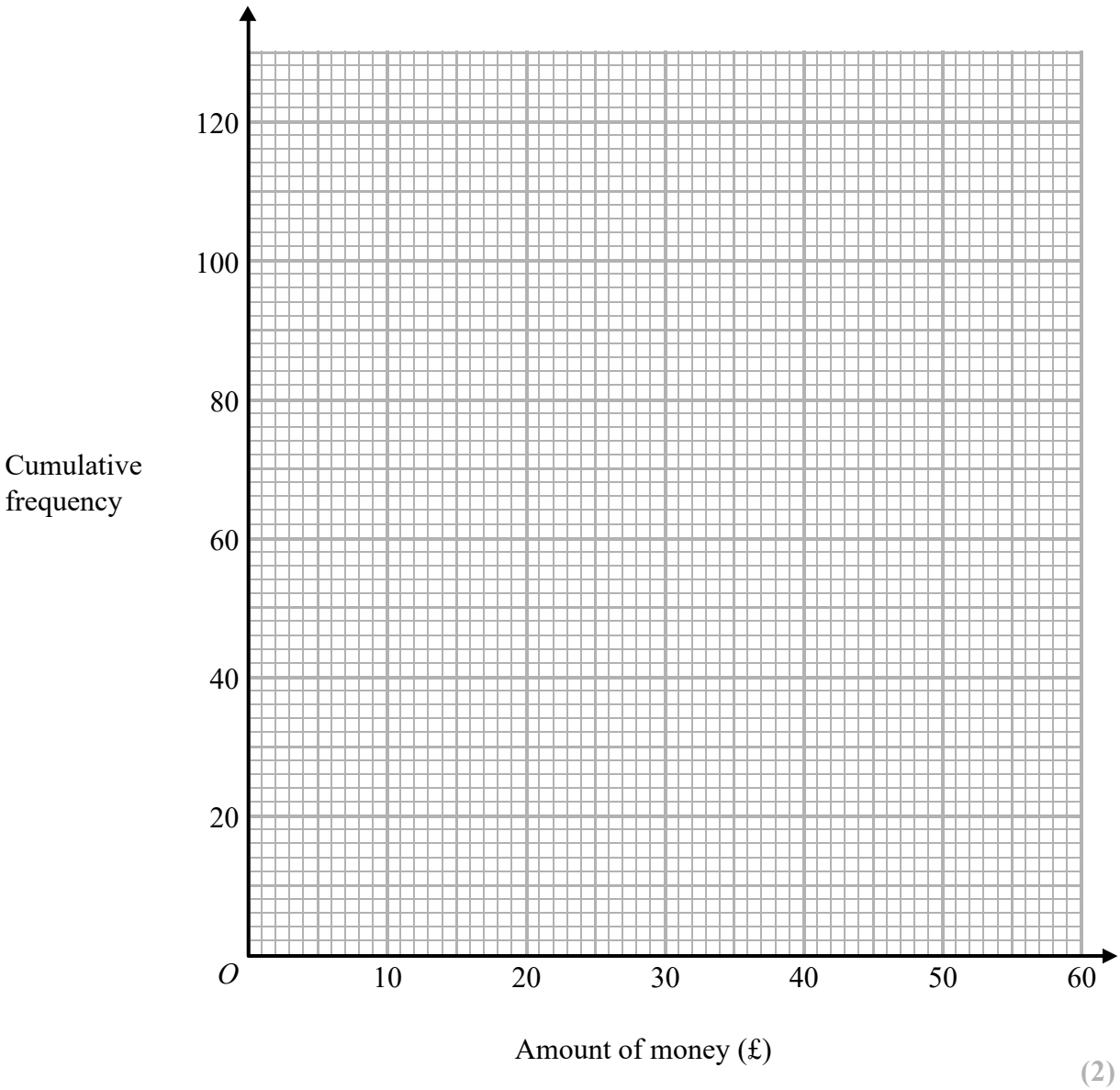
(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median amount of money spent in the shop by these people.

£.....

(2)

(Total for Question 12 is 5 marks)

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13 Make b the subject of $P = \frac{1}{2}ab^2 + c$ where b is positive.

.....

(Total for Question 13 is 3 marks)

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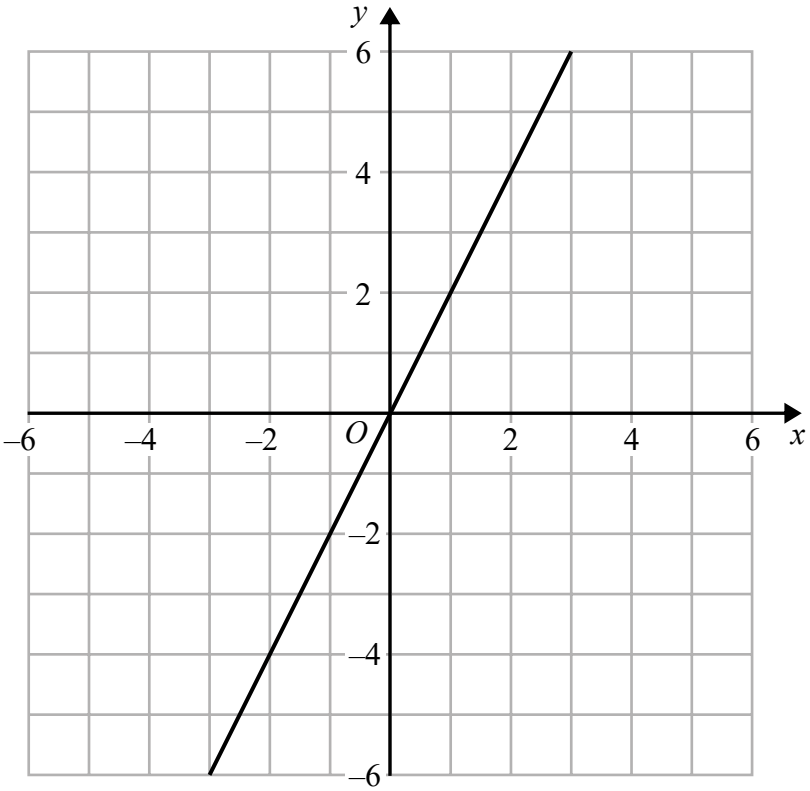
14 The line with equation $y = 2x$ is drawn on the grid.

(a) On the same grid, draw the line with equation $4x + 3y = 12$

(2)



(b) Show, by shading on the grid, the region defined by all four inequalities

$$y \leqslant 2x$$

$$4x + 3y \leqslant 12$$

$$y \geqslant -3$$

$$x \leqslant 4$$

(3)

(Total for Question 14 is 5 marks)

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15 There are 100 students in Year 11

All 100 students study at least one of art, drama and music.

7 of the students study art and drama and music.
23 of the students study art and drama.
35 of the students study art and music.
12 of the students study music and drama.
65 of the students study art.
52 of the students study music.

(a) Draw a Venn diagram to show this information.

(3)

One of the 100 students is selected at random.

(b) Find the probability that this student studies Drama but not Music.

.....

(1)

Given that the student studies Drama,

(c) find the probability that this student also studies Art.

.....

(1)

(Total for Question 15 is 5 marks)

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16 M is inversely proportional to g^3
$M = 24$ when $g = 2.5$

(a) Find a formula for M in terms of g

.....

(3)

(b) Work out the value of g when $M = \frac{1}{9}$

$g =$ .....

(2)

(Total for Question 16 is 5 marks)

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17 The function f is such that $f(x) = \dfrac{3}{x-2}$

(a) Find f(1)

.....

(1)

(b) State which value of x must be excluded from any domain of f

.....

(1)

The function g is such that $g(x) = x + 4$

(c) Calculate fg(2)

.....

(2)

(Total for Question 17 is 4 marks)

---

18 Solid **A** and solid **B** are mathematically similar.

Solid **A** has surface area 384 cm^2
Solid **B** has surface area 864 cm^2

Solid **B** has a volume of 2457 cm^3

Calculate the volume of solid **A**.

.....cm^3

(Total for Question 18 is 3 marks)

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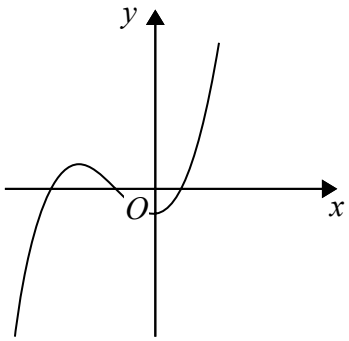
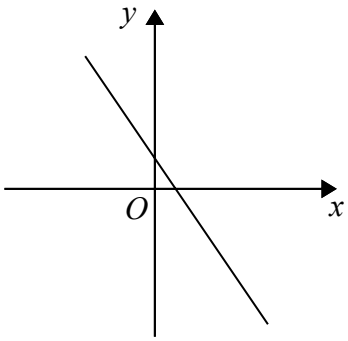
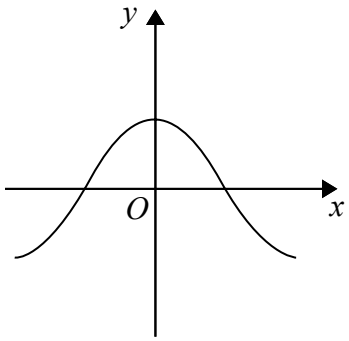
19 Here are nine graphs.



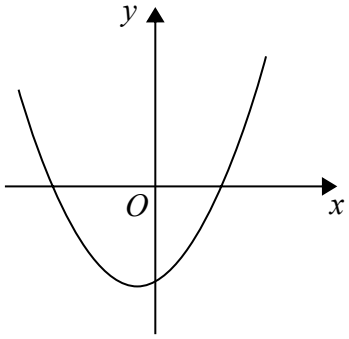
Graph A



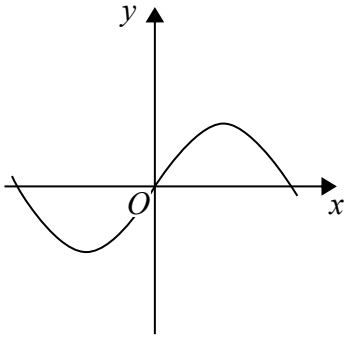
Graph B



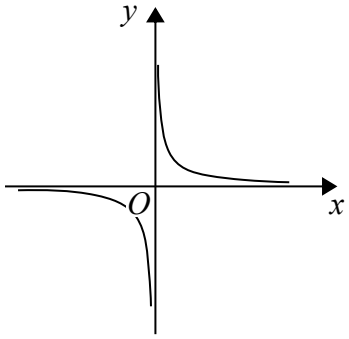
Graph C



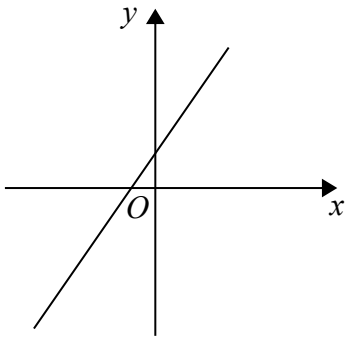
Graph D



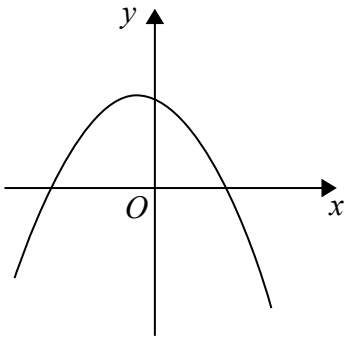
Graph E



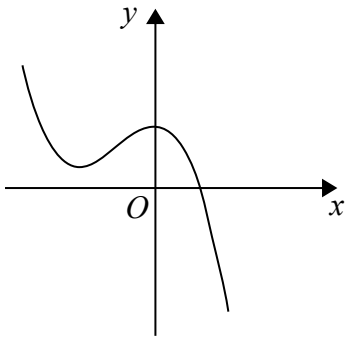
Graph F



Graph G



Graph H



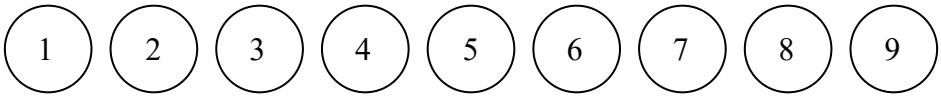
Graph I

Complete the table below with the letter of the graph that could represent each given equation.

Equation	Graph
$y = \sin x$	
$y = 2 - 3x$	
$y = x^2 + x - 6$	
$y = x^3 + 3x^2 - 2$	

(Total for Question 19 is 3 marks)

20 Gemma has 9 counters.
Each counter has a number on it.



Gemma puts the 9 counters into a bag.
She takes at random two counters from the bag.

(a) Work out the probability that the number on each counter is an even number.

.....
(2)

(b) Work out the probability that the sum of the numbers on the two counters is an odd number.
Show your working clearly.

.....
(3)

(Total for Question 20 is 5 marks)

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21 Here is triangle *LMN*, where angle *LMN* is an obtuse angle.

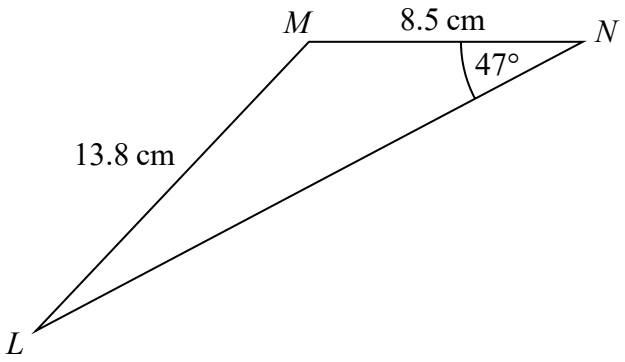

Diagram **NOT** accurately drawn

Work out the area of triangle *LMN*.
Give your answer correct to 3 significant figures.

.....cm^2

(Total for Question 21 is 6 marks)

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22 (a) Write $2x^2 - 8x + 9$ in the form $a(x + b)^2 + c$

.....

(3)

(b) Hence, or otherwise, explain why the graph of the curve with equation $y = 2x^2 - 8x + 9 = 0$ does not intersect the x-axis.

.....

.....

(1)

(Total for Question 22 is 4 marks)

23 $ABCD$ is a parallelogram.

$$\overrightarrow{AB} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad \overrightarrow{AC} = \begin{pmatrix} 9 \\ 4 \end{pmatrix}$$

Find the magnitude of $\overrightarrow{BC}$

.....

(Total for Question 23 is 3 marks)

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24 Show that $\dfrac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

Show your working clearly.

(Total for Question 24 is 4 marks)

25 A particle moves along a straight line.
The fixed point O lies on this line.
The displacement of the particle from O at time t seconds, $t \geqslant 0$, is s metres, where

$$s = t^3 - 5t^2 - 8t + 3$$

Find the value of t for which the particle is instantaneously at rest.

$t =$ .....

(Total for Question 25 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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International GCSE in Mathematics A - Paper 2H mark scheme

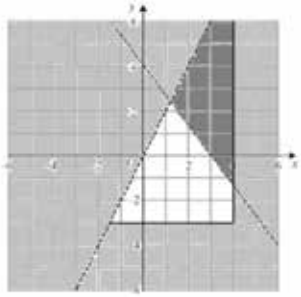
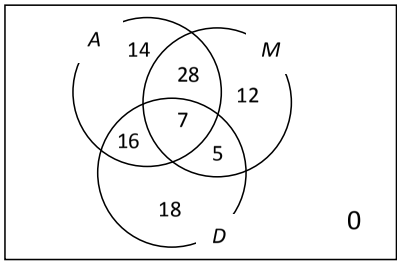
Question	Working	Answer	Mark	AO		Notes
1	2 × 2 × 5 **or** 2 × 3 × 5 **or** 3 × 3 × 5 **or** two of 20, 40, 60 … 30, 60, 90 … 45, 90, 105 2 × 2 × 5 **and** 2 × 3 × 5 **and** 3 × 3 × 5 **or** all of 20, 40, 60 , 80 … 180 30, 60, 90 … 180 45, 90, 105 … 180	180	3	AO1	M1 M1 A1	for one of 20, 30, 45 written as product of prime factors **or** list of at least 3 multiples of any two of 20, 30, 45 for 180 or 2 × 2 × 3 × 3 × 5 oe
2		$7n - 5$ oe	2	AO1	M1 A1	for $7n + k$ (k may be zero)
3	$\frac{1}{2} \times (10 + 14) \times 9$ oe (= 108) '108' × 6 (=648) '648' × 0.7	453.6	4	AO2	M1 M1 M1 A1	for area of cross section (dep on previous M1) for volume of prism (independent) accept 454

Question		Working	Answer	Mark	AO		Notes
4	**a**		p^9	1	AO1	B1	
	b		m^{-12}	1	AO1	B1	
	c		1	1	AO1	B1	
	d		$2^{\frac{1}{3}}$	1	AO1	B1	
	e	$5x + 35 = 2x - 10$ **or**			AO1	M1	for removing bracket or dividing all terms by 5
		$x + 7 = \frac{2x}{5} - \frac{10}{5}$					
		eg. $5x - 2x = -10 - 35$ **or**				M1	for isolating x terms in a correct equation
		$7 + \frac{10}{5} = \frac{2x}{5} + x$					
			−15	3		A1	dep on M1
5		14000 × 4 (=56000)			AO1	M1	NB. multiplication by 4 may occur before or after percentage decrease
		0.075 × '56000' (=4200) **or**				M1	
		0.075 × 14000 (=1050)					
		'56000' – '42000' **or**				M1	(dep)
		14000 – '1050'					
			51 800	4		A1	

Question		Working	Answer	Mark	AO		Notes
6	**a**		triangle with vertices (3, -1) (3, -4) (5, -4)	1	AO2	B1	
	b		Rotation centre (-3, 0) 90° anticlockwise	3	AO2	B1 B1 B1	 accept $+90^{0}$, 270° clockwise, -270° NB. If more than one transformation then no marks can be awarded
7	**a**	4 × 15 (=60) **or** $\frac{a+b+c+d}{4}=15$ **or** 4×15 – 39	21	2	AO3	M1 A1	
	b	$d - a = 10$ **or** $a = 11$ **or** a = "21" – 10 **or** $b + c = 39 - 11 = 28$	14	2	AO3	M1 A1 cao	ft from (a) (can be implied by 11, b, c, 21 **OR** a, b, c, d with $b + c = 28$)
8		0.02 × 40 000 (=800) **or** 1.02 × 40 000 (=40800) **or** 2400 "40800"×0.02(=816) **and** "41616"×0.02(=832.32) **OR** 2448.32	42448.32	3	AO1	M1 M1 A1	 (dep) method to find interest for year 2 **and** year 3

Question	Working	Answer	Mark	AO		Notes
9	$3x + y = 13$ **or** $6x + 2y = 26$ $-\ 3x - 6y = 27$ $+\ x - 2y = 9$ eg. $3x - 2 = 13$ **or** $15 + y = 13$	5,−2	3	AO1	M1 M1 A1	multiplication of one equation with correct operation selected **or** rearrangement of one equation with substitution into second (dep) correct method to find second variable for both solutions dependent on correct working
10	$\frac{14}{3} \div \frac{32}{9}$ $\frac{14}{3} \times \frac{9}{32}$ **or** $\frac{126}{27} \div \frac{96}{27}$ **or** $\frac{42}{9} \div \frac{32}{9}$	answer given	3	AO1	M1 M1 A1	 correct answer from correct working
11	$(6 - 2) \times 180$ (=720) '720' – (86 + 123 + 140 + 105) (=266) **or** '720' – 454 (=266) '266' ÷ 2	133	4	AO2	M1 M1 M1 A1	complete method to find sum of interior angles dep on 1st method mark dep on 1st method mark

Question		Working	Answer	Mark	AO		Notes
12	**a**		8, 25, 50, 90, 112, 120	1	AO3	B1	cao
	b	Plotting points from table at ends of interval			AO3	M1	± ½ sq ft from sensible table ie clear attempt to add frequencies
		Points joined with curve or line segments		2		A1	ft from points if 4 or 5 correct or if all points are plotted consistently within each interval at the correct heights Accept cf graph which is not joined to the origin **NB** A bar chart, unless it has a curve going consistently through a point in each bar, scores no points.
	c	60 (or 60.5) indicated on cf graph or stated			AO3	M1	for 60 (or 60.5) indicated on cf axis or stated
			approx 33	2		A1	If M1 scored, ft from cf graph If no indication of method, ft only from correct curve & if answer is correct (± ½ sq tolerance) award M1 A1
13		$P - c = \frac{1}{2}ab^2$			AO1	M1	Isolate term in b
		$\frac{2(P-c)}{a} = b^2$				M1	Isolate b^2
			$b = \sqrt{\frac{2(P-c)}{a}}$	3		A1	oe with b as the subject

Question		Working	Answer	Mark	AO		Notes
14	**a**	2 correct points plotted eg (0, 4) and (3, 0) $4x + 3y = 12$ drawn		 2	AO1 	M1 A1	
	b	Correct region 		3	AO1	B3	Correct region B2 for $x = 4$ and $y = -3$ drawn **and** consistent shading correct for at least two inequalities B1 for $x = 4$ and $y = -3$ drawn
15	**a**			3	AO1	B3	Correct diagram B2 for 3 over-lapping circles with 7 in intersection **and** at least 2 other correct numbers B1 for 3 over-lapping circles with 7 in intersection
	b		$\frac{34}{100}$ oe	1	AO3	B1	ft from diagram
	c		$\frac{23}{46}$ oe	1	AO3	B1	ft from diagram

Question		Working	Answer	Mark	AO		Notes
16	**a**	$M = \frac{k}{g^3}$ **or** $M \propto \frac{k}{g^3}$			AO1	M1	
		$24 = \frac{k}{2.5^3}$ oe **or** ($k = 375$)				M1	implies first M1
			$M = \frac{375}{g^3}$	3		A1	accept $M = \frac{k}{g^3}$ with $k = 375$ stated elsewhere in question
	b	$(g =)\sqrt[3]{375 \div \left(\frac{1}{9}\right)}$ oe **or** $\sqrt[3]{3375}$			AO1	M1	
			15	2		A1	
17	**a**		−3	1	AO1	B1	
	b		2	1	AO1	B1	
	c	g(2) = 6			AO1	M1	
			0.75 oe	2		A1	
18		correct length scale factor			AO2	M1	
		eg $\sqrt{\frac{384}{864}}$ **or** $\frac{2}{3}$ **or** $\frac{3}{2}$					
		$\left(\frac{2}{3}\right)^3 \times 2457$				M1	for complete method
			728	3		A1	

Question		Working	Answer	Mark	AO		Notes
19			E, B, D, A	3	AO1	B3	All correct B2 for 3 correct B1 for 2 correct
20	**a**	$\frac{4}{9}\times\frac{3}{8}$			AO3	M1	
			$\frac{1}{6}$	2		A1	oe , eg $\frac{12}{72}$ Allow 0.16(666...) rounded or truncated to at least 2dp
	b	$\frac{5}{9}\times\frac{4}{8}+\frac{4}{9}\times\frac{5}{8}$ or $\frac{20}{72}+\frac{20}{72}$ oe or $1-\frac{4}{9}\times\frac{3}{8}-\frac{5}{9}\times\frac{4}{8}$ or $1-\frac{'1'}{6}-\frac{5}{9}\times\frac{4}{8}$ oe	$\frac{5}{9}$		AO3	M2	M1 for $\frac{4}{9}\times\frac{5}{8}$ or $\frac{5}{9}\times\frac{4}{8}$ or $\frac{20}{72}$ oe Accept fractions evaluated $\frac{20}{72}=0.27\dot{7}$, $\frac{12}{72}=0.16\dot{6}$ rounded or truncated to at least 2dp
				3		A1	oe, e.g. $\frac{40}{72}$ or $\frac{20}{36}$

Question	Working	Answer	Mark	AO		Notes
21	$\frac{\sin 47}{13.8} = \frac{\sin MLN}{8.5}$			AO2	M1	Or method using a right angled triangle to find length *MX* (*MX* is perpendicular to *LN*) $\sin 47 = \frac{MX}{8.5}$
	$MLN = \sin^{-1}\left(\frac{\sin 47 \times 8.5}{13.8}\right)$				M1	Or $\cos^{-1} = \frac{8.5\sin 47}{13.8}$
	$MLN = 26.7(73...)$				A1	$LMX = 63.232$
	$LMN = 180 - 47 -$ '26.7...' or 106(.2260622…)				M1	$LMN = 63.232 + (180 - (90+47))\ldots$ or 106(.2260622…)
	$\frac{1}{2} \times 8.5 \times 13.8 \times \sin(\text{"106"})$				M1	
		56.3	6		A1	Accept an answer that rounds to 56.3 or 56.4 unless clearly obtained from incorrect working.
22 a	$2(x^2 - 4x) + 9$ **or**			AO1	M1	
	$2(x^2 - 4x + \frac{9}{2})$					
	$2((x-2)^2 - 2^2) + 9$ **or**				M1	
	$2((x-2)^2 - 2^2 + \frac{9}{2})$					
		$2(x-2)^2 + 1$	3		A1	
b		explanation	1	AO1	B1	E.g. Because minimum is at (2, 1)

Question	Working	Answer	Mark	AO	Notes	
23	$\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$ **or**			AO2	M1	
	$\begin{pmatrix} -2 \\ -3 \end{pmatrix} + \begin{pmatrix} 9 \\ 4 \end{pmatrix}$ **or** $\begin{pmatrix} 7 \\ 1 \end{pmatrix}$					
	$\sqrt{'7'^2 + '1'^2}$				M1	dep
		$\sqrt{50}$ oe	3		A1	accept 7.07(06…)
24	$\dfrac{\left(\sqrt{12} - 1\right)\left(2 + \sqrt{3}\right)}{\left(2 - \sqrt{3}\right)\left(2 + \sqrt{3}\right)}$			AO1	M1	method to rationalise
	$\dfrac{2\sqrt{12} - 2 + \sqrt{12}\sqrt{3} - \sqrt{3}}{4 - 3}$				M1	correct expansion of brackets
	$\sqrt{12} = 2\sqrt{3}$				B1	may be seen before expansion
		shown	4		A1	answer from fully correct working with all steps seen
25	$(v =)\ 3t^2 - 5 \times 2t - 8$			AO1	M1	for 2 out of 3 terms differentiated correctly
	$3t^2 - 10t - 8 = 0$				A1	correct equation
	$(3t + 2)(t - 4) = 0$				M1	for method to solve quadratic
		4	4		A1	$t = 4$ only

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