Issue one

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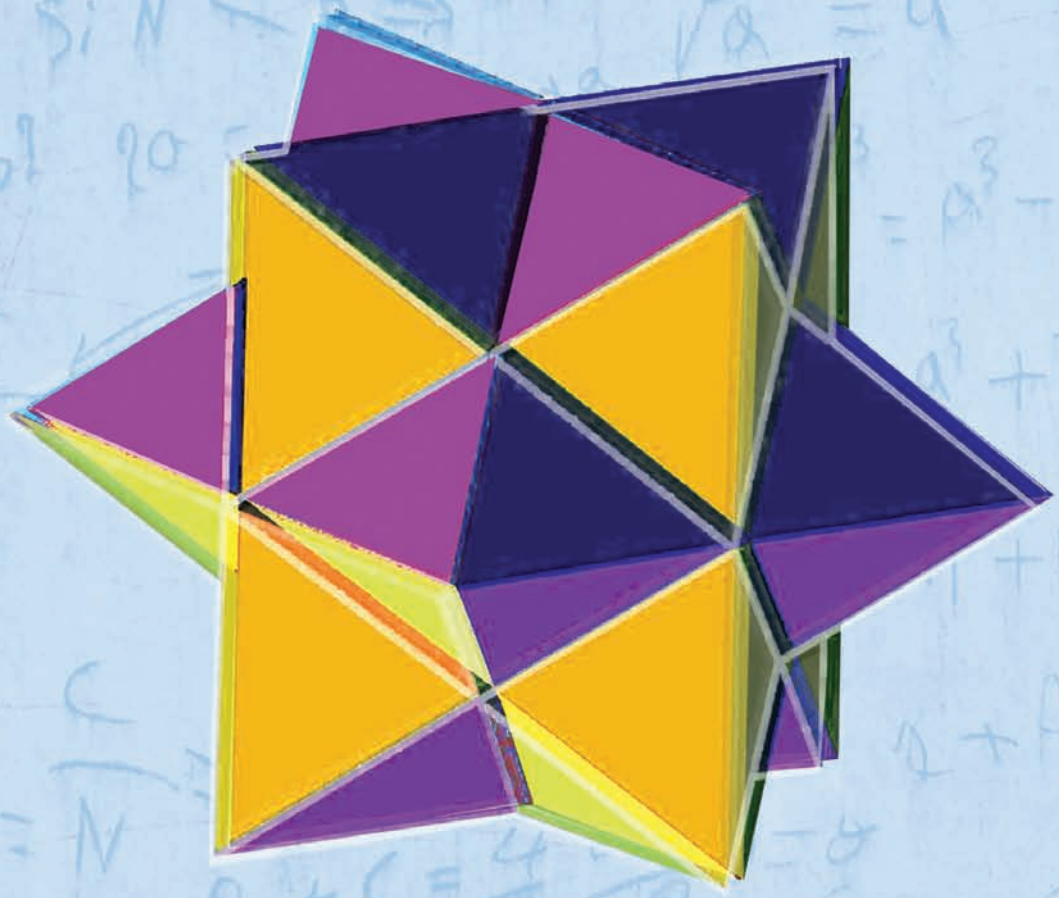

Sample Assessment Materials

Edexcel GCSE in Mathematics B – Modular (2MB01)

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

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Rewarding Learning

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Contents

General Marking Guidance

- 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.
- 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.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

  i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear.
  Comprehension and meaning is clear by using correct notation and labelling conventions.

  ii) select and use a form and style of writing appropriate to purpose and to complex subject matter.
  Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

  iii) organise information clearly and coherently, using specialist vocabulary when appropriate.
  The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

Guidance on the use of codes within this mark scheme
M1 – method mark
A1 – accuracy mark
B1 – working mark
C1 – communication mark
QWC – quality of written communication
oe – or equivalent
cao – correct answer only
ft – follow through
sc - special case

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 1: Statistics and Probability (Calculator)

Foundation Tier

Sample Assessment Material
Time: 1 hour 15 minutes

Paper Reference
5MB1/1F

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used**.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

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

Turn over ▶

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3/2/2/2/

S 3 7 7 2 5 A 0 1 1 8

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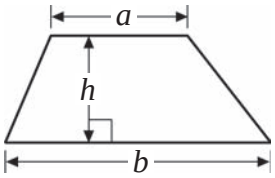
GCSE Mathematics 2MB01

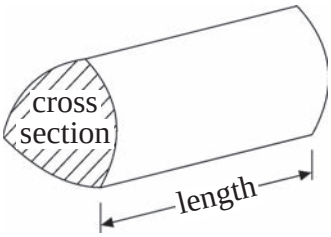
Formulae: Foundation Tier

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

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



Volume of prism = area of cross section × length



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Hannah carried out a survey of 20 people at a Fitness Centre.
She asked them which activity they liked best.

Here are her results.

Gym	Tennis	Squash	Swimming	Gym
Swimming	Gym	Tennis	Gym	Squash
Gym	Tennis	Squash	Tennis	Squash
Squash	Gym	Swimming	Gym	Swimming

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

(2)

Activity	Tally	Frequency
Gym		
Tennis		
Squash		
Swimming		

(b) Write down the number of people who liked Squash the best.

(1)

.....

(c) Which activity was liked best by the most people?

(1)

.....

(Total for Question 1 = 4 marks)

2 Mandy lives in Weymouth.
She is planning a shopping trip to Bournemouth.
She will travel by train.

Here is part of the train timetable from Weymouth to Southampton and from Southampton to Weymouth.

Weymouth to Southampton					
Weymouth	0903	1003	1103	1203	1303
Dorchester	0913	1013	1113	1213	1313
Poole	0940	1040	1140	1240	1340
Bournemouth	0953	1053	1153	1253	1353
Brockenhurst	1020	1120	1220	1320	1420
Southampton	1026	1126	1226	1326	1426

Southampton to Weymouth					
Southampton	1224	1324	1424	1524	1624
Brockenhurst	1237	1337	1437	1537	1637
Bournemouth	1300	1400	1500	1600	1700
Poole	1335	1435	1535	1635	1735
Dorchester	1344	1444	1544	1644	1744
Weymouth	1355	1455	1555	1655	1755

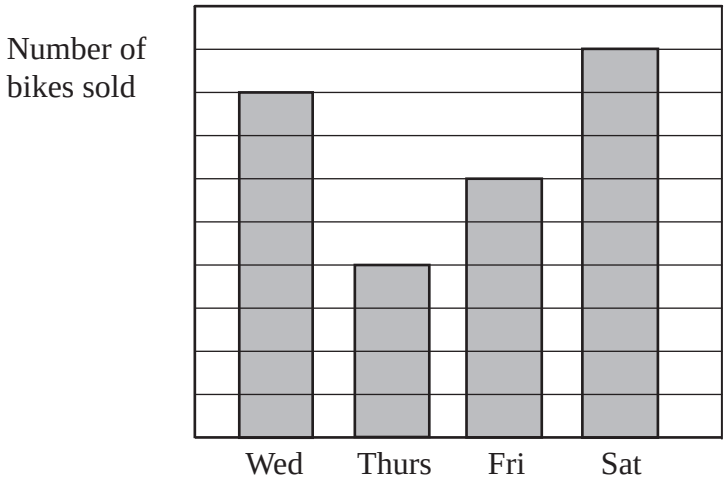
It takes Mandy 25 minutes to walk from home to the train station at Weymouth.
She wants to be in Bournemouth for 3 hours.

Plan a schedule for Mandy's shopping trip.

	Time
Mandy leaves home	
Train departs Weymouth	
Train arrives Bournemouth	
Train leaves Bournemouth (Mandy comes home)	
Train arrives Weymouth	
Mandy arrives home	

(Total for Question 2 = 5 marks)

3 The bar chart shows the numbers of bikes a shop sold on Wednesday, Thursday, Friday and Saturday.



Michael started to draw a pictogram to show the **same** information.
He has shown the number of bikes sold on Wednesday.

Complete the pictogram.

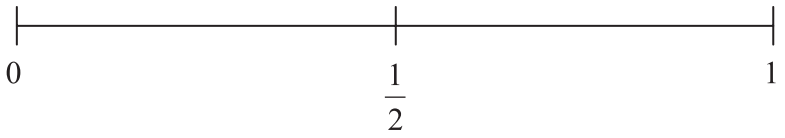
Wednesday	
Thursday	
Friday	
Saturday	

(Total for Question 3 = 3 marks)

4 Liam rolls an ordinary dice.

(a) On the probability scale below, mark with a cross (✕) the probability that he gets a number less than 7

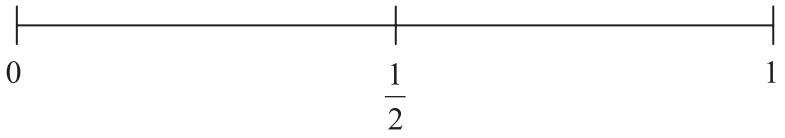
(1)



A bag contains 3 blue counters and 1 red counter.
Kenneth takes at random one counter from the bag.

(b) On the probability scale below, mark with a cross (✕) the probability that he takes a red counter.

(1)



Terry spins a coloured spinner.
The probability that the spinner will land on green is 0.25

The probability that the spinner will land on yellow is 0.35

(c) (i) Write 0.25 as a fraction.

(1)

.....

(ii) Write 0.35 as a percentage.

(1)

.....

A weather forecaster says that the probability it will rain tomorrow is s.

(d) Write down, in terms of s, the probability that it will **not** rain tomorrow.

(1)

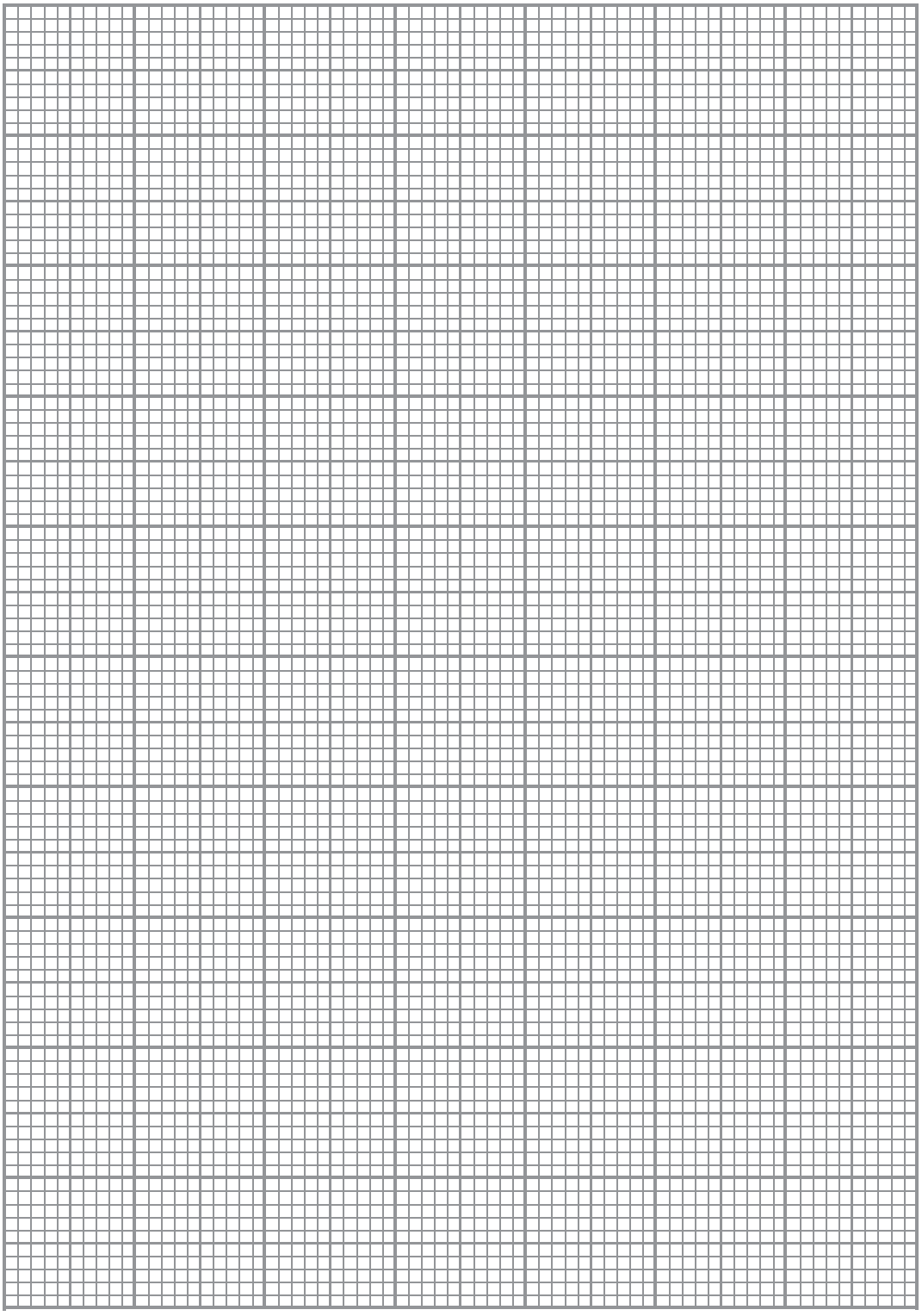
.....

(Total for Question 4 = 5 marks)

***5** The table shows information about some students' favourite pets.

	Cat	**Dog**	**Rabbit**	**Hamster**	**Goldfish**
Boys	6	12	4	10	5
Girls	10	7	6	5	5

On the grid, represent this information in a suitable diagram or chart.



(Total for Question 5 = 4 marks)

6 Ishmael has four white cards and three grey cards.

Ishmael takes at random one white card and one grey card.

(a) Show all the possible outcomes he could get.

(2)

Ishmael takes at random one white card and one grey card.

(b) Work out the probability that he will get a C and a 3.

(1)

.....

(Total for Question 6 = 3 marks)

***7** Harry and Edith are planning their holiday.
They want to travel by airplane.
They can travel with one of three airplane companies, Aireways, King Lingus or Easy Plane.
The tables show the cost per adult and the cost per child to travel with each airplane company.

Aireways									
		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£197	£200	£215	£215	£224	£209	£199	£188
	PM	£174	£177	£192	£192	£201	£186	£176	£165
Child	AM	£110	£113	£128	£128	£137	£122	£112	£101
	PM	£87	£90	£105	£105	£114	£99	£89	£78

King Lingus									
		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£193	£195	£197	£211	£220	£213	£208	£204
	PM	£176	£178	£180	£191	£203	£196	£191	£187
Child	AM	£119	£121	£123	£134	£146	£139	£134	£130
	PM	£102	£104	£106	£117	£129	£122	£117	£113

Easy Plane									
		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£198	£206	£213	£223	£232	£214	£210	£205
	PM	£181	£189	£196	£206	£215	£197	£193	£188
Child	AM	£94	£102	£109	£119	£128	£110	£106	£101
	PM	£77	£85	£92	£102	£111	£93	£89	£84

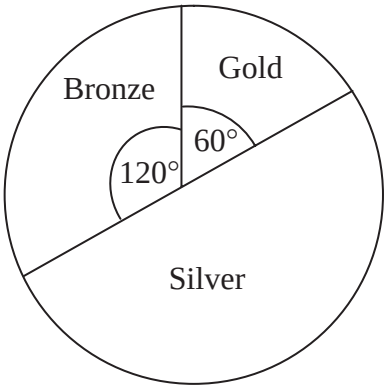
Harry and Edith have 3 children.
They want to travel on the morning of 27th July.

Work out the cheapest cost.

.....

(Total for Question 7 = 6 marks)

8 The pie chart shows some information about the numbers of medals won by Canada in the 2008 Olympic Games.



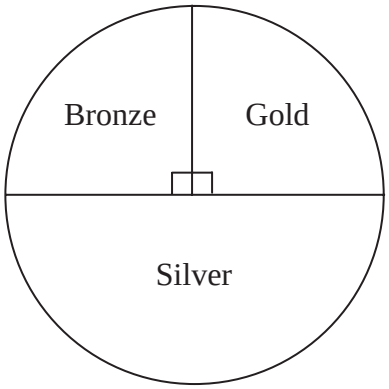
Canada won 3 gold medals.

(a) Work out the **total** number of medals Canada won.

(2)

.....

The pie chart below shows some information about the numbers of medals won by Canada in the 2004 Olympic Games.



Maria says

"The pie charts show that Canada won the same number of silver medals in 2008 as in 2004".

(b) Is Maria correct? Yes ☐ No ☐

Explain your answer.

(1)

.....

.....

(Total for Question 8 = 3 marks)

***9** Some students did a test.
Here are their scores.

Boys' scores	27	20	12	28	35	28	37		
Girls' scores	29	31	35	15	18	25	35	27	40

Compare fully the scores of these students.

(Total for Question 9 = 6 marks)

10 Charles wants to find out how much people spend on sweets.

He will use a questionnaire.

(a) Design a suitable question for Charles to use in his questionnaire.

(2)

Charles asks the people in his class to do his questionnaire.

(b) Give a reason why this may not be a suitable sample.

(1)

.....

.....

(Total for Question 10 = 3 marks)

***11** Kylie wants to invest £1000 for one year.
She considers two investments, Investment A and Investment B.

Investment A	**Investment B**
£1000	£1000
Earns £2.39 per month	Earns 3.29% interest per annum
plus	Interest paid yearly by cheque.
£4.50 bonus for each complete year	
Interest paid monthly by cheque.	

Kylie wants to get the greatest return on her investment.

Which of these investments should she choose?

(Total for Question 11= 5 marks)

12 Nadine asked 50 people which of the newspapers the Times, the Guardian and the Telegraph they like best.
Here is information about her results.

19 out of the 25 males said they like the Telegraph best.
5 females said they like the Guardian best.
4 out of the 7 people who said they like the Times best were female.

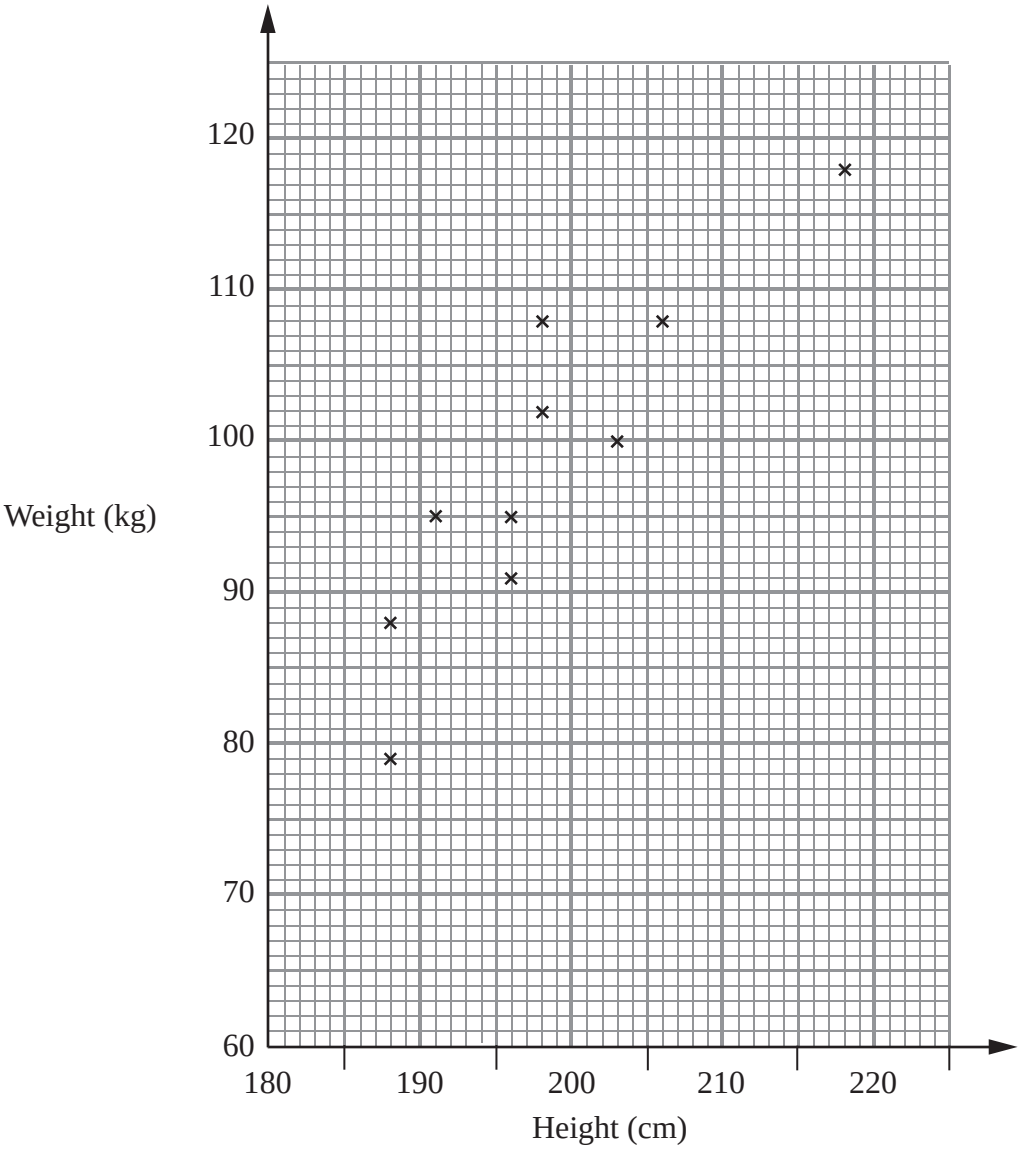
Work out the number of people who like the Telegraph best.

.....

(Total for Question 12 = 4 marks)

13 The scatter graph shows some information about a random sample of ten male players at a basketball club.

For each player it shows his height and his weight.



(a) (i) On the scatter graph, draw a line of best fit.

(ii) Work out the gradient of your line of best fit.

(3)

.....

(b) Estimate the proportion of male players in the club whose weight is greater than 99 kg and whose height is less than 200 cm.

(2)

.....

(Total for Question 13 = 5 marks)

14 Jenny uses her mother's recipe to make cheese scones.
Her recipe uses a mixture of self-raising flour, butter and cheese in the ratio 6 : 2 : 1 by weight.

In her kitchen, Jenny has:
2 kg of self-raising flour,
500 grams of butter,
200 grams of cheese.

When Jenny makes cheese scones each scone needs about 45 grams of mixture.

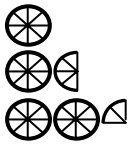
Work out the largest number of cheese scones that Jenny can make.

.....

(Total for Question 14 = 4 marks)

TOTAL FOR PAPER: 60 MARKS)

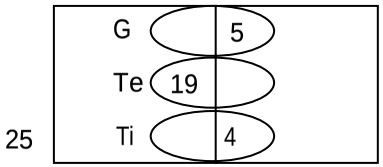
Unit 1 Foundation Tier: Statistics and Probability

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.	(a)	Gym 𝍸 II 7 Tennis IIII 4 Squash 𝍸 5 Swimming IIII 4	7, 4, 5, 4	2	B2 for all frequencies correct (B1 for 2 frequencies or 2 tallies correct or one tally with its frequency correct)
	(b)		5	1	B1 for 5 or '5' ft from table
	(c)		Gym	1	B1 for gym or 'gym' ft from table
					Total for Question: 4 marks
2. **FE**		e.g. 0903 – 25 minutes = 0838 0903 0953 0953 + 3 hours = 1253 1300 1355 1355 + 25 minutes = 1420	e.g. 0838 0903 0953 1300 1355 1420	5	B1 for a correct time 25 minutes (or more) before the train departs e.g. 0838, 0938 … or earlier B1 for a correct departure time, e.g. 0903, 1003… with the associated correct arrival time 0953, 1053… B1 for a correct departure time (3 hours after arrival) e.g. 1300, 1400… B1 for a correct arrival time corresponding to the departure time, e.g. 1355, 1455… B1 for a correct arrival time at home, e.g. 1420, 1520…
					Total for Question: 5 marks
3.			 Key  represents 8 bikes	3	B2 for all 3 days correct (B1 for at least one day correct, i.e. one circle for Thursday or one and a half circles or ft 1 $\frac{1}{2}$ × 'Thursday' for Friday or two and a quarter circles or ft 2 $\frac{1}{4}$ × 'Thursday' for Saturday) B1 for a correct key
					Total for Question: 3 marks

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
4.	(a)		Cross at 1	1	B1 for cross at 1 (allow ±2 mm tolerance)
	(b)		Cross at $\frac{1}{4}$	1	B1 for cross at $\frac{1}{4}$ (allow ±5 mm tolerance)
	(c)(i)		$\frac{1}{4}$	2	B1 for $\frac{1}{4}$ oe fraction
	(ii)		35		B1 for 35 or 35.0
	(d)		$1 - s$	1	B1 cao
					Total for Question: 5 marks

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5. **QWC (i)**			Diagram or chart	4	B1 for a key or suitable labels to identify boys and girls B1 for 5 correct animal labels B1 for a diagram or chart (combined or separate) set up for comparison, e.g. dual bar chart, back-to-back stem and leaf diagrams, pie charts, pictograms, vertical (stick) diagrams, etc C1 fully correct diagram or chart **QWC: Fully correct diagram or chart and all labelling is correct and clear**
					Total for Question: 4 marks
6.	(a)		(A,1), (A,2), (A,3), (B,1), (B,2), (B,3), (C,1), (C,2), (C,3), (D,1), (D,2), (D,3)	2	B2 for listing all 12 outcomes (B1 for listing 6 outcomes, ignore repeats)
	(b)		$\frac{1}{12}$	1	B1 ft for $\frac{1}{\text{'12'}}$
					Total for Question: 3 marks
7. **QWC (i, ii, iii)** **FE**		2(215) + 3(128) = 814 2(211) + 3(134) = 824 2(223) + 3(119) = 803	Easy Plane £803	6	M1 for 2 × Adult + 3 × Child M1 for using correct Adult and Child, i.e. (215, 128) or (211, 134) or (223, 119) A2 for 814, 824 and 803 (A1 for one or two correct or for a correct 2×'Adult' + 3×'Child') B1 for correct units, i.e. £ or pounds C1 for Easy Plane identified **QWC: Decision must be stated and total costs must be attributable**
					Total for Question: 6 marks
8.	(a)	3 × 6	18	2	M1 for 360 ÷ 60 or 6 seen or 1 gold = 20 A1 cao
	(b)		No and appropriate explanation	1	C1 for 'No' and correct explanation, e.g. the pie charts only show that the proportions are the same **OR** explains that she could be correct if the total number of medals is the same in each year **OR** explains that we don't know if she is correct because the total number of medals in 2004 is not known.
					Total for Question: 3 marks

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9. **QWC** **(i, iii)**		12, 20, 7, 28, 28, 35, 37 15, 18, 25, 27, 29, 31, 35, 35, 40	Compares 1.medians/ means 2.ranges	6	B2 for median (boys) = 28 and median (girls)= 29 OR mean (boys) = 26.7 or better and mean (girls) = 28.3 or better (B1 for one correct median/mean) B2 for range (boys) = 25 and range (girls) = 25 (B1 for one correct range) **OR** B2 for fully correct diagram/chart to compare, e.g. back-to-back stem and leaf diagram, dual bar chart, vertical (stick) graphs, etc (B1 for diagram chart with one error in presentation) C1 for median (girls) > median (boys) oe **or** mean (girls) > mean (boys) oe **or** for range (boys) = range (girls) oe C1 for comments relating to all working (ie range/mean/median/charts dep on B4) **QWC: Decisions should be justified, and calculations attributable** SC If no marks scored B1 for a correct comparison
					Total for Question: 6 marks
10.	(a)		Question + response boxes	2	B2 for a suitable question with at least 3 non-overlapping response boxes (must include a time period) (B1 for a suitable question with time period or non-overlapping response boxes)
	(b)		Reason	1	B1 for biased or all the students the same age or students (may) eat more sweets, etc
					Total for Question: 3 marks
11. **QWC** **(ii, iii)** **FE**		2.39 × 12 + 4.5 3.29/100 × 1000	33.18 32.90	5	M1 for '2.39 × 12' + 4.5 or diagram showing 2.39, 4.78, 7.17, …, 28.68 oe (condone one error) A1 cao M1 for 3.29/100 × 1000 oe A1 cao C1 for Investment A identified **QWC**: **Decision must be stated, with calculations clearly attributable**
					Total for Question: 5 marks

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.		e.g. <table><tr><td></td><td>Gu..</td><td>Te.</td><td>Ti.</td><td>Tot.</td></tr><tr><td>Male</td><td></td><td>19</td><td></td><td>25</td></tr><tr><td>Female</td><td>5</td><td></td><td>4</td><td></td></tr><tr><td></td><td></td><td></td><td>7</td><td>50</td></tr></table> Male Female  	35	4	M1 for a two-way table or Venn diagram. Telegraph, Times, Guardian and male, female labelled A1 for 4, 5, 7, 19 and 25 M1 for attempt to find 16 (condone one error) A1 cao [NB Two-way table/Venn diagram need not contain all numbers]
					Total for Question: 4 marks
13.	(a)(i)		Line of best fit	3	B1 for line drawn between (190, 80), (190, 95) and (210, 105), (210, 120) M1 for diff. *y* / diff. *x*
	(ii)		1.25		A1 for 0.5 — 2 or ft their line of best fit
	(b)		20%	2	M1 for a horizontal line at 99 and a vertical line at 200 or 2 seen A1 for 20% or $\frac{2}{10}$ or 0.2 oe
					Total for Question: 5 marks

5MB1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14.		Scone 30g:10g:5g	40	4	M1 for 45÷(6+2+1) A1 for SRF = 30, B = 10, C = 5
FE		200 ÷ 5 = 40 500 ÷ 10 = 50 2000 ÷ 30 = 66.7			M1 for 200÷5 or 500÷10 or 2000÷30 A1 cao **OR** M1 for 6×200 or 2×200 or 1×200 or 6×500 or 2×500 or 1×500 or 6×2000 or 2×2000 or 1×2000 A1 for SRF, B, C = 1200, 400, 200 or 1500, 500, 250 or 2000, 666.7, 33.3 M1 for (1200 + 400 + 200)/45 A1 cao.
					Total for Question: 4 marks

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 1: Statistics and Probability (Calculator)

Higher Tier

Sample Assessment Material
Time: 1 hour 15 minutes

Paper Reference
5MB1/1H

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Turn over ▶

S37724A

2/3/3/2

S 3 7 7 2 4 A 0 1 1 7

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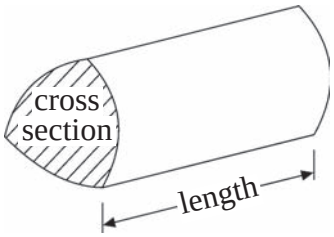
advancing learning, changing lives

GCSE Mathematics 2MB01

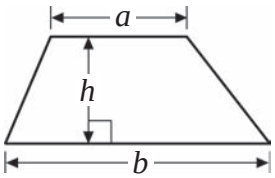
Formulae – Higher Tier

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

Volume of prism = area of cross section × length

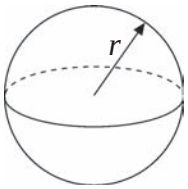


Area of trapezium = $\frac{1}{2}(a+b)h$



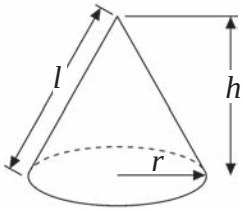
Volume of sphere = $\frac{4}{3}\pi r^3$

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

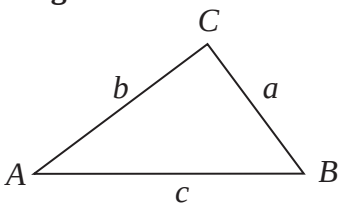


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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

The Quadratic Equation

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

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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The table shows some information about the ages, in years, of 80 people.

Age (a years)	Frequency
$20 \leqslant a < 30$	19
$30 \leqslant a < 40$	22
$40 \leqslant a < 50$	24
$50 \leqslant a < 60$	10
$60 \leqslant a < 70$	5

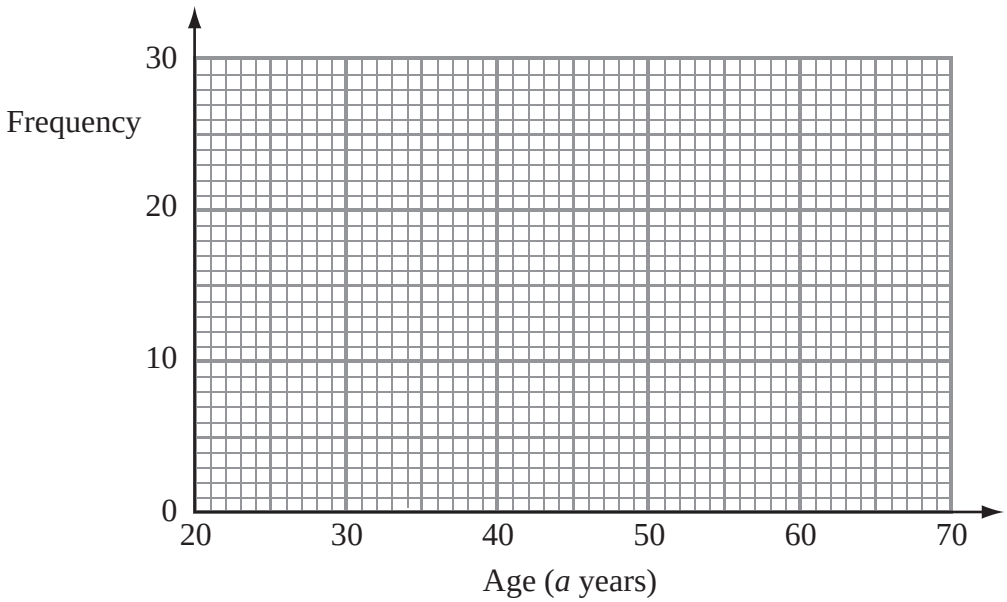
(a) Find the class interval that contains the median.

(1)

.....

(b) Draw a frequency polygon to show this information.

(2)



(Total for Question 1 = 3 marks)

***2** Harry and Edith are planning their holiday.

They want to travel by airplane.

They can travel with one of three airplane companies, Aireways, King Lingus or Easy Plane.

The tables show the cost per adult and the cost per child to travel with each airplane company.

Aireways

		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£197	£200	£215	£215	£224	£209	£199	£188
	PM	£174	£177	£192	£192	£201	£186	£176	£165
Child	AM	£110	£113	£128	£128	£137	£122	£112	£101
	PM	£87	£90	£105	£105	£114	£99	£89	£78

King Lingus

		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£193	£195	£197	£211	£220	£213	£208	£204
	PM	£176	£178	£180	£191	£203	£196	£191	£187
Child	AM	£119	£121	£123	£134	£146	£139	£134	£130
	PM	£102	£104	£106	£117	£129	£122	£117	£113

Easy Plane

		July				August			
Week		1 – 8	9 – 15	16 – 22	23 – 31	1 – 12	13 – 19	20 – 26	27 – 31
Adult	AM	£198	£206	£213	£223	£232	£214	£210	£205
	PM	£181	£189	£196	£206	£215	£197	£193	£188
Child	AM	£94	£102	£109	£119	£128	£110	£106	£101
	PM	£77	£85	£92	£102	£111	£93	£89	£84

Harry and Edith have 3 children.
They want to travel on the morning of 27th July.

Work out the cheapest cost.

.....

(Total for Question 2 = 6 marks)

***3** Some students did a test.

This back-to-back stem and leaf diagram shows information about their scores.

Boys' scores		Girls' scores
8 2	2	7 8
9 6 5 2	3	0 4 7 8
9 5 4 3 2 1 0	4	3 5 5 7 8
7 7 7 6 5 4	5	0 1 3 5 7 7 7 9 9
5 3 2 1	6	0 3 6

Key for boys' scores
8 | 2 means 28

Key for girls' scores
2 | 7 means 27

Compare and contrast the scores of these students.

(Total for Question 3 = 6 marks)

4 Charles wants to find out how much people spend on sweets.

He will use a questionnaire.

(a) Design a suitable question for Charles to use in his questionnaire.

(2)

Charles asks the people in his class to do his questionnaire.

(b) Give a reason why this may not be a suitable sample.

(1)

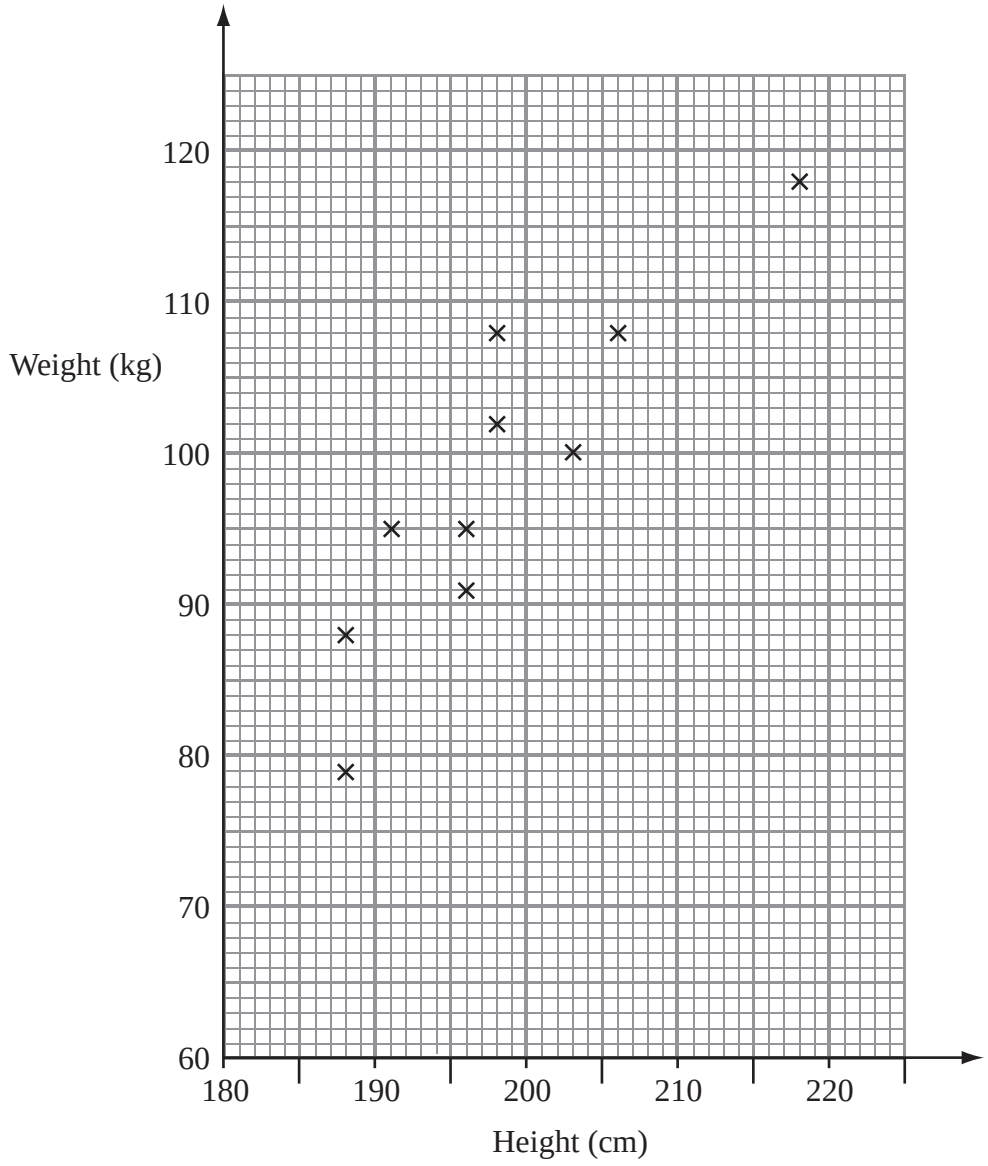
.....

.....

(Total for Question 4 = 3 marks)

5 The scatter graph shows some information about a random sample of ten male players at a basketball club.

For each player it shows his height and his weight.



(a) (i) On the scatter graph, draw a line of best fit.

(1)

(ii) Work out the gradient of your line of best fit.

(2)

.....

(iii) Write down a practical interpretation of this gradient.

(2)

.....

.....

Some of the male players at the basketball club have a weight greater than 99 kg.

(b) Estimate the proportion of these players who have a height less than 200 cm.

(2)

.....

(Total for Question 5 = 7 marks)

6 Jenny uses her mother's recipe to make cheese scones.

Her recipe uses a mixture of self-raising flour, butter and cheese in the ratio 6 : 2 : 1 by weight.

In her kitchen, Jenny has
2 kg of self-raising flour
500 grams of butter
200 grams of cheese

When Jenny makes cheese scones each scone weighs about 45 grams.

Work out the largest number of cheese scones that Jenny can make.

.....

(Total for Question 6 = 4 marks)

7 A bag contains only red counters, blue counters, green counters and yellow counters.
Rachel is going to take at random a counter from the bag.

The table shows each of the probabilities that Rachel will take a red counter or a blue counter or a green counter or a yellow counter.

Colour	Red	Blue	Green	Yellow
Probability	0.15	$2x$	x	0.1

(a) Work out the probability that Rachel will take a green counter.

(2)

.....

Rachel says that there are exactly 9 blue counters in the bag.
Rachel is wrong.

(b) Explain why there cannot be exactly 9 blue counters in the bag.

(1)

.....

.....

(Total for Question 7 = 3 marks)

8 A book has 120 pages.

The mean number of words per page for the whole book is 231
The mean number of words per page for the first 20 pages is 236

Calculate the mean number of words per page for the other 100 pages.

.....

(Total for Question 8 = 3 marks)

***9** Kylie wants to invest £20 000 for 3 years.
She considers two investments, Investment A and Investment B.

Investment A	**Investment B**
£20 000	£20 000
Earns 3.02% interest per annum	Earns 2.98% compound interest per annum
Interest paid yearly by cheque	

Kylie wants to get the greatest return on her investment.

Which of these investments should she choose?

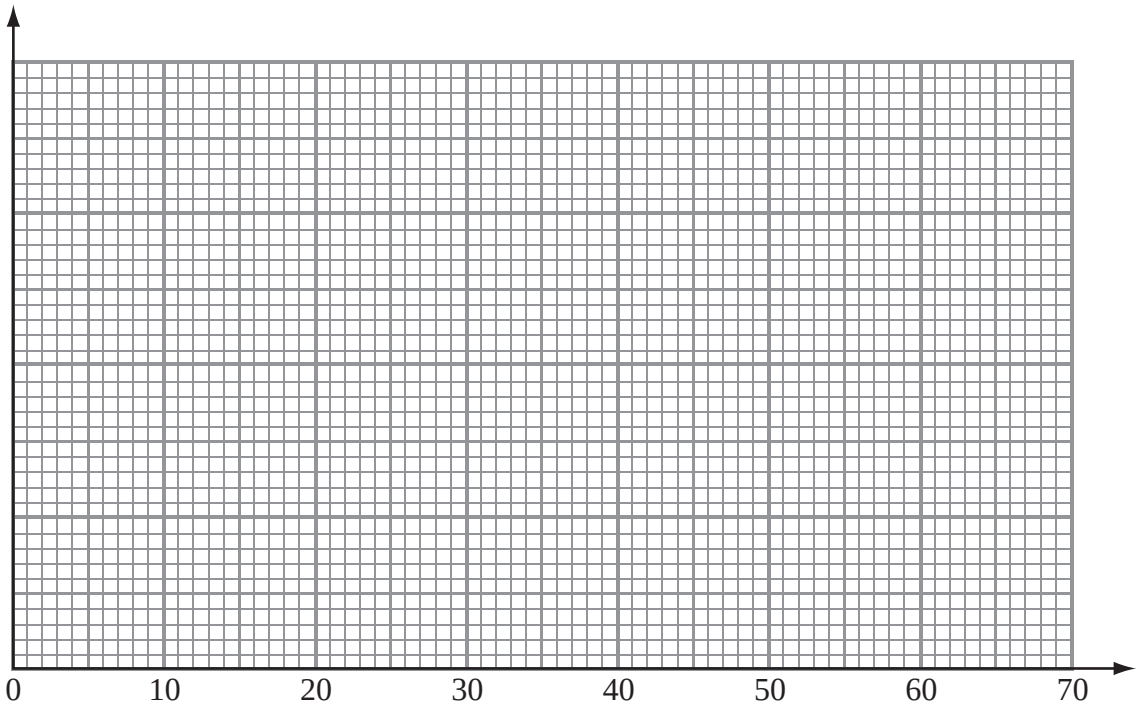
.....

(Total for Question 9 = 6 marks)

10 The table gives some information about the lengths of time, in hours, that some batteries lasted.

Time (h hours)	Frequency
$0 \leqslant h < 10$	5
$10 \leqslant h < 20$	18
$20 \leqslant h < 25$	15
$25 \leqslant h < 40$	12
$40 \leqslant h < 60$	10

Draw a histogram for the information in the table.



(Total for Question 10 = 3 marks)

11 (a) Explain what is meant by

(i) a random sample,

(1)

.....

.....

(ii) a stratified sample.

(1)

.....

.....

A Sixth Form College has 850 students.
The table shows some information about these students.

	Number of female students	**Number of male students**
Year 12	184	241
Year 13	222	203

Linda is going to do a survey of the students in the college.
She uses a sample of 50 students stratified by year group and by gender.

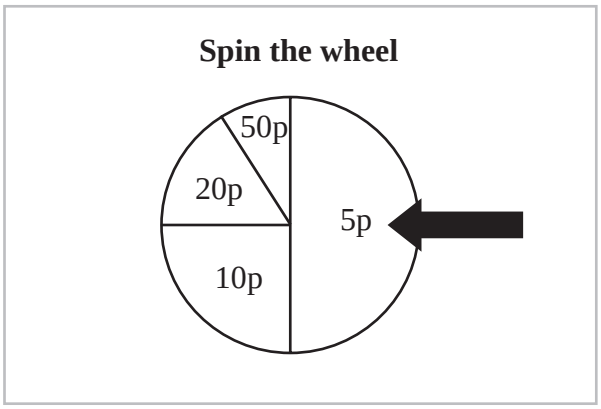
(b) Work out the number of Year 12 female students in her sample.

(2)

.....

(Total for Question 11 = 4 marks)

12



Bert has a game at a fair.

In the game players pay to spin a wheel.

When the wheel stops, the amount shown by the arrow is given to the player.
The table shows the probabilities that the wheel will stop on 5p, on 10p, on 20p and on 50p.

	5p	**10p**	**20p**	**50p**
Probability	0.5	0.25	0.15	0.1

Bert wants to make a profit from the game.

Work out the minimum he can charge players to spin the wheel.

.....

(Total for Question 12 = 4 marks)

13 In a bag there are 5 red counters and 4 blue counters.

Suki takes at random two counters from the bag.

Work out the probability that the counters will each have a different colour.

.....

(Total for Question 13 = 4 marks)

***14**

Angling Chronicle

Anglers dismayed at falling fish numbers!

A scientist wants to estimate the number of fish in a lake.
He catches 50 fish from the lake and marks them with a dye.
The fish are then returned to the lake.
The next day the scientist catches another 50 fish.
4 of these fish are marked with the dye.

Work out an estimate for the total number of fish in the lake.
You must write down any assumptions you have made.

.....

(Total for Question 14 = 4 marks)

TOTAL FOR PAPER = 60 MARKS

Unit 1 Higher Tier: Statistics and Probability

5MB1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.	(a)		$30 \leq a < 40$	1	B1 cao
	(b)		Points plotted at (25, 16), (35, 20), (45, 23), (55, 9), (65, 2) and joined with line segments	2	B2 complete polygon (ignore histograms and any lines below an age of 25 or above an age of 65), but award B1 only if there is a line joining the first to the last point (B1 one vertical or horizontal plotting error **or** incorrect but consistent error in placing the midpoints horizontally **or** correct plotting but not joined) Plotting tolerance: 1 (2 mm) square; points to be joined by lines (ruled or hand drawn, but not curves)
					Total for Question: 3 marks
2. **QWC (i, ii, iii)** **FE**		2(215) + 3(128) = 814 2(211) + 3(134) = 824 2(223) + 3(119) = 803	Easy Plane £803	6	M1 for 2 × Adult + 3 × Child M1 for using correct Adult and Child, i.e. (215, 128) or (211, 134) or (223, 119) A2 for 814, 824 and 803 (A1 for one or two correct or for a correct 2 × 'Adult' + 3 × 'Child') B1 for correct units, i.e. £ or pounds C1 for Easy Plane identified **QWC: Decision must be stated and total costs must be attributable**
					Total for Question: 6 marks

5MB1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3. **QWC (i, iii)**		Median (boys) = 45 Median (girls) = 50 Range (boys) = 65 – 22 = 43 Range (girls) = 66 – 27 = 39 IQR (boys) = 57 – 39 = 18 IQR (girls) = 57 – 38 = 19	Compares 1. medians 2. range/IQR	6	B2 for median (boys) = 45 and median (girls) = 50 (B1 for one correct median) B2 for range (boys) = 43 and range (girls) = 39 OR IQR (boys) = 18 and IQR (girls) = 19 (B1 for one correct range/IQR) **OR** B2 for fully correct diagram/chart to compare, e.g. box plots, cumulative frequency diagrams, etc (B1 for diagram/chart with one error in presentation) C1 for median (girls) > median (boys) oe or ft their medians **or** for range (boys) > range (girls) oe **or** ft their ranges **or** IQR (girls) > IQR (boys) oe **or** ft their IQRs C1 for comments relating to all working (ie range/median/charts dep on B4) **QWC: Decisions should be justified, and calculations attributable** SC If no marks scored B1 for a correct comparison
					Total for Question: 6 marks
4.	(a)		Question + response boxes	2	B2 for a suitable question with at least 3 non-overlapping response boxes (must include a time period) (B1 for a suitable question with time period or non-overlapping response boxes)
	(b)		Reason	1	B1 for biased or all the students the same age or students (may) eat more sweets, etc
					Total for Question: 3 marks

5MB1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(a)(i)		Line of best fit	5	B1 for line drawn between (190, 80), (190, 95) and (210, 105), (210, 120)
	(ii)		1.25		M1 for diff. y / diff. x A1 for 0.5 – 2 or ft their line of best fit
	(iii)		practical interpretation		B2 for increase in kg per cm increase in height oe (B1 for a correct interpretation with only one or no units)
	(b)		40%	2	M1 for a horizontal line at 99 and a vertical line at 200 or for 2 seen A1 for 40% or $\frac{2}{5}$ or 0.4 oe
					Total for Question: 7 marks
6.		Scone 30g:10g:5g	40	4	M1 for 45 ÷ (6 + 2 + 1) A1 for SRF = 30, B = 10, C = 5
FE		200 ÷ 5 = 40 500 ÷ 10 = 50 2000 ÷ 30 = 66.7			M1 for 200÷5 or 500÷10 or 2000÷30 A1 cao **OR** M1 for 6 × 200 or 2 × 200 or 1 × 200 or 6 × 500 or 2 × 500 or 1 × 500 or 6 × 2000 or 2 × 2000 or 1 × 2000 A1 for SRF, B, C = 1200, 400, 200 or 1500, 500, 250 or 2000, 666.7, 33.3 M1 for (1200 + 400 + 200)/45 A1 cao
					Total for Question: 4 marks
7.	(a)	1 – (0.15 + 0.1) = 0.75	0.25	2	M1 for 1 – (0.15 + 0.1) or 0.75 seen A1 cao
	(b)		appropriate correct explanation	1	C1 for an appropriate correct explanation, e.g. you can't have 4.5 green counters or 9÷5 is not a whole number, or that would mean there are 1.8 yellow counters
					Total for Question: 3 marks

5MB1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8.		(120 × 231 – 20 × 236) ÷ 100	230	3	M1 for 120 × 231 or 20 × 236 or 27720 or 4720 seen M1 for ('120 × 231' – '20 × 236') ÷ 100 oe A1 cao
					Total for Question: 3 marks
9. **QWC (ii, iii)** **FE**		3.02/100 × 20000 × 3 20000 × $(1.0298)^3$	(£)1812 (£)1841.81 Investment B	6	M1 for a complete process, e.g. 3.02/100 × 20000 × 3 or 1.0302 × 20000 × 3 A1 for 1812 or 21812 M2 for a complete process, e.g. $(1.0298)^3$ × 20000 (M1 for 1.0298 × 20000 oe or 20596 seen) A1 for 1841.81 or 21841.81 seen C1 for selecting the greater of '1812' and '1841.81' or '21812' and '21841.81' **QWC**: **Decision must be stated with all calculations attributable**
					Total for Question: 6 marks
10.		$0 \leq d < 10$ fd 0.5 $10 \leq d < 20$ fd 1.8 $20 \leq d < 25$ fd 3.0 $25 \leq d < 40$ fd 0.8 $40 \leq d < 60$ fd 0.5	Correct histogram	3	B2 for 5 correct histogram bars ± ½ square (B1 for 3 histogram bars correct) B1 for frequency density label or key and consistent scaling
					Total for Question: 3 marks
11.	(a) (i)		Correct explanation	1	C1 for all have equal chance of being selected
	(ii)			1	C1 for groups in the sample are in the same proportion as they are in the population
	(b)	$\frac{184}{850} \times 50$	11	2	M1 for $\frac{184}{850} \times 50$ or $\frac{184}{17}$ A1 cao
					Total for Question: 4 marks

5MB1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.		0.5×5 + 0.25×10 + 0.15×20 + 0.1×50 = 13	14p	4	M2 for 0.5×5 + 0.25×10 + 0.15×20 + 0.1×50 oe or for a consistent calculation for *n* spins, e.g. 50×5 + 25×10 + 15×20 + 10×50 where *n* = 100 (condone one error) (M1 for 0.5 ×5 or 0.25×10 or 0.15×20 or 0.1×50 oe) A1 for 13 or 14 A1 for 14p
					Total for Question: 4 marks
13.		$\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{5}{8} = \frac{20}{72} + \frac{20}{72}$ **OR** $1 - [\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{3}{8}]$ $=1 - \frac{32}{72}$	$\frac{40}{72}$	4	M1 for tree diagram with at most 2 errors **or** one of $\frac{5}{9} \times \frac{4}{8}$ **or** $\frac{4}{9} \times \frac{5}{8}$ **or** $\frac{4}{9} \times \frac{3}{8}$ **or** $\frac{20}{72}$ **or** $\frac{12}{72}$ **or** $\frac{5}{18}$ **or** $\frac{3}{18}$ oe M1 for any two of $\frac{5}{9} \times \frac{4}{8}$, $\frac{4}{9} \times \frac{5}{8}$, $\frac{4}{9} \times \frac{3}{8}$ **or** $\frac{20}{72}$, $\frac{20}{72}$, $\frac{12}{72}$ **or** $\frac{5}{18}$, $\frac{5}{18}$, $\frac{3}{18}$ oe M1 for $\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{5}{8}$ oe **or** $1 - [\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{3}{8}]$ oe A1 for $\frac{40}{72}$ oe SC B2 for $\frac{40}{81}$
					Total for Question: 4 marks
14. **QWC (ii, iii)**		$\frac{4}{50} = \frac{50}{N}$ (4 × 12.5)/(50 × 12.5) = 50/625	625 Assumption	4	M1 for $\frac{4}{50}$ oe or $\frac{50}{N}$ or 12.5 seen M1 for (4 × 12.5)/(50 × 12.5) **or** an attempt to scale, i.e. 4×k/50×k A1 for 625 C1 for a correct assumption, e.g. the population has not changed over night or the dye has not washed off or the returned sample has thoroughly mixed with the population or the sample is random, etc **QWC: Assumption must be stated clearly, in line with supporting calculations**
					Total for Question: 4 marks

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 2: Number, Algebra, Geometry 1 (Non-Calculator)

Foundation Tier

Sample Assessment Material
Time: 1 hour 15 minutes

Paper Reference
5MB2/2F

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

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

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

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

Turn over

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2/2/3/3/2

S 3 7 7 2 6 A 0 1 1 3

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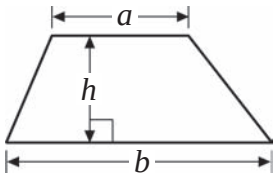
GCSE Mathematics 2MB01

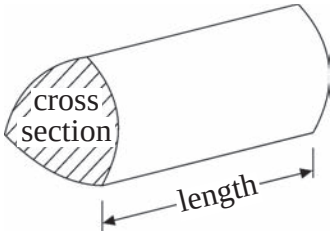
Formulae: Foundation Tier

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

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



Volume of prism = area of cross section × length



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 This is part of a list of TV programmes for one evening.

18 00	Tikkabilla
18 30	Teletubbies
19 00	Lunar Jim
19 10	Kerwhizz
19 35	Lazy Town
20 00	ChuckleVision
20 15	Arthur
20 30	Richard Hammond's Blast Lab

(a) Which TV programme lasts for 10 minutes?

(1)

.....

Brian turned on his TV set at 19 40

(b) How many minutes did Brian have to wait for the start of Arthur?

(1)

..... minutes

Richard Hammond's Blast Lab lasts for 45 minutes.

(c) At what time did Richard Hammond's Blast Lab end?

(1)

.....

(Total for Question 1 = 3 marks)

2 (a) Simplify $y + y + y + y + y$

(1)

.....

(b) Simplify $x + 5 + 2x - 7$

(2)

.....

(Total for Question 2 = 3 marks)

3 The table gives information about the temperatures at midnight on New Year's Eve in 5 capital cities.

City	Temperature
London	**-3^{o} C**
Madrid	**7^{o} C**
Oslo	**-11^{o} C**
Washington DC	**1^{o} C**
Wellington	**14^{o} C**

In Oslo, the temperature dropped by 8 degrees from midday to midnight.

(a) What was the temperature in Oslo at midday?

(1)

.....

At midnight on New Year's Eve in Paris, the temperature was halfway between the temperature in London and the temperature in Madrid.

(b) What was the temperature in Paris?

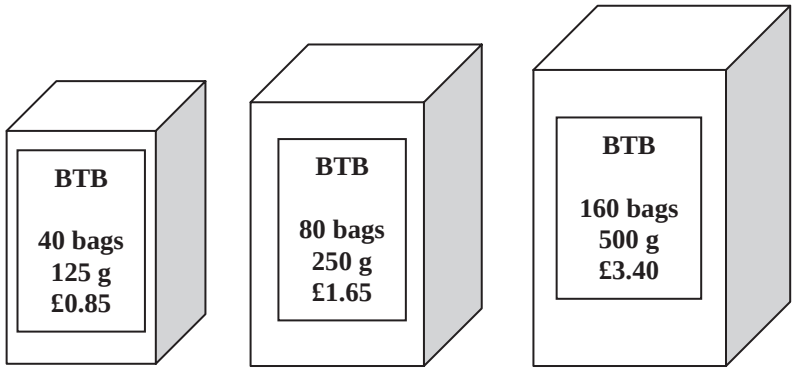
You must show your working.

(2)

.....

(Total for Question 3 = 3 marks)

4 The diagrams show three different size packets of Brew Tea Bags (BTB).



Diagrams **NOT** accurately drawn

Tommy buys 200 bags of Brew Tea Bags (BTB).
Tommy pays with a £10 note.

***** (a) Which packets should Tommy buy to leave him with the most change from £10?

You must show your working.

(4)

A supermarket shelf has room for just 72 small packets of Brew Tea Bags (BTB).
On Tuesday morning, when the supermarket opens, there are 57 packets on the shelf.
During the day,
125 packets are sold and
2 cartons, each containing 48 packets, are used to keep the shelf stocked up.

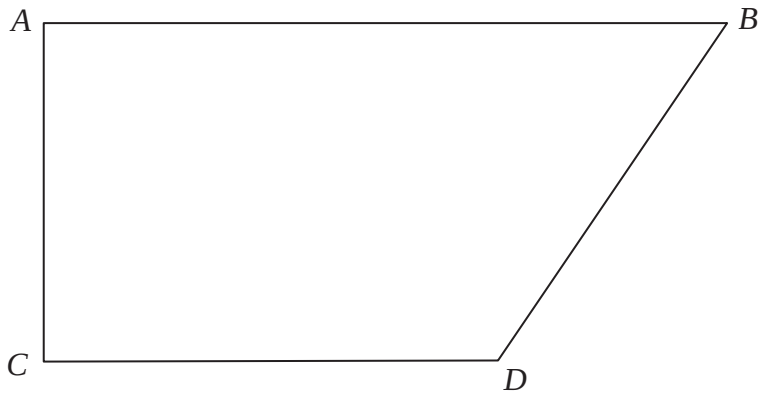
(b) Is there any space on the shelf to unpack another carton of 48 packets?

You must show your working.

(3)

(Total for Question 4 = 7 marks)

5 This is an accurately drawn quadrilateral.



(a) Write down the mathematical name of this quadrilateral.

(1)

.....

(b) Which line is perpendicular to the line *CD*?

(1)

.....

(c) Measure the length of the line *AC*.

(1)

.....

(d) Measure the size of the angle *ABD*.

(1)

.....

(Total for Question 5 = 4 marks)

6 Here is a list of numbers.

2	4	8	12	16	20	32	40

From the list,
write down all the numbers which are **not** factors of 32

.....

(Total for Question 6 = 2 marks)

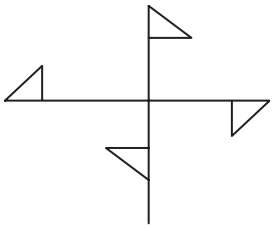
7 (a) Draw all the lines of symmetry of this shape.

(1)

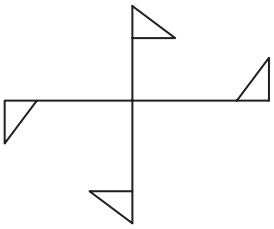
(b) Which of these shapes has rotational symmetry?

(1)

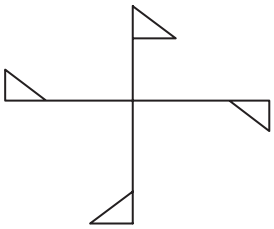
A



B



C

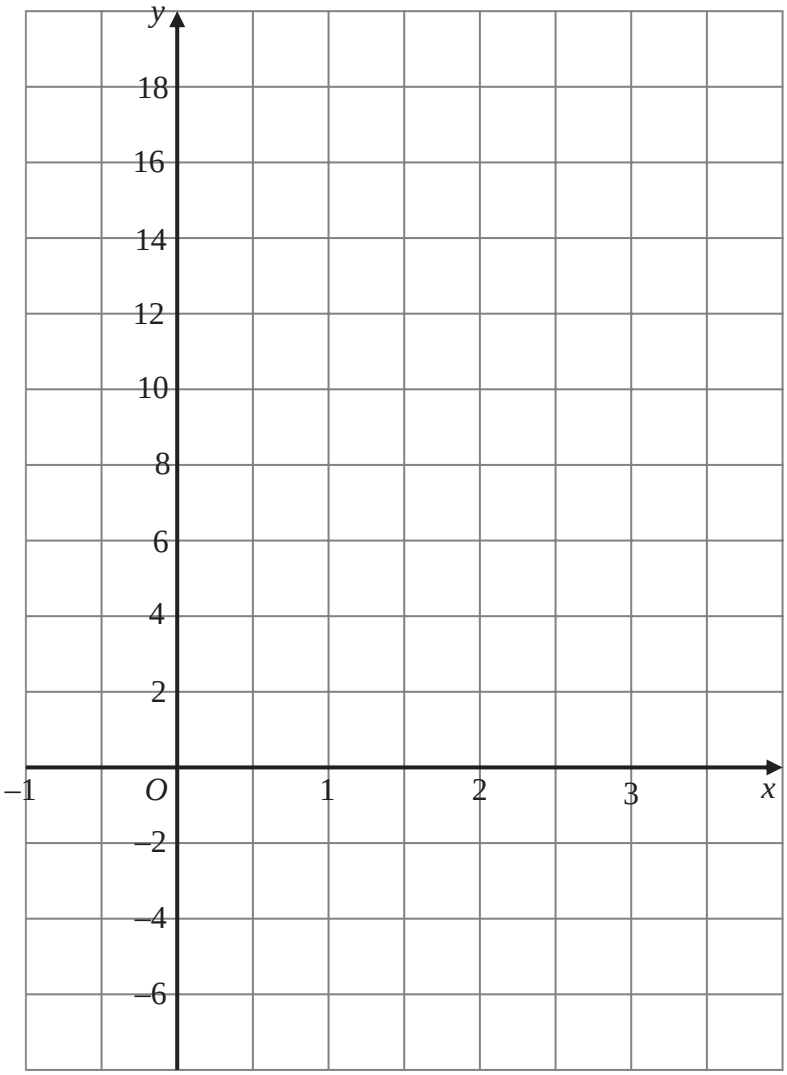


(c) In the space below, draw a shape that has line symmetry and rotational symmetry order 3.

(2)

(Total for Question 7 = 4 marks)

8 On the grid, draw the graph of $y = 5x + 1$ from $x = -1$ to $x = 3$



(Total for Question 8 = 3 marks)

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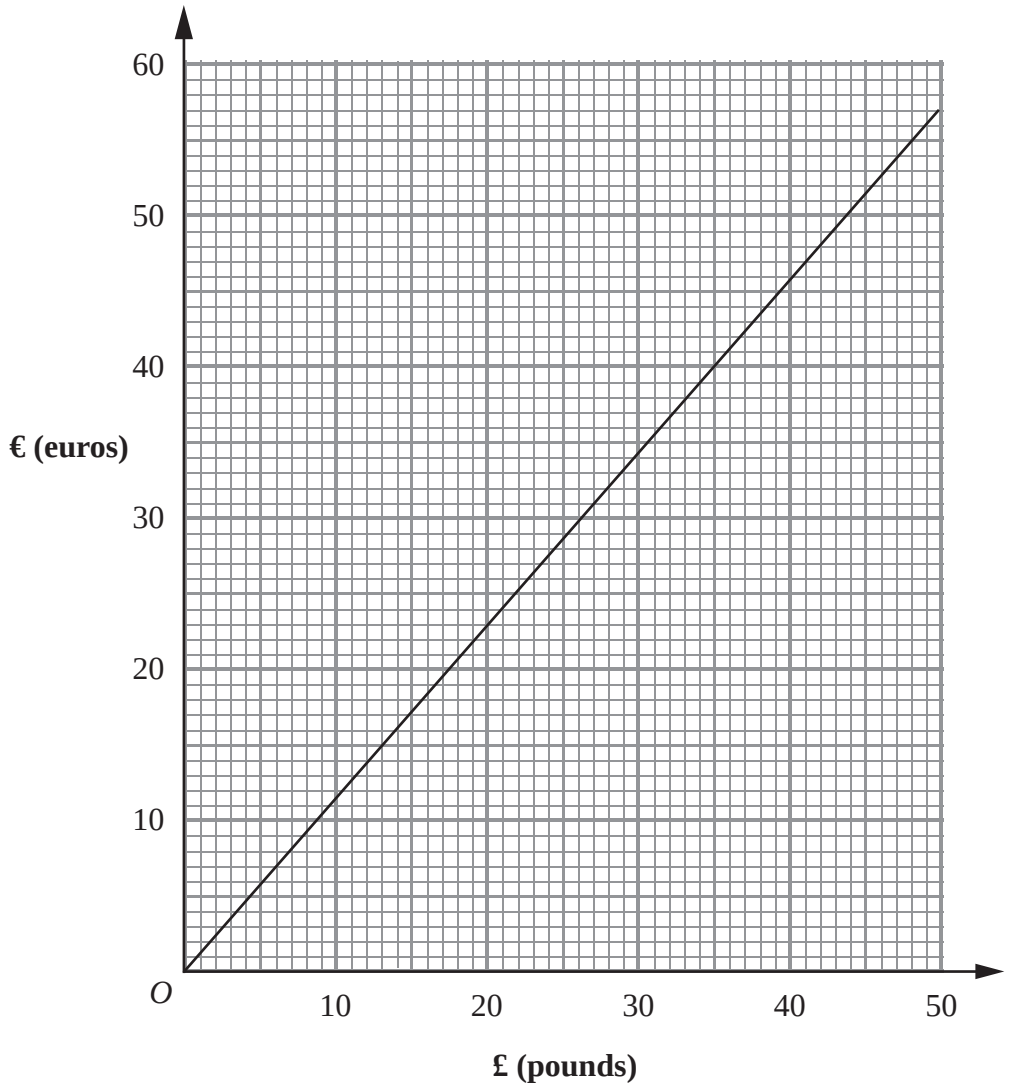
9 This is a graph that can be used to convert between £ (pounds) and € (euros).



This is part of a clipping from a newspaper showing the exchange rates for some countries.

UK **£1 =**
Australia ..... 1.91 dollars
Brazil ..... 3.01 rials
China ..... 11.16 yen
Canada ..... 1.76 dollars
Euro .....
Hong Kong .....
Japan .....

(a) The exchange rate for the euro has been smudged.
Find an estimate for the exchange rate for the euro.

(2)

.....

Ali wishes to buy a villa in Spain.
She has a budget of £150 000
In a brochure she sees these three villas.

Villa A	Villa B	Villa C
€155 000	**€170 000**	**€200 000**

(b) Which of these three villas can Ali afford to buy?
You must show your working.

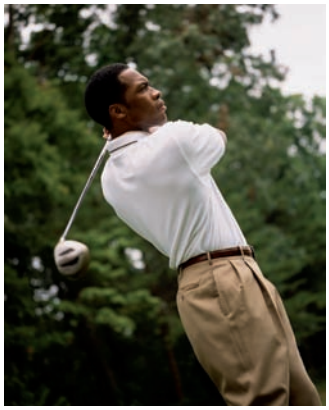
(3)

.....

(Total for Question 9 = 5 marks)

***10** The table shows the membership and annual fees of a local golf club.

	Full members	Weekday members	Lady members	Junior members
Number of members	**243**	**64**	**77**	**36**
Annual Fee	**£600**	**£300**	**£250**	**£120**



The club needs to raise £7200 to refurbish the clubhouse next year.

In the committee meeting, the club Captain suggests that the fee for each full member next year should be increased by 5%.
The club President says that next year each member should pay an extra £18

Which is the better suggestion?
You must show all your working.

(Total for Question 10 = 5 marks)

11 $p = 2^4 \times 2^3$

$q = 2^5$

Work out the value of $\frac{p}{q}$

You must show your working.

.....

(Total for Question 11 = 2 marks)

***12** The diagram shows a wall in Jenny's kitchen.

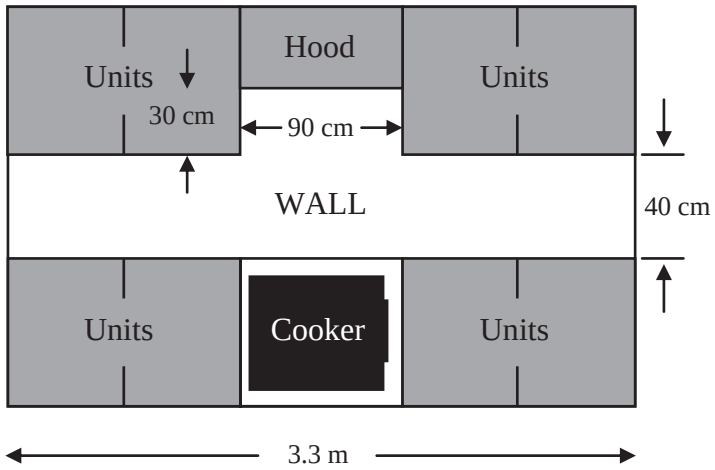
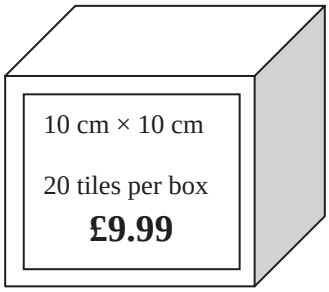


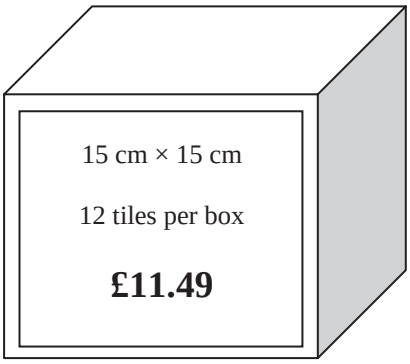
Diagram **NOT** accurately drawn

Jenny wishes to tile this wall in her kitchen.
She chooses between the two types of tile shown below.

Type A



Type B



Which tiles should Jenny use to spend the least amount of money on tiling the wall?
You must show all of your working.

(Total for Question 12 = 6 marks)

13 (a) Factorise fully $8p^2q + 12p$

(2)

.....

(b) Expand and simplify $5 - 2(m - 3)$

(2)

.....

(Total for Question 13 = 4 marks)

---

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

5 8 11 14 17

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

(2)

.....

The expression $3n^2 + 2$ is the nth term of another sequence.

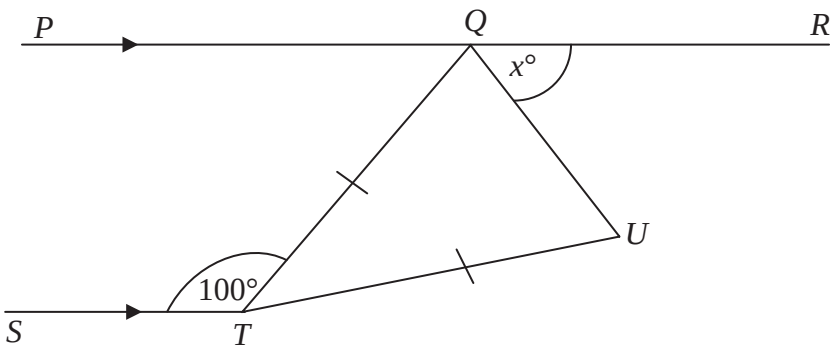
(b) Find the 4th term of this sequence.

(2)

.....

(Total for Question 14 = 4 marks)

***15**



PQR is a straight line parallel to *ST.*
QT = *UT*
Angle *STQ* = 100°.

Prove that angle *QTU* = (2*x* – 20)°.

(Total for Question 15 = 5 marks)

TOTAL FOR PAPER = 60 MARKS

Unit 2 Foundation Tier: Number, Algebra, and Geometry 1

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1. **FE**	(a)		Lunar Jim	1	B1 cao
	(b)	20 15 – 19 40 = 20 + 15	35	1	B1 cao
	(c)	20 30 + 45 = 21 00 + 15	21 15	1	B1 cao
					Total for Question: 3 marks
2.	(a)		$5y$	1	B1 for $5y$ or $5 \times y$
	(b)	$x + 2x + 5 - 7$	$3x - 2$	2	B2 cao [B1 for either $3x$ or -2]
					Total for Question: 3 marks
3.	(a)	−11 + 8 OR use a number line and count back Eg: –11 –10 –9 –8 –7 –6 –4 –3 –2 –1 0 1 Count 8 places	−3°C	1	B1 cao
	(b)		2°C	2	M1 for $\frac{-3+7}{2}$ or evidence of a number line from –3 to 7 A1 cao
					Total for Question: 3 marks

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
4. **FE**	(a)	200 bags = 40 × 5, cost = £0.85 × 5 = £4.25 or 80 × 2 + 40 × 1, cost = £1.65 × 2 + £0.85 = £3.30 + £0.85 = £4.15 or 160 × 1 + 40 × 1, cost = £3.40 + £0.85 = £4.25 **OR** Using the 80 bag packet is least expensive since: £1.65 < £0.85 × 2 (£1.70) and £1.65× 2 = £3.30 < £3.40 Therefore 2 80 bag packets + 1 40 bag packet will be needed to get the least expensive total cost.	80 × 2 + 40 × 1 is the least expensive	4	B1 for at least 2 alternative ways of getting 200 bags M1 for a correct process to work out the cost of 1 way A1 for the 3 correct total costs C1 for justification that 80 × 2 + 40 × 1 is the least expensive, therefore giving Tommy the greatest change **OR** M1 for comparing the cost of 2 40 bag packets with 1 80 bag packet or 2 80 bag packets with 1 1600 bag packet A1 for correct arithmetic giving accurate costs C1 for justification that using 80 bag packets gives thy least expensive way B1 for 80 bags × 2 + 40 bag × 1
	(b)	57 + 48 × 2 – 125 = 153 – 125 = 28 pkts on shelf 72 – 28 = 44 pkts on shelf at end of day **OR** 57 + 48 + 48 = 105 + 48 = 153 153 – 125 = 28 pkts on shelf 72 – 28 = 44 pkts on shelf at end of day **OR** When there are 72 – 48 = 24 pkts on shelf, a carton can opened. After selling 57 – 24 = 33, 1st carton of 48 is opened to fill the shelf to 72. After selling a further 48, 2nd carton of 48 added. 33 + 48 = 81 pkts sold. 125 – 81 = 44 pkts on shelf at end of day	Not room for the full carton	3	M1 for 57 + 48 × 2 – 125 oe M1 for 72 – "57 + 48 × 2 – 125 " = 44 C1 for justification for opening another carton or not **OR** M1 for a correct process that includes the removing of 125 pkts M1 for calculation leading to the number of spaces remaining at the end of the day C1 for justification for opening another carton or not
					Total for Question: 7 marks

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(a)		Trapezium	1	B1 cao
	(b)		*AC*	1	B1 cao
	(c)		4.5cm or 45mm	1	B1 for B1 cao
	(d)		56.3^{o}	1	B1 for an angle in the range 55 to 58 inc.
					Total for Question: 4 marks
6.			12, 20 and 40	2	B2 cao (– 1 for each extra number given) [B1 for 1 or 2 correct numbers (– 1 for each extra number given)
					Total for Question: 2 marks
7.	(a)		Vertical and horizontal lines of symmetry only	1	B1 cao (– 1 for extra lines drawn)
	(b)		B	1	B1 cao
	(c)		Eg. Equilateral triangle	2	B2 for any shape satisfying both criteria [B1 for a shape with rotation al symmetry of order 3 with no line symmetry]
					Total for Question: 4 marks
8.		Table of values $x = -1 \quad 0 \quad 1 \quad 2 \quad 3$ $y = -4 \quad 1 \quad 6 \quad 11 \quad 16$ **OR** Using $y = mx + c$, gradient = 5, y- intercept = 1	Single line from (– 1, – 4) to (3, 16)	3	B3 for a correct single line from (–1, – 4) to (3, 16) [B2 for at least 3 correct points plotted and joined with line segments **OR** 3 correct points plotted two of which must be the extremes with no joining OR a single line of gradient 5 passing through (0, 1) B1 for 2 correctly plotted points **OR** a single lie of gradient 5 OR a single line passing through (0, 1)
					Total for Question: 3 marks

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9.	(a)		£1 = 1.15 euros	2	M1 for reading off one of say £10, £20, £50, etc and dividing their result by 10, 20, 50, etc A1 for an answer in the range 1.05 to 1.25 inc.
FE	(b)	From graph, £15 = €17.25 £150000 = €172500 A – yes B - yes C - no **OR** From graph, €15.5 = £13.5, so €155000 = £135000 From graph, €17 = £14.8, so €170000 = £148000 From graph, €20 = £17.4, so €200000 = £174000 **OR** £150000 × "answer to (a)" = €172500 A – yes B - yes C - no Without the use of a calculator, division by "(a)" is not likely	A – yes B - yes or no C - no	3	M1 for a suitable reading from the graph A1 for converting to euros (€172500 ± €2500) C1 for correct comparison to price of the villas **OR** M1 for a suitable reading from the graph for the price of one of the villas A1 for converting to pounds (±£2000) C1 for correct comparison to price of the villas for their 'correct' conversions **OR** M1 for £150000 × "answer to (a)" A1 for €172500 ± €2500 C1 for correct comparison to price of the villas
					Total for Question: 5 marks

5MB2F

Question	Working	Answer	Mark	Additional Guidance
10. **QWC (ii, iii)** **FE**	5% of £600 = 6 × 5 = 30 243 × 30 = 7290 (243 + 64 + 77 + 36) × 18 = 420 × 18 Method 1: 420 × 10 = 4200 420 × 8 = 3360 + 7560 Method 2: 4000 + 200 + 3200 + 160 = 7560 Method 3:	£18 per member	5	M1 for $\frac{5}{100} \times 600$ or equivalent A1 for 7290 M1 for a complete method, condoning one multiplication error A1 for 7560 C1 for comparing the two results and clearly indicating, with reason, the suggestion which is better. For example, £18 per member raises the most money and the refurbishment is shared by all members [Accept the 5% levy since it raises enough money and the clubhouse is likely to be used more by full members than any other] **QWC: Decision and justification should be clear, with working for 1st and 2nd M1 clearly presented and attributed**

×	400	20
10	4000	200
8	3200	160

4	2	0	
0 / 4	0 / 2	0 / 0	1
3 / 2	1 / 6	0 / 0	8

Total for Question: 5 marks

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
11.		$\frac{2^4 \times 2^3}{2^5}$ $\frac{2^4 \times 2^3}{2^5} = \frac{2^{4+3}}{2^5} = 2^{7-5}$ **OR** $\frac{2\times2\times2\times2\times2\times2\times2}{2\times2\times2\times2\times2} = 2\times2$ **OR** $2^4 = 16,\ 2^3 = 8$ SO p = 16 × 8 = 128 $2^5 = 32 = q$ $\frac{p}{q} = 128 \div 32$	2^2 or 4	2	M1 for adding the indices in p and then subtracting the indices in the quotient A1 for 2^2 or 4 **OR** M1 for $\frac{2\times2\times2\times2\times2\times2\times2}{2\times2\times2\times2\times2} = 2\times2$ with an attempt to cancel A1 for 2^2 or 4 **OR** M1 for 128 and 32 seen A1 for 2^2 or 4
					Total for Question: 2 marks

5MB2F				
Question	**Working**	**Answer**	**Mark**	**Additional Guidance**
12. **QWC (i, ii, iii)** **FE**	330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles 132 + 27 = 159 tiles No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 330 ÷ 15 = 22 B tiles per long row 40 ÷ 15 = 3 long rows (1 row of tiles will be cut) 22 × 3 = 66 A tiles 90 ÷ 15 = 6 tiles per short row 30 ÷ 15 = 2 short rows 6 × 2 = 12 tiles 66 + 12 = 78 tiles No of boxes needed = 7 (12 × 7 = 84 tiles) £11.49 × 7 = £80.43 OR Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm^2 Tile A area = 10 × 10 = 100 cm^2 No of tiles = 15900 ÷ 100 = 159 No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 Tile B area = 15 × 15 = 225 cm^2 No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1 No of boxes needed = 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed £11.49 × 7 = £80.43	Tile A is the most economical	6	M1 for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 A1 for (33 and 9) or (22 and 6) M1 for 33 × 4 + 9 × 3 or 22 × 3 + 6 × 2 A1 ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number) B1 for answers or £79.92 and £80.43 to justify the choice C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable** **OR** M1 for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15 A1 for 15900 and (100 or 225) M1 for 15900 ÷ 100 or 15900 ÷ 225 A1 ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number) B1 for answers or £79.92 and £80.43 to justify the choice C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**
				Total for Question: 6 marks

5MB2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
13.	(a)		$4p(2pq + 3)$	2	B2 for $4p(2pq + 3)$ [B1 for $2p(2pq + 6)$ or $4(p^2q + 3p)$ or $p(4pq + 12)$ or $2(2p^2q + 6p)$]
	(b)	$5 - 2(m - 3) = 5 - 2m + 6$	$11 - 2m$	2	M1 for $5 - 2m + 6$ A1 cao
					Total for Question: 4 marks
14.	(a)		$3n + 2$	2	B2 for $3n + 2$ or equivalent [B1 for $3n + k$ where $k \neq 2$]
	(b)	$3 \times 4^2 + 2 = 3 \times 16 + 2$ $= 48 + 2$	50	2	M1 for $3 \times 4^2 + 2$ with a clear intention to square the 4 independent of the scalar 3 A1 cao
					Total for Question: 4 marks
15. **QWC (i, ii, iii)**		Angle RQT= 100° (alternate angles are equal) Angle TQU = $100 - x$ Angle QUT = $100 - x$ (base angles of isos triangle) Angle QTU = $180 - (100 - x + 100 - x)$ (angles in a triangle)	Proof	5	B1 for angle RQT = 100° B1 for angle TQU = $100 - x$ or angle QUT = $100 - x$ B1 for completing the proof C2 for all 3 reasons given **QWC: Proof should be clearly laid out with technical language correct, eg alternate angles are equal** [C1 for just 1 or 2 reasons given] **QWC: Proof should be clearly laid out with technical language correct, eg alternate angles are equal**
					Total for Question: 5 marks

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 2: Number, Algebra, Geometry 1 (Non-Calculator)

Higher Tier

Sample Assessment Material
Time: 1 hour 15 minutes

Paper Reference
5MB2/2H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

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

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

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

Turn over ▶

S37722A

2/3/3/2

S 3 7 7 2 2 A 0 1 1 3

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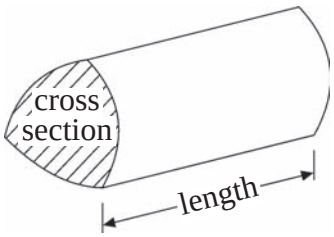
GCSE Mathematics 2MB01

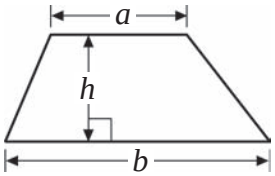
Formulae – Higher Tier

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

Volume of a prism = area of cross section × length

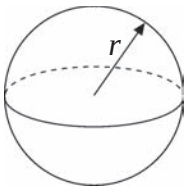


Area of trapezium = $\frac{1}{2}(a+b)h$



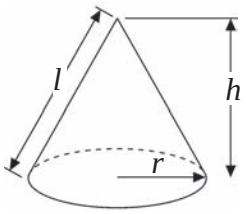
Volume of sphere = $\frac{4}{3}\pi r^3$

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

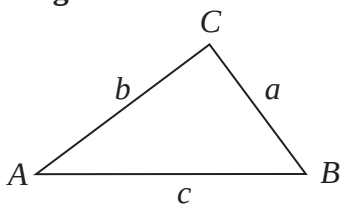


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation

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

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

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

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

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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (a) Express 84 as a product of its prime factors.

(2)

.....

Sally is a patient in a hospital.
She has to take a red pill every 4 hours, a blue pill every 6 hours and a white pill every 8 hours.
She takes a pill of each colour at midday.

(b) When will she next take a pill of each colour at the same time?

(2)

.....

(Total for Question 1 = 4 marks)

2 Anwar, Bethany and Colin each earn the same weekly wage.

Each week, Anwar saves 12% of his wage and spends the rest.

Each week, Bethany spends $\frac{7}{8}$ of her wage and saves the rest.

The ratio of the money Colin saves each week to what he spends is 1 : 9

Which of Anwar, Bethany and Colin, saves the most money each week?
You must show each stage of your working.

.....

(Total for Question 2 = 4 marks)

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

5 8 11 14 17

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

(2)

.....

The expression $3n^2 + 2$ is the nth term of another sequence.

(b) Find the 4th term of this sequence.

(2)

.....

(Total for Question 3 = 4 marks)

4

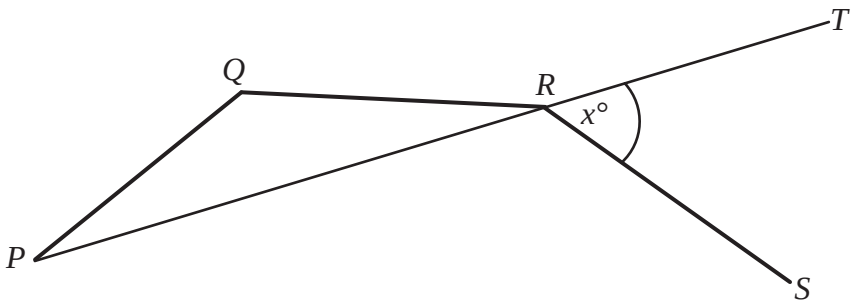


Diagram **NOT** accurately drawn

PQ, *QR* and *RS* are 3 sides of a regular decagon.
PRT is a straight line.
Angle *TRS* = *x*°

Work out the value of *x*

x = ...

(Total for Question 4 = 5 marks)

5 The diagram shows a wall in Jenny's kitchen.

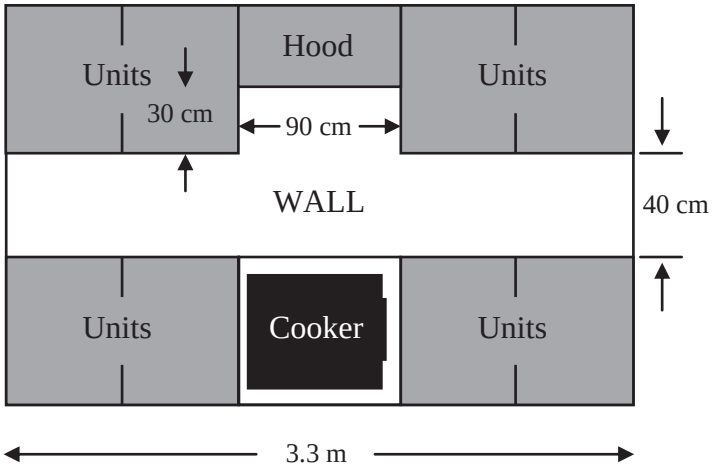
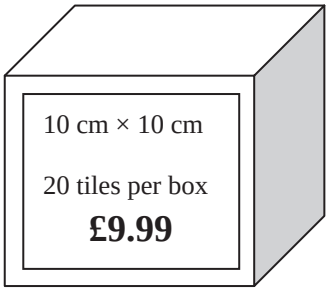


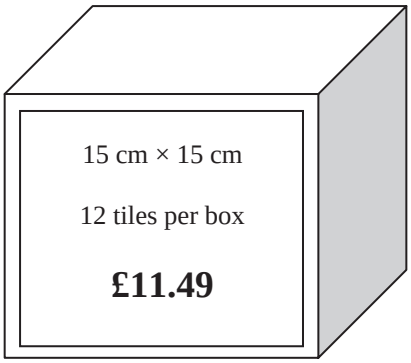
Diagram **NOT** accurately drawn

Jenny wishes to tile this wall in her kitchen.
She chooses between the two types of tile shown below.

Type A



Type B



***(a)** Which tiles should Jenny use to spend the least amount of money on tiling the wall?

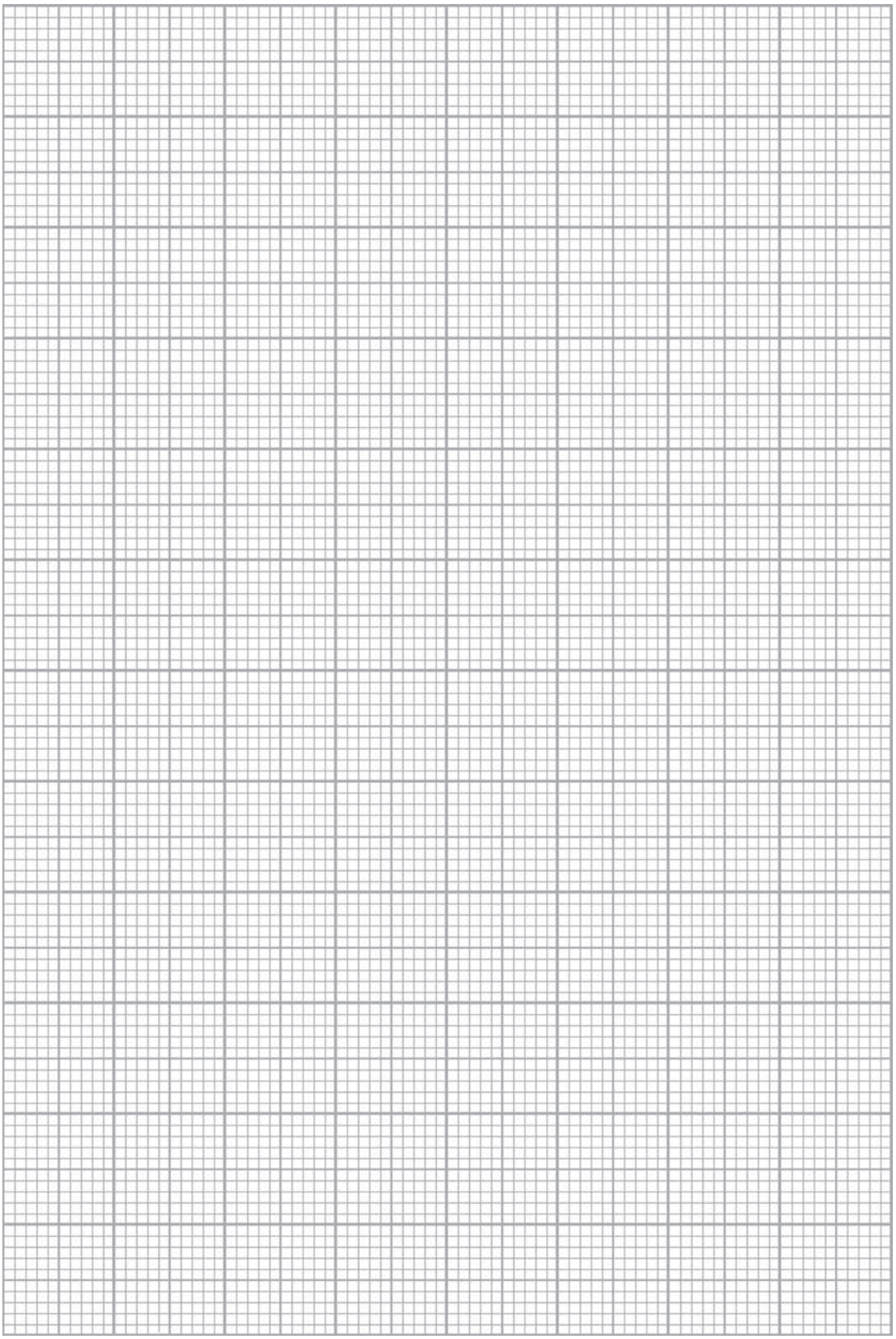
You must show all of your working.

(6)

A Box of Type A tiles has dimensions 10.5 cm × 10.5 cm × 21 cm.
Readypac wants to produce cartons which hold 12 boxes of Type A tiles, when full.

(b) On the grid below, design a net of a carton that Readypac could use.

(3)



(Total for Question 5 = 9 marks)

6 (a) Factorise fully $8p^2q + 12p$

(2)

.....

(b) Expand and simplify $5 - 2(m - 3)$

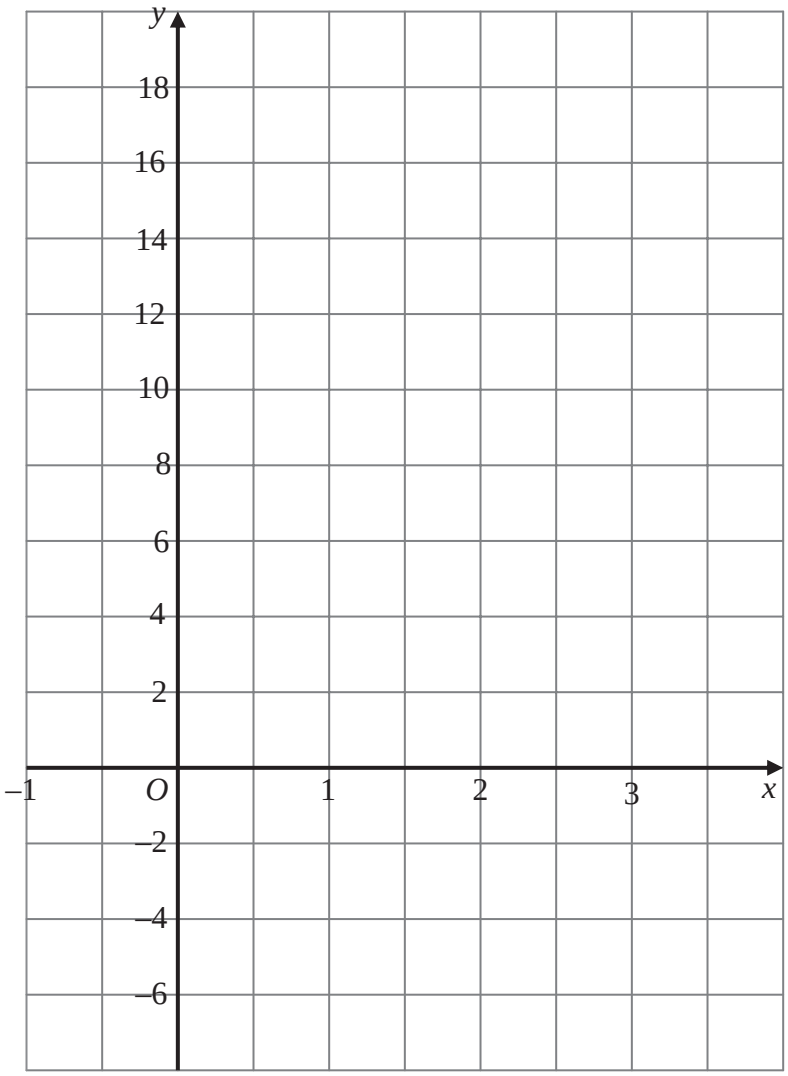
(2)

.....

(Total for Question 6 = 4 marks)

7 (a) On the grid, draw the graph of $y = 5x + 1$ from $x = -1$ to $x = 3$

(3)



(b) Which of the following is the equation of a line parallel to $y = 5x + 1$?

(1)

A	**B**	**C**	**D**	**E**
$y = x + 1$	$5y = x + 1$	$y + 5x = 3$	$y - 5x + 1 = 0$	$y = -\frac{x}{5} + 1$

.....

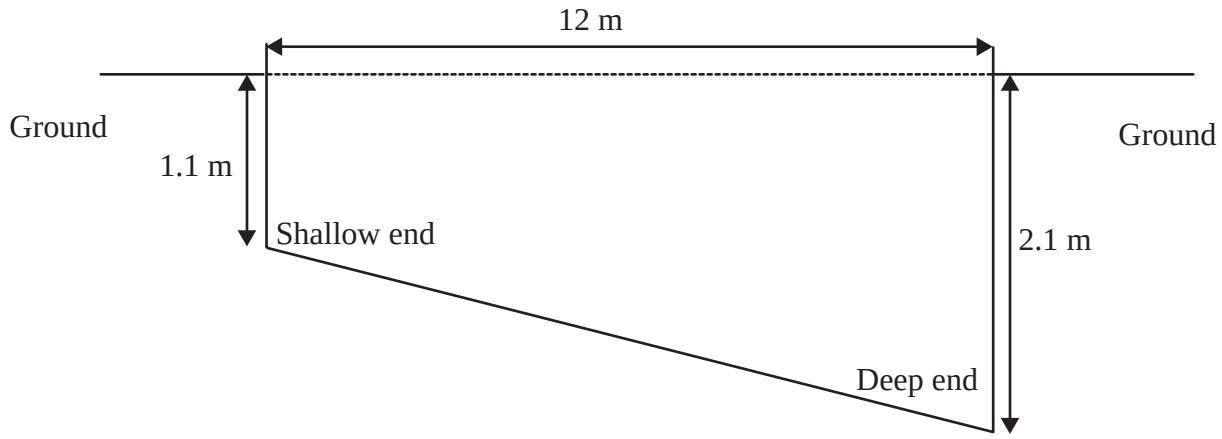
(c) Find the equation of line which is perpendicular to $y = 5x + 1$ and passes through the point (0, 0).

(2)

.....

(Total for Question 7 = 6 marks)

8 The diagram shows a cross-section of Rafa's new swimming pool.



The swimming pool has two identical sides in the shape of a trapezium.
All other sides are rectangular.
The length of the pool is 12 m.
The width of the pool is 4 m.
The depth of the pool is 2.1 m at the deep end and 1.1 m at the shallow end.

Rafa fills the pool up with water from a hosepipe.
The surface of the water is to be 10 cm from the top of the pool.

Rafa turns on the hosepipe at 09 00 on Monday and water fills at a rate of 200 ml per second.

When the pool is full, Rafa turns off the tap. At what time will this be?
Show your working.

.....

(Total for Question 8 = 6 marks)

9 Find the value of

(i) 8^0

.....

(ii) $\left(\frac{1}{3}\right)^{-2}$

.....

(iii) $\left(16^{-2}\right)^{-\frac{3}{4}}$

.....

(Total for Question 9 = 4 marks)

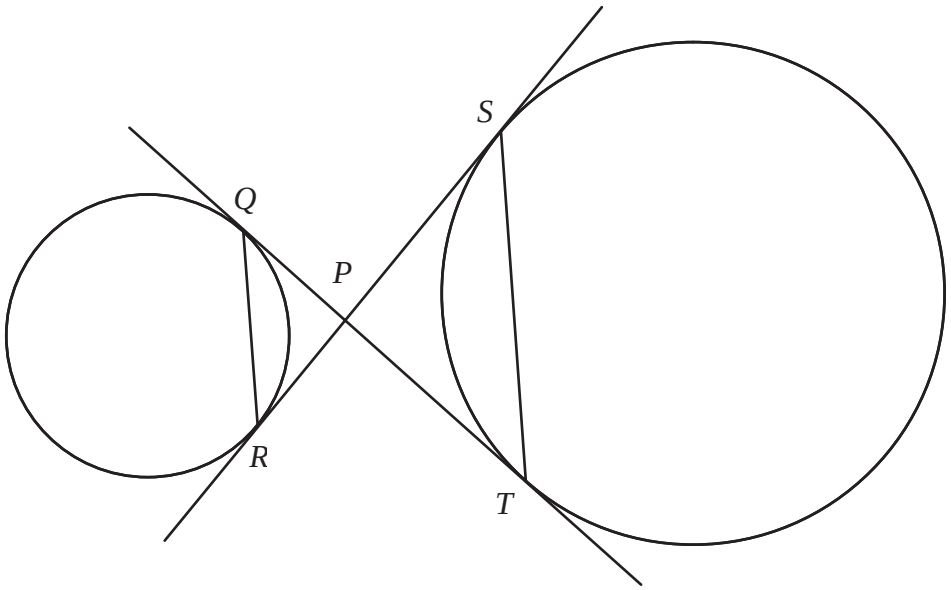
---

10 Simplify fully $\frac{x+3}{4}+\frac{x-5}{3}$

.....

(Total for Question 10 = 3 marks)

***11**



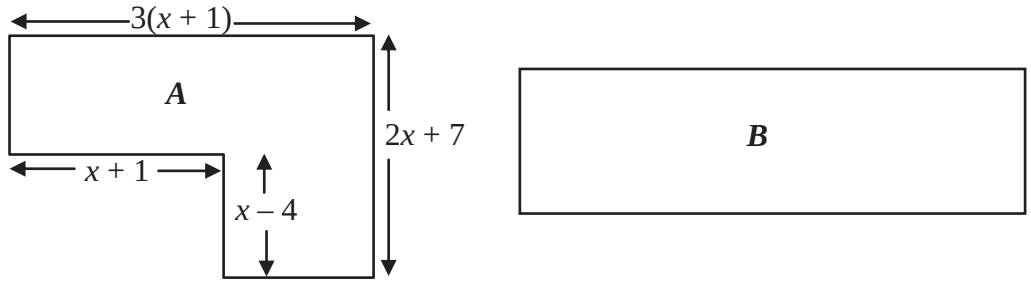
Q and *R* are two points on the circumference of a circle.
S and *T* are two points on the circumference of another circle.

QT and *SR* are tangents to both circles.
P is the point of intersection of the two tangents.

Prove that *QR* is parallel to *ST*.

(Total for Question 11 = 5 marks)

12 Diagrams **NOT** accurately drawn



The diagram shows two shapes.
In shape *A*, all of the angles are right angles.
Shape *B* is a rectangle.
All the measurements are in centimetres.

The area of shape *A* is equal to the area of shape *B*.

Find an expression, in terms of *x*, for the length and an expression, in terms of *x*, for the width of shape *B*.

.....

(Total for Question 12 = 6 marks)

TOTAL FOR PAPER = 60 MARKS

Unit 2 Higher Tier: Number, Algebra, Geometry 1

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.	(a)	84 = 2 × 42 = 2 × 2 × 21 = 2 × 2 × 3 × 7 OR Use of factor trees	2 × 2 × 3 × 7	2	M1 for a systematic method of at least 2 correct divisions by a prime number or an equivalent factor tree or a full process with one calculation error A1 for 2 × 2 × 3 × 7 or 2^2 × 3 × 7
	(b)	LCM of 4, 6 and 8 is **24** **OR** Red = after 4, 8, 12, 16, 20, **24**, 28, …….. Blue = after 6, 12, 18, **24**, 30, 36, …….. White = after 8, 16, **24**, 32, 40, ……. **OR** Table of times from midday onwards into the next day, with indication when a red, blue and white pill are to be taken.	Midday on the following day	2	M1 for an attempt to find the LCM A1 for midday (or equivalent) the next day **OR** M1 for listing multiples of 4, 6 and 8 A1 for midday (or equivalent) the next day **OR** M1 for a correct timetable showing when pills are taken A1 for midday (or equivalent) the next day
					Total for Question: 4 marks

5MB2H				
Question	**Working**	**Answer**	**Mark**	**Additional Guidance**
2.	Colin saves $\frac{1}{1+9} = \frac{1}{10}$ of his wage Anwar saves 12%, Bethany saves $1 - \frac{7}{8} = \frac{1}{8}$ of her wage $\frac{1}{10}$ = 0.1, 12% = 0.12, $\frac{1}{8}$ =0.125 **OR** $\frac{1}{10}$ = 10%, 12%, $\frac{1}{8}$ = 12.5% **OR** Let the weekly wage be £100 say Colin saves $\frac{1}{1+9} = \frac{1}{10}$ of his wage Anwar saves 12%, Bethany saves $1 - \frac{7}{8} = \frac{1}{8}$ of her wage $\frac{1}{10}$ of £100 = $\frac{1}{10} \times 100 = 10$ 12% of £100 = $\frac{12}{100} \times 100 = 12$ $\frac{1}{8}$ of £100 = $\frac{1}{8} \times 100 = 12.5$	Bethany	4	B1 for $\frac{1}{1+9} = \frac{1}{10}$ B1 for $1 - \frac{7}{8} = \frac{1}{8}$ M1 for conversion to a decimal or 0.1 or 0.12 or 0.125 seen A1 cao for Bethany **OR** M1 for conversion to a percentage or 10% or 12.5% seen A1 cao for Bethany **OR** B1 for $\frac{1}{1+9} = \frac{1}{10}$ [or M1 for 100 ÷ (1+9)] B1 for $1 - \frac{7}{8} = \frac{1}{8}$ {or A1 ft for £100 – "£87.50" (= £12.50)} M1 for $\frac{1}{10} \times 100$ (=10) [or A1 for 10] or $\frac{12}{100} \times 100$ (=12) or $\frac{1}{8} \times 100$ (=12.5) {or $\frac{7}{8} \times 100$ (=87.5)} A1 cao for Bethany
				Total for Question: 4 marks

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3.	(a)		$3n + 2$	2	B2 for $3n + 2$ or equivalent [B1 for 3n + k where k ≠ 2]
	(b)	3 × 42 + 2 = 3 × 16 + 2 = 48 + 2	50	2	M1 for 3 × 42 + 2 with a clear intention to square the 4 independent of the scalar 3. A1 cao
					Total for Question: 4 marks
4.		Angle PQR = angle QRS = $\frac{(10-2)\times 180}{10}$ = 144° (interior angle of an n-sided polygon) Angle QPR = angle QRP = $\frac{180-144}{2}$ = 18° (base angles of isos triangle) Angle PRS = 144 – 18 = 126° x = 180 – 126 = 54° (angles on a straight line)	54°	5	M1 for $\frac{(10-2)\times 180}{10}$ oe A1 for interior angle = 144 M1 for $\frac{180-144}{2}$ or 18° seen M1 (dep) for "180 – ('144' – '18')" A1 cao
					Total for Question: 5 marks

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5. **QWC (i, ii, iii)** **FE**	(a)	Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm^2 Tile A area = 10 × 10 = 100 cm^2 No of tiles = 15900 ÷ 100 = 159 No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 Tile B area = 15 × 15 = 225 cm^2 No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1 No of boxes needed = 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed £11.49 × 7 = £80.43 **OR** 330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles 132 + 27 = 159 tiles No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 330 ÷ 15 = 22 B tiles per long row 40 ÷ 15 = 3 long rows (1 row of tiles will be cut) 22 × 3 = 66 A tiles 90 ÷ 15 = 6 tiles per short row 30 ÷ 15 = 2 short rows 6 × 2 = 12 tiles 66 + 12 = 78 tiles No of boxes needed = 7 (12× 7 = 84 tiles) £11.49 × 7 = £80.43	Tile A is the most economical	6	M1 for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15 A1 for 15900 and (100 or 225) M1 for 15900 ÷ 100 or 15900 ÷ 225 A1 ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number) B1 for answers or £79.92 and £80.43 to justify the choice C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable** **OR** M1 for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 A1 for (33 and 9) or (22 and 6) M1 for 33 × 4 + 9 × 3 or 22 × 3 + 6 × 2 A1 ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number) B1 for answers or £79.92 and £80.43 to justify the choice C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(b)	The carton can have dimensions 42 cm × 31.5 cm × 21 cm or 63 cm × 21 cm × 21 cm or 84 cm × 31.5 cm × 10.5 cm or 63 cm × 42 cm × 10.5 cm or 126 cm × 21 cm × 10.5 cm	Net	3	B1 for quoting a correct set of dimensions (could be simply on the diagram) M1 for a net showing 6 rectangles that could form a cuboid A1 for an accurate scale drawing or lengths labeled accurately
					Total for Question: 9 marks
6.	(a)		$4p(2pq + 3)$	2	B2 for $4p(2pq + 3)$ [B1 for $2p(2pq + 6)$ or $4(p^2q + 3p)$ or $p(4pq + 12)$ or $2(2p^2q + 6p)$]
	(b)	$5 - 2(m - 3) = 5 - 2m + 6$	$11 - 2m$	2	M1 for $5 - 2m + 6$ A1 cao
					Total for Question: 4 marks
7.	(a)	Table of values $x = -1 \quad 0 \quad 1 \quad 2 \quad 3$ $y = -4 \quad 1 \quad 6 \quad 11 \quad 16$ **OR** Using $y = mx + c$, gradient = 5, y- intercept = 1	Single line from (–1, –4) to (3, 16)	3	B3 for a correct single line from (–1, –4) to (3, 16) [B2 for at least 3 correct points plotted and joined with line segments **OR** 3 correct points plotted two of which must be the extremes with no joining **OR** a single line of gradient 5 passing through (0, 1)] B1 for 2 correctly plotted points **OR** a single lie of gradient 5 **OR** a single line passing through (0, 1)
	(b)		D	1	B1 cao
	(c)	Gradient = $-\frac{1}{5}$, $c = 0$	$y = -\frac{1}{5}x$	2	M1 for $y = -\frac{1}{5}x + c$ A1 cao
					Total for Question: 6 marks

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8.		Volume of water in pool when full = $\frac{(2+1)}{2} \times 12 \times 4 = 72$ m^3 = 72 000 000 cm^3 (ml) Time to fill pool = 72 000 000 ÷ 200 = 360 000 seconds = 360 000 ÷ 60 = 6000 mins = 100 hours	100 hours or 4 days and 4 hours, Friday 13 00	6	M1 for $\frac{(2+1)}{2} \times 12$ A1 for 72 m^3 B1 for 72 000 000 cm^3 (ml) or multiplying volume by 1 000 000 M1 for "72 000 000" ÷ 200 M1 for "360 000" ÷ 3600 A1 for 100 hours or 4 days and 4 hours, Friday at 1300 [B1 for an answer left as 360 000 seconds, if the last M1 not awarded]
					Total for Question: 6 marks
9.	(i)		1	4	B1 cao
	(ii)	$\left(\frac{3}{1}\right)^2$ or $\left(\frac{1}{9}\right)^{-1}$	9		B1 cao
	(iii)	$(16)^{\frac{3}{2}} = \left(\sqrt{16}\right)^3$	64		B2 cao [B1 for $(16)^{\frac{3}{2}}$ or equivalent]
					Total for Question: 4 marks
10.		$\frac{x+3}{4} + \frac{x-5}{3}$ $= \frac{3(x+3)+(x-5)}{12}$	$\frac{7x-11}{12}$	3	M1 resolution of denominator to 12 M1 expansion and simplification of brackets A1 cao
					Total for Question: 3 marks

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
11. **QWC, (i, ii, iii)**		PS = PT and PQ = PR (equal tgts from a point) Let angle SPT = x Angle PST = angle PTS = $\frac{180-x}{2}$ (base angles of isos triangle) Angle QPR = x (vertically opposite angles) Angle PQR = angle PRQ = $\frac{180-x}{2}$ (base angles of isos triangle) Therefore angle PQR = angle PTS which are alternate angles. Hence QR is parallel to ST	Proof	5	B1 for PS = PT or PQ = PR B1 for equal tangents from a point B1 for angle PST = angle PTS = $\frac{180-x}{2}$ or angle PQR = angle PRQ = $\frac{180-x}{2}$ C1 for base angles of isos triangle are equal or vertically opposite angles are equal **QWC: Working should be clearly laid out in a logical sequence, with calculations atributable** C1 for alternate angles implying parallel **QWC: Any technical language should be correct**
					Total for Question: 5 marks

5MB2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.		A = $3(x + 1)(2x + 7) – (x – 4)(x + 1)$ $= 3(2x^2 + 9x + 7) – (x^2 – 3x – 4)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$ **OR** Splitting shape A into rectangles, area to be added: e.g. $3(x + 1)(x + 11) + (x – 4)(2x + 2)$ $= 3(x^2 + 12x + 11) +$ $(2x^2 – 6x – 8)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$	5x + 5 by x + 5 or 5x + 25 by x + 1	6	M1 for attempting to subtract the area of small rectangle from area of large rectangle in A M1 for $3(x + 1)(2x + 7) – (x – 4)(x + 1)$ A1 for $3(2x^2 + 9x + 7)$ and $(x^2 – 3x – 4)$ A1 for $5x^2 + 30x + 25$ M1 for attempting to factorise "$5x^2 + 30x + 25$" to get dimensions of B A1 for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$ **OR** M1 for attempting to add the area of two (or more) rectangles that make up the shape A M1 for 3(x + 1)(x + 11) + (x – 4)(2x + 2) oe equivalent A1 for $3(x^2 + 12x + 11)$ and $(2x^2 – 6x – 8)$ A1 for $5x^2 + 30x + 25$ M1 for attempting to factorise "$5x^2 + 30x + 25$" to get dimensions of B A1 for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$
					Total for Question: 6 marks

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 3: Number, Algebra, Geometry 2 (Calculator)

Foundation Tier

Sample Assessment Material
Time: 1 hour 30 minutes

Paper Reference
5MB3/3F

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used**.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

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

Turn over ▶

S37723A

2/2/3/2

S 3 7 7 2 3 A 0 1 2 0

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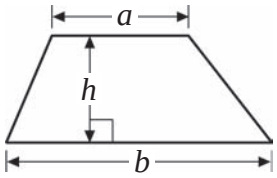
GCSE Mathematics 2MB01

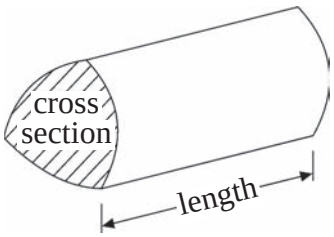
Formulae: Foundation Tier

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

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



Volume of prism = area of cross section × length

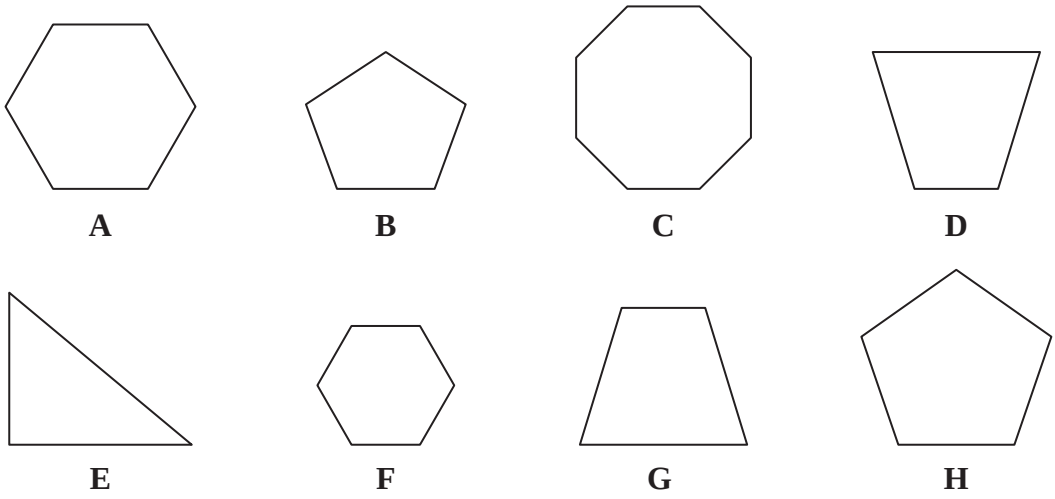


Answer ALL questions.

Write all your answers in the spaces provided.

You must write down all stages in your working.

1 Here are 8 polygons.



(a) Write down the mathematical name for shape **A**.

(1)

.....

(b) Write down the letter of the shape that is an octagon.

(1)

.....

(c) Write down the letters of the pair of congruent shapes.

(1)

..... and .....

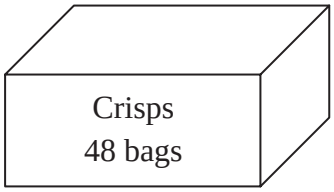
(Total for Question 1 = 3 marks)

2 Jan bought 3 boxes of Salt ‘n’ Vinegar crisps and 2 boxes of Ready Salted crisps to sell at the Year 11 disco.

There are 48 bags of crisps in each box.

At the end of the disco there were 25 bags of crisps left.

How many bags of crisps were sold at the disco?



..... Bags

(Total for Question 2 = 3 marks)

3 Tom wants to clean the upstairs windows of his house.

He decides to buy a ladder.

The ladder has to reach exactly 3.8 metres up the wall of the house.

To be safe, the ladder has to be at an angle of 72° to the ground.

What length of ladder should Tom buy?

.....

(Total for Question 3 = 4 marks)

***4** Ben buys 10 trays of bottled water for £5.99 a tray.

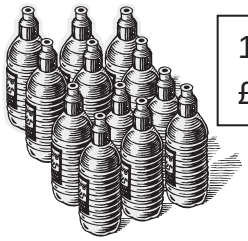
Each tray holds 12 bottles of water.

Ben goes to a car boot sale to sell his water.

In the morning he sells 80 bottles at 99p each.

In the afternoon he reduces the price and
he sells all the bottles he has left for 75p each.

How much profit or loss does he make?



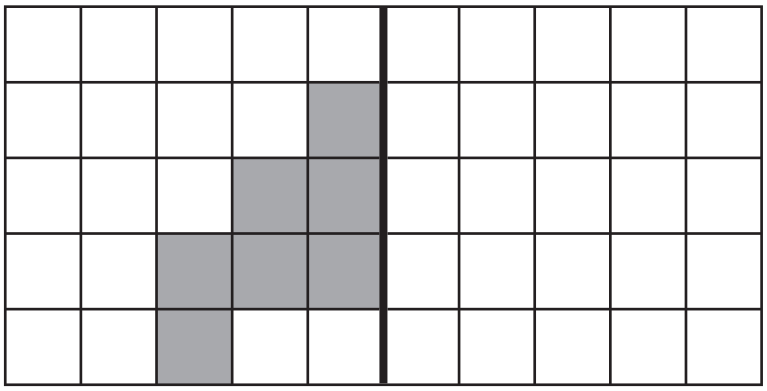
12 bottles
£5.99 a tray

£ .....

(Total for Question 4 = 5 marks)

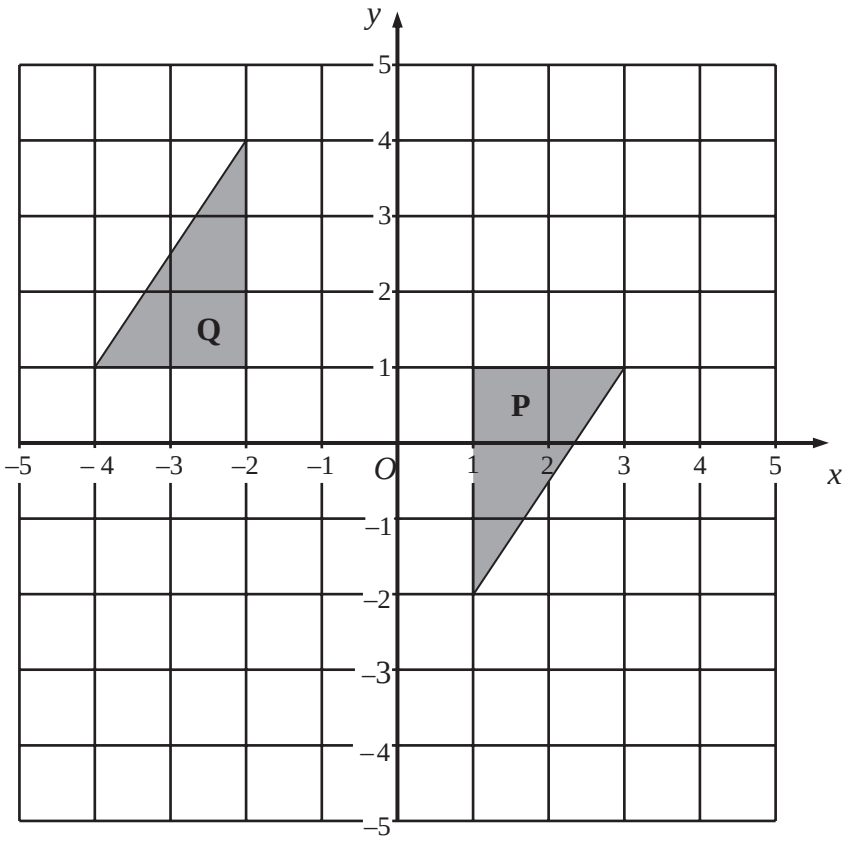
5 (a) Reflect the shaded shape in the mirror line.

(1)



(b) Describe the single transformation that moves shape **P** to shape **Q**.

(2)



.....

(Total for Question 5 = 3 marks)

6 Jemilla goes swimming.

She swims 64 lengths of a swimming pool.

Each length is 25 m long.

(a) Work out how far Jemilla swims.

Give your answer in kilometres.

(3)

..... kilometres

The swimming pool is 25 m long by 10 m wide by 2.5 m deep.

(b) How many litres of water does it contain?

(3)

..... *l*

(Total for Question 6 = 6 marks)

7 Erica and Luke use this rule to work out their pay.

Pay = number of hours worked × rate of pay per hour

Erica worked for 32 hours.
Her rate of pay per hour was £5.20

(a) What was Erica's pay?

(2)

£ .....

Luke's pay was £172.50
His rate of pay per hour was £5.75

(b) How many hours did Luke work?

(2)

..... hours

(Total for Question 7 = 4 marks)

8 This is the meter reading card for Mr Hassan's use of electricity.

Electricity Meter Reading

Lightning Electric Co

Date of meter reading	Reading in units				
3 April 2012	0	8	9	6	3
30 June 2012	1	0	6	2	5

Here is part of Mr Hassan's bill.

Electricity Bill

Lightning Electric Co

2 July 2012

Current rates

Standing charge	15.07p for each day
Cost per unit	11.85p

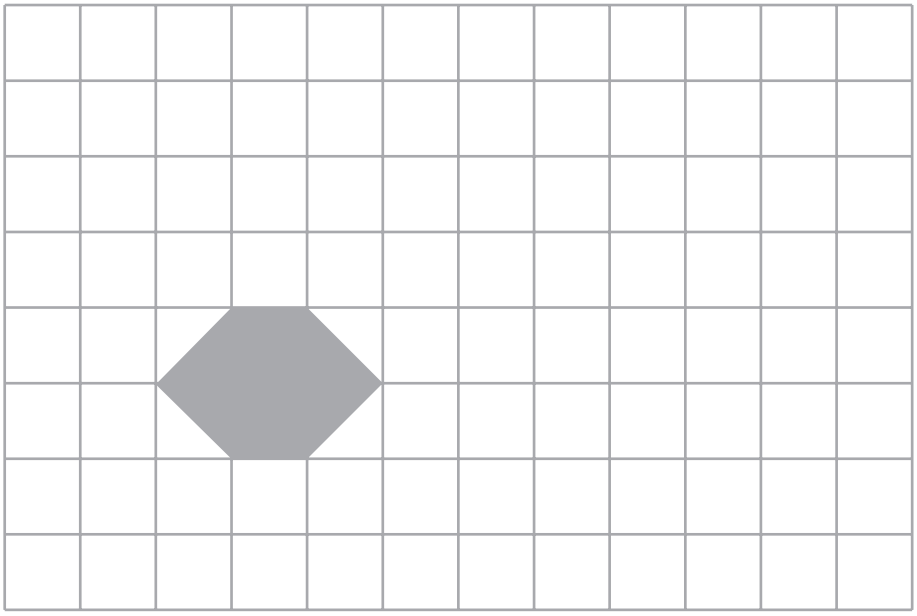
Find the total cost of Mr Hassan's electricity bill.

£ .....

(Total for Question 8 = 6 marks)

9 Harry buys some tiles so that he can tile his bathroom floor.
One of the tiles is drawn on the grid below.

On the grid below show how the tiles will tessellate.
You should draw at least 6 tiles.



(Total for Question 9 = 2 marks)

10 (a) Solve $4x = 12$

(1)

$x =$ .....

(b) Solve $y - 7 = 11$

(1)

$y =$ .....

(Total for Question 10 = 2 marks)

11 In a school there are 220 pupils in Year 9.
120 of these pupils are girls.

What fraction of the 220 pupils are boys?

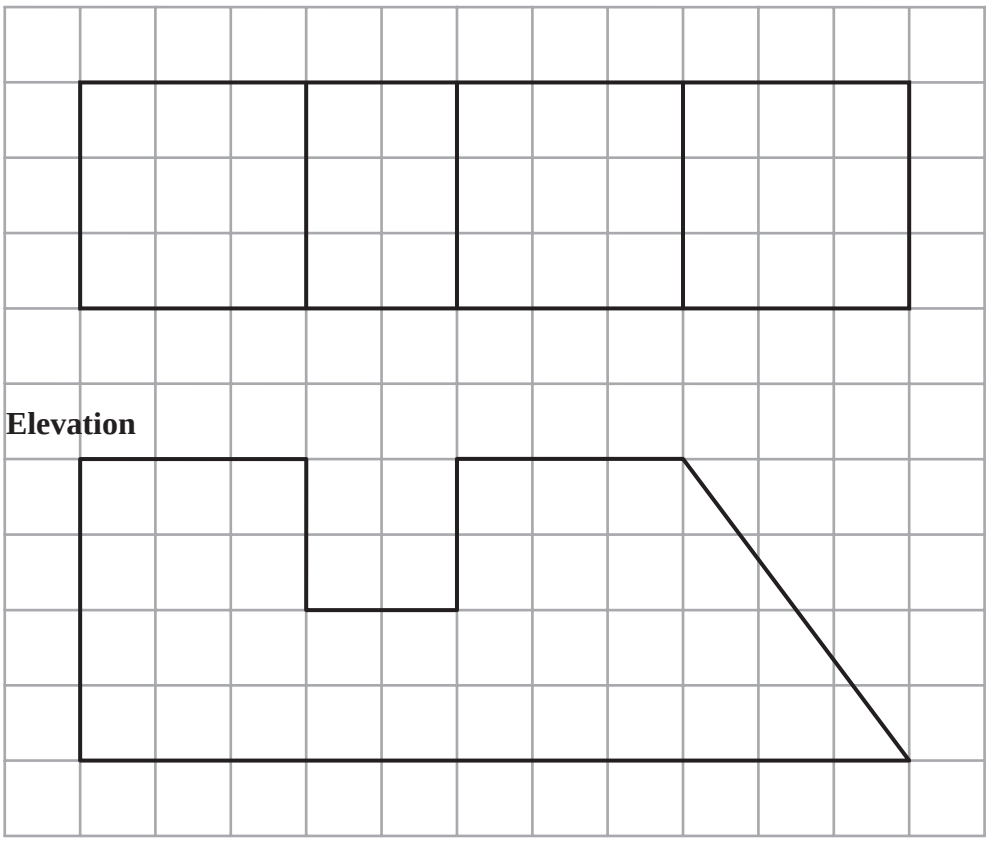
Give your fraction in its simplest form.

.....

(Total for Question 11 = 2 marks)

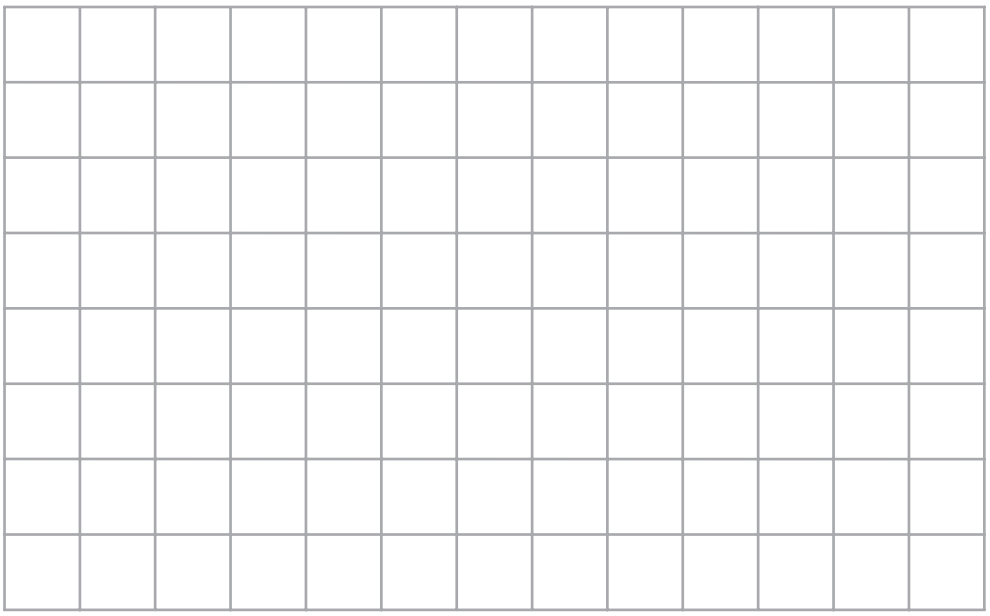
12 Here are the plan and front elevation of a prism.
The front elevation shows the cross section of the prism.

Plan



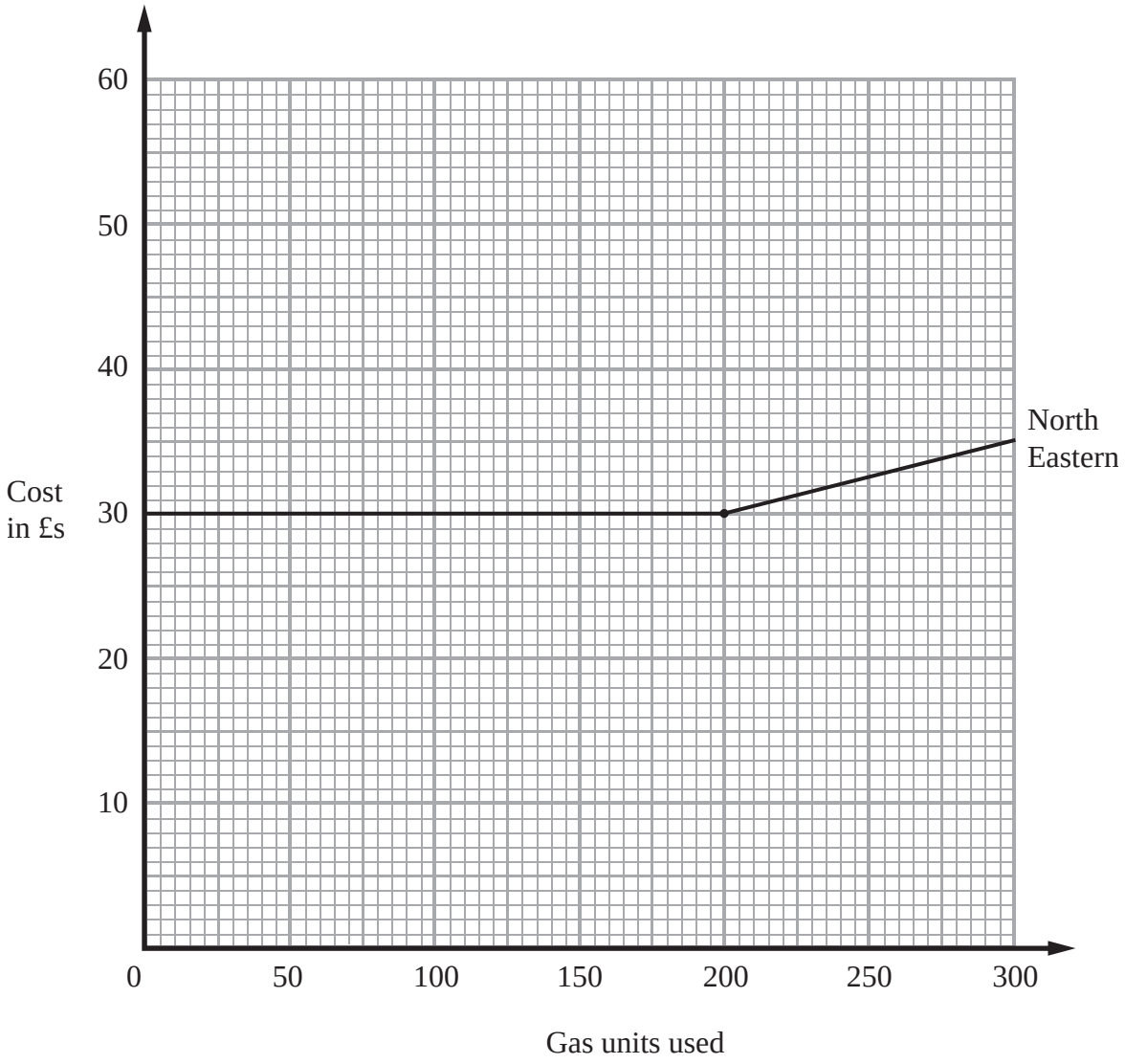
Front Elevation

On the grid below draw a side elevation of the prism.



(Total for Question 12 = 3 marks)

***13** The graph shows the cost of buying gas from the North Eastern Gas Company.



Here are the costs for buying gas from three Gas Companies.

North Eastern	Basic cost £30	First 200 units free then each unit costs 5p
Pacific	Every unit costs 20p	
East Anglian	Basic cost £10	Every unit costs 10p

Erica uses between 100 and 200 units each month.

Explain which would be the cheapest for her to use.
Show clearly how you got your answer.

(Total for Question 13 = 5 marks)

***14** Mrs White wants to buy a new washing machine.

Three shops sell the washing machine she wants.

Clean Machines	**Electrics**	**Wash 'n' Go**
		
Washing machine	**Washing machine**	**Washing machine**
Buy now pay later!	$\frac{1}{4}$ off the usual price	£280
£50 deposit plus	of	plus
10 equal payments of £27	£420	VAT at $17\frac{1}{2}$%

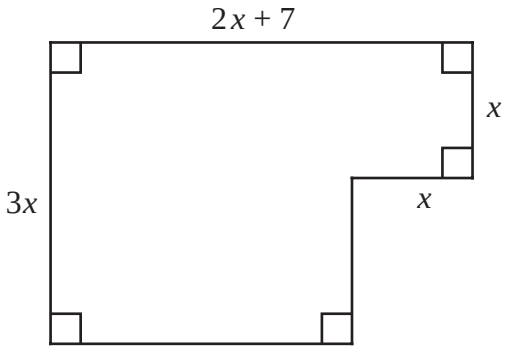
Mrs White wants to buy the cheapest one.
She decides to buy her washing machine from one of these 3 shops.

From which of these shops should she buy her washing machine?
You must show how you decided on your answer.

.....

(Total for Question 14 = 6 marks)

15 The perimeter of this shape is 22 cm.



All measurements are in centimetres

Find the area.

..... cm²

(Total for Question 15 = 5 marks)

16 Use your calculator to work out

$$\frac{\sqrt{6700} - 2.38^2}{3.6^2 + 5.71}$$

You must give your answer as a decimal.
Give your answer to three significant figures.

.....

(Total for Question 16 = 3 marks)

17 Jason earns £50 000 a year.

He has to pay income tax.

He is allowed to earn £6500 before paying tax.
He pays 20% tax on the next £37 400.
He then pays 40% tax on the rest.

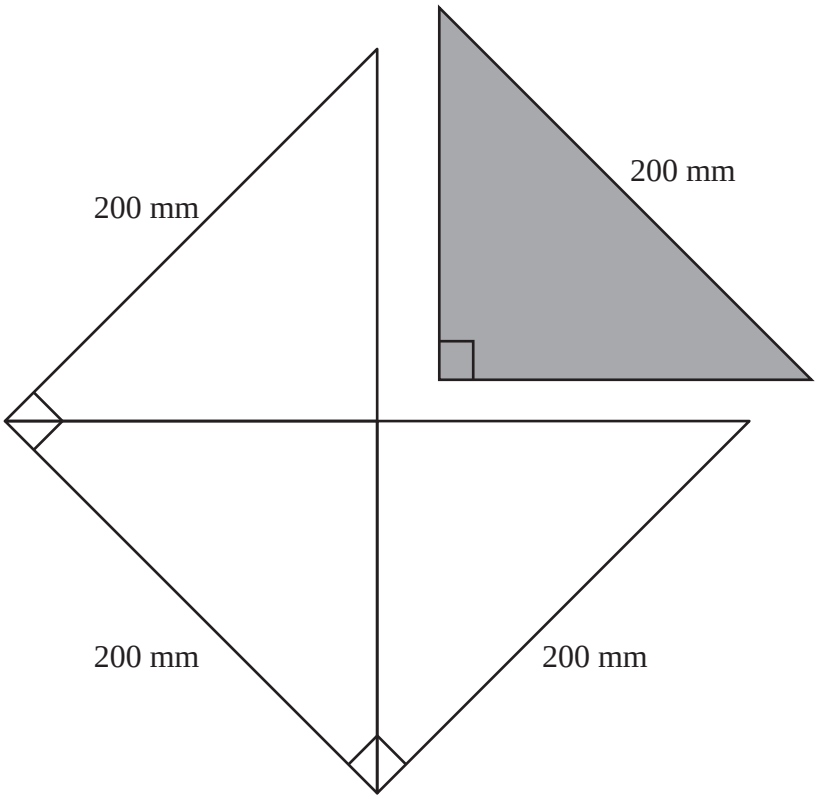
His employer deducts the income tax each month.

How much income tax does Jason get deducted each month?

£ .....

(Total for Question 17 = 5 marks)

18 The shaded isosceles right angled triangle is cut out of a large square of side 200 mm.



The squares are cut out of an A0 sized rectangular piece of paper which has dimensions 1189 mm by 841 mm.

More triangles are cut from the paper that is left after the squares have been cut out.

What is the greatest total number of these triangles that can be cut out of the large, rectangular sheet of paper?

..... triangles

(Total for Question 18 = 5 marks)

19 $P = 3a + 2b^2$

(a) Find the value of P when $a = 5$ and $b = -4$

(2)

.....

(b) Make a the subject of the formula.

(2)

.....

(Total for Question 19 = 4 marks)

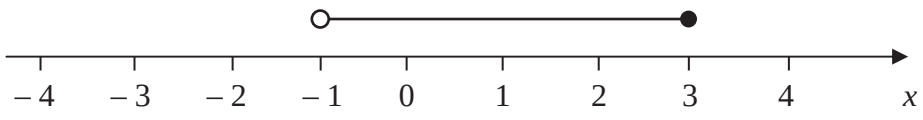
20 $-3 \leqslant n < 2$

n is an integer.

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

(2)

.....



(b) Write down the inequalities represented on the number line.

(2)

.....

(Total for Question 20 = 4 marks)

TOTAL FOR PAPER = 80 MARKS

Unit 3 Foundation Tier: Number, Algebra, Geometry 2

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.	(a)		Regular hexagon	1	B1 (accept hexagon)
	(b)		C	1	B1 cao
			D and G	1	B1 for both, in any order
					Total for Question: 3 marks
2.		(3 + 2) × 48 = 240 240 – 35	215	3	M1 for attempt to find total number of bags of crisps M1 for attempt to subtract 25 A1 cao 3
					Total for Question: 3 marks
3. **FE**			4.0 m ± 0.1 m	4	M2 for drawing a right angled triangle (M1 for a sketch of a right angled triangle) M1 for drawing an angle of 72º ± 2º A1 for answer of 4.0 m ± 0.1 m
					Total for Question: 4 marks
4. **QWC (i, ii, iii)** **FE**		10 × £5.99 = £59.90 10 × 120 – 80 = 40 80 × £0.99 = £79.20 40 × £0.75 = £30 £79.20 + £30 – £59.90 **OR** 5.99 ÷ 12 = 50p (approx) 10 × 12 – 80 = 40 80 × (“99 – 50”)= £39.20 40 × (“75 – 50”) = £10	£49.30 profit	5	M1 for attempt to find original cost of water M1 for attempt to find cost of sale of first 80 bottles M1 for attempt to find number of remaining bottles 10 × 12 – 80 oe M1 for attempt to find cost of cost of sale of remaining bottles A1 cao **QWC: Decision must be stated with clear working attributed correctly** **OR** M1 for 5.99 ÷ 12 = approx 50p M1 for attempt to find profit on sale of first 80 bottles M1 for attempt to find number of remaining bottles M1 for attempt to find profit on sale of remaining bottles A1 cao **QWC: Decision must be stated with clear working attributed correctly**
					Total for Question: 5 marks

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(a)		Correct reflection	1	B1 cao
	(b)		Rotation 180° centre (–0.5, 1)	2	B2 for all 3 attributes B1 for any two of the three attributes
					Total for Question: 3 marks
6.	(a)	64 × 75m = 4800m 4800 ÷ 1000	4.8 km	3	M1 for 64 × 75 M1 for "64 × 75" ÷ 1000 A1 cao
	(b)	Vol = 25 × 10 × 2.5= 625m^3 625 × 1000	625 000	3	M1 for attempt at finding the volume M1 for attempt to find the number of *l* in 1m^3 or 1m^3 = 1000*l* A1 cao
					Total for Question: 6 marks
7.	(a)	32 × £5.20	£166.40	2	M1 for 32 × £5.20 A1 cao
	(b)	£172.50 ÷ £5.75	30 hours	2	M1 for 172.50 ÷ 5.75 A1 cao
					Total for Question: 4 marks
8. **FE**		Days 3rd Apr to 30th Jun is 28 + 31 + 30 = 89 days Cost of days ="89" × 15.07p = £13.41 Units used 10625 – 8963 = 1662 Cost of units = 1662 × 11.85 = £196.95 196.95 + 13.41	£210.36	6	M1 for attempt to find the number of days M1 for standing charge = "89" × 15.07p M1 for attempt to find the number of units used M1 for attempt to find cost of units "1662" × 11.85p A1 for standing charge = "13.41" or unit cost = £196.95 A1 for £210.36 cao
					Total for Question: 6 marks

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9.			Correct tessellation	2	M1 for extra hexagons in vertical plane or at points in horizontal plane or 1 hexagon meets another on a diagonal plane A1 for at least 6 hexagons tessellating correctly
					Total for Question: 2 marks
10.	(a)		3	1	B1 cao
	(b)		18	1	B1 cao
					Total for Question: 2 marks
11.		$220 - 120$ $\frac{100}{220}$	$\frac{5}{11}$	2	M1 for $\frac{220-120}{220}$ oe A1 cao **OR** M1 for $1 - \frac{120}{220}$ $(=\frac{100}{220})$ A1 cao
					Total for Question: 2 marks

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.			Correct front elevation	3	B1 for rectangle of width 3 cm B1 for rectangle of height 4 cm B1 for hidden line shown dotted
					Total for Question: 3 marks
13. **QWC (ii, iii)** **FE**		For 100 units: N Eastern = £30 Pacific = £20 East Anglian = £20 For 200 units: N Eastern = £30 Pacific = £40 East Anglian = £30 **OR** Graphs plotted correctly	Correct conclusion with justifying working	5	B1 for calculating 2 correct points for Pacific M1 for attempt find 2 correct points on East Anglian A1 for two correct points on East Anglian M1 for calculating a point that allows a comparison to be made between 100 and 200 units C1 for correct conclusion **QWC: Decision must be stated, and all comments should be clear and follow through from working out**
					Total for Question: 5 marks
14. **QWC (ii, iii)** **FE**		280 × 0.175 + 280 (= 329) 420 ÷ 4 (= 315) 50 + 10 × 27 (= 320)	£315, Electrics	6	M1 for 50 + 10 × 27 M1 for $\frac{1}{4}$ × 420 or 420 ÷ 4 oe M1 for 280 × 0.175 + 280 or 280 × 1.175 oe A2 for 320, 315 and 329 (A1 for any 2 correct of 320, 315 and 329) C1(dep on M2 A2) for 'Electrics' as final answer **QWC: Decision must be stated, with all calculations attributable**
					Total for Question: 6 marks
15.		$2(3x + 2x + 7) = 22$ **OR** $3x + 2x + 7 + x + x + 2x + x + 7 = 22$ $10x + 14 = 22$ $10x = 8$ $x = 0.8$ Area = 2.4 × 8.6 – 1.6 × 0.8 **OR** 0.8 × 08 + 2.4 × 7.8	19.36 cm²	5	M1 for attempt to find an expression of the perimeter A1 for $10x + 14 = 22$ A1 for $x = 0.8$ M1 for attempt to find area A1 for 19.36
					Total for Question: 5 marks

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
16.			4.08	3	B1 for 5.6644 or 81.8535(2772...) or 76.1(8912772...) or 18.67 B1 for 4.08(0831694) B1 cao
					Total for Question: 3 marks
17.		20% of £37 400 = £7480 50 000 – 37 400 – 6500 = £6100 40% of 6100 = £2440 (“7480” + “2440”) ÷ 12	£826.67	5	M1 for attempt to find 20% of £37 400 M1 for attempt to find how much is taxed at 40% 50 000 – 37 400 – 6500 M1 for attempt to find 40% of “6100” M1 for monthly tax bill is (“7480” + “2440”) ÷ 12 A1 for £826.67 cao
					Total for Question: 5 marks
18.		1189 ÷ 200 or 891 ÷ 200 = 5 and 4 or 20 squares $200^2 \div 2$ $= \sqrt{(200^2 \div 2)}$ = 141.4 Realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 = 5 squares	90	5	M1 for attempt to divide 1189 ÷ 200 or 891 ÷ 200 M1 for $200^2 \div 2$ M1 for $\sqrt{(200^2 \div 2)}$ M1 for realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 A1 cao for 90 triangles
					Total for Question: 5 marks
19.	(a)	$3 \times 5 + 2 \times (-4)^2$ $15 + 2 \times 16$ $15 + 32$	47	2	M1 for $3 \times 5 + 2 \times (-4)^2$ A1 for 47
	(b)	$P - 2b^2 = 3a$ $a = (P - 2b^2) \div 3$	$a = \frac{P - 2b^2}{3}$	2	M1 for $P - 2b^2 = 3a$ A1 cao
					Total for Question: 4 marks

5MB3F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
20.	(a)		–3, –2, –1, 0, 1	2	B2 for –3, –2,-1, 0, 1 (B1 for –2, –1, 0, 1 or –2, –1, 0, 1, 2)
	(b)		$-1 < x \leq 3$	2	B2 for $-1 < x \leq 3$ (B1 for $-1 \leq x \leq 3$ or $-1 < x < 3$
					Total for Question: 4 marks

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics B

Unit 3: Number, Algebra, Geometry 2 (Calculator)

Higher Tier

Sample Assessment Material
Time: 1 hour 45 minutes

Paper Reference
5MB3/3H

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used**.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

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

Turn over

S37719A

2/3/3/2

S 3 7 7 1 9 A 0 1 2 0

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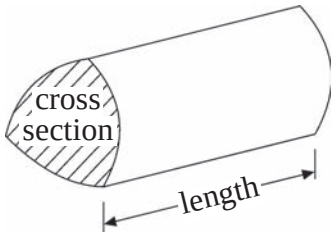
GCSE Mathematics 2MB01

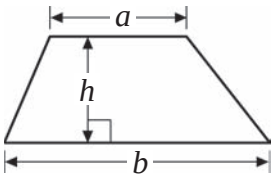
Formulae – Higher Tier

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

Volume of a prism = area of cross section × length

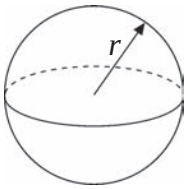


Area of trapezium = $\frac{1}{2}(a+b)h$



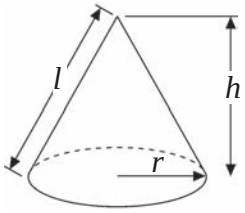
Volume of sphere = $\frac{4}{3}\pi r^3$

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

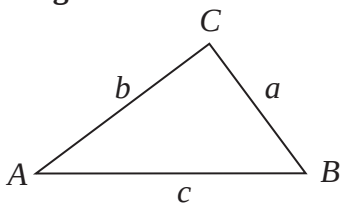


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation

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

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

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

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

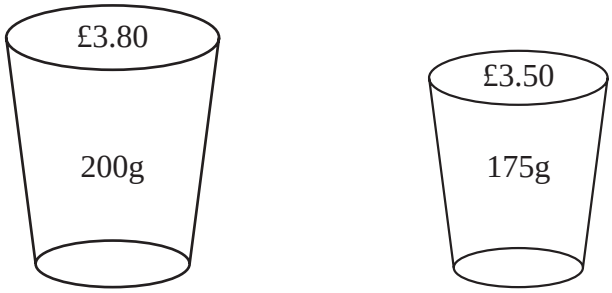
Area of triangle = $\frac{1}{2}ab\sin C$

Answer ALL questions.

Write all your answers in the spaces provided.

You must write down all stages in your working.

1



Large Regular

A Large tub of popcorn costs £3.80 and holds 200g.
A Regular tub of popcorn costs £3.50 and holds 175g.

Which is the better value for money?

.....

(Total for Question 1 = 3 marks)

2 Use your calculator to work out

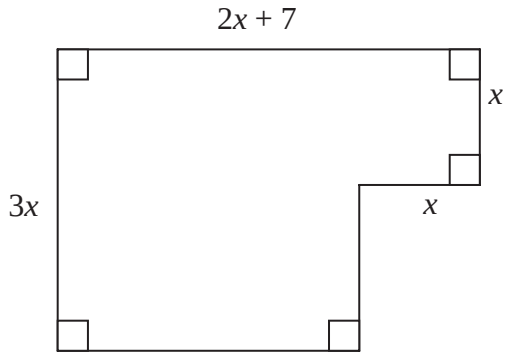
$$\frac{\sqrt{6700} - 2.38^2}{3.6^2 + 5.71}$$

You must give your answer as a decimal.
Give your answer to three significant figures.

.....

(Total for Queston 2 = 3 marks)

3 The perimeter of this shape is 22 cm.



All measurements are in centimetres

Find the area.

..... cm^2

(Total for Question 3 = 5 marks)

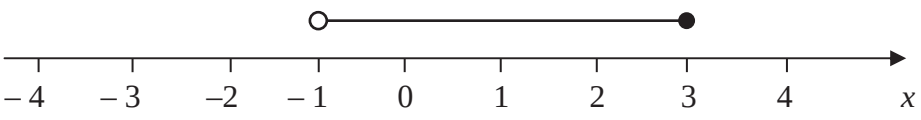
4 $-3 \leqslant n < 2$

n is an integer.

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

(2)

.....



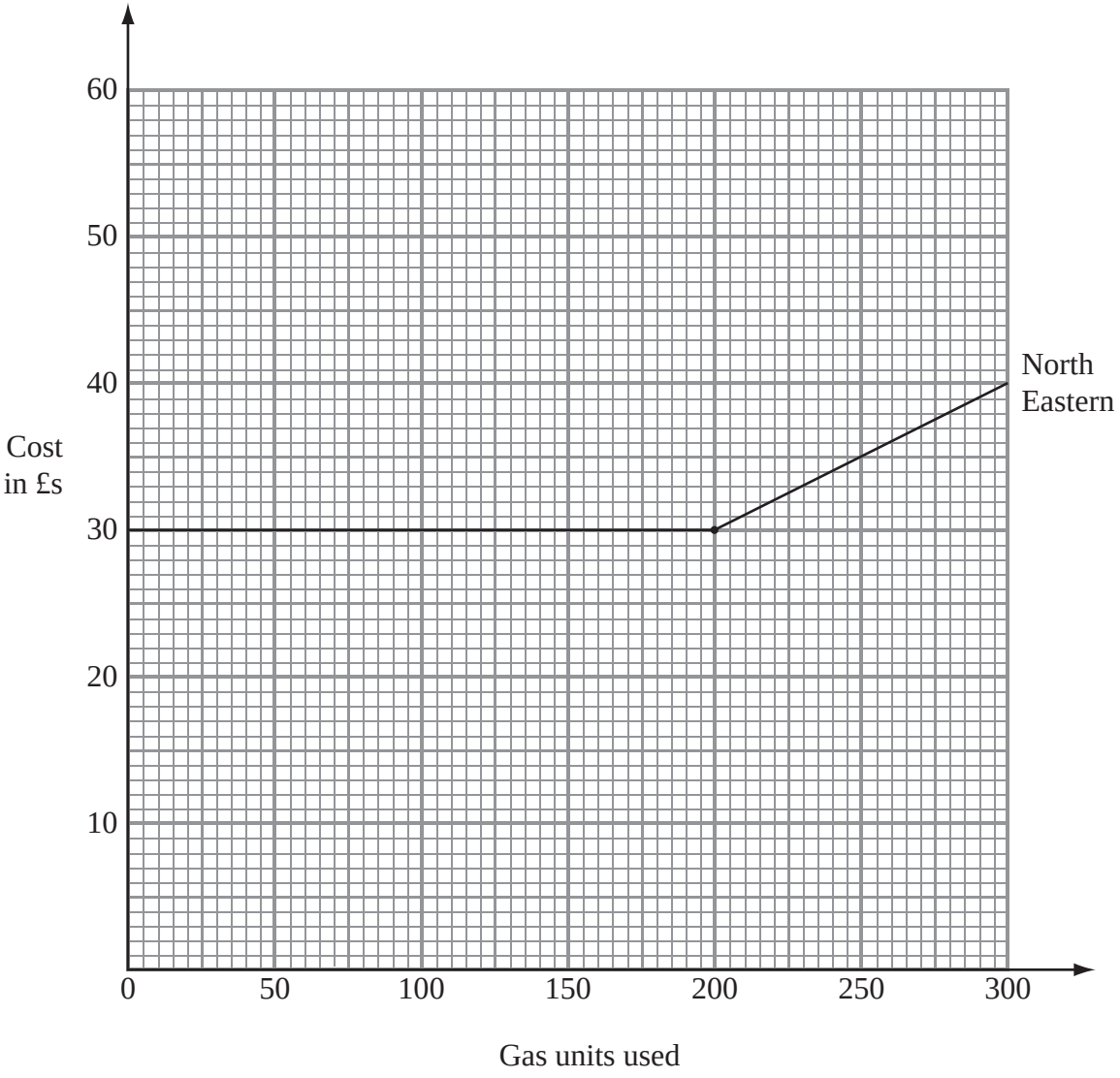
(b) Write down the inequalities represented on the number line.

(2)

.....

(Total for Question 4 = 4 marks)

***5** The graph shows the cost of buying gas from the North Eastern Gas Company.



Here are the costs for buying gas from three Gas Companies.

North Eastern	Basic cost £30	First 200 units free then each unit costs 5p
Pacific	Every unit costs 20p	
East Anglian	Basic cost £10	Every unit costs 10p

Erica uses between 100 and 200 units each month.

Explain which Company would be the cheapest for her to use.
Show clearly how you got your answer.

(Total for Question 5 = 5 marks)

6

Ben's Tyre Shop

Mini prices for Tyres

Tyres for Minis	Price
Goodweek	£65
Dunlap	£62
Bridgearth	£75
Pirello	£69
Valves	50p per tyre
Balancing	£1 per tyre

Des buys two Dunlap tyres with valves and balancing and has to pay VAT at 15%.

(a) Work out the total amount Des pays for the tyres.

(3)

£ .....

Ben sees Dunlap tyres offered for sale in a different garage.
He wants to compare the prices before VAT was added.

(b) What is the price of these tyres before VAT was added?

(2)

Tyre Sale

Dunlap tyres for Minis
(including valves and balancing)

£71.30
including VAT at 15%

£ .....

In 2010 the VAT rate is to be increased from 15% to 17½%.

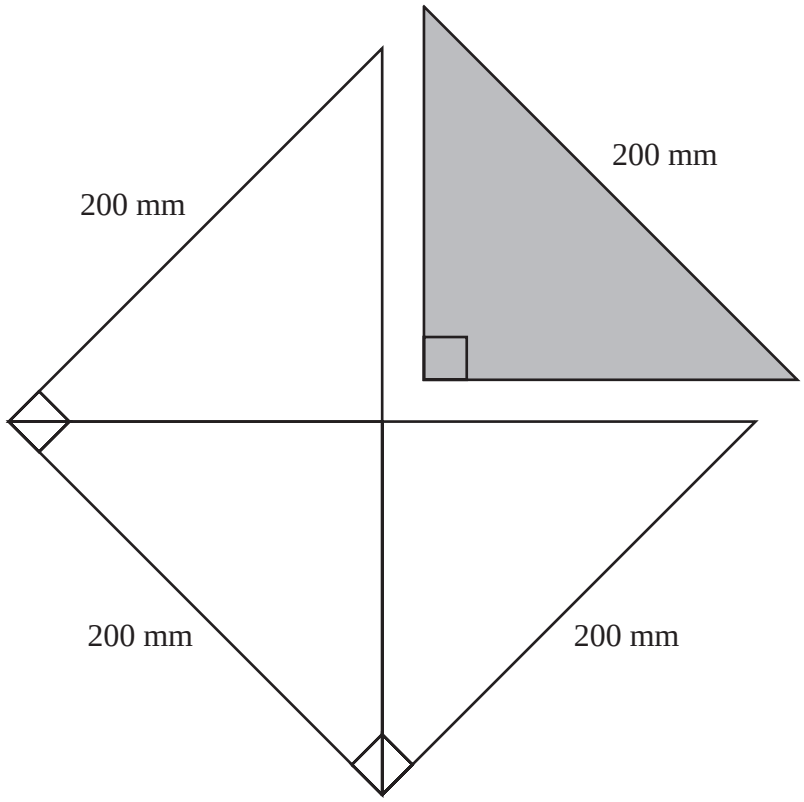
(c) By what number will Ben have to multiply the old prices by to give the new prices including VAT?

(2)

£ .....

(Total for Question 6 = 7 marks)

7 The shaded isosceles right angled triangle is cut out of a large square of side 200 mm.



The squares are cut out of an A0 sized rectangular piece of paper which has dimensions 1189 mm by 841 mm.

More triangles are cut from the paper that is left after the squares have been cut out.

What is the greatest total number of these triangles that can be cut out of the large, rectangular sheet of paper?

..... triangles

(Total for Question 7 = 5 marks)

8 Tom wants to clean the upstairs windows of his house.

He decides to buy a ladder.

The ladder has to reach exactly 3.8 metres up the wall of the house.

To be safe, the ladder has to be at an angle of 72° to the ground.

What length of ladder should Tom buy?

.....

(Total for Question 8 = 4 marks)

9 The time it takes for the pendulum of a clock to swing from one end of its arc to the other and back again is given by the formula

$$T = 2\pi\sqrt{\frac{l}{g}}$$

(a) Find the value of l, when

$T = 2$, $\pi = 3.14$ and $g = 9.81$

(2)

.....

(b) Make l the subject of the formula.

(3)

.....

(Total for Question 9 = 5 marks)

10 Solve

$$\frac{x}{x+4} = \frac{x+7}{x+3}$$

(4)

$x =$ .....

(Total for Question 10 = 4 marks)

11

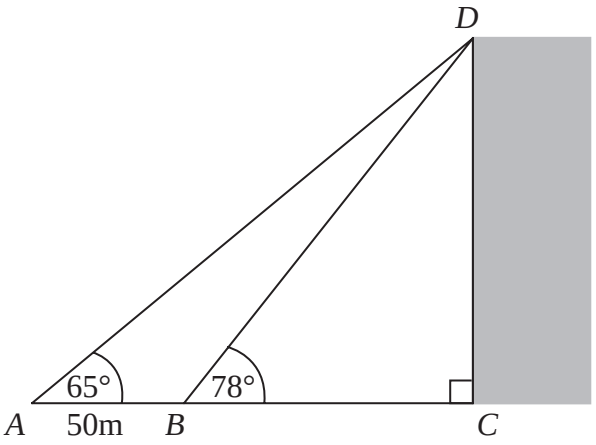


Diagram **NOT** accurately drawn

Steve is working out the height of a tall vertical building *CD*.
The building is standing on horizontal ground.

Steve measures the angle of elevation of the top, *D*, of the building from two different points *A* and *B*.

The angle of elevation of *D* from *A* is 65°
The angle of elevation of *D* from *B* is 78°
AB = 50 m.
ABC is a straight line.

Calculate the height of the building.
Give your answer correct to 3 significant figures.

..... m

(Total for Question 11 = 6 marks)

12 Solve the simultaneous equations

$3x + 2y = 11$

$2x - 5y = 20$

$x =$ .....

$y =$ .....

(Total for Queston 12 = 4 marks)

13 Solve $3x^2 + 2x - 4 = 0$

Give your answer correct to three significant figures.

.....

(Total for Question 13 = 3 marks)

14 Gerry has an ingot of steel that he is going to turn into ball bearings.

The ingot is in the shape of a cuboid and it cost him £50.

The dimensions of the cuboid are 30 cm, by 15 cm by 8 cm to the nearest mm.
The ball bearings are spheres of diameter 5 mm to the nearest tenth of a millimetre.

Gerry melts the ingot and recasts the metal without losing any of the steel.
He sells all the ball bearings he makes at 10 ball bearings for 1 pence.

Work out the least profit Gerry could make if he sells all of the ball bearings.

£ .....

(Total for Question 14 = 6 marks)

***15**

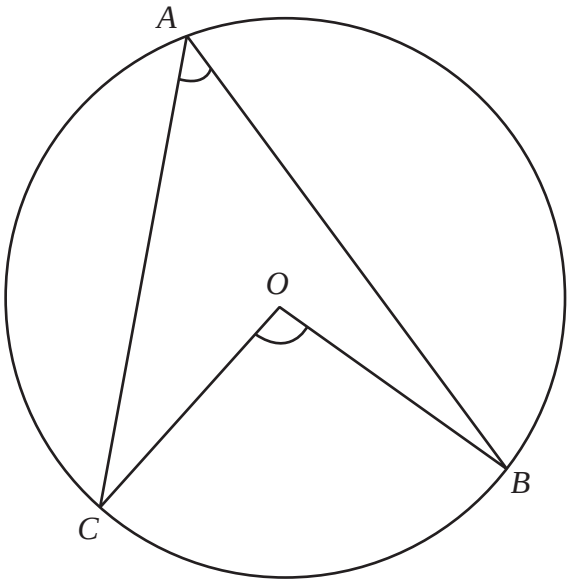


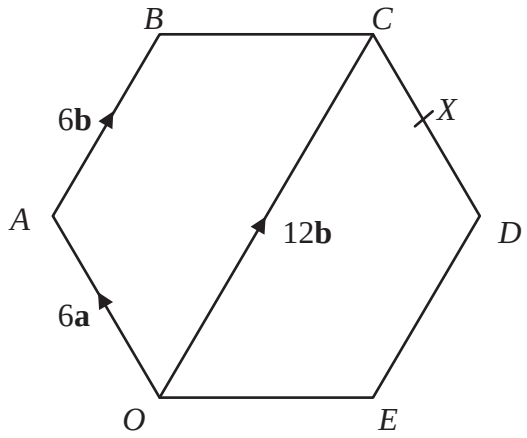
Diagram **NOT** accurately drawn

A, *B* and *C* are points on the circle with centre *O*.

Prove that the angle subtended by arc *BC* at the centre of the circle is twice the angle subtended by arc *BC* at point *A*.

(Total for Question 15 = 4 marks)

16



The diagram shows a regular hexagon $OABCDE$.

$\overrightarrow{OA} = \overrightarrow{DC} = 6\mathbf{a}$, $\overrightarrow{OC} = 12\mathbf{b}$

(a) Find $\overrightarrow{BC}$, in terms of **a** and **b**.

(1)

.....

X is the midpoint of CD.

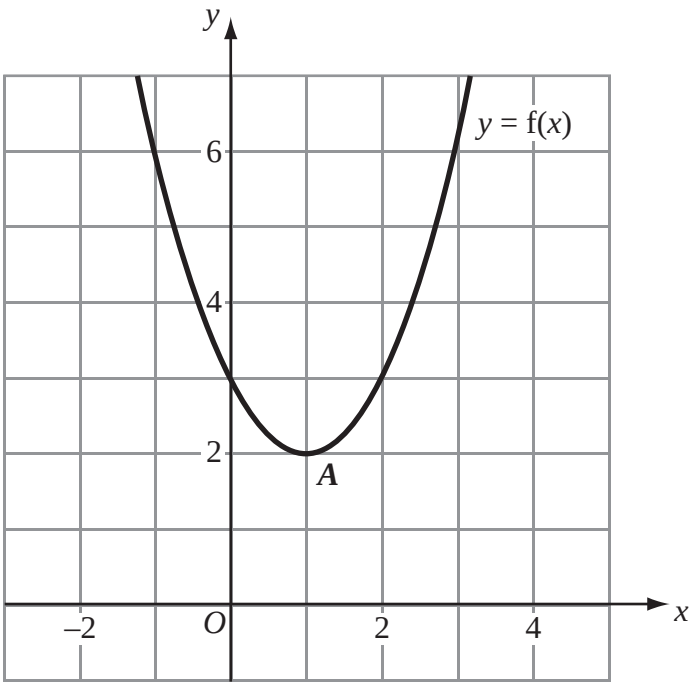
Y is the point on BC extended, such that $BC : CY = 3 : 2$

*****(b) Prove that O, X and Y lie on the same straight line.

(4)

(Total for Question 16 = 5 marks)

17



The diagram shows the graph of $y = f(x)$.

The only vertex of the graph is A at (1, 2).

Write down the coordinates of the vertex of the curve with equation.

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

(1)

.....,.....

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

(1)

.....,.....

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

(b) Describe the transformation.

(1)

.....

(Total for Question 17 = 3 marks)

18

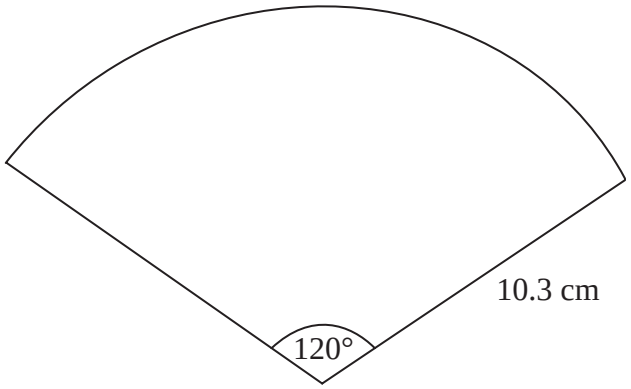


Diagram **NOT** accurately drawn

The diagram shows a net.
The net is a sector of a circle.
The radius of the circle is 10.3 cm and the angle at the centre of the circle is 120º.

The net is used to make a cone.

Calculate the vertical height of the cone.
Give your answer correct to 3 significant figures.

..... cm

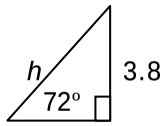
(Total for Question 18 = 4 marks)

TOTAL FOR PAPER = 80 MARKS

Unit 3 Higher Tier: Number, Algebra, Geometry 2

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1. **FE**		380 ÷ 200 = 1.9 350 ÷ 175 = 2	Regular by 0.1p per gram	3	M1 for 380 ÷ 200 (= 1.9) or 200 ÷ 380 (= 0.526) M1 for 350 ÷ 175 (= 2) oe or 175 ÷ 350 (= 0.5) oe C1 for Regular with correct calculations
					Total for Question: 3 marks
2.	(a)(i) (ii)		4.08	3	B1 for 5.6644 or 81.8535(2772…) or 76.1(8912772…) or 18.67 B1 for 4.08(0831694) B1 cao
					Total for Question: 3 marks
3.		$2(3x + 2x + 7) = 22$ **OR** $3x + 2x + 7 + x + x + 2x + x + 7 = 22$ $10x + 14 = 22$ $10x = 8$ $x = 0.8$ Area = 2.4 × 8.6 – 1.6 × 0.8 **OR** 0.8 × 08 + 2.4 × 7.8	19.36 cm²	5	M1 for attempt to find an expression of the perimeter A1 for $10x + 14 = 22$ A1 for $x = 0.8$ M1 for attempt to find area A1 for 19.36
					Total for Question: 5 marks
4.	(a)		–3, –2, –1, 0, 1	2	B2 for –3, –2, –1, 0, 1 (B1 for –2, –1, 0, 1 or –2, –1, 0, 1, 2)
	(b)		$-1 < x \leq 3$	2	B2 for $-1 < x \leq 3$ (B1 for $-1 \leq x \leq 3$ or $-1 < x < 3$
					Total for Question: 4 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5. **QWC (ii, iii)** **FE**		For 100 units: N Eastern = £30 Pacific = £20 East Anglian = £20 For 200 units: N Eastern = £30 Pacific = £40 East Anglian = £30 **OR** Graphs plotted correctly	Correct conclusion with justifying working	5	B1 for calculating 2 correct points for Pacific M1 for attempt find 2 correct points on East Anglian A1 for two correct points on East Anglian M1 for calculating a point that allows a comparison to be made between 100 and 200 units C1 for correct conclusion **QWC: Decision must be stated, and all comments should be clear and follow through from working out**
					Total for Question: 5 marks
6. **FE**	(a)	2 × (62 + 0.50+ 1) "127" × 1.15	£146.05	3	M2 for attempt to find cost including VAT e.g. "127" × 1.15 (M1 for VAT = "127" × 0.175 or $\frac{15}{100} \times 127$ or 12.70 + 6.35) A1 cao
	(b)	71.30 ÷ 1.15	£62	2	M1 for 71.30 ÷ 1.15 or 71.30 ÷ 115 × 100 A1 cao
	(c)		1.02(173913)	2	M1 for ÷ 1.15 or × 1.175 A1 for 1.02(173913)
					Total for Question: 7 marks
7.		1189 ÷ 200 or 891 ÷ 200 = 5 and 4 or 20 squares $200^2 \div 2$ $= \sqrt{(200^2 \div 2)}$ = 141.4 Realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 = 5 squares	90	5	M1 for attempt to divide 1189 ÷ 200 or 891 ÷ 200 M1 for $200^2 \div 2$ M1 for $\sqrt{(200^2 \div 2)}$ M1 for realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 A1 cao for 90 triangles
					Total for Question: 5 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8. **FE**		 $\sin 72 = \frac{3.8}{h}$ $h = \frac{3.8}{\sin 72}$	4 m	4	M1 for drawing sketch of scenario showing all information M1 for $\sin 72 = \frac{3.8}{h}$ or for attempt at scale drawing M1 for $h = \frac{3.8}{\sin 72}$ C1 any ladder over 4.66 m long providing M3 earned NB scale drawing attempt scores a maximum of 2 marks
					Total for Question: 4 marks
9.	(a)	$2 = 2 \times 3.14 \times \sqrt{\frac{l}{9.81}}$ $\sqrt{\frac{l}{9.81}} = \frac{2}{2 \times 3.14}$ $\frac{l}{9.81} = \left(\frac{2}{2 \times 3.14}\right)^2$ $l = 9.81 \times \left(\frac{2}{2 \times 3.14}\right)^2$	0.995	2	M1 for dividing 2 by 2 × 3.14 and squaring A1 for 0.994(96937) cao
	(b)	$T^2 = 4\pi^2 \frac{l}{g}$ $\frac{T^2}{4\pi^2} = \frac{l}{g}$	$l = \frac{T^2 g}{4\pi^2}$	3	M1 for squaring both sides M1 for dividing by $4\pi^2$ or multiplying by g A1 for $l = \frac{T^2 g}{4\pi^2}$ oe
					Total for Question: 5 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
10.		$x(x + 3) = (x + 7)(x + 4)$	−3.5	4	M1 for multiplying through by LCD = $(x + 4)(x + 3)$ A1 for $x^2 + 3x = x^2 + 11x + 28$ B1 for − 28 = 8 A1 cao
					Total for Question: 4 marks
11.	(a)	78 – 65 = 13 $\frac{DB}{\sin 65} = \frac{50}{\sin"13"}$ $DB = \frac{50}{\sin"13"} \times \sin 65$ (=201..) "201" × sin 78	197 m	6	B1 for 13° M1 for $\frac{DB}{\sin 65} = \frac{50}{\sin"13"}$ M1 for $DB = \frac{50}{\sin"13"} \times \sin 65$ A1 for 201 – 201.5 M1 for "201" × sin 78 A1 for 196.6 – 197.1 **OR** B1 for 13° M1 for $\frac{AD}{\sin 102} = \frac{50}{\sin"13"}$ M1 for $AD = \frac{50}{\sin"13"} \times \sin 102$ A1 for 217 – 217.42 M1 for "217" × sin 65 A1 for 196.6 – 197.1
					Total for Question: 6 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.		$15x + 10y = 55$ $4x - 10y = 40$ $19x = 95$ $x = 5$ $15 + 2y = 11$ $2y = -4$ $y = -2$	$x = 5$ $y = -2$	4	M1 for correct multiplication and use of correct operation to eliminate either x or y ,condone one arithmetical error A1 for either $x = 5$ or $y = -2$ M1 (dep) for substitution of found variable into either equation A1 for correct value of 2nd variable **OR** M1 Correct rearrangement of 1 equation and substitution into 2nd equation A1 for either $x = 5$ or $y = -2$ M1 (dep) for substitution of found variable into either equation A1 for correct value of 2nd variable **OR** M1 for one line drawn M1 for second line drawn A1 for $x = 5$ A1 for $y = -2$ (SC : If no method marks awarded, score B1 for one value correct)
					Total for Question: 4 marks
13.		$\frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -4}}{2 \times 3}$ $= \frac{-2 \pm \sqrt{52}}{6}$ **OR** $3(x + \frac{1}{3})^2 - \frac{13}{3} = 0$ $(x + \frac{1}{3})^2 = \frac{13}{9}$	0.869 –1.54	3	M1 for $\frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -4}}{2 \times 3}$ allow substitution of $c = \pm 4$ M1 for $\frac{-2 \pm \sqrt{52}}{6}$ A1 for 0.869 and –1.54 **OR** M1 for $3(x + \frac{1}{3})^2 - \frac{13}{3} = 0$ M1 for $(x + \frac{1}{3})^2 = \frac{13}{9}$ A1 for 0.869 and –1.54 **Trial and improvement:** M1 correct set of trials A1 for 0.869 and –1.54
					Total for Question: 3 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14. **FE**		$\frac{(29.95 \times 14.95 \times 7.95)^3}{\frac{4}{3}\pi(0.255)^3}$ $= \frac{3559.632375}{0.0694559011\ 8}$	£462.25	6	B1 for using the least value of 1 dimension of the cuboid M1 for 29.95 × 14.95 × 7.95 oe B1 for using greatest radius of sphere as 0.25cm + 0.005 cm M1 for dividing least volume of lead "3559.632375" by greatest volume of sphere "0.0694559" A1 for 51250 or Selling price = £51.25 A1 for Profit = £1.25 cao
					Total for Question: 6 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
15. **QWC (i,ii, iii)**		Join *AO* and produce to *P* Mark equal angles in isosceles triangle *AOC* or *AOB* Mark angle *COP* as twice angle *CAO* or mark angle *BOP* as twice angle *BAO* Identify angle *A* as half angle *BOC*		4	M1 for Joining *AO* and producing to "*P*" M1 for marking equal angles in isosceles triangle *AOC* or *AOB* giving reason that triangles are isosceles because radii are equal M1 for marking angle *COP* as twice angle *CAO* or marking Angle *BOP* as twice angle *BAO* giving reason that exterior angle of a triangle is equal to the interior and opposite angles o.e. **QWC: Working should be logical and sequential in structure; following on from labelling the extended line** A1 for Identifying angle *A* as half angle *BOC* if M3 awarded **QWC: All labelling and angle notation should be consistent**
					Total for Question: 4 marks
16.	(a)	$-6\mathbf{b} - 6\mathbf{a} + 12\mathbf{b}$	$6\mathbf{b} - 6\mathbf{a}$	1	B1 cao
QWC (ii, iii)	(b)	$\overrightarrow{BC} = -6\mathbf{b} - 6\mathbf{b} + 12\mathbf{b} = 6\mathbf{b} - 6\mathbf{a}$ $\overrightarrow{CY} = 4\mathbf{b} - 4\mathbf{a}$ $\overrightarrow{OX} = 12\mathbf{b} - 3\mathbf{a}$ $\overrightarrow{OY} = 12\mathbf{b} + 4\mathbf{b} - 4\mathbf{a} = 16\mathbf{b} - 4\mathbf{a}$ $\overrightarrow{OX} : \overrightarrow{OY} = 3 : 4$		4	M1 for attempt to find $\overrightarrow{CY}$ or sight of $\frac{2}{3}(6\mathbf{b} - 6\mathbf{a})$ M1 for attempt to find $\overrightarrow{OX}$ or sight of $12\mathbf{b} - 3\mathbf{a}$ M1 for attempt to find $\overrightarrow{OY}$ or sight of $12\mathbf{b} + 4\mathbf{b} - 4\mathbf{a}$ A1 for $OX : OY = 3 : 4$ shows that *OX* and *OY* are co-linear **QWC: labelling must be consistent and correct**
					Total for Question: 5 marks
17.	(a) (i) (ii)		(1, 5) (3, 2)	2	B1 cao B1 cao
	(b)		Reflection in *x* axis	1	B1 cao
					Total for Question: 3 marks

5MB3H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
18.		$\frac{120}{360} \times 2\pi \times 10.3 = 21.572$ "21.572" $\div 2\pi = 3.4333$ $\sqrt{(10.3^2 - 3.433^2)}$	9.71	4	M1 for Length of arc = $\frac{120}{360} \times 2\pi \times 10.3$ M1 for Radius of circle = "21.572" $\div 2\pi$ M1 for $\sqrt{(10.3^2 - 3.433^2)}$ A1 cao
					Total for Question: 4 marks

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