



General Certificate of Secondary Education

Mathematics 4307
Specification B (Modular)
2009

SPECIMEN ASSESSMENT MATERIALS

Vertical black lines indicate a significant change or addition to the Specimen Assessment Materials published previously.

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Introduction

The GCSE awarding bodies have prepared revised specifications to incorporate the range of features required by GCSE and subject criteria. The specimen assessment material accompanying the specifications is provided to give centres a reasonable idea of the general shape and character of the planned question papers in advance of the first operational examination.

Papers

These specimen question papers have been designed to exemplify the question papers, to be set for Specification B, for first examination in June 2009. The associated mark scheme follows each paper.

The question papers are targeted at two tiers A* - D (Higher) and grades C - G (Foundation).

It should be noted that on both tiers candidates must not use a calculator for Section B of Modules 1 and 3 and Paper 1 on Module 5.

The question papers should be read in conjunction with AQA Specification B for 2009. The specification is available on the web site www.aqa.org.uk

The question papers are intended to represent the length and balance of the papers that will be set for the examination and to indicate the types of questions that will be used. It must be emphasised, however, that the questions have not been subjected to the rigorous review that would take place with questions before use in examination.

Mark Schemes

Principal Examiners have prepared these mark schemes for **specimen** papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

- M** Method marks are awarded for a correct method which could lead to a correct answer.
- A** Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
- B** Marks awarded independent of method.
- M dep** A method mark dependent on a previous method mark being awarded.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- oe** Or equivalent. Accept answers that are equivalent.
eg, accept 0.5 as well as $\frac{1}{2}$

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education



**MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 1 Foundation Tier Section A**

**43051/FA
F**

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments • a treasury tag. 	
---	--

Time allowed for Section A: 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- This paper is divided into two sections: Section A and Section B.
- After the 30 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section A is 23.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice

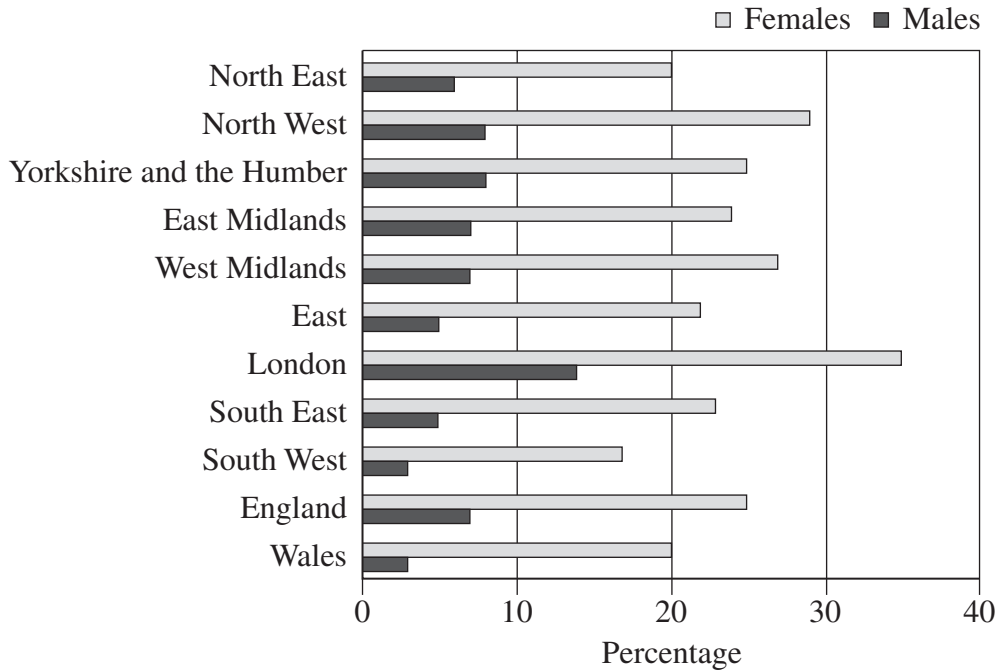
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Section A		Section B	
Question	Mark	Question	Mark
1		5	
2		6	
3		7	
4		8	
		9	
		10	
Total Section A			
Total Section B			
TOTAL			
Examiner's Initials			



Answer **all** questions in the spaces provided.

1 The bar chart shows the percentage of people aged 60 or over feeling very unsafe when walking alone at night.



Source: *National Statistics Regional Trends 39*, November 2005

1 (a) Which region has the greatest percentage of males feeling very unsafe?

Answer (1 mark)

1 (b) Which region has the smallest percentage of females feeling very unsafe?

Answer (1 mark)

1 (c) Which region has the same percentage of females feeling very unsafe as the North East?

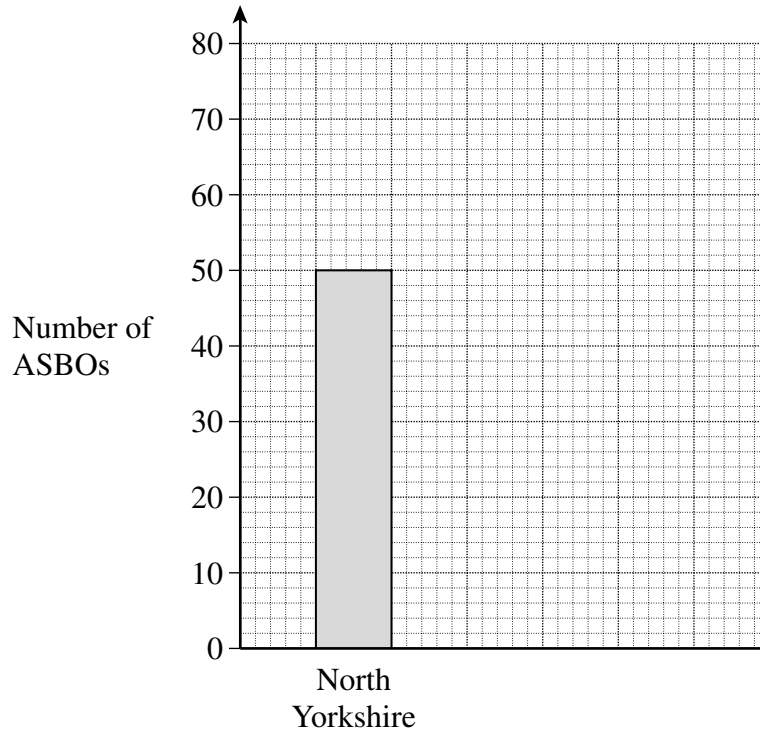
Answer (1 mark)



- 1 (d) The table shows the number of antisocial behaviour orders (ASBOs) issued in two regions.

Region	Number of ASBOs
Gwent (G)	56
Surrey (S)	74

The bar chart shows the number of ASBOs issued in North Yorkshire.



(2 marks)

- 1 (d) (i) Complete the bar chart for Gwent and Surrey.
 1 (d) (ii) How many more ASBOs were issued in Surrey than in North Yorkshire?

.....

Answer (2 marks)

- 1 (e) Police records show that most criminal damage is either to a vehicle or a house. The table shows the probabilities of these types of criminal damage.

Type of criminal damage	Probability
Vehicle	0.39
House	0.25

What is the probability that criminal damage is **not** either to a vehicle or a house?

.....

Answer (2 marks)



- 2 200 customers were asked which type of TV they prefer.

The table shows their results.

Type of TV	Frequency
Plasma	130
LCD	50
Direct view	20

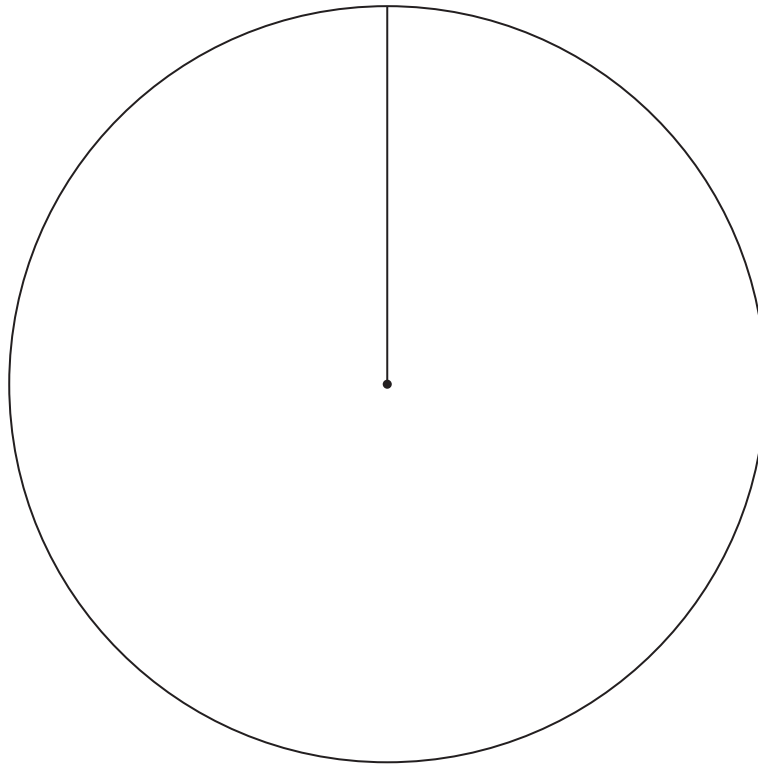
- 2 (a) Draw and label a pie chart to show these results.

.....

.....

.....

Preferred type of TV



(4 marks)

- 2 (b) One of these customers is chosen at random to receive a gift.

Write down the probability that the chosen customer preferred a Plasma TV.

Answer (1 mark)

5



- 3 A spinner has four sections.
Each section is labelled with one letter from the word STAR.
The spinner is biased.



Some of the probabilities of the spinner landing on each section are shown in the table.

Section	Probability
S	0.40
T	
A	
R	0.25

The probability that the spinner lands on T is half the probability that it lands on S.

- 3 (a) What is the least likely letter that the spinner will land on?
You **must** show your working.

.....
.....
.....

Answer (3 marks)

- 3 (b) Calculate the probability that the spinner lands on either S or R.

.....
.....

Answer (2 marks)

5

Turn over ►



4 The best 200 marathon times, in minutes, are summarised in the table.

Time, t (minutes)	Frequency		
$124 \leq t < 126$	7		
$126 \leq t < 128$	144		
$128 \leq t < 130$	49		
Total	200		

Calculate an estimate of the mean time.

.....

.....

.....

.....

.....

.....

Answer minutes (*4 marks*)

4

END OF SECTION A



Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 1 Foundation Tier Section B

43051/FB
F

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
--	--

Time allowed for Section B: 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section B is 23.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

5 The boxes show some events.

Write one of the following words by the side of each box to describe the chance of the event happening.

IMPOSSIBLE UNLIKELY EVENS LIKELY CERTAIN

There will be at least 3 Mondays next month.

.....

Picking a black disc from a bag containing only white discs.

.....

A fair coin landing on heads.

.....






(3 marks)

3



6 The pictogram shows how many people attended a slimming club each week.

 represents 2 people

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

6 (a) In which week did most people attend?

Answer (1 mark)

6 (b) How many people attended the club in Week 1?

.....

Answer (1 mark)

6 (c) In which week did 11 people attend the club?

.....

Answer (1 mark)

6 (d) How many more people attended the club in Week 4 than in week 5?

.....

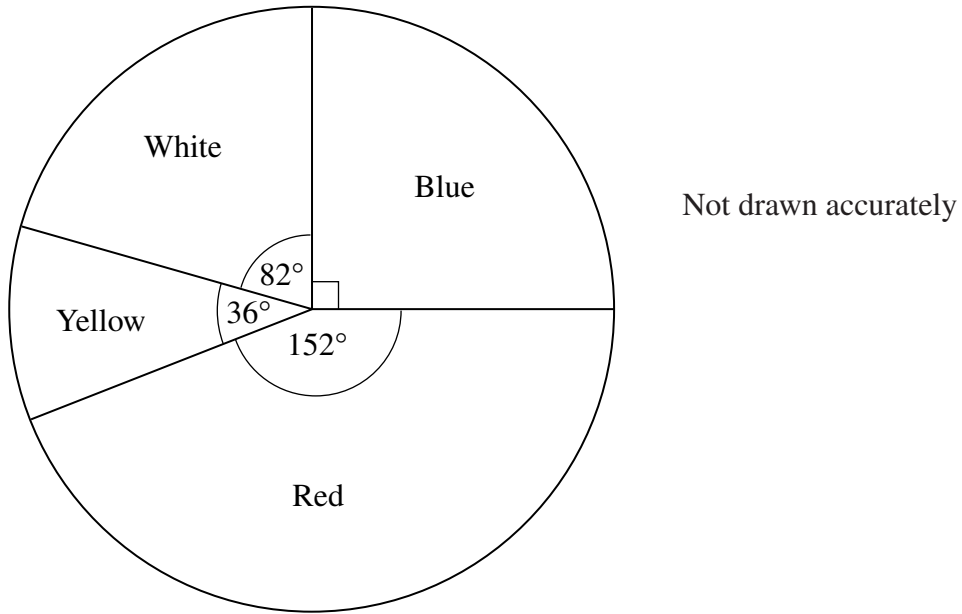
Answer (2 marks)

5

Turn over ►



7 The pie chart shows the proportions of each colour of ticket sold in a raffle.



7 (a) What fraction of tickets sold were blue?

.....

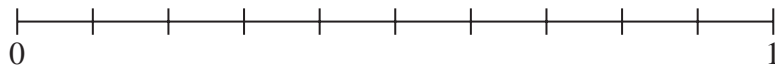
Answer (1 mark)

7 (b) One ticket is drawn at random to win the first prize.

7 (b) (i) Which colour of ticket is most likely to win the first prize?

Answer (1 mark)

7 (b) (ii) Mark the scale with an arrow to show the probability that a yellow ticket wins first prize.

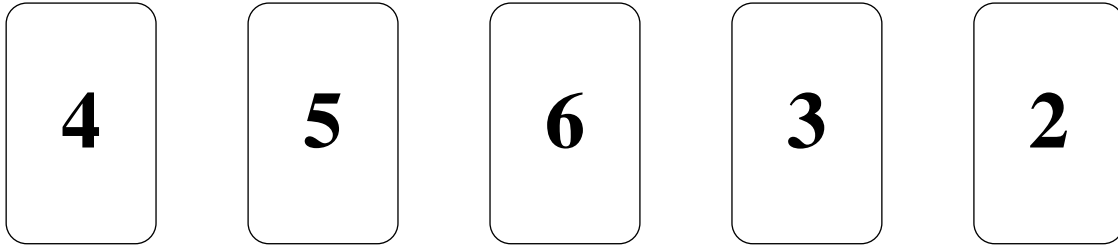


(1 mark)

3



8 Here is a set of five cards.



8 (a) Fran says that the range and the median of the numbers on the cards are the same.

Show that Fran is correct.

.....

.....

.....

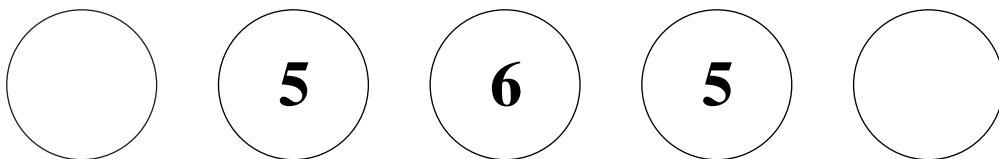
.....

.....

(2 marks)

8 (b) Another set of five cards is shown below.

Write a digit on each blank card so that the mode is equal to the median.



(2 marks)

4

Turn over ►



9 Jordi records the number of e-mails that he receives each day for 15 days.

His results are

11	13	18	22	16
20	19	26	34	28
33	41	27	17	35

9 (a) Complete an ordered stem-and-leaf diagram for his results.

.....

.....

.....

Key | represents e-mails

.....
.....
.....
.....

(3 marks)

9 (b) On the 16th day the number of e-mails that Jordi received increased his range by 1.

Write down the **two** possible numbers of e-mails that he received on the 16th day.

.....

.....

.....

Answer and (2 marks)

5



10 A council surveys 100 households in the town.

10 (a) Here is one of the questions.

What do you think about the council services?

Explain why this question is **not** suitable for a survey.

.....

.....

.....

(1 mark)

10 (b) Here is a different question.

How do you rate the garden refuse collection service?

Good Satisfactory Fair Poor Don't know

The replies from the 100 households are summarised in the table.

Reply	Frequency
Good	12
Satisfactory	19
Fair	30
Poor	33
Don't know	6

There are 20 000 households in the town.

Use the table to calculate an estimate of the number of households in the town who would reply 'Poor'.

.....

.....

.....

Answer (2 marks)

END OF QUESTIONS

3



There are no questions printed on this page

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Q	Answers	Mark	Comments
1(a)	London	B1	
1(b)	South West	B1	
1(c)	Wales	B1	
1(d)(i)	2 bars labelled	M1	
	Correct heights $\pm \frac{1}{2}sq$	A1	
1(d)(ii)	74 – 50	M1	
	24	A1	
1(e)	$1 - (0.39 + 0.25)$	M1	
	0.36	A1	
2(a)	$\frac{130}{200} \times 360$	M1	Any correct method seen
	234° or 90° or 36°	A1	Any correct angle seen or implied
	3 sectors drawn (each within $\pm 2^\circ$)	B1	
	Correct labelling	B1	In proportion to size
2(b)	$\frac{130}{200}$	B1	oe
3(a)	$T = 0.20$	B1	
	$1 - (0.40 + \text{“0.20”} + 0.25)$	M1	
	A (= 0.15)	A1ft	ft their T
3(b)	$0.40 + 0.25$	M1	
	0.65	A1	

Q	Answers	Mark	Comments
4	All 3 correct midpoints seen	B1	
	fx	M1	eg, 7×125 a product seen or any value in class \times class frequency
	$\frac{\sum fx}{\sum f} = \frac{"25484"}{200}$	M1dep	Adding three products and intending to divide their total by 200 May be implied from their answer.
	= 127.42	A1	Accept 127 or better from correct working seen
5	Certain	B1	
	Impossible	B1	
	Evens	B1	
6(a)	2	B1	
6(b)	9	B1	
6(c)	3	B1	
6(d)	10 – 7	M1	
	3	A1	
7(a)	$\frac{90}{360}$	B1	oe
7(b)(i)	Red	B1	
7(b)(ii)	Mark at $\frac{1}{10}$	B1	± 2 mm
8(a)	Range = 4	B1	
	Median => 2, 3, 4, 5, 6	B1	or median = 4
8(b)	Check values work eg, 2, ... 7 etc	B2	B1 for bimodal values eg, 2, 2

Q	Answers	Mark	Comments																											
9(a)	2 5 represents 25 e-mails	B1																												
	<table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">1</td><td style="padding-right: 10px;">1</td><td style="padding-right: 10px;">3</td><td style="padding-right: 10px;">6</td><td style="padding-right: 10px;">7</td><td style="padding-right: 10px;">8</td><td style="padding-right: 10px;">9</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="padding-right: 10px;">0</td><td style="padding-right: 10px;">2</td><td style="padding-right: 10px;">6</td><td style="padding-right: 10px;">7</td><td style="padding-right: 10px;">8</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td style="padding-right: 10px;">3</td><td style="padding-right: 10px;">4</td><td style="padding-right: 10px;">5</td><td></td><td></td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">4</td><td style="padding-right: 10px;">1</td><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	1	3	6	7	8	9	2	0	2	6	7	8		3	3	4	5				4	1						B2
1	1	3	6	7	8	9																								
2	0	2	6	7	8																									
3	3	4	5																											
4	1																													
9(b)	10	B1																												
	42	B1																												
10(a)	Vague ie, council has lots of services or Not specific enough ie, too many services or No choices given	B1																												
10(b)	$\frac{33}{100} \times 20000$	M1																												
	6600	A1																												

Surname						Other Names					
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Candidate Signature											

General Certificate of Secondary Education



**MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 1 Higher Tier Section A**

43051/HA
H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments • a treasury tag. 	
---	--

Time allowed for Section A: 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- This paper is divided into two sections: Section A and Section B.
- After the 30 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section A is 23.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Section A		Section B	
Question	Mark	Question	Mark
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	
Total Section A			
Total Section B			
TOTAL			
Examiner's Initials			



Answer **all** questions in the spaces provided.

1 The amount spent by each of 50 customers in a chemist shop is summarised.

Amount, x (£)	Frequency
$0 < x \leq 5$	12
$5 < x \leq 10$	16
$10 < x \leq 15$	11
$15 < x \leq 20$	7
$20 < x \leq 25$	4

1 (a) Work out the probability that a customer chosen at random spent more than £10.

.....

Answer (2 marks)

1 (b) Explain why it is not possible to work out the probability that a customer chosen at random spent exactly £14.

.....

(1 mark)

3



- 2 A spinner has four sections.
Each section is labelled with one letter from the word STAR.
The spinner is biased.



Some of the probabilities of the spinner landing on each section are shown in the table.

Section	Probability
S	0.40
T	
A	
R	0.25

The probability that the spinner lands on T is half the probability that it lands on S.

What is the least likely letter that the spinner will land on?
You **must** show your working.

.....

.....

.....

Answer (3 marks)

3

Turn over ►



3 The best 200 marathon times, in minutes, are summarised in the table.

Time, t (minutes)	Frequency		
$124 \leq t < 126$	7		
$126 \leq t < 128$	144		
$128 \leq t < 130$	49		
Total	200		

3 (a) Calculate an estimate of the mean time.

.....

.....

.....

.....

.....

.....

Answer minutes (4 marks)

3 (b) A report on the marathon times states that the median time was 128.2 minutes.

Explain why this statement cannot be correct.

.....

.....

.....

(1 mark)

5



- 4 The gas bills for a household over two years are shown.
One of the bills is missing.

	2005				2006			
Month	Feb	May	Aug	Nov	Feb	May	Aug	Nov
Bill (£)	125	85	46	62		95	58	89

- 4 (a) Calculate the value of the first four-part moving average.

.....

Answer £ (2 marks)

- 4 (b) The value of the second four-point moving average is £84.

Calculate the bill for February 2006.

.....

Answer £ (3 marks)

5

Turn over ►



5 The time spent completing homework by Year 10 pupils is summarised.

Time, m (minutes)	Frequency
$0 < m \leq 10$	8
$10 < m \leq 15$	13
$15 < m \leq 25$	32
$25 < m \leq 30$	22
$30 < m \leq 60$	15

Draw a histogram to represent this information.

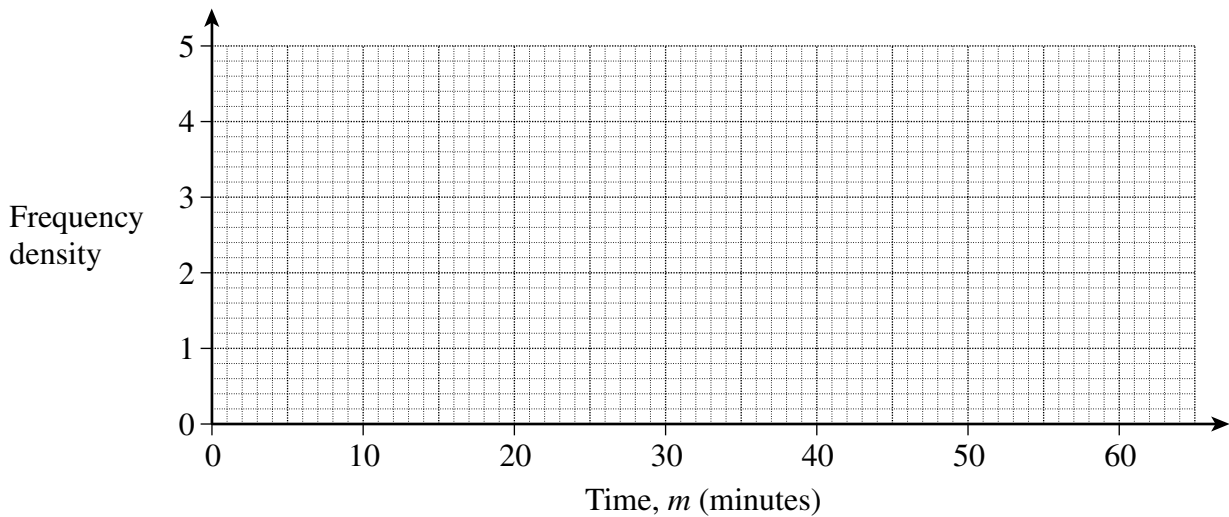
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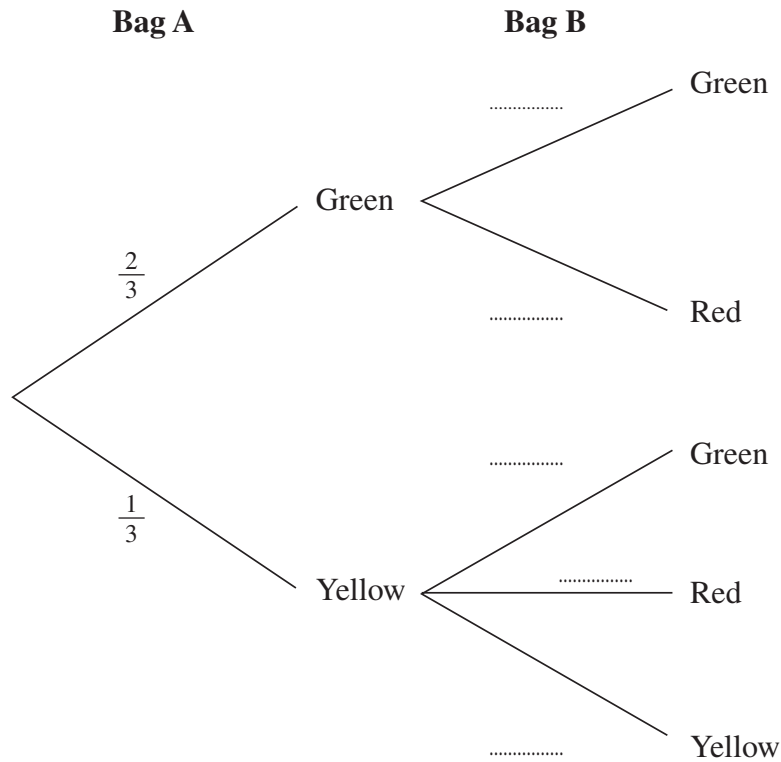
(3 marks)

3



- 6** Bag A contains 2 green discs and 1 yellow disc.
 Bag B contains 1 green disc and 2 red discs.
 A disc is selected at random from Bag A and put into Bag B.
 A disc is then selected at random from Bag B.

- 6** (a) Complete the tree diagram to show all the probabilities.



(2 marks)

- 6** (b) Work out the probability that **neither** of the 2 discs selected are green.

.....

.....

.....

.....

Answer (2 marks)

END OF SECTION A

.....
4



There are no questions printed on this page

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Centre Number						Candidate Number					
Candidate Signature											

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MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 1 Higher Tier Section B

43051/HB

H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
--	--

Time allowed for Section B: 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section B is 23.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

7 Jordi records the number of e-mails that he receives each day for 15 days.

His results are

11	13	18	22	16
20	19	26	34	28
33	41	27	17	35

Complete an ordered stem-and-leaf diagram for his results.

.....

.....

.....

Key | represents e-mails

.....
.....
.....
.....

(3 marks)

8 A council surveys households from a town.

8 (a) They plan to survey 200 households on a large estate.

Explain why this is **not** a suitable method for the survey.

.....

.....

.....

(1 mark)

3



8 (b) Here is one of the questions.

What do you think about the council services?

Explain why this question is **not** suitable for a survey.

.....

.....

.....

(1 mark)

8 (c) Here is a different question.

How do you rate the garden refuse collection service?

Good Satisfactory Fair Poor Don't know

The replies from the 100 households are summarised in the table.

Reply	Frequency
Good	12
Satisfactory	19
Fair	30
Poor	33
Don't know	6

There are 20 000 households in the town.

Use the table to calculate an estimate of the number of households in the town who would reply "Poor".

.....

.....

.....

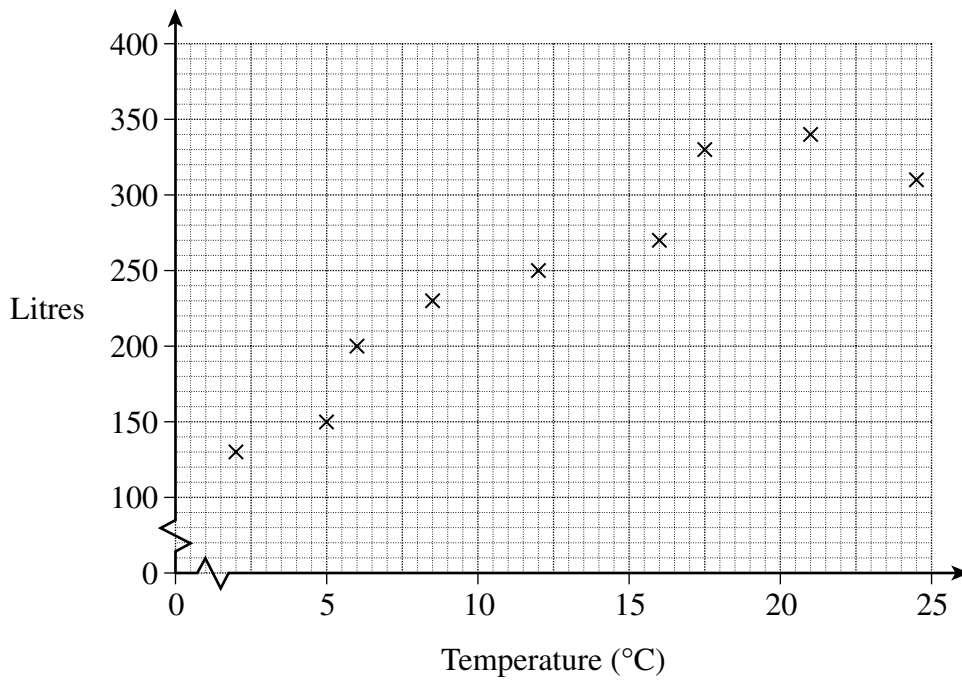
Answer *(2 marks)*

4

Turn over ►



- 9 (a) The scatter diagram shows the volume of ice cream sold in a supermarket and the average daily temperature on nine days.



- 9 (a) (i) Draw a line of best fit on the graph. (1 mark)

- 9 (a) (ii) Use your line of best fit to estimate the temperature when 300 litres of ice cream is sold.

Answer °C (1 mark)

- 9 (a) (iii) State the relationship between the temperature and the volume of ice cream sold.

.....

.....

.....

(1 mark)



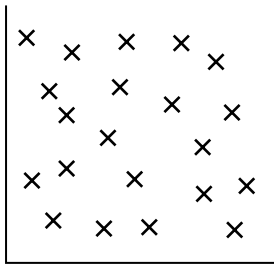
9 (b) Here are three statements about correlation.

Statement A : Strong negative correlation

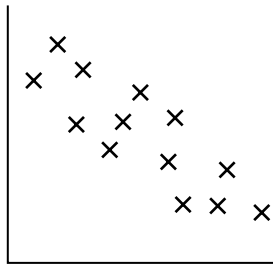
Statement B : Zero correlation

Statement C : Weak negative correlation

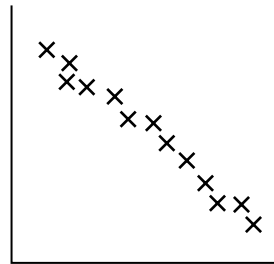
Which statement best describes the type of correlation in each of the scatter diagrams below?



Statement



Statement



Statement

(2 marks)

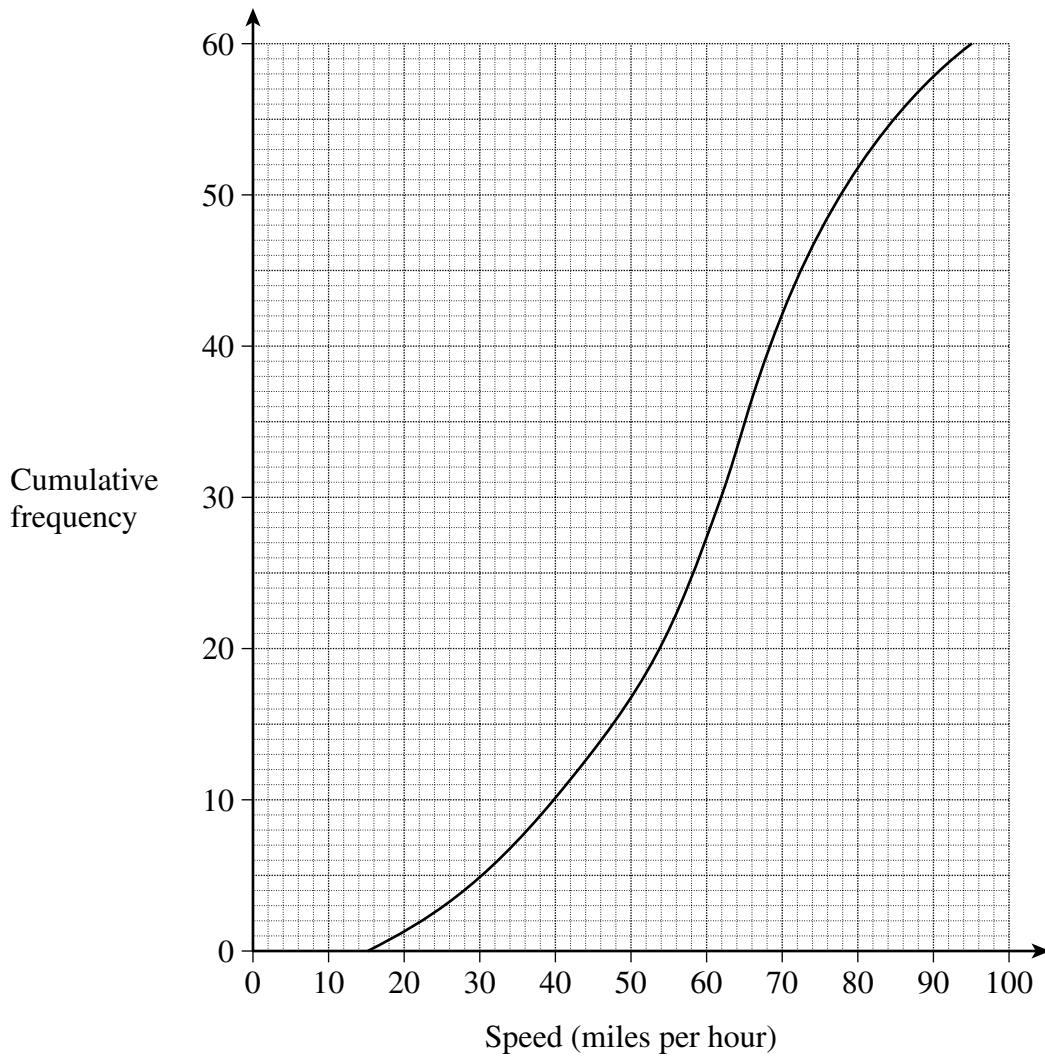
5

Turn over for the next question

Turn over ►



- 10** (a) The speed, in miles per hour, of each of 60 cars passing a police checkpoint on a motorway is represented by the cumulative frequency diagram.



- 10** (a) (i) Use the diagram to estimate the median speed.

Answer miles per hour (*1 mark*)



- 10** (a) (ii) Drivers of cars travelling faster than 70 miles per hour are breaking the law.

Use the diagram to estimate the number of drivers breaking the law.

.....

Answer (2 marks)

- 10** (b) Information about the speeds of lorries, in miles per hour, on the motorway was also collected.

lowest speed 20

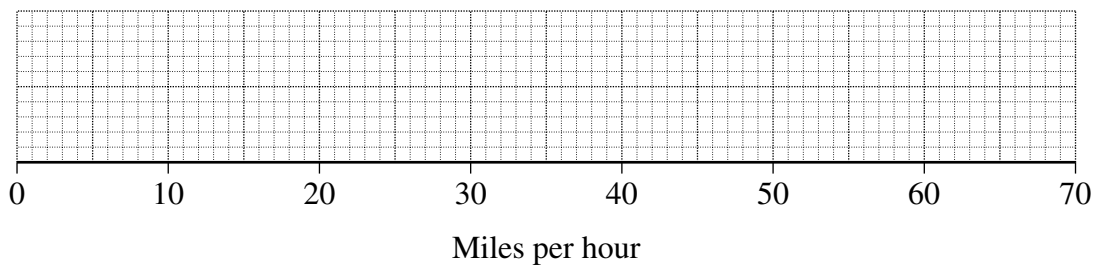
highest speed 65

lower quartile 34

interquartile range 18

median 42

Draw a box plot to represent this information.



(2 marks)

5

Turn over for the next question

Turn over ►



11 A Headteacher decides to carry out a survey about school uniform. She is going to ask pupils, parents and teachers. The numbers in the school are shown.

Pupils	Parents	Teachers
1200	2000	100

11 (a) Explain why the Headteacher should take a stratified sample.

.....

.....

(1 mark)

11 (b) A stratified sample is taken. 60 pupils are selected.

Work out the number of parents that should be selected.

.....

.....

.....

Answer *(2 marks)*

3

12 Information about the members of the choir of a sixth form college is shown.

	Year 12	Year 13
Female	5	9
Male	3	8

Two members are to be chosen at random to attend a concert.

Work out the probability that the two members chosen will be from the same Year.

.....

.....

.....

.....

.....

Answer *(3 marks)*

3

END OF QUESTIONS



Q	Answers	Mark	Comments
1(a)	$11 + 7 + 4$	M1	
	$\frac{22}{50}$	A1	oe
1(b)	Don't know how many spent exactly £14	B1	
2	$T = 0.20$	B1	
	$1 - (0.40 + "0.20" + 0.25)$	M1	
	A (= 0.15)	A1ft	ft their T
3(a)	All 3 correct midpoints seen	B1	
	fx	M1	eg, 7×125 a product seen or any value in class \times class frequency
	$\frac{\sum fx}{\sum f} = \frac{"25484"}{200}$	M1dep	Adding three products and intending to divide their total by 200 May be implied from their answer
	127.42	A1	Accept 127 or better from correct working seen
3(b)	Median is in the class $126 \leq t < 128$	B1	
4(a)	$\frac{125 + 85 + 46 + 62}{4}$	M1	
	79.50	A1	Do not allow 79.5 but implies M1
4(b)	$84 \times 4 (= 336)$	M1	
	$(336) - 85 - 46 - 62$	M1dep	$(336) - 193$
	143	A1	

Q	Answers	Mark	Comments																											
5	At least one frequency \div width	M1																												
	At least 4 of 0.8 2.6 3.2 4.4 0.5	A1																												
	Fully correct histogram	A1																												
6(a)	Top two branches each labelled with $\frac{1}{2}$	B1	oe probability																											
	Other three branches labelled $\frac{1}{4}, \frac{1}{2}, \frac{1}{4}$ respectively	B1	oe probabilities																											
6(b)	$\frac{1}{3} \times \frac{1}{4} + \frac{1}{3} \times \frac{1}{2}$	M1	$\frac{1}{3} \times \frac{3}{4}$																											
	$\frac{1}{4}$	A1	oe																											
7	2 5 represents 25 emails	B1																												
	<table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">1</td><td>1</td><td>3</td><td>6</td><td>7</td><td>8</td><td>9</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td>0</td><td>2</td><td>6</td><td>7</td><td>8</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td>3</td><td>4</td><td>5</td><td></td><td></td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">4</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	1	3	6	7	8	9	2	0	2	6	7	8		3	3	4	5				4	1						B2
1	1	3	6	7	8	9																								
2	0	2	6	7	8																									
3	3	4	5																											
4	1																													
8(a)	They will only get views from one area of the town	B1																												
8(b)	Vague ie, council has lots of services or Not specific enough ie, too many services or No choices given	B1																												
8(c)	$\frac{130}{200} \times 20000$	M1																												
	6600	A1																												

Q	Answers	Mark	Comments
9(a)(i)	Suitable line of best fit drawn	B1	
9(a)(ii)	Temperature from 300 on vertical axis	B1ft	ft their line of best fit
9(a)(iii)	As temperature increases the amount of ice cream sold increases	B1	
9(b)	B C A	B2	B1 for any one correct
10(a)(i)	62	B1	
10(a)(ii)	(60 –) Their c f value from speed of 70	M1	(60 –) 44
	16	A1	
10(b)	Marks 20, 34, 42 and 65	M1	
	Fully correct box plot	A1	SC1 UQ = 52
11(a)	There are different numbers of pupils, parents and teachers	B1	
11(b)	$\frac{60}{1200} \times (1200 + 2000 + 100)$	M1	
	165	A1	
12	$\frac{8}{25} \times \frac{7}{24}$ or $\frac{17}{25} \times \frac{16}{24}$	M1	oe probabilities
	$\frac{8}{25} \times \frac{7}{24} + \frac{17}{25} \times \frac{16}{24}$	M1dep	oe probabilities
	$\frac{41}{75}$	A1	oe

Surname						Other Names					
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Candidate Signature											

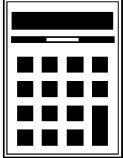
General Certificate of Secondary Education

**MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 3 Foundation Tier Section A**

**43053/FA
F**



Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments • a treasury tag. 	
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Time allowed for Section A: 45 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- This paper is divided into two sections: Section A and Section B.
- After the 40 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section A is 35.
- The marks for questions are shown in brackets.
- You may ask for more answer paper. This must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Section A		Section B	
Pages	Mark	Pages	Mark
2–3		2–3	
4–5		4–5	
6–7		6–7	
		8	
Total Section A			
Total Section B			
TOTAL			
Examiner's Initials			



Answer **all** questions in the spaces provided.

1 (a) Write down the value of the digit 4 in 24 609.

Answer (1 mark)

1 (b) Write down the number that is 100 more than 24 609.

Answer (1 mark)

1 (c) Write down the number that is 10 less than 24 609.

Answer (1 mark)

1 (d) Caroline says that the number 24 609 is closer to 24 000 than to 25 000.

Is Caroline correct?
Explain your answer.

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

2 Niles buys a toy car.
The car costs £39.99
The car needs four large batteries.
A pack of two large batteries costs £3.09

How much does it cost to buy the car and four batteries?

.....
.....
.....

Answer £ (3 marks)



3 A monthly magazine costs £2.75

3 (a) (i) Becky buys the magazine every month for one year.

How much does Becky pay for the magazines in one year?

.....
.....

Answer £ (2 marks)

3 (a) (ii) She gives two £20 notes to pay for the magazines for one year.

How much change should Becky receive?

.....

Answer £ (1 mark)

3 (b) Maria buys one of the magazines.
She gives the exact money using the smallest possible number of coins.

List the coins she pays with.

.....

Answer (2 marks)

3 (c) A shop offers the magazine at a discount of 20%.

Work out the discount in pence.

.....
.....

Answer pence (2 marks)



4 (a) At a cricket match, for every four male spectators there are three female spectators.

What fraction of the spectators are male?

Answer (1 mark)

4 (b) There are 35 000 people at the cricket match.

How many of the spectators are male?

.....
.....

Answer (2 marks)

4 (c) There are 5000 children at the match.
4000 of the children are boys.

What is the ratio of boys to girls?

.....

Answer : (1 mark)

4 (d) 150 extra children arrive at the match.
The ratio of boys to girls remains the same.

How many extra girls arrive?

.....
.....

Answer (2 marks)



5 On 25th March Iqbal says that his birthday will be in 10 days time.
Iqbal makes a mistake by one day.

What are the **two** possible dates of Iqbal's birthday?

.....
.....
.....

Answer and (2 marks)

6 Calculate $7.54 \div 90$

6 (a) Write down your full calculator display.

Answer (1 mark)

6 (b) Write down your answer to one decimal place.

Answer (1 mark)

6 (c) Write down your answer to 6(a) to one significant figure.

Answer (1 mark)

7 Eggs are packed into boxes.
Each box has space for 12 eggs.

How many boxes are needed to pack 433 eggs so that none are left without a box?

.....
.....
.....

Answer (2 marks)



- 10** A ceiling is 237 centimetres above the floor.
This is measured to the nearest centimetre.

What is the least and greatest possible height of the ceiling?

Answer Least cm (*1 mark*)

 Greatest cm (*1 mark*)

END OF SECTION A



There are no questions printed on this page

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**MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 3 Foundation Tier Section B**

**43053/FB
F**

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
--	--

Time allowed for Section B: 45 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section B is 35.
- The marks for questions are shown in brackets.
- You may ask for more answer paper. This must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

11 Work out

11 (a) $78 + 25$

.....
.....
.....

Answer (1 mark)

11 (b) $305 - 62$

.....
.....
.....

Answer (1 mark)

11 (c) 15×6

.....
.....
.....

Answer (1 mark)

11 (d) $133 \div 7$

.....
.....
.....

Answer (1 mark)



12 From this list of numbers 55 30 64 32 25 38

12 (a) Write down the **two** square numbers.

Answer and (2 marks)

12 (b) Write down a multiple of 6.

Answer (1 mark)

12 (c) Write down the number which is half the value of the largest number in the list.

.....
.....

Answer (1 mark)

12 (d) Write down the **two** numbers which make a total of 80.

.....

Answer and (1 mark)

12 (e) Write down the **two** numbers which have a difference of 13.

.....

Answer and (1 mark)

13 Write the word 'smaller' or the word 'larger' to make each sentence correct.

13 (a) 1078 is than 870.1 (1 mark)

13 (b) $\frac{1}{2}$ is than 0.2 (1 mark)

13 (c) -4 is than -7 (1 mark)

13 (d) 0.28 is than 0.9 (1 mark)



14 Nick received 23 e-mails one Tuesday.
The number of e-mails he received doubled on each day for the rest of that week.
He claimed that he received over 200 e-mails on that Friday.

Is Nick correct?
You **must** show your working.

.....
.....
.....
.....

(2 marks)

15 Work out 15% of 120.

.....
.....
.....

Answer *(2 marks)*



16 Here is part of a bus timetable for journeys from Scunthorpe to Lincoln.

Scunthorpe	07:25	07:55	08:15
Scotter	07:47	08:17	08:37
Gainsborough	08:09	08:39	09:09
Lincoln	09:02	09:32	10:02

16 (a) How long does the 07:25 bus from Scunthorpe take to get to Gainsborough?

.....

Answer minutes (2 marks)

16 (b) It takes Liz eight minutes to walk to the bus stop in Scotter from her house.
She leaves her house at 08:04
The bus is 16 minutes late.

How long does Liz wait at the bus stop for the bus?
You **must** show your working.

.....
.....
.....

Answer minutes (3 marks)



17 Nasreen says that $2^5 = 5^2$

Is Nasreen correct?

You **must** show your working.

.....

.....

.....

(2 marks)

18 (a) Jenny estimates the value of 9.65×5.06
Her answer is 50.

Explain how she did her estimation.

.....

.....

(2 marks)

18 (b) Dave correctly works out the multiplication using his calculator.

$$9.65 \times 5.06 = 48.829$$

Use Dave's answer to work out the exact answer to 0.965×506 .

.....

Answer (1 mark)



19 A plane has a top speed of 600 miles per hour.
The plane flies between two airports, a distance of 2100 miles.

19 (a) Calculate the time taken for the plane to fly between the airports at top speed.
Give your answer in hours and minutes.

.....
.....
.....

Answer hours minutes (*3 marks*)

19 (b) Explain why the plane will actually take longer than this to fly between the two airports.

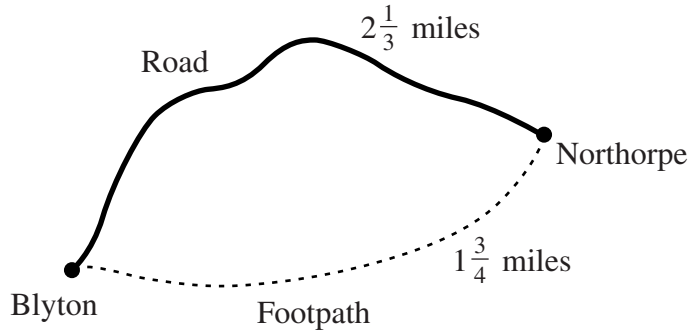
.....
.....

(*1 mark*)

Turn over for the next question



20 The diagram shows two routes between the villages of Blyton and Northorpe.



The distance from Blyton to Northorpe is $2\frac{1}{3}$ miles by road.

The distance from Blyton to Northorpe is $1\frac{3}{4}$ miles by footpath.

How much further is it to go by road than by footpath?

.....
.....
.....
.....

Answer miles (3 marks)

END OF QUESTIONS



Q	Answers	Mark	Comments
1(a)	Thousand	B1	oe Accept 4000
1(b)	24 709	B1	
1(c)	24 599	B1	
1(d)	Says Caroline wrong because 609 is greater than 500	B1	
2(a)	Needs 2 packs of batteries	M1	May be implied
	$39.99 + 3.09 + 3.09$	M1	oe
	46.17	A1	SC2 52.35
3(a)(i)	12×2.75	M1	
	33	A1	
3(a)(ii)	7	B1ft	
3(b)	£2, 50(p), 20(p), 5(p)	B2	B1 Correct total more than 4 coins
3(c)	0.2×2.75	M1	
	55p	A1	
4(a)	$\frac{4}{7}$	B1	
4(b)	$35\ 000 \div 7 \times 4$	M1	ft their fraction from (a)
	20 000	A1	
4(c)	4 : 1	B1	
4(d)	$150 \div 5$	M1	
	30	A1	
5	3 rd April and 5 th April	B1 each	SC1 for 2 nd and 4 th April
6(a)	0.083777 or better	B1	
6(b)	0.1	B1ft	ft any number with 2dp or more
6(c)	0.08	B1ft	ft any number with 2sf or more

Q	Answers	Mark	Comments
7	$433 \div 12 (= 36.083\dots)$	M1	
	37	A1	
8	$\frac{4}{20}$ should be $\frac{5}{20}$	B1	
	answer denominator should be 20	B1	
9(a)	First correct division or pair of factor tree branches	M1	oe
	Correct factor tree or $3 \times 3 \times 3 \times 3 \times 3$ in non-index form	A1	oe
	3^5	A1	
9(b)	3^{10}	B1	
10	236.5	B1	
	237.5	B1	or 237.49 recurring using standard notation
11(a)	103	B1	
11(b)	243	B1	
11(c)	90	B1	
11(d)	19	B1	
12(a)	64 and 25	B1 B1	
12(b)	30	B1	
12(c)	32	B1	
12(d)	55 and 25	B1	
12(e)	38 and 25	B1	

Q	Answers	Mark	Comments
13(a)	Larger	B1	
13(b)	Larger	B1	
13(c)	Larger	B1	
13(d)	Smaller	B1	
14	Attempts to double at least 3 times	M1	46, 92, 184 if correct
	Sight of 184 and states Nick wrong	A1	oe Wrong may be implied from working
15	10% = 12 5% = 6 and adds	M1	oe
	18	A1	
16(a)	35 + 9	M1	or 08:09 seen
	44	A1	
16(b)	Arrives at stop at 8:04 + 0:08 (= 8:12)	M1	
	Bus arrives at 8:17 + 0:16 (= 8:33)	M1	
	21 minutes	A1	
17	Sight of 32 or 25 (No)	B1 each	
18(a)	Rounded to 10 and 5	M1	
	10×5	A1	
18(b)	488.29	B1	
19(a)	2100 / 600	M1	
	3.5	A1	
	3 hours 30 minutes	A1	
19(b)	Plane cannot always fly at top speed	B1	

Q	Answers	Mark	Comments
20	common denominator of 12 with at least one numerator correct	M1	
	$\frac{28}{12} - \frac{21}{12}$	A1	
	$\frac{7}{12}$	A1	

Surname						Other Names					
Centre Number						Candidate Number					
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General Certificate of Secondary Education



**MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 3 Higher Tier Section A**

43053/HA
H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments • a treasury tag. 	
---	--

For Examiner's Use			
Section A		Section B	
Pages	Mark	Pages	Mark
2–3		2–3	
4–5		4–5	
6–7		6–7	
		8	
Total Section A			
Total Section B			
TOTAL			
Examiner's Initials			

Time allowed for Section A: 45 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- This paper is divided into two sections: Section A and Section B.
- After the 40 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section A is 35.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

- 1 (a) There are 5000 children at the match.
4000 of the children are boys.

What is the ratio of boys to girls?

.....

Answer : (1 mark)

- 1 (b) 150 extra children arrive at the match.
The ratio of boys to girls remains the same.

How many extra girls arrive?

.....

.....

Answer (2 marks)

- 2 Trevor is attempting to add $\frac{1}{4}$ and $\frac{2}{5}$

This is his attempt.

It contains **two** errors.

$$\begin{aligned}\frac{1}{4} + \frac{2}{5} &= \frac{4}{20} + \frac{8}{20} \\ &= \frac{12}{40}\end{aligned}$$

What are his errors?

.....

.....

Answer Error 1

Error 2

(2 marks)



3 A television is advertised as shown.

TELEVISION
£595
Add 17.5% VAT

Work out the cost of the television including VAT.

.....

.....

.....

Answer £ (3 marks)

4 Jose has 128 trees in his garden.
16 of the trees are pear trees.

What percentage of the trees in his garden are pear trees?

.....

.....

Answer % (2 marks)

10

Turn over ►



- 5 (a) Write 243 as the product of prime factors.
Give your answer in index form.

.....
.....
.....

Answer (3 marks)

- 5 (b) Write $3^6 \times 3^4$ as a single power of 3.

.....

Answer (1 mark)

- 6 A carton of milk holds 125 millilitres.
This is measured to the nearest millilitre.

What is the least and greatest possible volume of milk in three of these cartons?

Answer Least millilitres (1 mark)

 Greatest millilitres (1 mark)

- 7 (a) Write 0.0005 in standard form.

Answer (1 mark)

- 7 (b) Write 2000 in standard form.

Answer (1 mark)



8 (a) Factorise fully $2x^2 - 4x$

.....

Answer (2 marks)

8 (b) Factorise $x^2 - 36$

.....

Answer (1 mark)

8 (c) Donna says that $4x^2(2x^3 - 5) \equiv 8x^6 - 9x^2$

Show that Donna has made **two** errors.

.....
.....
.....

Error 1

Error 2 (2 marks)

9 A battery operated pig walks for 10 metres when it is first turned on. Each time it is turned on it walks 90% of the previous distance as the battery starts to run out.

How many times does the pig walk at least 8 metres?
You **must** show your working.

.....
.....
.....
.....

Answer (2 marks)



10 y is inversely proportional to \sqrt{x}
When $y = 10$, $x = 25$

10 (a) Express y in terms of x .

.....
.....
.....

Answer $y =$ (3 marks)

10 (b) Find x when $y = 40$

.....
.....

Answer (2 marks)



11 Each of the numbers in the calculation $\frac{15 + 110}{0.042}$ has been rounded to two significant figures.

Find the least possible value of the exact calculation as a percentage of

$$\frac{15 + 110}{0.042}$$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Answer % (5 marks)

END OF SECTION A

10



There are no questions printed on this page

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MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 3 Higher Tier Section B

43053/HB

H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
--	--

Time allowed for Section B: 45 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The maximum mark for Section B is 35.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

- 12 (a) Jenny estimates the value of 9.65×5.06
Her answer is 50.

Explain how she did her estimation.

.....

(2 marks)

- 12 (b) Dave correctly works out the multiplication using his calculator.

$$9.65 \times 5.06 = 48.829$$

Use Dave's answer to work out the exact answer to 0.965×506 .

.....

Answer (1 mark)

- 13 A plane has a top speed of 600 miles per hour.
The plane flies between two airports, a distance of 2100 miles.

- 13 (a) Calculate the time taken for the plane to fly between the airports at top speed.
Give your answer in hours and minutes.

.....

Answer hours minutes (3 marks)

- 13 (b) Explain why the plane will actually take longer than this to fly between the two airports.

.....

(1 mark)



14 (a) Work out $\frac{3}{4} \div 5$

.....

.....

Answer (2 marks)

14 (b) You are given that $0.625 = \frac{5}{8}$

Work out 0.0625 as a fraction.

Give your answer in its simplest form.

.....

.....

.....

Answer (3 marks)

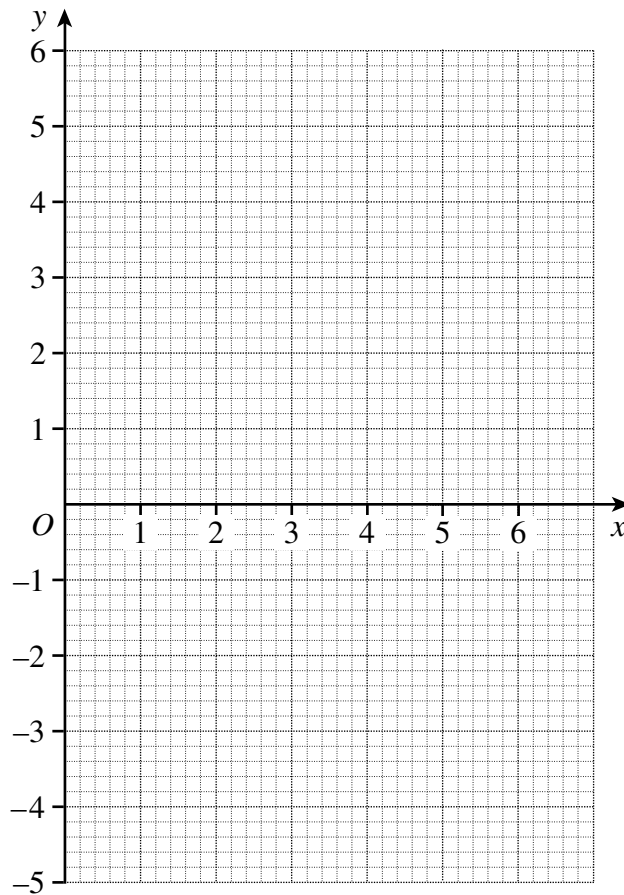
Turn over for the next question



15 (a) The table gives values for $y = x^2 - 6x + 5$

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

On the grid below, draw the graph of $y = x^2 - 6x + 5$ for values of x between 0 and 6.



(2 marks)



15 (b) Factorise $x^2 - 6x + 5$

.....

.....

(2 marks)

15 (c) Hence show that

$$\frac{(x^2 - 6x + 5)(x + 1)}{(x - 1)} \equiv x^2 - 4x - 5$$

.....

.....

.....

(2 marks)

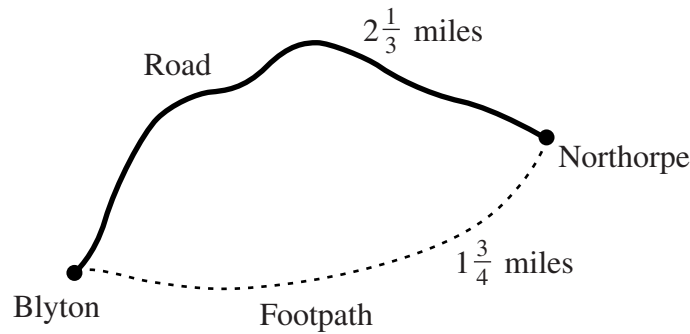
Turn over for the next question

6

Turn over ►



- 16** The diagram shows two routes between the villages of Blyton and Northorpe.



The distance from Blyton to Northorpe is $2\frac{1}{3}$ miles by road.

The distance from Blyton to Northorpe is $1\frac{3}{4}$ miles by footpath.

- 16** (a) How much further is it to go by road than by footpath?

.....

.....

.....

.....

Answer miles (3 marks)

- 16** (b) Howard walks from Blyton to Northorpe and back by footpath.

How far did he walk altogether?

.....

.....

.....

Answer miles (2 marks)



17 Light travels at a speed of approximately 3×10^5 kilometres per second.
There are approximately 32 million seconds in a year.

17 (a) Work out the approximate distance travelled by light in a year.
Give your answer as an ordinary number.

.....
.....
.....

Answer km (3 marks)

17 (b) Write your answer in standard form.

.....

Answer km (1 mark)

18 (a) Show that $(\sqrt{50} - 3\sqrt{32})^2 = 98$

.....
.....
.....
.....
.....
.....
.....
.....

(3 marks)

18 (b) Express $\sqrt{98}$ in terms of $\sqrt{50}$ and $\sqrt{32}$

.....
.....

Answer $\sqrt{98} =$ (1 mark)

Turn over for the next question

13

Turn over ►



19 Which is larger, $81^{-\frac{3}{4}}$ or $\frac{1}{\sqrt[3]{125}}$?

You **must** show your working.

.....

.....

.....

.....

.....

.....

.....

.....

Answer (4 marks)

END OF QUESTIONS



Q	Answers	Mark	Comments
1(a)	4 : 1	B1	
1(b)	150 ÷ 5	M1	
	30	A1	
2	$\frac{4}{20}$ should be $\frac{5}{20}$	B1	
	Answer denominator should be 20	B1	
3	Method to find 17.5% of 595 eg, $0.175 \times 595 (= 104.125)$	M1	Build up must have all % values correct and intention to add
	Adds Their 104.125 to 595	M1	1.175×595 gets M2
	699.12 or 699.13	A1	
4	$\frac{16}{128} \times 100$	M1	
	12.5	A1	
5(a)	First correct division or pair of factor tree branches	M1	oe
	Correct factor tree or $3 \times 3 \times 3 \times 3 \times 3$ in non-index form	A1	oe
	3^5	A1	
5(b)	3^{10}	B1	
6	373.5	B1	
	376.5	B1	or 376.49 recurring using standard notation
7(a)	5×10^{-4}	B1	
7(b)	2×10^3	B1	

Q	Answers	Mark	Comments
8(a)	$2x(x-2)$	B2	B1 $x(2x-4)$ or $2(x^2-2x)$
8(b)	$(x+6)(x-6)$	B1	
8(c)	References that first power of x should be 5	B1	Allow implications made by correct expansions seen
	References that the '9' should be 20	B1	
9	$0.9 \times 10 (=9)$ $0.9 \times (9) (=8.1)$ $0.9 \times (8.1) (=7.29)$	M1	oe 3 repeats of finding 90%
	3 times	A1	
10(a)	$y \propto \frac{1}{\sqrt{x}}$ or $y = \frac{k}{\sqrt{x}}$	M1	
	$10 = \frac{k}{5}$	M1	
	$y = \frac{50}{\sqrt{x}}$	A1	or States $k = 50$ with equation given for M1
10(b)	$40 = \frac{50}{\sqrt{x}}$ so $x = \left(\frac{50}{40}\right)^2$	M1	oe
	$x = \frac{25}{16}$	A1	oe
11	Sight of any of: 14.5, 15.5, 105, 115, 0.0415 or 0.0425	B1	
	<u>Their min + Their min</u> Their max	M1	
	2811.764706 to 4sf or better	A1	
	$\frac{2811.76(\dots)}{2976.19(04)} \times 100$	M1	
	94.47(529...)	A1	

Q	Answers	Mark	Comments
12(a)	Rounded to 10 and 5	M1	
	10×5	A1	
12(b)	488.29	B1	
13(a)	2100 / 600	M1	
	3.5	A1	
	3 hours 30 minutes	A1	
13(b)	Plane cannot always fly at top speed	B1	
14(a)	$\frac{3}{4} \times \frac{1}{5}$	M1	
	$\frac{3}{20}$	A1	oe
14(b)	$\frac{5}{8} \div 10$	M1	
	$\frac{5}{80}$	A1	
	$\frac{1}{16}$	A1	
15(a)	Plots the coordinates and draws smooth curve	B2	B1 points B1 curve fit
15(b)	$(x-5)(x-1)$	B2	B1 – one of the correct factors
15(c)	Shows cancelling of $(x-1)$	M1	
	Convincing expansion of $(x-5)(x+1)$ shows all 4 terms	A1	$x^2 - 5x + (1)x - 5$

Q	Answers	Mark	Comments
16(a)	Common denominator of 12 with at least one numerator correct	M1	
	$\frac{28}{12} - \frac{21}{12}$	A1	
	$\frac{7}{12}$	A1	
16(b)	$2 \times 1\frac{3}{4}$	M1	
	$3\frac{1}{2}$	A1	
17(a)	Attempts to multiply the two numbers	M1	
	$32\,000\,000 \times 300\,000$	A1	
	$9600\,000\,000\,000$	A1	
17(b)	9.6×10^{12}	B1ft	
18(a)	Shows $\sqrt{50} = 5\sqrt{2}$ or $(3)\sqrt{32} = (3 \times)4\sqrt{2}$	M1	
	Both of above shown and subtracts ($=(-7\sqrt{2})^2$)	M1	
	Sight of $49 \times 2 (=98)$	A1	
18(b)	$\sqrt{50} - 3\sqrt{32}$	B1	
19	Sight of $\frac{1}{5}$	B1	
	$81^{\frac{1}{4}} = 3$ or $81^{\frac{3}{4}} = 27$	M1	
	$81^{-\frac{3}{4}} = \frac{1}{27}$	A1	
	so $\frac{1}{\sqrt[3]{125}}$ is bigger	B1	

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Foundation Tier
Paper 1 Non-Calculator

43055/1F

F

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
--	--

For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16	
TOTAL	
Examiner's Initials	

Time allowed: 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

Advice

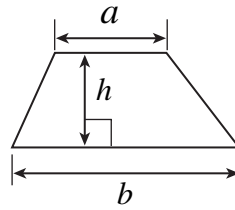
- In all calculations, show clearly how you work out your answer.



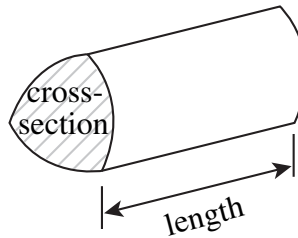
Formulae Sheet: Foundation Tier

You may need to use the following formulae:

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



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



Answer **all** questions in the spaces provided.

1 From the list of numbers

2 3 7 12 15 29 36 40

1 (a) write down the multiples of 5

.....

Answer (2 marks)

1 (b) write down the square number

.....

Answer (1 mark)

1 (c) write down **three** factors of 24.

.....

Answer (2 marks)

2 (a) The superstore is due West of the market.

Complete the sentence

The market is due of the superstore.

(1 mark)

2 (b) The bus station is South East of the sports centre.

Complete the sentence

The sports centre is of the bus station.

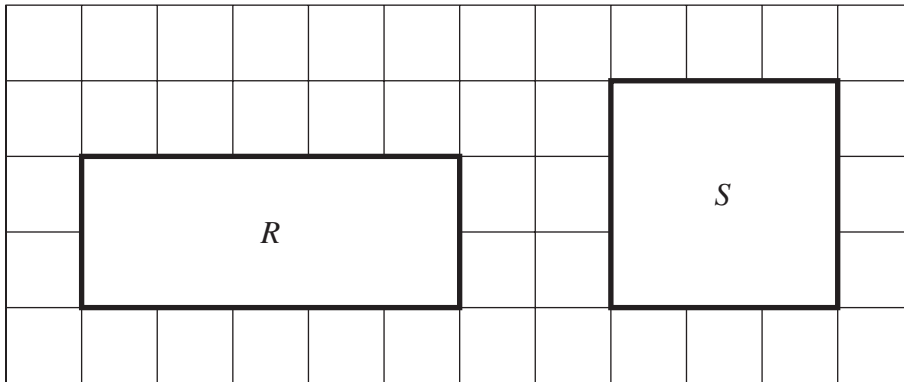
(1 mark)

7

Turn over ►



- 3 A rectangle R and a square S are drawn on the grid below.



Which shape has the longer perimeter?
You **must** show your working.

.....

.....

.....

.....

Answer (3 marks)

- 4 Here is a sequence of numbers.

2 9 16 23 30

- 4 (a) Write down the next **two** numbers in the sequence.

.....

.....

Answer and (2 marks)

- 4 (b) What is the rule for continuing the sequence?

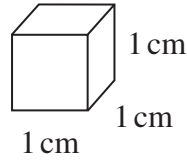
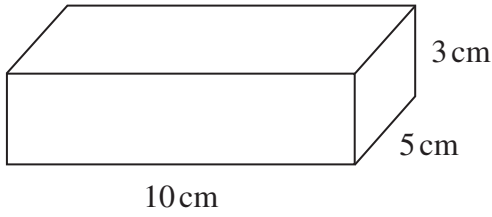
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.....

(1 mark)



- 5 A rectangular box has length 10 cm, width 5 cm and height 3 cm.
The box is to be filled with centimetre cubes.



Not drawn
accurately

- 5 (a) How many centimetre cubes are needed to fill the box?

.....
.....

Answer cubes (2 marks)

- 5 (b) Write down the volume of the box.
State the units of your answer.

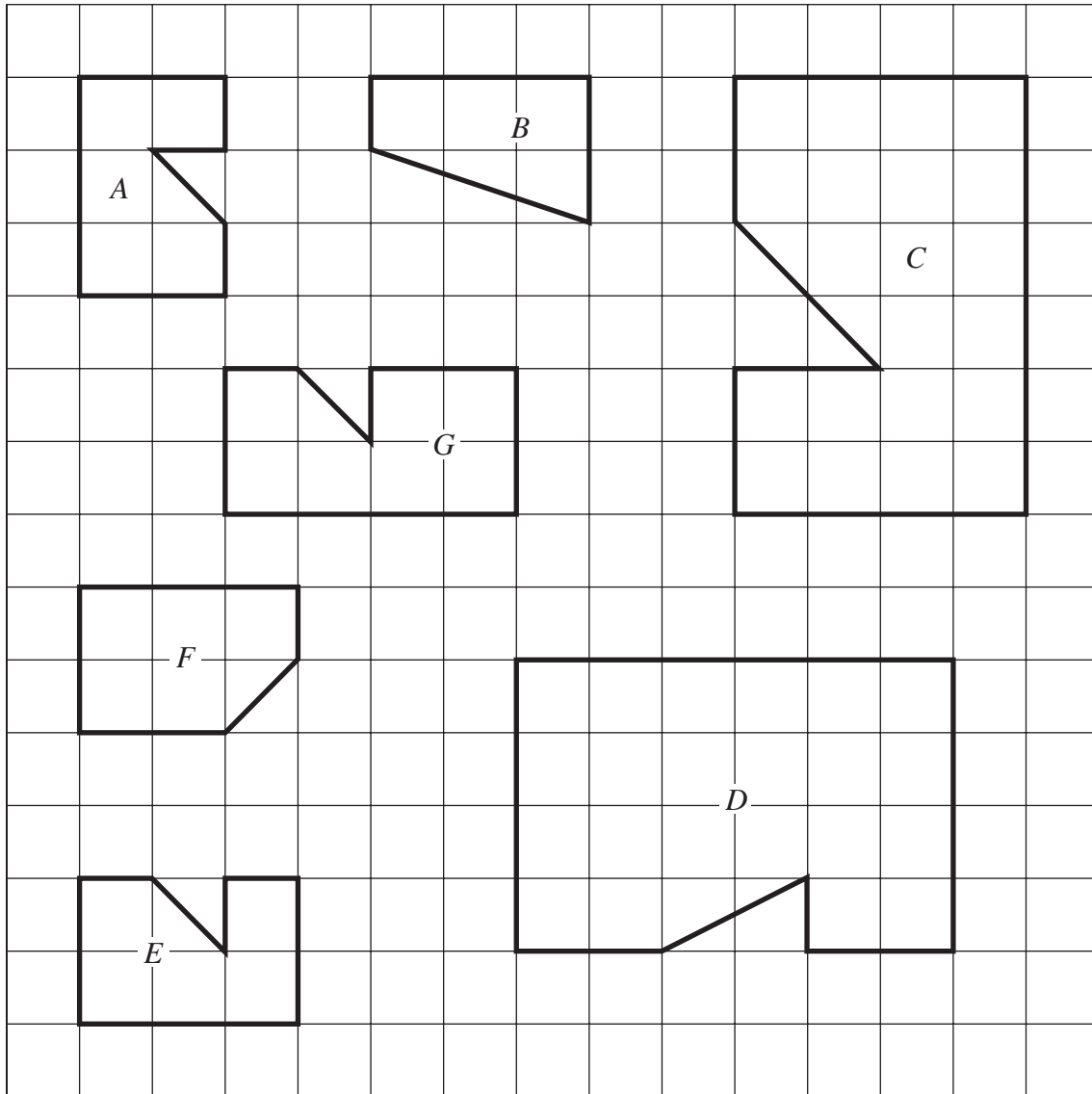
Answer (1 mark)

Turn over for the next question

Turn over ►



6 The grid shows seven shapes *A*, *B*, *C*, *D*, *E*, *F* and *G*.



6 (a) Which shape is congruent to shape *A*?

Answer (1 mark)

6 (b) Write down a different shape that has the same area as shape *A*.

Answer (1 mark)

6 (c) Which shape is an enlargement of shape *A*?

Answer (1 mark)



7 Steve is working on this problem.

Which is larger, 0.7 or 10%?

He writes down $0.7 = 7\%$ so 10% is larger.

Explain why Steve is wrong.

.....

.....

.....

(2 marks)

8 Anna buys x oranges at 14 pence each.

8 (a) Write down an expression for the total cost in terms of x .

Answer pence (1 mark)

8 (b) Anna also buys y pears at 22 pence each.

Write down an expression for the total cost of the oranges and pears.

.....

.....

Answer pence (2 marks)

9 Emma thinks of a number.

She divides it by 4 and then adds 12.

The answer is 20.

Freddie is working out Emma's number.

He writes $20 \times 4 - 12$
 $= 80 - 12$
 $= 68$

Is this Emma's number?

Explain your answer.

.....

.....

.....

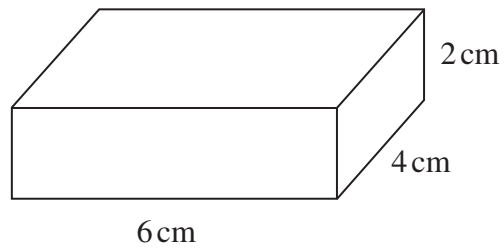
(2 marks)

10

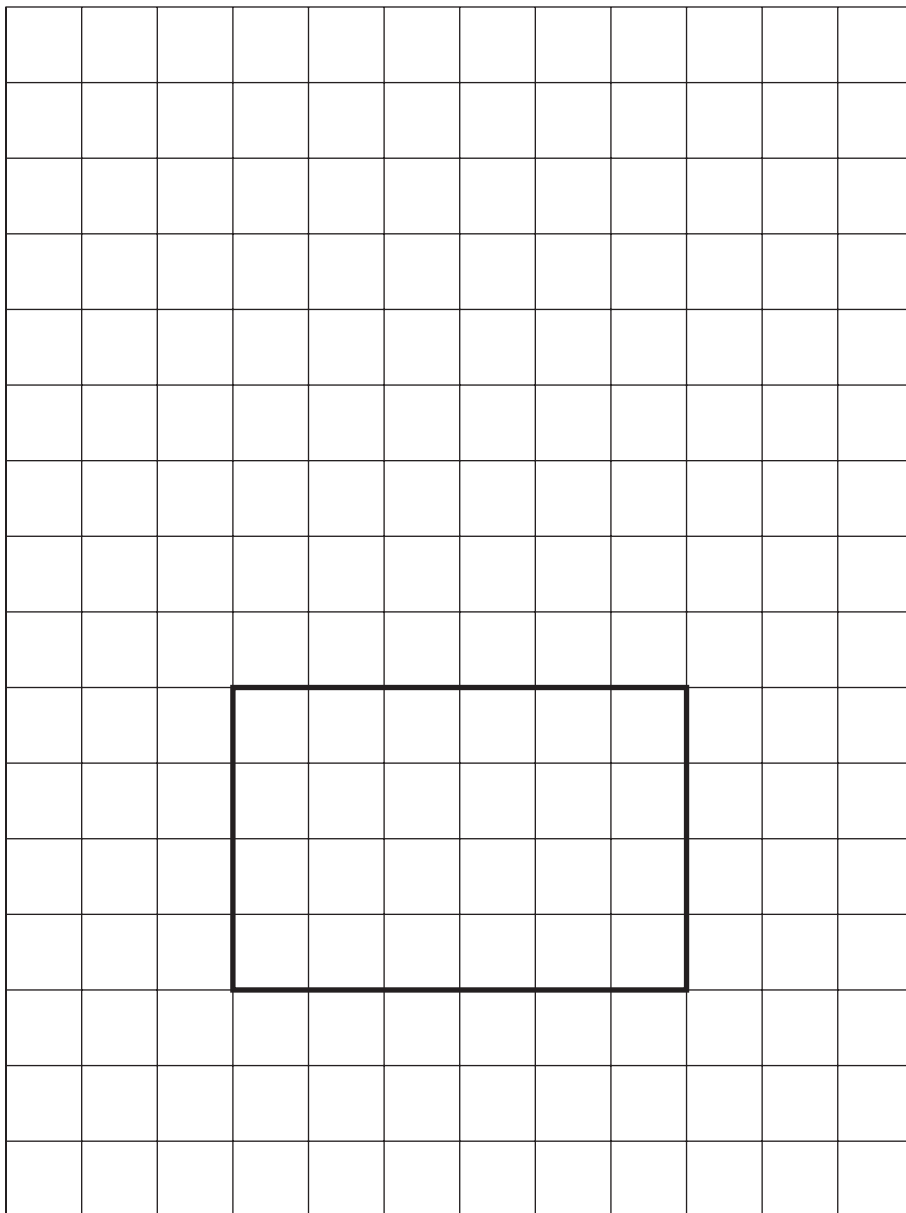
Turn over ►



- 10 The diagram shows a cuboid with length 6 cm, width 4 cm and height 2 cm.



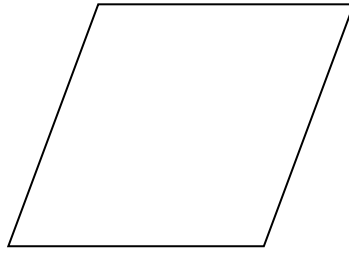
Complete an accurate net of this cuboid on the grid below.
The base has been drawn for you.



(3 marks)



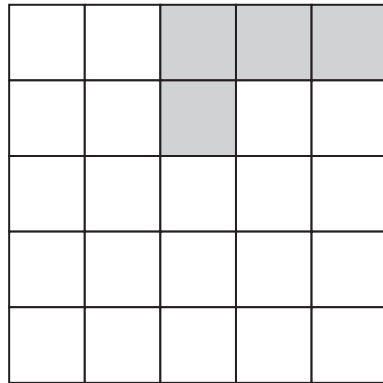
- 11 (a) The diagram shows a rhombus.



Draw all the lines of symmetry on the rhombus.

(2 marks)

- 11 (b)

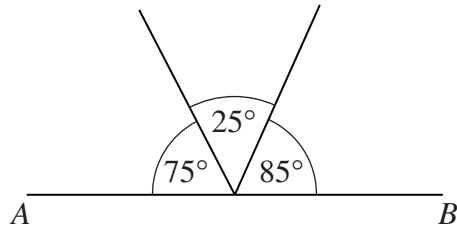


Shade in more squares to make a pattern with rotational symmetry of order 4.

(3 marks)



12 (a)



Not drawn accurately

Is AB a straight line?
Explain your answer.

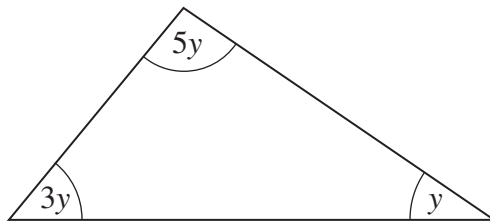
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.....

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(2 marks)

12 (b)



Not drawn accurately

Calculate the value of y .

.....

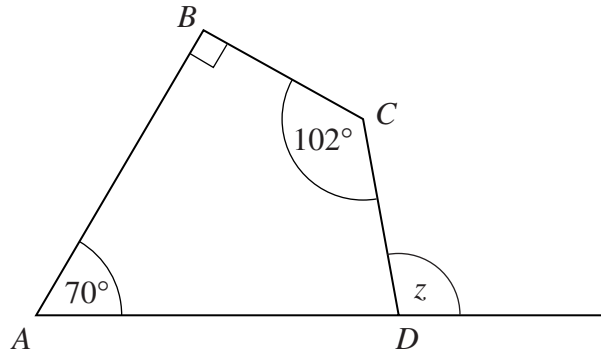
.....

.....

Answer degrees (3 marks)



- 12** (c) The diagram shows a quadrilateral $ABCD$ with AD extended.
Angle $A = 70^\circ$, angle $B = 90^\circ$ and angle $C = 102^\circ$



Not drawn accurately

Calculate the value of z .

.....

.....

.....

.....

Answer degrees (3 marks)

- 13** If $x = -1$ and $y = -6$, find the value of

13 (a) $5xy$

.....

.....

Answer (2 marks)

13 (b) $x^2 + y^2$

.....

.....

Answer (2 marks)



14 (a) Complete the table of values for $y = x^2 + x$

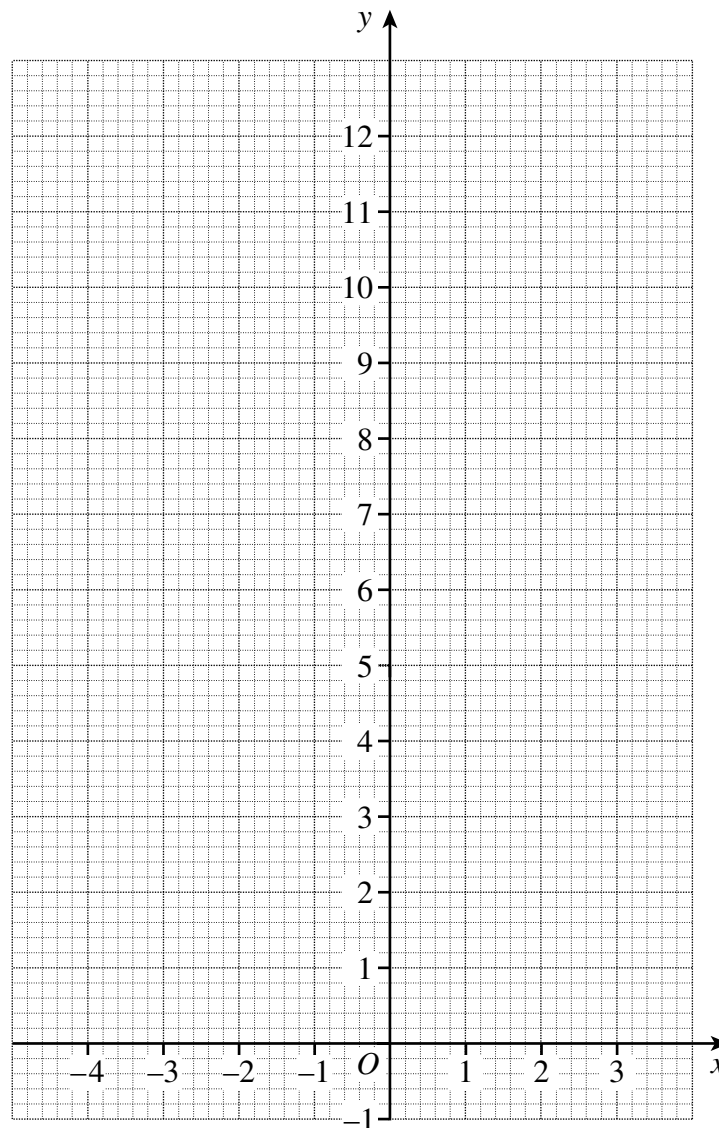
x	-4	-3	-2	-1	0	1	2	3
y	12		2	0	0		6	12

.....

.....

(2 marks)

14 (b) Draw the graph of $y = x^2 + x$ for values of x from -4 to +3.



(2 marks)

14 (c) Write down the values of x where the line $y = 5$ crosses the graph.

Answer and (2 marks)



14 (d) What happens to the value of y between $x = -1$ and $x = 0$?

.....

 (1 mark)

15 Simplify

15 (a) $3x + 5x - 2x$

.....
 Answer (1 mark)

15 (b) $4p + 7q - 3p - q$

.....

 Answer (2 marks)

15 (c) $2(q + 3) + 3(q - 4)$

.....

 Answer (2 marks)

15 (d) $m \times m \times m \times m$

Answer (1 mark)

15 (e) $x^2 \times x^5$

Answer (1 mark)

15 (f) $\frac{y^6}{y^3}$

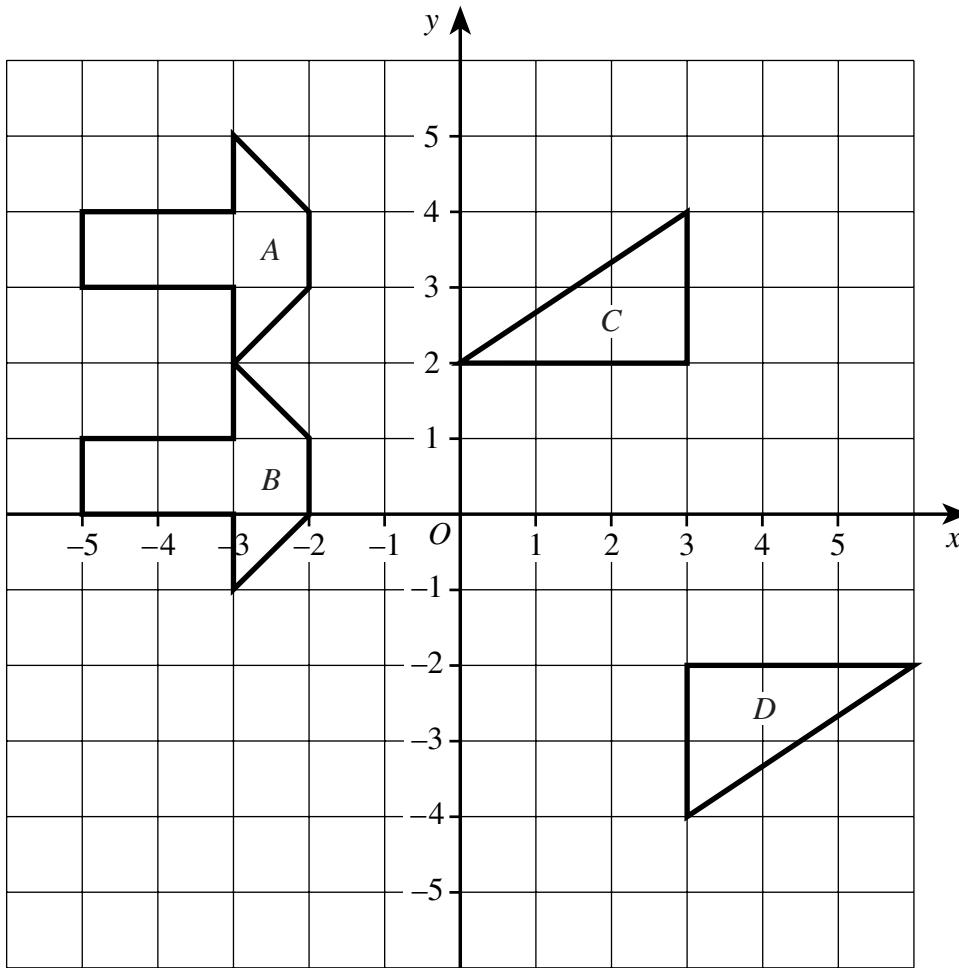
Answer (1 mark)

15

Turn over ►



16



16 (a) Describe fully the **single** transformation which takes shape A onto shape B.

.....

 (2 marks)

16 (b) Triangle C is rotated onto triangle D.

16 (b) (i) Write down the angle of rotation.

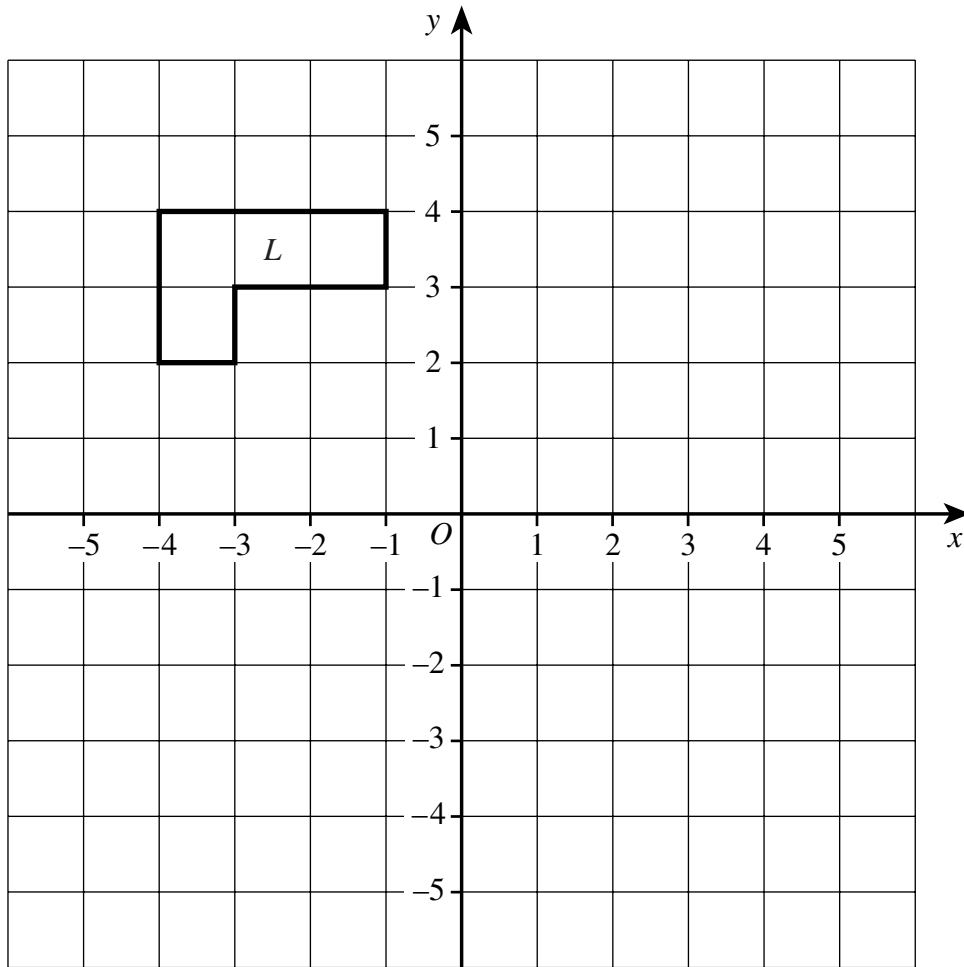
Answer (1 mark)

16 (b) (ii) Write down the coordinates of the centre of rotation.

Answer (..... ,) (1 mark)



16 (c)



Shape L is translated by the vector $\begin{pmatrix} 4 \\ -5 \end{pmatrix}$

Draw the new position of shape L .

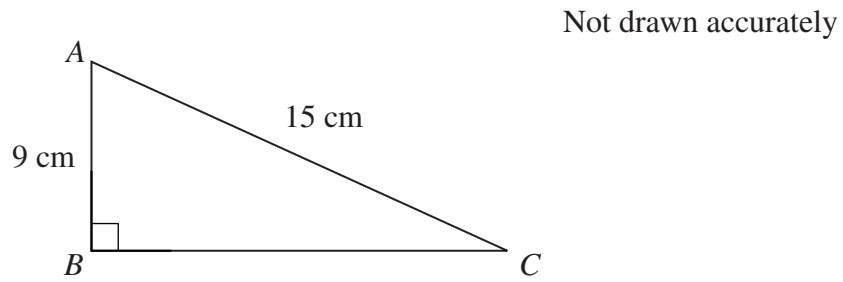
(2 marks)

Turn over for the next question

Turn over ►



17 In triangle ABC , angle $B = 90^\circ$, $AB = 9\text{ cm}$ and $AC = 15\text{ cm}$



Calculate the length of BC .

.....

.....

.....

.....

Answer cm (3 marks)

END OF QUESTIONS



Q	Answers	Mark	Comments
1(a)	15	B1	
	40	B1	
1(b)	36	B1	
1(c)	2, 3, 12	B2	B1 for any two correct
2(a)	East	B1	Accept E
2(b)	North West	B1	Accept NW
3	Perimeter of R = $5 + 2 + 5 + 2$	M1	or 14 seen
	Perimeter of S = $3 + 3 + 3 + 3$	M1	or 12 seen
	R	A1	
4(a)	37	B1	
	44	B1ft	(their 37) + 7
4(b)	Add 7	B1	
5(a)	$10 \times 5 \times 3$	M1	
	150	A1	
5(b)	$(150) \text{ cm}^3$	B1	Units mark
6(a)	E	B1	
6(b)	F	B1	
6(c)	C	B1	
7	$0.7 \neq 7\%$	M1	Identifying error
	70% so 0.7 is larger	A1	
8(a)	$14x$	B1	
8(b)	$22y$	M1	
	$14x + 22y$	A1	

Q	Answers	Mark	Comments																									
9	$(20 - 12) \times 4$	M1	$68 \div 4 + 12$																									
	32 and No	A1	29 and No																									
10	Fully correct net	B3	Tolerance 2 mm One more face correct (must be attached to base) B1 4 more correct faces (all attached) B2																									
11(a)	Line joining opposite vertices	B1	Tolerance 2 mm																									
	Second line joining opp. vertices	B1	-1 for each extra line																									
11(b)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>t</td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>t</td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <td>t</td> <td>t</td> <td></td> <td>y</td> <td>y</td> </tr> <tr> <td></td> <td></td> <td>z</td> <td></td> <td>y</td> </tr> <tr> <td>z</td> <td>z</td> <td>z</td> <td></td> <td>y</td> </tr> </table>	t					t					t	t		y	y			z		y	z	z	z		y	B1	If y or z or t squares shaded
		t																										
		t																										
t	t		y	y																								
		z		y																								
z	z	z		y																								
B2	If 2 of these shaded																											
B3	If fully correct																											
12(a)	$75 + 25 + 85$	M1	or 185 seen.																									
	No	A1																										
12(b)	$3y + 5y + y$	M1	or $9y$																									
	$180 \div \text{their } 9$	M1																										
	20	A1																										
12(c)	$360 - (70 + 90 + 102)$	M1	or 98 seen																									
	$180 - \text{their } 98$	M1																										
	82	A1																										
13(a)	$5 \times -1 \times -6$	M1																										
	30	A1	-30 earns SC1																									
13(b)	$(-1)^2 + (-6)^2$	M1																										
	37	A1																										

Q	Answers	Mark	Comments
14(a)	6	B1	
	2	B1	
14(b)	At least 7 correct plots	M1	ft their table
	Smooth curve through their plots	A1	Must go through their plots No marks for straight lines
14(c)	Readings from their graph at $y = 5$	M1	
	1.8 and -2.8	A1	Either of these is evidence for M1
14(d)	It is negative	B1	oe (eg, “below the x -axis”)
15(a)	$6x$	B1	
15(b)	p or $6q$	M1	
	$p + 6q$	A1	
15(c)	$2q + 6 + 3q - 12$	M1	Allow one error
	$5q - 6$	A1	
15(d)	m^4	B1	
15(e)	x^7	B1	
15(f)	y^3	B1	
16(a)	Reflection	B1	
	$y = 2$	B1	
16(b)(i)	180°	B1	
16(b)(ii)	(3, 0)	B1	
16(c)	New position with top left corner at (0 -1)	B2	B1 for movement either 4 across or 5 down B1 also for movement $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$

Q	Answers	Mark	Comments
17	$15^2 - 9^2 (= 144)$	M1	
	$\sqrt{\text{their } 144}$	M1dep	
	12	A1	

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Higher Tier
Paper 1 Non-Calculator

43055/1H

H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
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For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
TOTAL	
Examiner's Initials	

Time allowed: 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

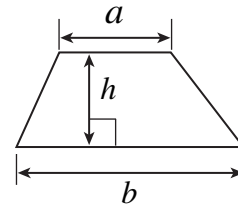
Advice

- In all calculations, show clearly how you work out your answer.

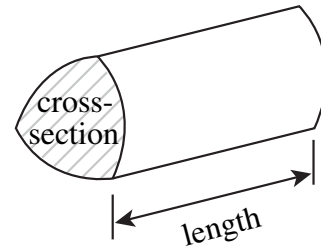


Formulae Sheet: Higher Tier

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

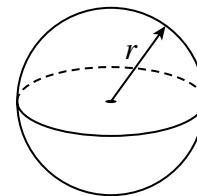


Volume of prism = area of cross-section \times length



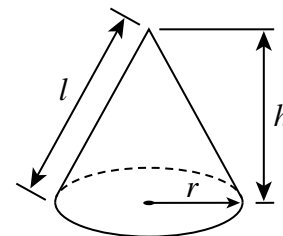
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

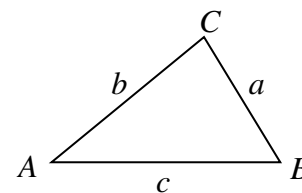


In any triangle ABC

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

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

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



The Quadratic Equation

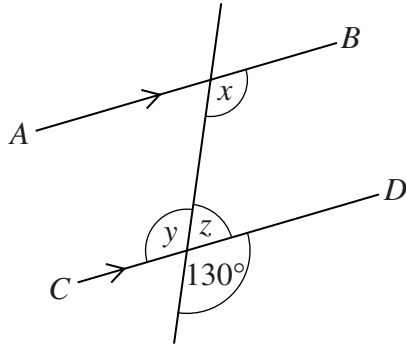
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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



Answer **all** questions in the spaces provided.

1 In the diagram AB is parallel to CD .



Not drawn accurately

1 (a) State the value of x .
Give a reason for your answer.

Answer degrees

Reason
.....

(2 marks)

1 (b) State the value of y .
Give a reason for your answer.

Answer degrees

Reason
.....

(2 marks)

1 (c) Find the value of z .

.....

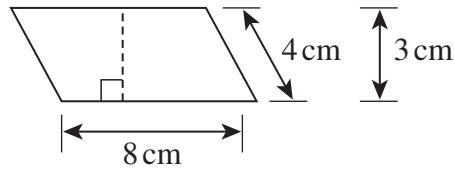
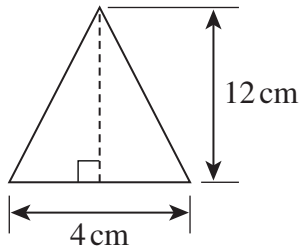
Answer degrees (1 mark)



2 Javed says that the triangle and parallelogram shown have the same area.

Is he correct?

You **must** show your working.



Not drawn
accurately

.....

.....

.....

(4 marks)



3 (a) The n th term of a sequence is $5n-2$.

Write down the first **three** terms of the sequence.

.....

Answer,, (2 marks)

3 (b) Matchsticks are used to make this pattern of triangles.

Pattern 1



1 triangle

Pattern 2



2 triangles

Pattern 3



3 triangles

Pattern 4



4 triangles

Pattern number	Number of matchsticks
1	3
2	5
3	7
4	9

3 (b) (i) Find an expression for the number of matchsticks needed to make Pattern n .

.....

Answer (2 marks)

3 (b) (ii) How many complete triangles can be made with 40 matchsticks?

.....

Answer (2 marks)



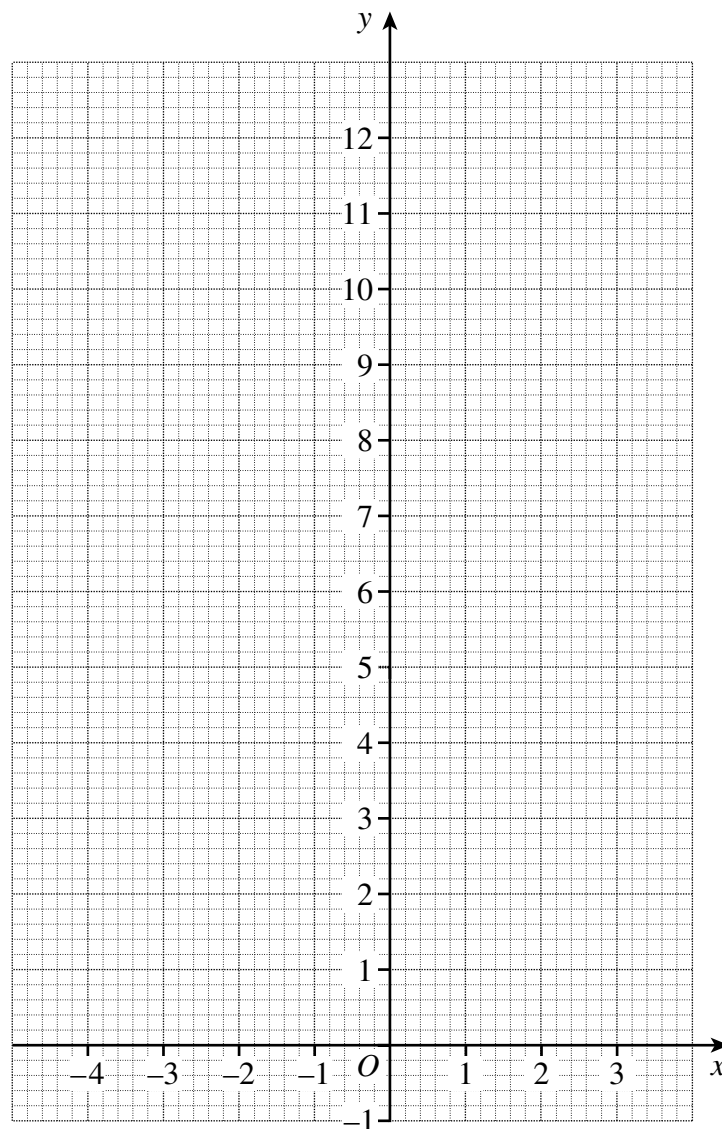
- 4 (a) Complete the table of values for $y = x^2 + x$

x	-4	-3	-2	-1	0	1	2	3
y	12		2	0	0		6	12

.....

(2 marks)

- 4 (b) Draw the graph of $y = x^2 + x$ for values of x from -4 to +3.



(2 marks)



- 4 (c) Write down the values of x where the line $y = 5$ crosses the graph.

Answer and (2 marks)

- 4 (d) What happens to the value of y between $x = -1$ and $x = 0$?

.....

 (1 mark)

5 Simplify

- 5 (a) $2(q + 3) + 3(q - 4)$

.....

Answer (2 marks)

- 5 (b) $x^2 \times x^5$

.....

Answer (1 mark)

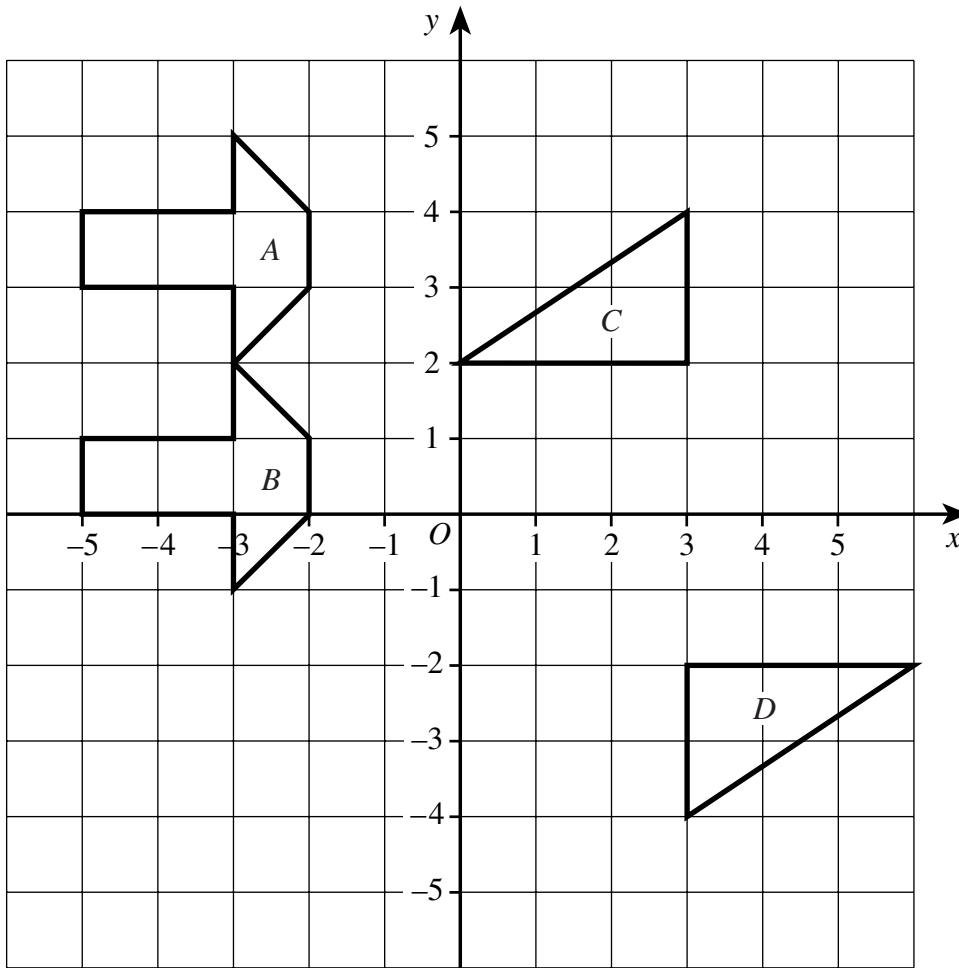
- 5 (c) $\frac{y^6}{y^3}$

.....

Answer (1 mark)



6



6 (a) Describe fully the **single** transformation which takes shape A onto shape B.

.....

 (2 marks)

6 (b) Triangle C is rotated onto triangle D.

6 (b) (i) Write down the angle of rotation.

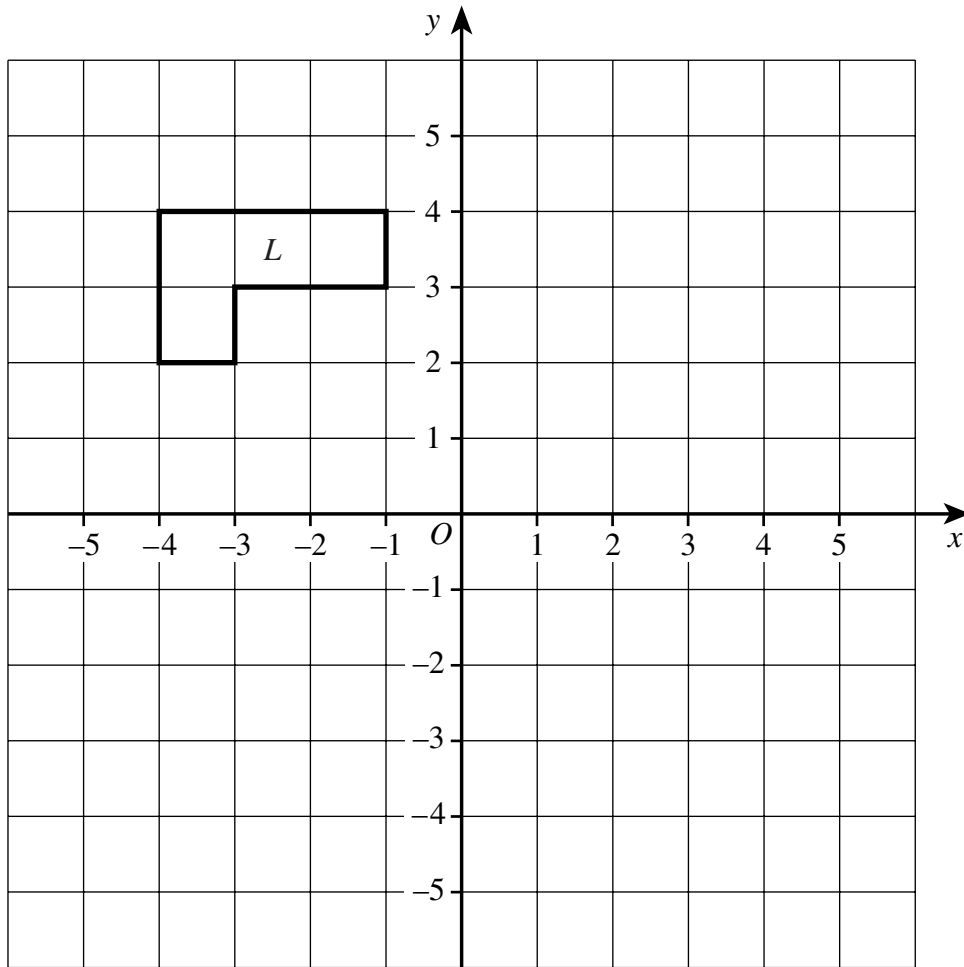
Answer (1 mark)

6 (b) (ii) Write down the coordinates of the centre of rotation.

Answer (..... ,) (1 mark)



6 (c)



Shape L is translated by the vector $\begin{pmatrix} 4 \\ -5 \end{pmatrix}$

Draw the new position of shape L .

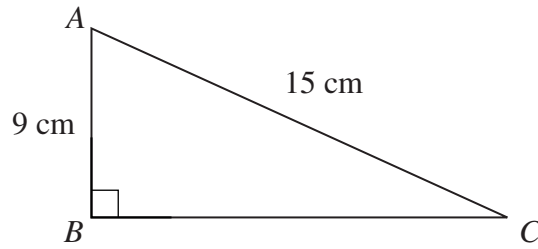
(2 marks)

Turn over for the next question

Turn over ►



7 (a) In triangle ABC , angle $B = 90^\circ$, $AB = 9\text{ cm}$ and $AC = 15\text{ cm}$



Not drawn accurately

Calculate the length of BC .

.....

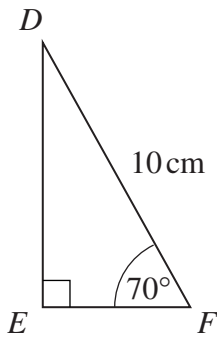
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.....

.....

Answer cm (3 marks)

7 (b) In triangle DEF , angle $E = 90^\circ$, $DF = 10\text{ cm}$ and angle $F = 70^\circ$



Not drawn accurately

Angle	Sine	Cosine	Tangent
20°	0.342	0.940	0.364
70°	0.940	0.342	2.747

Use the table of data to work out the length of EF .

.....

.....

.....

.....

Answer cm (3 marks)



8 (a) Expand and simplify $(x + 3)(x - 4)$

.....
.....

Answer (2 marks)

8 (b) Factorise fully $6a^2 - 9ab$

.....

Answer (2 marks)

8 (c) (i) Factorise $x^2 - 7x + 10$

.....

Answer (2 marks)

8 (c) (ii) Hence solve $x^2 - 7x + 10 = 0$

.....

Answer (1 mark)

9 The line AB has equation $2x - 5y = 10$

9 (a) Show that the gradient of AB is $\frac{2}{5}$

.....
.....

(2 marks)

9 (b) A second line PQ has equation $2y = 6 - 5x$
Jade says that the line PQ is parallel to the line AB .

Is she correct?

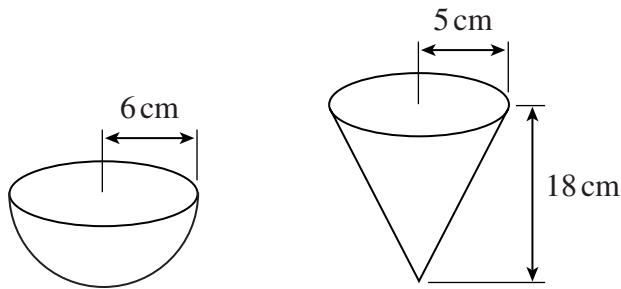
You **must** show your working and give a reason for your answer.

.....
.....
.....

(2 marks)



- 10** The diagram shows two containers.
One container is a hemisphere of radius 6 cm.
The other container is a cone of radius 5 cm and height 18 cm.



Not drawn
accurately

- 10** (a) Show that the volume of the hemisphere is 144π

.....

 (2 marks)

- 10** (b) Which container has the larger volume?
You **must** show your working.

.....

 (3 marks)

- 11** Prove that $(n + 3)^2 - (n - 2)^2 \equiv 5(2n + 1)$

.....

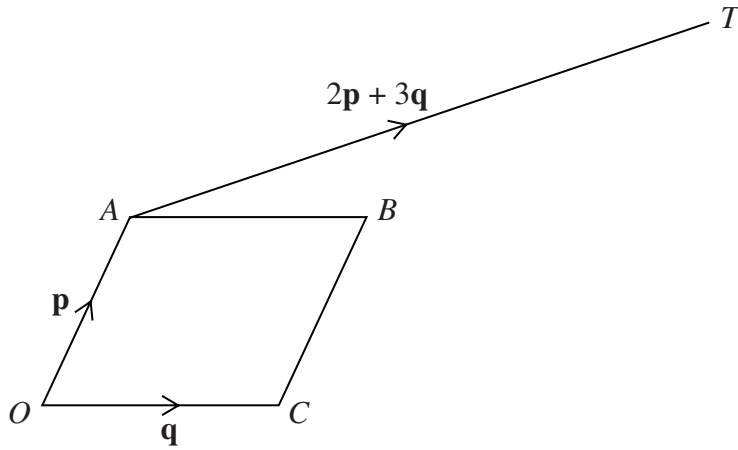
 (3 marks)



12 $OABC$ is a parallelogram.

$\vec{OA} = \mathbf{p}$ and $\vec{OC} = \mathbf{q}$

T is a point outside the parallelogram such that $\vec{AT} = 2\mathbf{p} + 3\mathbf{q}$



12 (a) Find, in terms of \mathbf{p} and \mathbf{q} , expressions for the following vectors.
Give each answer in its simplest form.

12 (a) (i) \vec{OB}

.....

Answer (2 marks)

12 (a) (ii) \vec{BT}

.....

Answer (2 marks)

12 (b) Explain what your answers to part a) tell you about

12 (b) (i) the positions of O , B and T

.....

.....

(1 mark)

12 (b) (ii) the lengths of \vec{OB} and \vec{BT} .

.....

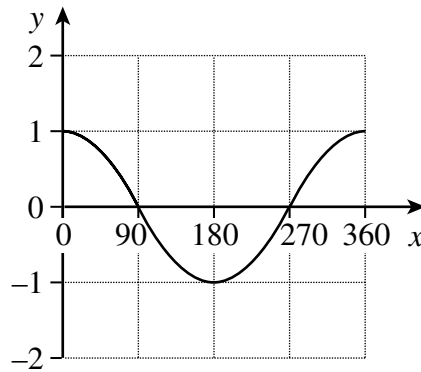
.....

(1 mark)

Turn over ►



13 The diagram shows the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$



13 (a) One solution of the equation $\cos x = 0.809$ is $x = 36^\circ$

Work out the other solution in this range.

.....

Answer $x =$ degrees (1 mark)

13 (b) Write down the number of solutions in the range $0^\circ \leq x \leq 360^\circ$ for each equation.

13 (b) (i) $2\cos x = -0.6$

.....

Answer (1 mark)

13 (b) (ii) $\cos 2x = -0.6$

.....

Answer (1 mark)



14 (a) Find the values of a and b such that

$$x^2 - 8x + 21 \equiv (x - a)^2 + b$$

.....
.....
.....
.....
.....
.....

Answer $a = \dots\dots\dots$, $b = \dots\dots\dots$ (2 marks)

14 (b) Hence, or otherwise, write down

14 (b) (i) the minimum value of $x^2 - 8x + 21$

.....
.....

Answer (1 mark)

14 (b) (ii) the equation of the line of symmetry of $x^2 - 8x + 21$.

.....

Answer (1 mark)

END OF QUESTIONS



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

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Q	Answers	Mark	Comments
1(a)	130°	B1	
	Corresponding angle	B1	
1(b)	130°	B1	
	Alternate angle or vertically opposite	B1	
1(c)	50°	B1	
2	Triangle area = $\frac{1}{2} \times 4 \times 12$	M1	
	=24	A1	
	Parallelogram area = 3×8	M1	
	= 24 (yes)	A1	
3(a)	3, 8, 13	B2	B1 for 3, 8
3(b)(i)	$2n + 1$	B2	B1 for $2n$
3(b)(ii)	$2n = 39$ or $2n + 1 = 40$	M1	
	19	A1	
4(a)	6	B1	
	2	B1	
4(b)	At least 7 correct plots	M1	ft their table
	Smooth curve through Their plots	A1	Must go through Their plots. No marks for straight line.
4(c)	Reading from Their graph at $y = 5$	M1	
	1.8 and -2.8	A1	Either of these is evidence for M1
4(d)	It is negative	B1	oe eg, below the axis

Q	Answers	Mark	Comments
5(a)	$2q + 6 + 3q - 12$	M1	
	$5q - 6$	A1	
5(b)	x^7	B1	
5(c)	y^3	B1	
6(a)	Reflection	B1	
	$y = 2$	B1	
6(b)(i)	180°	B1	
6(b)(ii)	(3,0)	B1	
6(c)	New position with top left corner at (0, -1)	B2	B1 for movement either 4 across or 5 down B1 also for movement $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$
7(a)	$15^2 - 9^2 (=144)$	M1	
	$\sqrt{\text{Their } 144}$	M1	
	12	A1	
7(b)	$\frac{EF}{10} = \cos 70^\circ$	M1	
	$EF = 0.342 \times 10$	M1	
	3.4(2)	A1	
8(a)	$x^2 + 3x - 4x - 12$	M1	
	$x^2 - x - 12$	A1	
8(b)	$3a(2a + 3b)$	B2	B1 for $a(6a + 9b)$ or $3(2a^2 - 3ab)$
8(c)(i)	$(x - 2)(x - 5)$	B2	B1 for correct numbers
8(c)(ii)	2 and 5	B1ft	

Q	Answers	Mark	Comments
9(a)	$2x - 10 = 5y$	M1	
	$\frac{2x}{5} - \frac{10}{5} = y$	A1	
9(b)	$y = \frac{6}{2} - \frac{5x}{2}$	M1	
	Gradient is $-\frac{5}{2}$ She is wrong	A1	
10(a)	$\frac{2}{3} \pi \times 6 \times 6 \times 6$	M1	Attempt at volume of hemisphere
	144π	A1	
10(b)	$\frac{1}{3} \pi \times 5 \times 5 \times 18$	M1	
	150π	A1	
	The cone has the larger volume	A1	
11	$n^2 + 3n + 3n + 9 - (n^2 - 2n - 2n + 4)$	M1	
	$10n + 5$	A1	
	$5(2n + 1)$	A1	
12(a)(i)	$p + q$	B2	B1 for $p - q$
12(a)(ii)	$-q + 2p + 3q$	M1	
	$2p + 2q$	A1	
12(b)(i)	They are in a straight line	B1	Collinear
12(b)(ii)	$\vec{BT} = 2\vec{OB}$	B1	
13(a)	324°	B1	
13(b)	2	B1	
13(c)	4	B1	

Q	Answers	Mark	Comments
14(a)	$a = 4$	B1	
	$b = 5$	B1	
14(b)	$(4, 5)$	B1	
	$x = 4$	B1	

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education

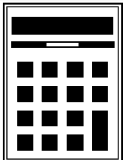


MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Foundation Tier
Paper 2 Calculator

43055/2F

F

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
---	---

For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16	
TOTAL	
Examiner's Initials	

Time allowed: 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

Advice

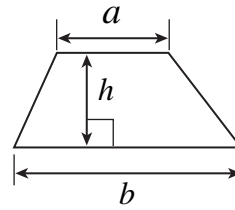
- In all calculations, show clearly how you work out your answer.



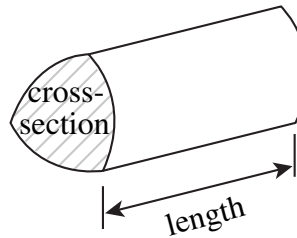
Formulae Sheet: Foundation Tier

You may need to use the following formulae:

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



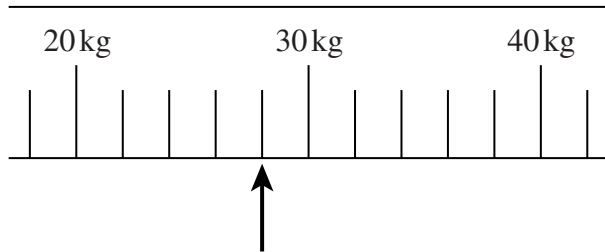
Volume of prism = area of cross-section \times length



Answer **all** questions in the spaces provided.

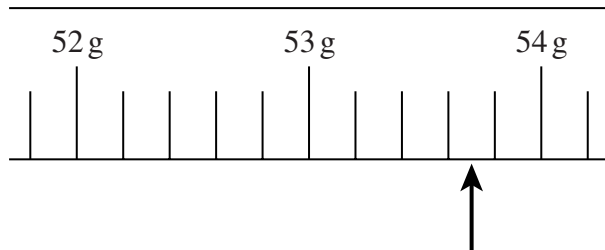
1 (a) What value is shown by the arrow in each of these diagrams?

1 (a) (i)



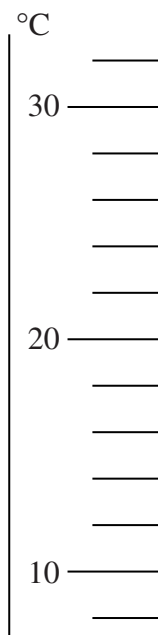
Answer kg (1 mark)

1 (a) (ii)



Answer g (1 mark)

1 (b) Draw an arrow on this diagram to show 24°C.



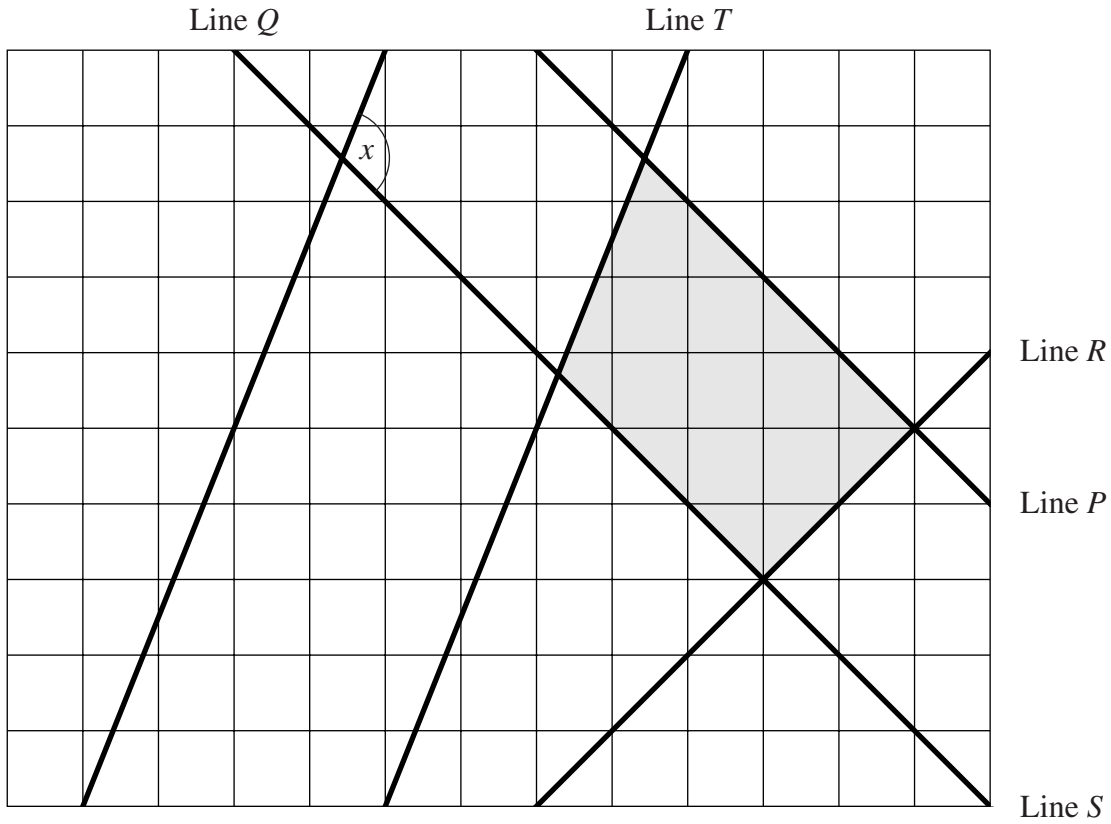
(1 mark)

3

Turn over ►



- 2 The diagram shows five straight lines P , Q , R , S and T .
The diagram is drawn accurately.



- 2 (a) Which line is parallel to line P ?

Answer (1 mark)

- 2 (b) Write down another pair of parallel lines.

Answer and (1 mark)

- 2 (c) Which line is perpendicular to line S ?

Answer (1 mark)

- 2 (d) Circle the correct word from this list to describe the shaded shape.

square parallelogram kite trapezium pentagon

(1 mark)

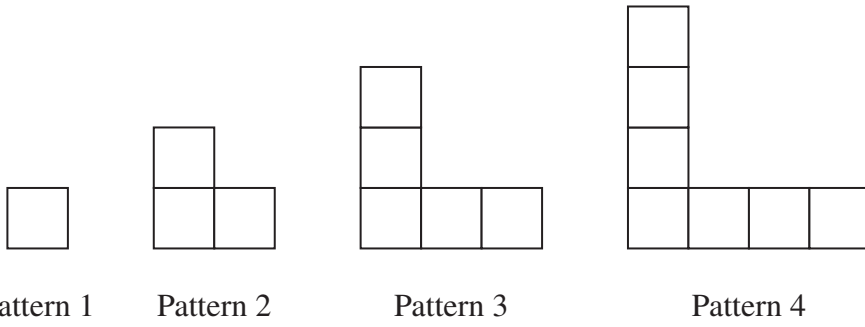
- 2 (e) Choose the correct words from this list to complete the sentence.

a right angle a reflex angle an acute angle an obtuse angle

The angle marked x is (1 mark)



3 These patterns are made of squares.



3 (a) Complete the table for Pattern 4.

Pattern number	1	2	3	4
Number of squares	1	3	5	

(1 mark)

3 (b) Sketch Pattern 5.

(1 mark)

3 (c) Which pattern will have 27 squares?

.....

Answer (2 marks)

3 (d) Explain why there will **not** be a pattern with 28 squares.

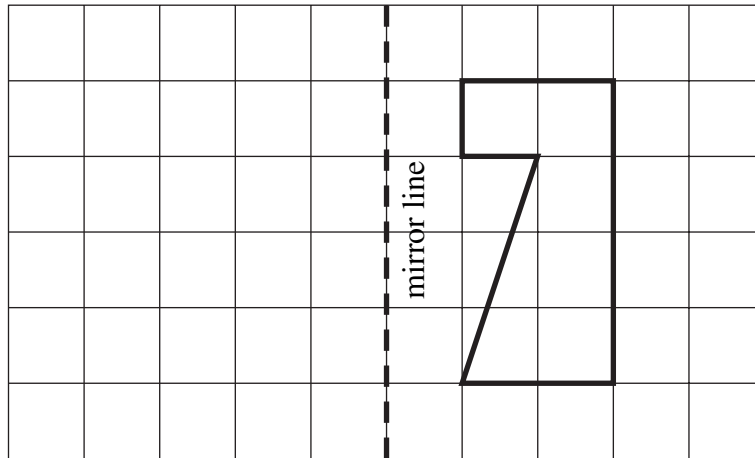
.....

(1 mark)

Turn over ►



4 Draw the reflection of the shape in the mirror line.



(2 marks)



5

PARTY PACKS FOR TODDLERS
 full of goodies
 Jo will deliver them to you

Jo charges according to this formula:

£2.99 for each party pack plus £10 for delivery.

5 (a) Jo delivers 15 party packs to Mrs Marker.

How much does Jo charge Mrs Marker?

.....

.....

Answer £ (2 marks)

5 (b) The playgroup orders Jo’s party packs for the Christmas party.
Jo delivers them to the hall and charges £129.60

How many party packs were ordered by the playgroup?

.....

.....

.....

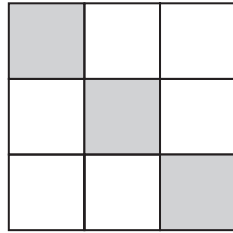
Answer (3 marks)

7

Turn over ►

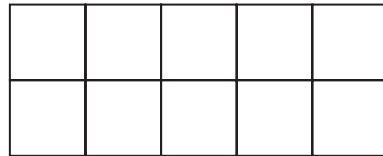


- 6 (a) What fraction of this shape is shaded?



Answer (1 mark)

- 6 (b) Shade $\frac{3}{5}$ of this shape.



(1 mark)

- 6 (c) Write down another fraction which is equivalent to $\frac{3}{5}$.

.....

Answer (1 mark)

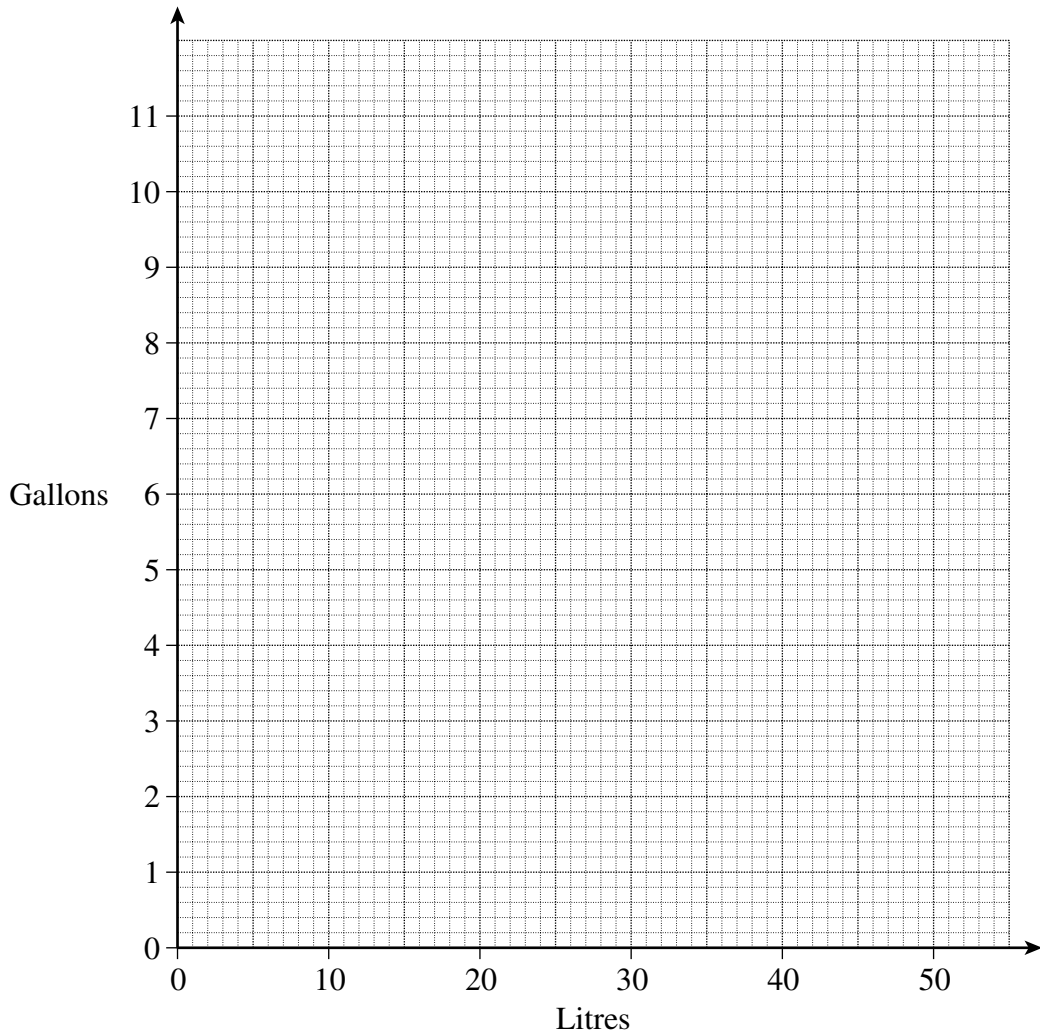
- 6 (d) What percentage is equivalent to $\frac{3}{5}$?

.....

Answer % (1 mark)



7 You are given that 50 litres is equivalent to 11 gallons.



7 (a) Draw a straight line graph to convert litres to gallons.

(3 marks)

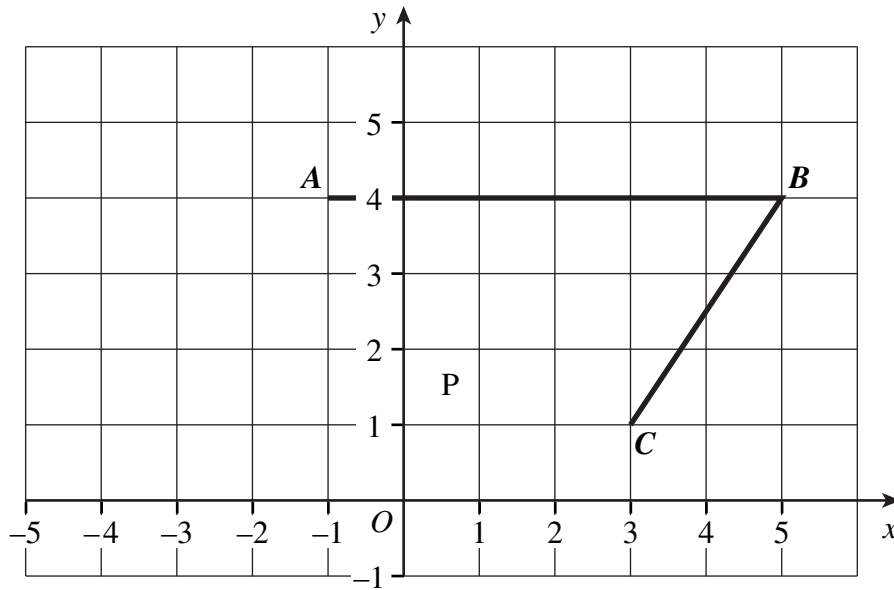
7 (b) Work out how many gallons are equivalent to 280 litres.

Answer gallons

(2 marks)



8 Two sides of a parallelogram are drawn on the grid.



8 (a) Write down the coordinates of the point C.

Answer (..... ,) (1 mark)

8 (b) Write down the coordinates of the point A.

Answer (..... ,) (1 mark)

8 (c) (i) Draw **two** more lines to complete the parallelogram ABCD.

(1 mark)

8 (c) (ii) Write down the coordinates of D.

Answer (..... ,) (1 mark)

9 (a) Calculate 17^3

Answer (1 mark)

9 (b) Calculate the positive square root of 15.21

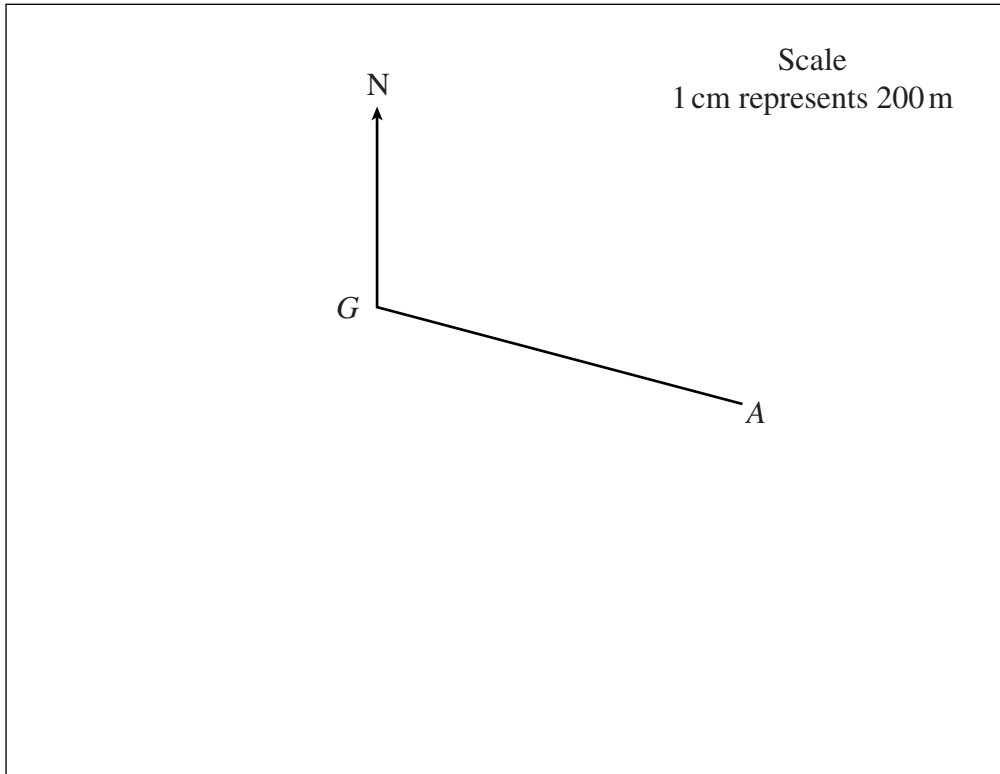
Answer (1 mark)

9 (c) Calculate $\frac{1}{0.025}$

Answer (1 mark)



- 10** The diagram shows the positions of Anna’s house *A* and the garage *G*.
The diagram is drawn to scale.
1 cm represents 200 m.



- 10 (a)** Use the diagram to work out the actual distance from Anna’s house to the garage.

.....
.....

Answer m (2 marks)

- 10 (b)** Measure and write down the three-figure bearing of Anna’s house from the garage.

.....

Answer ° (1 mark)

- 10 (c)** The college *C* is 700 m from the garage *G* on a bearing of 160°.

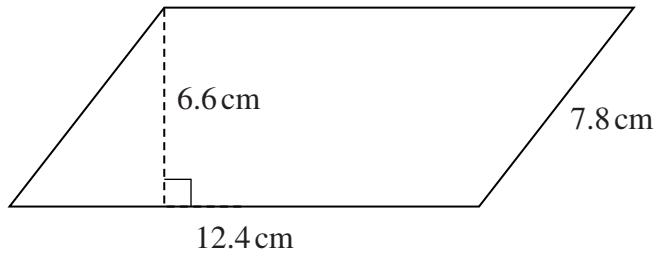
Mark the position of *C* on the diagram.

(2 marks)

Turn over ►



- 11** This parallelogram has sides of length 12.4 cm and 7.8 cm.
The height of the parallelogram is 6.6 cm.



Not drawn accurately

Calculate the area of the parallelogram.
Give your answer to one decimal place.

.....

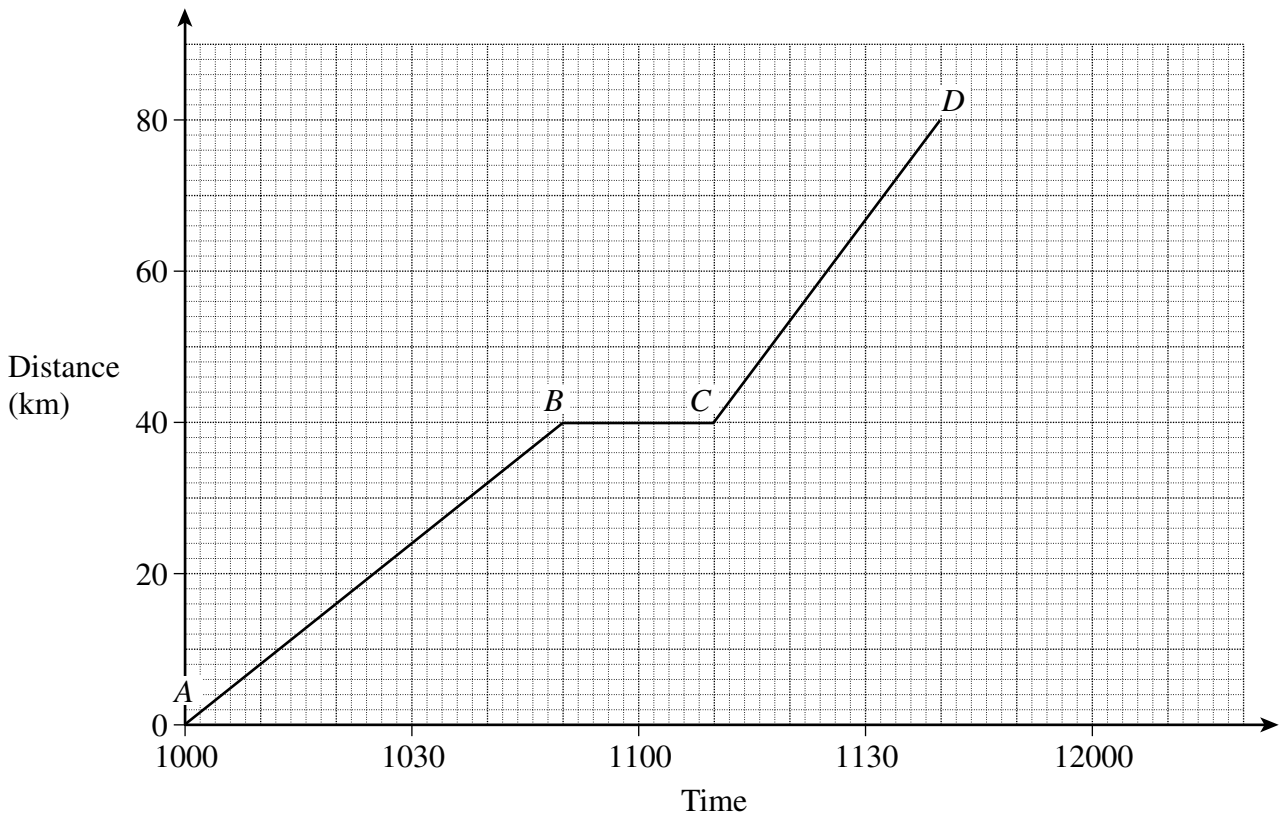
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.....

Answer cm^2 (3 marks)



12 The graph shows a coach journey.



12 (a) How far has the coach travelled in the first half hour?

Answer km (1 mark)

12 (b) How can you tell from the graph that the coach is travelling faster from C to D than from A to B?

.....
(1 mark)

12 (c) What is the speed of the coach from C to D?
Give your answer in kilometres per hour.

.....
.....
.....

Answer km/h (2 marks)



13 Solve these equations.

13 (a) $p + 5 = 9$

.....

Answer $p =$ (1 mark)

13 (b) $2q - 1 = 14$

.....

.....

Answer $q =$ (2 marks)

13 (c) $\frac{x}{4} = 8$

.....

Answer $x =$ (1 mark)

13 (d) $2(y + 3) = 22$

.....

.....

.....

Answer $y =$ (3 marks)

14 (a) Calculate the size of the exterior angle of a regular hexagon.

.....

.....

Answer degrees (2 marks)

14 (b) Explain why you cannot have a regular polygon with an exterior angle equal to 50° .

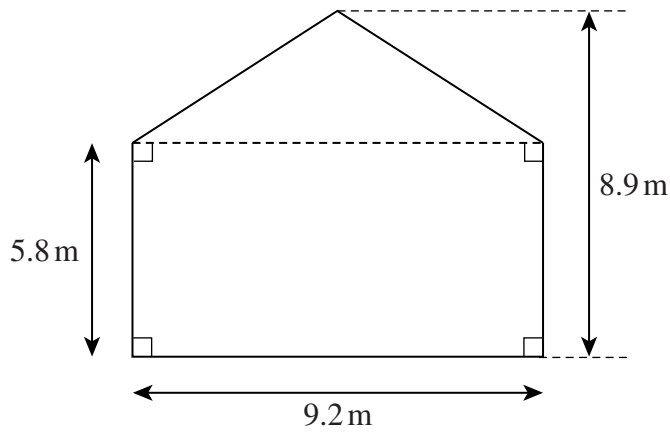
.....

.....

(2 marks)



15 The diagram shows the end wall of a house.



Not drawn accurately

Calculate the area of the wall.

.....

.....

.....

Answer m² (4 marks)

16 A solution of the equation $x^3 - 5x = 60$ lies between $x = 4$ and $x = 5$.

Use trial and improvement to find this solution.
Give your answer to one decimal place.

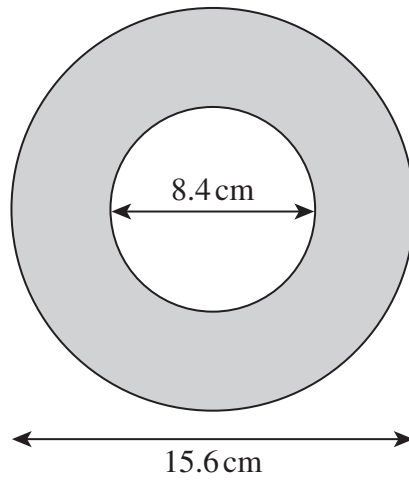
x	$x^3 - 5x$	Comment
4	44	too small

Answer $x =$ (3 marks)

Turn over ►



- 17** The diagram shows a metal ring.
The inner diameter of the ring is 8.4 cm and the outer diameter is 15.6 cm.



Not drawn accurately

Calculate the area of the ring.

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.....

.....

Answer cm² (4 marks)

END OF QUESTIONS



Q	Answers	Mark	Comments
1(a)(i)	28	B1	
1(a)(ii)	53.7	B1	
1(b)	Arrow on 2 nd mark up from 20	B1	
2(a)	S	B1	
2(b)	Q and T	B1	
2(c)	R	B1	
2(d)	Trapezium	B1	
2(e)	A reflex angle	B1	
3(a)	7	B1	
3(b)	5 squares across and 5 up	B1	Need not be ruled
3(c)	Counting on in 2s	M1	or use of $2n - 1$
	14	A1	
3(d)	Always odd number of squares	B1	or next pattern has 29 squares
4	Fully correct	B2	Award B1 for 2 correct lines or for any reflection
5(a)	$15 \times 2.99 + 10$	M1	
	54.85	A1	
5(b)	$129.6 - 10$	M1	or full build-up method
	$(\text{Their } 119.6) \div 2.99$	M1dep	
	40	A1	

Q	Answers	Mark	Comments
6(a)	$\frac{1}{3}$	B1	$\frac{3}{9}$
6(b)	6 squares shaded	B1	
6(c)	$\frac{6}{10}$	B1	oe
6(d)	60	B1	
7(a)	Plot at (50, 11)	B1	Tolerance 1 mm
	Attempt to connect their plot to origin	M1	Does not have to be ruled for this mark
	Correct ruled line	A1	Must be ruled
7(b)	Reading off from 28 litres up to Their graph	M1	oe on graph
	62	A1	ft from their line, tolerance ± 0.2
	or $\frac{11}{50} \times 280$	M1	
	61.6 or 62	A1	
8(a)	(3, 1)	B1	
8(b)	(-1, 4)	B1	
8(c)(i)	2 lines parallel to AB and BC	M1	Within 2 mm of correct
8(c)(ii)	(-3, 1)	B1	
9(a)	4913	B1	
9(b)	3.9	B1	
9(c)	40	B1	

Q	Answers	Mark	Comments
10(a)	5 cm	M1	
	1000 m	A1	
10(b)	105	B1	
10(c)	Line on 200° bearing from G	M1	$\pm 2^\circ$
	C marked on line, 3.5 cm from G	A1	± 2 mm
11	12.4×6.6	M1	
	81.84	A1	
	81.8	A1ft	
12(a)	24	B1	
12(b)	Line is steeper	B1	oe
12(c)	40 km and 30 minutes	M1	
	80	A1	
13(a)	4	B1	
13(b)	$2q = 14 + 1$	M1	
	7.5 or $7\frac{1}{2}$	A1	
13(c)	32	B1	
13(d)	$2y + 6 = 22$	M1	or $y + 3 = 22 \div 2$ (or 11)
	$2y = 22 - 6$ (or 16)	M1	$y =$ their $11 - 8$
	8	A1	8
14(a)	$360 \div 6$	M1	
	60	A1	
14(b)	$360 \div 50$	M1	
	Not a whole number	A1	oe

Q	Answers	Mark	Comments
15	$5.8 \times 9.2 (= 53.36)$	M1	
	$8.9 - 5.8 (=3.1)$	M1	
	$\frac{1}{2} \times 9.2 \times \text{Their } 3.1 (= 14.26)$	M1dep	
	67.6(2) or 68	A1	
16	Trial for $4 < x \leq 5$	B1	$4.5 \rightarrow 68.625$ $5 \rightarrow 100$ $4.3 \rightarrow 58.00\dots$ $4.36 \rightarrow 61.08\dots$ $4.31 \rightarrow 58.51\dots$ $4.37 \rightarrow 61.60\dots$ $4.32 \rightarrow 59.02\dots$ $4.38 \rightarrow 62.12\dots$ $4.33 \rightarrow 59.53\dots$ $4.39 \rightarrow 62.65\dots$ $4.34 \rightarrow 60.04\dots$ $4.4 \rightarrow 63.18\dots$ $4.35 \rightarrow 60.56\dots$ All trials correct to, or truncated to 1 decimal place
	Trials at 4.3 and 4.35	B1	or any 2 trials for $4.3 \leq x \leq 4.35$ which bracket 60
	4.3	B1dep	Dependent on second B1
17	$\pi \times 4.2^2 (= 55.41\dots)$	M1	
	$\pi \times 7.8^2 (= 191.1\dots)$	M1	
	Subtraction of areas	M1dep	Dependent on both M1s
	135 to 136	A1	

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

General Certificate of Secondary Education

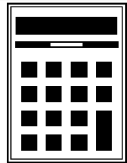


MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Higher Tier
Paper 2 Calculator

43055/2H

H

Specimen Paper (Non-coursework Specification) 2009

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
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For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16	
TOTAL	
Examiner's Initials	

Time allowed: 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

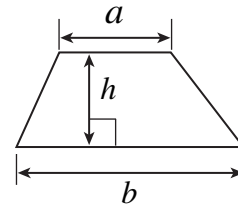
Advice

- In all calculations, show clearly how you work out your answer.

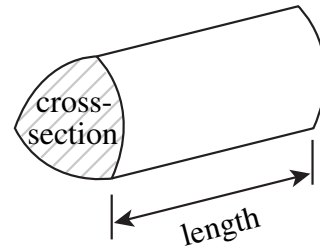


Formulae Sheet: Higher Tier

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

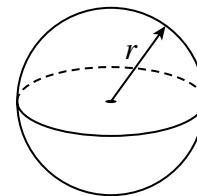


Volume of prism = area of cross-section \times length



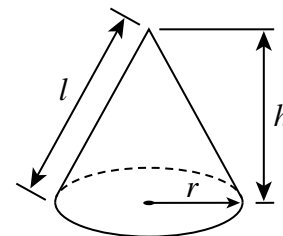
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

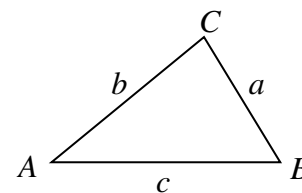


In any triangle ABC

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

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

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



The Quadratic Equation

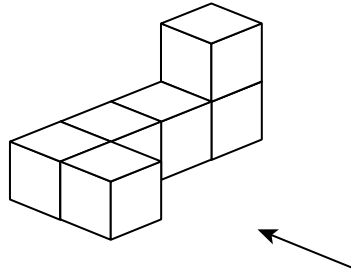
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

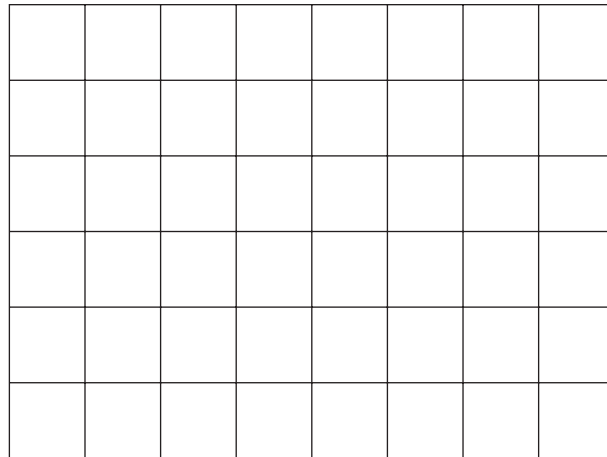


Answer **all** questions in the spaces provided.

- 1 The diagram shows a solid made from centimetre cubes.



On the grid below, draw the elevation of this solid, from the direction shown by the arrow.

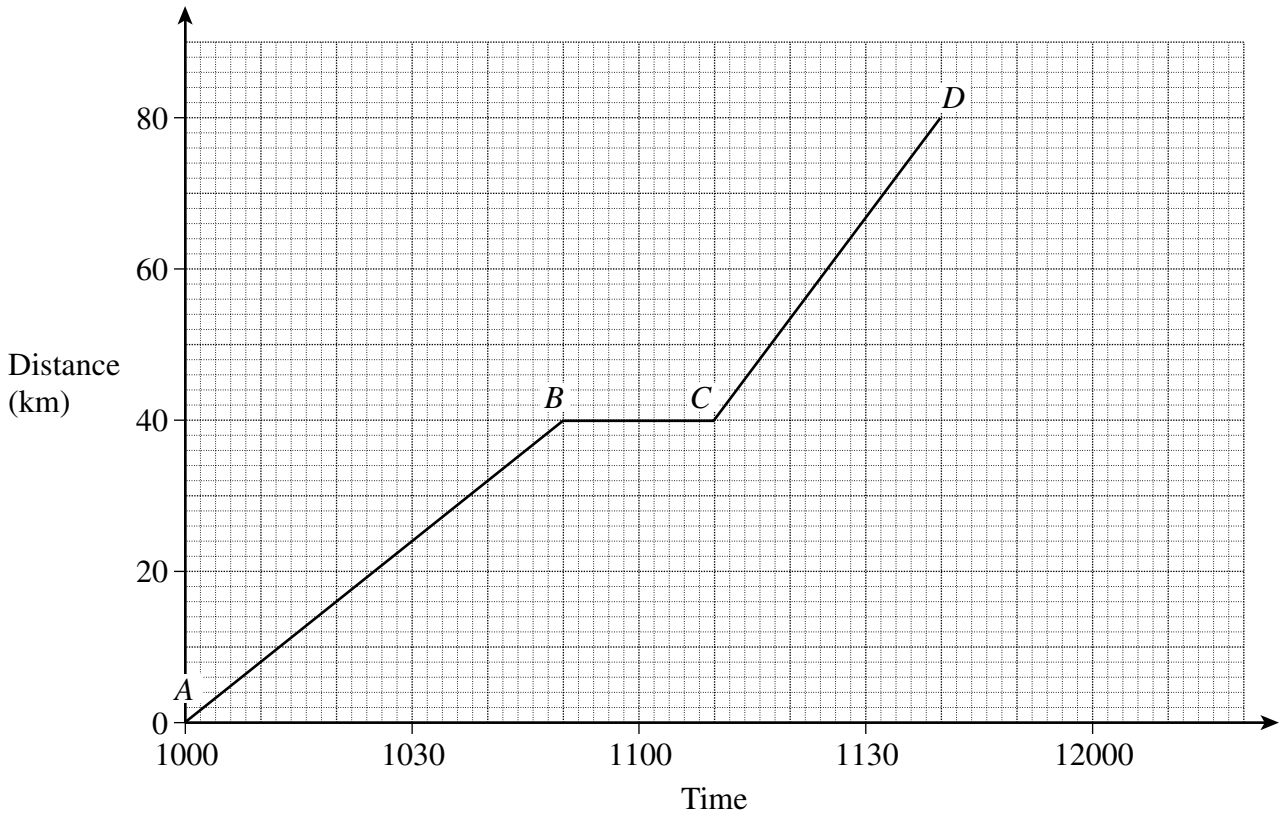


(2 marks)

Turn over ►



2 The graph shows a coach journey.



2 (a) For which part of the journey is the coach travelling at the fastest speed?

.....

 (1 mark)

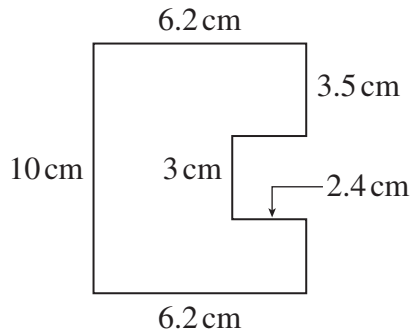
2 (b) What is the speed of the coach from C to D?
 Give your answer in kilometres per hour.

.....

Answer km/h (2 marks)



3 The diagram shows a shape made from rectangles.



Not drawn accurately

Find the area of the shape.
State the units of your answer.

.....

.....

.....

Answer (4 marks)

4 Solve these equations.

4 (a) $2(y + 3) = 22$

.....

.....

Answer $y =$ (3 marks)

4 (b) $6z + 9 = 1 - 2z$

.....

.....

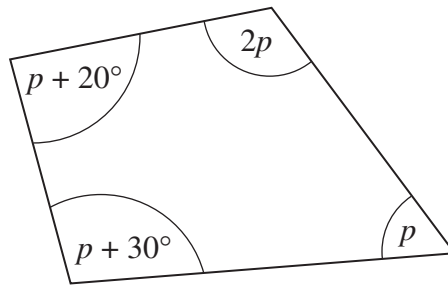
.....

Answer $z =$ (3 marks)

Turn over ►



- 5 The diagram shows a quadrilateral.



Not drawn
accurately

Find the value of p .

.....

.....

.....

Answer degrees (4 marks)

- 6 (a) Calculate the size of the exterior angle of a regular pentagon.

.....

.....

Answer degrees (2 marks)

- 6 (b) Explain why you cannot have a regular polygon with an exterior angle equal to 50° .

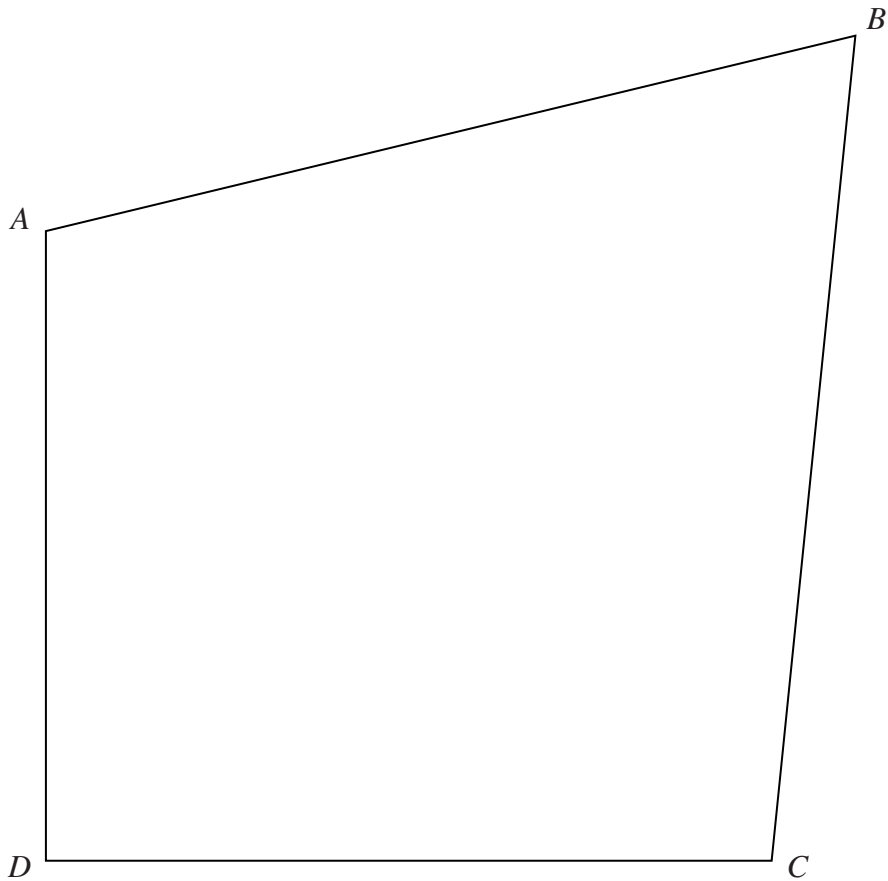
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(2 marks)



7 The diagram shows a walled garden $ABCD$.



7 (a) Using ruler and compasses only, construct the perpendicular bisector of AB .
(2 marks)

7 (b) A statue stands in the garden.
The statue is equidistant from A and B .
It is also equidistant from the walls AD and CD .

Using ruler and compasses only, mark the position of the statue.
Label it S .

(2 marks)



8 A solution of the equation $x^3 - 5x = 60$ lies between $x = 4$ and $x = 5$.

Use trial and improvement to find this solution.

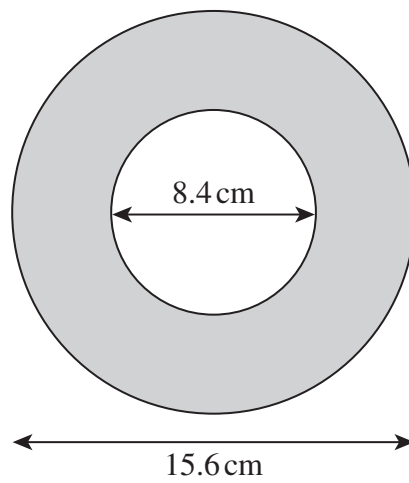
Give your answer to one decimal place.

x	$x^3 - 5x$	Comment
4	44	too small

Answer $x = \dots\dots\dots$ (3 marks)



- 9 The diagram shows a metal ring.
The inner diameter of the ring is 8.4 cm and the outer diameter is 15.6 cm.



Not drawn accurately

Calculate the area of the ring.
Give your answer to an appropriate degree of accuracy.

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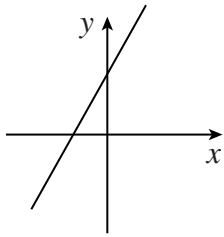
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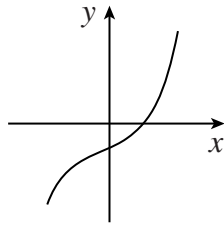
Answer cm² (5 marks)



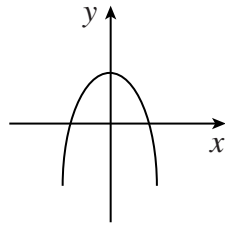
10 Each of these graphs represents a different equation.



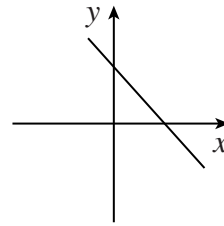
Graph A



Graph B



Graph C



Graph D

Match each graph to its equation.

10 (a) $y = x^3 - 2$ is Graph (1 mark)

10 (b) $x + y = 3$ is Graph (1 mark)

10 (c) $y = 5 - x^2$ is Graph (1 mark)

10 (d) $y = 2x + 4$ is Graph (1 mark)

11 Solve $\frac{3x - 4}{10} + \frac{x - 3}{5} = \frac{7}{2}$

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Answer (4 marks)



- 12** w , x , y and z represent lengths.
Match each expression, with an arrow, to the type of formula it represents.

$$w^2(x + y + z)$$

Length

$$2x + 3y + wz$$

Area

$$y^2 + wz$$

Volume

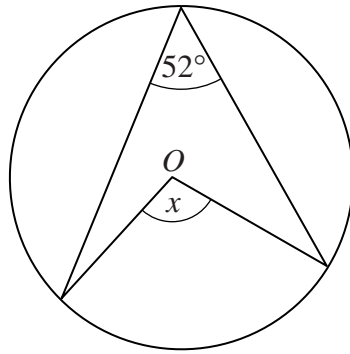
None

(3 marks)

Turn over ►



- 13 (a) In the diagram, O is the centre of the circle.



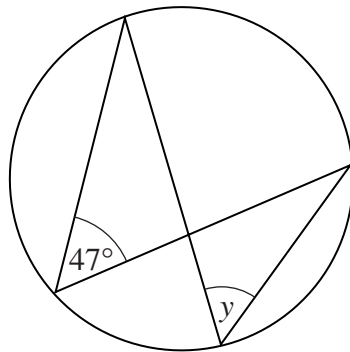
Not drawn
accurately

Work out the value of x .

.....

Answer degrees (1 mark)

- 13 (b)



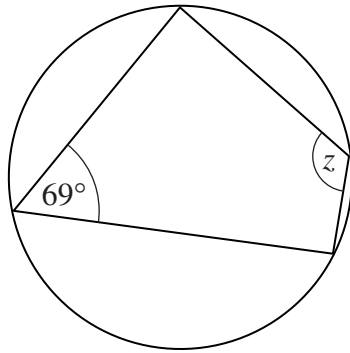
Not drawn
accurately

Write down the value of y .

Answer degrees (1 mark)



13 (c)



Not drawn accurately

Work out the value of z .
Give a reason for your answer.

.....

Answer degrees (1 mark)

Reason (1 mark)

14 Make x the subject of the formula $y = \frac{2x - 4}{x + 3}$

.....

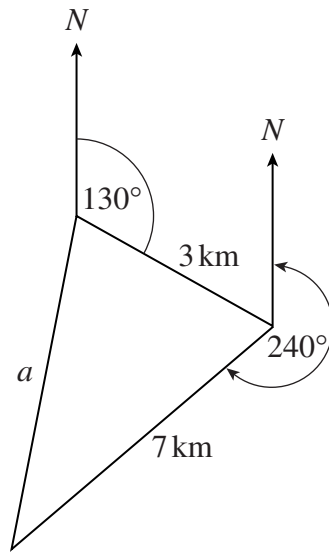
(4 marks)

8

Turn over ►



- 15** A ship leaves port and sails on a bearing of 130° for 3 km.
The ship then changes course and sails on a bearing of 240° for 7 km.



Not drawn accurately

Calculate the distance of the ship from the port (marked a on the diagram).

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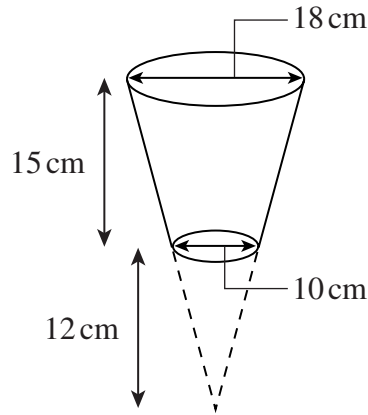
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Answer km (5 marks)



- 16** A plant pot is in the shape of a frustum of a cone.
The plant pot has a base diameter of 10 cm and a top diameter of 18 cm.
The height of the plant pot is 15 cm.



Sandra has a 2 litre bag of compost.

Will she have enough compost to fill the plant pot?

You **must** show your working.

1 litre = 1000 cm³

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(4 marks)



17 Find the x -coordinates of the points of intersection of the line $y = 2x - 1$ and the circle $x^2 + y^2 = 27$

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Answer and (7 marks)

END OF QUESTIONS



Q	Answers	Mark	Comments
1	4 squares horizontally	B1	
	2 squares vertically at right end	B1	
2(a)	C to D	B1	
2(b)	40 km and 30 minutes	M1	
	80	A1	
3	$(6.2 \times 3.5 \times 2)$ or $(6.2 - 2.4) \times 3$	M1	
	$43.4 + 11.4$	M1	
	54.8	A1	
	cm ²	B1	
4(a)	$2y + 6 = 22$	M1	or $y + 3 = \frac{22}{2}$
	$2y = 22 - 6$ or $2y = 16$	M1dep	$y = \text{their } 11 - 3$
	8	A1	
4(b)	$6z + 2z$	M1	or $1 - 9$
	$6z + 2z = 1 - 9$	M1	oe
	-1	A1	
5	$p + 20 + 2p + p + p + 30 (= 360)$	M1	
	$5p + 50 (= 360)$	A1	
	$5p = 360 - 50$	M1	
	$p = 62^\circ$	A1	
6(a)	$360 \div 5$	M1	
	72	A1	
6(b)	$360 \div 50$	M1	
	Not a whole number	A1	oe

Q	Answers	Mark	Comments
7(a)	Arcs in correct position	M1	
	Straight line joining intersecting arcs	A1	
7(b)	Angle bisector drawn accurately	M1	
	Intersection labelled T	A1	
8	Trial for $4 < x \leq 5$	B1	$4.5 \rightarrow 68.625$ $5 \rightarrow 100$ $4.3 \rightarrow 58.00\dots$ $4.36 \rightarrow 61.08\dots$ $4.31 \rightarrow 58.51\dots$ $4.37 \rightarrow 61.60\dots$ $4.32 \rightarrow 59.02\dots$ $4.38 \rightarrow 62.12\dots$ $4.33 \rightarrow 59.53\dots$ $4.39 \rightarrow 62.65\dots$ $4.34 \rightarrow 60.04\dots$ $4.4 \rightarrow 63.18\dots$ $4.35 \rightarrow 60.56\dots$ All trials correct to, or truncated to 1 decimal place
	Trials at 4.3 and 4.35	B1	or any 2 trials for $4.3 \leq x \leq 4.35$ which bracket 60
	4.3	B1dep	Dependent on second B1
9	$\pi \times 4.2^2$	M1	
	$\pi \times 7.8^2$	M1	
	191.3... –55.4.....	M1dep	Dependent on both M1s
	$135 < \text{area} < 136$	A1	
	135.7 or 136	A1ft	
10(a)	B	B1	
10(b)	D	B1	
10(c)	C	B1	
10(d)	A	B1	

Q	Answers	Mark	Comments
11	$\frac{(3x-4)+2(x-3)}{10} = \frac{7}{2}$	M1	
	$3x - 4 + 2x - 3 = 35$	M1	
	$5x - 7 = 35$	M1	
	$x = 8.4$	A1	
12	Area joined to $y^2 = wz$	B1	
	Volume joined to $w^2(x + y + z)$	B1	
	None joined to $2x + 3y + wz$	B1	
13(a)	104°	B1	
13(b)	47°	B1	
13(c)	111°	B1	
	Opposite angles in a cyclic quadrilateral add up to 180°	B1	
14	$360^\circ - (240^\circ + 50^\circ)$	M1	
	Angle of 70° marked in correct position	A1	
	$a^2 = 3^2 + 7^2 - 2 \times 3 \times 7 \times \cos 70^\circ$	M1	
	$a^2 = 43.64$	M1	
	$a = 6.6$	A1	
15	$xy + 3y = 2x - 4$	M1	
	$3y + 4 = 2x - xy$	M1	
	$3y + 4 = x(2 - y)$	M1	
	$x = \frac{3y + 4}{2 - y}$	A1	

Q	Answers	Mark	Comments
16	$\frac{1}{3} \times \pi \times 9^2 \times 27$ or 2290.22	M1	
	$\frac{1}{3} \times \pi \times 5^2 \times 12$ or 314.16	M1	
	1976cm ³	A1	Subtracting totals
	1.976 litres. Yes	A1	
17	$x^2 + (2x - 1)^2 - 27 = 0$	M1	
	$x^2 + 4x^2 - 4x + 1 - 27 = 0$	M1	
	$5x^2 - 3x - 26 = 0$	M1	
	$x = \frac{9 \pm \sqrt{9 - 4 \times 5 \times -26}}{10}$	M1	
	$x = \frac{9 \pm 21.656}{10}$	M1	
	3.2	A1	
	-1.4	A1	