

Please write clearly in	n block capitals.	
Centre number	Candidate number	
Surname		
Forename(s)		
Candidate signature	I declare this is my own work.	/

# GCSE MATHEMATICS

H

Higher Tier

Paper 2 Calculator

Time allowed: 1 hour 30 minutes

#### **Materials**

For this paper you must have:

- a calculator
- mathematical instruments.



## 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. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

#### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing 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		
Pages	Mark	
2–3		
4–5		
6–7		
8–9		
10–11		
12–13		
14–15		
16–17		
18–19		
20–21		
22–23		
24		
TOTAL		

## Answer all questions in the spaces provided.

1 Circle the factor of  $x^2 - 5x$ 

[1 mark]

- x 1
- -5x
- x-5
- 5*x*

2 A is half of B.

Work out the ratio A: B

Circle your answer.

[1 mark]

- 1:2
- 2:1
- 1:3
- 3:1
- The first three terms of a geometric progression are  $\frac{2}{3}$   $\frac{4}{9}$   $\frac{8}{27}$

Circle the fourth term.

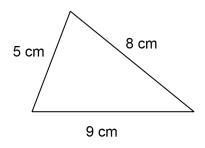
[1 mark]

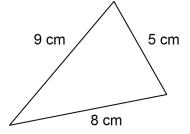
- 10 81
- 14 81
- 16 81
- 32 81



ɔo.uk 找名校导师,用小草线上辅导(微信小程序同名)

4





Not drawn accurately

Circle the reason why these triangles are congruent.

[1 mark]

ASA

**RHS** 

SAS

SSS

5	Solve	10x - 62.4 - 3x

	[2 marks]

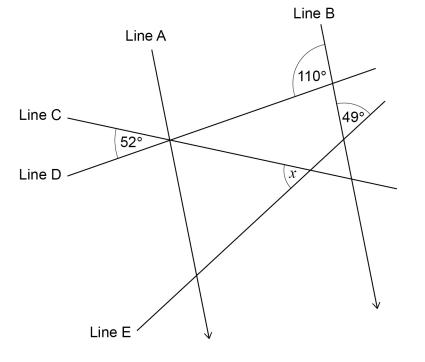
$$x =$$

6

Turn over ▶



**6** Lines A, B, C, D and E intersect as shown. Lines A and B are parallel.



Not drawn accurately

Work out the size of angle x.

Answer

work out the size of angle x.	[3 marks]



degrees

7 102 boys and 85 girls took a test.

The table shows information about the mean marks.

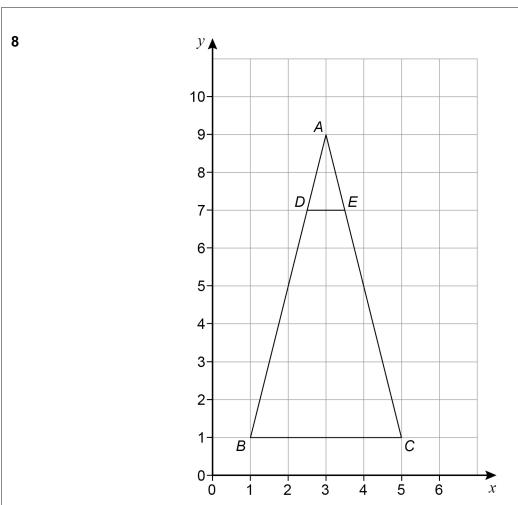
	Boys	Girls
Number of students	102	85
Mean mark	68.5	72.4

The pass mark for the test was 70

Was	the mean	mark for <b>al</b>	I of these	students	greater than	the pass	s mark?
You	must sho	w your work	ing.				

[3 marks]





Describe fully the **single** transformation that maps triangle *ABC* to triangle *ADE*.

4



[3 marks]

More air is pumped into the ball at a rate of 160 cm<sup>3</sup> per second. The ball is full of air when it becomes a sphere with radius 15 cm



Volume of a sphere =  $\frac{4}{3}\pi r^3$  where r is the radius

Does it take **less than** 1 minute to fill the ball? You **must** show your working.

[4 marks]

\_



10	p is a positive number.			
	n is a negative number.			
	For each statement, tick the co	orrect box.		
				[4 marks]
		Always true	Sometimes true	Never true
	p+n is positive			
	p-n is positive			
	$p^2 + n^2$ is positive			
	$p^3 \div n^3$ is positive			



11 250 trains arrived at a station.

The number of trains that were late was recorded after every 50 trains.

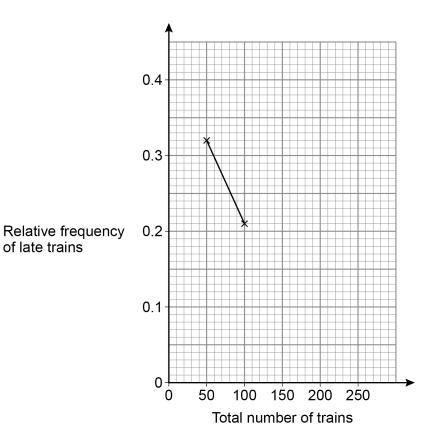
The table shows some information about the results.

Total number of trains	50	100	150	200	250
Total number of late trains	16	21	36	38	55
Relative frequency of late trains	0.32	0.21			

11 (a) Complete the relative frequency graph.

of late trains

[3 marks]



11 (b) Write down the best estimate of the probability that a train arriving at the station is late. [1 mark]

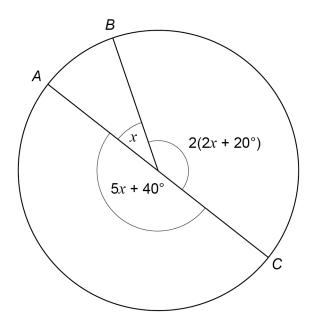
Answer			
TI I SW CI			



A, B and C are three points on a circle.

The radii from A, B and C are shown.





Is AC a diameter of the circle?

You **must** show your working.

[3 marks]



13	A straight line	
	has gradient 6	
	and	
	passes through the point (3, 19)	
	Work out the equation of the line.	
	Give your answer in the form $y = mx + c$	[3 marks]
	Answer	

Turn over for the next question

6

Turn over ►



14	The population of butterflies in a park is 4200	
14 (a)	Assume that the population increases by 12% each day.	
	Show that after 20 days the population would be greater than 40 000	[2 marks]
14 (b)	In fact, the population increases by 13% each day for 19 days	
	then	
	decreases by 8% for 1 day.	
	After the 20 days, is the actual population greater than 40 000?	
	Tick a box.	
	Yes No	
	Show working to support your answer.	[2 marks]



**14 (c)** The expected number of visitors to the park each day depends on the temperature.

Temperature	Expected number of visitors each day
Less than 21°C	700
21°C or more	900

On each of the 30 days in June

the park is open

the probability that the temperature is less than 21°C is 0.4

Work out the total number of expected visitors to the park in June.

	·	•	[3 marks
Answer			

7

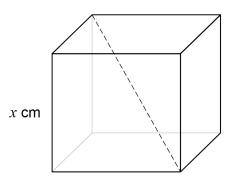




Turn over ▶

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$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$	$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$	$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$	$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$	15 (a) Work out an equation connecting $L$ and $D$ .  [3 marks]	$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$	$L = 85 \   \text{when} \   D = 10$ $\textbf{15 (a)} \qquad \text{Work out an equation connecting } L \   \text{and } D.$ $\textbf{[3 marks]}$
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16 (a) Circle the length, in centimetres, of the diagonal.

[1 mark]

$$\sqrt{3} x$$

$$\sqrt{3} x$$
  $\sqrt[3]{3x^2}$ 

$$\sqrt{x^3}$$

$$\sqrt[3]{3} x$$

16 (b) The total length, in centimetres, of the edges of the cube is a multiple of 18 Circle the correct statement.

[1 mark]

Turn over for the next question



17	20 people were asked which device they used more often, laptop or phone.
	The table shows the results.

	Laptop	Phone
Male	2	9
Female	4	5

		Female	4	5	
17 (2)	One male and one f	iomalo aro ch	oson at random		
17 (a)					
	Work out the probat	oility that <b>exa</b>	ctly one of them s	aid laptop.	[3 marks]
	۸۰۰	ower			
	All	swei			
17 (b)	Two males are chos	sen at random	1.		
	Work out the probat	oility that they	<b>both</b> said phone.		
					[2 marks]
	An	swer			



On the grid, identify the region represented by

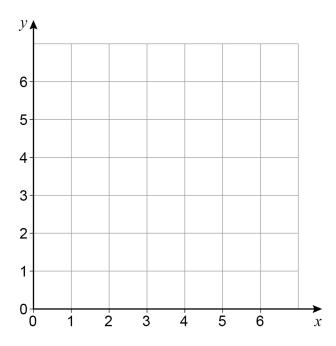
$$x \leq 5$$

$$y \leq 4$$

$$x + y > 6$$

Label the region R.

[3 marks]



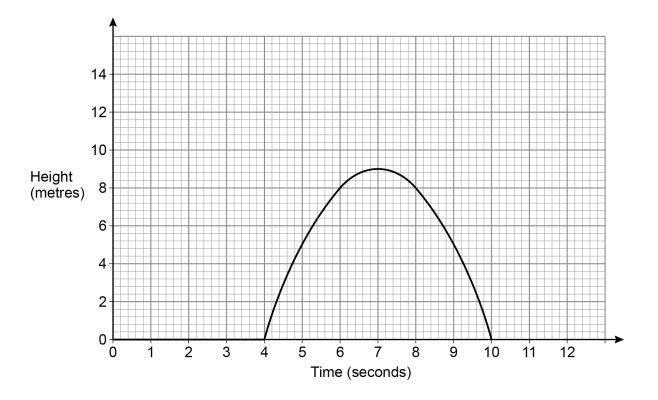
Turn over for the next question

R



19 The graph shows the height above ground of a toy rocket for 10 seconds.





**19 (a)** For how long is the rocket in the air? Circle your answer.

[1 mark]

10 seconds 9 seconds 6 seconds 4 seconds



) (b)	Using the graph, estimate the speed of the rocket after 6 s State the units of your answer.	econds. [3 marks]
	Answer	
	A square has an area of 0.25 square metres.  Circle the length, in <b>centimetres</b> , of one side of the square	e. [1 mark]
	0.5 cm 5 cm 50 cm	500 cm



x is an intege	er.		
Prove that	$35 + (3x + 1)^2 - 2x(4x - 3)$	is a square number.	[4 marks]



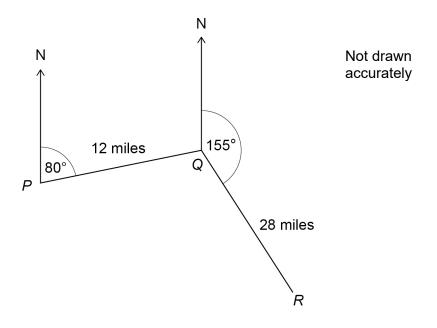
22	Liam is trying to remember a 2 digit code	
22	Liam is trying to remember a 3-digit code.  He knows the rule that	
	the first digit is a cube number	
	the second digit is a factor of 16	
	the third digit is an odd number.	
	Liam tries at random a code that matches the rule.	
	Work out the probability that this is the correct code.	
		[4 marks]
	Answer	

8





A ship sails from P to Q and then from Q to R.
Q is 12 miles from P, on a bearing of 080°
R is 28 miles from Q, on a bearing of 155°



Work out the direct distance from <i>P</i> to <i>R</i> .	[4 marks]
Answer	miles



The flight of a plane was in two stages.

The table shows information about the flight.

	Distance (miles)	Speed (mph)	Time (hours)
1st stage	731	x	$\frac{731}{x}$
2nd stage	287	<i>x</i> – 24	$\frac{287}{x-24}$

In total, the flight lasted 2 hours.

Work out the value of <i>x</i> .	[5 marks]

Answer \_\_\_\_\_

\_

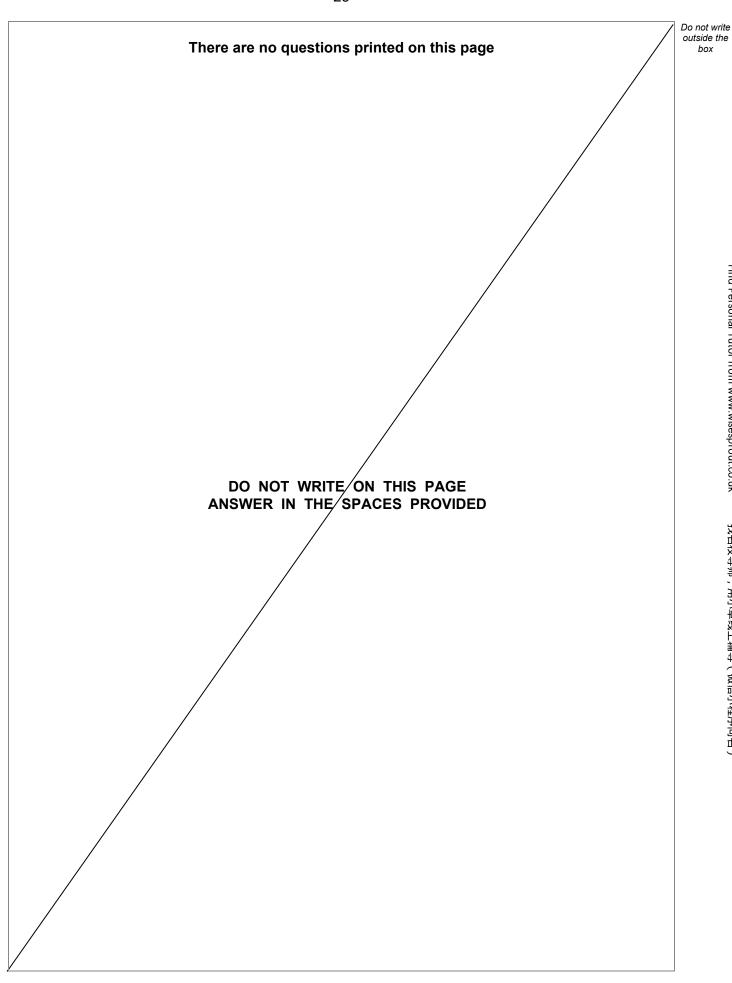


25	The equation of a curve is $y = x^2 + 14x + 52$	
	By completing the square, work out the coordinates of the turning point.	
	You <b>must</b> show your working.	[3 marks]
	Answer ( , )	

# **END OF QUESTIONS**

3







Question number	Additional page, if required. Write the question numbers in the left-hand margin.



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