

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

C300U10-1



A21-C300U10-1



TUESDAY, 2 NOVEMBER 2021 – MORNING

MATHEMATICS – Component 1

Non-Calculator Mathematics FOUNDATION TIER

2 hours 15 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

If you run out of space, use the additional page at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	8	
2.	5	
3.	2	
4.	5	
5.	4	
6.	4	
7.	3	
8.	4	
9.	4	
10.	4	
11.	4	
12.	11	
13.	9	
14.	7	
15.	7	
16.	4	
17.	4	
18.	2	
19.	4	
20.	5	
21.	4	
22.	4	
23.	4	
24.	5	
25.	3	
Total	120	



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Formula list*Area and volume formulae*

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

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

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

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

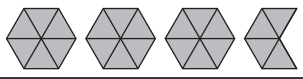
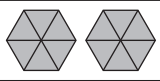

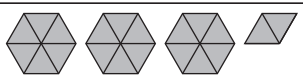
$$v^2 = u^2 + 2as$$




2. Samad asks a group of 120 football fans the following question.

"What type of football matches do you enjoy watching most?"

The pictogram shows his results.

League	
FA Cup	
European Championships	
World Cup	

Key	 represents 12 fans
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(a) How many more football fans answered League than answered FA Cup? [1]

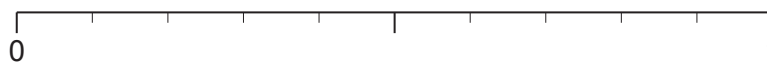
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(b) A football fan is chosen at random from Samad's group of 120.

(i) On the probability scale below, mark with an arrow the probability that this football fan answered European Championships. [2]



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- (ii) Work out the probability that the football fan answered World Cup.
Give your answer as a fraction in its simplest form. [2]

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3. (a) Circle the equation. [1]

$2x > 3$

$3x = 6$

$x \leq 5$

$x \neq 2$

$5x + 7$

- (b) Circle the expression that means '4 lots of n '. [1]

$4 + n$

$n \times n \times n \times n$

$n = 4$

$n \div 4$

$4n$



5. The diagram shows an **equilateral** triangle, PQR , inside a rectangle, $PSTU$. Q is on side PS of the rectangle.

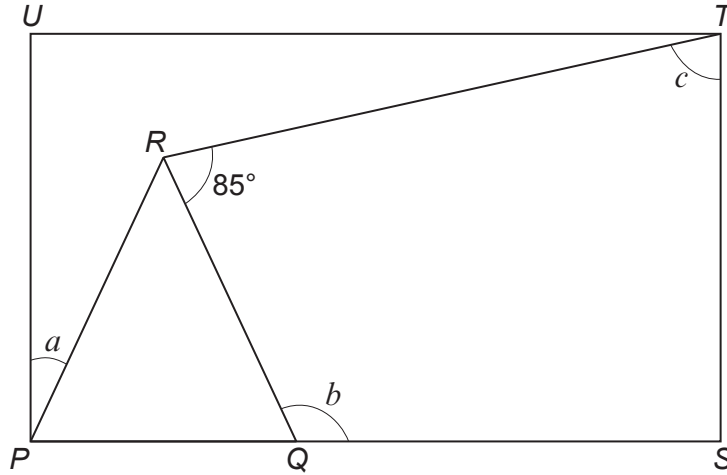


Diagram not drawn to scale

Calculate the size of each of the angles, a , b and c .

[4]

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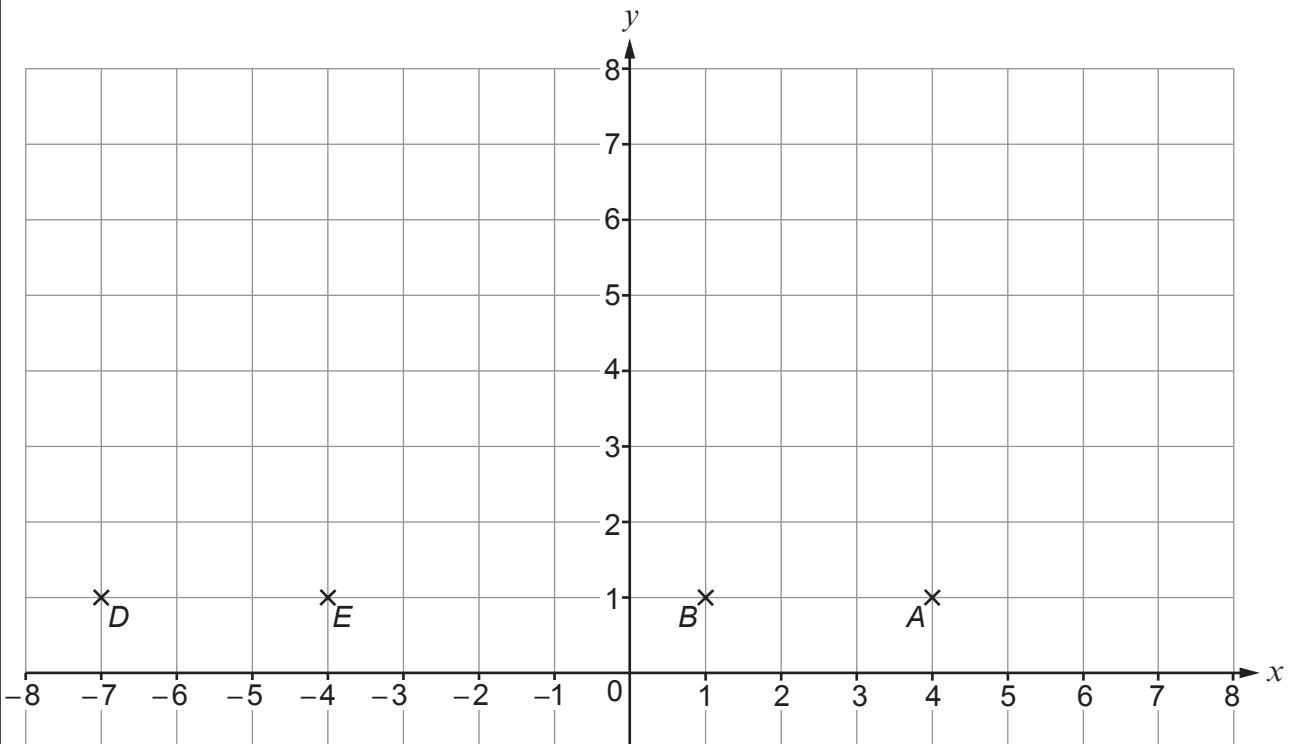
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$a = \dots\dots\dots^\circ$; $b = \dots\dots\dots^\circ$; $c = \dots\dots\dots^\circ$



6. The points A , B , D and E have been marked on the 1 cm grid below.



- (a) Write down the coordinates of E .

[1]

E (..... ,)

- (b) (i) ABC is a triangle with the following properties.

- Angle ABC is a right angle.
- The length of BC is twice the length of AB .

Mark and label the position of C on the grid.

[2]

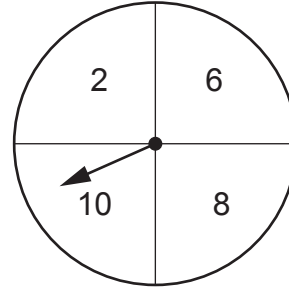
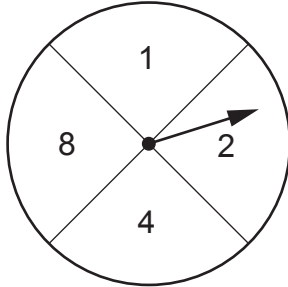
- (ii) D and E are two vertices of a triangle DEF .
Triangle DEF is congruent to triangle ABC .

Mark and label the position of F on the grid.

[1]



7. Maria is playing a game with two fair spinners. She spins each spinner once.



She adds the two scores together.

- (a) Complete the diagram to show all the possible totals.

[1]

		Spinner 2			
		+	2	6	8
Spinner 1	1	3	7	9	11
	2	4	8	10	
	4	6	10		
	8	10			

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- (b) Maria wins the game when the total is 10 or less.

What is the probability that Maria does **not** win the game?

[2]

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8. (a) Put one pair of brackets in each calculation to make it correct.

(i) $3 \times 4 + 1 \times 2 = 30$

[1]

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(ii) $50 - 36 \div 2 \times 3 = 21$

[1]

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(b) Callum is working out $(41 - 29 \cdot 5)^2$.

He **estimates** the answer to be 700.

Is Callum's answer a good estimate?

Yes

No

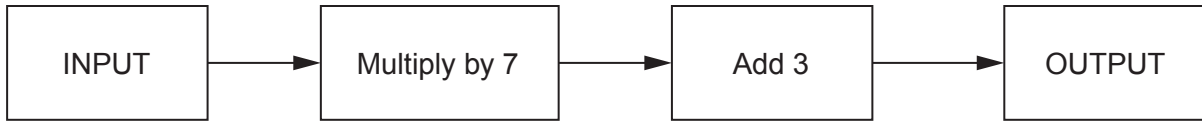
Show how you decide.

[2]

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9. (a) Here is a number machine.



(i) The input is 6.
What is the output?

[1]

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(ii) The input is $2x$.
Write an expression for the output.
Simplify your answer.

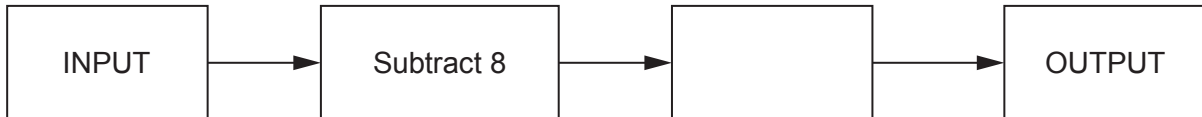
[2]

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(b) Here is a different number machine.



When the input is 12 the output is 0.4.

Complete the number machine.
You must use multiplication or division.

[1]

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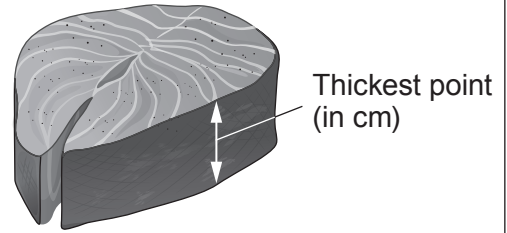
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C300U101
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10. (a) Katy uses the following rule for cooking frozen fish.

- Measure the fish in cm at its thickest point.
- Cook frozen fish for 8 minutes per cm.
- Turn the fish over halfway through the cooking time.



Katy cooks a piece of frozen fish that measures 3 cm at its thickest point.

After how many minutes should Katy turn her piece of fish over? [2]

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(b) Sajid uses the following rule for cooking fresh fish.

- Measure the fish in cm at its thickest point.
- Cook fresh fish for 4 minutes per cm.
- Add an extra 5 minutes to the cooking time for fish wrapped in foil.

Sajid cooks a piece of **fresh** fish that he has wrapped in foil.
He uses the rule and cooks his fish for a total of 31 minutes.

How thick was Sajid's fish at its thickest point before he cooked it? [2]

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(b) In March 2020, the King family went on holiday to New Delhi, India.

(i) When their flight took off from London, it was 14:55 in New Delhi. The duration of the flight was 8 hours 10 minutes.

What was the time in New Delhi when their flight arrived? [2]

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(ii) Flights from New Delhi back to London take a different route.

The King family's flight was due to take off from New Delhi at 11:05, New Delhi time, on 21st March.

It was due to arrive in London at 15:20, London time, on 21st March.

New Delhi time is 5 hours 30 minutes ahead of London time.

What was the duration of their flight?

You may assume the flight took off and landed on time. [3]

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Duration of flight

(iii) The assumption in part (ii) was incorrect.

The flight took off 10 minutes late and landed in London before 15:20.

How does this affect your answer to part (ii)? [1]

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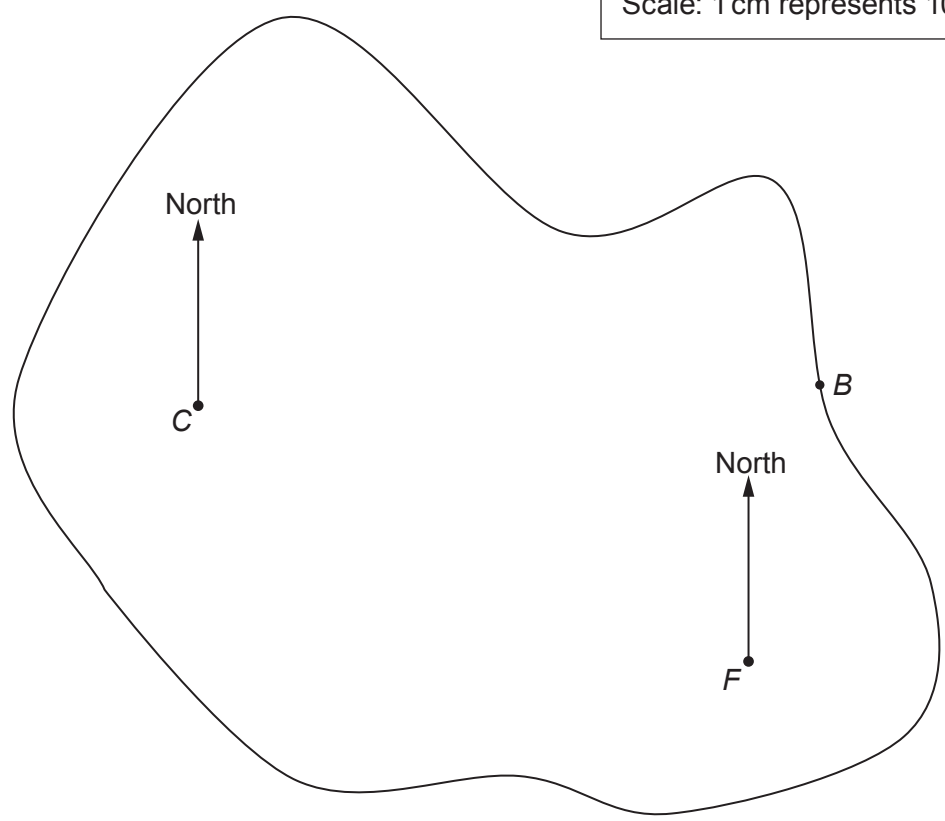
C300U101
15



Examiner only

13. (a) The scale drawing shows the positions of a beach café (*B*), a church (*C*) and a farmhouse (*F*) on an island.

Scale: 1 cm represents 1000 m



Don's house is on a bearing of 015° from the church (*C*) and on a bearing of 320° from the farmhouse (*F*).

(i) Mark the position of Don's house (*D*) on the diagram. [3]

(ii) Work out the shortest distance in metres from Don's house (*D*) to the beach café (*B*). [2]

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..... metres

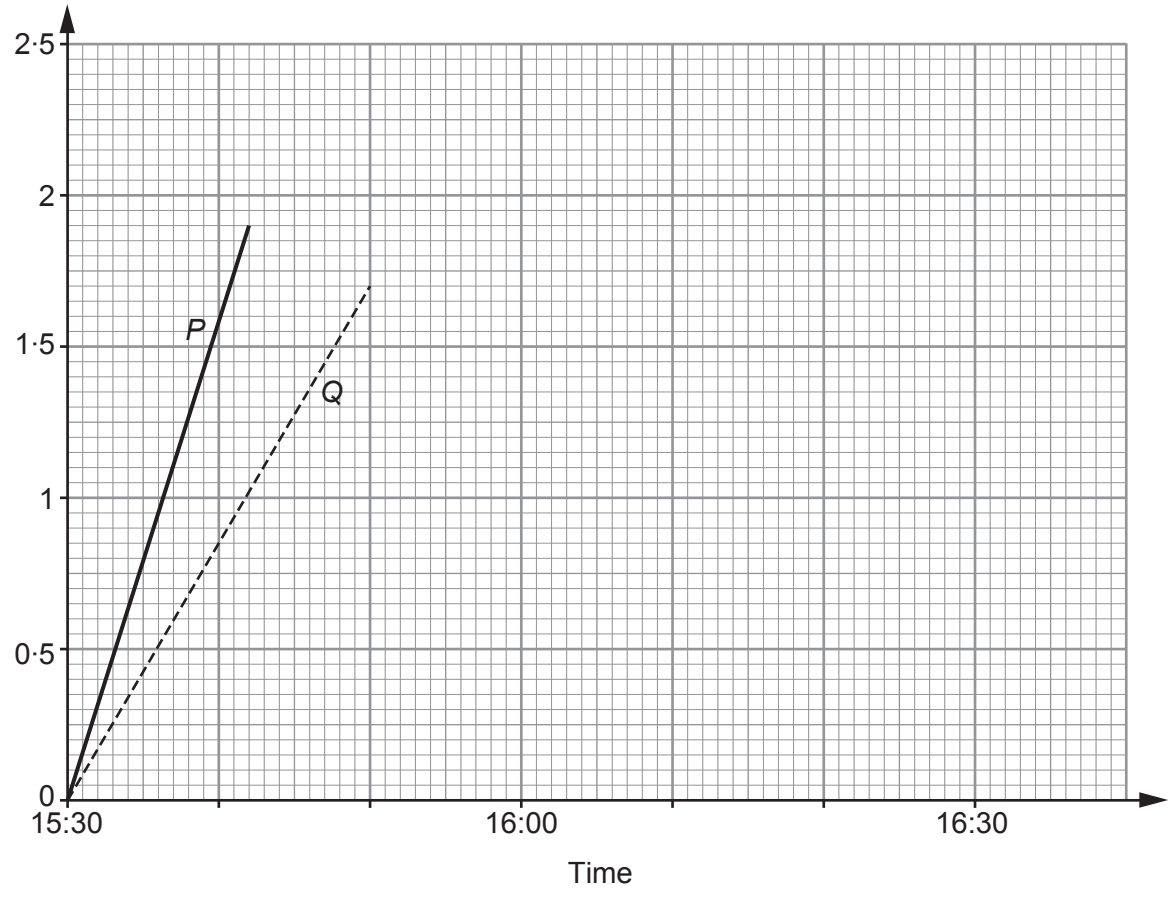


Examiner only

14. Three workmates, Alf, Nicky and Harriet, took part in a first aid training course at the local medical centre.
The course ended at 15:30.

After the course, they all travelled home to the same village.
The distance-time graph shows Alf's journey and Nicky's journey.

Distance travelled from medical centre (km)



(a) Alf rode his bicycle and Nicky walked home.

Which of the two lines on the graph, *P* or *Q*, is more likely to represent Nicky's journey home?

P *Q*

Explain how you decide. [1]

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Examiner only

(b) Harriet waited 10 minutes at a bus stop outside the medical centre and then caught the bus home.

After 5 minutes, the bus stopped in a traffic jam 0.5 km from the medical centre for 12 minutes.

The bus then travelled directly to Harriet's village.

Harriet got off the bus at a stop in her village 1.5 km from the medical centre.

Harriet was on the bus for a total of 20 minutes.

(i) Draw Harriet's bus journey on the distance-time graph. [3]

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(ii) Harriet got off the bus and then walked 0.5 km to her house. She walked at a speed of 2 km per hour.

How many minutes did it take Harriet to walk home from the bus stop? [2]

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..... minutes

(iii) Harriet lives further from the medical centre than Alf and Nicky.

Complete Harriet's journey home on the distance-time graph. [1]

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Examiner
only

15. When they were students, Paige and Anja had part-time jobs.

(a) One week, Paige earned £51 at a rate of £8.50 per hour.

For how many hours did Paige work?

[2]

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(b) Anja worked as a carer at weekends.
Her rate of pay for the daytime was £12 per hour.
Her rate of pay for the night-time was £9 per hour.

(i) How much did Anja earn for working 20 daytime hours and 10 night-time hours?

[2]

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(ii) Last weekend, her total daytime pay and her total night-time pay were in the ratio
total daytime pay : total night-time pay = 4 : 1.

She earned a total of £360.

How many night-time hours did she work last weekend?

[3]

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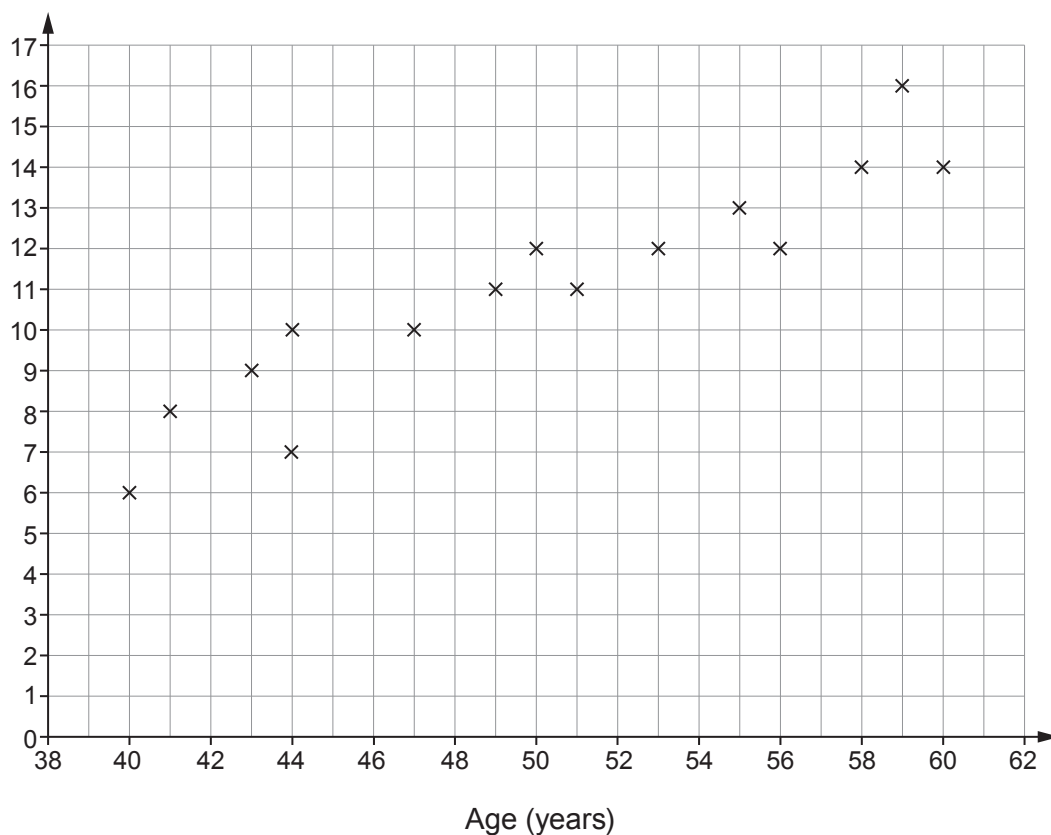
17. Fifteen people aged between 40 and 60 take an eye test as part of an experiment.

The test involves reading letters from a chart.
 Each line of letters is smaller than the line above.
 Letter size is measured in points.



The scatter graph below shows the age of and the smallest letter size read by each person.

Letter size (points)



- (a) The mean age is 50 years and the mean letter size is 11 points.

Using this information, draw a line of best fit on the scatter graph. [2]

- (b) Use the scatter graph to answer each of the following questions.

- (i) Estimate the smallest letter size which can be read by a person aged 52. [1]

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- (ii) Jared is 30 years old.

Should the scatter graph be used to estimate the smallest letter size that Jared can read?

Yes No

Give a reason for your answer. [1]

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Examiner
only

18. Zena is carrying out a survey to find out how people learn about **recent national political events**.

Here is her question.

Which method do you use to learn about politics?
Tick (✓) one box.

Social media	<input type="checkbox"/>	Newspaper	<input type="checkbox"/>	Radio	<input type="checkbox"/>
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Write a better version of Zena's question in the box below.
You must include response boxes.

[2]

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19. (a) Simplify $5\sqrt{7} + 3\sqrt{7}$.

[1]

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(b) Work out the value of $6 + \sqrt[3]{8000}$.

[1]

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(c) Work out the value of $3^{20} \div 3^{18}$.

[2]

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21. A company logo is printed on cards and letters.

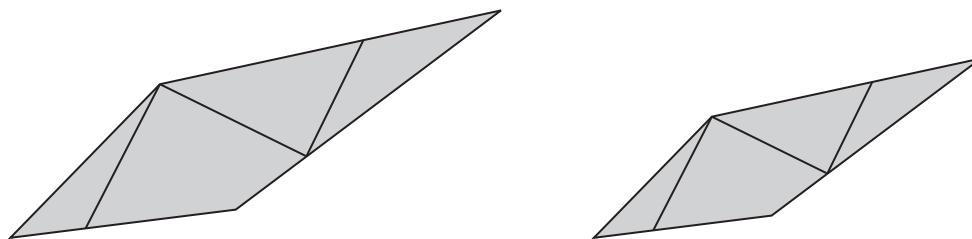


Diagram not drawn to scale

Each line in the larger logo has a corresponding line in the smaller one.
The lengths of the corresponding lines are all in the ratio 5 : 2.

(a) (i) Complete the following statement with a single mathematical word. [1]

'The two logos are because corresponding lines are in the same proportion.'

(ii) Complete the following statement with a number. [1]

'The larger logo is an enlargement of the smaller logo using a scale factor of

(b) One of the lines on the larger logo is 7.5 cm long.

How long is the corresponding line on the smaller logo? [2]

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22. (a) Find an expression for the n th term of this sequence. [2]

1 10 19 28 37

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(b) (i) The n th term of a different sequence is $3(n^2 + 1)$.
Find the 10th term of this sequence. [1]

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(ii) Explain why 601 cannot be a term of this sequence.
Do not find any more terms. [1]

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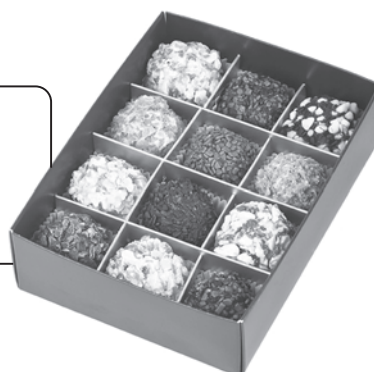
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24. Novak's online chocolate company has a special offer.

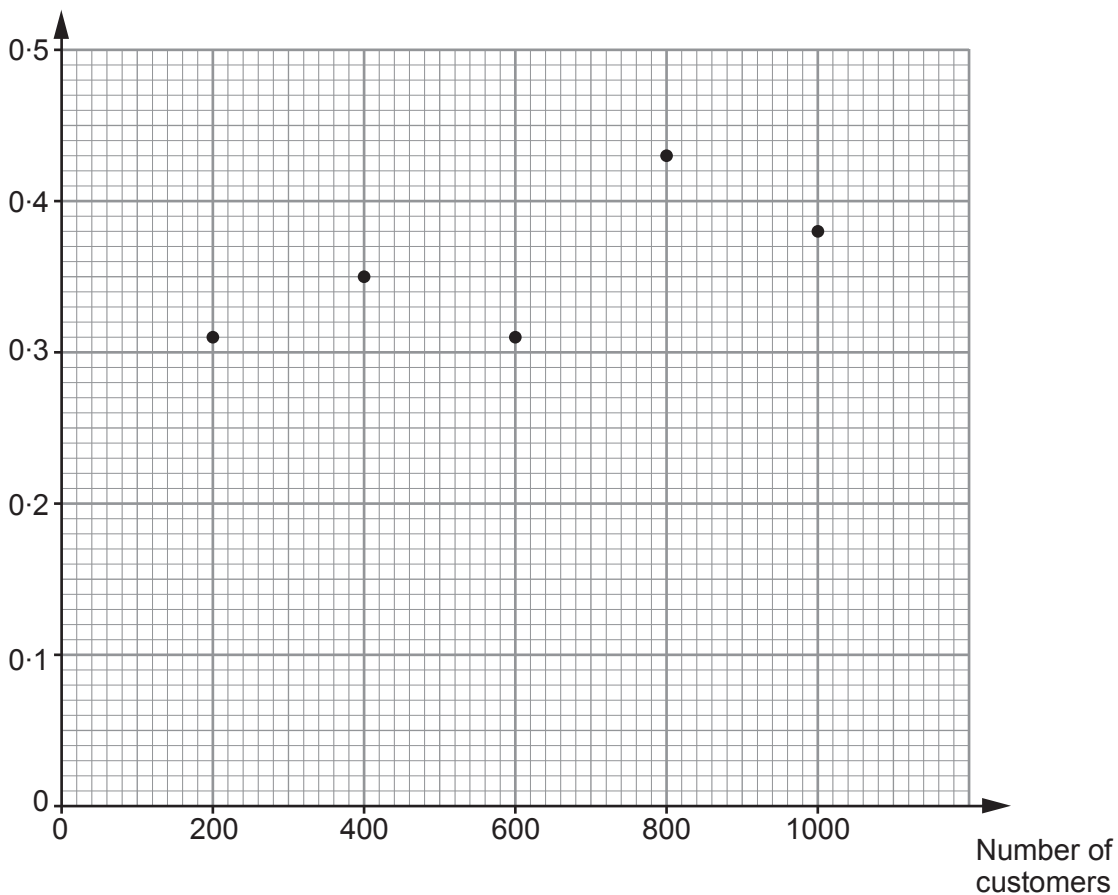
Special Offer
Free sample box worth £3*
*requires a minimum spend of £25



Novak records the number of free sample boxes he sends to his customers.

The graph shows the relative frequency that a customer has been sent a free sample box after 200, 400, 600, 800 and 1000 customer orders.

Relative frequency of a customer being sent a free sample box



Examiner only

(a) What is the total value of the free sample boxes that Novak sent his first 400 customers?

[4]

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Total value of free sample boxes is £

(b) Novak says:

The most accurate estimate of the probability that a customer will be sent a free sample box is 0.38.

Is he correct?

Yes No

Explain how you decide.

[1]

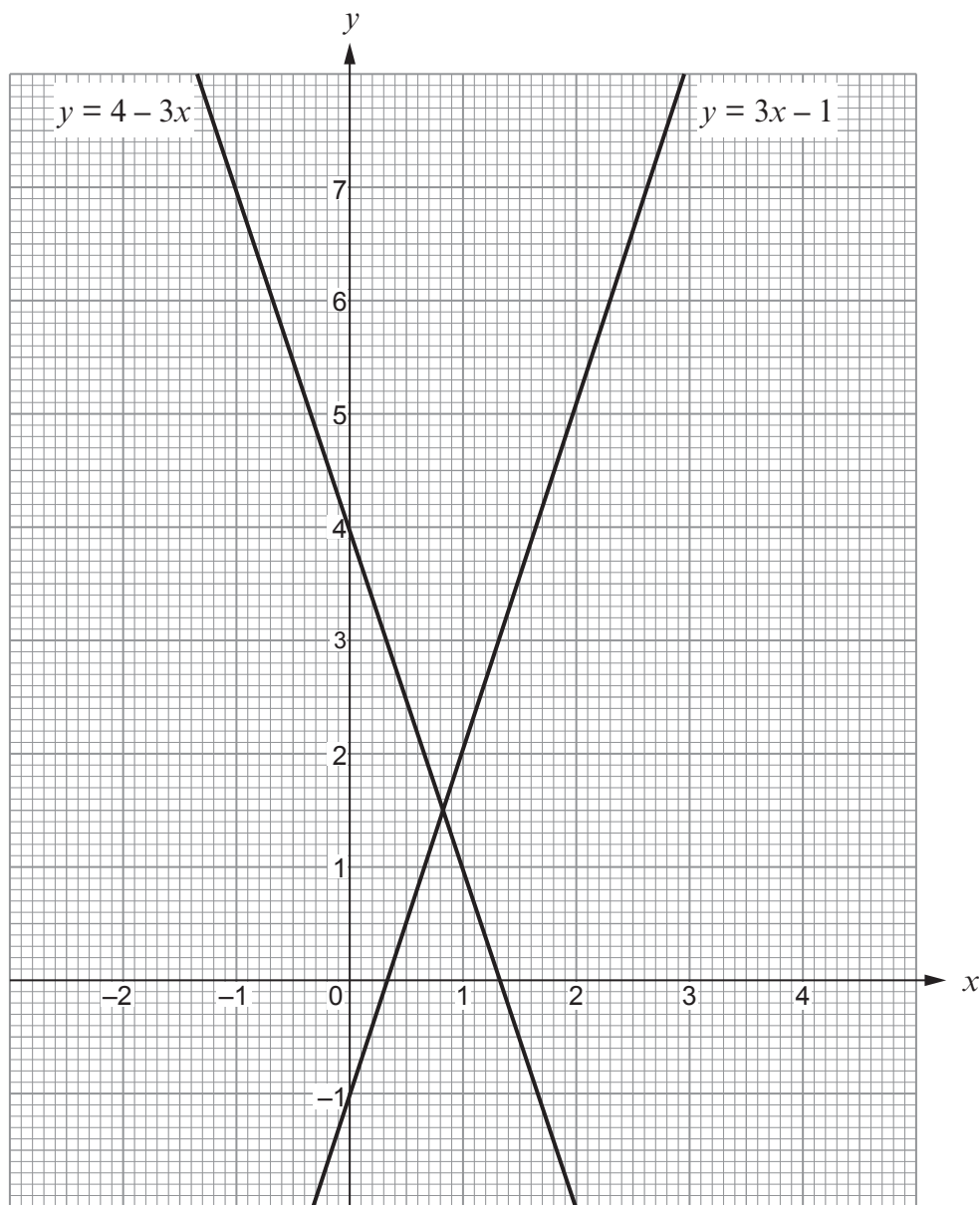
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25. (a) The diagram shows the graphs of $y = 3x - 1$ and $y = 4 - 3x$.



- (i) Use the graphs to write down an **approximate** solution of the equation $3x - 1 = 4 - 3x$. [1]

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 $x =$



(ii) Circle the equation that represents a line parallel to $y = 3x - 1$.

[1]

$y = 3 - x$

$3y = x - 1$

$y = 3x + 2$

$\frac{3}{y} = x$

$\frac{x}{3} = y$

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(b) Circle the equation where y is directly proportional to x .

[1]

$y = \frac{5}{x}$

$x + y = 1$

$7 = xy$

$y = 3x^2$

$y = 4x$

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