Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

C300U20-1

Z22-C300U20-1

TUESDAY, 7 JUNE 2022 – MORNING

MATHEMATICS – Component 2
Calculator-Allowed Mathematics
FOUNDATION TIER

2 hours 15 minutes

ADDITIONAL MATERIALS

An additional formulae sheet.

A calculator will be required for 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(s) at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·142 or use the π button on your calculator.

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.	**5**	
2.	**6**	
3.	**2**	
4.	**4**	
5.	**7**	
6.	**4**	
7.	**3**	
8.	**6**	
9.	**6**	
10.	**10**	
11.	**6**	
12.	**5**	
13.	**4**	
14.	**4**	
15.	**4**	
16.	**4**	
17.	**5**	
18.	**4**	
19.	**3**	
20.	**5**	
21.	**5**	
22.	**7**	
23.	**6**	
24.	**5**	
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:

Curved surface area of a cone = πrl

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

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

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:

$$v = u + at$$

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

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

Examiner only

1. The cost of various items sold at a shop are shown below.

Item	Cost
Notebook	£2.49
File	£3.59
Pen	95p
Calculator	£10.50
Pencil	55p
Stapler	£2.15

(a) Find the total cost of buying a calculator, a file and a pencil. [1]

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(b) Nisreen bought five notebooks.
She paid for them with a £20 note.

How much change should she get? [2]

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(c) George bought two different items.
He paid for them with a £5 note and received £1.90 change.

Which two items did he buy?
You must show all your working. [2]

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Items are ..... and .....

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2. (a) Find the size of each of the angles marked a, b and c. [4]

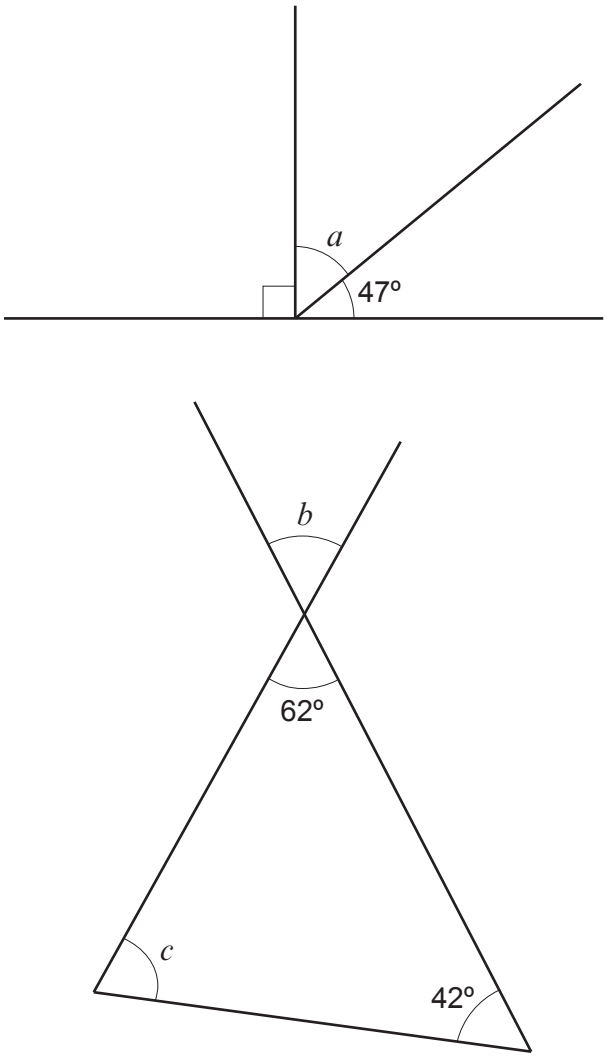

Diagram not drawn to scale

a = ... º b = ... º c = ... º

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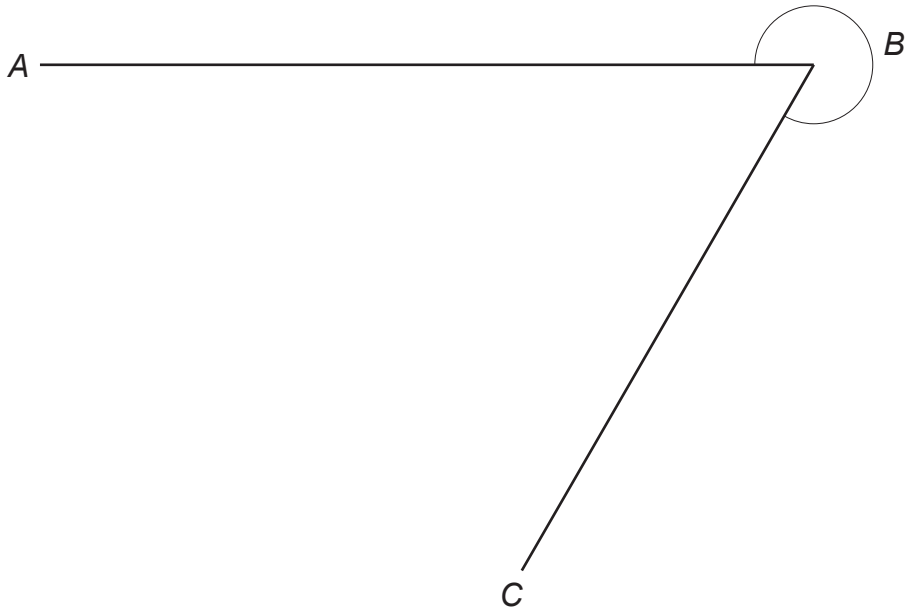
(b) The interior angles of a triangle are 65º, 65º and 50º.
Circle the correct mathematical name of this triangle. [1]

Equilateral Right-angled Isosceles Obtuse-angled Scalene

Examiner only

(c) Measure the size of the reflex angle *ABC* shown below. [1]



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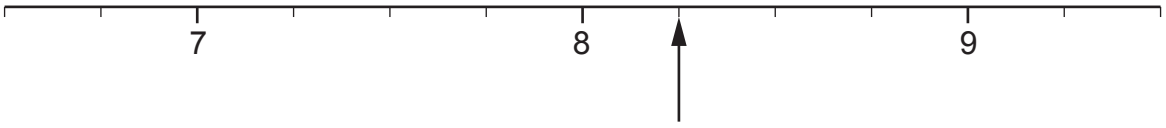
Reflex angle *ABC* = ... °

3. (a) Part of a number line is shown below.

Which number is the arrow pointing at? [1]



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(b) Circle the **two** lengths below that are equal. [1]

1740 mm 1740 cm 174 cm 174 m 17·4 km

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Examiner only

4. (a) Write the following statement using the correct mathematical symbol. [1]

0·24 is less than 0·3

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(b) Give calculations to show that the following statement is correct. [3]

18% of 160 is the same as $\frac{2}{3}$ of 43·2

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Examiner only

5. Roman has the nine cards shown below.

9	13	14	15	17	24	27	32	36

You must only use the numbers on these cards.
You must show all your working.

(a) (i) Calculate the sum of the two prime numbers. [2]

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(ii) Calculate the product of the two square numbers. [2]

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(iii) Find the number which is both a factor of 72 and a multiple of 8. [2]

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(b) Roman picks one of his nine cards at random.
He says,

"I have a $\frac{2}{9}$ chance of picking a card with a cube number on it."

Is Roman's statement correct?

Yes ☐ No ☐

Show how you decide. [1]

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6. Oscar is making a model of his house.

Diagram not drawn to scale

He decides to use a scale of 1 cm represents $\frac{1}{4}$ metre to make his model.

(a) Oscar's model is 30 cm tall.

How tall is his actual house? [2]

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(b) The front window of Oscar's house is 2 metres wide.

How wide should the front window be on Oscar's model house?
Give your answer in cm. [2]

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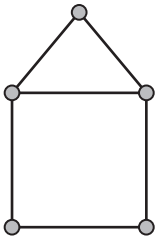
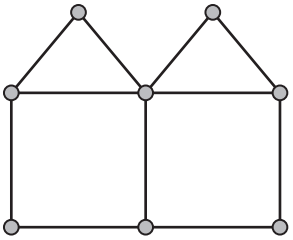
7. The following sequence of patterns is made using lines and circles.

Pattern 1



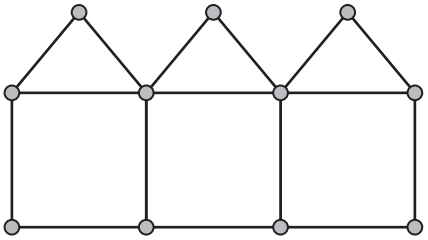
Lines: **6**
Circles: **5**

Pattern 2



Lines: **11**
Circles: **8**

Pattern 3



Lines: **16**
Circles: **11**

(a) How many lines and circles will there be in pattern **5**? [2]

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Lines ..... Circles .....

(b) Is it possible for a pattern in this sequence to have 36 lines and 24 circles?

Yes ☐ No ☐

Show how you decide. [1]

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8. (a) A Headteacher wants to put new carpet in one of his classrooms.
He uses carpet that costs £12.48 per m^2.

The diagram below shows the dimensions of the classroom.

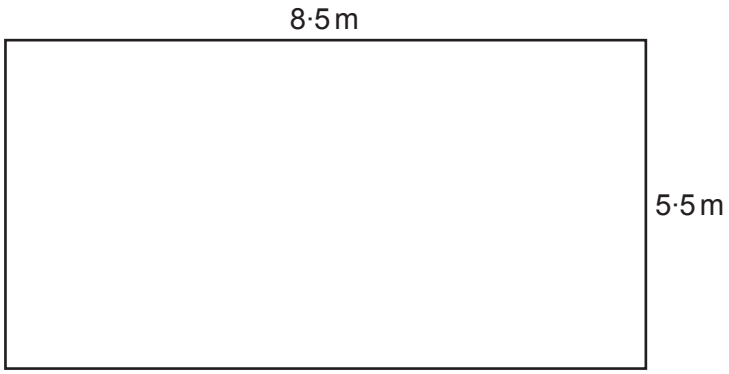

Diagram not drawn to scale

How much will it cost to buy the exact amount of carpet needed to cover the classroom floor? [3]

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(b) The Headteacher needs to buy vinyl flooring for a different classroom with an area of 67·2 m^2.
It is sold in rolls that each cover an area of 10·5 m^2.

What is the minimum number of rolls of vinyl flooring he needs to buy? [3]

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9. Below is a recipe to make a batch of 12 flapjacks.

Makes 12 flapjacks

240 g of porridge oats
125 g of butter
100 g of brown sugar
2 tablespoons of golden syrup

(a) Complete the table to show how much of each ingredient would be needed to make 72 flapjacks. [2]

Makes 72 flapjacks

..... g of porridge oats
..... g of butter
..... g of brown sugar
..... tablespoons of golden syrup

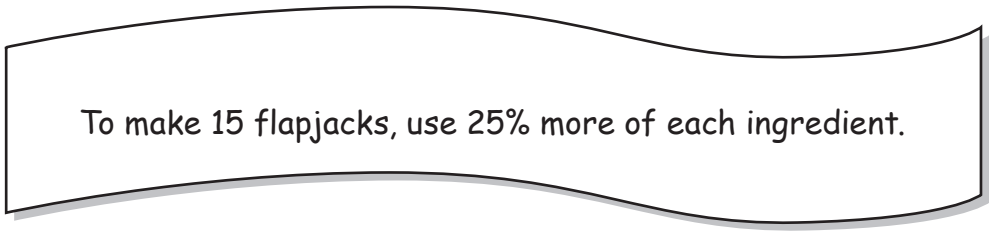
(b) Anatoly has 1·75 kg of butter and plenty of the other ingredients.

What is the greatest number of batches of 12 flapjacks Anatoly can make? [3]

Anatoly can make ..... batches of 12 flapjacks.

Examiner only

(c) This note is written underneath the original recipe.



Show that this statement is correct. [1]

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10. (a) Simplify $5f + 6g + 3f - 9g$. [2]

(b) Expand $5(m - 3)$. [1]

(c) Find the value of $6x + 3y$ when $x = 5{\cdot}2$ and $y = 0{\cdot}4$. [2]

(d) Solve $\frac{e}{2} - 4 = 6$. [2]

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(e) The rectangle below has length y and width x.

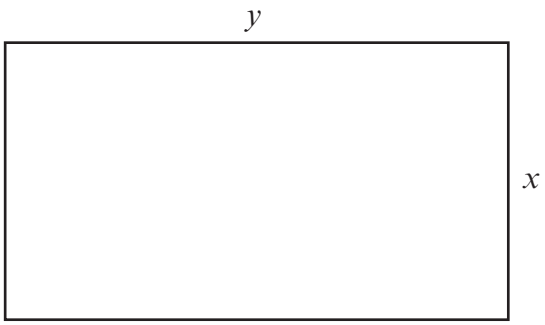

Diagram not drawn to scale

Three rectangles congruent to the one above are arranged, without overlapping, to create the large rectangle below.

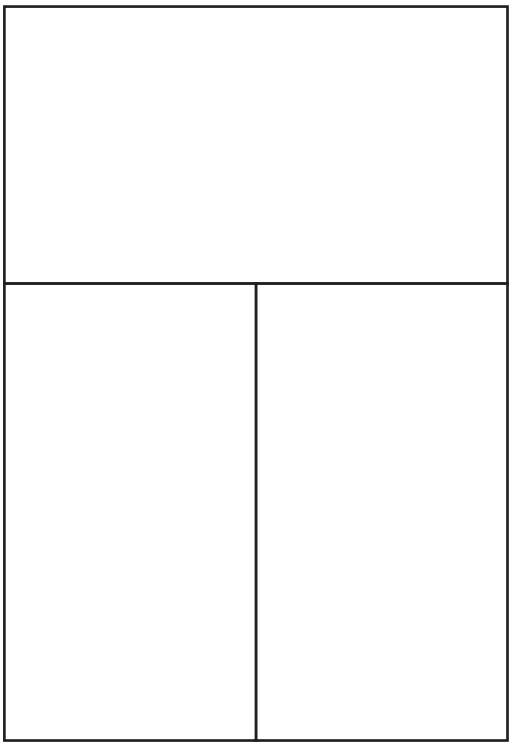

Diagram not drawn to scale

Find an expression for the perimeter of this large rectangle **in terms of x**.
Simplify your answer. [3]

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Examiner only

11. Faheema has a sack that contains a number of identical balls of different colours.

The table below shows the probability of randomly choosing a ball that is red, green, yellow or blue.

Colour	Red	Green	Yellow	Blue
Probability	0·32	0·46	0·1	0·12

(a) Faheema claims:

"There are other balls that are not red, green, yellow or blue in the sack."

Explain why she is incorrect. [1]

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(b) A ball is chosen at random from the sack.

Calculate the probability that this ball is either green or yellow. [1]

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Examiner only

(c) Faheema uses the sack of balls for a game at her school fair.

In the game, each person pays 50p to choose a ball at random from the sack.
The ball is then returned to the sack.

The player wins a prize worth £2.95 if a blue ball is chosen.

150 people each played the game once.

How much profit would you expect Faheema to make?
You must show all your working. [4]

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Examiner only

12. (a) A car leaves Chester at 9:27 a.m.
It arrives at Taunton at 1:13 p.m.

How long does the journey take?
Give your answer in hours and minutes. [2]

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..... hours ..... minutes

(b) Bus A and Bus B both leave the station at 8:00 a.m.

Bus A returns to the station every 30 minutes.
Bus B returns to the station every 24 minutes.

At what time will both buses next return to the station at the same time? [3]

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Examiner only

13.

Zahra buys 2·3 kg of parsnips and 3·5 kg of potatoes.
These cost a total of £6.23.
1 kg of potatoes costs £1.32.

What is the cost of 1 kg of parsnips? [4]

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1 kg of parsnips costs .....

Examiner only

14. (a) Calculate the value of $\frac{2{\cdot}6 \times 5{\cdot}7}{3{\cdot}4 - 1{\cdot}8}$.

Give your answer correct to 1 decimal place. [2]

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(b) Write 68 321 correct to 2 significant figures. [1]

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(c) Write 6 300 000 in standard form. [1]

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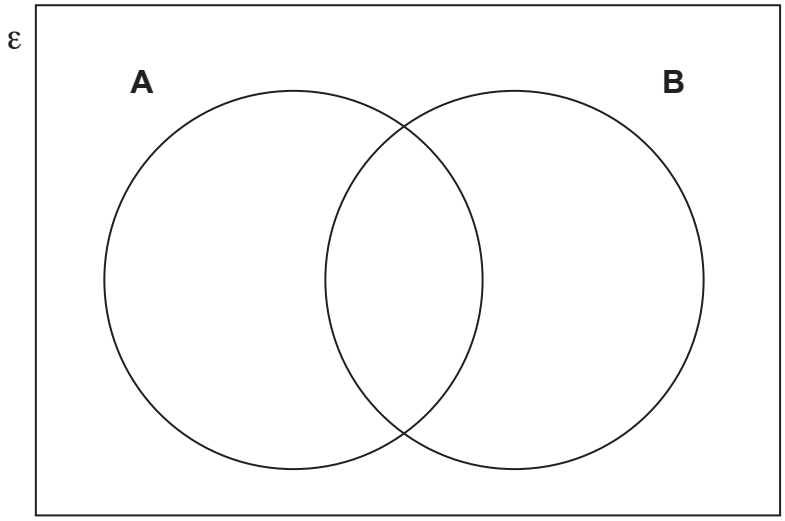
Examiner only

15. The universal set (ε) contains the numbers 31, 32, 33, 34, 35, 36, 37, 38, 39 and 40.

A is the set of odd numbers.
B is the set of multiples of 3.

(a) Show this information on the Venn diagram below. [2]



(b) A number is selected at random from the universal set (ε).

Find the probability that the number selected is an odd number but not a multiple of 3. [2]

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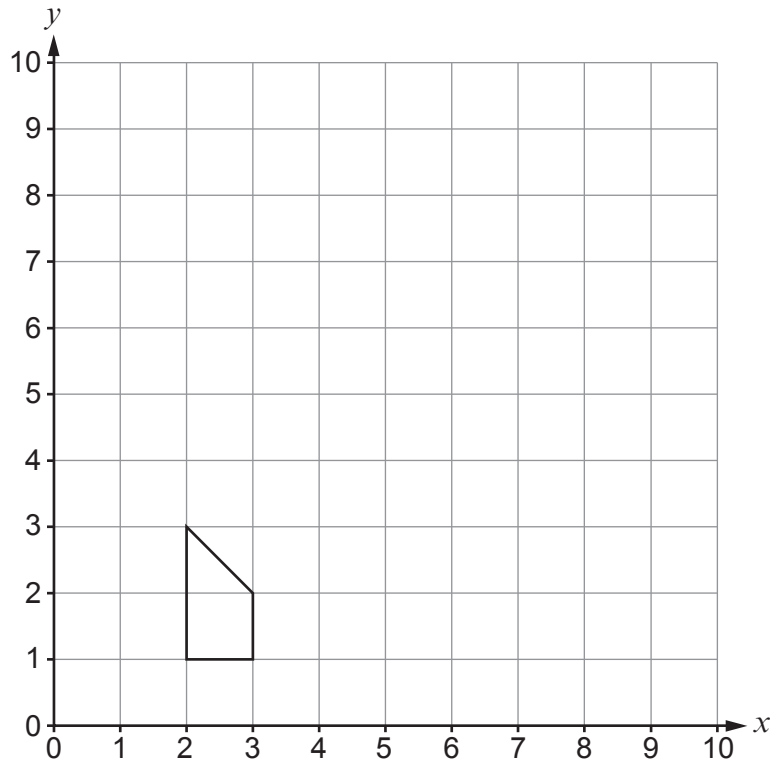
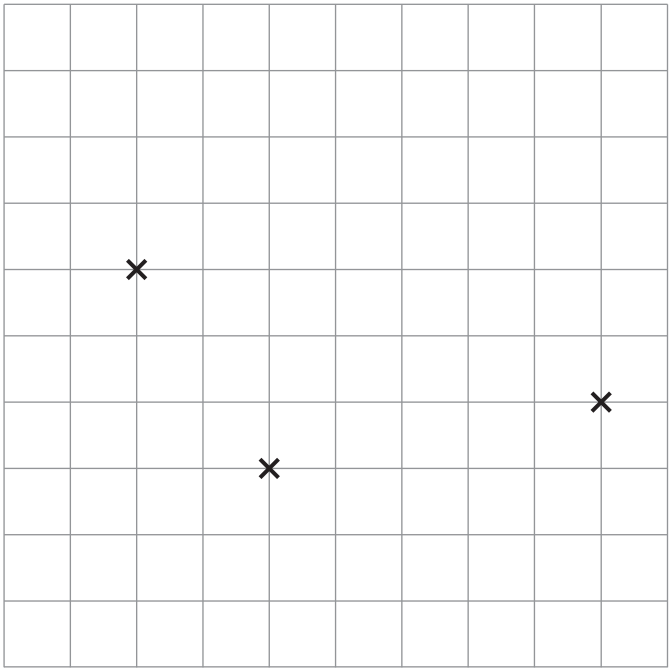
Examiner only

16. (a) Draw an enlargement of the shape below using a scale factor of 2 and (0,0) as the centre of enlargement. [3]



(b) Three vertices of a parallelogram have been plotted on the grid below.

Plot the fourth vertex of the parallelogram. [1]



Examiner only

17. Amy and Vance each buy a thin pizza.

Amy's pizza has a radius of 3 inches.
Vance's pizza has a radius of 5 inches.

Amy eats one half of her pizza.
Vance eats one quarter of his pizza.

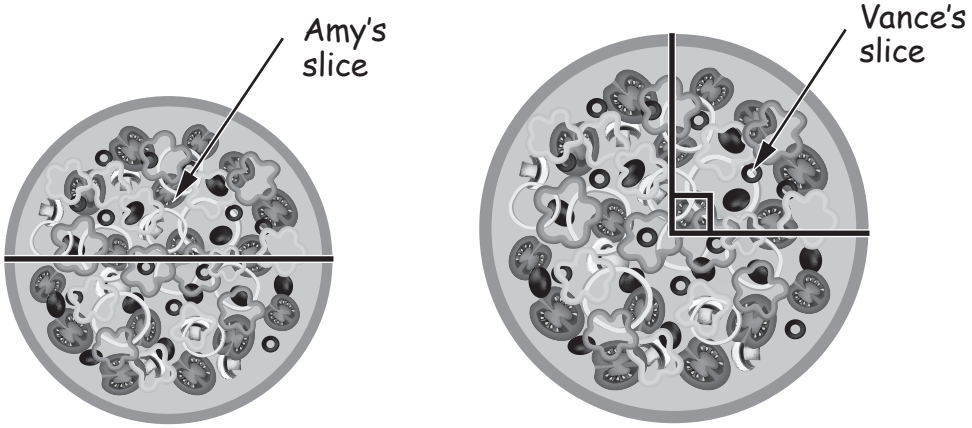


Diagram not drawn to scale

Who eats the slice of pizza with the greater area?

Amy ☐ Vance ☐

You must show all your working. [5]

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Examiner only

18. The table shows the mass of 90 carrots grown by a gardener.

Mass, m (grams)	Number of carrots
$30 < m \leqslant 60$	9
$60 < m \leqslant 90$	33
$90 < m \leqslant 120$	38
$120 < m \leqslant 150$	8
$150 < m \leqslant 180$	2

Calculate an estimate for the mean mass of these carrots. [4]

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Examiner only

19. Jan, Freda and Pieter share some money.

Freda gets 3 times as much as Jan.
Pieter gets half as much as Freda.

(a) Write down the ratio of the amounts of money that they each get.
Give your answer in its simplest form. [2]

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Jan : Freda : Pieter = ... : ..... : .....

(b) What fraction of the money does Pieter get? [1]

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Examiner only

20.

Edudig Digger
£35 950

Samir buys this digger and expects to use it for 1250 hours each year.
The digger will decrease in value at a yearly rate of 18% of its value at the end of the previous year.

Use this information to calculate the decrease in value of Samir's digger when it has been used for 10 000 hours. [5]

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Examiner only

21. A circular wheel makes 42 complete turns each minute.

(a) How many degrees does it turn through in one second? [3]

(b) (i) State **one** assumption you have made in your answer to part (a). [1]

(ii) How would your answer to part (a) change if this assumption was not correct? [1]

Examiner only

22. (a) Solve $2x + 5 = 11 + 5x$. [2]

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(b) Solve $8x - (3x + 1) = 2$.

Give your answer as a fraction. [3]

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Examiner only

(c) Tansy is trying to solve $1 < x + 2 \leqslant 5$ where x is a whole number.
Here is her work.

	$1 - 2 < x$ and $x \leqslant 5 - 2$
	$-1 < x$ and $x \leqslant 3$
	$-1 < x \leqslant 3$
	x is –1, 0, 1, 2 or 3.

Ali says,

"You have made an error."

Is Ali correct?

Yes ☐ No ☐

Show clearly how you decide. [1]

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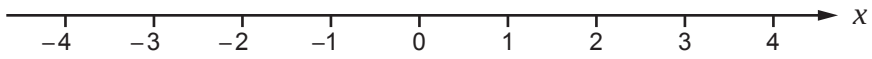
(d) Represent the inequality $x > -2$ on the number line below. [1]

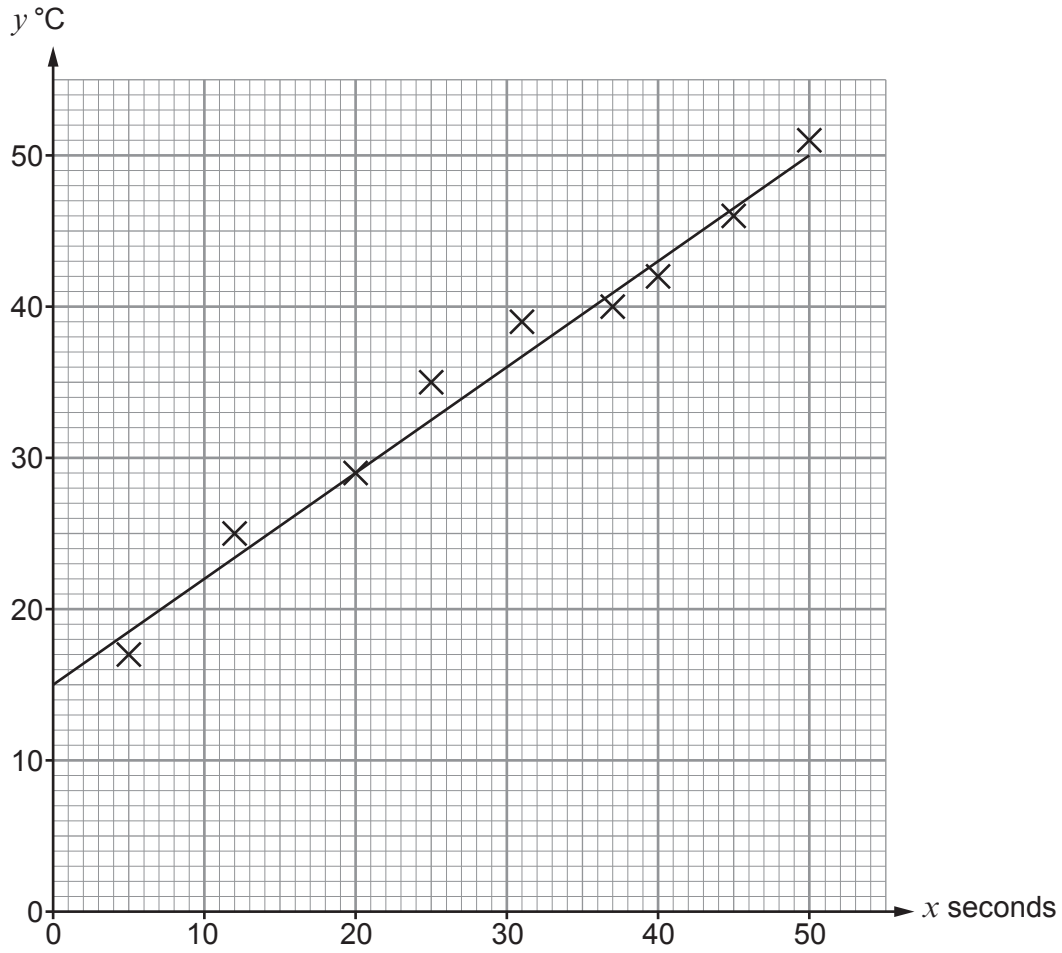


Examiner only

23. In an experiment, a scientist records the temperature, y °C, of an object as it is heated for x seconds.

The scientist thinks that the equation $y = mx + c$ is a good fit for this data.

The diagram shows his results on a scatter graph and his line of best fit.



(a) Estimate the number of seconds for which the object has been heated when its temperature is 27 °C. [1]

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Examiner only

(b) When $x = 70$ seconds, the scientist measures the value of y to be 52 °C.

Use this information to decide whether the line of best fit is likely or unlikely to give reliable predictions for values of y when x is greater than 50 seconds.

Likely ☐ Unlikely ☐

Explain how you decide. [1]

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(c) The line of best fit passes through the points (0, 15) and (10, 22).

Find the equation of the line of best fit.
Give your answer in the form $y = mx + c$. [3]

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(d) Explain what the gradient of the line of best fit represents in this context. [1]

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Examiner only

24.

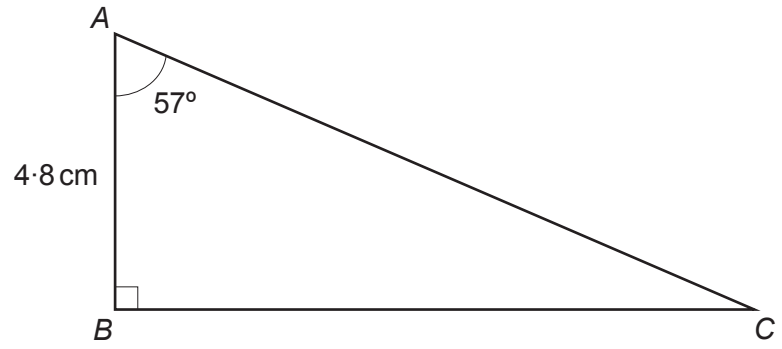

Diagram not drawn to scale

ABC is a right-angled triangle.
$AB = 4{\cdot}8$ cm and $B\hat{A}C = 57°$.

Calculate the area of triangle *ABC*. [5]

Area = ... cm^2

END OF PAPER

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

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