

Surname	Centre Number	Candidate Number
First name(s)		0



**GCSE**

C300U10-1



**TUESDAY, 1 NOVEMBER 2022 – MORNING**

**MATHEMATICS – Component 1**  
**Non-Calculator Mathematics**  
**FOUNDATION TIER**

2 hours 15 minutes

**ADDITIONAL MATERIALS**

An additional formulae sheet.  
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(s) 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.	7	
2.	4	
3.	2	
4.	5	
5.	5	
6.	5	
7.	4	
8.	4	
9.	6	
10.	10	
11.	2	
12.	4	
13.	4	
14.	4	
15.	3	
16.	3	
17.	4	
18.	4	
19.	5	
20.	7	
21.	4	
22.	5	
23.	3	
24.	6	
25.	3	
26.	7	
<b>Total</b>	<b>120</b>	

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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:

$$v = u + at$$

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

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



1. (a) Work out  $3 \times 19$ .

[1]

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(b) Work out  $3 \cdot 162 + 10 \cdot 57$ .

[2]

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(c) Work out  $8 + 6 \div 2$ .

[1]

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(d) Write  $\frac{18}{24}$  in its simplest form.

[1]

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(e) Write 0.32 as a percentage.

[1]

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(f) Write down a value that is less than  $-10$ .

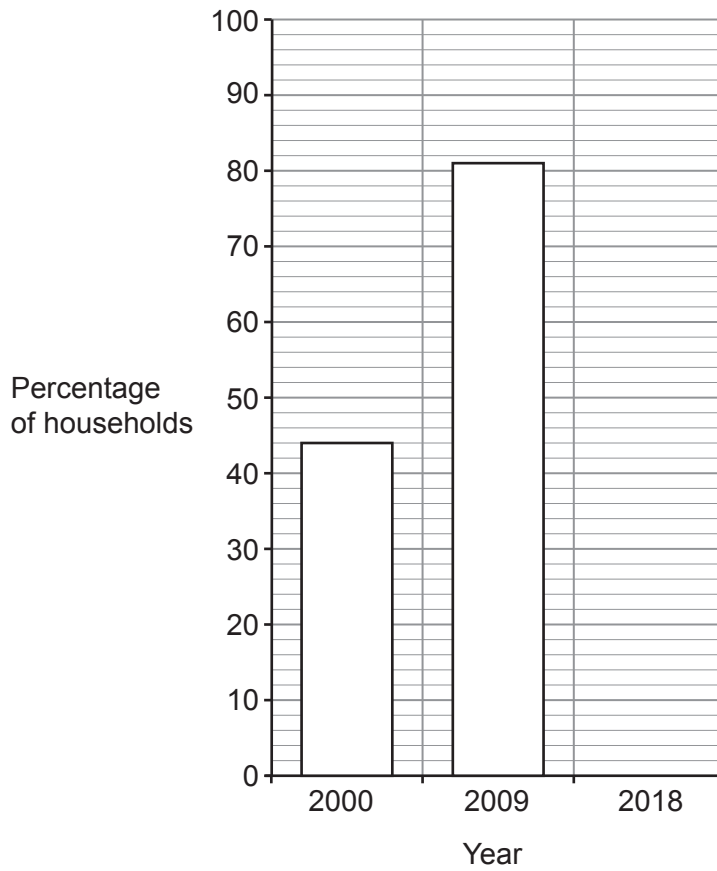
[1]

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2. The bar chart shows the percentage of households in the UK who owned at least one mobile phone in the years 2000 and 2009.



- (a) What was the increase in the percentage of households who owned at least one mobile phone from 2000 to 2009? [2]

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- (b) In 2018, 95% of households in the UK owned at least one mobile phone.  
Complete the bar chart. [1]

- (c) Comment on how mobile phone ownership seems to have changed between 2000 and 2018. [1]

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3. Sally has two sets of cards.  
3 cards have letters on them and 4 cards have numbers on them.



She shuffles each set and chooses one card from each set at random.

Complete the table to show all the possible pairs of cards.

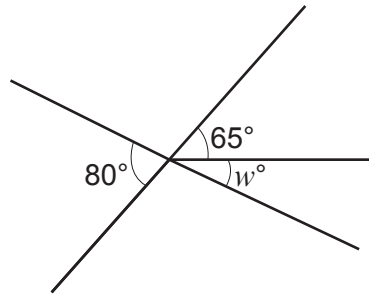
[2]

Letter card	Number card
A	1
A	2

You may not  
need all the lines  
in the table.



4. (a)

Diagram not  
drawn to scaleFind the value of  $w$ .

[2]

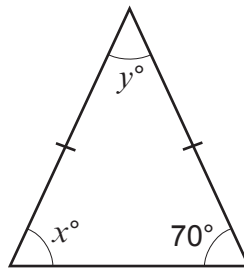
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$$w = \dots\dots\dots$$

(b)

Diagram not  
drawn to scale

The diagram shows an isosceles triangle.

Find the value of  $x$  and the value of  $y$ .

[3]

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$$x = \dots\dots\dots \quad y = \dots\dots\dots$$



5. Matt has 120 music albums.

$\frac{3}{5}$  of his albums are CDs.

15% of his albums are vinyl records.

The rest of his albums are digital downloads.

How many of Matt's albums are digital downloads?

[5]

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6. (a) Small oranges cost  $x$  pence each.  
Large oranges cost twice as much as small oranges.

Write an expression, in terms of  $x$ , for the total cost of 4 small oranges and 6 large oranges.

Give your answer in its simplest form.

[3]

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(b) Lemons cost  $\pounds y$  for a bag of 4.

Write an expression, in terms of  $y$ , for the cost in **pence** of 1 lemon.

[2]

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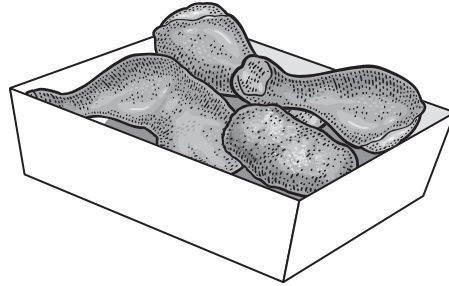
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7. Tomas owns a take-away food shop.

(a) Here is part of the menu.

One chicken piece	£2.00
Two chicken pieces	£3.20
Three chicken pieces	£4.20



Jean orders 4 chicken pieces.  
Tomas charges Jean £6.40.

(i) Show how Tomas has worked out the cost of Jean's 4 chicken pieces. [1]

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(ii) Jean says,

*"You have charged me 20p too much."*

Show how Jean may be correct. [1]

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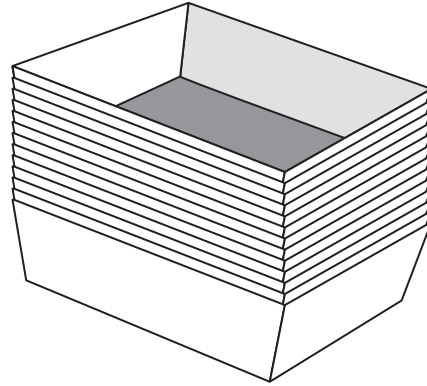
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- (b) Tomas orders some food trays.  
The table shows his options.

Number of Trays	Cost
25	£5
50	£9
100	£17
250	£33
1000	£99



Tomas spends exactly £83 on trays.  
He orders as many trays as possible.

How many trays does Tomas order?

[2]

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8. (a) Find **two** whole numbers that
- have a difference of 20, and
  - when one is divided by the other, the answer is  $-9$ .

[2]

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..... and .....

- (b) Find **three** whole numbers that
- multiply to give 24, and
  - add to a total of  $-5$ .

[2]

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..... and ..... and .....



9. Alan builds a model of a steam train.



The scale he uses is 1 cm represents 75 cm.

(a) The width of a wheel on Alan's model is 3 cm.

What is the width of a wheel on the steam train?

[2]

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(b) The length of the whistle on the steam train is 375 millimetres.

What is the length of the whistle on Alan's model train?  
Give your answer in centimetres.

[3]

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(c) Alan's model train has 6 wheels.  
Alan's friend Mandy says,

"The steam train has  $6 \times 75 = 450$  wheels."

Explain why Mandy is not correct.

[1]

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10. Nico's normal pay rate was £20 for each hour he worked.  
Nico normally worked 35 hours each week.

Any extra hours Nico worked were hours of overtime.  
Nico's pay rate for each hour of overtime was 1.5 times his normal pay rate.

(a) Show that Nico earns £700 in a week when he does not work any hours of overtime. [1]

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(b) (i) One week, Nico worked for 38 hours.

Calculate Nico's pay for this week. [2]

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(ii) The next week, Nico earned £1060.

How many hours of overtime did Nico work?  
You must show all your working. [4]

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(c) The following week, Nico's normal pay rate increased.  
He did not work any hours of overtime.  
He earned £735 for that week.

(i) Show that Nico had a pay increase of less than 6%. [2]

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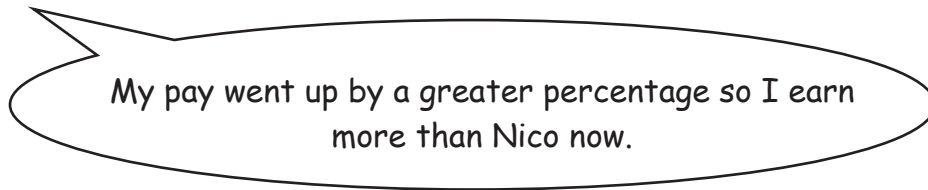
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(ii) Dana works with Nico and they work the same number of hours.  
Dana had a pay increase of 6%.

She says,



Explain why Dana may not be correct. [1]

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11. Ari has a **biased** spinner.  
The numbers on the spinner are 1, 2, 3, 4, 5, 6, 7, 8, 9.

The table shows the relative frequencies of some events using Ari's spinner.

Event	Number less than 5	5	Number more than 5
Relative frequency	0.75	0.1	

What is the relative frequency of spinning a number more than 5? [2]

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12. The table shows some of the values of  $y = 4x - 1$  for  $-1 \leq x \leq 1$ .

$x$	-1	-0.5	0	0.5	1
$y = 4x - 1$	-5			1	3

(a) Complete the table above.

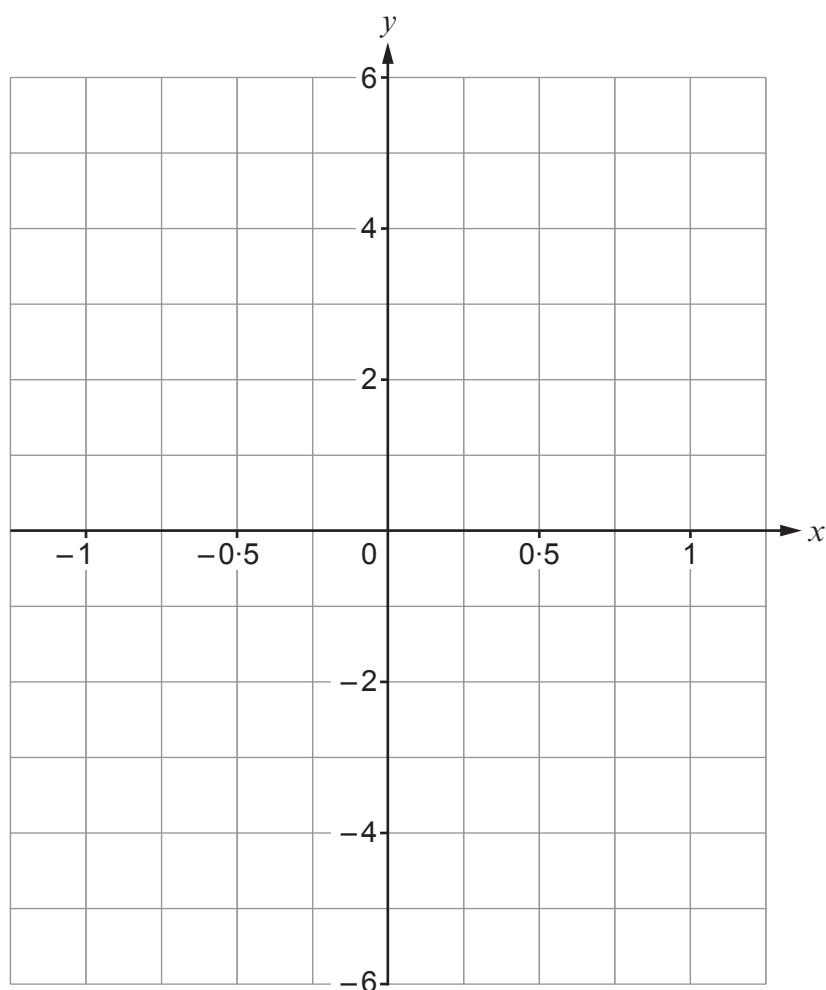
[2]

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(b) On the grid below, draw the graph of  $y = 4x - 1$  for  $-1 \leq x \leq 1$ .

[2]



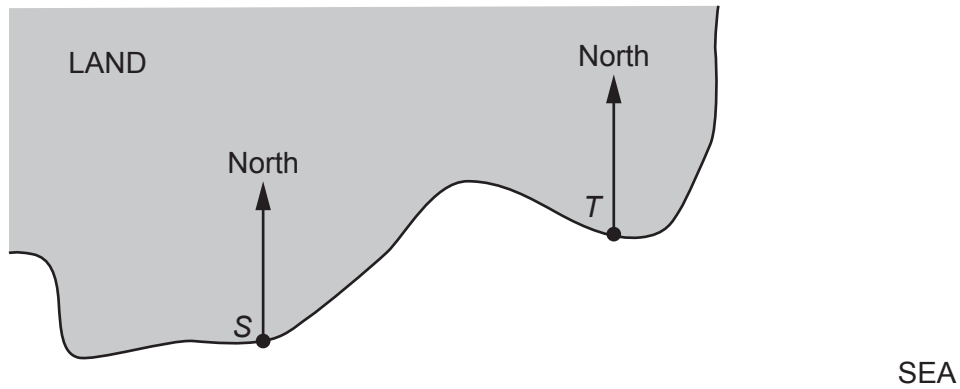
13. Kit paddles a canoe out to sea from the point marked S.

He stops when he is:

- on a bearing of  $160^\circ$  from S
- 120 m from S.

Use the scale diagram below to find Kit's distance and bearing from T when he stops. [4]

Scale: 1 cm represents 20 m



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Distance from T ..... m Bearing from T ..... $^\circ$



14. (a) Calculate  $\frac{9}{14} - \frac{2}{7}$ . [2]

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- (b) Calculate  $\frac{10}{13} \times \frac{1}{5}$ . [2]  
Give your answer in its simplest form.

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15. Sarah borrows £4200 from her friend at a rate of 2% simple interest per year. She agrees to pay back the £4200 **plus** the interest in one payment at the end of 5 years. How much should Sarah give her friend at the end of the 5 years? [3]

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16. Calculate the size of an interior angle of a regular 10-sided shape (decagon).

[3]

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17. One summer, Shaun grew runner beans.



Each week he recorded, in kilograms, the total mass of the runner beans he picked.

The results for the first 4 weeks are given below.

3.6

3.4

2.9

5.1

For the first 5 weeks, the mean mass of the runner beans Shaun picked was 4.2 kg per week.

How many kilograms of runner beans did Shaun pick in week 5?

You must show all your working.

[4]

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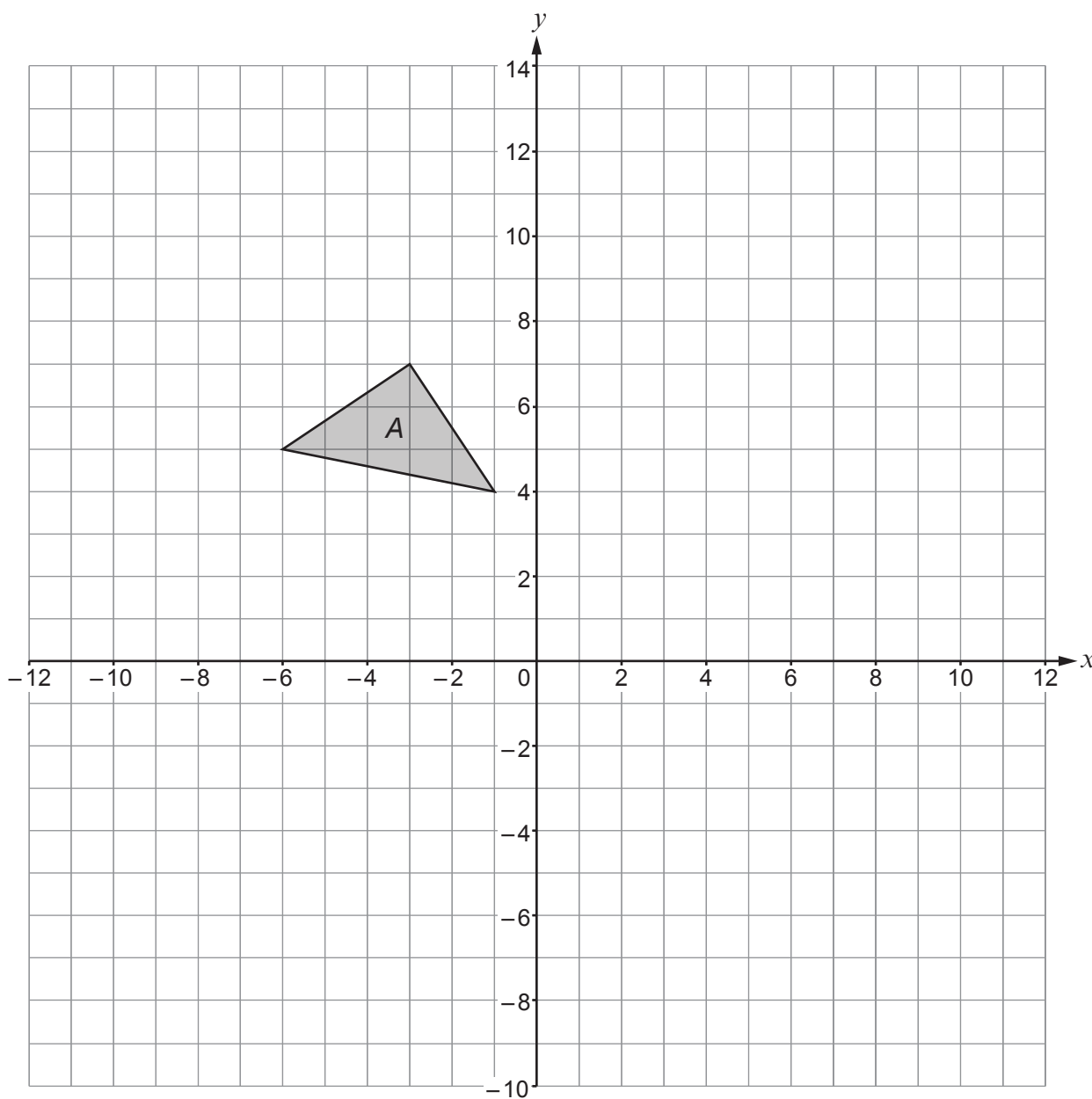
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Week 5 = ..... kg



18. The diagram shows triangle A.



- (a) Reflect **triangle A** in the line  $y = 4$ .  
Label your answer *B*.

[2]

- (b) Translate **triangle A** using the vector  $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ .

Label your answer *C*.

[2]



19. Bryn lives in Canada.



When he bought a book from the UK for £240, the exchange rate was

$$£1 = 2.50 \text{ Canadian dollars.}$$

When he sold the same book to a person in Japan for 162 000 Japanese yen, the exchange rate was

$$1 \text{ Canadian dollar} = 81 \text{ Japanese yen.}$$

Show that Bryn made more than 1000 Canadian dollars buying and selling this book. [5]

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20. (a) Tick (✓) the **two** correct statements about  $3xy(y + 2) \equiv 3xy^2 + 6xy$ .

[2]

It is an equation.	<input type="checkbox"/>
It is true for all values of $x$ and $y$ .	<input type="checkbox"/>
It is an identity.	<input type="checkbox"/>
It is only true for certain values of $x$ and $y$ .	<input type="checkbox"/>
It is an inequality.	<input type="checkbox"/>
It is true for only one value of $x$ and one value of $y$ .	<input type="checkbox"/>

(b) In this part of the question all lengths are in centimetres.

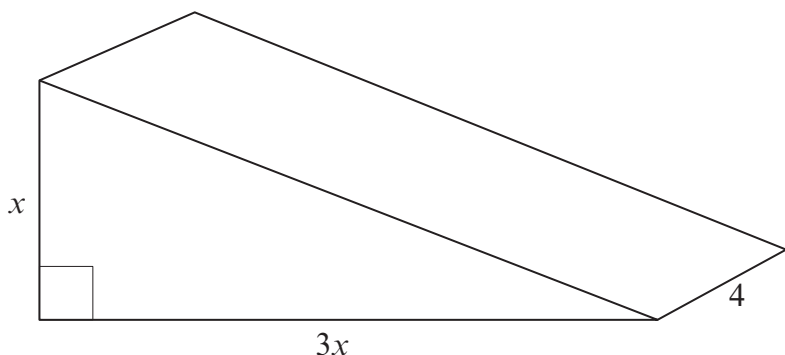


Diagram not  
drawn to scale

The diagram shows a prism.  
The cross-section of the prism is a triangle with height  $x$  and base  $3x$ .  
The volume of the prism is  $216 \text{ cm}^3$ .

Use an algebraic method to find the height of the triangle.

[5]

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21. (a) Mary and Paul run 100 metres.

Mary's time is between 14 and 15 seconds inclusive.

Paul's time is between 12 and 13 seconds inclusive.

Complete the inequality to show the least and greatest possible difference between the times of these two runners. [2]

.....  $\leq$  time difference  $\leq$  .....

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(b) Peter wants to go by ferry to France.

He is taking a van and a small trailer.

He knows:

- the van is 590 centimetres long, correct to the nearest 10 cm
- the trailer is 200 centimetres long, correct to the nearest 10 cm.

The ferry company uses the following rules for the length of vehicles.

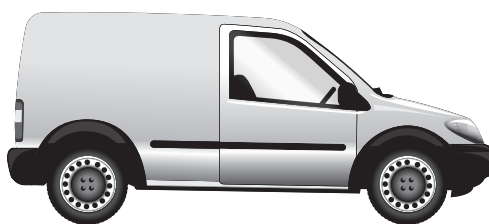
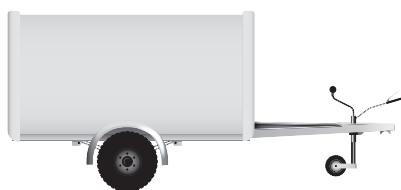


Diagram not  
drawn to scale

Small trailer: maximum length 2 m

Van: maximum length 6 m

Peter thinks that the length of his van and the length of his trailer will **both** fit the rules.

Use lengths to give one example to show how Peter **may** be correct, and one example to show how Peter **may not** be correct. [2]

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May be correct .....

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May not be correct .....

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22. (a) Work out  $(6 \times 10^5) \div 20$ .  
Give your answer in standard form.

[2]

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- (b) At midday, the volume of water flowing over a waterfall is  $3 \times 10^8$  litres per minute.

At midday, what is the volume of water flowing over the waterfall in litres per hour?  
Give your answer in standard form.

[3]

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23. (a) Find the next term of the following Fibonacci-type sequence. [1]

2, 3, 5, 8, 13, 21, 34, .....

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(b) Find the  $n$ th term of the following sequence. [2]

4, 9, 14, 19, 24, .....

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24. A glass of water is placed on a small table. The table stands on horizontal ground.

(a) The total mass of the table and the glass of water is 9.6 kg.

You are given the ratios,

mass of table : mass of glass of water = 11 : 1,

mass of empty glass : mass of water = 3 : 5.



**Diagram not  
drawn to scale**

What is the mass of the empty glass?

[3]

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(b) Use:  $\text{Pressure} = \frac{\text{Force (N)}}{\text{Area (cm}^2\text{)}}$

The base of the table has an area of  $1600 \text{ cm}^2$ .  
Some books are also placed on the table.  
The books, glass of water and table exert a pressure of  $0.1 \text{ N/cm}^2$  on the ground.

Calculate the force exerted on the ground by the books,  
glass of water and table.  
Assume that the whole of the base of the table is in  
contact with the ground.



**Diagram not  
drawn to scale**

[2]

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(c) In fact, the assumption made in part (b) is incorrect. Part of the base of the table is not in contact with the ground.

Describe how this changes your answer to part (b).

[1]

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25.



Reduced price  
£1008

In a sale, jewellery is reduced in price by 40%.  
The price of a ring is reduced to £1008 in the sale.

What was the price of the ring before the sale?

[3]

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26. (a) Expand and simplify  $(3x - 4)(5x + 7)$ .

[3]

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(b) Factorise each of the following.

(i)  $2x^2y + 12xy^2$

[3]

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(ii)  $x^2 - 64$

[1]

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**END OF PAPER**



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

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