Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

C300U10-1

A22-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**	
Total	**120**	

C300U101
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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. (a) Work out 3×19. [1]

(b) Work out $3{\cdot}162 + 10{\cdot}57$. [2]

(c) Work out $8 + 6 \div 2$. [1]

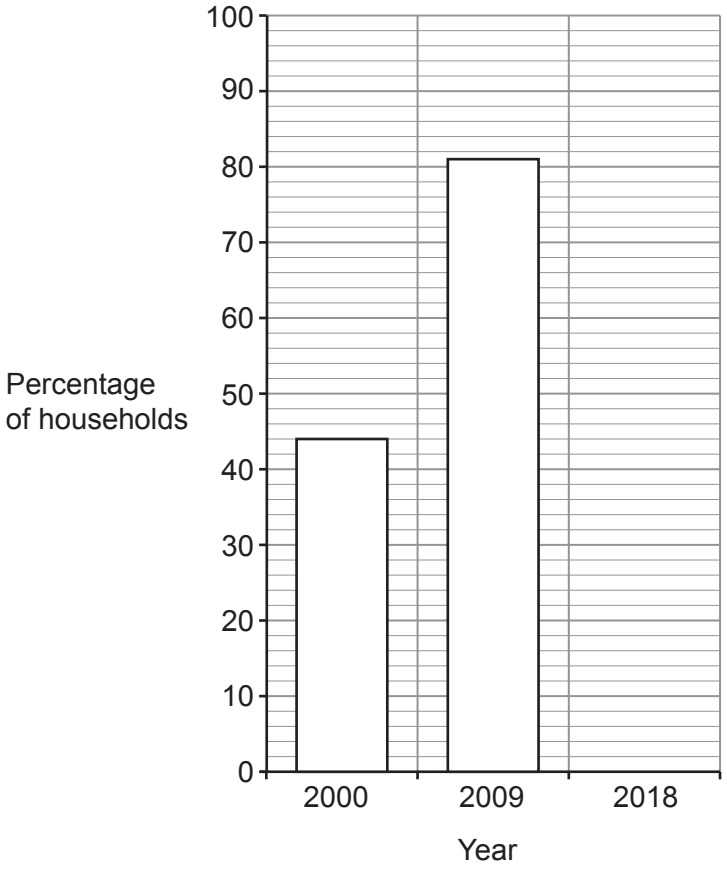
(d) Write $\frac{18}{24}$ in its simplest form. [1]

(e) Write $0{\cdot}32$ as a percentage. [1]

(f) Write down a value that is less than –10. [1]

Examiner only

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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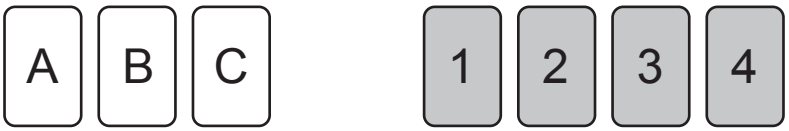
Examiner only

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.

Examiner only

4. (a)

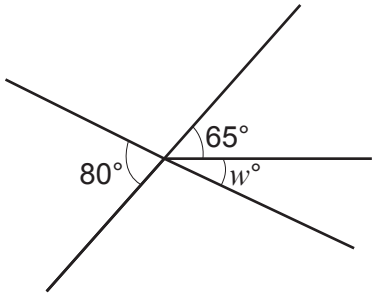


Diagram not drawn to scale

Find the value of w. [2]

w = ...

(b)

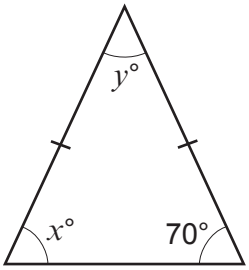


Diagram not drawn to scale

The diagram shows an isosceles triangle.

Find the value of x and the value of y. [3]

x = ... y = ...

Examiner only

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]

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]

(b) Lemons cost £y for a bag of 4.

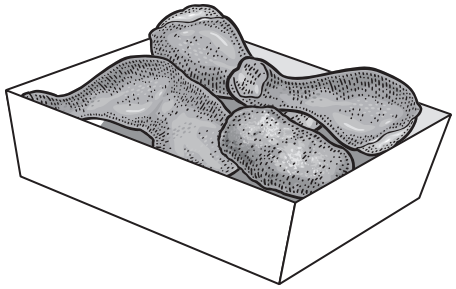
Write an expression, in terms of y, for the cost in **pence** of 1 lemon. [2]

Examiner only

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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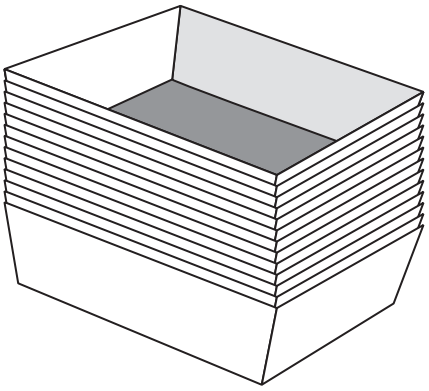
Examiner only

(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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Examiner only

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 .....

Examiner only

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 × 75 = 450 wheels."

Explain why Mandy is not correct. [1]

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Examiner only

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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Examiner only

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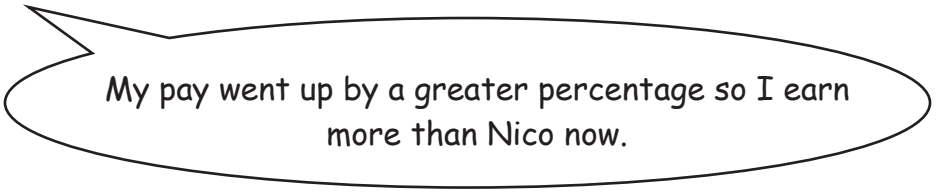
(ii) Dana works with Nico and they work the same number of hours.
Dana had a pay increase of 6%.

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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Examiner only

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

x	–1	–0·5	0	0·5	1
$y = 4x - 1$	–5			1	3

(a) Complete the table above. [2]

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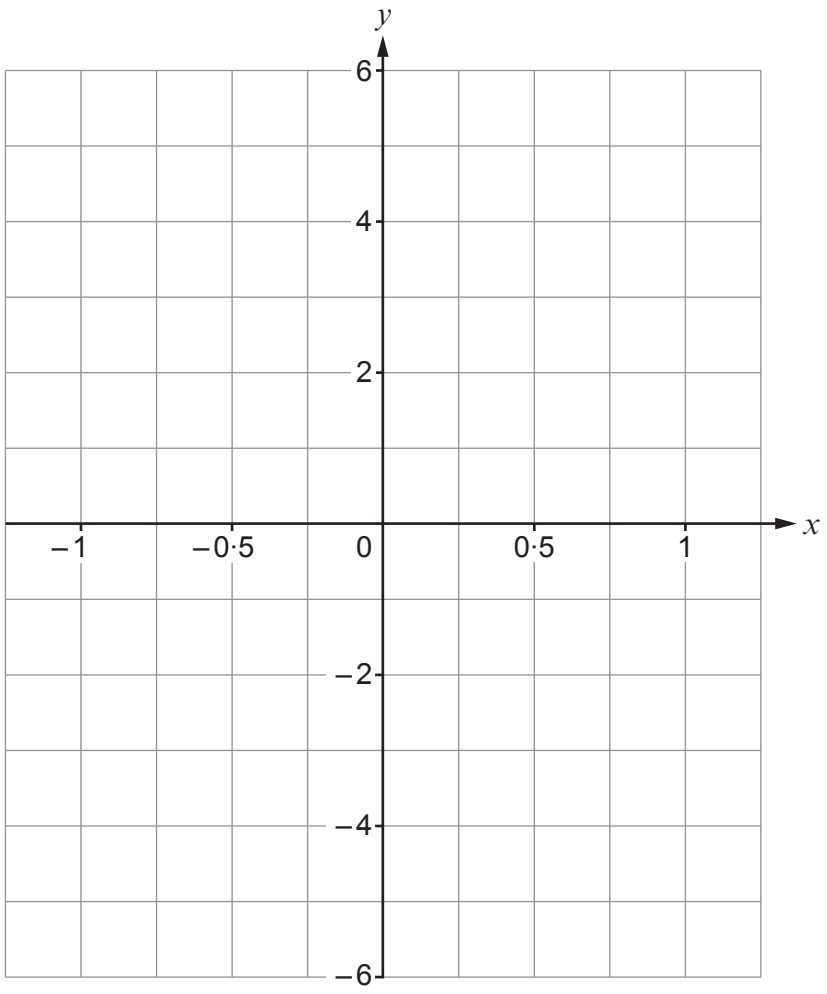
(b) On the grid below, draw the graph of $y = 4x - 1$ for $-1 \leqslant x \leqslant 1$. [2]

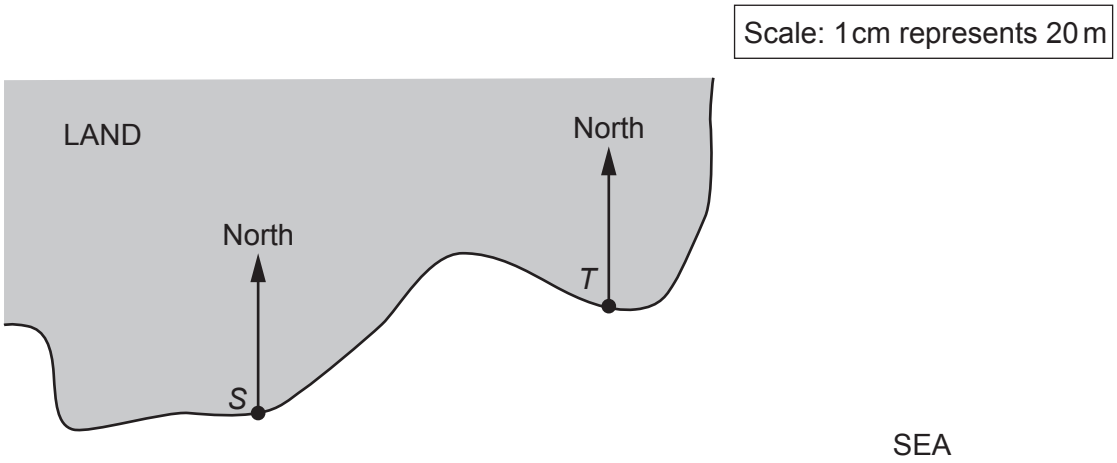


Examiner only

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

He stops when he is:
- on a bearing of 160° from *S*
- 120 m from *S*.

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



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Distance from *T* ..... m Bearing from *T* .....°

Examiner only

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

(b) Calculate $\frac{10}{13} \times \frac{1}{5}$.

Give your answer in its simplest form. [2]

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]

£ .....

Examiner only

16. Calculate the size of an interior angle of a regular 10-sided shape (decagon). [3]

Examiner only

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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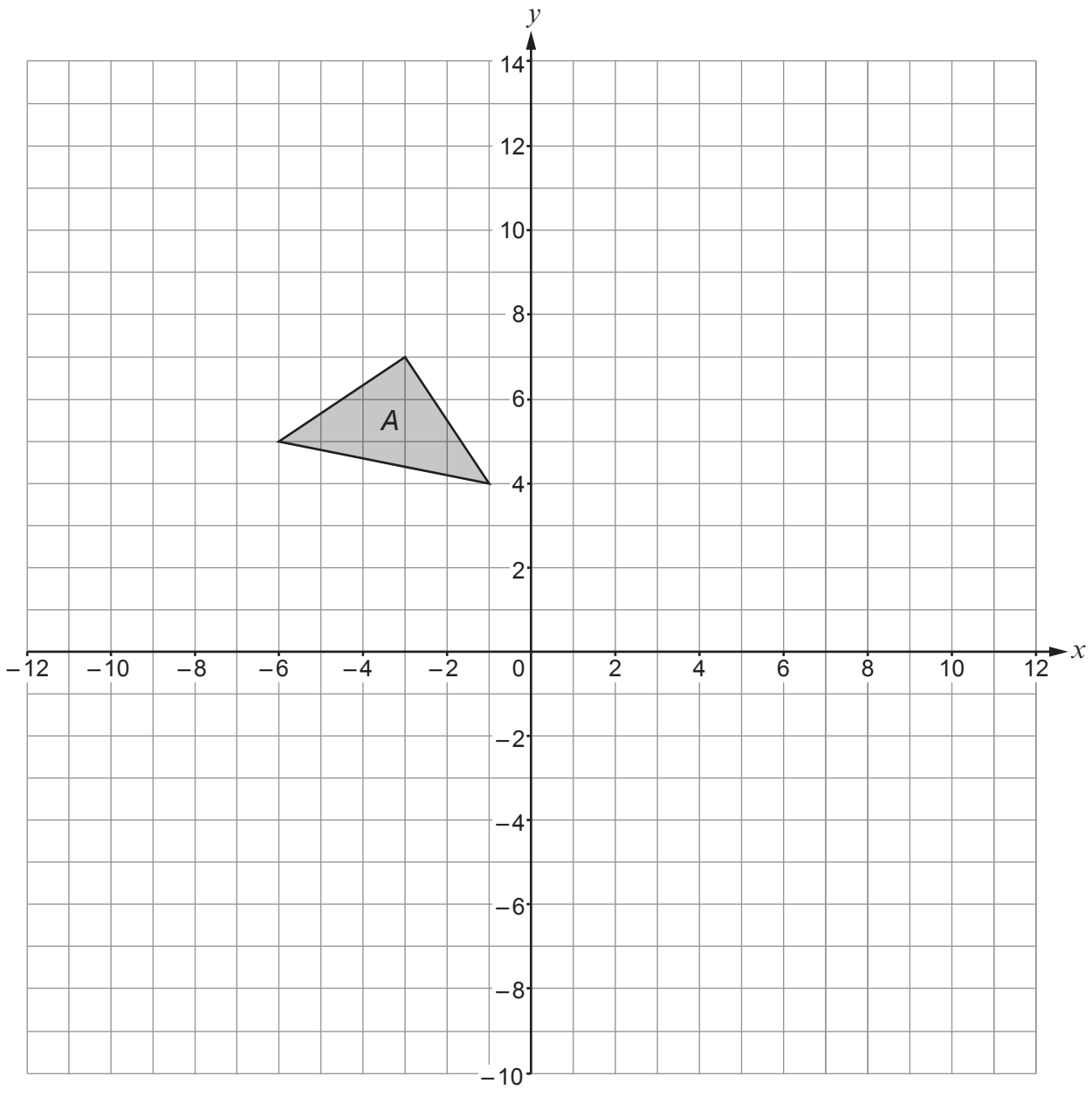
Week 5 = ... kg

Examiner only

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]

Examiner only

19. Bryn lives in Canada.

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

£1 = 2.50 Canadian dollars.

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

1 Canadian dollar = 81 Japanese yen.

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

Examiner only

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

It is an equation.	
It is true for all values of x and y.	
It is an identity.	
It is only true for certain values of x and y.	
It is an inequality.	
It is true for only one value of x and one value of y.	

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

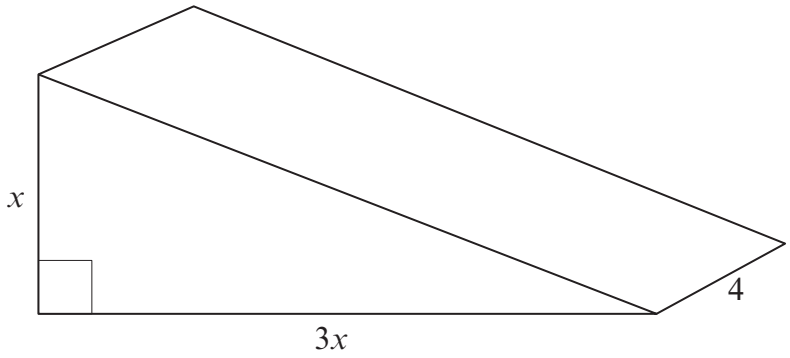


Diagram not drawn to scale

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 cm^3.

Use an algebraic method to find the height of the triangle. [5]

Examiner only

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]

..... ⩽ time difference ⩽ .....

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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.

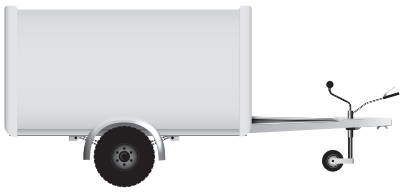

Diagram not drawn to scale

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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Examiner only

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 3×10^8 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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Examiner only

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

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

(b) Find the nth term of the following sequence. [2]

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

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.

Diagram not drawn to scale

You are given the ratios,

mass of table : mass of glass of water = 11 : 1,
mass of empty glass : mass of water = 3 : 5.

What is the mass of the empty glass? [3]

Examiner only

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

The base of the table has an area of 1600 cm^2.
Some books are also placed on the table.
The books, glass of water and table exert a pressure of 0·1 N/cm^2 on the ground.

Diagram not drawn to scale

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.

[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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Examiner only

25.

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]

Examiner only

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

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

Examiner only