



General Certificate of Secondary Education  
2019

Centre Number

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Candidate Number

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# Mathematics

Unit M7 Paper 1  
(Non-Calculator)

Higher Tier



[GMC71]

\*GMC71\*

**THURSDAY 6 JUNE, 9.15am–10.30am**

## TIME

1 hour 15 minutes.

## INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page, on blank pages or tracing paper.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all seventeen** questions.

All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

You **must not** use a calculator for this paper.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 50.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a ruler, compasses and a protractor.

The Formula Sheet is on page 2.

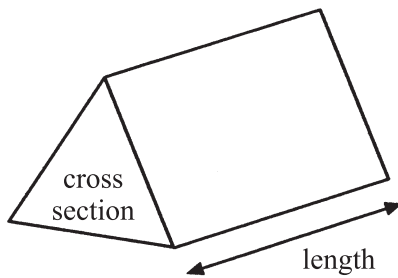
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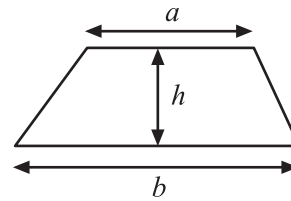
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# Formula Sheet

**Volume of prism** = area of cross section  $\times$  length

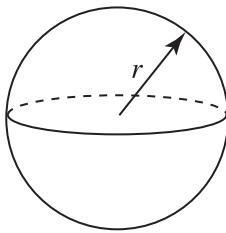


**Area of trapezium** =  $\frac{1}{2}(a+b)h$



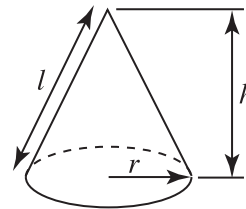
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

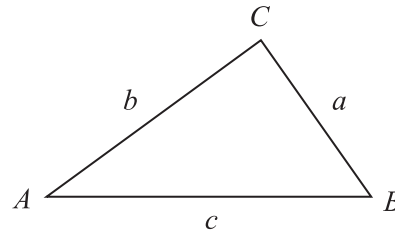


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**In any triangle ABC**



## Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$   
where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

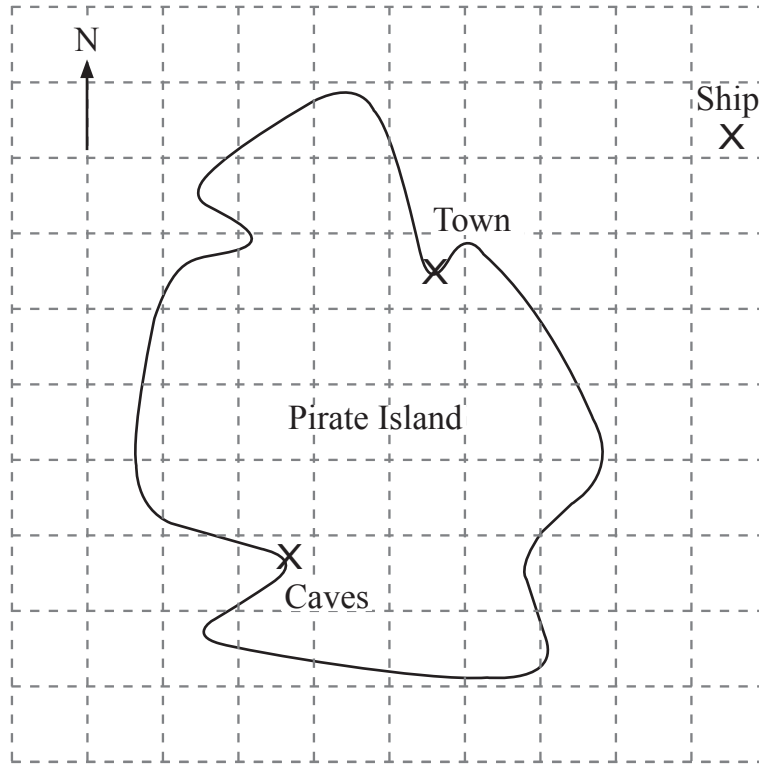
**Sine Rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule:**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



1



Measure and write down the bearing of the ship from the town.

Answer \_\_\_\_\_ ° [2]

2 (a) Fill in the next two terms of this sequence.

14, 13, 11, 8, ,  [2]

(b) Write down the name of the numbers in the sequence below.

1, 8, 27, 64, ...  
Answer \_\_\_\_\_ [1]

[Turn over



3 Tom bought a full bag of coal.

After one week the bag was  $\frac{2}{3}$  full.

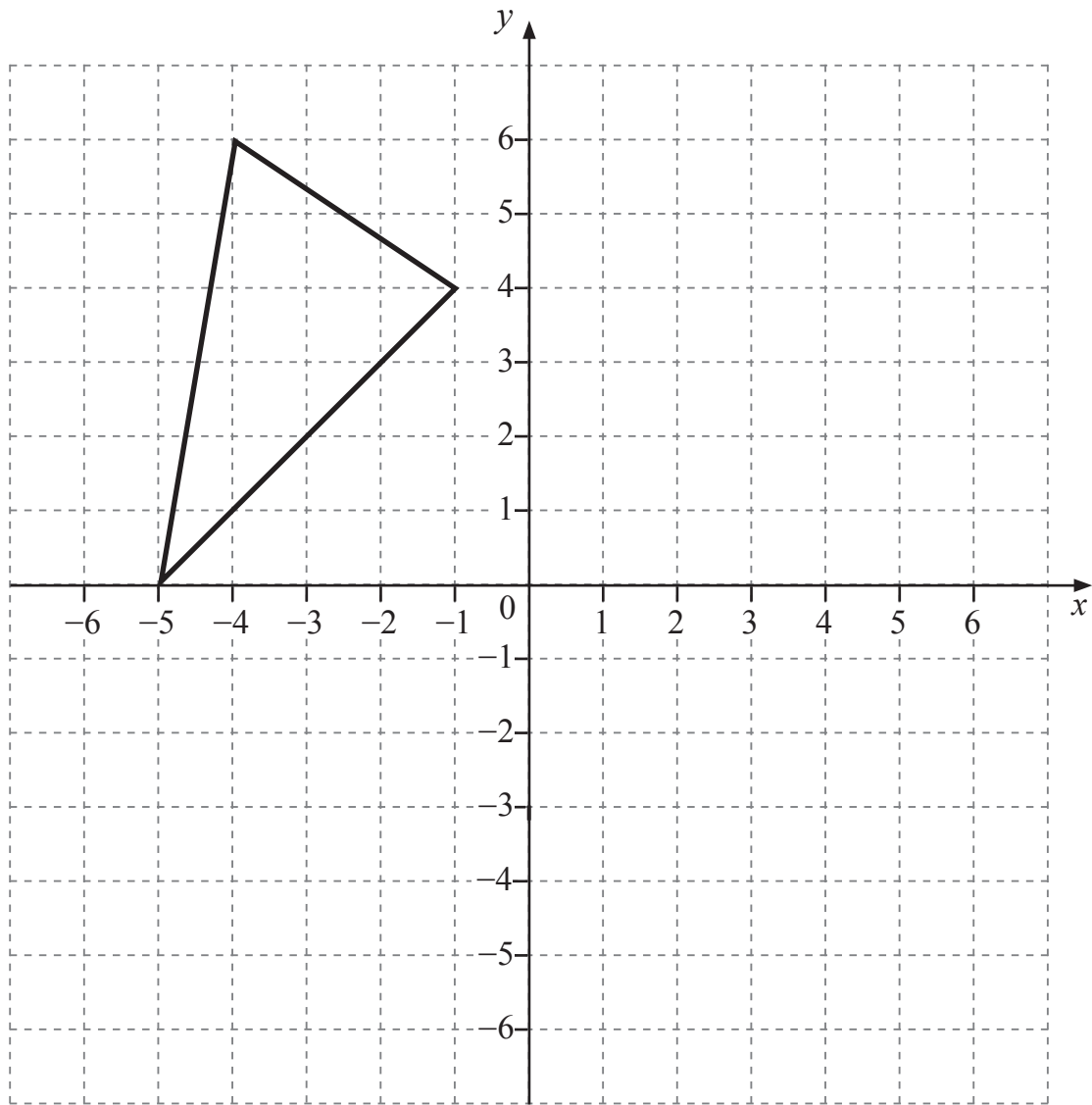
During the next week he used  $\frac{1}{4}$  of the remaining coal.

What fraction was left in the bag?

Answer \_\_\_\_\_ [2]



4 Reflect the triangle shown in the  $y$ -axis.



[1]

[Turn over



- 5 (a) Calculate the size of angle  $x$ .

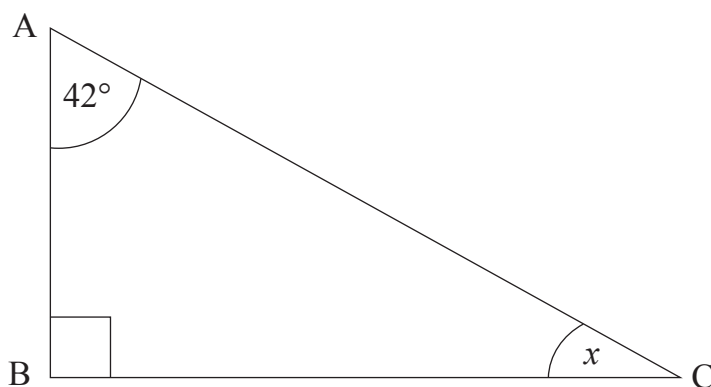
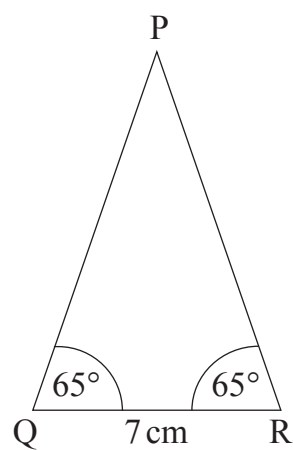


diagram not  
drawn accurately

Answer \_\_\_\_\_  $^\circ$  [2]

- (b) Make an accurate drawing of the triangle sketched below.



Q ×

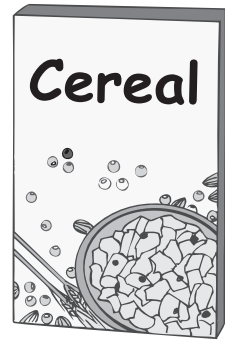
[3]



6 A machine fills boxes of breakfast cereal.

Each box should weigh 375 g.

Jason takes 100 boxes and tests the accuracy of the machine by weighing them.



Weight (g)	Less than 375	Exactly 375	More than 375
Number of boxes	9	58	33

(a) What is the probability that one of the boxes taken by Jason weighs less than 375 g?

Answer \_\_\_\_\_ [1]

(b) The machine fills 5000 boxes.

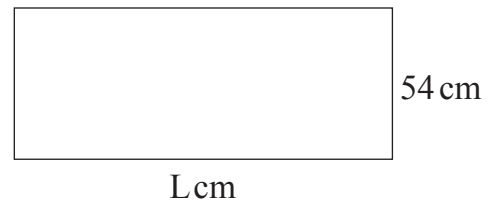
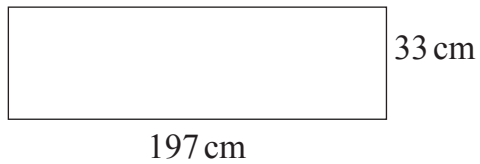
Calculate the number of boxes you would expect to weigh less than 375 g.

Answer \_\_\_\_\_ [2]

[Turn over



7



The two rectangles above have the same area.

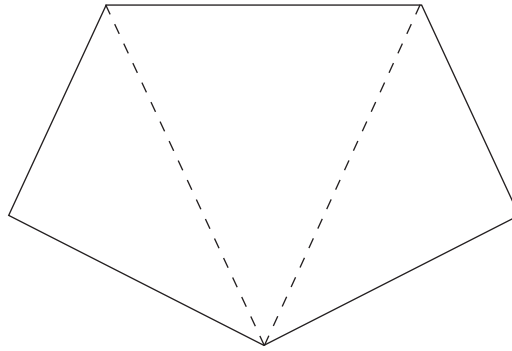
Using estimation, work out an estimate for the length, L, of the second rectangle.

Answer L= \_\_\_\_\_ cm [2]





8



(a) (i) What is the total of all the angles in the three triangles shown?

Answer \_\_\_\_\_ ° [1]

(ii) What is the sum of the interior angles of a five-sided polygon?

Answer \_\_\_\_\_ ° [1]

(b) What is the sum of the interior angles of a seven-sided polygon?

Answer \_\_\_\_\_ ° [2]

9 Rewrite  $4 + x = 9 - y$  to make  $y$  the subject.

Give your answer in its simplest form.

Answer  $y =$  \_\_\_\_\_ [2]

[Turn over

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10 (a) Write the binary number 10101 as a decimal number.

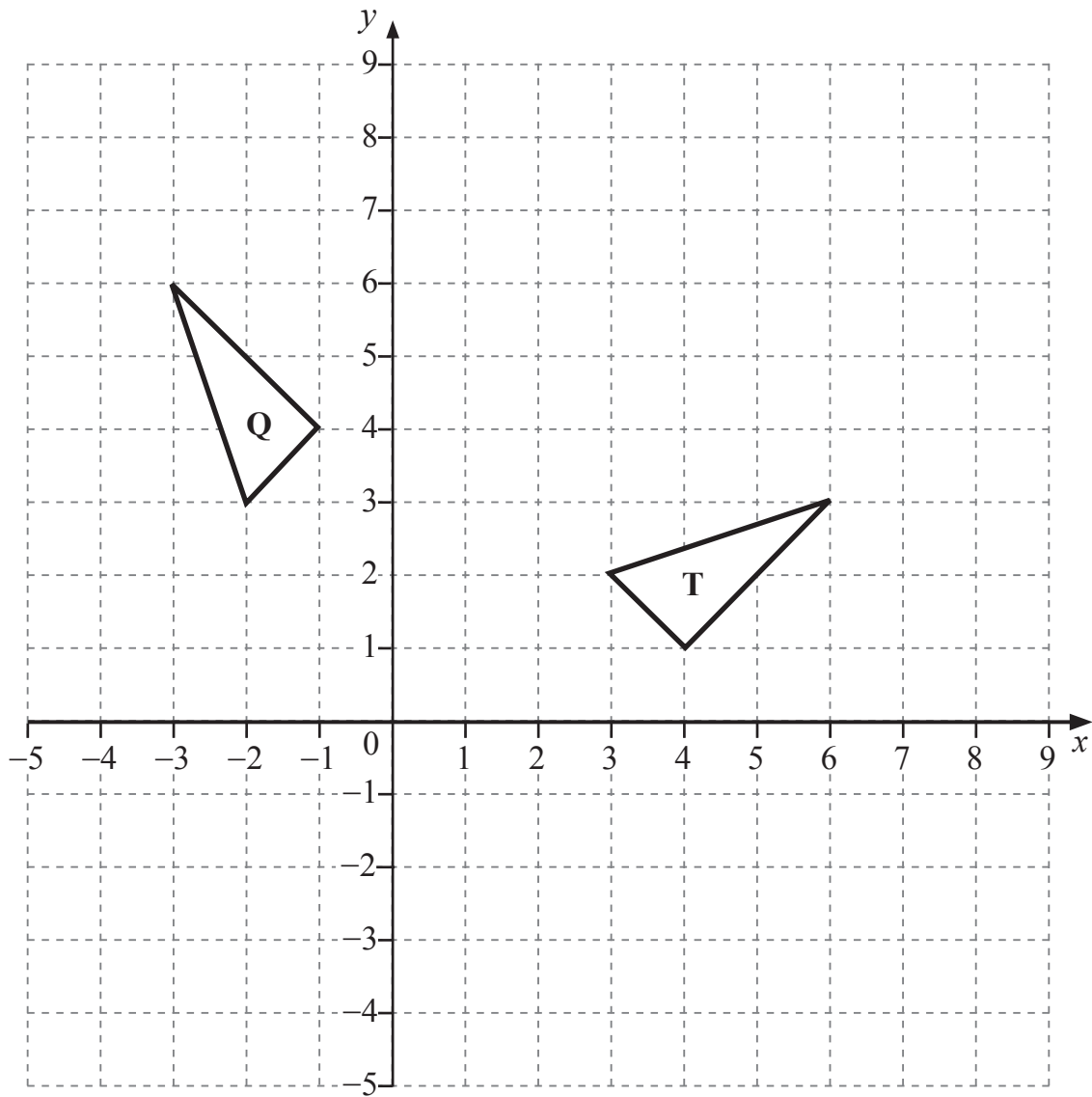
Answer \_\_\_\_\_ [1]

(b) Write the decimal number 26 as a binary number.

Answer \_\_\_\_\_ [1]



11



(a) Describe fully the **single** transformation which maps triangle T onto triangle Q. [3]

Answer \_\_\_\_\_ [3]

(b) On the grid, draw the image of triangle T after a translation  $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$ . [2]

[Turn over



12 A six-sided dice is rolled 800 times.

The table below shows the relative frequency of scoring a six after different numbers of rolls.

Number of rolls	Relative frequency of a six
100	0.3
200	0.26
300	0.27
500	0.23
800	0.25

(a) How many times was a six scored after 300 rolls?

Show how you obtained your answer.

Answer \_\_\_\_\_ [2]

(b) Which relative frequency from the table gives the best estimate of the probability of scoring a six when this dice is rolled?

Explain your answer.

Answer \_\_\_\_\_

Reason \_\_\_\_\_ [2]

(c) How many sixes would you expect to get if a **fair** six-sided dice was rolled 300 times?

Answer \_\_\_\_\_ [2]



13 Solve

$$12 - n > 4n - 3$$

Answer \_\_\_\_\_ [2]

14 John has six shirts, eight ties and five cravats.

John is going out to dinner and he must choose a shirt **and** either a tie or a cravat to wear.

How many different combinations has John got to choose from?

Answer \_\_\_\_\_ [3]

[Turn over

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15 Find the value of

(a)  $3^0 + 4^0$

Answer \_\_\_\_\_ [1]

(b)  $2^{-3}$

Answer \_\_\_\_\_ [1]

16 A one gram bag of seed contains half a million seeds.

If each seed weighs the same, calculate the weight, in grams, of one seed.

Give your answer in standard form.

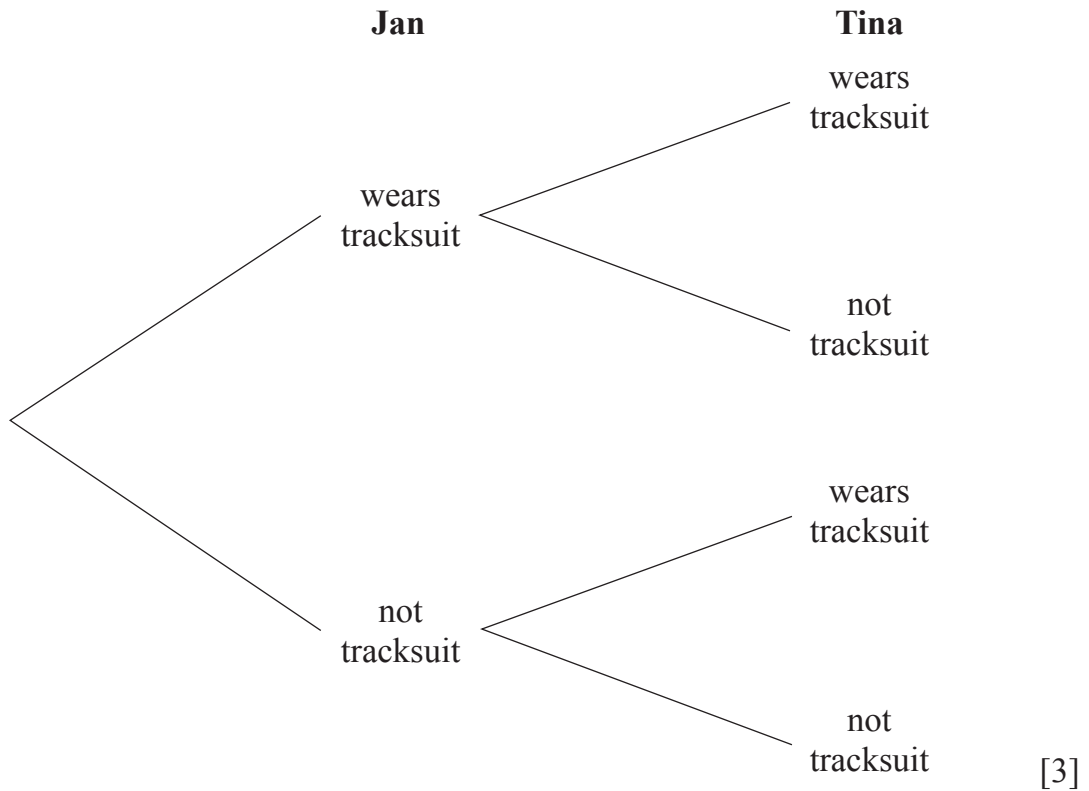
Answer \_\_\_\_\_ g [3]



17 When Jan goes to the gym, the probability that she wears a tracksuit is  $\frac{3}{4}$

When Tina goes to the gym, the probability that she wears a tracksuit is  $\frac{2}{3}$

Complete the tree diagram.



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**THIS IS THE END OF THE QUESTION PAPER**

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<b>For Examiner's use only</b>	
<b>Question Number</b>	<b>Marks</b>
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<b>Total Marks</b>	
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Examiner Number

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