Rewarding Learning

General Certificate of Secondary Education
2019

Centre Number

Candidate Number

Mathematics

Unit M7 Paper 1
(Non-Calculator)
Higher Tier

MV18

[GMC71]
THURSDAY 6 JUNE, 9.15am–10.30am

Time

1 hour 15 minutes, plus your additional time allowance.

Instructions to Candidates

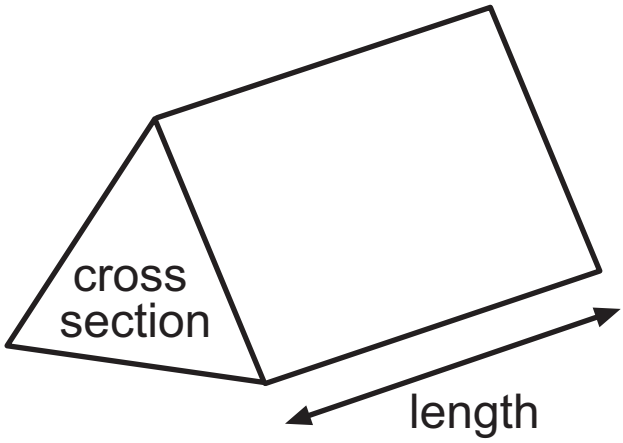
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write on blank pages or tracing paper.
Complete in black ink only. Answer **all seventeen** questions.
All working should be clearly shown in the 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 at the end of each question indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on pages 2 and 3.

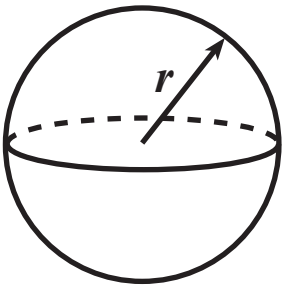
Formula Sheet

Volume of prism = area of cross section × length



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

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



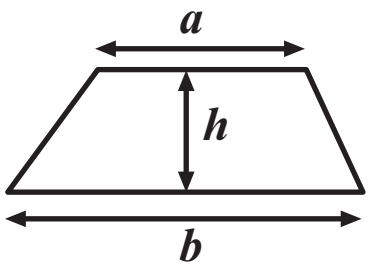
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

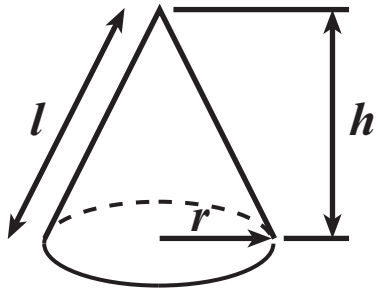
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

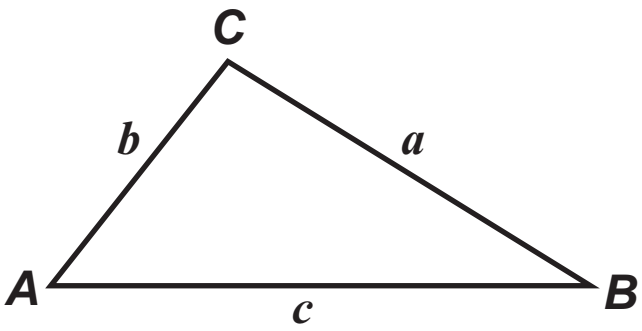


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle *ABC*

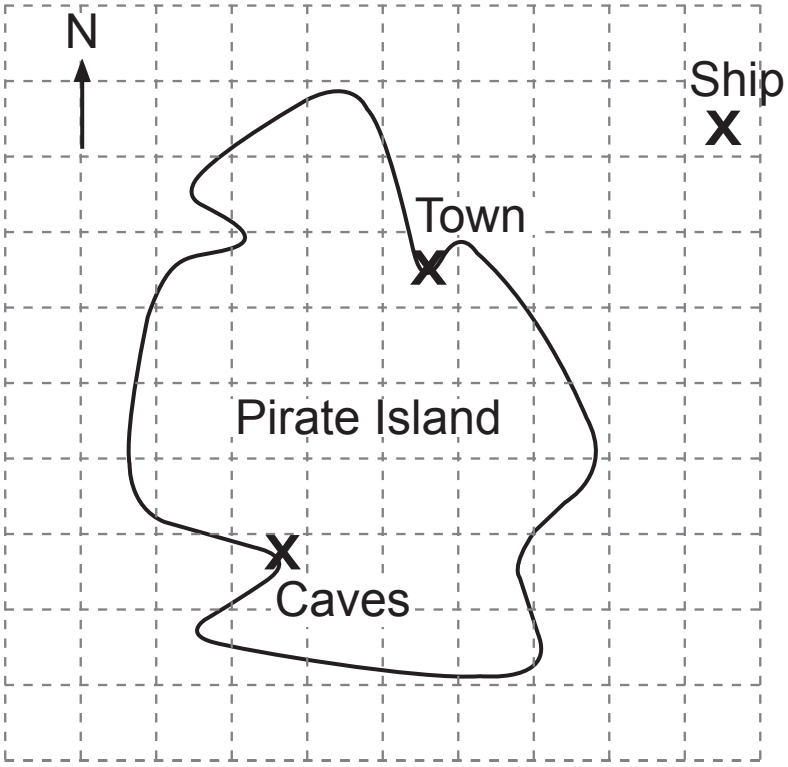


Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

1



Scale
1 cm = 2 km

Measure and write down the bearing of the ship from the town. [2 marks]

Answer _____ °

2 **(a)** Fill in the next two terms of this sequence. [2 marks]

14, 13, 11, 8, ☐, ☐

(b) Write down the name of the numbers in the sequence below. [1 mark]

1, 8, 27, 64, **...**

Answer _____

3 Tom bought a full bag of coal.

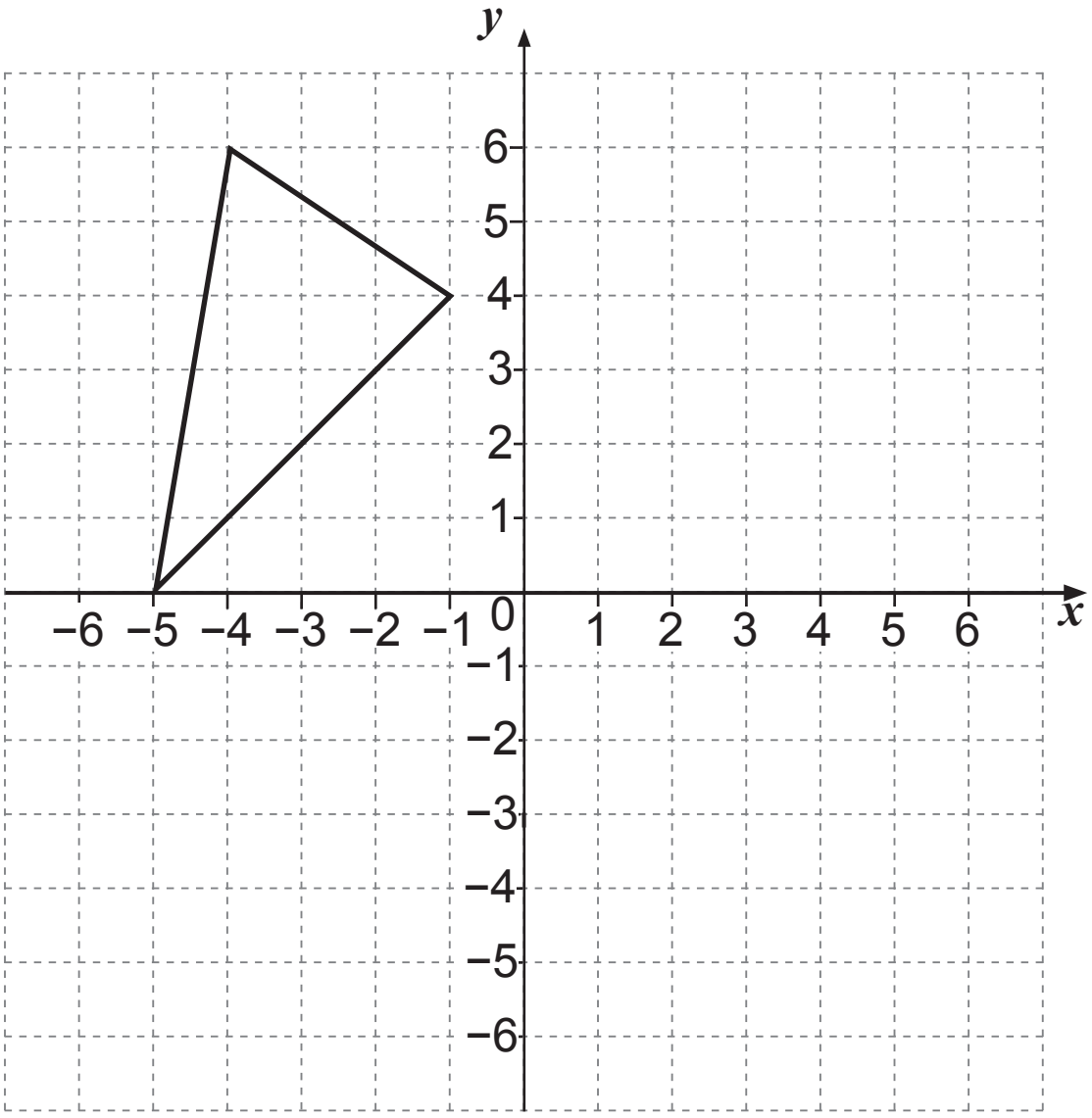
After one week the bag was $\frac{2}{3}$ full.

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

What fraction was left in the bag? [2 marks]

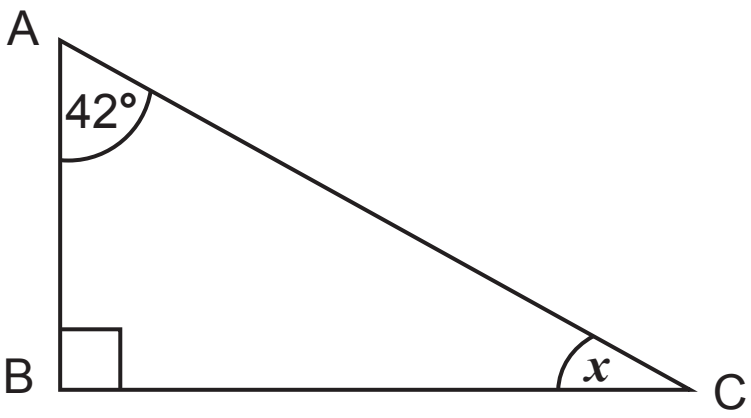
Answer _____

4 Reflect the triangle shown in the y-**axis**. [1 mark]



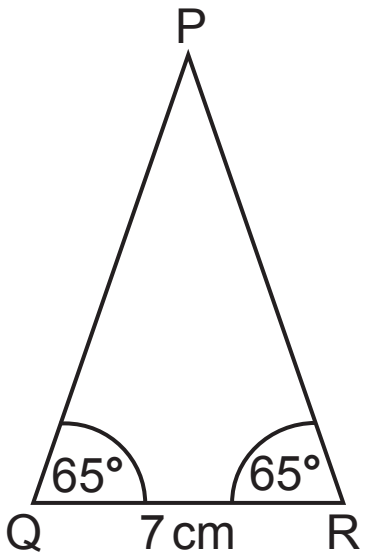
5 **(a)** Calculate the size of angle x. [2 marks]

Diagram not drawn accurately



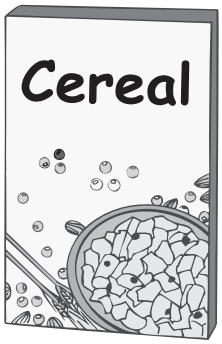
Answer _____ °

(b) Make an accurate drawing of the triangle sketched below. [3 marks]



Q ×

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? [1 mark]

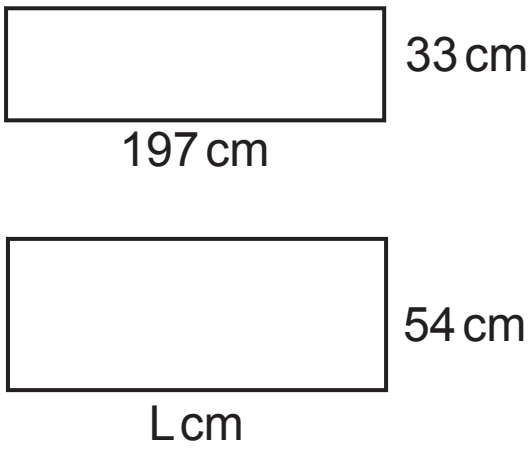
Answer _____

(b) The machine fills 5000 boxes.

Calculate the number of boxes you would expect to weigh less than 375 g. [2 marks]

Answer _____

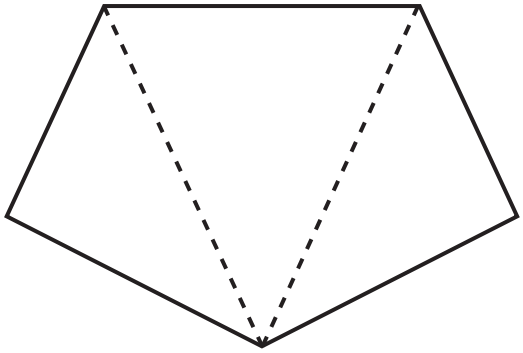
7 The two rectangles below have the same area.



Using estimation, work out an estimate for the length, L, of the second rectangle. [2 marks]

Answer L = _____ cm

8



(a) (i) What is the total of all the angles in the three triangles shown? [1 mark]

Answer _____ °

(ii) What is the sum of the interior angles of a five-sided polygon? [1 mark]

Answer _____ °

(b) What is the sum of the interior angles of a seven-sided polygon? [2 marks]

Answer _____ °

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

Give your answer in its simplest form. [2 marks]

Answer $y =$ _____

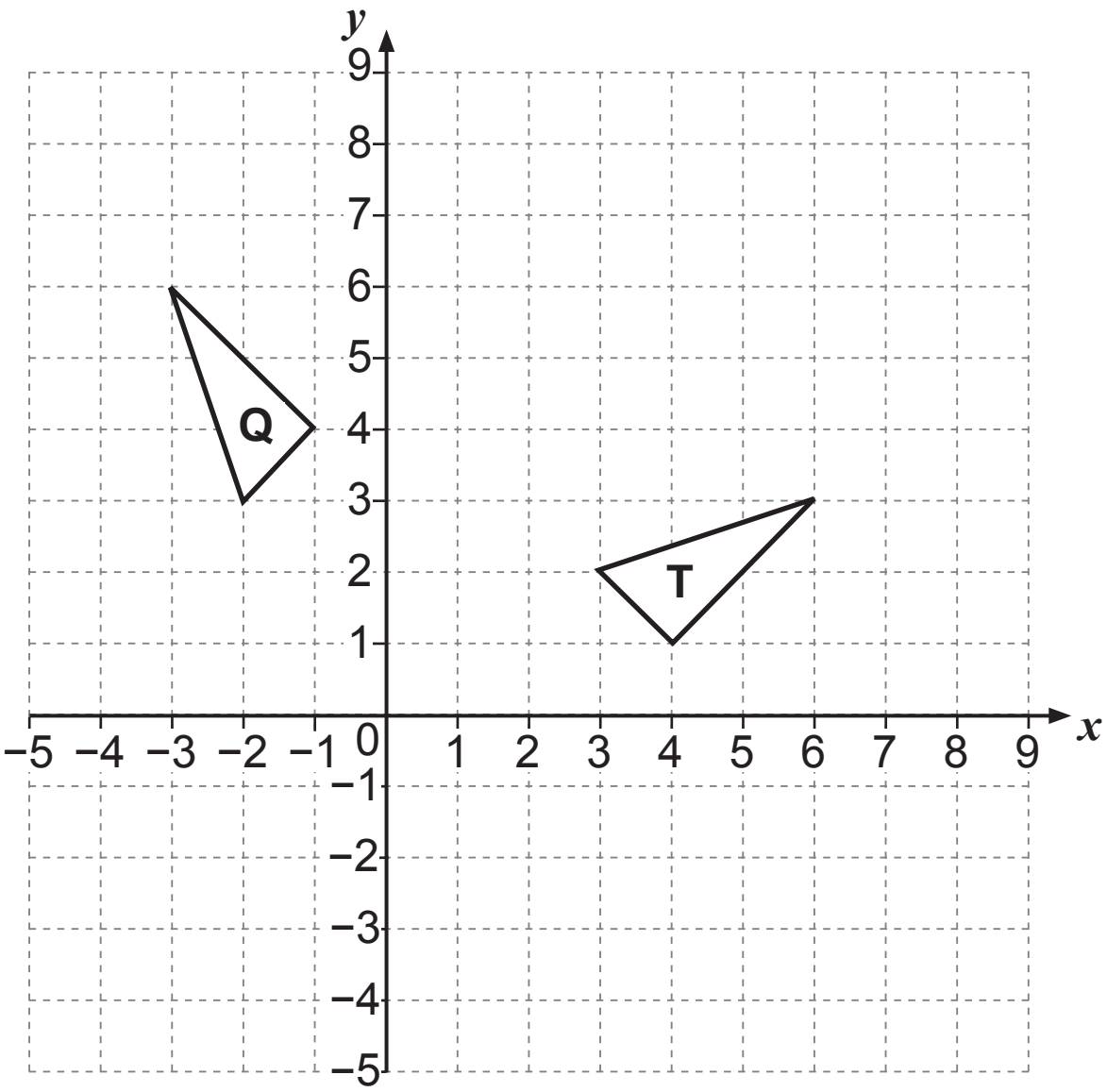
10 **(a)** Write the binary number 10101 as a decimal number.
[1 mark]

Answer _____

(b) Write the decimal number 26 as a binary number.
[1 mark]

Answer _____

11



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

Answer _____

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

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? [2 marks]

Show how you obtained your answer.

Answer _____

(b) Which relative frequency from the table gives the best estimate of the probability of scoring a six when this dice is rolled? [2 marks]

Explain your answer.

Answer _____

Reason _____

(c) How many sixes would you expect to get if a **fair** six-sided dice was rolled 300 times? [2 marks]

Answer _____

13 Solve

$12 - n > 4n - 3$ [2 marks]

Answer _____

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? [3 marks]

Answer _____

15 Find the value of

(a) $3^0 + 4^0$ [1 mark]

Answer _____

(b) 2^{-3} [1 mark]

Answer _____

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.

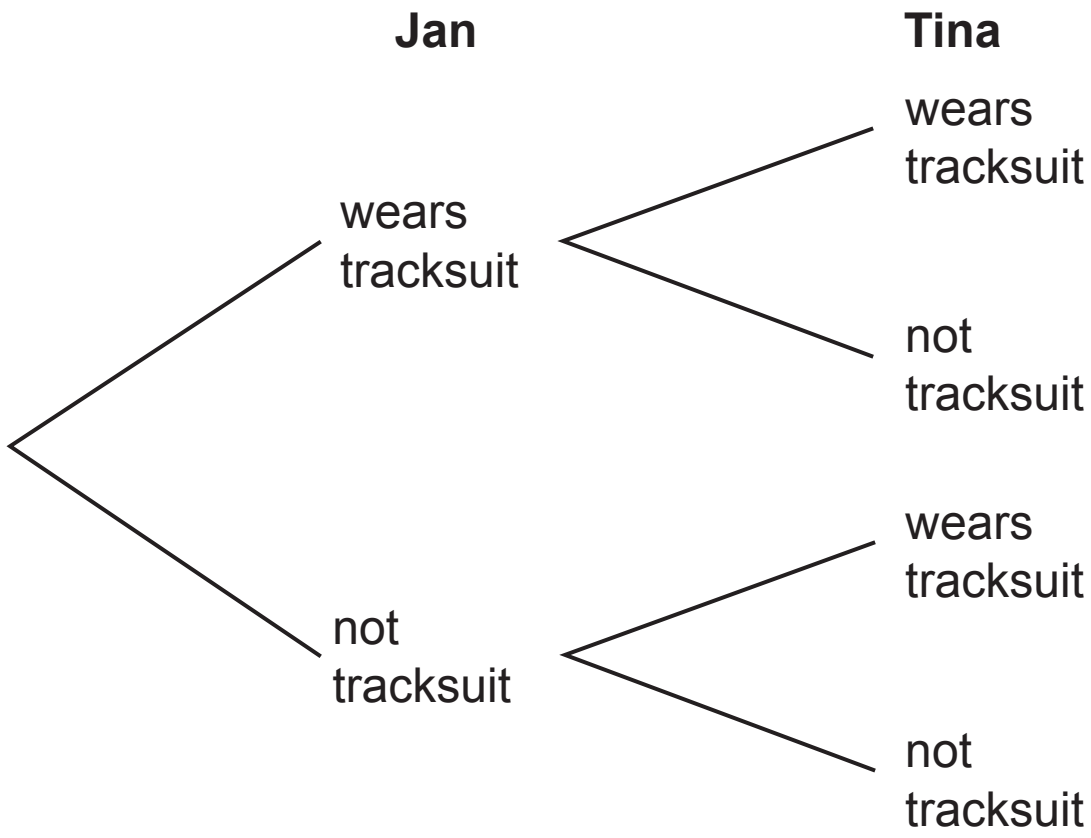
Give your answer in standard form. [3 marks]

Answer _____ g

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. [3 marks]



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For Examiner's use only	
Question Number	**Marks**
1	
2	
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Total Marks	

Examiner Number