Centre Number

Candidate Number

cea

Rewarding Learning

General Certificate of Secondary Education
2019

Mathematics

Unit M8 Paper 1
(Non-Calculator)

Higher Tier

MV18

[GMC81]

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 twelve** 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

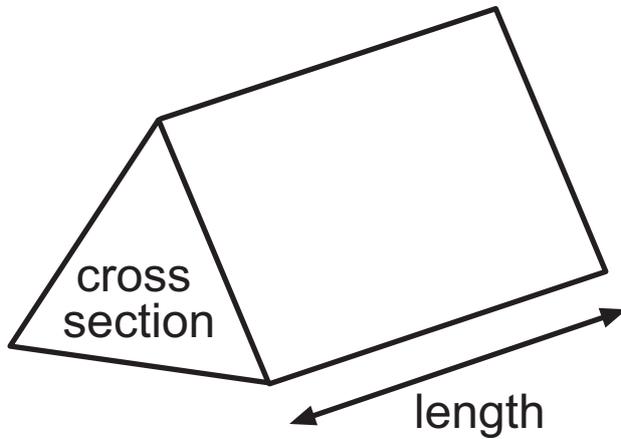The total mark for this paper is 50.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
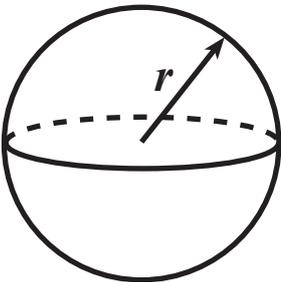The Formula Sheet is on pages 2 and 3.

Formula Sheet

Volume of prism = area of cross section × length

cross
section

length

Volume of sphere $= \frac{4}{3}\pi r^3$
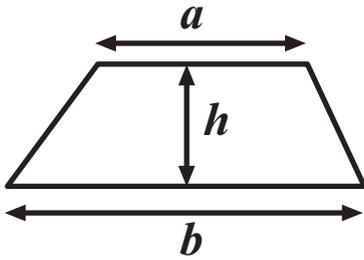
Surface area of sphere $= 4\pi r^2$

r

Quadratic Equation

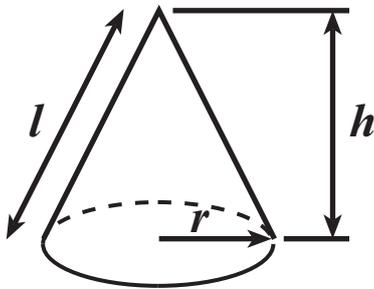The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

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

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

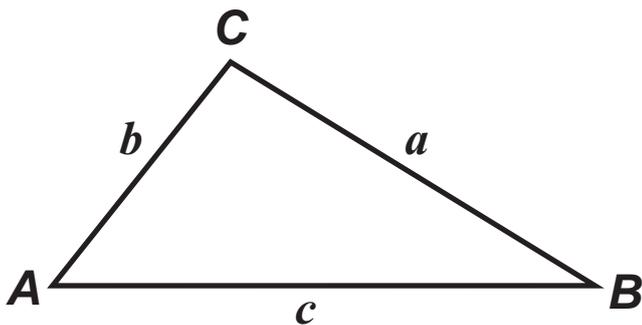**Volume of cone** $= \frac{1}{3}\pi r^2 h$

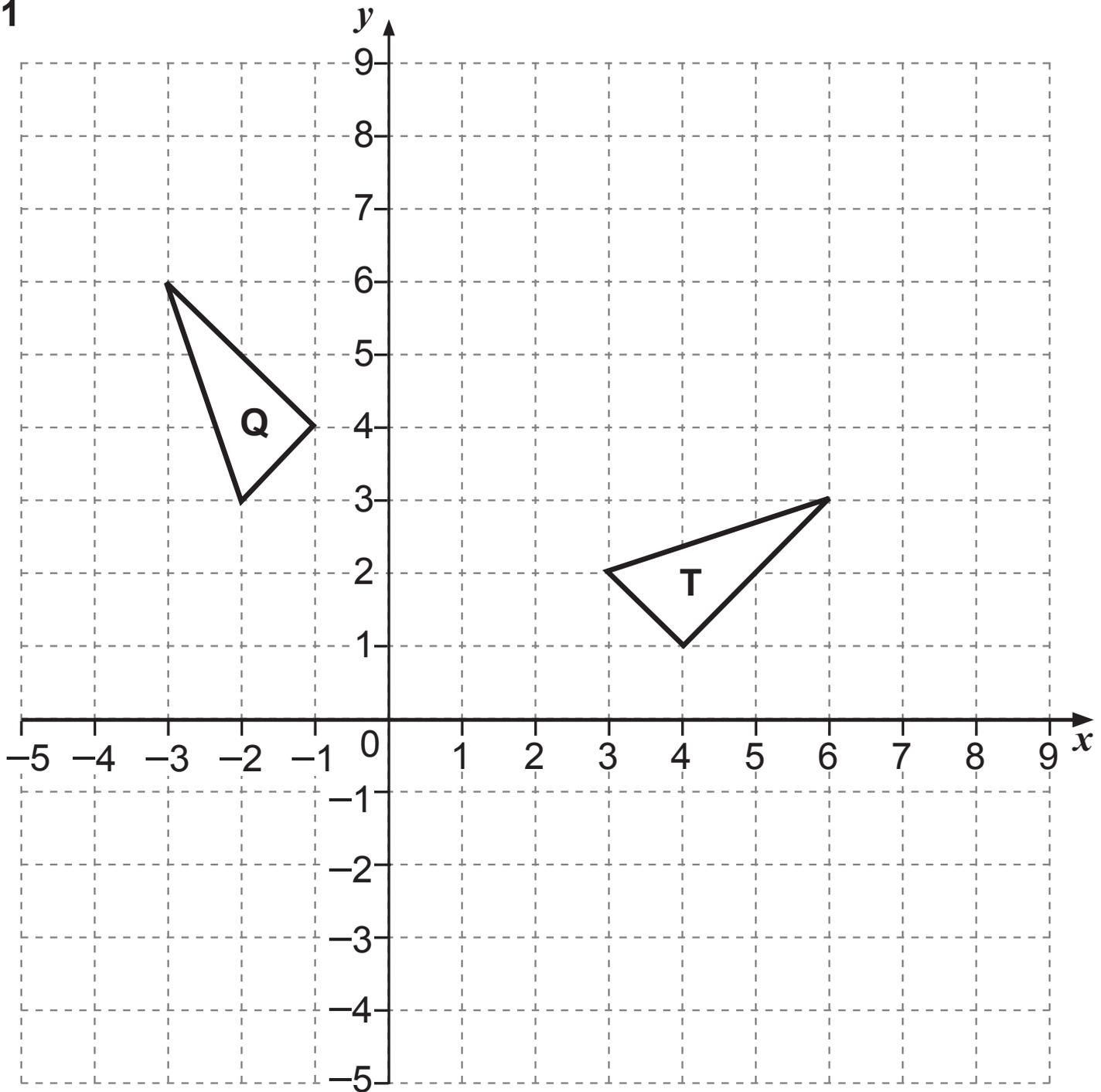**Curved surface area of cone** $= \pi r l$

In any triangle *ABC*

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

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

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

Blank Page

1

(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]

2 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.   [2 marks]

Answer _____

(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.   [2 marks]

Answer _____

Reason _____

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

Answer _____

3 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 _____

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

Answer _____

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

Answer _____

(b) Find the value of $3^0 + 4^0$ [1 mark]

Answer _____

9

5 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

6 Tom bought shares costing **£**4 000

The value, V, of the shares depreciated by 0.05**%**
each year.

Circle the formula which gives the value, V, of the shares
after two years.   [1 mark]

V = $(4000 - 0.05)^2$

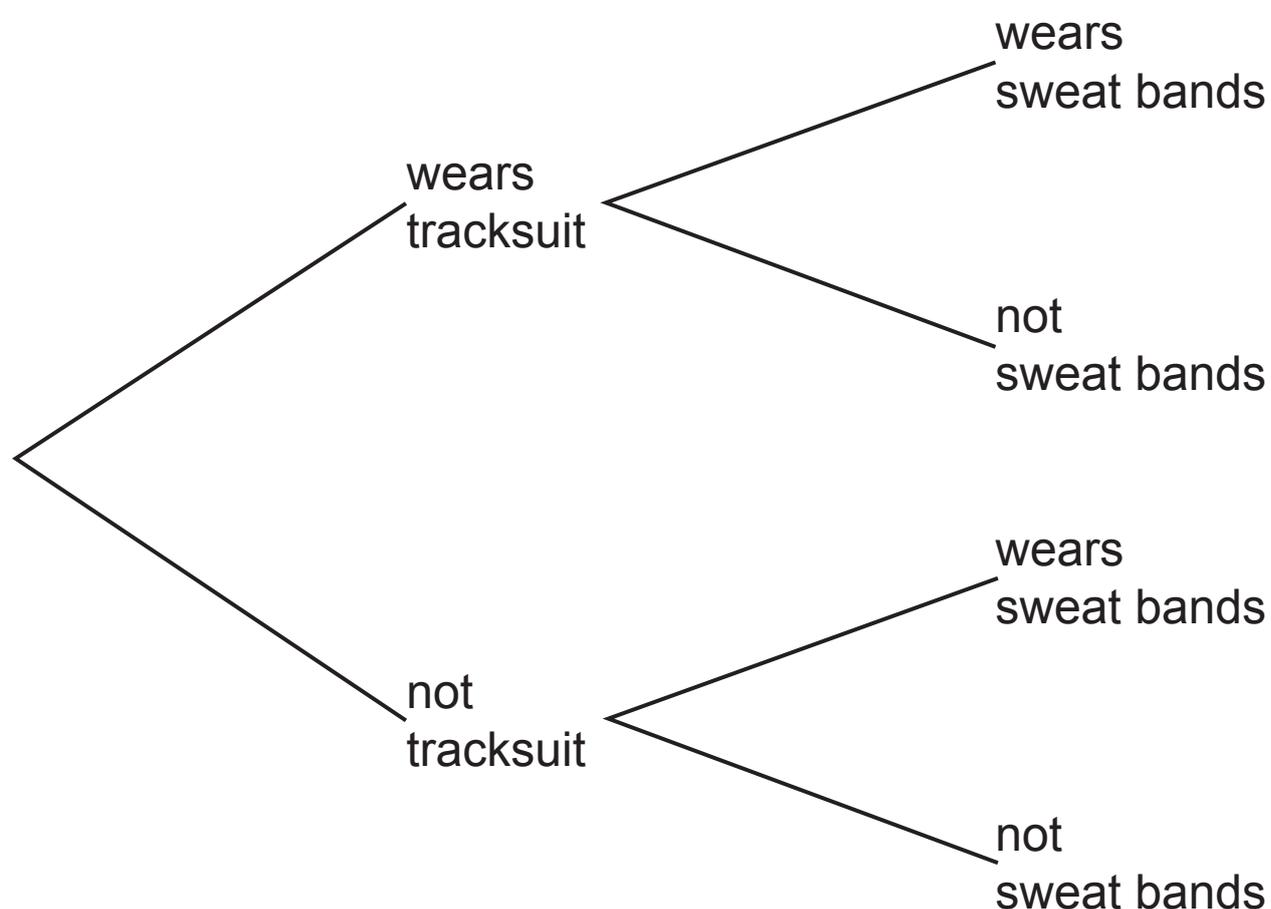V = $4000 (1.05)^2$

V = $4000 (0.9995)^2$

V = $4000 (0.95)^2$

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

When she wears a tracksuit, the probability that she wears sweat bands is $\frac{4}{5}$

When she does not wear a tracksuit, the probability that she wears sweat bands is $\frac{3}{5}$

(a) Complete the tree diagram.   [3 marks]

```
                                          wears
                                          sweat bands
                    wears
                    tracksuit
                                          not
                                          sweat bands


                                          wears
                                          sweat bands
                    not
                    tracksuit
                                          not
                                          sweat bands
```

(b) Calculate the probability that Jan does not wear sweat bands.   [2 marks]

Answer _____

13

[Turn over

8 Change the recurring decimal 0.561561 … into a fraction in its simplest form. [2 marks]

Answer _____

9 Evaluate

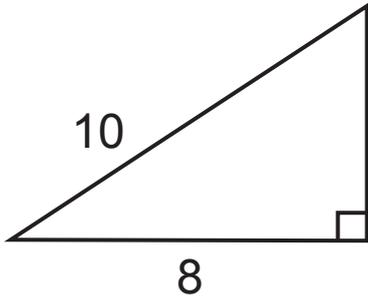**(a)** $16^{\frac{3}{4}}$ [1 mark]

Answer _____

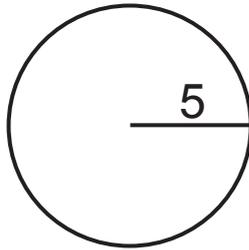**(b)** $\dfrac{81^{\frac{1}{2}} - 125^{\frac{1}{3}}}{100^{-0.5}}$ [3 marks]

Answer _____

10 For each shape, decide whether the area is a rational or an irrational number.
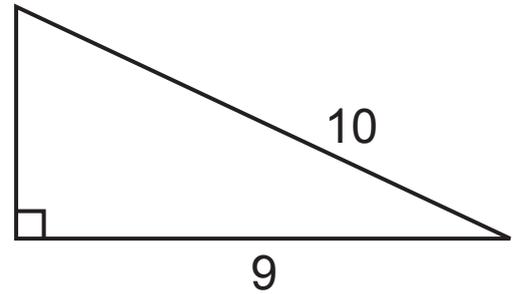
Give a reason for each answer.   [1 mark for each]

10

8

Shape A

5

Shape B

10

9

Shape C

Area of Shape A is _____ because _____

_____

Area of Shape B is _____ because _____

_____

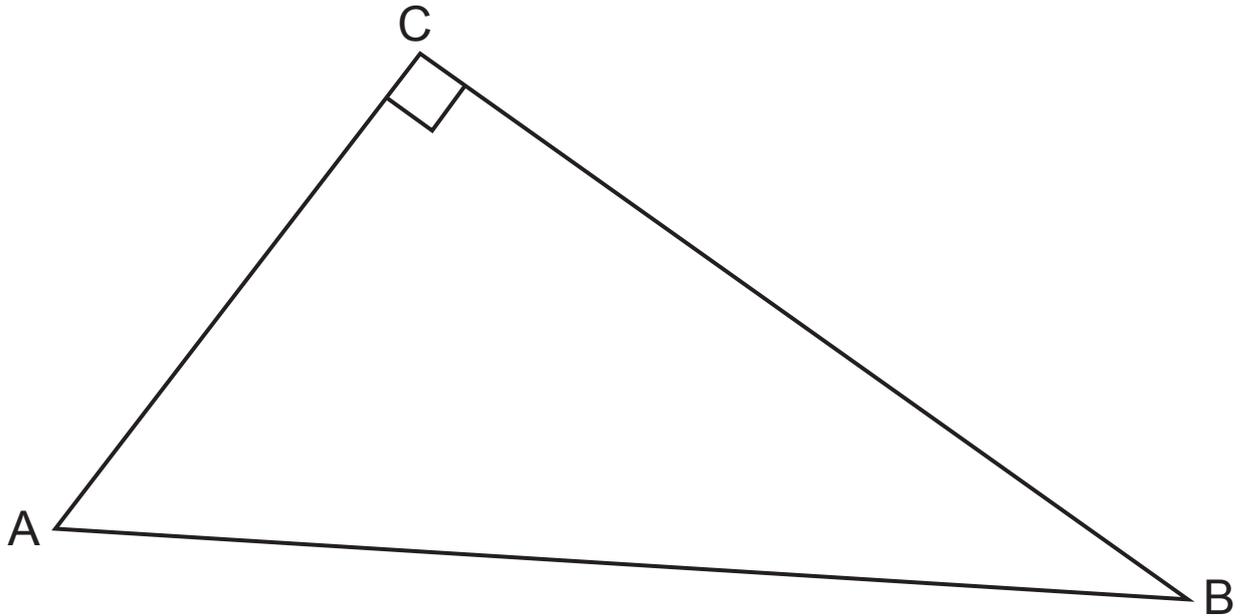Area of Shape C is_____ because _____

_____

11 $(-3, 4)$ is a point on the circle $x^2 + y^2 = 25$

(a) Show that the equation of the tangent to the circle at this point is $4y = 3x + 25$ [4 marks]

(b) Find the coordinates of the points of intersection of this tangent and the curve $y = x^2 + 6$ [6 marks]

Answer _____

12

BC = $3\sqrt{5} - 1$ and AC = $3 + \sqrt{5}$

Find AB.

Give your answer in the form $p\sqrt{q}$ [5 marks]

THIS IS THE END OF THE QUESTION PAPER

11947.02 **MV18**