**General Certificate of Secondary Education
2019**

Mathematics

Unit M8 Paper 2
(With calculator)
Higher Tier

[GMC82]

GMC82

THURSDAY 6 JUNE, 10.45am–12 noon

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 thirteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** 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.
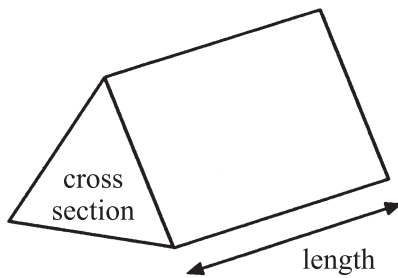You should have a calculator, ruler, compasses and a protractor.
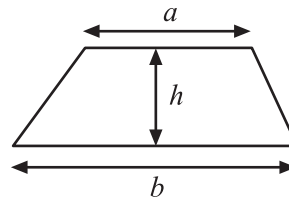The Formula Sheet is on page 2.

11948

16GMC8201

Formula Sheet

Volume of prism = area of cross section × length

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

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

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

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

Surface area of sphere $= 4\pi r^2$
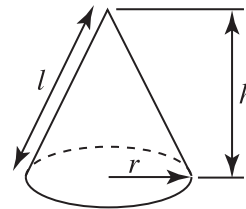
In any triangle ABC
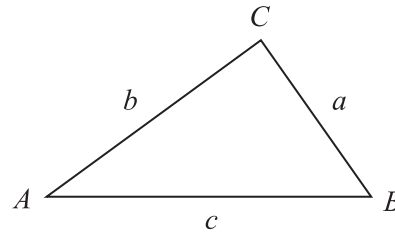
Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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

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

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

11948

16GMC8202

1 Simplify $\dfrac{m^5 \times m^3}{m^2}$

Answer _____ [1]

2 Work out the nth term of the sequence   6,   3,   0,   −3,   ...

Answer _____ [2]

11948

16GMC8203

3

A   B

D   C

ABCD is a rectangle, with AB = 9 cm and BC = 7 cm.

Shade the region inside the rectangle which is the locus of all points that are

(i) greater than 4.5 cm from C

and **(ii)** nearer to B than D. [3]

4 Use trial and improvement to solve the equation $x^3 - 3x = 11$

Give your answer correct to one decimal place.
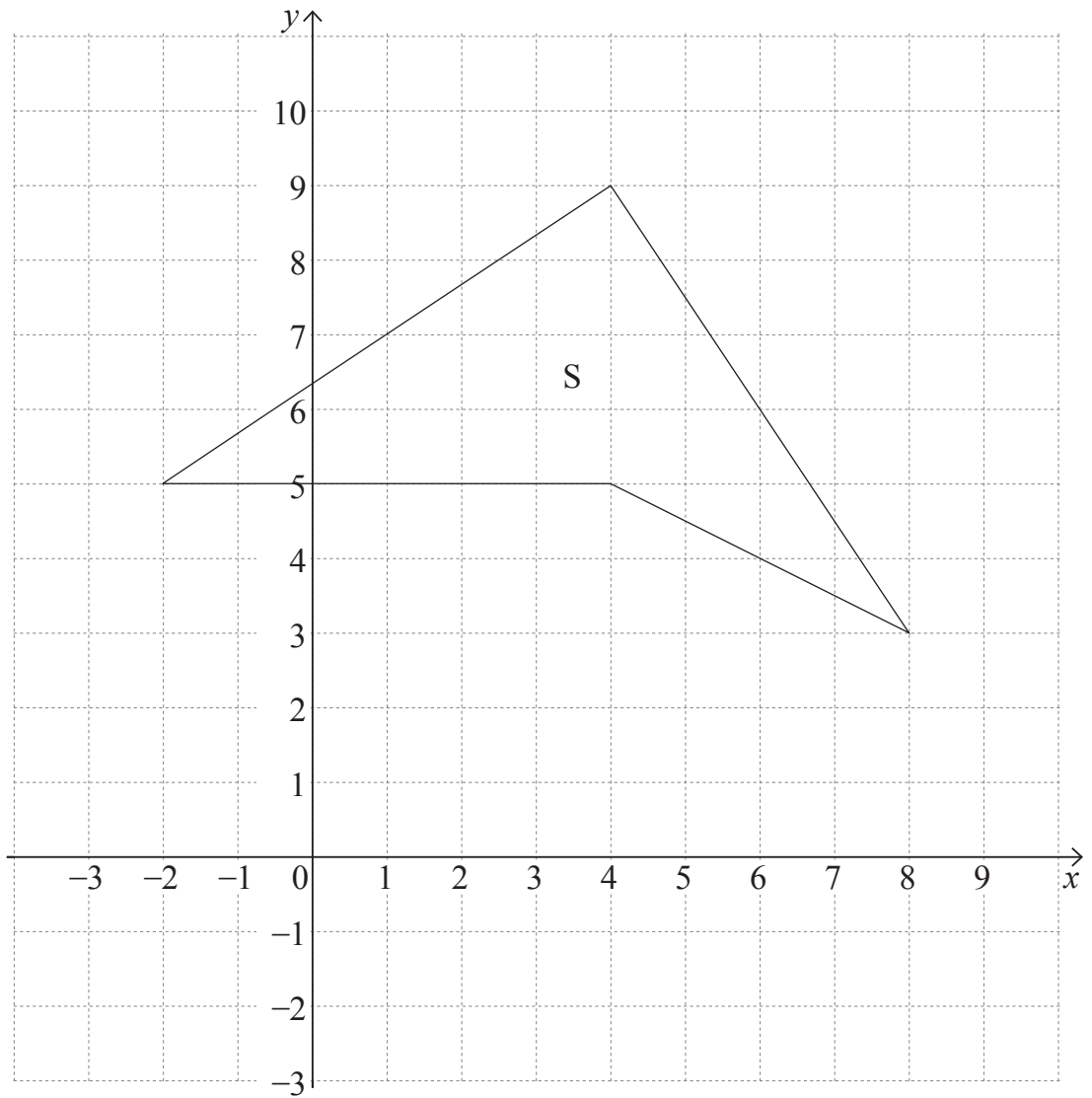
You must show your working

x	$x^3 - 3x$	

Answer _____ [4]

5

(a) On the grid above, draw an enlargement of the shape S, using a scale factor of $\frac{1}{2}$ and centre $(0, -1)$.

[3]

(b) If the shape S has an area of $20\,\text{cm}^2$, what is the area of the enlarged shape?

Answer _____ cm^2 [1]

11948

6 *s* is directly proportional to the square of *v*.

When $v = 20$, $s = 250$

Express *s* in terms of *v*.

Answer _____ [3]

11948

16GMC8207

7 A bag contains 60 coins.

Each coin in the bag is either a 20p coin or a 50p coin.

The total value of the coins in the bag is £22.80

Work out how many of each coin is in the bag.

A solution by trial and improvement will not be accepted.

Answer _____ 20p coins

_____ 50p coins [5]

11948

8 Make T the subject of $J = \sqrt{TR}$
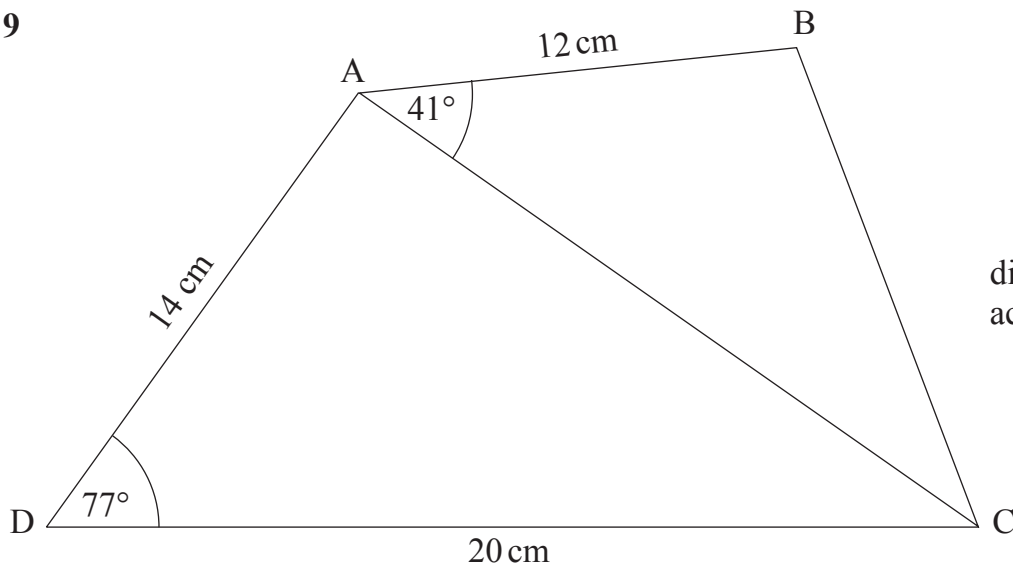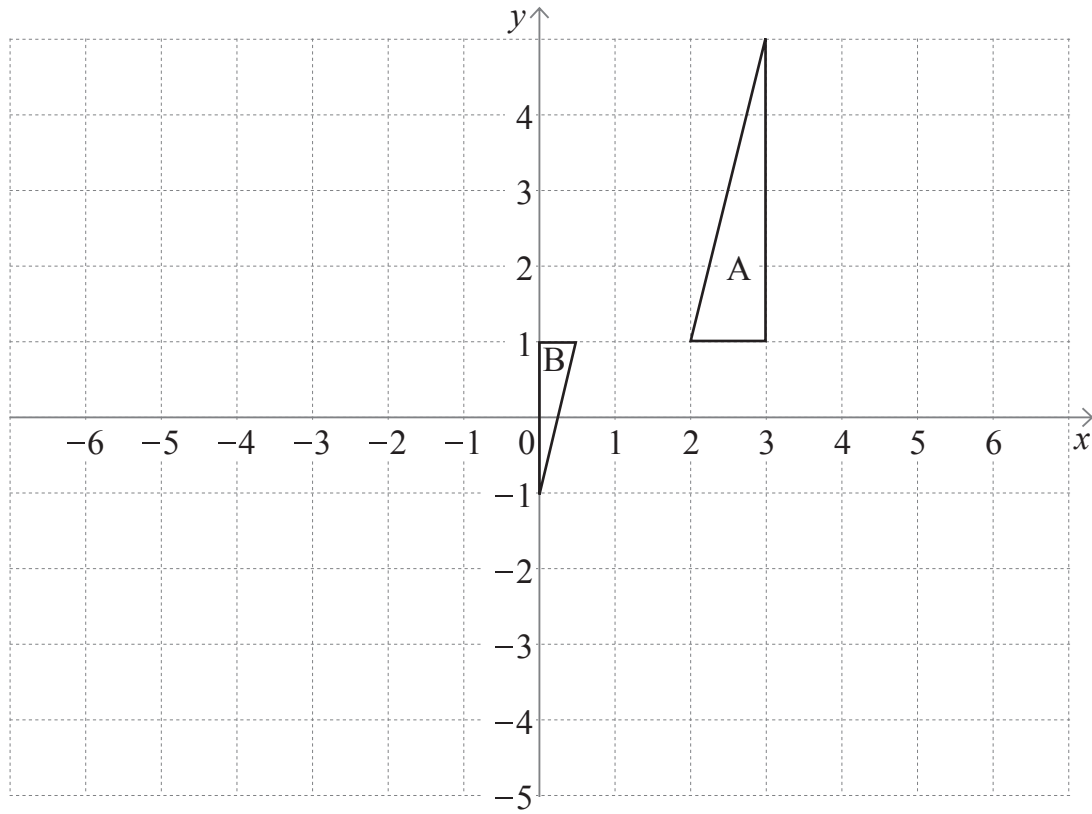
Answer _____ [2]

11948

9

12 cm

B

A

41°

14 cm

diagram not drawn accurately

77°

D

C

20 cm

Find the area of the triangle ABC.

Answer _____ cm² [5]

16GMC8210

10

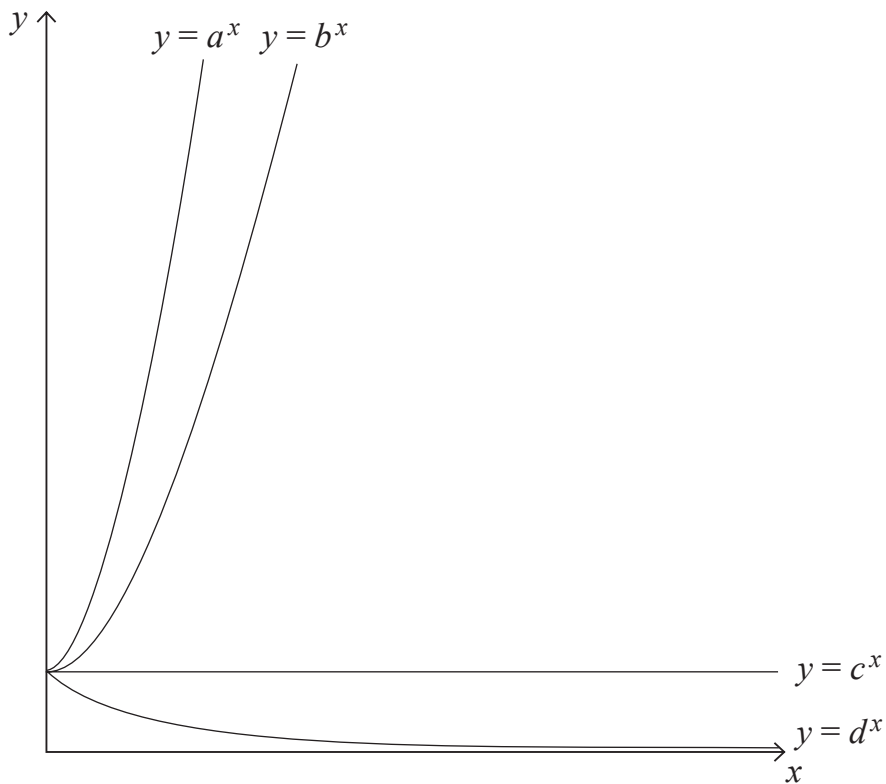Describe fully the **single** transformation that maps triangle A to triangle B.

Answer _____

_____ [3]

11948

16GMC8211

11

Sketches of $y = a^x$, $y = b^x$, $y = c^x$, $y = d^x$ are drawn above.

(a) *a* and *b* are numbers. One has the value 2 and the other has the value 3

Which is which?

Answer *a* = _____ , *b* = _____ [1]

(b) Write down the value of *c*

Answer *c* = _____ [1]

(c) Estimate the value of *d*

Answer *d* = _____ [1]

11948

12 A drawer contains two blue socks, four grey socks and six white socks.
Two socks are taken at random from the drawer.

What is the probability that
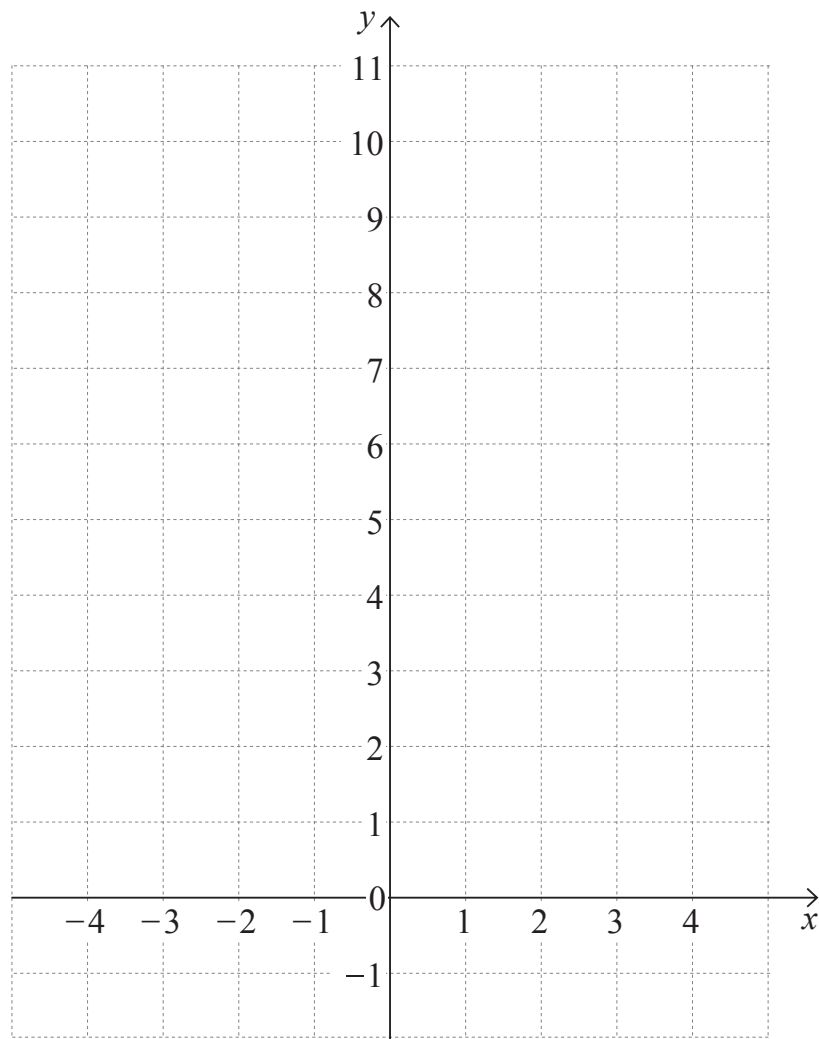
(a) they are both grey,

Answer _____ [2]

(b) the two socks are not the same colour as each other?

Answer _____ [5]

11948

16GMC8213

13

(a) Draw the graph of $y = x^2 - 2x + 3$ for $-2 \leq x \leq 4$ on the grid above.

[2]

11948

(b) Use your graph to find the gradient of the curve when $x = 2$

Answer _____ [2]

(c) By drawing an appropriate line solve $2x^2 - 4x - 1 = 0$

Answer _____ [2]

(d) What line would you draw on your graph to solve the equation $x^2 + 12x + 4 = 0$?

Answer _____ [2]

THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

11948/4

16GMC8216