Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Mathematics

Unit M8 Paper 2
(With calculator)
Higher Tier

MV24

[GMC82]
THURSDAY 6 JUNE, 10.45am–12 noon

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 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 at the end of each question 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 pages 4 and 5.

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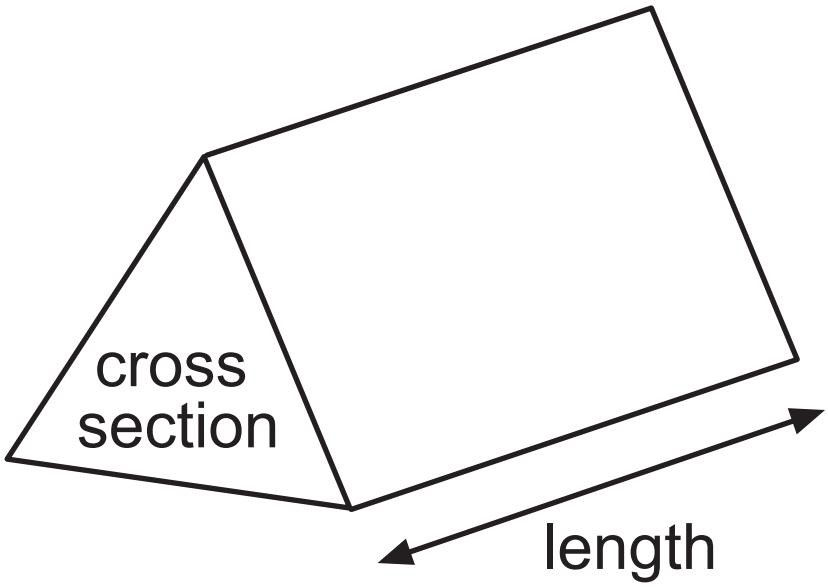
(Formula sheet overleaf)

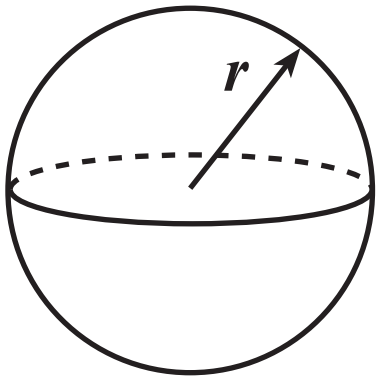
Formula Sheet

Volume of prism = area of cross section × length



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

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



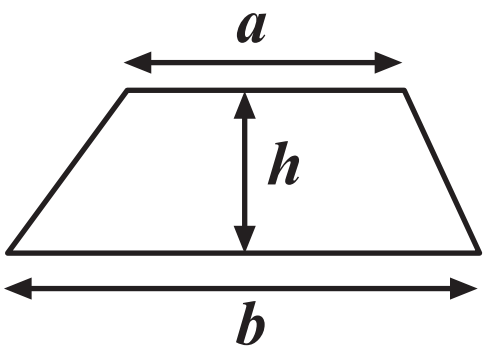
Quadratic Equation

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

where $a \neq 0$, are given by

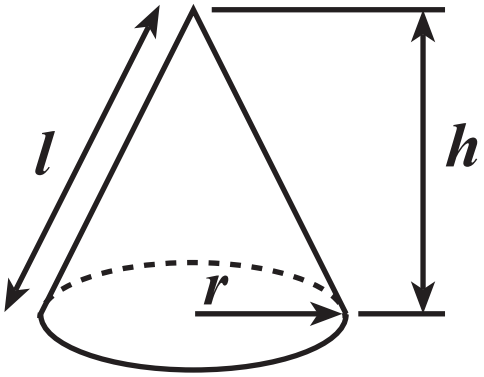
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

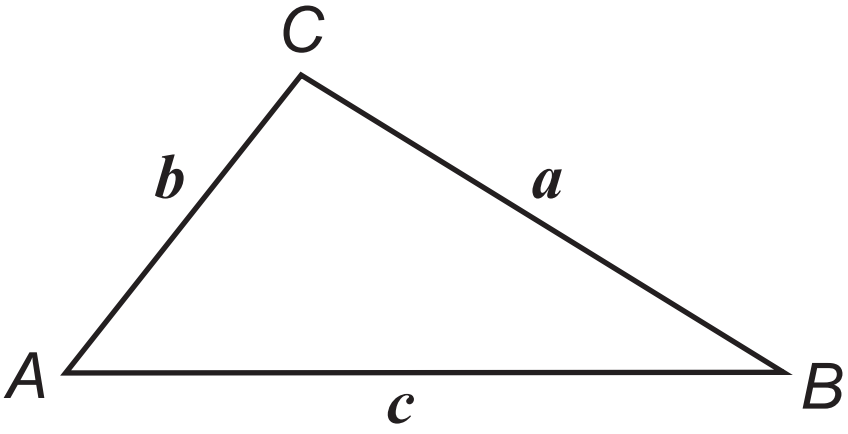


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle *ABC*



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

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

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

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

Answer _____

2 Work out the n^{th} term of the sequence

6, 3, 0, −3, ... [2 marks]

Answer _____

3

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 marks]

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

Give your answer correct to one decimal place. [4 marks]

You must show your working

x	$x^3 - 3x$	

Answer _____

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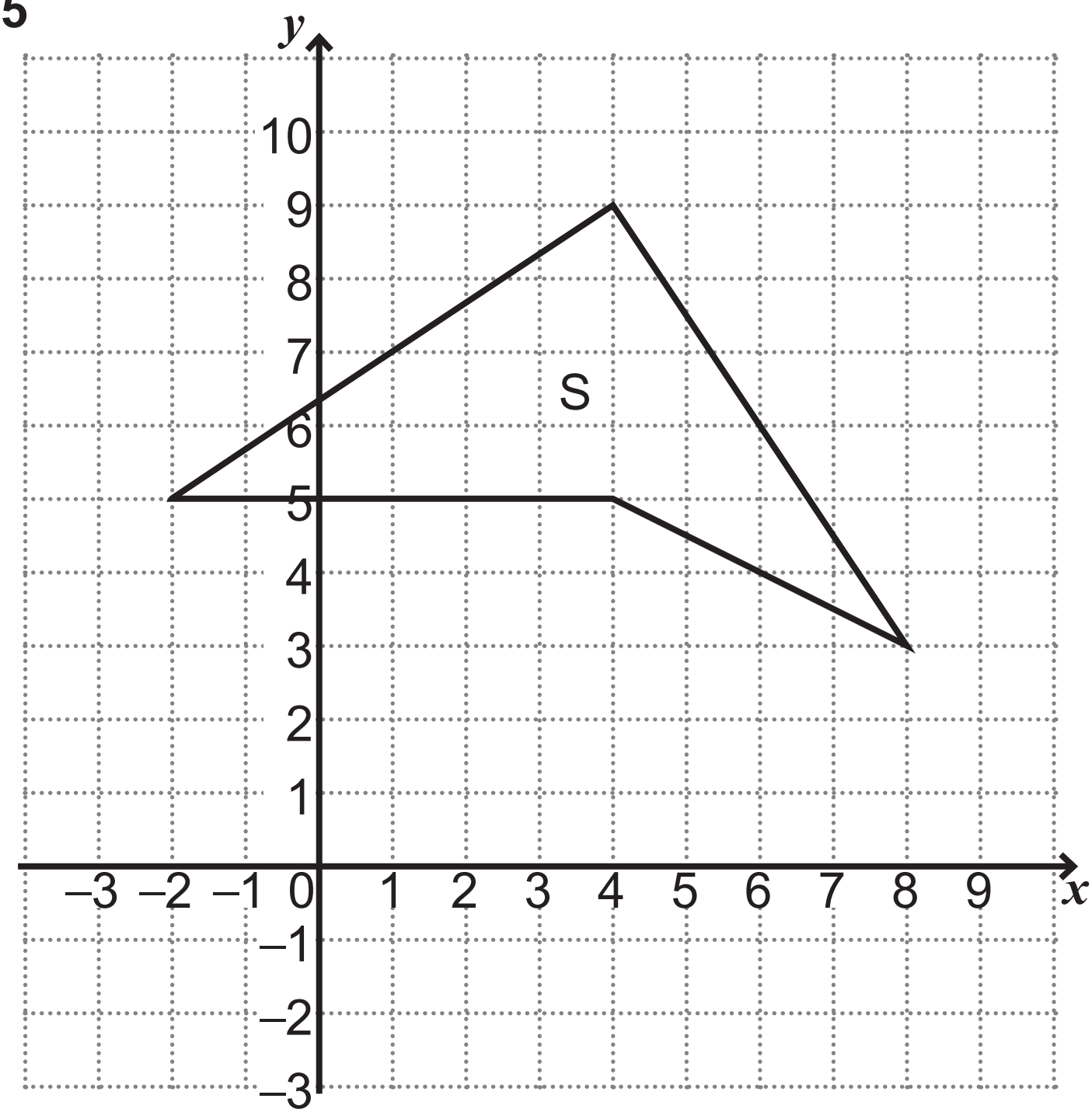
(Questions continue overleaf)

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 marks]

(b) If the shape S has an area of 20 cm^2, what is the area of the enlarged shape? [1 mark]

Answer _____ cm^2

6 s is directly proportional to the square of v.

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

Express s in terms of v. [3 marks]

Answer _____

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. [5 marks]

A solution by trial and improvement will not be accepted.

Answer _____ 20p coins

_____ 50p coins

8 Make T the subject of $J = \sqrt{TR}$

[2 marks]

Answer _____

9

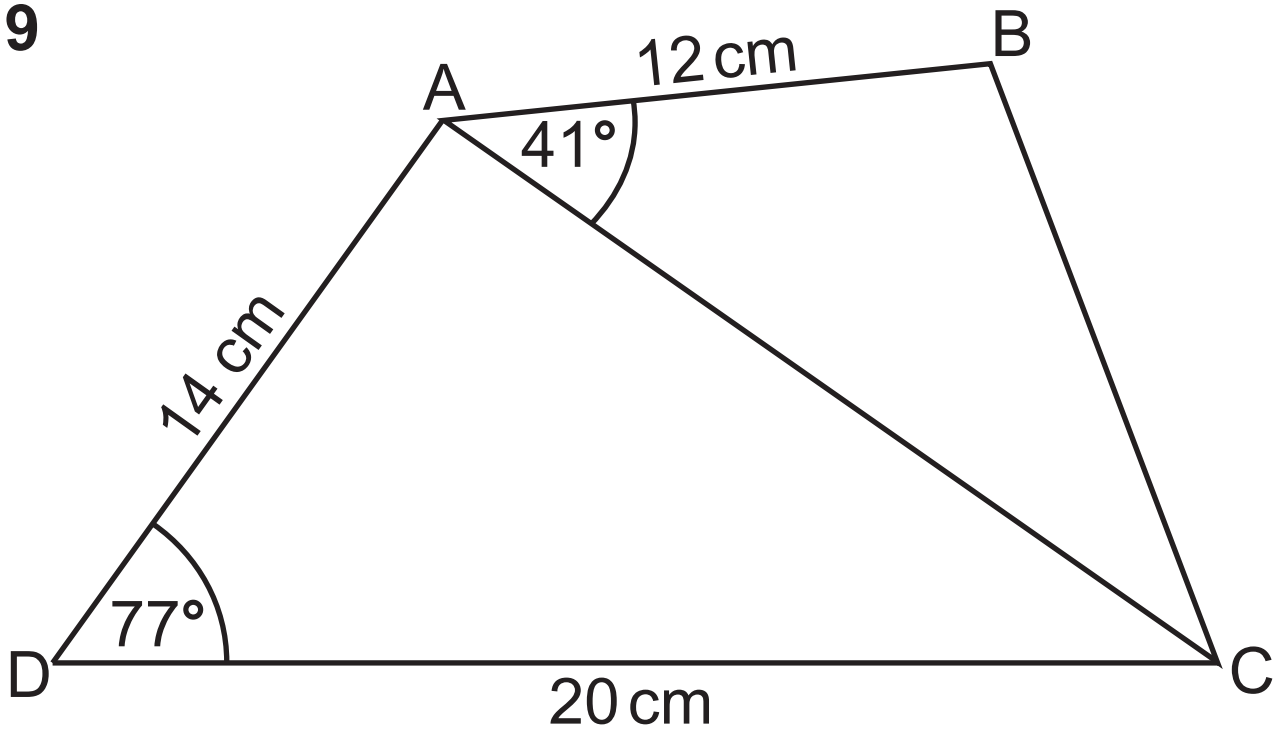
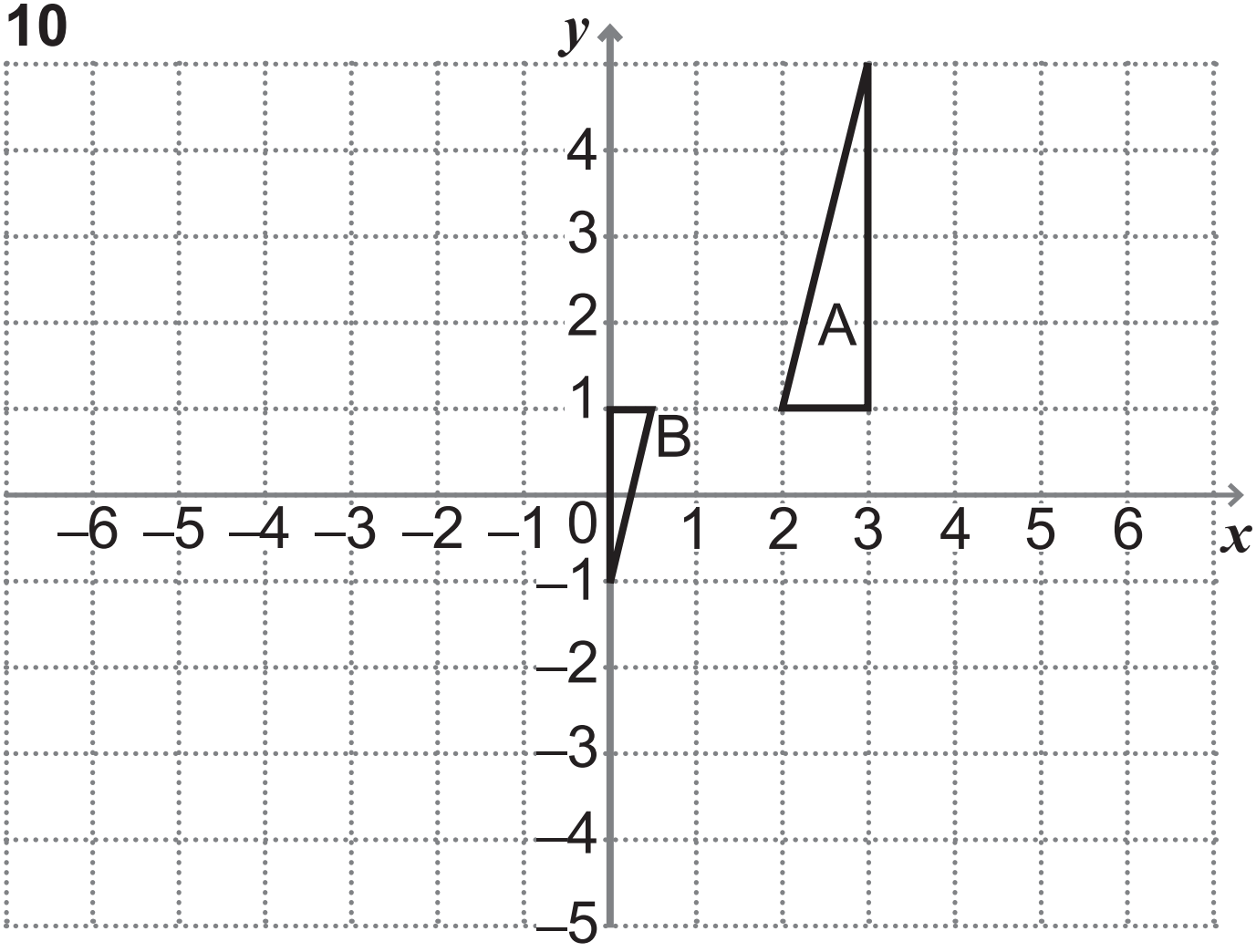


Diagram not drawn accurately.

Find the area of the triangle ABC.
[5 marks]

Answer _____ cm^2

10



Describe fully the **single** transformation that maps triangle A to triangle B. [3 marks]

Answer _____

_____

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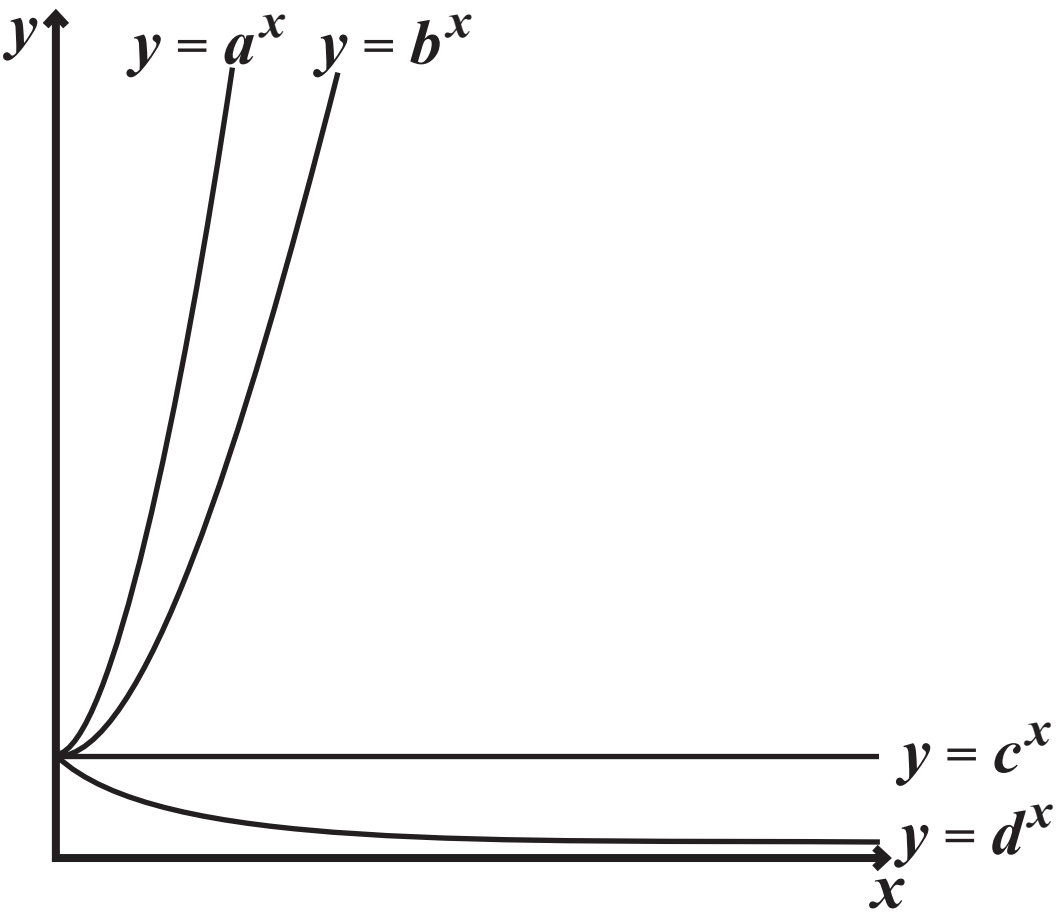
(Questions continue overleaf)

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? [1 mark]

Answer a = _____, b = _____

(b) Write down the value of c [1 mark]

Answer c = _____

(c) Estimate the value of d [1 mark]

Answer d = _____

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

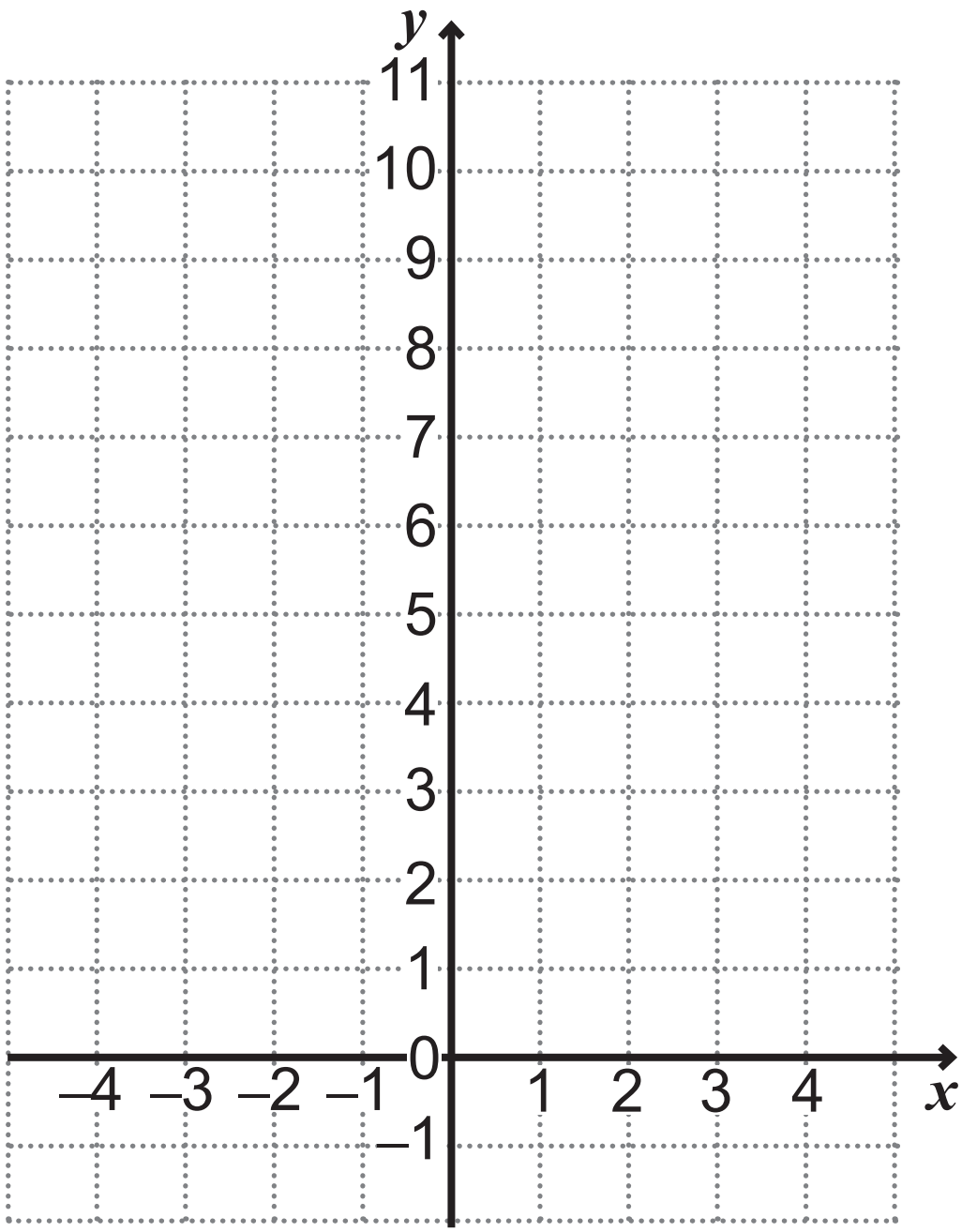
(a) they are both grey, [2 marks]

Answer _____

(b) the two socks are not the same colour as each other? [5 marks]

Answer _____

13



(a) Draw the graph of

$y = x^2 - 2x + 3$ for $-2 \leq x \leq 4$

on the grid above. [2 marks]

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

Answer _____

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

Answer _____

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

Answer _____

This is the end of the question paper

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total Marks	

Examiner Number