

# Edexcel

GCSE

# Mathematics

# H

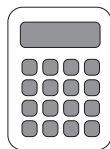
## SET B – Paper 3 Higher Tier (Calculator)

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Time allowed: 1 hour 30 minutes

### You must have:

- Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.



### Instructions

- Use **black** ink or black ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

### Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Name: .....

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages of your working.**

**1** From this list write down the cube number.

81          225          729          1024

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**(Total for Question 1 is 1 mark)**

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**2** From this list write down the power of 5.

55          100          125          225

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**(Total for Question 2 is 1 mark)**

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3 (a) Simplify  $x^3 \times x^6$

(1)

(b) Simplify  $x^{12} \div x^2$

(1)

(Total for Question 3 is 2 marks)

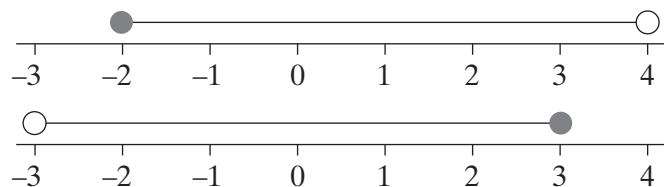
4 Here are two column vectors.

$$\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} 6 \\ -2 \end{pmatrix}$$

Work out  $2\mathbf{a} + \mathbf{b}$

(Total for Question 4 is 2 marks)

- 5 Two inequalities are shown.



Write down the integers that are in **both** inequalities.

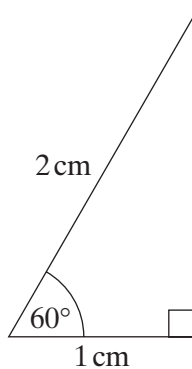
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(Total for Question 5 is 2 marks)

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- 6 The diagram shows a right-angled triangle.

One of the other angles is  $60^\circ$



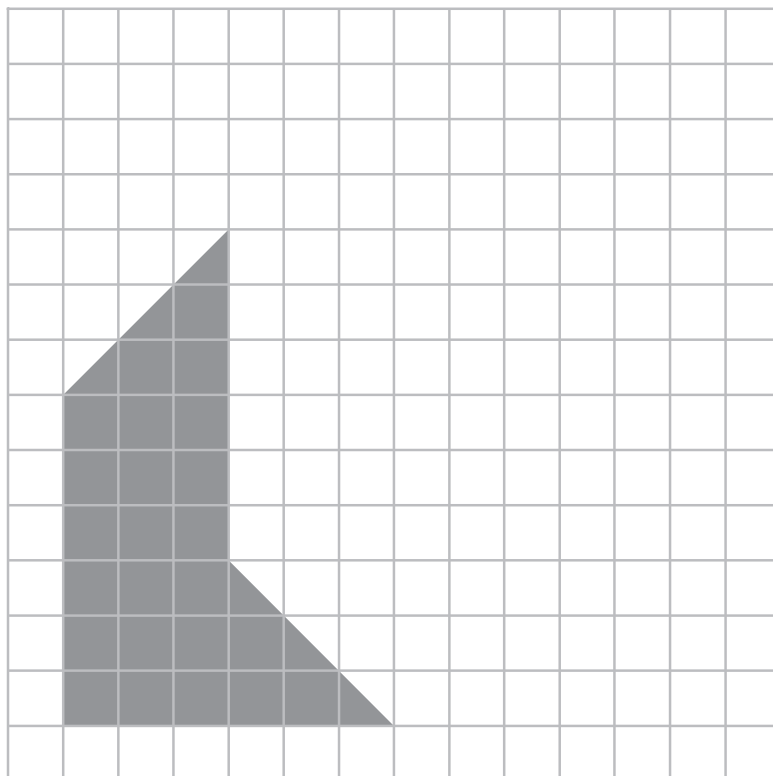
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accurately

Calculate the **exact** value of  $\sin 60^\circ$

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(Total for Question 6 is 2 marks)

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**(Total for Question 7 is 2 marks)**

- 8** A large candle exerts a pressure of 2 Pa on its base.

As the candle burns the pressure decreases.

After 2 hours the pressure is 0.5 Pa.

Work out the rate of change of pressure.

Give your answer in Pa/hour.

**(Total for Question 8 is 2 marks)**

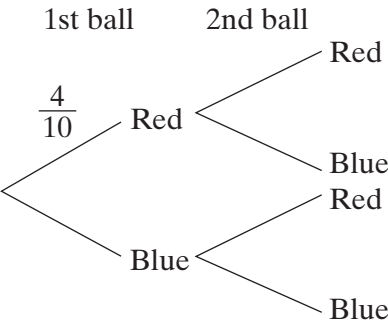
9 A bag contains 10 balls.

4 of the balls are red and 6 are blue.

A ball is taken at random from the bag.

The ball is replaced and another ball is taken at random from the bag.

(a) Complete the tree diagram.



(1)

(b) Use the tree diagram, or otherwise, to work out the probability that both balls were the same colour.

(3)

(Total for Question 9 is 4 marks)

10 Solve the simultaneous equations.

$3x + 2y = 2$

$x + 4y = 9$

(Total for Question 10 is 3 marks)

**11 (a)** Factorise  $x^2 - 25$

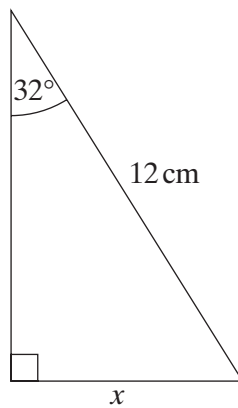
(1)

**(b)** Show that  $(x + 2)^2 - (x + 1)^2 \equiv 2x + 3$

(3)

**(Total for Question 11 is 4 marks)**

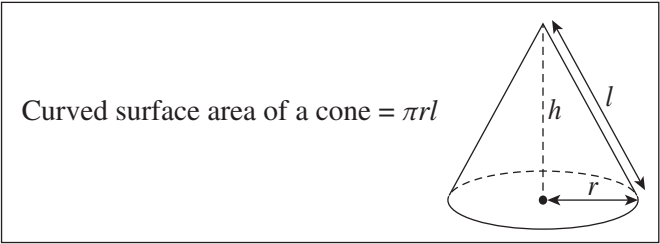
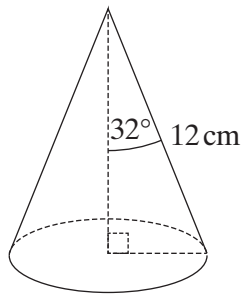
**12 (a)** Show that the length  $x$  in the triangle below is 6.36 cm to 2 decimal places.



Not drawn  
accurately

(1)

(b) A cone has a half vertical angle of  $32^\circ$  and a slant height  $l$  of 12 cm.



Work out the curved surface area of the cone.

.....  $\text{cm}^2$   
(2)

(Total for Question 12 is 3 marks)

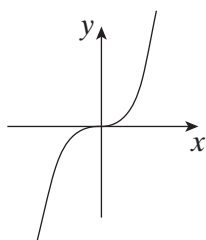
- 13** A seal colony has 6000 seals.  
It is declining at a rate of 8% per year.  
How long will it be before the colony is half its original size?

.....  
(Total for Question 13 is 3 marks)

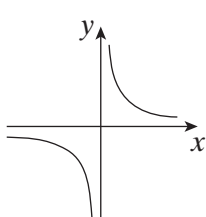


**14** Match each graph to the equations.

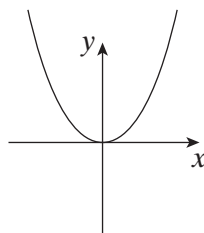
Graph A



Graph B



Graph C



$y = \tan x$  matches graph .....

$y = 2^x$  matches graph .....

$y = \frac{1}{x}$  matches graph .....

**(Total for Question 14 is 2 marks)**

**15** Simplify  $(2x^2 y^3)^2$

**(Total for Question 15 is 2 marks)**

16 Here are the equations of four lines.

Line A:  $y = 3x + 3$       Line B:  $y = \frac{1}{4}x - 3$

Line C:  $y = \frac{1}{3}x + 3$       Line D:  $y = -4x - 4$

(a) Which two lines are perpendicular?

.....  
(1)

(b) Which two lines intersect on the  $x$ -axis?

.....  
(1)

(Total for Question 16 is 2 marks)

17 (a) Write down the next two terms of this quadratic sequence.

3    5    8    12    17    23    ...    ...

.....  
(2)

(b) Work out the  $n$ th term of the quadratic sequence

6    10    16    24    34    46    ...

.....  
(4)

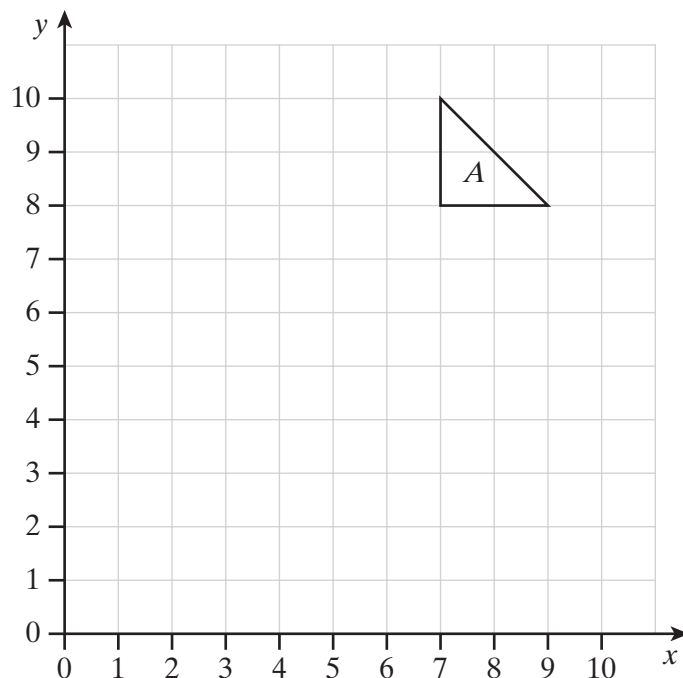
(Total for Question 17 is 6 marks)

- 18** The triangle  $A$ , shown, is reflected in  $y = 6$

Call this triangle  $B$ .

Triangle  $B$  is then reflected in  $x = 5$

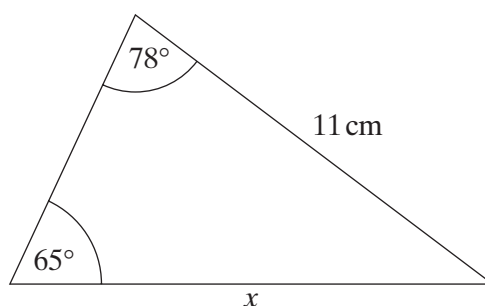
Call this triangle  $C$ .



Describe the **single** transformation that will map triangle  $C$  to triangle  $A$ .

(Total for Question 18 is 4 marks)

- 19** Work out the length  $x$  in the triangle.

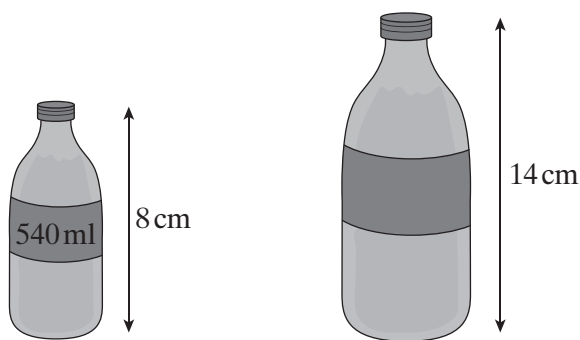


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accurately

$x =$  ..... cm

(Total for Question 19 is 3 marks)

- 20 These two bottles are similar in shape.



Not drawn  
accurately

Work out the volume of the large bottle.

Give your answer to 3 significant figures.

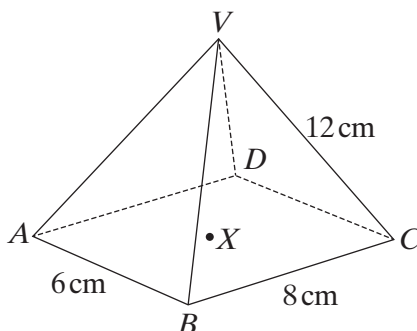
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(Total for Question 20 is 3 marks)

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- 21 A pyramid has a rectangular base  $ABCD$ .

The vertex is directly over the midpoint,  $X$ , of the base.



Calculate the angle between the side  $VC$  and the base  $ABCD$ .

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(Total for Question 21 is 5 marks)

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**22 (a)** Rearrange the equation  $b^3 - 2a + 3 = 0$  to make  $b$  the subject.

.....  
**(1)**

**(b)** One solution of the equation  $x^3 - 2x + 3 = 0$  can be found with the iterative formula

$$x_{n+1} = \sqrt[3]{2x_n - 3}$$

Starting with  $x_0 = 1$ , write down the value of  $x_1$

.....  
**(1)**

**(c)** Continue the iteration to find the solution.

Give your answer to 2 decimal places.

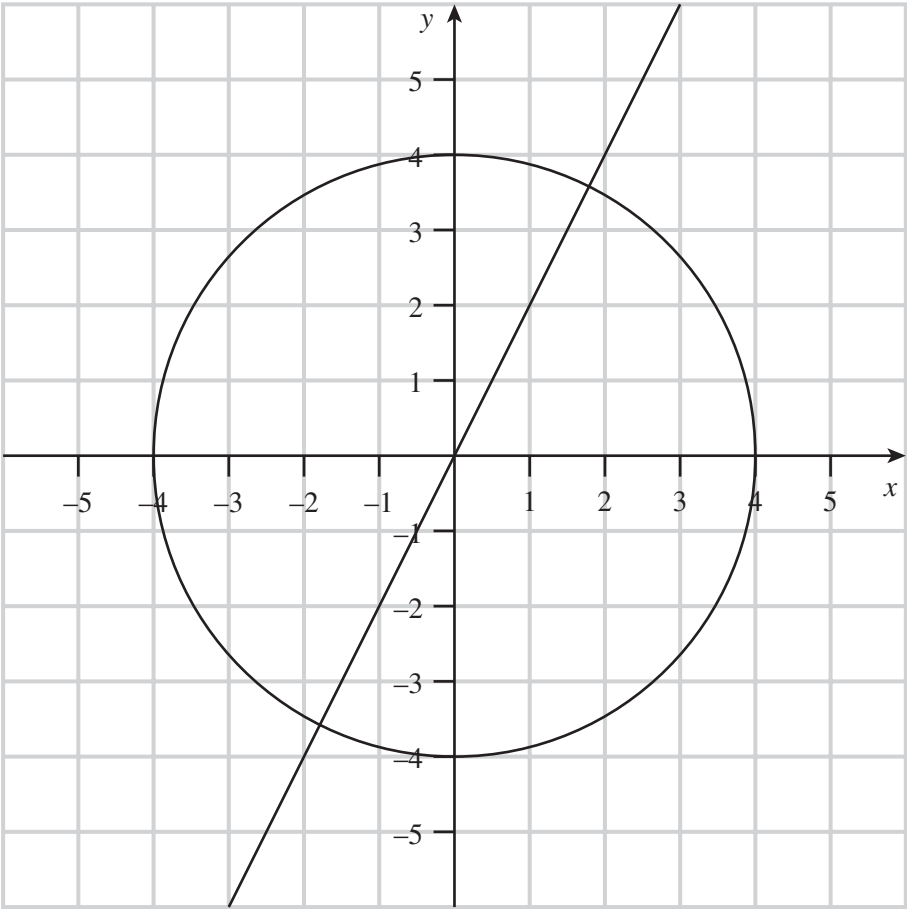
.....  
**(2)**

**(Total for Question 22 is 4 marks)**

**23** A circle and a line are shown on the centimetre grid.

The line intersects the circle at  $A$ .

The circle intersects the  $x$ -axis at  $B$ .



**(a)** Write down the equation of the circle.

.....  
**(1)**

**(b)** Work out the length of the minor arc  $AB$ .

.....  
**(3)**

**(Total for Question 23 is 4 marks)**

**24** There are  $x$  beads in a jar.

The probability of taking a red bead from the jar at random is  $\frac{4}{9}$

7 more red beads are added to the jar.

The probability of taking a red bead from the jar at random is now  $\frac{1}{2}$

Use algebra to work out the value of  $x$ .

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**(Total for Question 24 is 5 marks)**

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**25** Two functions are  $f(x) = 3x - 1$  and  $g(x) = x^2 + 2$

**(a)** Work out  $f^{-1}(x)$

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**(2)**

**(b)** Work out  $fg(x)$

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**(2)**

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**(Total for Question 25 is 4 marks)**

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**26** Solve the simultaneous equations

$$y = x + 3$$

$$x^2 + y^2 = x + 12$$

**(Total for Question 26 is 5 marks)**

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**TOTAL FOR PAPER IS 80 MARKS**