# GCSE

**wjec cbac**

3300U30-1

A17-3300U30-1

## MATHEMATICS
### UNIT 1: NON-CALCULATOR
### INTERMEDIATE TIER

FRIDAY, 10 NOVEMBER 2017 – MORNING

1 hour 45 minutes

## ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.
A ruler, protractor and a pair of compasses may be required.

## INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet. Question numbers must be given for all work written on the continuation page.

Take π as 3·14.

## INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

In question **3***(a)*, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

| For Examiner's use only | | |
|---|---|---|
| Question | Maximum Mark | Mark Awarded |
| 1. | 7 | |
| 2. | 3 | |
| 3. | 7 | |
| 4. | 3 | |
| 5. | 6 | |
| 6. | 9 | |
| 7. | 5 | |
| 8. | 3 | |
| 9. | 5 | |
| 10. | 4 | |
| 11. | 5 | |
| 12. | 3 | |
| 13. | 4 | |
| 14. | 5 | |
| 15. | 3 | |
| 16. | 4 | |
| 17. | 4 | |
| Total | 80 | |

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1. Calculate each of the following.

   (a) $3^4 \times 10^3$ [2]

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   (b) $\dfrac{1}{0{\cdot}5}$ [1]

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   (c) $5{\cdot}6 - 3{\cdot}82$ [1]

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   (d) $\dfrac{5}{6} - \dfrac{2}{3}$ [2]

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   (e) $0{\cdot}2 \times 0{\cdot}3$ [1]

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(3300U30-1) **Turn over.**

**2.** Circle either TRUE or FALSE for each of the following statements. [3]

| | | |
|---|---|---|
| The expression $g \times g \times g$ can be written as $3g$ | TRUE | FALSE |
| The expression $7y - y$ can be written as $7$ | TRUE | FALSE |
| $\dfrac{a}{4} \div a = \dfrac{1}{4}$ | TRUE | FALSE |
| $\dfrac{a}{2} + \dfrac{a}{2} = a$ | TRUE | FALSE |
| When $a = 1$, $b = 2$ and $c = 3$, $a + b + c = abc$ | TRUE | FALSE |

*Space for working:*

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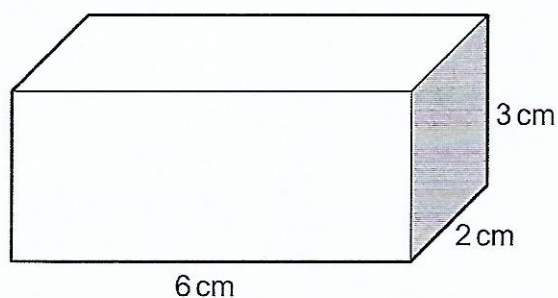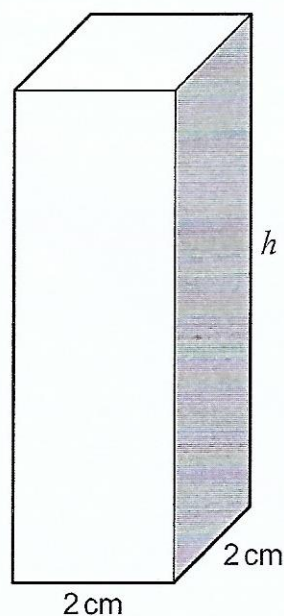
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**3.** *(a)* *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

The two cuboids shown below have equal volumes.



3 cm
2 cm
6 cm
**Cuboid A**

*h*
2 cm
2 cm
**Cuboid B**

*Diagrams not drawn to scale*

Calculate the height *h* of Cuboid B.
You must show all your working.                    [4 + 2 OCW]

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*(b)* How many cubic centimetres (cm³) are there in 2·5 litres?          [1]

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2·5 litres = ................................. cm³

(3300U30-1)          **Turn over.**

**4.** A fraction is written as $\frac{a}{b}$ .

- The fraction is a multiple of 0·2.

- The fraction is greater than $\frac{1}{2}$ .

- The fraction is less than 75%.

Write down the fraction as $\frac{a}{b}$, where $a$ and $b$ are whole numbers. [3]

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Answer = ...................................

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**5.** (a) Write down the next two numbers in the following sequence. [2]

22    21    18    13    ............    ............

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(b) Expand $5(3x - 2)$. [1]

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(c) Solve $9x + 3 = 4x + 5$. [3]

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**6.** Sara is in charge of a game at her school's Christmas party.

Two fair spinners are spun as shown in the example below.
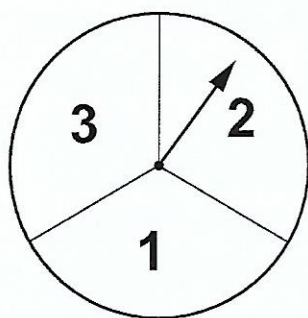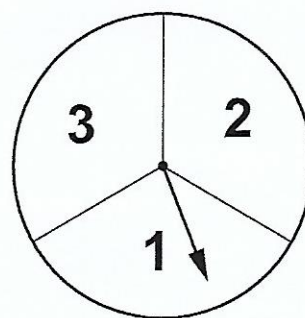


1st Spinner                2nd Spinner

People can make a two-digit number using the numbers shown on the spinners using the following rule:

> Multiply the number on the first spinner by 10 and then add the number on the second spinner.

One example, as shown above, makes the number 21, because $2 \times 10 + 1 = 21$.

(a) How many different numbers can be made playing this game? [1]

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(b) Write down all the prime numbers that can be made playing this game. [2]

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(c) What is the probability that a person makes a prime number when playing the game once? [2]

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*(d)*  Sara charges each person £1 to play the game once.
Each player who makes a prime number from their spins wins £2.
How much profit would the school expect to make when 180 people play the game?  [4]

**Turn over.**

7. *ABCD* is a quadrilateral.
$A\hat{B}C = 93°$, $B\hat{C}D = 122°$ and $A\hat{D}C = 85°$.
Points *P* and *Q* lie on the quadrilateral as shown, such that *AP = AQ*.

Prove that triangle *APQ* is an equilateral triangle.
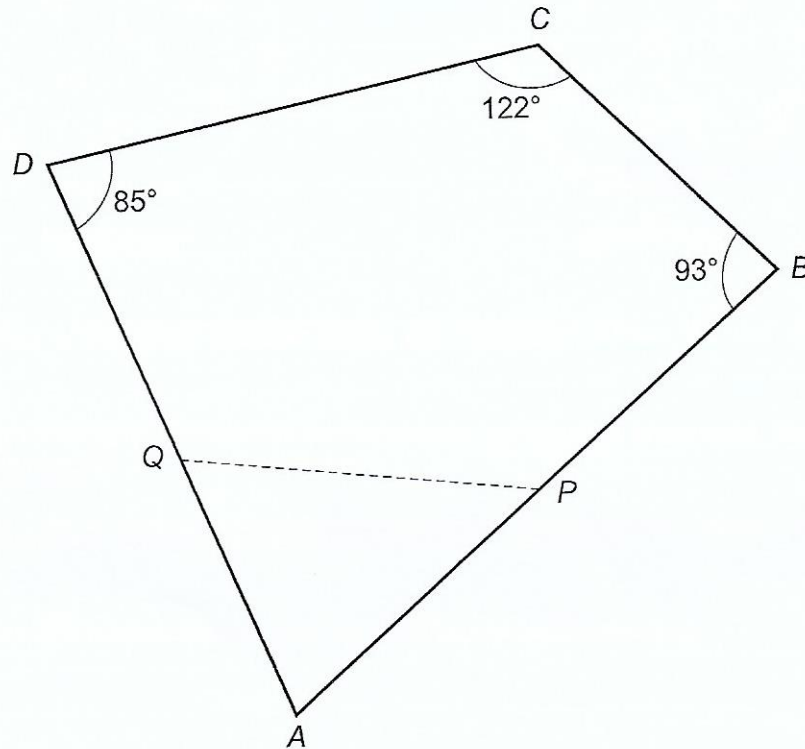You must show all your working.

[5]

C

122°

D

85°

93° B

Q

P

A

*Diagram not drawn to scale*

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8.  Look at the following descriptions of special quadrilateral shapes.
    Circle the correct name for each one.

    (a)  Its diagonals intersect at 90°.
         Only one diagonal is a line of symmetry.                          [1]

         Kite          Rhombus          Square          Trapezium          Rectangle

    (b)  Only one pair of sides are parallel.                              [1]

         Kite          Rhombus          Square          Trapezium          Rectangle

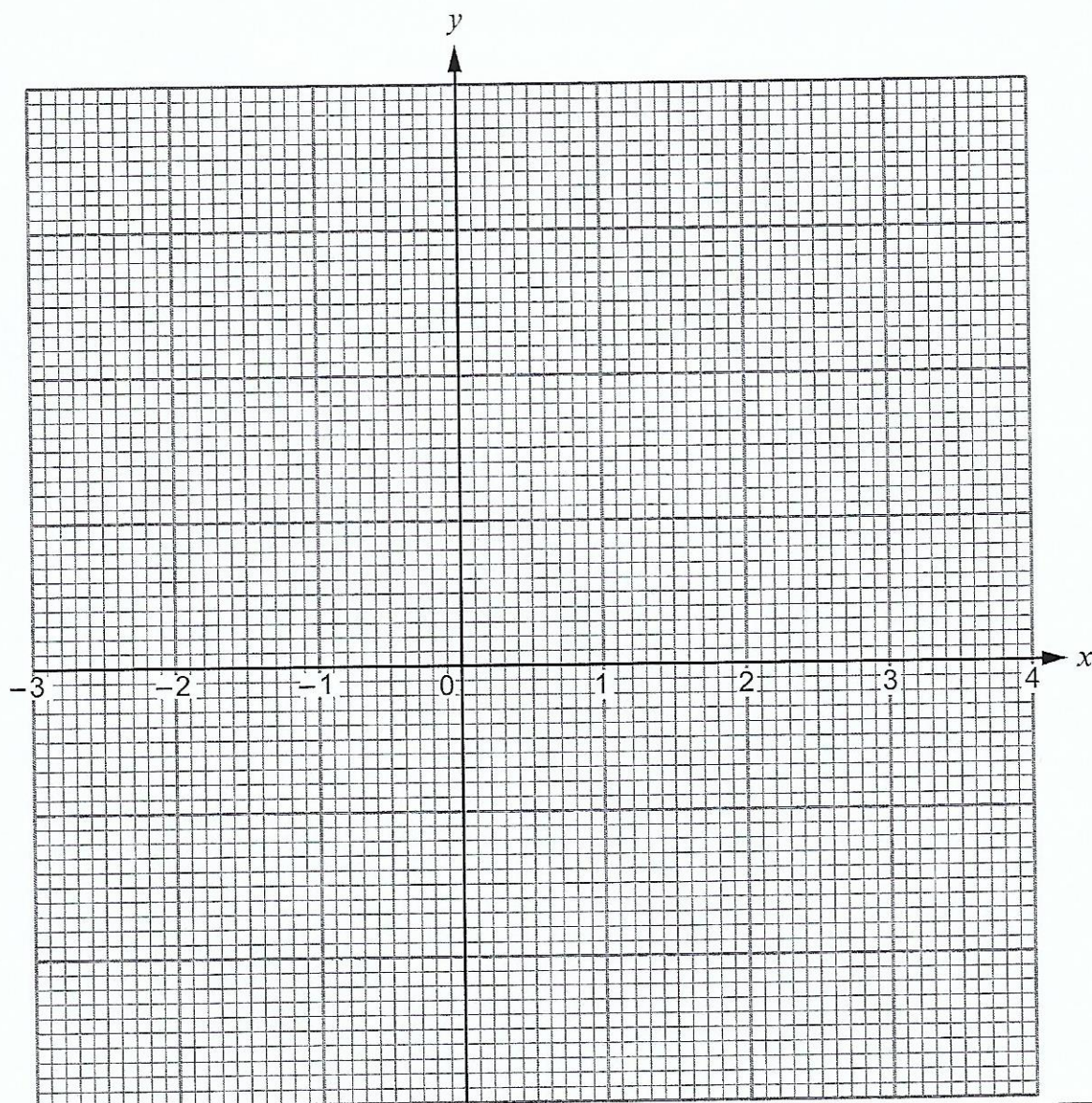    (c)  All four sides are equal.
         Its diagonals are not equal in length.                           [1]

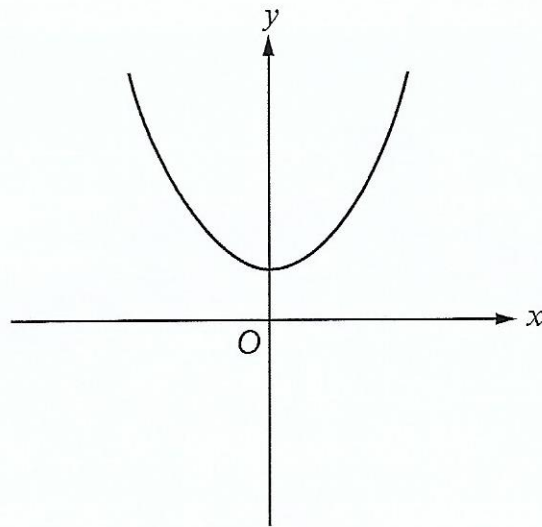         Kite          Rhombus          Square          Trapezium          Rectangle

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**9.** *(a)* Complete the table below.
Draw the graph of $y = 2x^2 - 5$ for values of $x$ between $-2$ and $3$.
Use the graph paper below.
Choose a suitable scale for the $y$-axis.

[4]

| $x$ | $-2$ | $-1$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y = 2x^2 - 5$ | 3 | | $-5$ | $-3$ | 3 | 13 |

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*(b)*



The sketch above can represent only one of the equations given below. Circle this equation. [1]

$$y = x^2 \qquad y = x^2 - 3 \qquad y = -x^2 \qquad y = x^2 + 3 \qquad y = 3x$$

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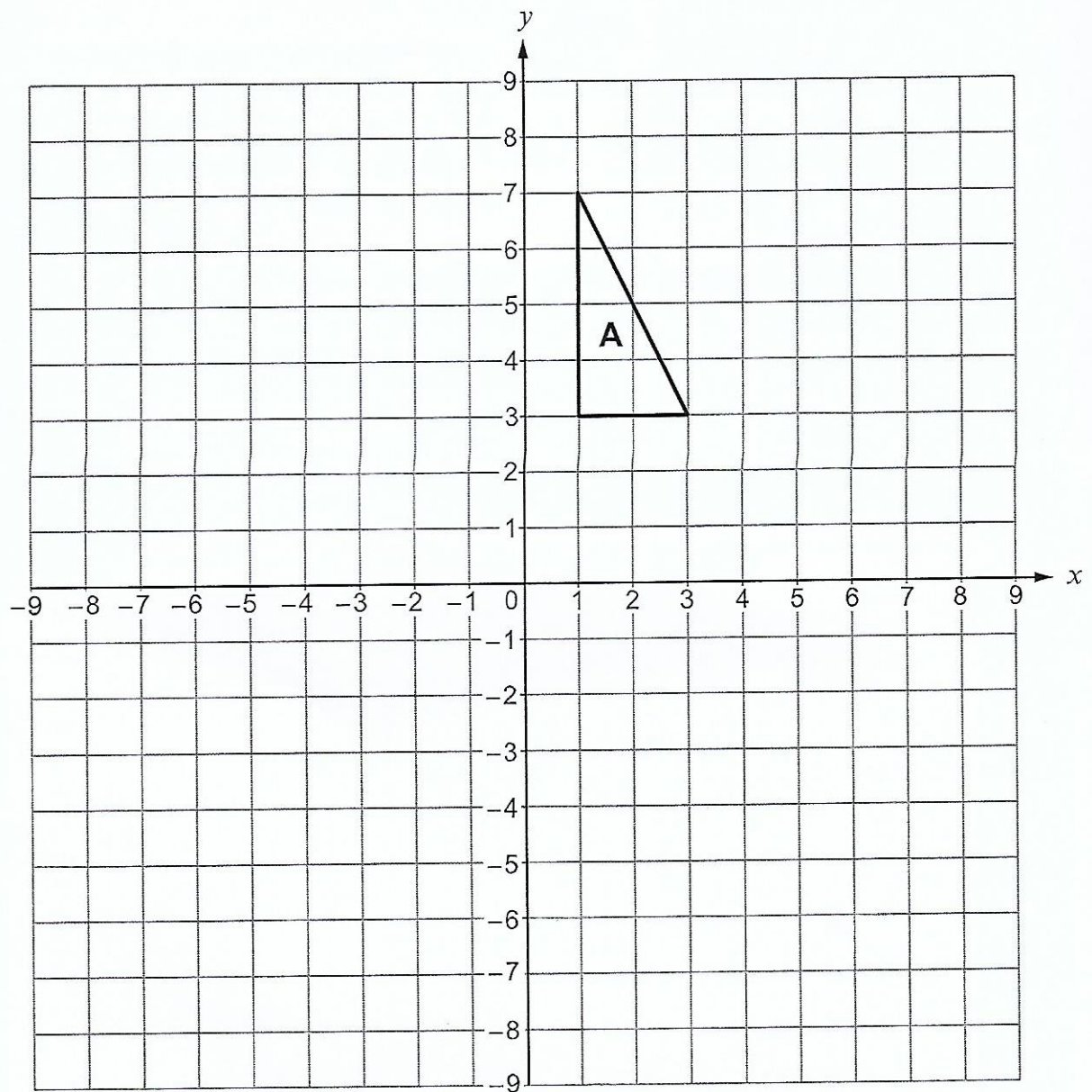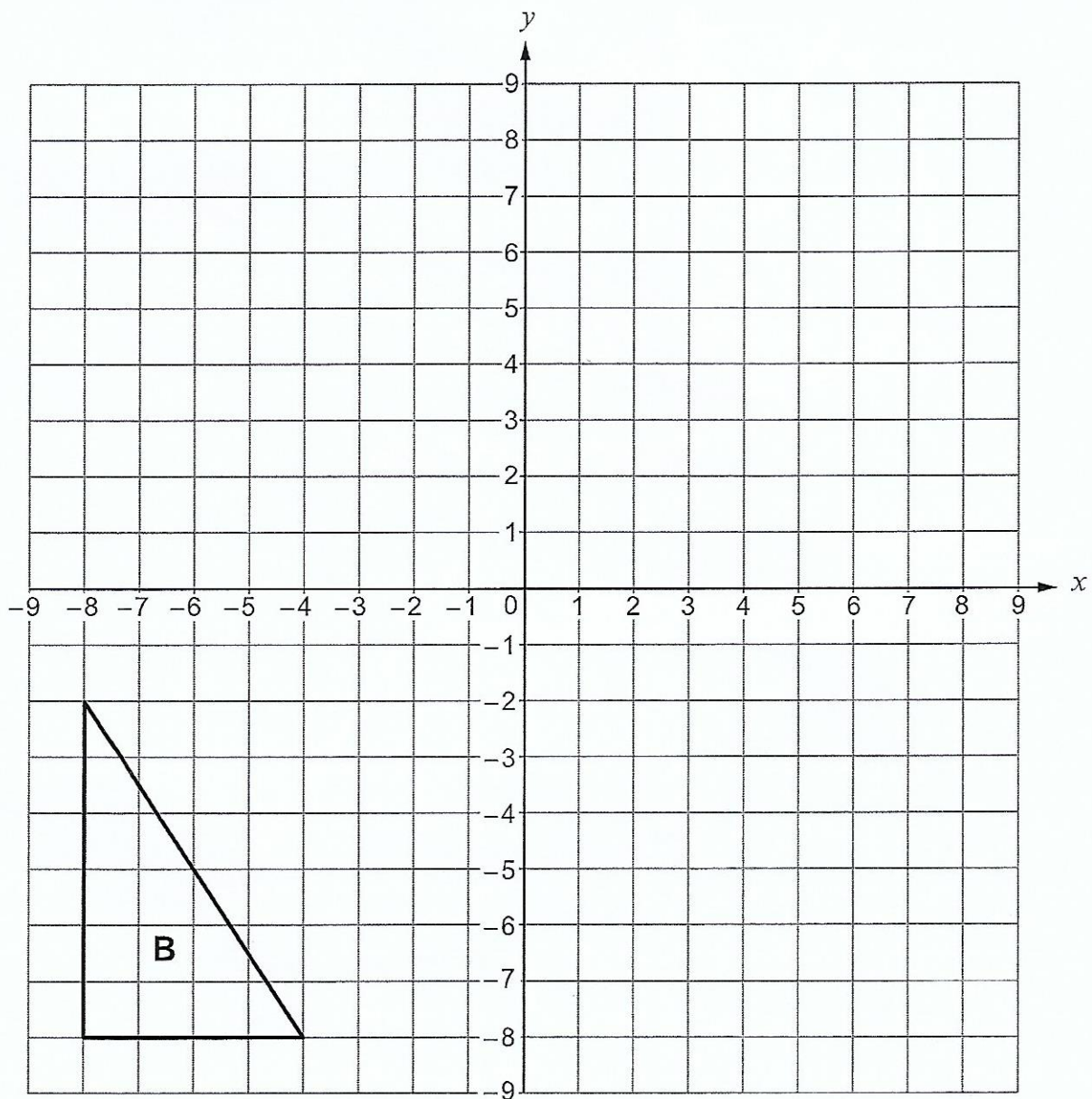**10.** *(a)*    Rotate triangle A through 90° anticlockwise, about the point (–2, 3).    [2]

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(b)    Enlarge triangle B by a scale factor of $\frac{1}{2}$, using (0, 0) as the centre of enlargement.    [2]

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**11.** *PQ* and *PR* are tangents to a circle with centre *O*.
$R\hat{P}Q = 30°$.



*Diagram not drawn to scale*

Find the size of $O\hat{Q}R$.

You must indicate any angles you calculate.
You must give a reason for each stage of your working.

[5]

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$$O\hat{Q}R = \text{..............................} °$$

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**12.** Using only a ruler and a pair of compasses, construct a perpendicular line from the point *P* to the line *AB*. [3]

*B*

*P* •

*A*

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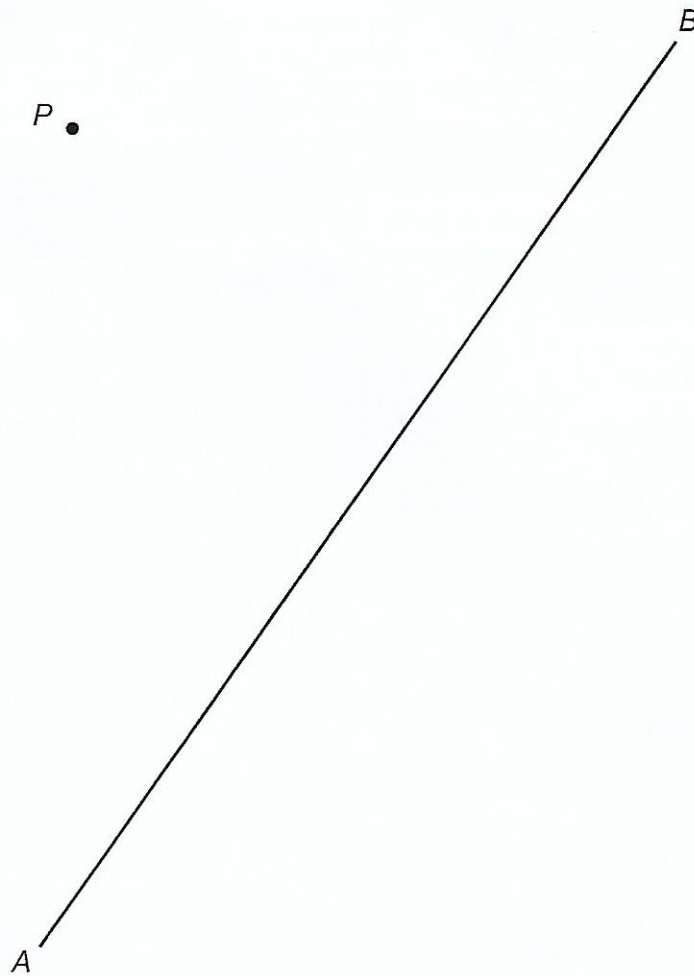
**13.** *(a)* Express 0·000 42 in standard form. [1]

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*(b)* Calculate the value of $\dfrac{7 \cdot 2 \times 10^6}{2 \times 10^{-2}}$.

Give your answer in standard form. [1]

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*(c)* Calculate the value of $(4 \cdot 7 \times 10^5) - (6 \cdot 2 \times 10^4)$.
Give your answer in standard form. [2]

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**14.** A group of pupils from a school took part in The Urdd National Eisteddfod.
**All** of them competed in at least one of the following competitions: *Singing*, *Dancing* or *Reciting*.

- 2 of them only took part in a *Dancing* competition.
- 5 only took part in a *Reciting* competition.
- No one took part in both a *Reciting* and a *Dancing* competition.
- 3 took part in both a *Singing* and a *Dancing* competition.
- 9 took part in a *Reciting* competition.
- 22 took part in a *Singing* competition.

The Venn diagram below shows some of the above information.
The universal set, Ɛ, contains all of the pupils in the group.

One of the pupils in the group is chosen at random.
What is the probability that this person **only** took part in a *Singing* competition? [5]

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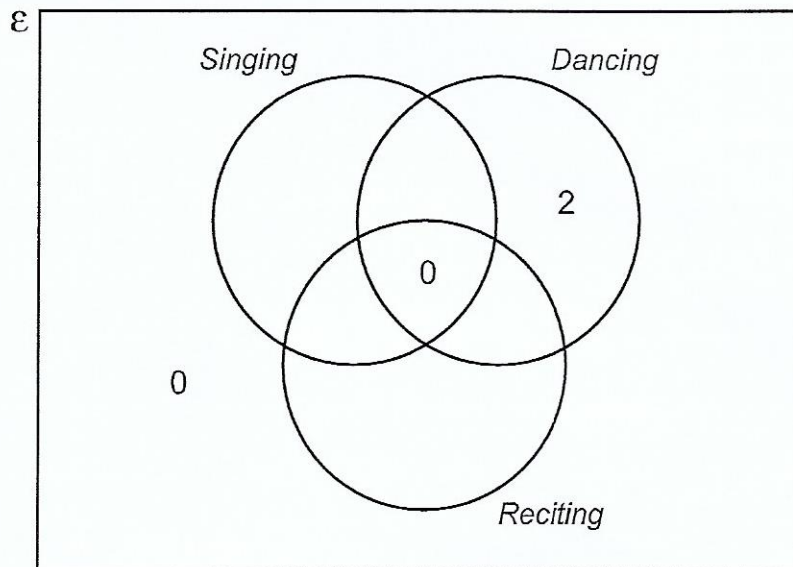
**15.** Factorise $x^2 - 7x - 18$, and hence solve $x^2 - 7x - 18 = 0$. [3]

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**16.** Solve the following simultaneous equations using an algebraic (not graphical) method. [4]

$$4x - 3y = 2$$
$$6x - 5y = 1$$

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**Turn over.**

**17.** A cylinder just fits inside a hollow cube with sides of length $m$ cm.
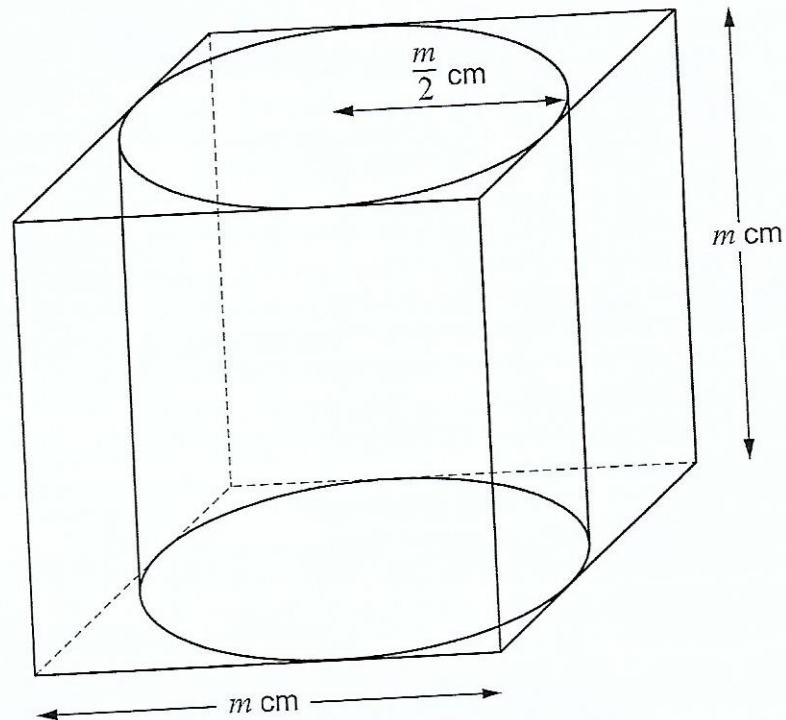


*Diagram not drawn to scale*

The radius of the cylinder is $\frac{m}{2}$ cm.

The height of the cylinder is $m$ cm.

The ratio of the volume of the cube to the volume of the cylinder is given by

volume of cube : volume of cylinder

$$= k : \pi,$$

where $k$ is a number.

Find the value of $k$.
You must show all your working.

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**END OF PAPER**

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