



# Cambridge IGCSE™

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NAME

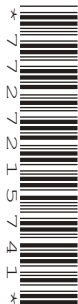
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**MATHEMATICS**

**0580/33**

Paper 3 (Core)

**May/June 2022**

**2 hours**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

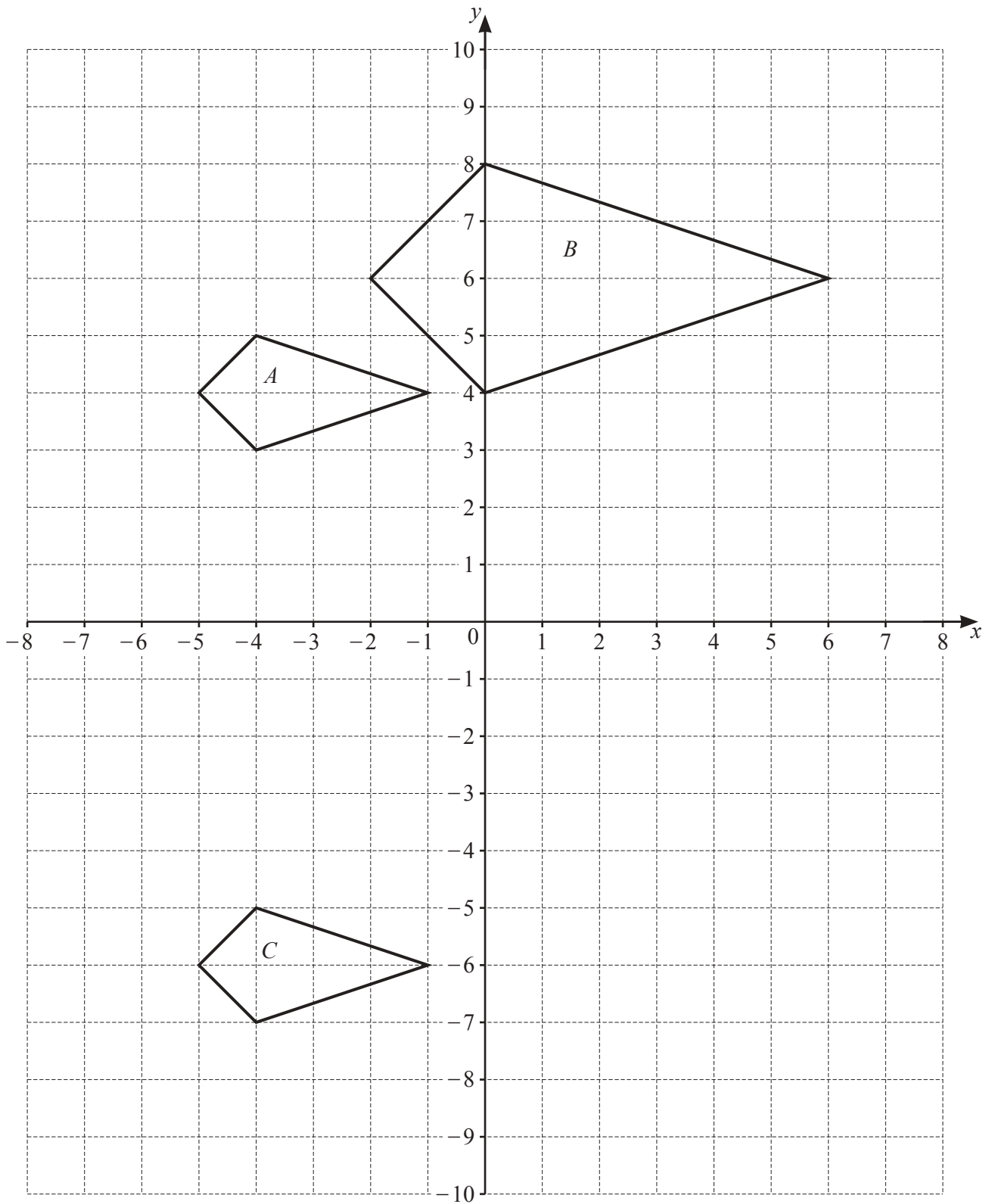
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

- 1 The diagram shows three quadrilaterals on a  $1 \text{ cm}^2$  grid.



(a) Write down the mathematical name of quadrilateral  $A$ .

..... [1]

(b) Find the area of quadrilateral  $A$ .

.....  $\text{cm}^2$  [1]

(c) Describe fully the **single** transformation that maps quadrilateral  $A$  onto

(i) quadrilateral  $B$ ,

.....  
 ..... [3]

(ii) quadrilateral  $C$ .

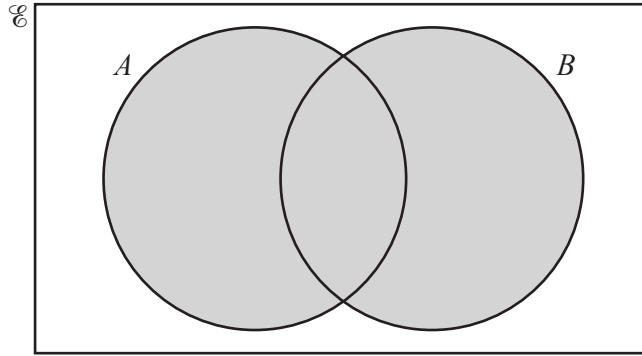
.....  
 ..... [2]

(d) On the grid, draw the image of

(i) quadrilateral  $C$  after a  $90^\circ$  anticlockwise rotation about the origin, [2]

(ii) quadrilateral  $C$  after a reflection in the line  $x = 1$ . [2]

2 (a)



Use set notation to describe the shaded region.

..... [1]

(b)  $\mathcal{E} = \{x : x \text{ is a natural number } \leq 16\}$

(i) Write down all the square numbers in the universal set,  $\mathcal{E}$ .

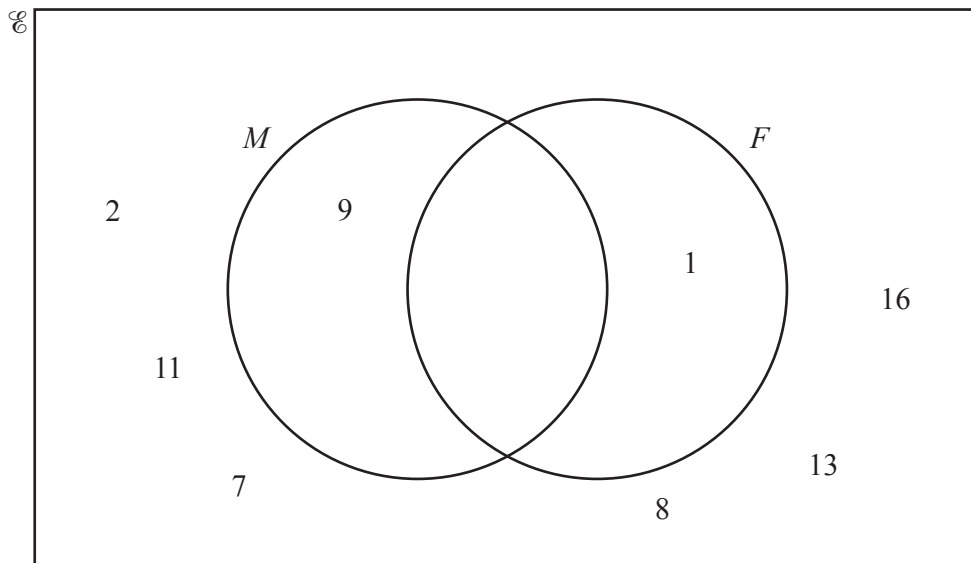
..... [2]

(ii) Write down the six prime numbers in the universal set,  $\mathcal{E}$ .

....., ....., ....., ....., ....., ..... [2]

(iii)  $M = \{x : x \text{ is a multiple of } 3\}$   
 $F = \{x : x \text{ is a factor of } 15\}$

(a) Complete the Venn diagram to show the elements of these sets.



[2]

(b) Write down all the odd numbers that are not in set  $M$  and not in set  $F$ .

..... [1]

(c) Find  $n(M \cap F)$ .

..... [1]

(d) A number is chosen at random from the universal set,  $\mathcal{U}$ .

Find the probability that this number is in set  $F$ .

..... [1]

3 Mr Zhang, his wife and three children go on a holiday from Shanghai to Auckland.

- (a) The flight for an adult costs \$630.  
The cost for a child is  $\frac{5}{8}$  of the adult cost.

Show that the total cost of the flight for the family is \$2441, correct to the nearest dollar.

[3]

- (b) The plane leaves Shanghai at 2005 local time on 13th November.  
The plane stops for 2 hours 30 minutes in Sydney.  
The plane lands in Auckland at 1725 local time on 14th November.  
The local time in Auckland is 5 hours ahead of the local time in Shanghai.

- (i) Work out how long the plane is flying, in hours and minutes.

..... h ..... min [3]

- (ii) Write your answer to **part (b)(i)** in hours, correct to 3 decimal places.

..... h [1]

- (iii) The flight distance from Shanghai to Sydney is 7882 km.  
The flight distance from Sydney to Auckland is 2156 km.

Find the total distance the plane flies.

..... km [1]

- (iv) Calculate the average speed of the plane when it is flying.

..... km/h [2]

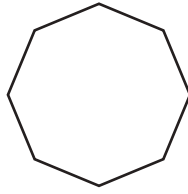
- (c) The holiday expenses are in the ratio

hotel : car hire : food = 8 : 5 : 6.

The cost of the hotel is \$2400.

Show that the total of the holiday expenses is \$5700.

[2]



The diagram shows a regular polygon.

(a) (i) Write down the mathematical name of this polygon.

..... [1]

(ii) Show that the interior angle of this polygon is  $135^\circ$ .

[2]

(b) A sequence of diagrams is made by joining these polygons.

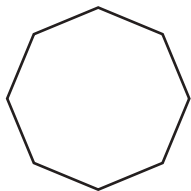


Diagram 1

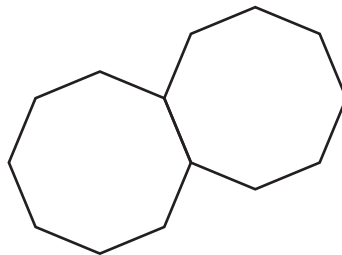


Diagram 2

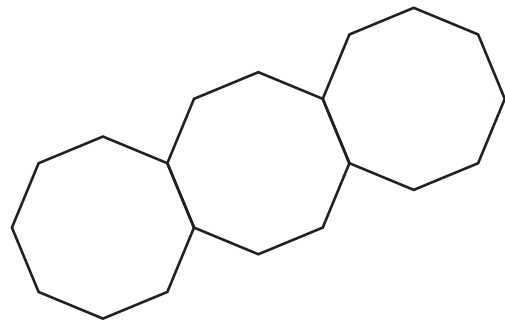


Diagram 3

(i) Complete the table.

|                 |   |    |   |   |   |
|-----------------|---|----|---|---|---|
| Diagram number  | 1 | 2  | 3 | 4 | 5 |
| Number of lines | 8 | 15 |   |   |   |

[3]

(ii) Write down the term to term rule for the number of lines in the sequence.

..... [1]



(iii) Work out the number of lines in Diagram 9.

..... [1]

(iv) Find an expression, in terms of  $n$ , for the number of lines in Diagram  $n$ .

..... [2]

(v) Diagram  $k$  has 113 lines.

Find the value of  $k$ .

$k =$  ..... [2]

- 5 (a) Work out the number of days in seven weeks.

..... days [1]

- (b) The summit of Mount Everest is 8848 metres above sea level.  
Ayding Lake is 154 metres below sea level.

Work out the difference in height between these places.

..... m [1]

- (c) Find two integers that have a sum of  $-12$  and a product of  $32$ .

..... and ..... [1]

- (d) Write  $\frac{3}{8}$  as

(i) a decimal,

..... [1]

(ii) a percentage.

.....% [1]

- (e) Write down the reciprocal of  $\frac{1}{9}$ .

..... [1]

- (f) Find the value of

(i)  $4^5$ ,

..... [1]

(ii)  $\sqrt[3]{512}$ .

..... [1]

(g) (i) Write 587 000 in standard form.

..... [1]

(ii) Calculate  $4.9 \times 10^{-3} + 8.1 \times 10^{-4}$ .  
Give your answer in standard form.

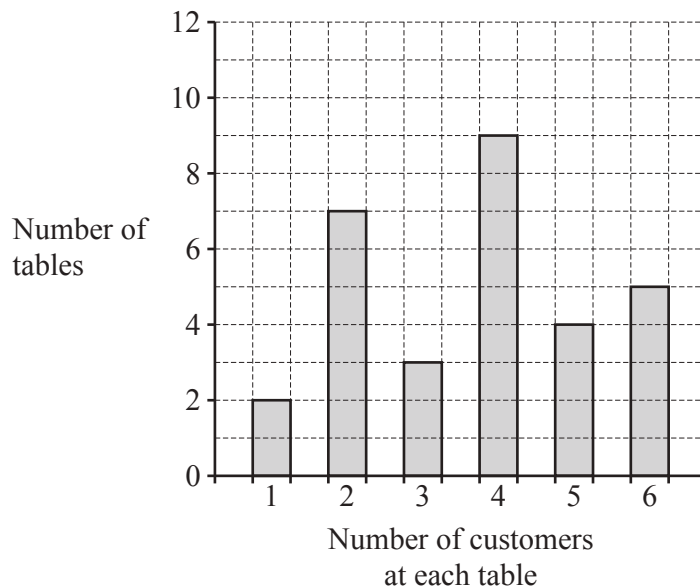
..... [1]

(h) The height,  $h$  metres, of a fence post is 2.43 m, correct to the nearest centimetre.

Complete the statement about the value of  $h$ .

.....  $\leq h <$  ..... [2]

- 6 Maria owns a restaurant with 30 tables. One day she records the number of customers at each table at 7 pm. The bar chart shows the results.



- (a) (i) Write down the mode.

..... [1]

- (ii) Find the range.

..... [1]

- (iii) Calculate the mean.

..... [3]

- (b) On the same day she also recorded the number of customers at each table at 1 pm. The results are shown in the table.

|                                   |   |    |   |   |   |   |
|-----------------------------------|---|----|---|---|---|---|
| Number of customers at each table | 1 | 2  | 3 | 4 | 5 | 6 |
| Number of tables                  | 8 | 13 | 5 | 4 | 0 | 0 |

Write down two comments comparing the results from 7 pm with the results from 1 pm.

1. ....

2. .... [2]

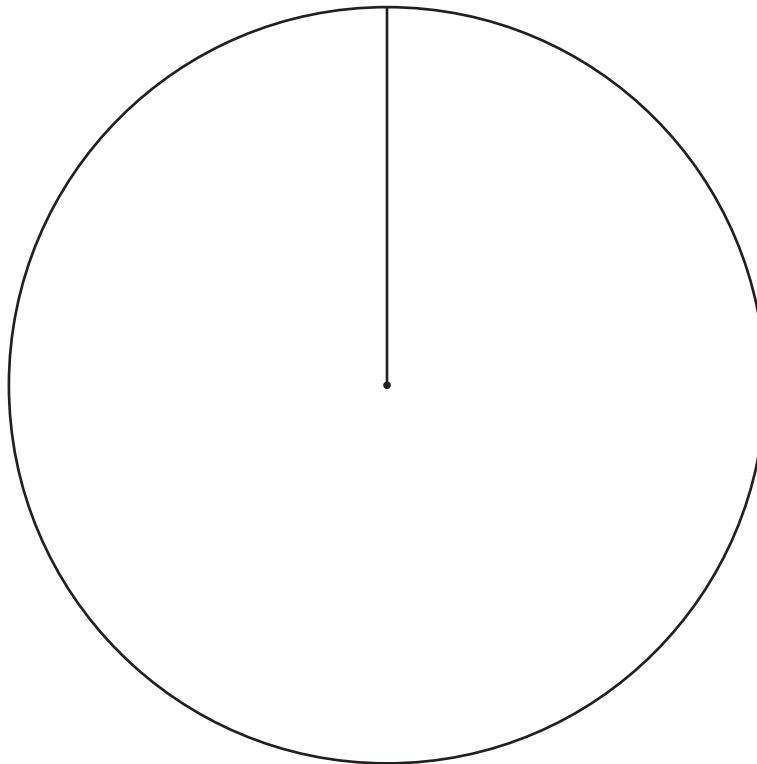
- (c) 270 meals are ordered one day at the restaurant.  
The table shows the number of each type of meal.

| Meal       | Number ordered | Pie chart sector angle |
|------------|----------------|------------------------|
| Meat       | 117            |                        |
| Fish       | 99             |                        |
| Vegetarian | 54             | $72^\circ$             |

- (i) Complete the table.

[2]

- (ii) Complete the pie chart.



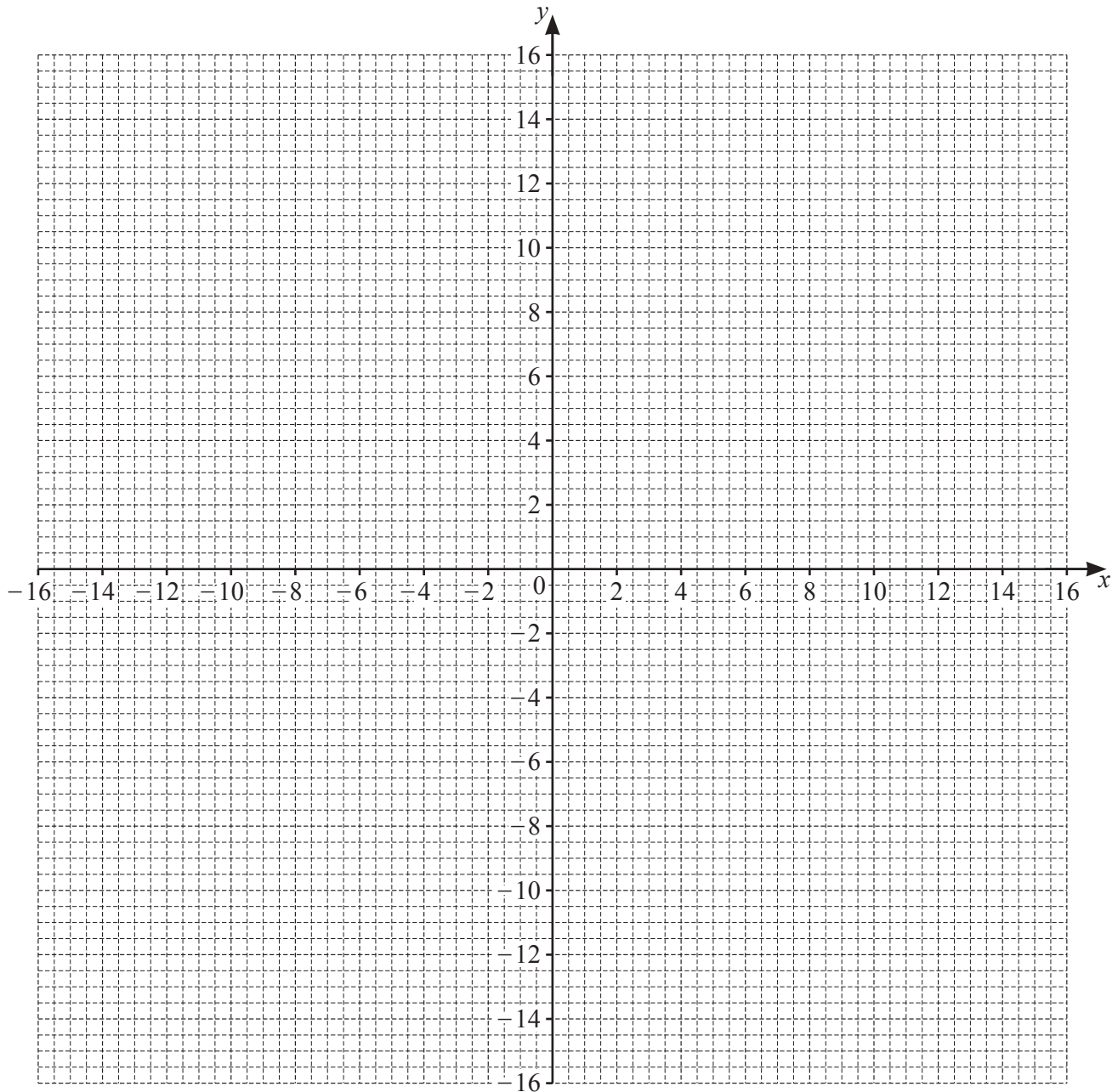
[2]

7 (a) Complete the table of values for  $y = \frac{15}{x}$ ,  $x \neq 0$ .

|     |     |      |    |    |    |     |    |   |   |   |    |    |
|-----|-----|------|----|----|----|-----|----|---|---|---|----|----|
| $x$ | -15 | -10  | -5 | -3 | -2 | -1  | 1  | 2 | 3 | 5 | 10 | 15 |
| $y$ |     | -1.5 |    | -5 |    | -15 | 15 |   | 5 |   |    |    |

[3]

(b) On the grid, draw the graph of  $y = \frac{15}{x}$  for  $-15 \leq x \leq -1$  and  $1 \leq x \leq 15$ .



[4]

(c) Write down the order of rotational symmetry of the graph.

..... [1]

(d) (i) On the grid, draw the lines of symmetry of the graph.

[2]

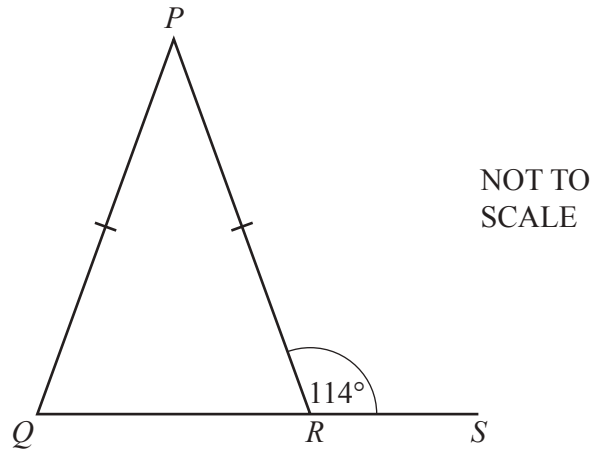
(ii) Write down the equation of the line of symmetry that does **not** intersect the graph.

..... [1]

(e) Use your graph to solve the equation  $\frac{15}{x} = -6$ .

$x =$  ..... [1]

8 (a)



In the diagram,  $PQ = PR$  and  $QRS$  is a straight line.

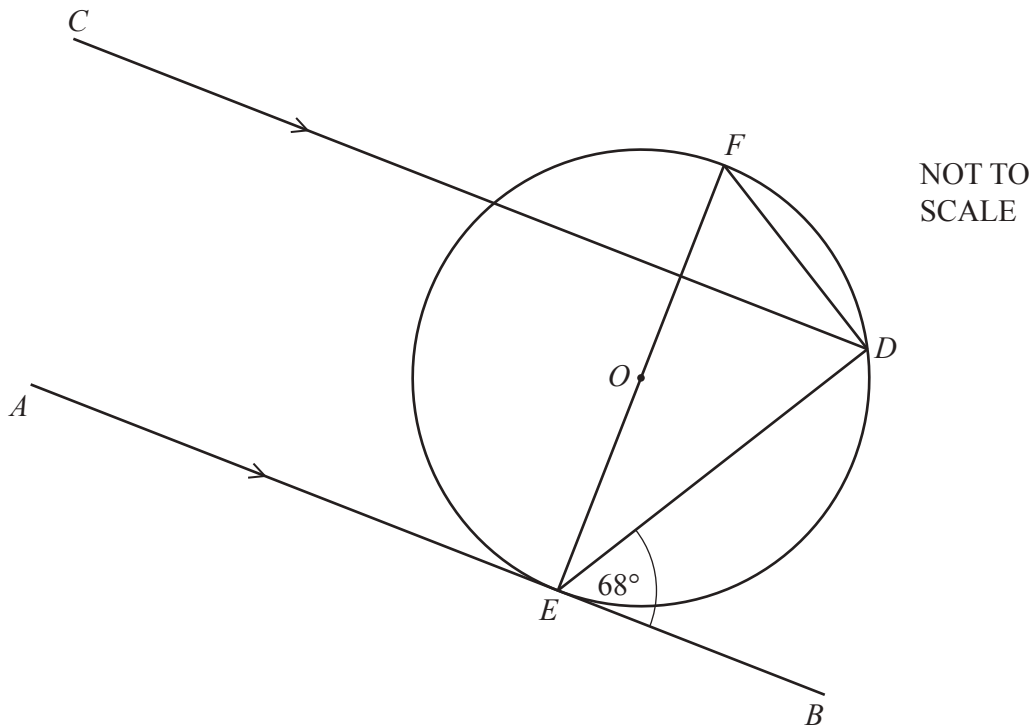
(i) Write down the mathematical name of triangle  $PQR$ .

..... [1]

(ii) Work out angle  $QPR$ .

Angle  $QPR =$  ..... [3]

(b)



In the diagram,  $D$ ,  $E$  and  $F$  are points on a circle, centre  $O$ .  
 $AB$  is a tangent to the circle at  $E$ .  
 Lines  $AB$  and  $CD$  are parallel and angle  $BED = 68^\circ$ .



(i) Find angle  $CDE$  and give a reason for your answer.

Angle  $CDE = \dots\dots\dots$  because  $\dots\dots\dots$   
 $\dots\dots\dots$  [2]

(ii) Find angle  $DEF$  and give a reason for your answer.

Angle  $DEF = \dots\dots\dots$  because  $\dots\dots\dots$   
 $\dots\dots\dots$  [2]

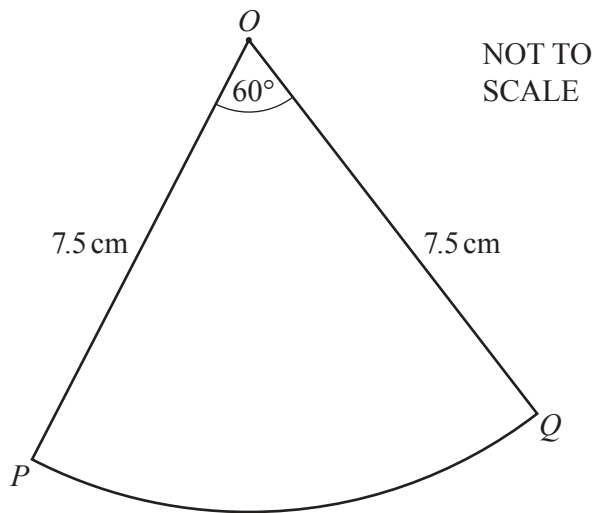
(iii) Work out angle  $EFD$ .

Write down the two further geometrical properties needed to find angle  $EFD$ .

Angle  $EFD = \dots\dots\dots$

1.  $\dots\dots\dots$
2.  $\dots\dots\dots$  [3]

(c)



$POQ$  is a sector of a circle, centre  $O$  and radius 7.5 cm.  
 The sector angle is  $60^\circ$ .

Calculate the length of the arc  $PQ$ .

$PQ = \dots\dots\dots$  cm [2]

9 Ahmed owns a company.

(a) (i) Each year he earns \$56 000 plus 3% of the year's profit.

Calculate the amount he earns in a year when the profit is \$320 600.

\$ ..... [2]

(ii) In the following year the profit is \$347 851.

Calculate the percentage increase in the profit.

..... % [2]

(b) Ahmed employs three people, Budi, Citra and Dian.  
Budi earns \$17 000, Citra earns \$13 600 and Dian earns \$6800.

Find the ratio of their earnings in its simplest form.

Budi : Citra : Dian = ..... : ..... : ..... [2]

- (c) Ahmed buys materials from China costing 7560 yuan.

Work out the cost of the materials in dollars when the exchange rate is  $\$1 = 7.06$  yuan.  
Give your answer correct to the nearest dollar.

\$ ..... [2]

- (d) Ahmed borrows \$8 000 for 3 years at a rate of 5% per year compound interest.

Calculate the amount of interest he will pay at the end of the 3 years.

\$ ..... [3]