Cambridge Assessment International Education

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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 π, use either your calculator value or 3.142.

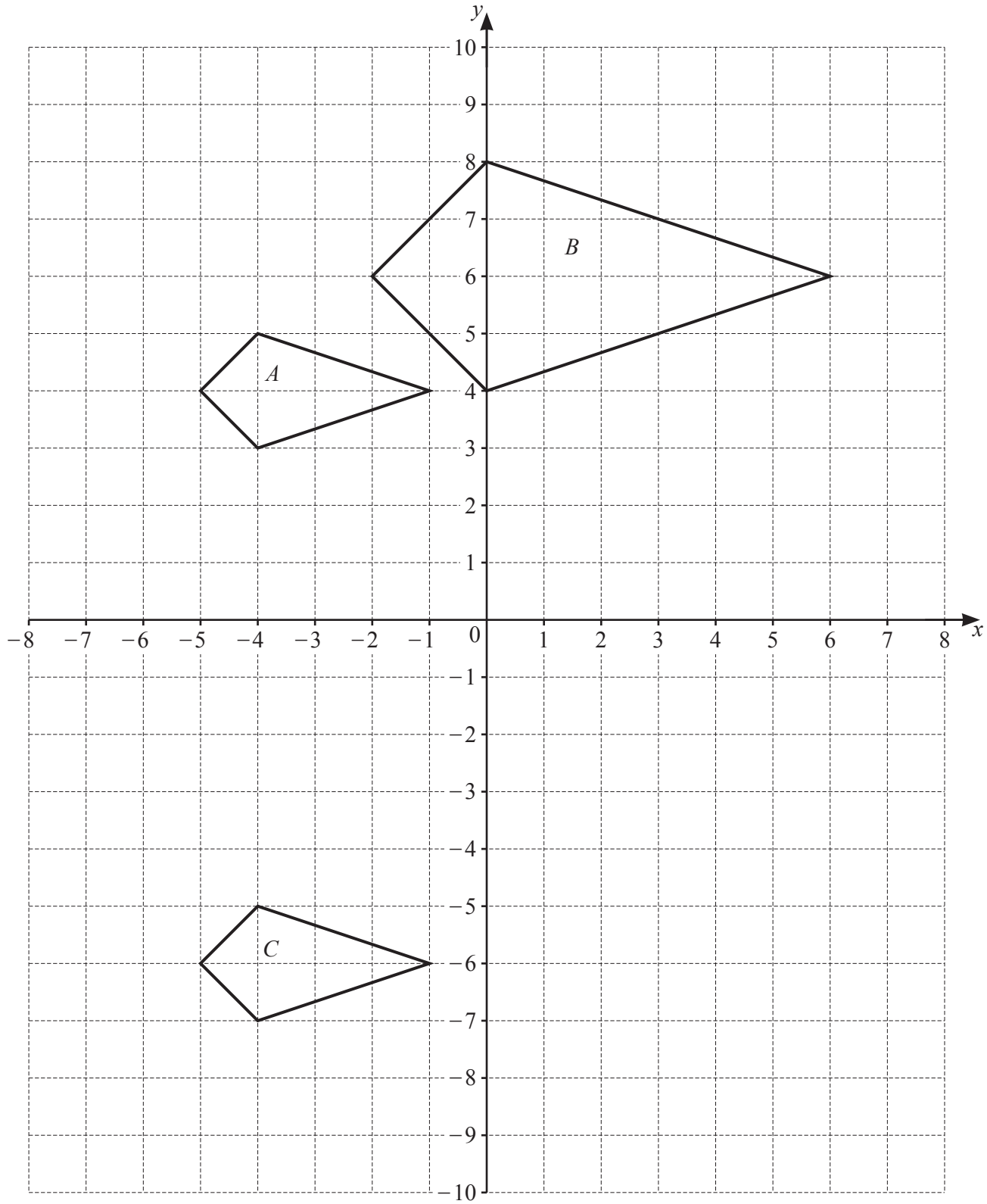
INFORMATION

- 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.

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1 The diagram shows three quadrilaterals on a 1 cm^2 grid.



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

..... [1]

(b) Find the area of quadrilateral A.

..... cm^2 [1]

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

(i) quadrilateral B,

.....

..... [3]

(ii) quadrilateral C.

.....

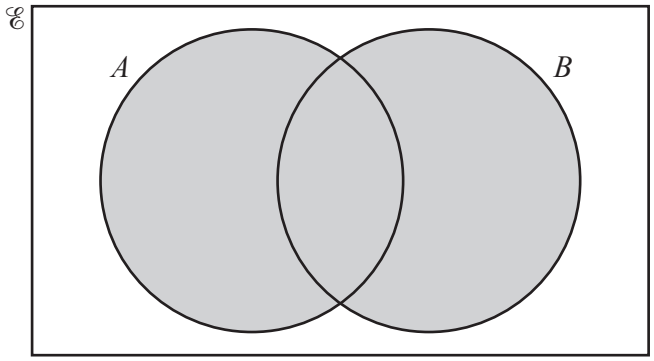
..... [2]

(d) On the grid, draw the image of

(i) quadrilateral C after a 90° 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) $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 16\}$

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

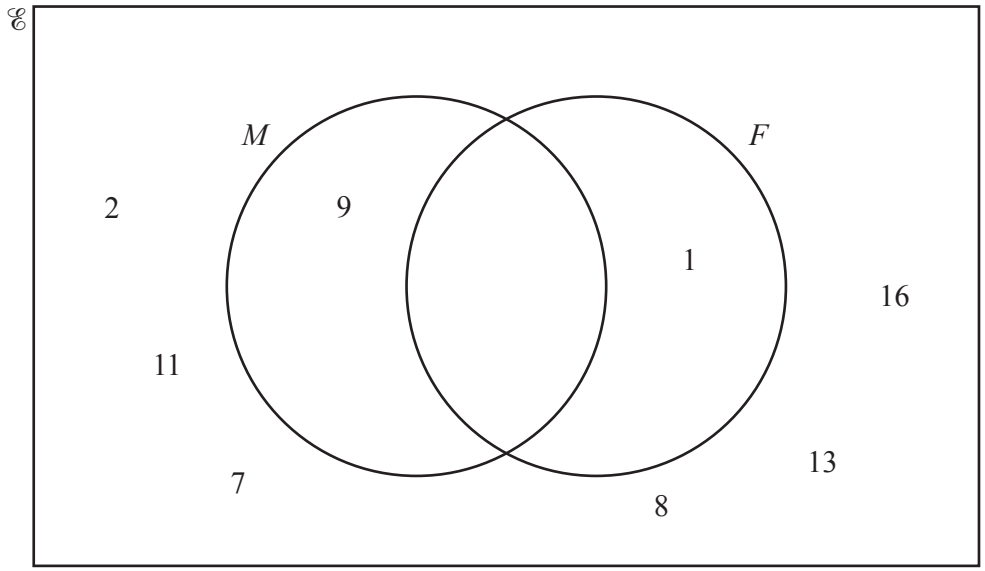
..... [2]

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

....., ..., ..., ..., ..., ... [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, $\mathscr{E}$.

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]

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(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

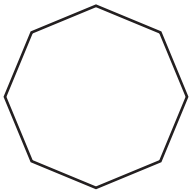
hotel : car hire : food = 8 : 5 : 6.

The cost of the hotel is $2400.

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

[2]

4



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°.

[2]

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

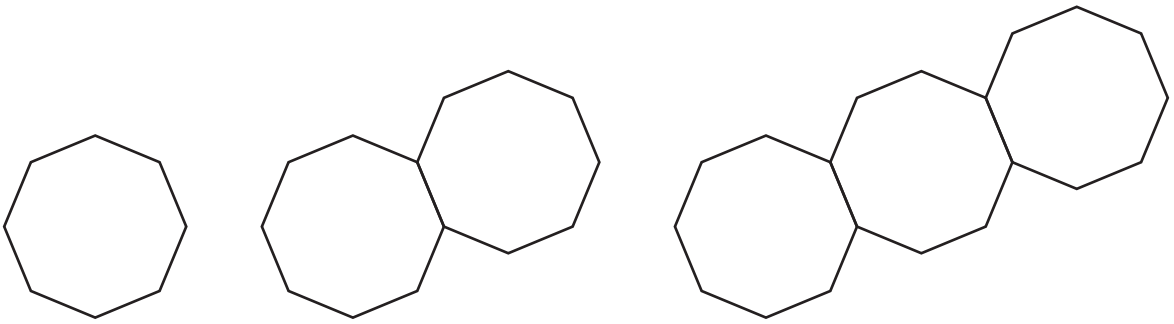


Diagram 1 Diagram 2 Diagram 3

(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.

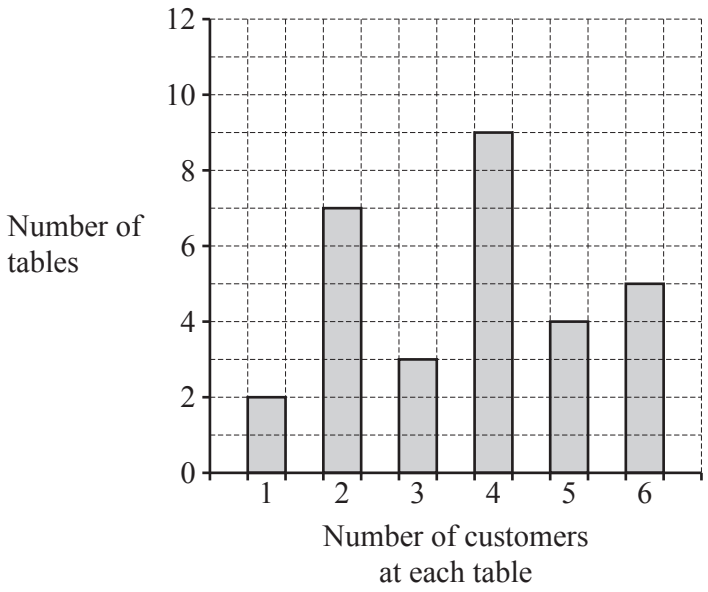
..... [1]

(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.

..... $\leqslant h <$ ..... [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]

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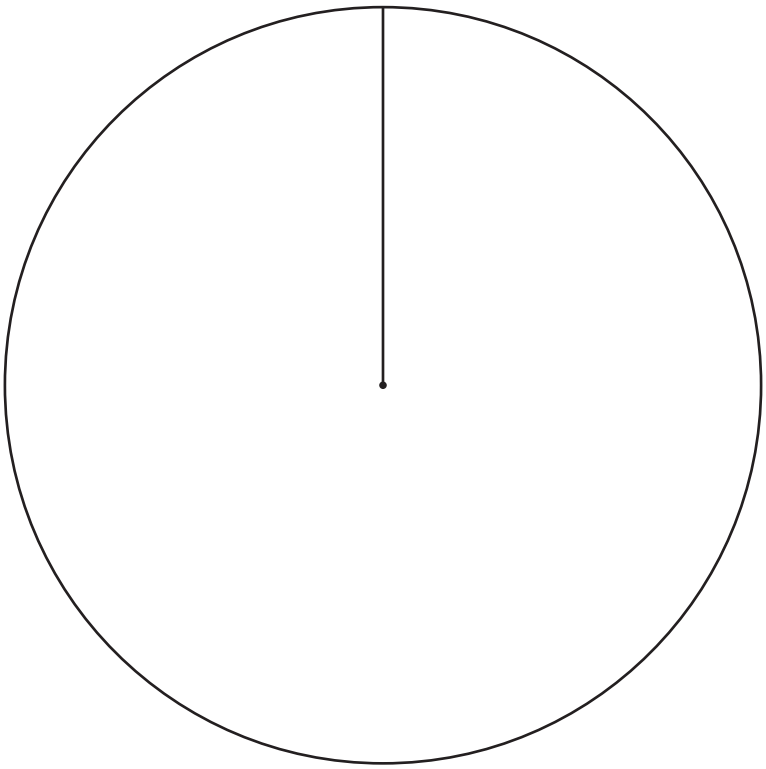
(c) 270 meals are ordered one day at the restaurant.
The table shows the number of each type of meal.

Meal	Number ordered	Pie chart sector angle
Meat	117	
Fish	99	
Vegetarian	54	72°

(i) Complete the table.

[2]

(ii) Complete the pie chart.



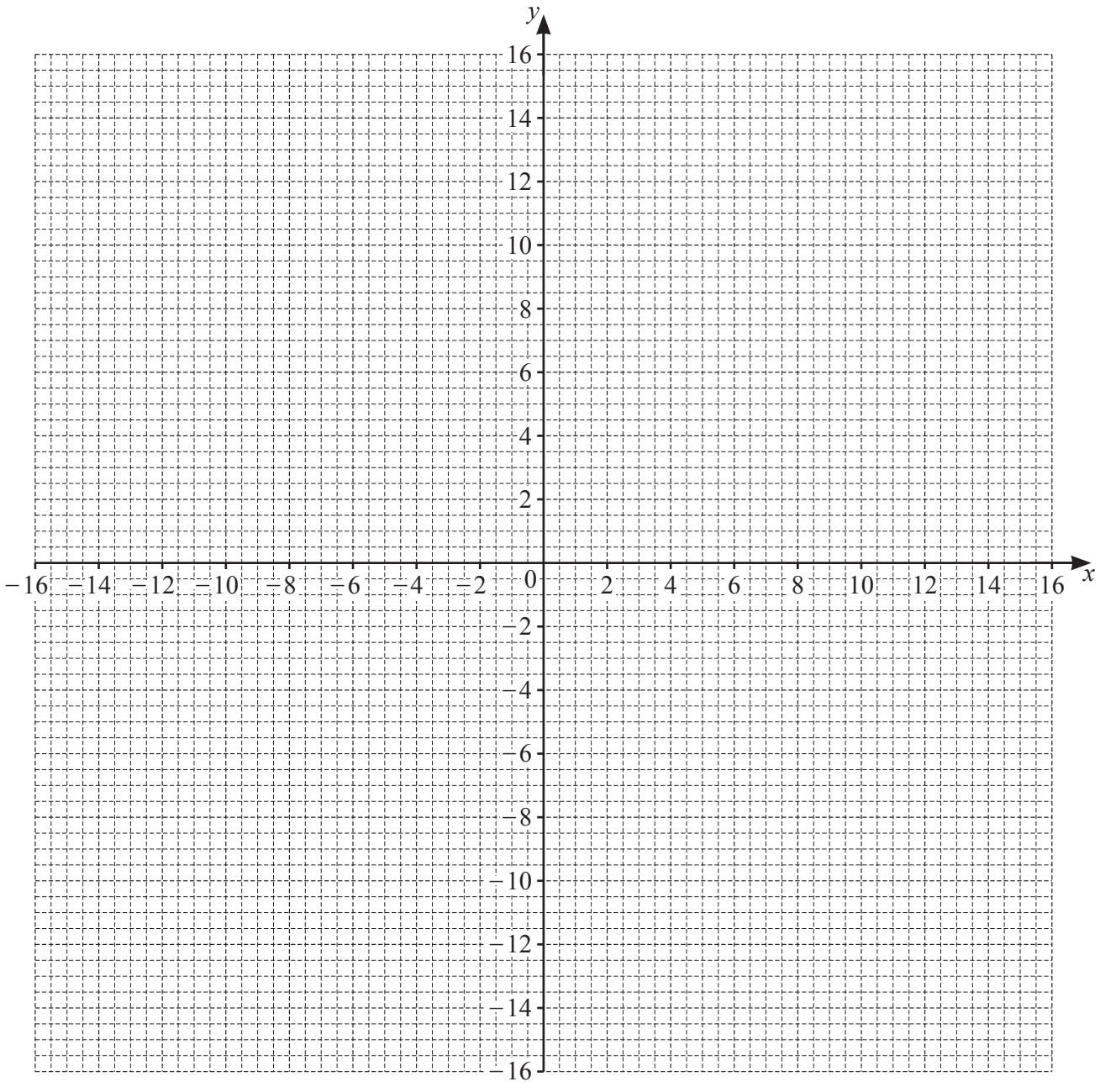
[2]

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 $-15 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 15$.



[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]

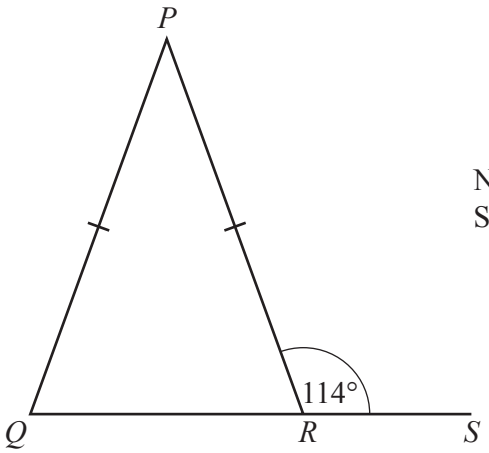
(ii) Write down the equation of the line of symmetry that does **not** intersect the graph.

..... [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.

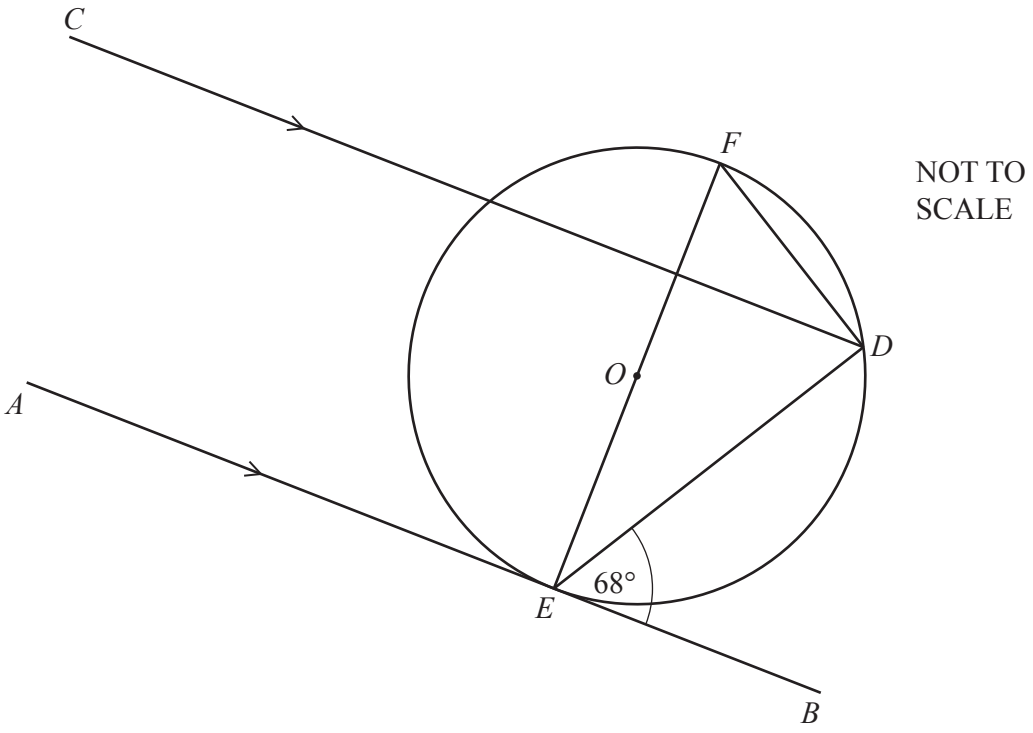
(i) Write down the mathematical name of triangle PQR.

..... [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 $BED = 68°$.

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

Angle *CDE* = ... because .....

..... [2]

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

Angle *DEF* = ... because .....

..... [2]

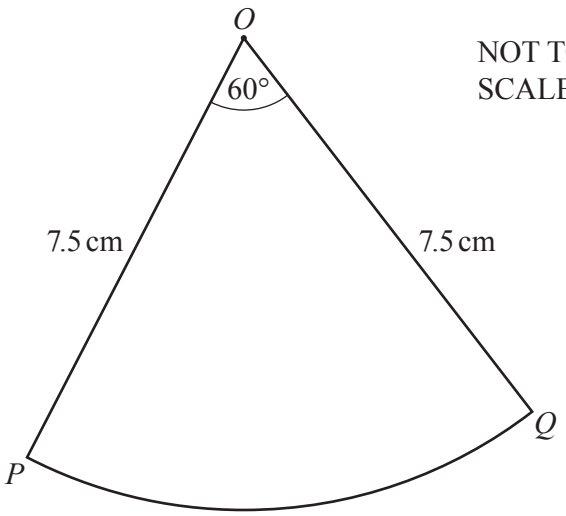
(iii) Work out angle *EFD*.
Write down the two further geometrical properties needed to find angle *EFD*.

Angle *EFD* = ...

1. .....

2. ..... [3]

(c)



POQ is a sector of a circle, centre *O* and radius 7.5 cm.
The sector angle is 60°.

Calculate the length of the arc *PQ*.

PQ = ... 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]

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(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]

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