



1 Mr Chan flies from London to Los Angeles, a distance of 8800 km.  
The flight takes 11 hours and 10 minutes.

- (a) (i) His plane leaves London at 09 35 local time.  
The local time in Los Angeles is 8 hours behind the time in London.

Calculate the local time when the plane arrives in Los Angeles.

..... [2]

- (ii) Work out the average speed of the plane in km/h.

..... km/h [2]

(b) There are three types of tickets, economy, business and first class.  
The price of these tickets is in the ratio economy : business : first class = 2 : 5 : 9.

- (i) The price of a business ticket is \$2350.

Calculate the price of a first class ticket.

\$..... [2]

- (ii) Work out the price of an economy ticket as a percentage of the price of a first class ticket.

.....% [1]

(c) The price of a business ticket for the same journey with another airline is \$2240.

- (i) The price of a first class ticket is 70% more than a business ticket.

Calculate the price of this first class ticket.

\$..... [2]

- (ii) The price of a business ticket is 180% **more** than an economy ticket.

Calculate the price of this economy ticket.

\$..... [3]

- (d) Mr Chan hires a car in Los Angeles.  
The charges are shown below.

<p><b><u>Car Hire</u></b></p> <p>\$28.00 per day plus \$6.50 per day insurance.</p> <p>\$1.25 for every kilometre travelled after the first 800 km. The first 800 km are included in the price.</p>
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Mr Chan hired the car for 12 days and paid \$826.50 .

- (i) Find the number of kilometres Mr Chan travelled in this car.

..... km [4]

- (ii) The car used fuel at an average rate of 1 litre for every 10 km travelled.  
Fuel costs \$1.30 per litre.

Calculate the cost of the fuel used by the car during the 12 days.

\$..... [2]

2 (a) Work out the value of  $x$  in each of the following.

(i)  $3^x = 243$

$x = \dots\dots\dots$  [1]

(ii)  $16^x = 4$

$x = \dots\dots\dots$  [1]

(iii)  $8^x = 32$

$x = \dots\dots\dots$  [2]

(iv)  $27^x = \frac{1}{9}$

$x = \dots\dots\dots$  [2]

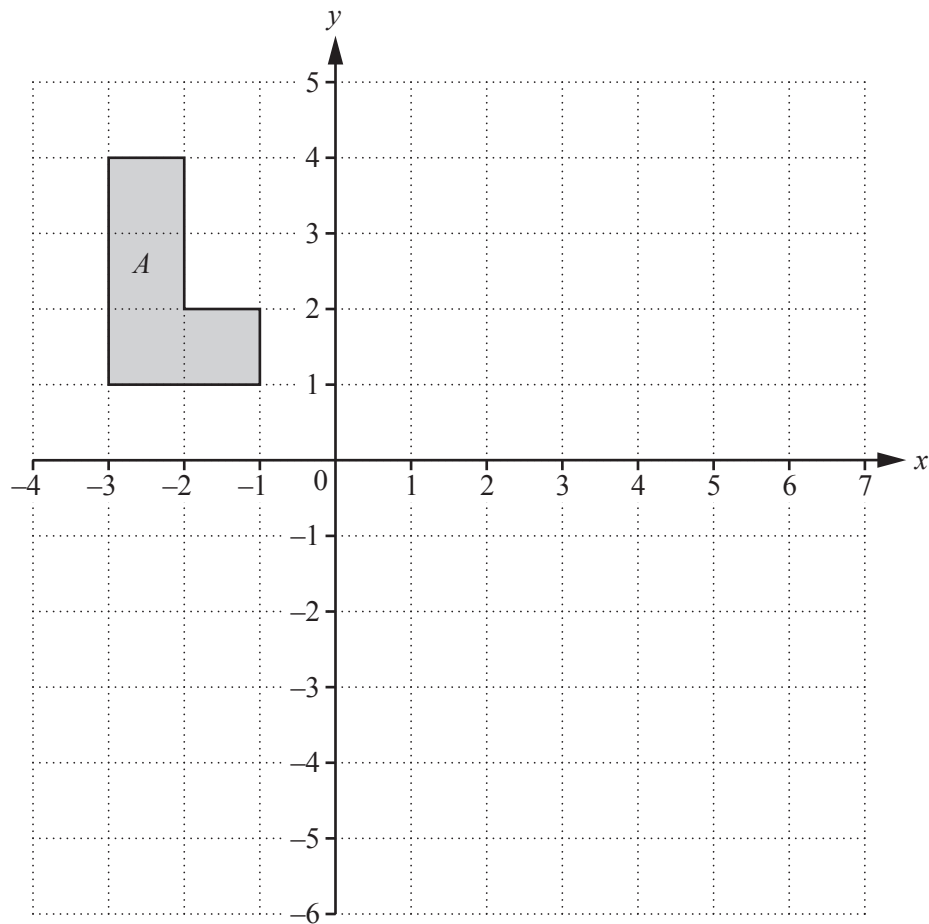
(b) Solve by factorisation.

$$y^2 - 7y - 30 = 0$$

Show your working.

$y = \dots\dots\dots$  or  $y = \dots\dots\dots$  [3]

3 (a)



On the grid, draw the image of

(i) shape  $A$  after a reflection in the line  $x = 1$ , [2]

(ii) shape  $A$  after an enlargement with scale factor  $-2$ , centre  $(0, 1)$ , [2]

(iii) shape  $A$  after the transformation represented by the matrix  $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ . [3]

(b) Describe fully the **single** transformation represented by the matrix  $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ .

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

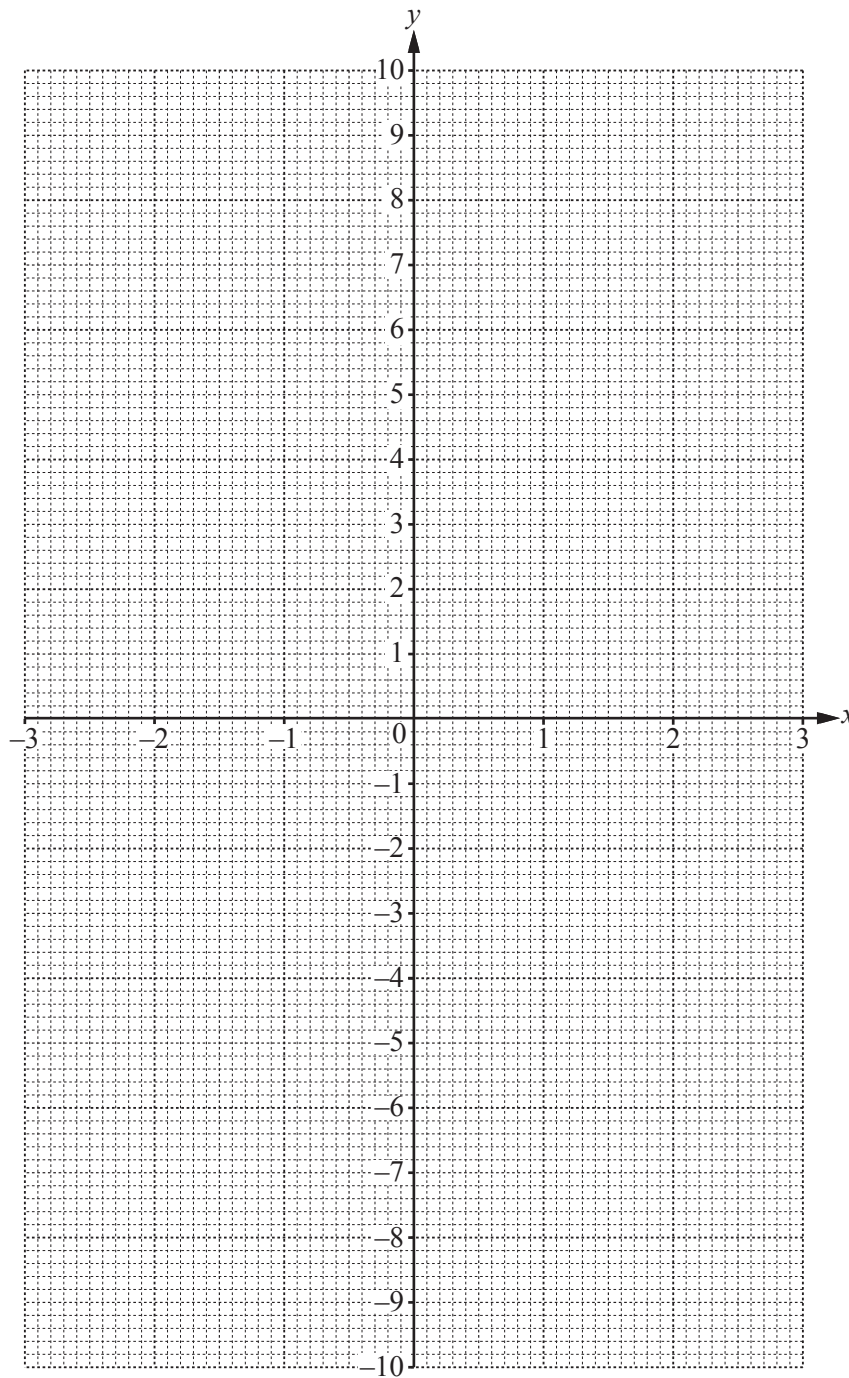
4  $f(x) = x^2 - \frac{1}{x} - 4, x \neq 0$

(a) (i) Complete the table.

$x$	-3	-2	-1	-0.5	-0.1		0.2	0.5	1	2	3
$f(x)$	5.3	0.5		-1.8	6.0		-9.0	-5.8	-4		4.7

[2]

(ii) On the grid, draw the graph of  $y = f(x)$  for  $-3 \leq x \leq -0.1$  and  $0.2 \leq x \leq 3$ .



[5]

(b) Use your graph to solve the equation  $f(x) = 0$ .

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots \text{ or } x = \dots\dots\dots [3]$$

(c) Find an integer  $k$ , for which  $f(x) = k$  has one solution.

$$k = \dots\dots\dots [1]$$

(d) (i) By drawing a suitable straight line, solve the equation  $f(x) + 2 = -5x$ .

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [4]$$

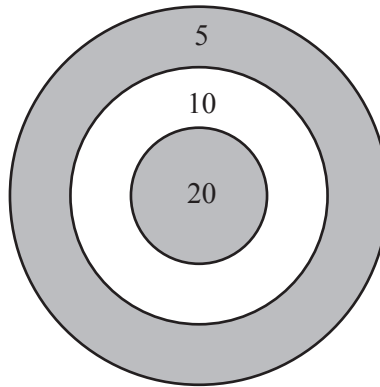
(ii)  $f(x) + 2 = -5x$  can be written as  $x^3 + ax^2 + bx - 1 = 0$ .

Find the value of  $a$  and the value of  $b$ .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots [2]$$

- 5 Kiah plays a game.  
The game involves throwing a coin onto a circular board.  
Points are scored for where the coin lands on the board.



If the coin lands on part of a line or misses the board then 0 points are scored.  
The table shows the probabilities of Kiah scoring points on the board with one throw.

Points scored	20	10	5	0
Probability	$x$	0.2	0.3	0.45

- (a) Find the value of  $x$ .

$x = \dots\dots\dots$  [2]

- (b) Kiah throws a coin fifty times.

Work out the expected number of times she scores 5 points.

$\dots\dots\dots$  [1]

- (c) Kiah throws a coin two times.

Calculate the probability that

- (i) she scores either 5 or 0 with her first throw,

$\dots\dots\dots$  [2]

- (ii) she scores 0 with her first throw and 5 with her second throw,

$\dots\dots\dots$  [2]



(iii) she scores a total of 15 points with her two throws.

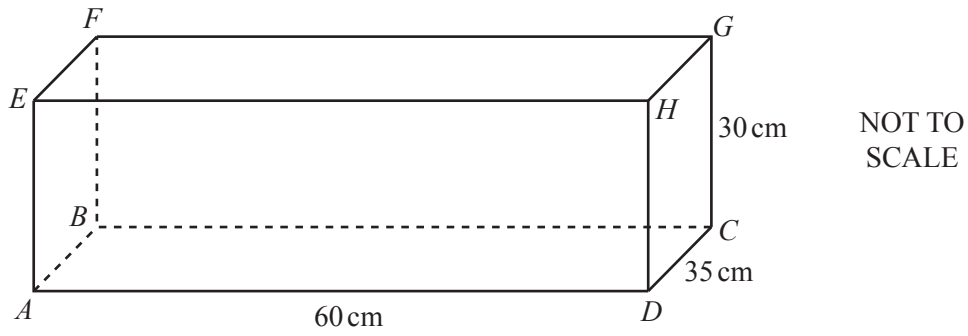
..... [3]

(d) Kiah throws a coin three times.

Calculate the probability that she scores a total of 10 points with her three throws.

..... [5]

6 The diagram shows a cuboid.



$AD = 60\text{ cm}$ ,  $CD = 35\text{ cm}$  and  $CG = 30\text{ cm}$ .

(a) Write down the number of planes of symmetry of this cuboid.

..... [1]

(b) (i) Work out the surface area of the cuboid.

.....  $\text{cm}^2$  [3]

(ii) Write your answer to **part (b)(i)** in square metres.

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

(c) Calculate

(i) the length  $AG$ ,

$AG =$  .....  $\text{cm}$  [4]

(ii) the angle between  $AG$  and the base  $ABCD$ .

..... [3]

(d) (i) Show that the volume of the cuboid is  $63\,000\text{ cm}^3$ .

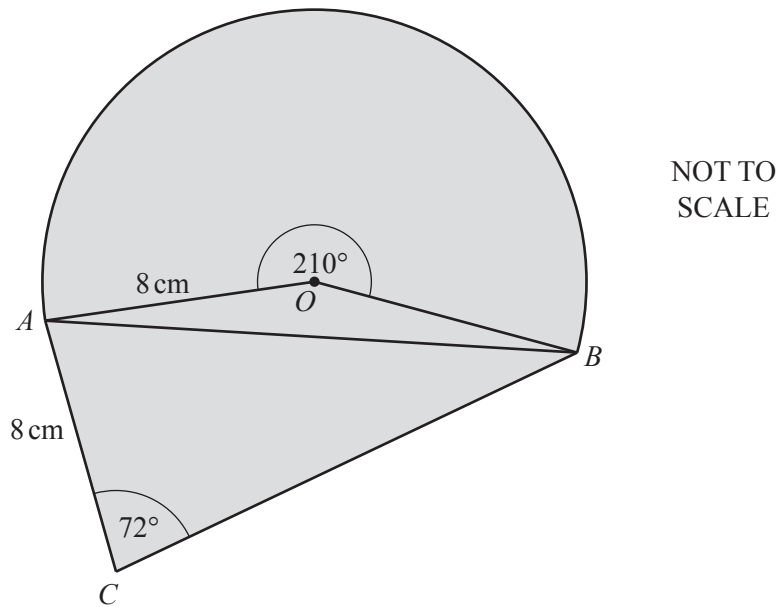
[1]

(ii) A cylinder of height  $40\text{ cm}$  has the same volume as the cuboid.

Calculate the radius of the cylinder.

..... cm [3]

7



The diagram shows a design for a logo made from a sector and two triangles.  
 The sector, centre  $O$ , has radius 8 cm and sector angle  $210^\circ$ .  
 $AC = 8$  cm and angle  $ACB = 72^\circ$ .

(a) Show that angle  $OAB = 15^\circ$ .

[2]

(b) Calculate the length of the straight line  $AB$ .

$AB = \dots\dots\dots$  cm [4]

(c) Calculate angle  $ABC$ .

Angle  $ABC = \dots\dots\dots$  [3]

(d) Calculate the total area of the logo design.

$\dots\dots\dots\text{cm}^2$  [6]

(e) The logo design is an enlargement with scale factor 4 of the actual logo.

Calculate the area of the actual logo.

$\dots\dots\dots\text{cm}^2$  [2]

**8**             $f(x) = 5x + 7$              $g(x) = \frac{4}{x-3}, x \neq 3$

**(a)** Find

**(i)**  $fg(1)$ ,

..... [2]

**(ii)**  $gf(x)$ ,

..... [2]

**(iii)**  $g^{-1}(x)$ ,

$g^{-1}(x) =$  ..... [3]

**(iv)**  $f^{-1}f(2)$ .

..... [1]

(b)  $f(x) = g(x)$

(i) Show that  $5x^2 - 8x - 25 = 0$ .

[3]

(ii) Solve  $5x^2 - 8x - 25 = 0$ .

Show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [4]

**Question 9 is printed on the next page.**

9 A line joins the points  $A(-2, -5)$  and  $B(4, 13)$ .

(a) Calculate the length  $AB$ .

$$AB = \dots\dots\dots [3]$$

(b) Find the equation of the line through  $A$  and  $B$ .  
Give your answer in the form  $y = mx + c$ .

$$y = \dots\dots\dots [3]$$

(c) Another line is parallel to  $AB$  and passes through the point  $(0, -5)$ .

Write down the equation of this line.

$$\dots\dots\dots [2]$$

(d) Find the equation of the perpendicular bisector of  $AB$ .

$$\dots\dots\dots [5]$$

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