



1 (a) Abdullah and Jasmine bought a car for \$9000.  
Abdullah paid 45% of the \$9000 and Jasmine paid the rest.

(i) How much did Jasmine pay towards the cost of the car?

Answer(a)(i) \$ ..... [2]

(ii) Write down the ratio of the payments Abdullah : Jasmine in its simplest form.

Answer(a)(ii) ..... : ..... [1]

(b) Last year it cost \$2256 to run the car.  
Abdullah, Jasmine and their son Henri share this cost in the ratio 8 : 3 : 1.  
Calculate the amount each paid to run the car.

Answer(b) Abdullah \$ .....

Jasmine \$ .....

Henri \$ ..... [3]

(c) (i) A new truck costs \$15 000 and loses 23% of its value **each year**.  
Calculate the value of the truck after three years.

Answer(c)(i) \$ ..... [3]

(ii) Calculate the overall percentage loss of the truck's value after three years.

Answer(c)(ii) ..... % [3]

2 (a) Find the integer values for  $x$  which satisfy the inequality  $-3 < 2x - 1 \leq 6$ .

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Answer(a) ..... [3]

(b) Simplify  $\frac{x^2 + 3x - 10}{x^2 - 25}$ .

Answer(b) ..... [4]

(c) (i) Show that  $\frac{5}{x - 3} + \frac{2}{x + 1} = 3$  can be simplified to  $3x^2 - 13x - 8 = 0$ .

Answer(c)(i)

[3]

(ii) Solve the equation  $3x^2 - 13x - 8 = 0$ .

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

Answer(c)(ii)  $x =$  ..... or  $x =$  ..... [4]

- 3 The table shows information about the heights of 120 girls in a swimming club.

Height ( $h$ metres)	Frequency
$1.3 < h \leq 1.4$	4
$1.4 < h \leq 1.5$	13
$1.5 < h \leq 1.6$	33
$1.6 < h \leq 1.7$	45
$1.7 < h \leq 1.8$	19
$1.8 < h \leq 1.9$	6

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- (a) (i) Write down the modal class.

Answer(a)(i) ..... m [1]

- (ii) Calculate an estimate of the mean height. Show all of your working.

Answer(a)(ii) ..... m [4]

- (b) Girls from this swimming club are chosen at random to swim in a race.  
Calculate the probability that

- (i) the height of the first girl chosen is more than 1.8 metres,

Answer(b)(i) ..... [1]

- (ii) the heights of **both** the first and second girl chosen are 1.8 metres or less.

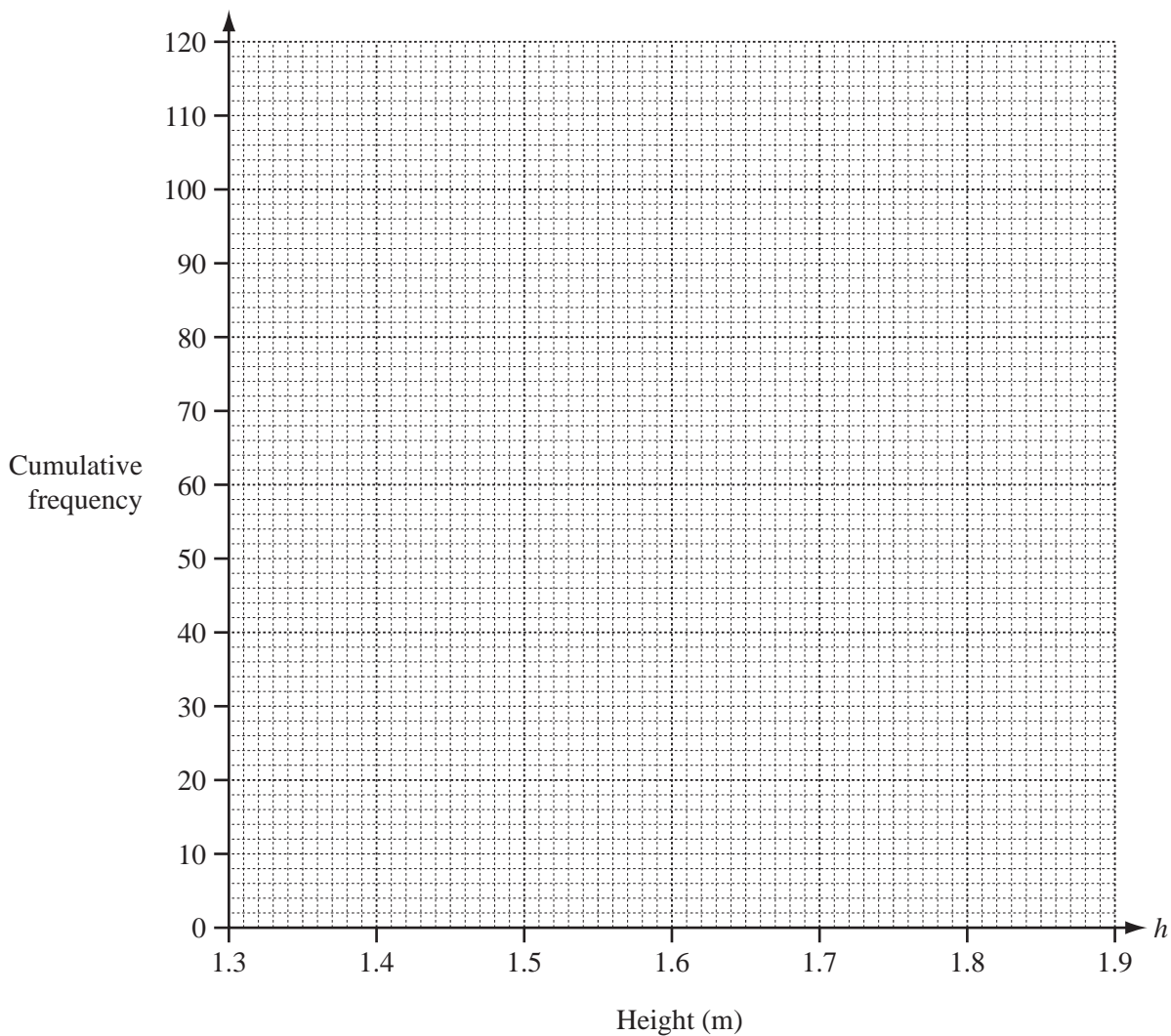
Answer(b)(ii) ..... [3]

(c) (i) Complete the cumulative frequency table for the heights.

Height ( $h$ metres)	Cumulative frequency
$h \leq 1.3$	0
$h \leq 1.4$	4
$h \leq 1.5$	17
$h \leq 1.6$	50
$h \leq 1.7$	
$h \leq 1.8$	114
$h \leq 1.9$	

[1]

(ii) Draw the cumulative frequency graph on the grid.



[3]

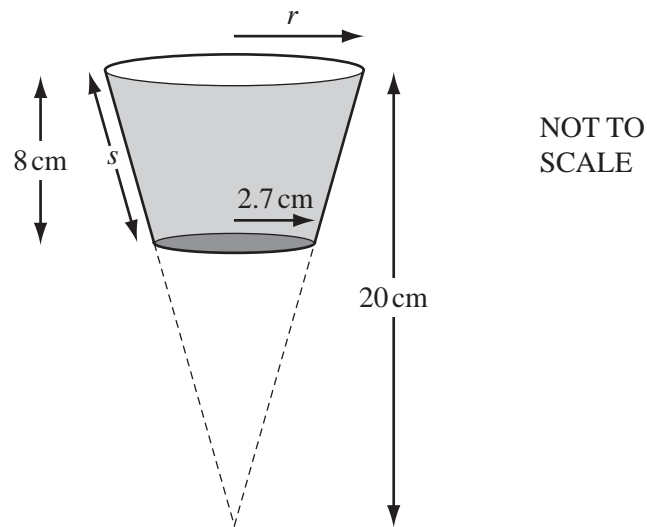
(d) Use your graph to find

(i) the median height,

Answer(d)(i) ..... m [1]

(ii) the 30th percentile.

Answer(d)(ii) ..... m [1]



The diagram shows a plastic cup in the shape of a cone with the end removed.  
 The vertical height of the cone in the diagram is 20 cm.  
 The height of the cup is 8 cm.  
 The base of the cup has radius 2.7 cm.

- (a) (i) Show that the radius,  $r$ , of the circular top of the cup is 4.5 cm.

*Answer(a)(i)*

[2]

- (ii) Calculate the volume of water in the cup when it is full.

[The volume,  $V$ , of a cone with radius  $r$  and height  $h$  is  $V = \frac{1}{3} \pi r^2 h$ .]

*Answer(a)(ii)* .....  $\text{cm}^3$  [4]

- (b) (i) Show that the slant height,  $s$ , of the cup is 8.2 cm.

*Answer(b)(i)*

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[3]

- (ii) Calculate the curved surface area of the outside of the cup.  
[The curved surface area,  $A$ , of a cone with radius  $r$  and slant height  $l$  is  $A = \pi rl$ .]

*Answer(b)(ii)* ..... cm<sup>2</sup> [5]

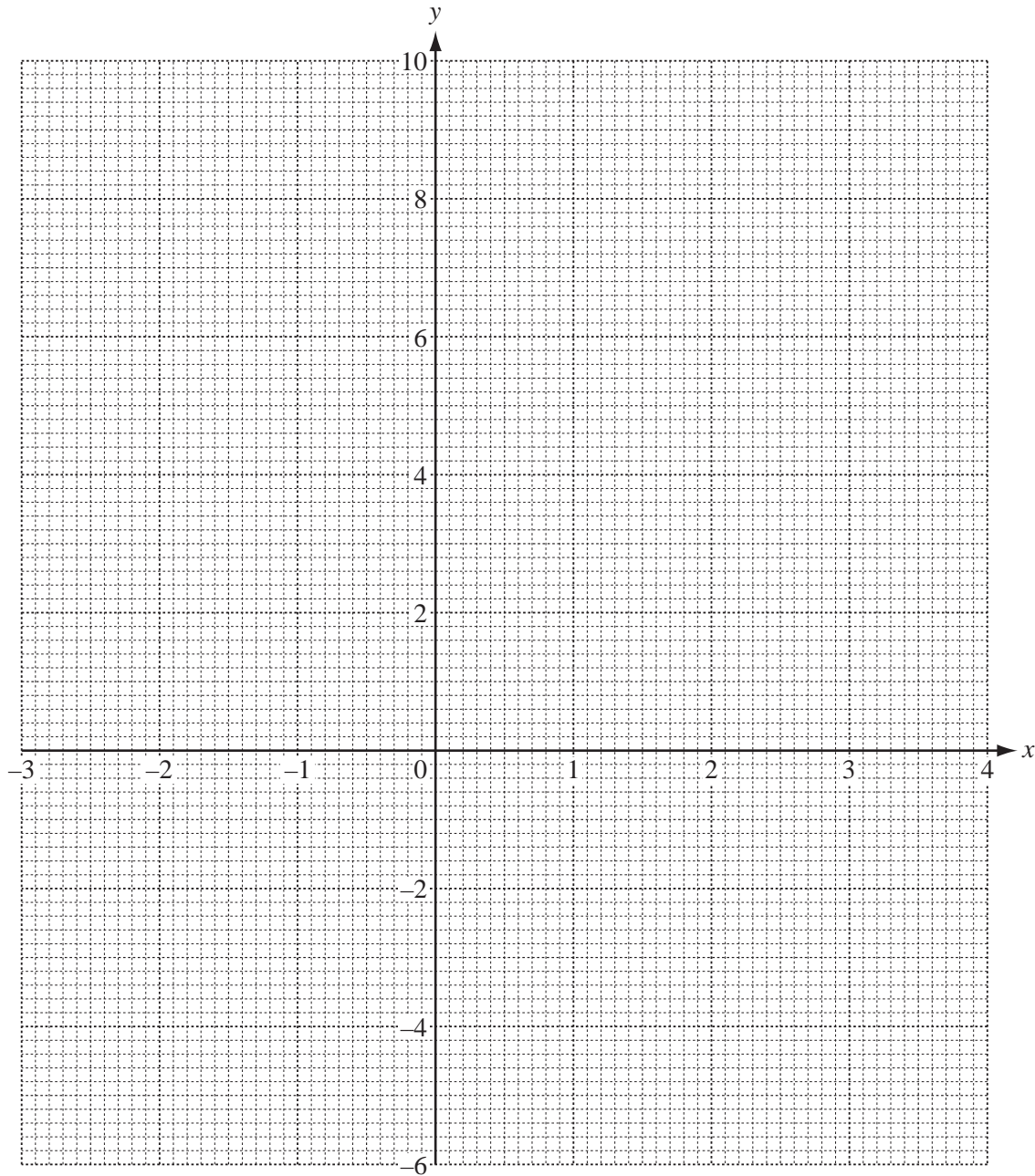
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- 5 (a) Complete the table for the function  $f(x) = \frac{x^3}{2} - 3x + 1$ .

$x$	-3	-2	-1.5	-1	0	1	1.5	2	3	3.5
$f(x)$	-5.5		1.8	1.5		-3.5	-3.8	-3		9.9

[3]

- (b) On the grid draw the graph of  $y = f(x)$  for  $-3 \leq x \leq 3.5$ .



[4]



(c) Use your graph to

(i) solve  $f(x) = 0.5$ ,

*Answer(c)(i)*  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(ii) find the inequalities for  $k$ , so that  $f(x) = k$  has only 1 answer.

*Answer(c)(ii)*  $k < \dots\dots\dots$   
 $k > \dots\dots\dots$  [2]

(d) (i) On the same grid, draw the graph of  $y = 3x - 2$  for  $-1 \leq x \leq 3.5$ . [3]

(ii) The equation  $\frac{x^3}{2} - 3x - 1 = 3x - 2$  can be written in the form  $x^3 + ax + b = 0$ .  
 Find the values of  $a$  and  $b$ .

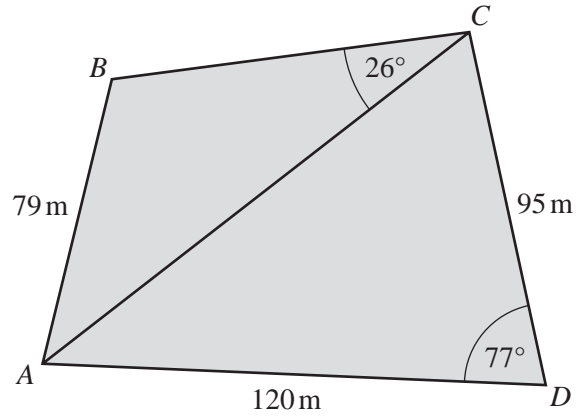
*Answer(d)(ii)*  $a = \dots\dots\dots$  and  $b = \dots\dots\dots$  [2]

(iii) Use your graph to find the **positive** answers to  $\frac{x^3}{2} - 3x - 1 = 3x - 2$  for  $-3 \leq x \leq 3.5$ .

*Answer(d)(iii)*  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [2]

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The quadrilateral  $ABCD$  represents an area of land.

There is a straight road from  $A$  to  $C$ .

$AB = 79$  m,  $AD = 120$  m and  $CD = 95$  m.

Angle  $BCA = 26^\circ$  and angle  $CDA = 77^\circ$ .

- (a) Show that the length of the road,  $AC$ , is 135 m correct to the nearest metre.

*Answer(a)*

[4]

- (b) Calculate the size of the **obtuse** angle  $ABC$ .

*Answer(b)* Angle  $ABC =$  ..... [4]

(c) A straight path is to be built from  $B$  to the nearest point on the road  $AC$ .

Calculate the length of this path.

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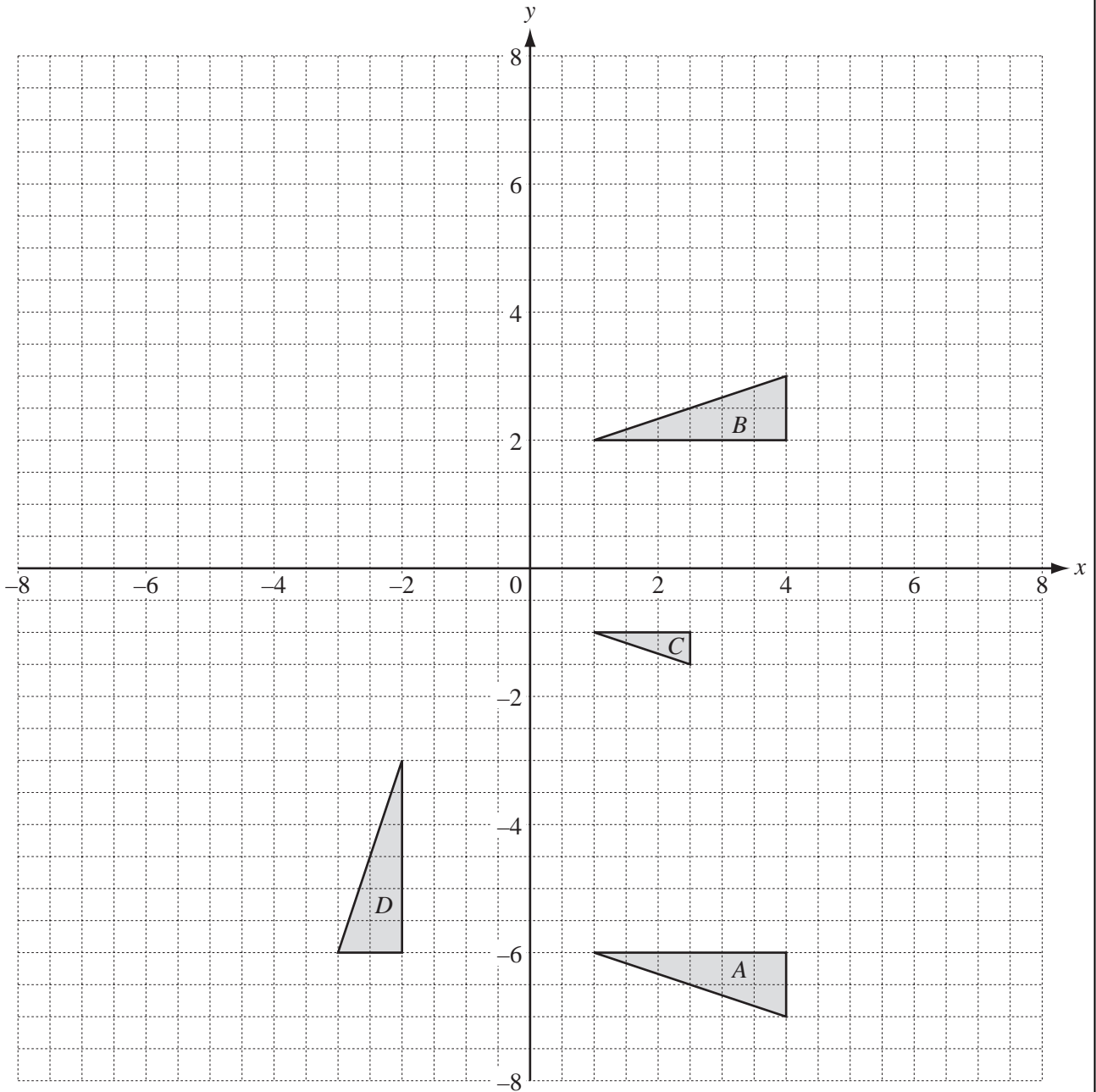
Answer(c) ..... m [3]

(d) Houses are to be built on the land in triangle  $ACD$ .  
Each house needs at least  $180 \text{ m}^2$  of land.

Calculate the maximum number of houses which can be built.  
Show all of your working.

Answer(d) ..... [4]

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(a) Describe fully the **single** transformation which maps

(i) triangle *A* onto triangle *B*,

Answer(a)(i) ..... [2]

(ii) triangle *A* onto triangle *C*,

Answer(a)(ii) ..... [3]

(iii) triangle *A* onto triangle *D*.

Answer(a)(iii) ..... [3]

(b) Draw the image of

(i) triangle  $B$  after a translation of  $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ , [2]

(ii) triangle  $B$  after a transformation by the matrix  $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$ . [3]

(c) Describe fully the **single** transformation represented by the matrix  $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$ .

Answer(c) .....  
..... [3]

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8 Mr Chang hires  $x$  large coaches and  $y$  small coaches to take 300 students on a school trip. Large coaches can carry 50 students and small coaches 30 students. There is a maximum of 5 large coaches.

(a) Explain clearly how the following two inequalities satisfy these conditions.

(i)  $x \leq 5$

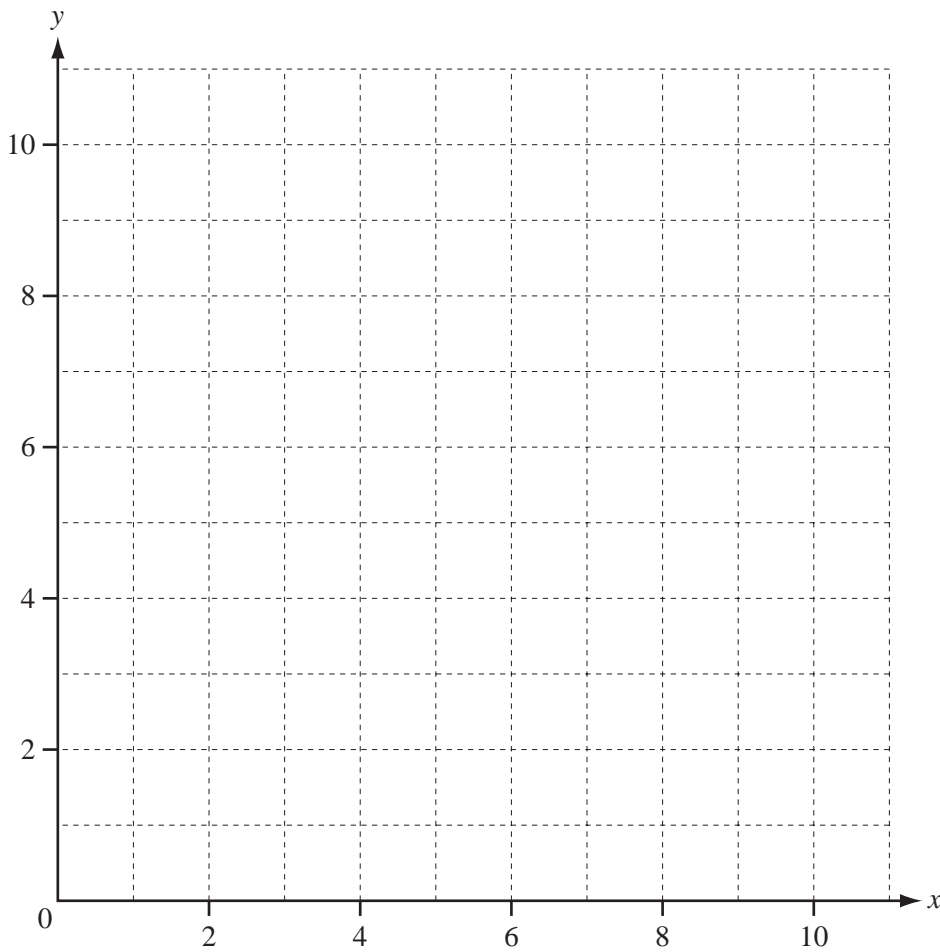
Answer(a)(i) ..... [1]

(ii)  $5x + 3y \geq 30$

Answer(a)(ii) .....  
..... [2]

Mr Chang also knows that  $x + y \leq 10$ .

(b) On the grid, show the information above by drawing three straight lines and shading the **unwanted** regions.



[5]

(c) A large coach costs \$450 to hire and a small coach costs \$350.

(i) Find the number of large coaches and the number of small coaches that would give the minimum hire cost for this school trip.

Answer(c)(i) Large coaches .....

Small coaches ..... [2]

(ii) Calculate this minimum cost.

Answer(c)(ii) \$ ..... [1]

9 (a)  $72 = 2 \times 2 \times 2 \times 3 \times 3$  written as a product of prime factors.

(i) Write the number 126 as a product of prime factors.

Answer(a)(i)  $126 =$  ..... [2]

(ii) Find the value of the highest common factor of 72 and 126.

Answer(a)(ii) ..... [1]

(iii) Find the value of the lowest common multiple of 72 and 126.

Answer(a)(iii) ..... [2]

The rest of question 9 is printed on the next page.

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- (b) John wants to estimate the value of  $\pi$ .  
He measures the circumference of a circular pizza as 105 cm and its diameter as 34 cm, both correct to the nearest centimetre.

Calculate the lower bound of his estimate of the value of  $\pi$ .  
Give your answer correct to 3 decimal places.

*Answer(b)* ..... [4]

- (c) The volume of a cylindrical can is  $550 \text{ cm}^3$ , correct to the nearest  $10 \text{ cm}^3$ .  
The height of the can is 12 cm correct to the nearest centimetre.

Calculate the upper bound of the radius of the can.  
Give your answer correct to 3 decimal places.

*Answer(c)* ..... cm [5]

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