



- 1 (a) Ali and Ben receive a sum of money.  
They share it in the ratio 5 : 1.  
Ali receives \$2345.

Calculate the total amount.

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

- (b) Ali uses 11% of his \$2345 to buy a television.

Calculate the cost of the television.

Answer(b) \$ ..... [2]

- (c) A different television costs \$330.

- (i) Ben buys one in a sale when this cost is reduced by 15%.

How much does Ben pay?

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

- (ii) \$330 is 12% less than the cost last year.

Calculate the cost last year.

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

- (d) Ali invests \$1500 of his share in a bank account.  
The account pays compound interest at a rate of 2.3% per year.

Calculate the total amount in the account at the end of 3 years.

Answer(d) \$ ..... [3]

- (e) Ali also buys a computer for \$325.  
He later sells this computer for \$250.

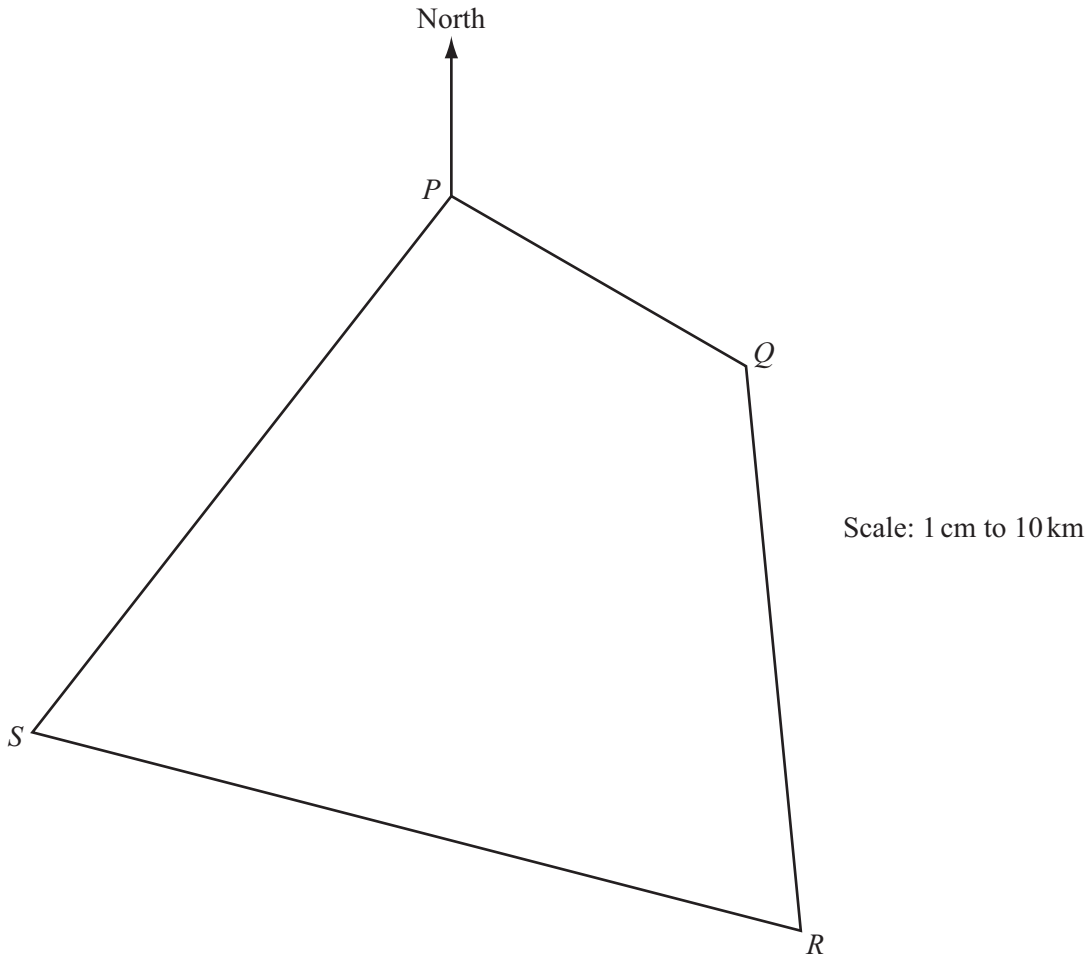
Calculate Ali's percentage loss.

Answer(e) ..... % [3]

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- 2 (a) In this question show all your construction arcs and use only a ruler and compasses to draw the boundaries of your region.

This scale drawing shows the positions of four towns,  $P$ ,  $Q$ ,  $R$  and  $S$ , on a map where 1 cm represents 10 km.



A nature reserve lies in the quadrilateral  $PQRS$ .  
The boundaries of the nature reserve are:

- equidistant from  $Q$  and from  $R$
- equidistant from  $PS$  and from  $PQ$
- 60 km from  $R$
- along  $QR$ .

(i) Shade the region which represents the nature reserve. [7]

(ii) Measure the bearing of  $S$  from  $P$ .

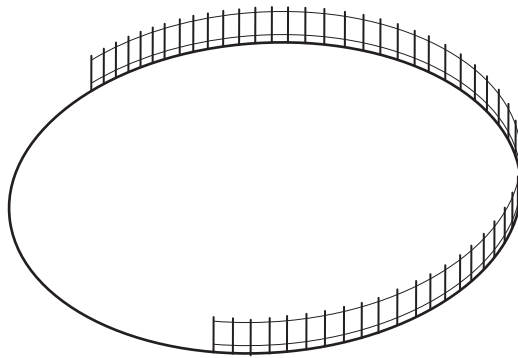
Answer(a)(ii) ..... [1]

(b) A circular lake in the nature reserve has a radius of 45 m.

(i) Calculate the area of the lake.

Answer(b)(i) ..... m<sup>2</sup> [2]

(ii)



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A fence is placed along part of the circumference of the lake.  
This arc subtends an angle of  $210^\circ$  at the centre of the circle.

Calculate the length of the fence.

Answer(b)(ii) ..... m [2]

3 (a) Luk wants to buy  $x$  goats and  $y$  sheep.

(i) He wants to buy at least 5 goats.

Write down an inequality in  $x$  to represent this condition.

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

(ii) He wants to buy at least 11 sheep.

Write down an inequality in  $y$  to represent this condition.

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

(iii) He wants to buy at least 20 animals.

Write down an inequality in  $x$  and  $y$  to represent this condition.

*Answer(a)(iii)* ..... [1]

(b) Goats cost \$4 and sheep cost \$8.  
The maximum Luk can spend is \$160.

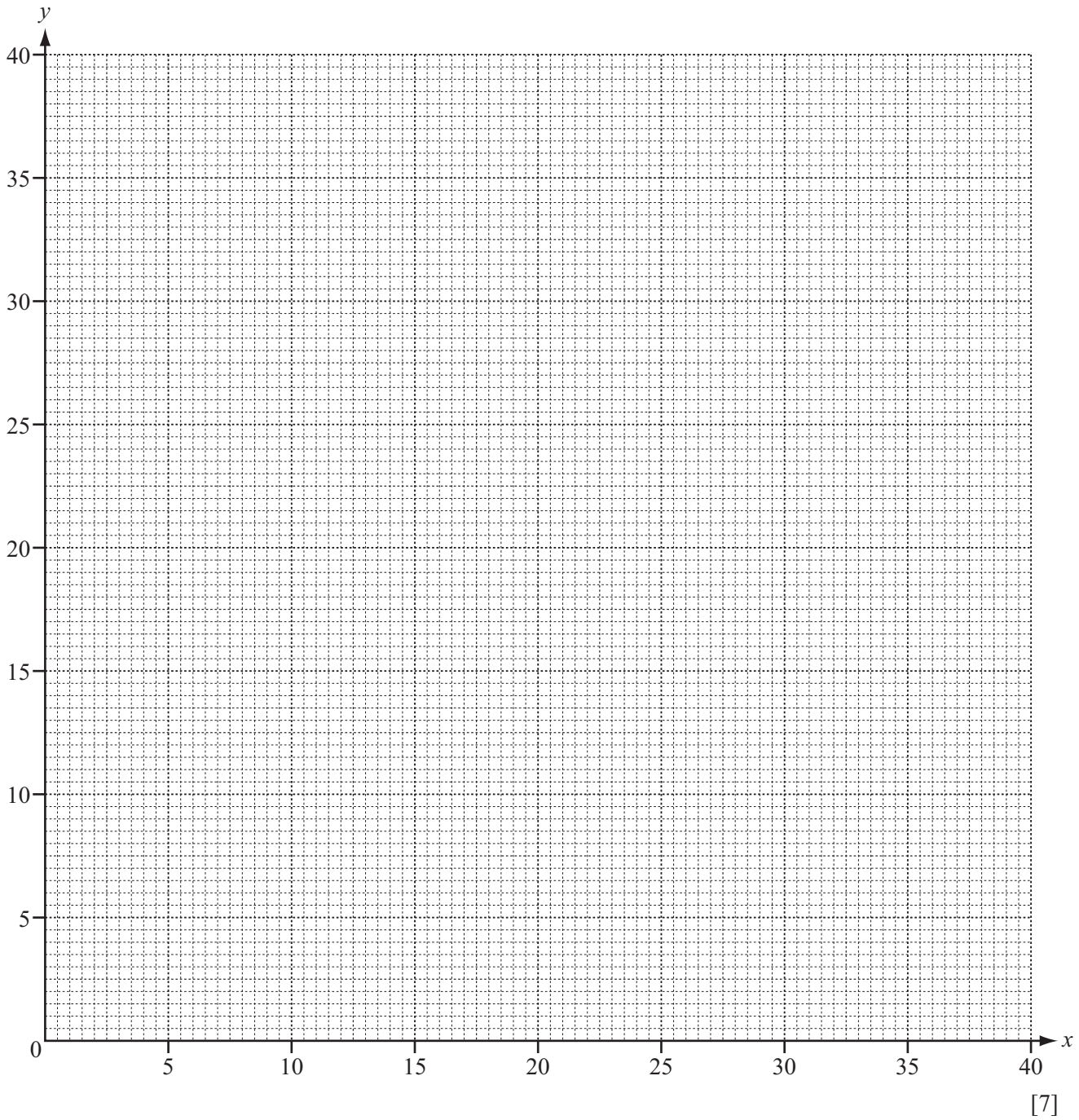
Write down an inequality in  $x$  and  $y$  and show that it simplifies to  $x + 2y \leq 40$ .

*Answer(b)*

[1]

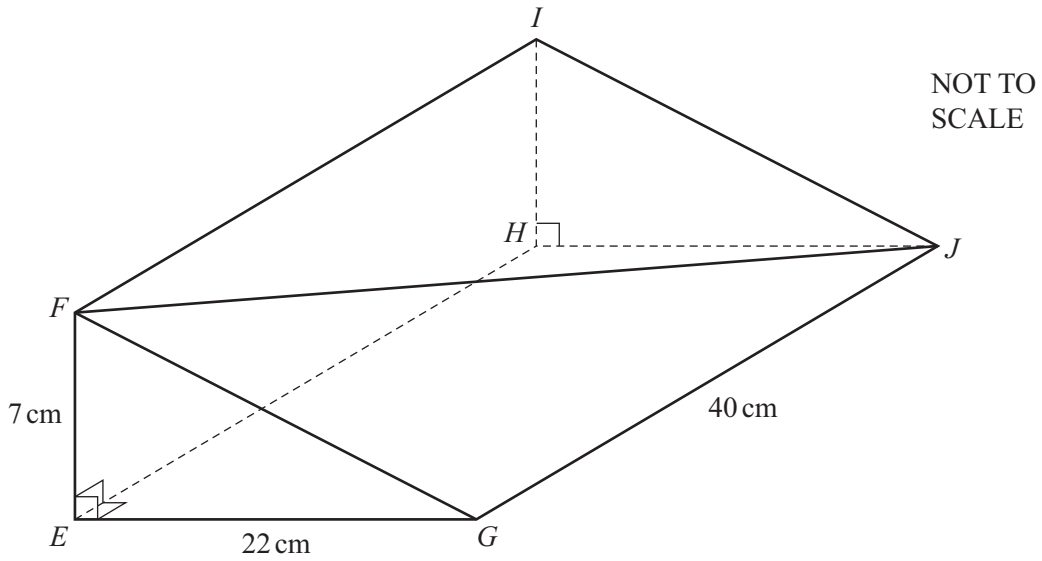
(c) (i) On the grid below, draw four lines to show the four inequalities and shade the **unwanted** regions.

*For  
Examiner's  
Use*



(ii) Work out the maximum number of animals that Luk can buy.

*Answer(c)(ii)* ..... [2]



*EFGHIJ* is a solid metal prism of length 40 cm.  
The cross section *EFG* is a right-angled triangle.  
*EF* = 7 cm and *EG* = 22 cm.

(a) Calculate the volume of the prism.

Answer(a) ..... cm<sup>3</sup> [2]

(b) Calculate the length *FJ*.

Answer(b) *FJ* = ..... cm [4]



- (c) Calculate the angle between  $FJ$  and the base  $EGJH$  of the prism.

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

- (d) The prism is melted and made into spheres.  
Each sphere has a radius 1.5 cm.

Work out the greatest number of spheres that can be made.

[The volume,  $V$ , of a sphere with radius  $r$  is  $V = \frac{4}{3}\pi r^3$ .]

*Answer(d)* ..... [3]

- (e) (i) A right-angled triangle is the cross section of another prism.  
This triangle has height 4.5 cm and base 11.0 cm.  
Both measurements are correct to 1 decimal place.

Calculate the upper bound for the area of this triangle.

*Answer(e)(i)* .....  $\text{cm}^2$  [2]

- (ii) Write your answer to **part (e)(i)** correct to 4 significant figures.

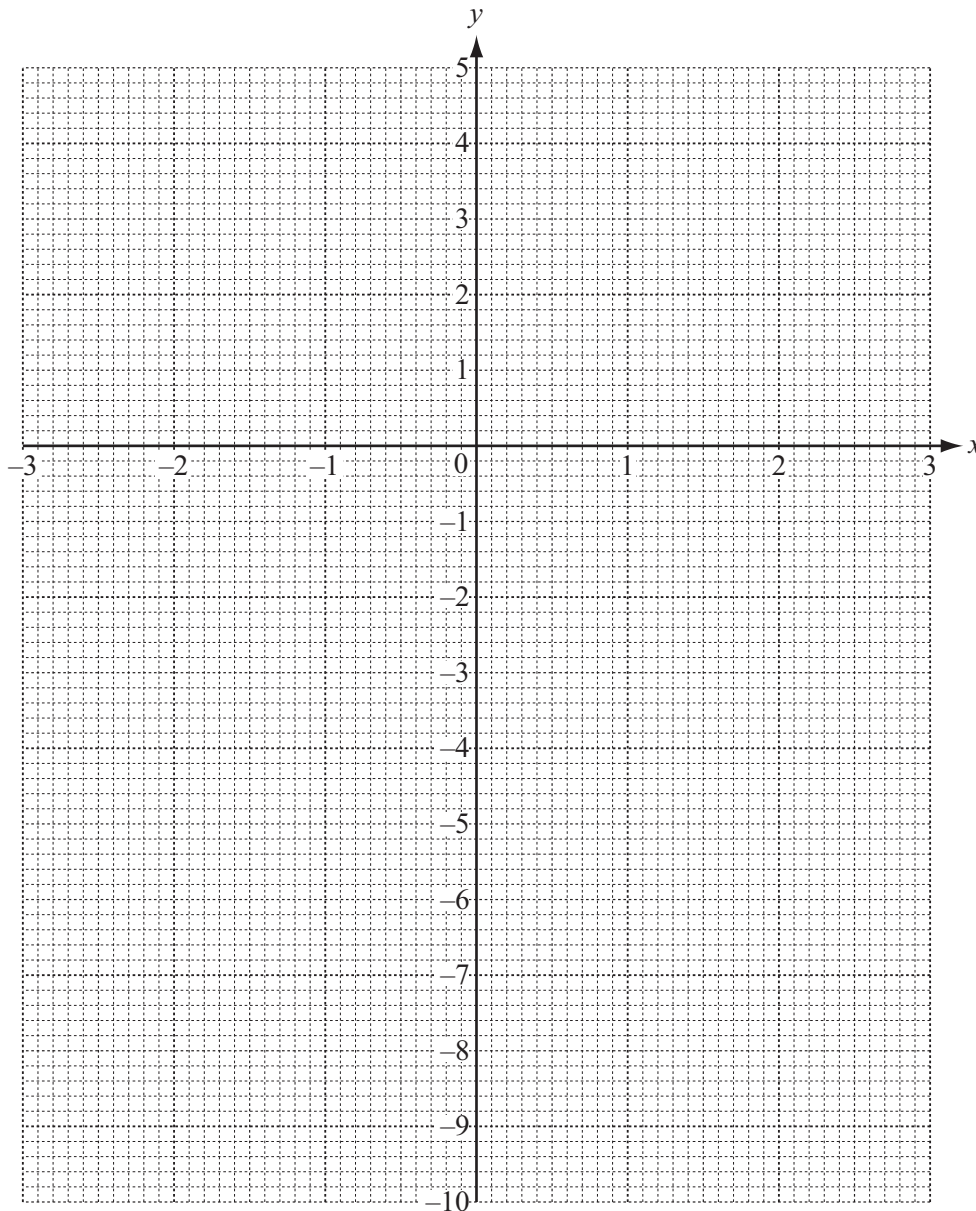
*Answer(e)(ii)* .....  $\text{cm}^2$  [1]

- 5 (a) Complete this table of values for the function  $f(x) = \frac{1}{x} - x^2$ ,  $x \neq 0$ .

$x$	-3	-2	-1	-0.5	-0.2		0.2	0.5	1	2	3
$f(x)$	-9.33	-4.5	-2	-2.25			4.96			-3.5	-8.67

[3]

- (b) Draw the graph of  $f(x) = \frac{1}{x} - x^2$  for  $-3 \leq x \leq -0.2$  and  $0.2 \leq x \leq 3$ .



[5]

- (c) Use your graph to solve  $f(x) = -3$ .

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

- (d) By drawing a suitable line on your graph, solve the equation  $f(x) = 2x - 2$ .

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

- (e) By drawing a suitable tangent, work out an estimate of the gradient of the curve at the point where  $x = -2$ .

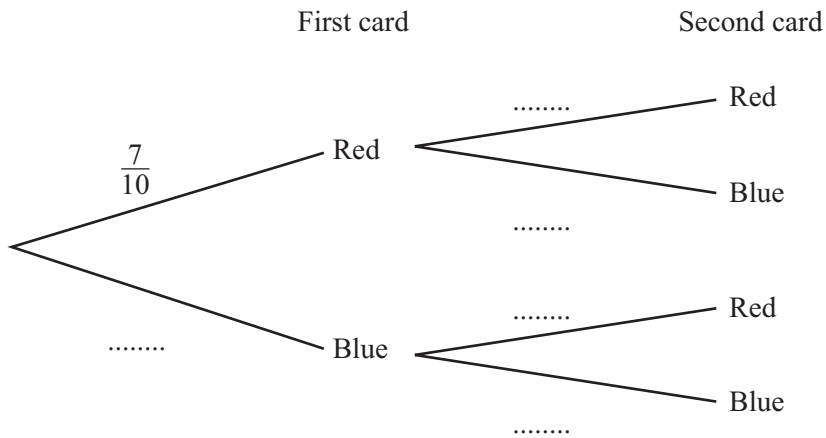
You must show your working.

*Answer(e)*  $\dots\dots\dots$  [3]

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- 6 In a box there are 7 red cards and 3 blue cards.  
A card is drawn at random from the box and is not replaced.  
A second card is then drawn at random from the box.

(a) Complete this tree diagram.

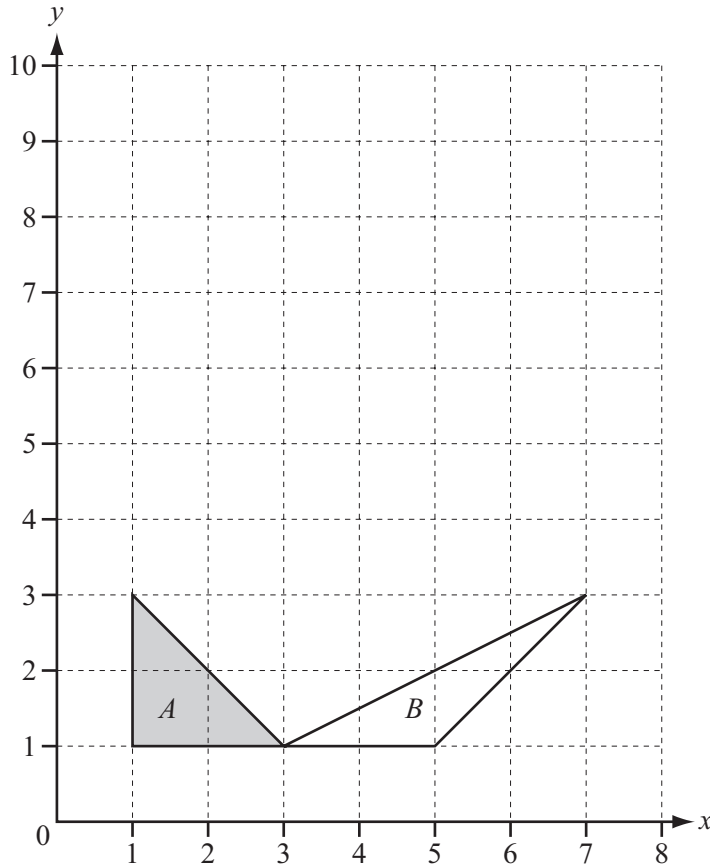


[3]

- (b) Work out the probability that the two cards are of different colours.  
Give your answer as a fraction.

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

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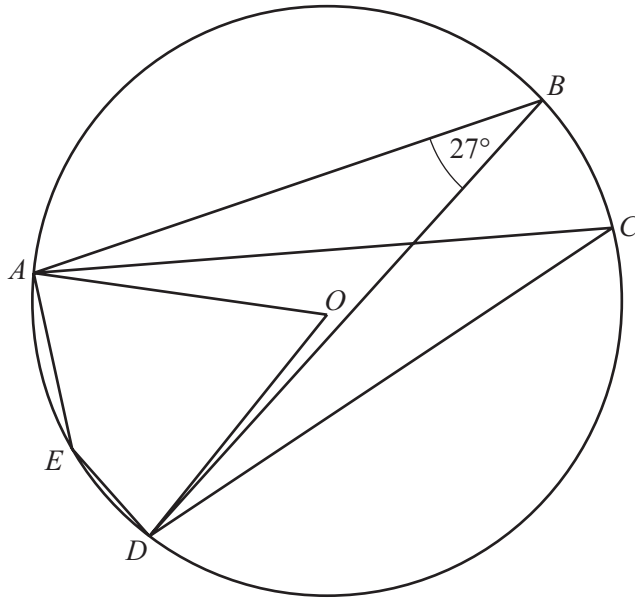
- (a) (i) Draw the image of shape *A* after a stretch, factor 3, *x*-axis invariant. [2]  
 (ii) Write down the matrix representing a stretch, factor 3, *x*-axis invariant.

Answer(a)(ii)  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [2]

- (b) (i) Describe fully the **single** transformation which maps shape *A* onto shape *B*.  
 Answer(b)(i) ..... [3]

- (ii) Write down the matrix representing the transformation which maps shape *A* onto shape *B*.  
 Answer(b)(ii)  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [2]

8 (a)



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$A, B, C, D$  and  $E$  are points on the circle centre  $O$ .  
Angle  $ABD = 27^\circ$ .

Find

(i) angle  $ACD$ ,

Answer(a)(i) Angle  $ACD = \dots\dots\dots$  [1]

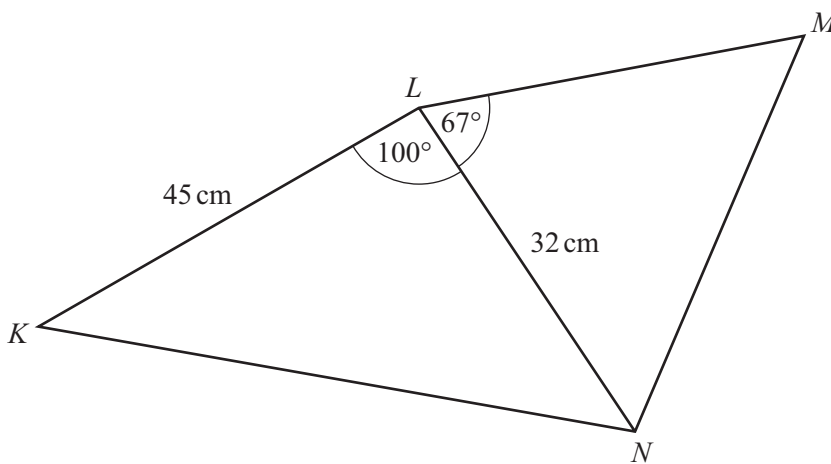
(ii) angle  $AOD$ ,

Answer(a)(ii) Angle  $AOD = \dots\dots\dots$  [1]

(iii) angle  $AED$ .

Answer(a)(iii) Angle  $AED = \dots\dots\dots$  [1]

(b)



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The diagram shows quadrilateral  $KLMN$ .  
 $KL = 45$  cm,  $LN = 32$  cm, angle  $KLN = 100^\circ$  and angle  $NLM = 67^\circ$ .

- (i) Calculate the length  $KN$ .

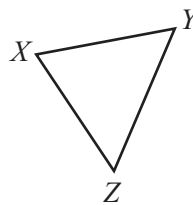
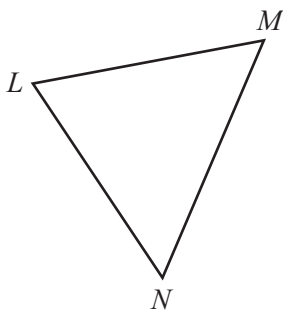
Answer(b)(i)  $KN = \dots\dots\dots$  cm [4]

- (ii) The area of triangle  $LMN$  is  $324 \text{ cm}^2$ .

Calculate the length  $LM$ .

Answer(b)(ii)  $LM = \dots\dots\dots$  cm [3]

- (iii) Another triangle  $XYZ$  is mathematically similar to triangle  $LMN$ .



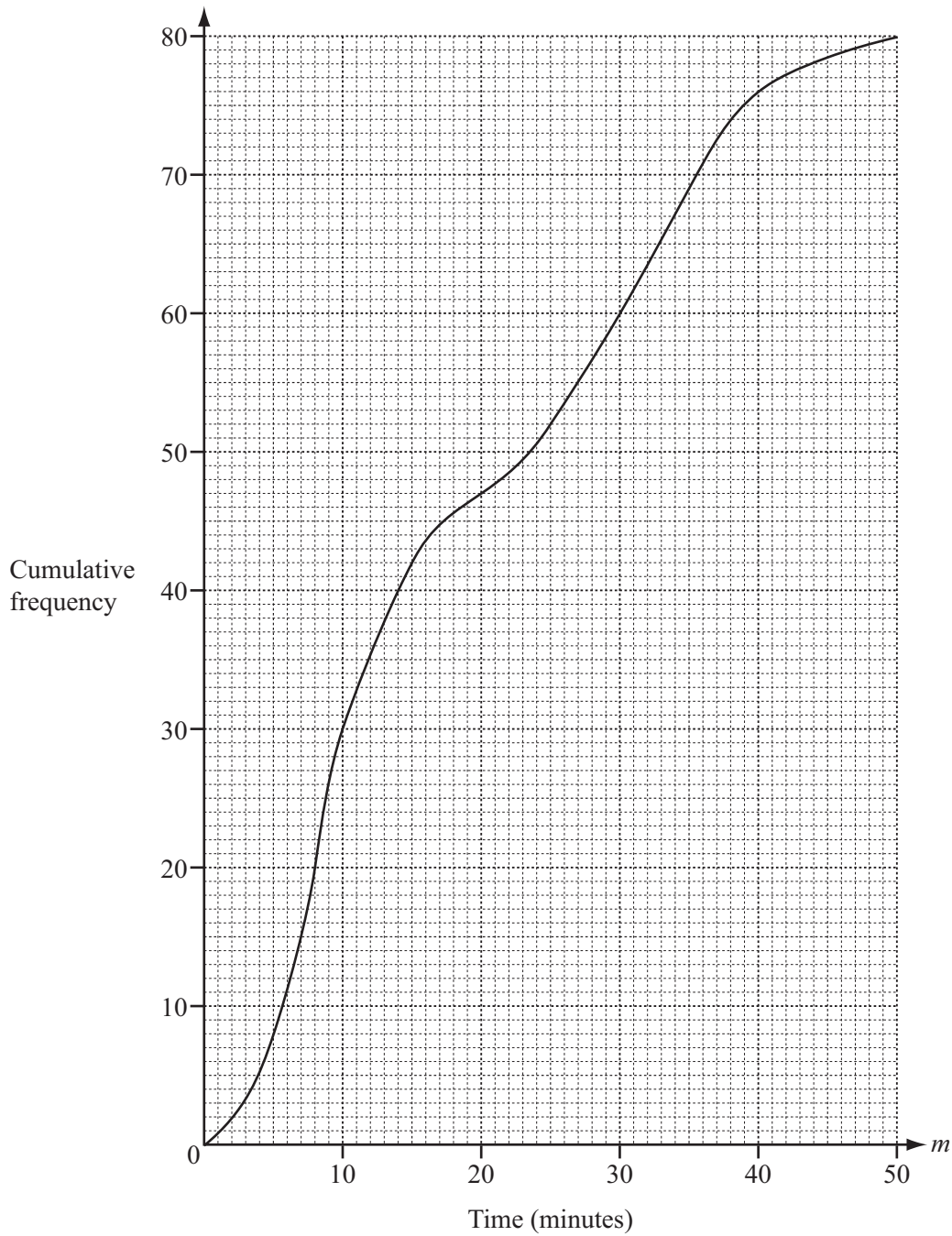
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$XZ = 16 \text{ cm}$  and the area of triangle  $LMN$  is  $324 \text{ cm}^2$ .

Calculate the area of triangle  $XYZ$ .

Answer(b)(iii)  $\dots\dots\dots$   $\text{cm}^2$  [2]

- 9 Sam asked 80 people how many minutes their journey to work took on one day. The cumulative frequency diagram shows the times taken ( $m$  minutes).



(a) Find

(i) the median,

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

(ii) the lower quartile,

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

(iii) the inter-quartile range.

Answer(a)(iii) ..... min [1]



- (b) One of the 80 people is chosen at random.

Find the probability that their journey to work took more than 35 minutes.  
Give your answer as a fraction.

Answer(b) ..... [2]

- (c) Use the cumulative frequency diagram to complete this frequency table.

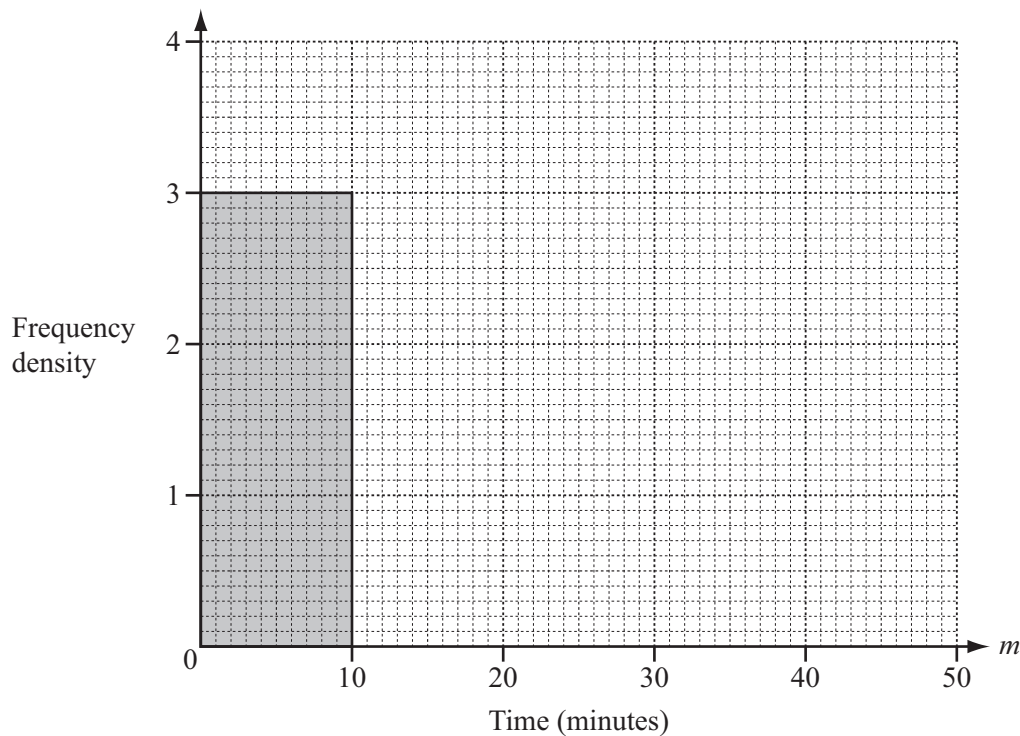
Time ( $m$ minutes)	$0 < m \leq 10$	$10 < m \leq 15$	$15 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$
Frequency	30	12	18		

[2]

- (d) Using mid-interval values, calculate an estimate of the mean journey time for the 80 people.

Answer(d) ..... min [3]

- (e) Use the table in **part (c)** to complete the histogram to show the times taken by the 80 people.  
One column has already been completed for you.



[5]

10 (a) (i) Solve  $2(3x - 7) = 13$ .

Answer(a)(i)  $x = \dots\dots\dots$  [3]

(ii) Solve by factorising  $x^2 - 7x + 6 = 0$ .

Answer(a)(ii)  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(iii) Solve  $\frac{3x - 2}{5} + \frac{x + 2}{10} = 4$ .

Answer(a)(iii)  $x = \dots\dots\dots$  [4]

$$(b) \quad 1^2 = 1$$

$$1^2 + 2^2 = 5$$

$$1^2 + 2^2 + 3^2 = 14$$

$$1^2 + 2^2 + 3^2 + 4^2 = 30$$

$$1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2 = an^3 + bn^2 + \frac{n}{6}$$

Work out the values of  $a$  and  $b$ .

*Answer(b)*  $a = \dots\dots\dots$

$b = \dots\dots\dots$  [6]

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