

--	--	--	--	--

--	--	--	--

0580/43

October/November 2012

2 hours 30 minutes

Additional Materials:	Electronic calculator	Geometrical instruments
	Mathematical tables (optional)	Tracing paper (optional)

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [] at the end of each question or part question.
The total of the marks for this paper is 130.

[Turn over

- 1 (a) The Martinez family travels by car to Seatown.
The distance is 92 km and the journey takes 1 hour 25 minutes.

- (i) The family leaves home at 07 50.
Write down the time they arrive at Seatown.

Answer(a)(i) [1]

- (ii) Calculate the average speed for the journey.

Answer(a)(ii) km/h [2]

- (iii) During the journey, the family stops for 10 minutes.

Calculate 10 minutes as a percentage of 1 hour 25 minutes.

Answer(a)(iii) % [1]

- (iv) 92 km is 15% more than the distance from Seatown to Deecity.

Calculate the distance from Seatown to Deecity.

Answer(a)(iv) km [3]

- (b) The Martinez family spends \$150 in the ratio

fuel : meals : gifts = 11 : 16 : 3 .

- (i) Show that \$15 is spent on gifts.

Answer (b)(i)

[2]

- (ii) The family buys two gifts.
The first gift costs \$8.25.

Find the ratio

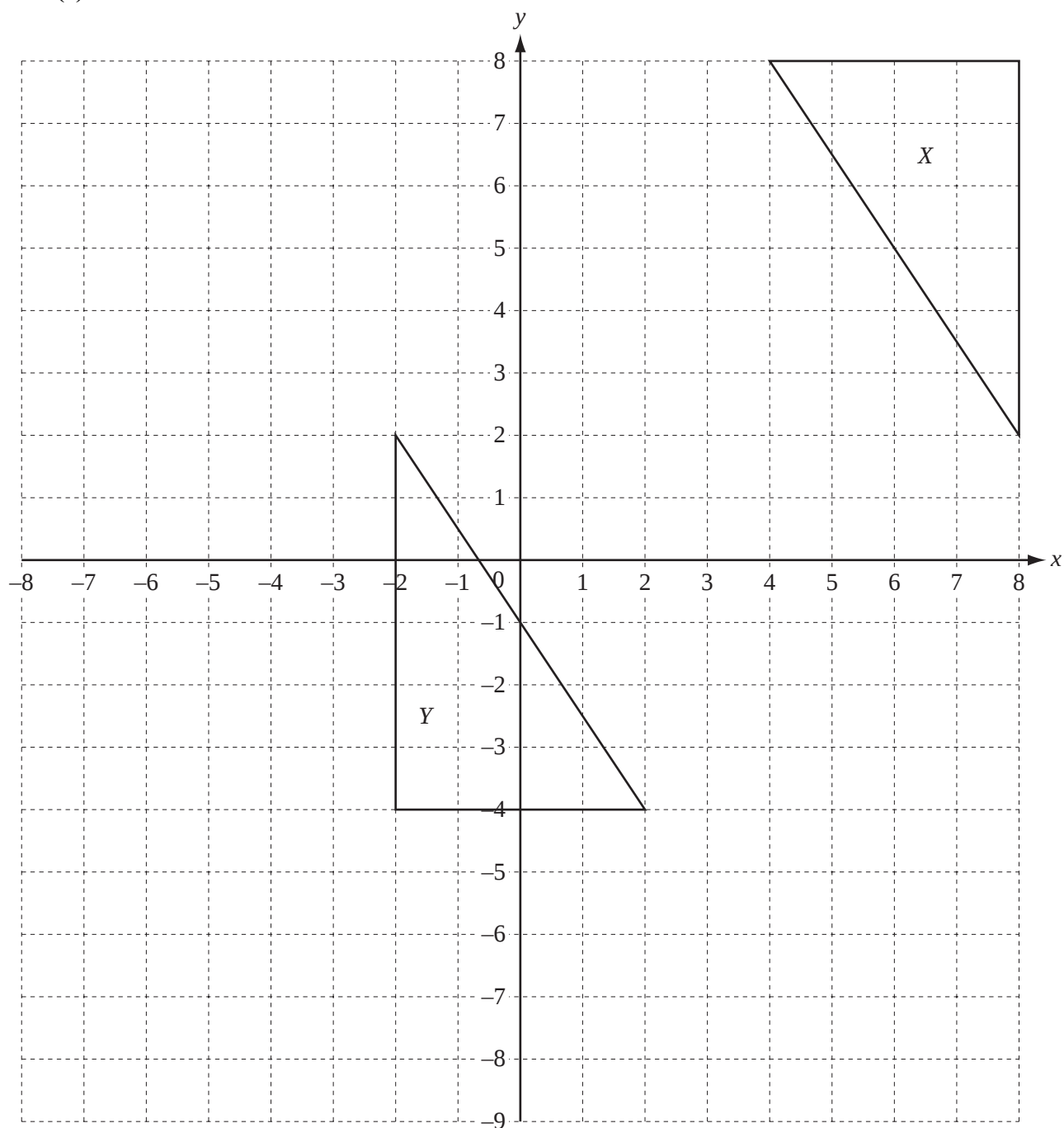
cost of first gift : cost of second gift.

Give your answer in its simplest form.

Answer(b)(ii) : [2]

*For
Examiner's
Use*

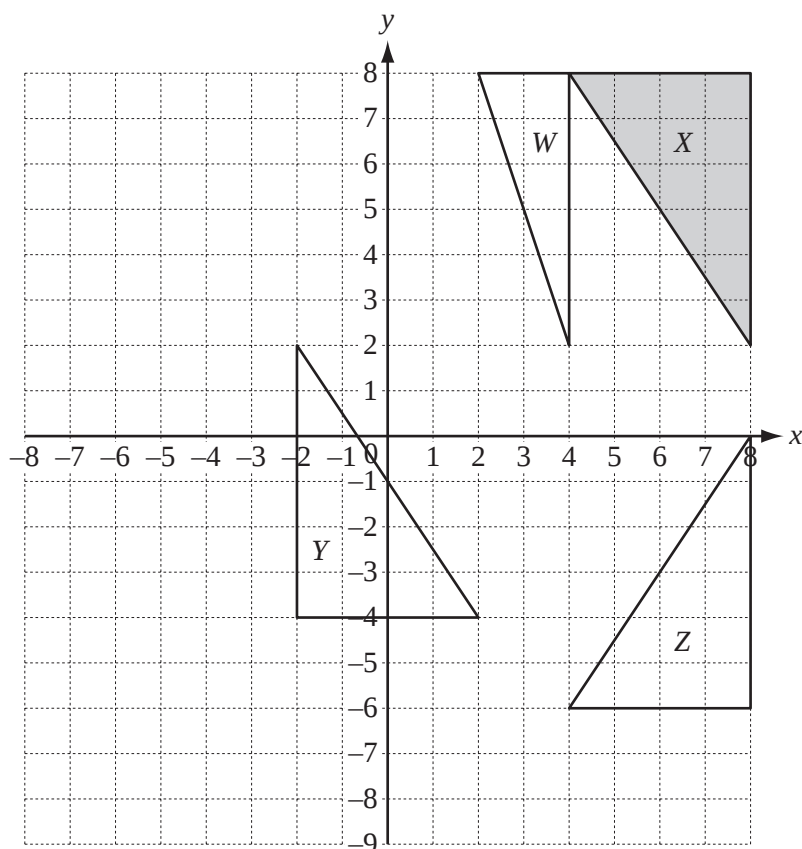
2 (a)

For
Examiner's
Use

(i) Draw the translation of triangle X by the vector $\begin{pmatrix} -11 \\ -1 \end{pmatrix}$. [2]

(ii) Draw the enlargement of triangle Y with centre $(-6, -4)$ and scale factor $\frac{1}{2}$. [2]

(b)



Describe fully the **single** transformation that maps

- (i) triangle X onto triangle Z ,

Answer(b)(i) [2]

- (ii) triangle X onto triangle Y ,

Answer(b)(ii) [3]

- (iii) triangle X onto triangle W .

Answer(b)(iii) [3]

- (c) Find the matrix that represents the transformation in **part (b)(iii)**.

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

- 3 A metal cuboid has a volume of 1080 cm^3 and a mass of 8 kg.

- (a) Calculate the mass of one cubic centimetre of the metal.
Give your answer in grams.

Answer(a) g [1]

- (b) The base of the cuboid measures 12 cm by 10 cm.

Calculate the height of the cuboid.

Answer(b) cm [2]

- (c) The cuboid is melted down and made into a sphere with radius r cm.

- (i) Calculate the value of r .

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

Answer(c)(i) $r =$ [3]

For
Examiner's
Use

- (ii) Calculate the surface area of the sphere.

[The surface area, A , of a sphere with radius r is $A = 4\pi r^2$.]

For
Examiner's
Use

Answer(c)(ii) cm^2 [2]

- (d) A larger sphere has a radius R cm.

The surface area of this sphere is double the surface area of the sphere with radius r cm in **part (c)**.

Find the value of $\frac{R}{r}$.

Answer(d) [2]

4

$$f(x) = \frac{2}{x^2} - 3x, \quad x \neq 0$$

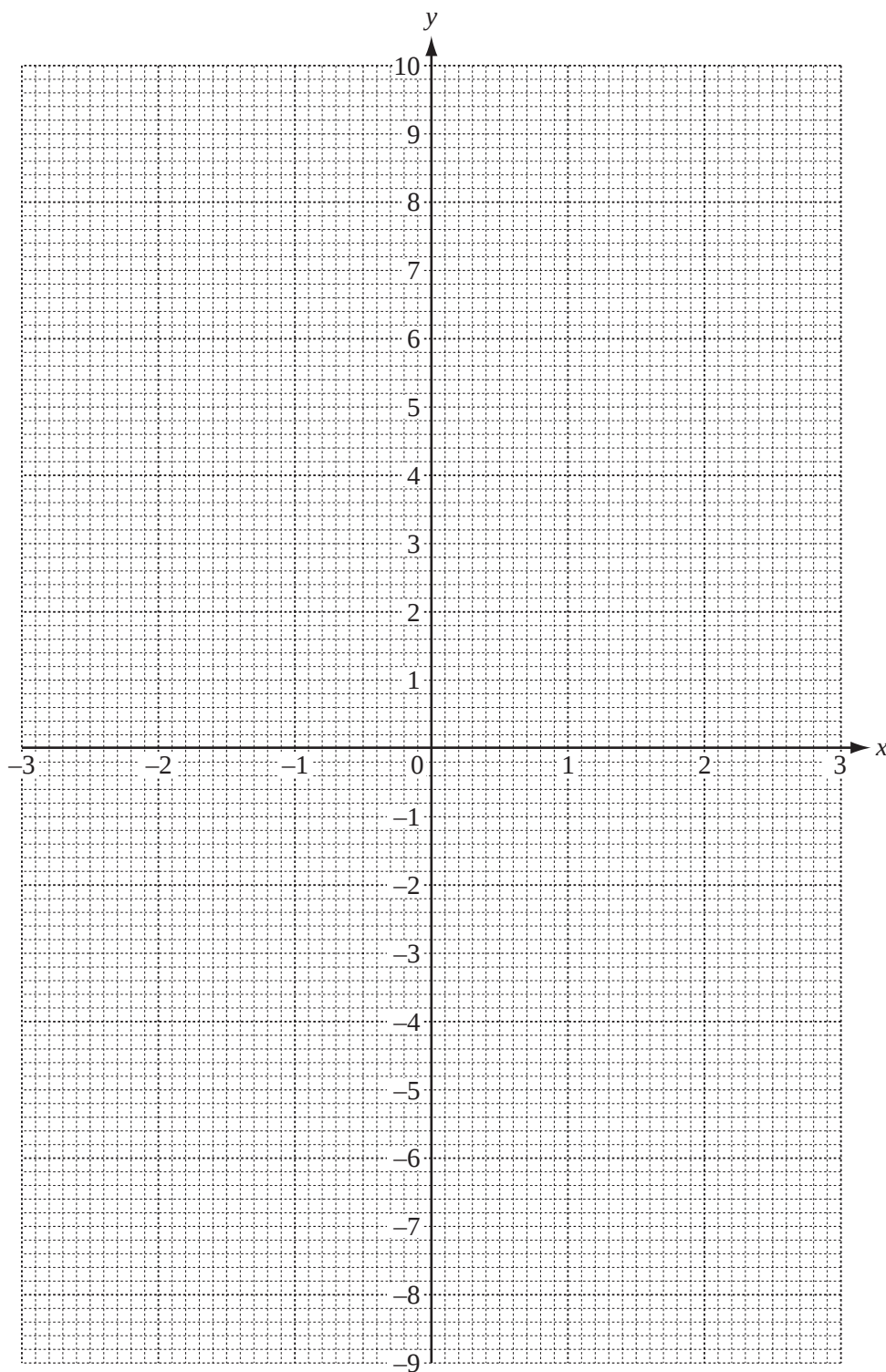
For
Examiner's
Use

(a) Complete the table.

x	-3	-2.5	-2	-1.5	-1	-0.5	0.5	1	1.5	2	2.5	3
$f(x)$	9.2	7.8	6.5	5.4		9.5	6.5		-3.6	-5.5	-7.2	-8.8

[2]

(b) On the grid, draw the graph of $y = f(x)$, for $-3 \leq x \leq -0.5$ and $0.5 \leq x \leq 3$.



[5]

(c) Use your graph to solve the equations.

(i) $f(x) = 4$

Answer(c)(i) $x =$ [1]

(ii) $f(x) = 3x$

Answer(c)(ii) $x =$ [2]

(d) The equation $f(x) = 3x$ can be written as $x^3 = k$.

Find the value of k .

Answer(d) $k =$ [2]

(e) (i) Draw the straight line through the points $(-1, 5)$ and $(3, -9)$. [1]

(ii) Find the equation of this line.

Answer(e)(ii) [3]

(iii) Complete the statement.

The straight line in **part (e)(ii)** is a to the graph of $y = f(x)$. [1]

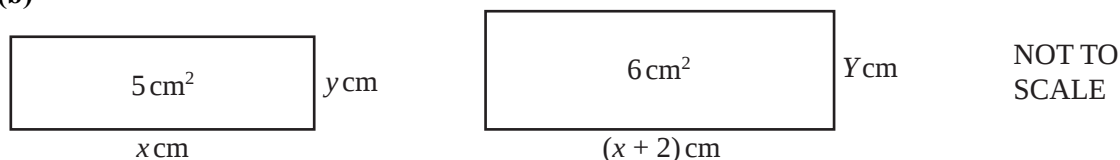
For
Examiner's
Use

- 5 (a) Marcos buys 2 bottles of water and 3 bottles of lemonade.
 The total cost is \$3.60.
 The cost of one bottle of lemonade is \$0.25 more than the cost of one bottle of water.
 Find the cost of one bottle of water.

For
Examiner's
Use

Answer(a) \$ [4]

(b)



The diagram shows two rectangles.
 The first rectangle measures x cm by y cm and has an area of 5 cm^2 .
 The second rectangle measures $(x + 2)$ cm by Y cm and has an area of 6 cm^2 .

- (i) When $y + Y = 1$, show that $x^2 - 9x - 10 = 0$.

Answer (b)(i)

[4]

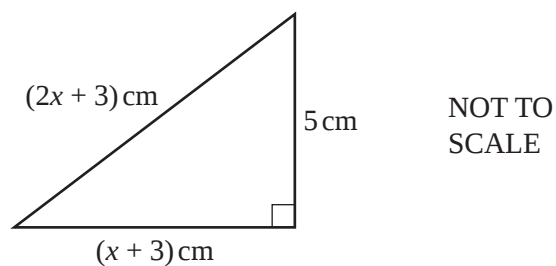
- (ii) Factorise $x^2 - 9x - 10$.

Answer(b)(ii) [2]

- (iii) Calculate the perimeter of the first rectangle.

Answer(b)(iii) cm [2]

(c)



The diagram shows a right-angled triangle with sides of length 5 cm, $(x + 3)$ cm and $(2x + 3)$ cm.

- (i) Show that $3x^2 + 6x - 25 = 0$.

Answer (c)(i)

[4]

- (ii) Solve the equation $3x^2 + 6x - 25 = 0$.
Show all your working and give your answers correct to 2 decimal places.

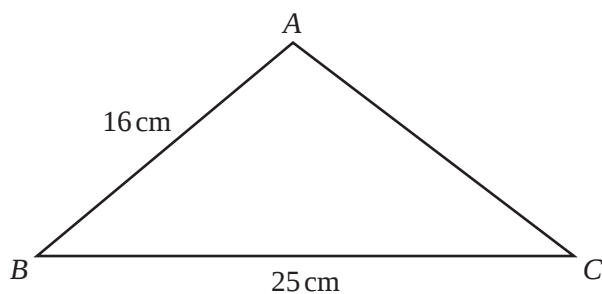
Answer(c)(ii) $x =$ or $x =$ [4]

- (iii) Calculate the area of the triangle.

Answer(c)(iii) cm^2 [2]

*For
Examiner's
Use*

6

For
Examiner's
UseNOT TO
SCALE

The area of triangle ABC is 130 cm^2 .
 $AB = 16 \text{ cm}$ and $BC = 25 \text{ cm}$.

- (a) Show clearly that angle $ABC = 40.5^\circ$, correct to one decimal place.

Answer (a)

[3]

- (b) Calculate the length of AC .

Answer(b) $AC = \dots\dots\dots \text{ cm}$ [4]

- (c) Calculate the shortest distance from A to BC .

Answer(c) $\dots\dots\dots \text{ cm}$ [2]

7 (a)



Two discs are chosen at random **without** replacement from the five discs shown in the diagram.

- (i) Find the probability that both discs are numbered 2.

Answer(a)(i) [2]

- (ii) Find the probability that the numbers on the **two** discs have a total of 5.

Answer(a)(ii) [3]

- (iii) Find the probability that the numbers on the two discs do **not** have a total of 5.

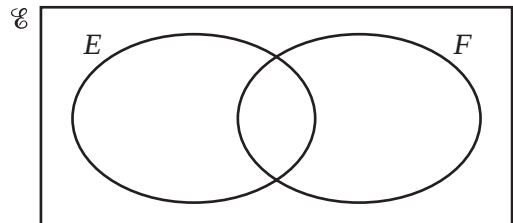
Answer(a)(iii) [1]

- (b) A group of international students take part in a survey on the nationality of their parents.

$E = \{\text{students with an English parent}\}$

$F = \{\text{students with a French parent}\}$

$n(\mathcal{E}) = 50$, $n(E) = 15$, $n(F) = 9$ and $n(E \cup F)' = 33$.



- (i) Find $n(E \cap F)$.

Answer(b)(i) [1]

- (ii) Find $n(E' \cup F)$.

Answer(b)(ii) [1]

- (iii) A student is chosen at random.
Find the probability that this student has an English parent and a French parent.

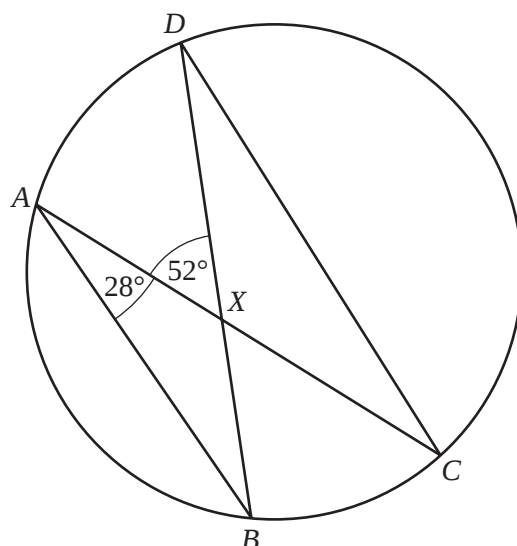
Answer(b)(iii) [1]

- (iv) A student who has a French parent is chosen at random.
Find the probability that this student also has an English parent.

Answer(b)(iv) [1]

For
Examiner's
Use

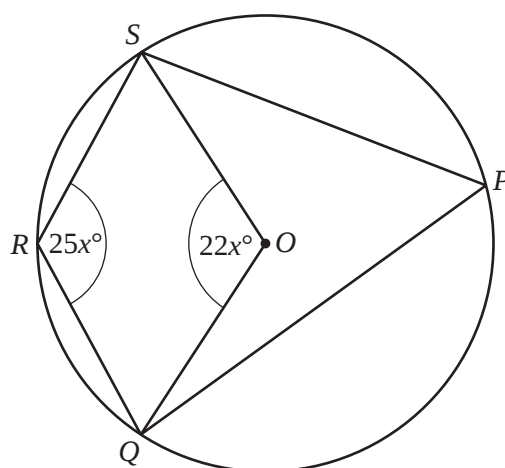
8 (a)

For
Examiner's
UseNOT TO
SCALE

A, B, C and D lie on a circle.
The chords AC and BD intersect at X .
Angle $BAC = 28^\circ$ and angle $AXD = 52^\circ$.
Calculate angle XCD .

Answer(a) Angle $XCD = \dots\dots\dots$ [3]

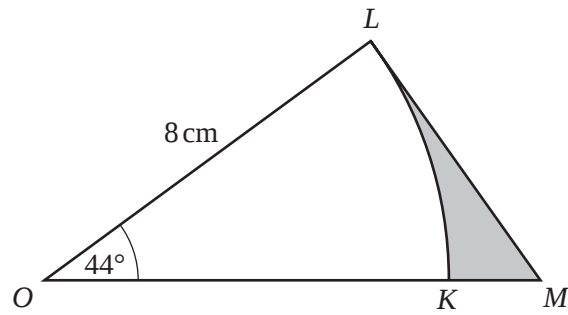
(b)

NOT TO
SCALE

$PQRS$ is a cyclic quadrilateral in the circle, centre O .
Angle $QOS = 22x^\circ$ and angle $QRS = 25x^\circ$.
Find the value of x .

Answer(b) $x = \dots\dots\dots$ [3]

(c)

NOT TO
SCALE

In the diagram OKL is a sector of a circle, centre O and radius 8 cm.
 OKM is a straight line and ML is a tangent to the circle at L .
 Angle $LOK = 44^\circ$.

Calculate the area shaded in the diagram.

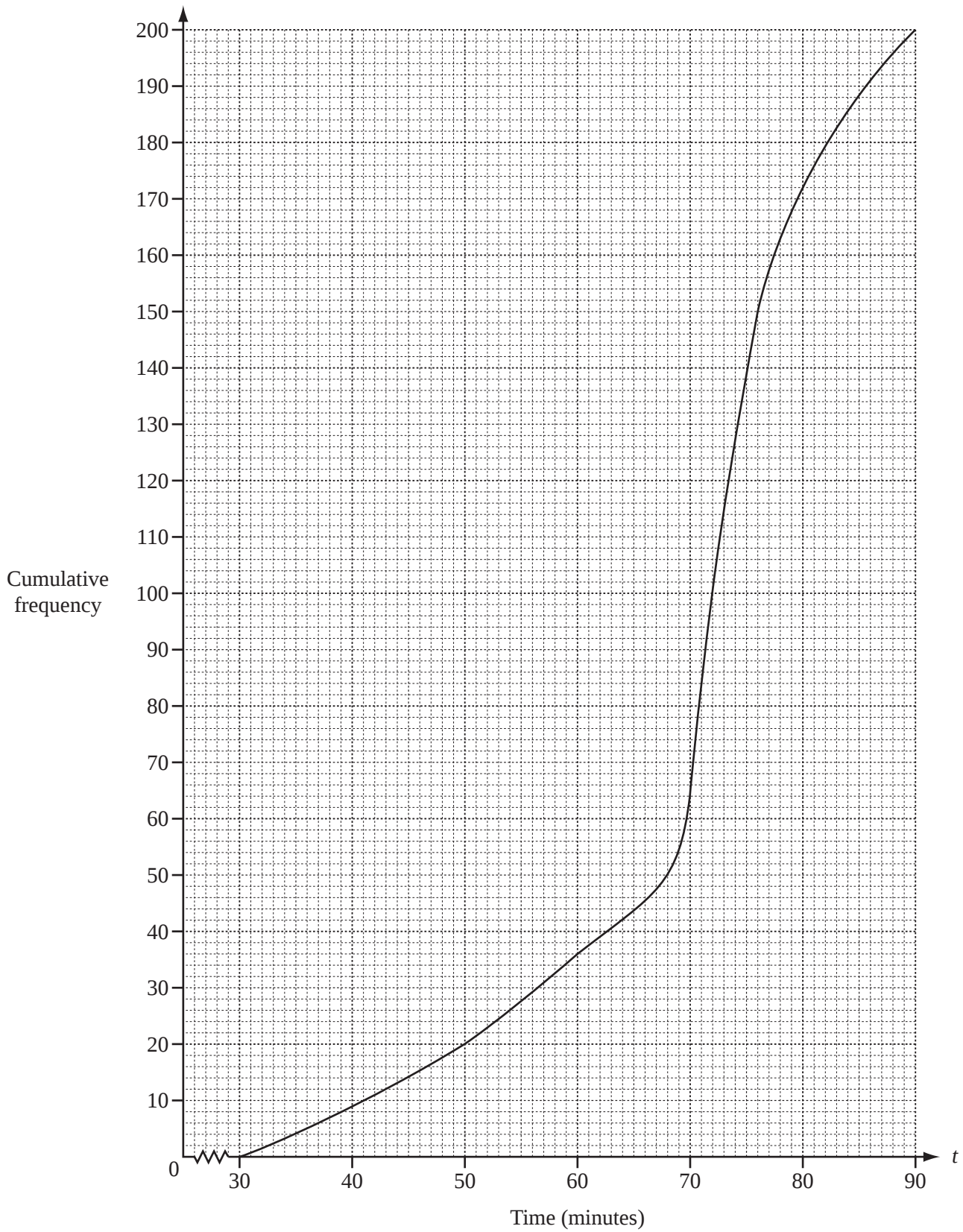
Answer(c) cm^2 [5]

For
Examiner's
Use

- 9 200 students take a Mathematics examination.

The cumulative frequency diagram shows information about the times taken, t minutes, to complete the examination.

*For
Examiner's
Use*



(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]

(iv) the number of students who took more than 1 hour.

Answer(a)(iv) [2]

(b) (i) Use the cumulative frequency diagram to complete the grouped frequency table.

Time, t minutes	$30 < t \leq 40$	$40 < t \leq 50$	$50 < t \leq 60$	$60 < t \leq 70$	$70 < t \leq 80$	$80 < t \leq 90$
Frequency	9		16	28	108	28

[1]

(ii) Calculate an estimate of the mean time taken by the 200 students to complete the examination.

Show all your working.

Answer(b)(ii) min [4]

- 10 (a) Complete the table for the 6th term and the n th term in each sequence.

	Sequence	6th term		n th term
A	11, 9, 7, 5, 3			
B	1, 4, 9, 16, 25			
C	2, 6, 12, 20, 30			
D	3, 9, 27, 81, 243			
E	1, 3, 15, 61, 213			

[12]

- (b) Find the value of the 100th term in

(i) Sequence A ,

Answer(b)(i) [1]

(ii) Sequence C .

Answer(b)(ii) [1]

For
Examiner's
Use

- (c) Find the value of n in Sequence D when the n th term is equal to 6561.

For
Examiner's
Use

Answer(c) $n =$ [1]

- (d) Find the value of the 10th term in Sequence E .

Answer(d) [1]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.