Surname		Centre Number	Candidate Number
Other Names			0

GCSE

WJEC CBAC

4370/05

MATHEMATICS – LINEAR
PAPER 1
HIGHER TIER

P.M. MONDAY, 11 June 2012

2 hours

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**(a).

JD*(S12-4370-05)

Formula List

Area of trapezium = $\frac{1}{2}(a+b)h$
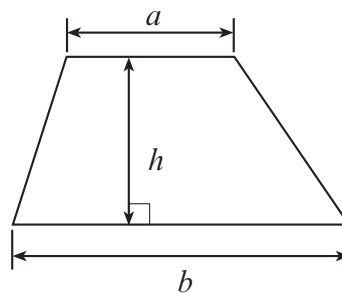
Volume of prism = area of cross-section × length
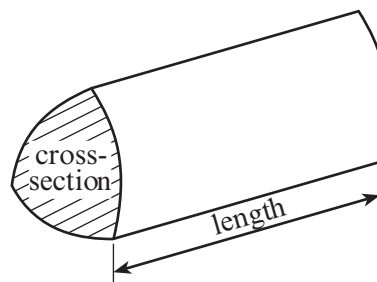
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$
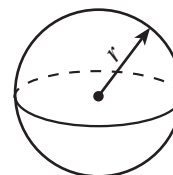
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$
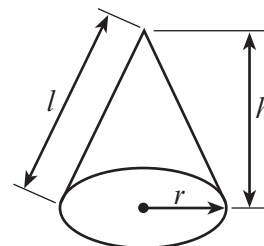
In any triangle ABC

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$
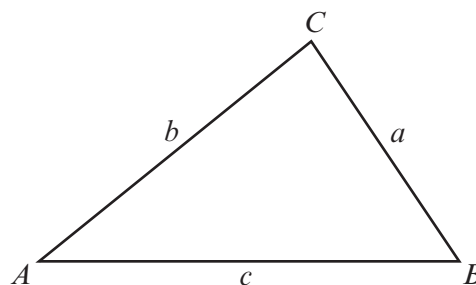
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

1.
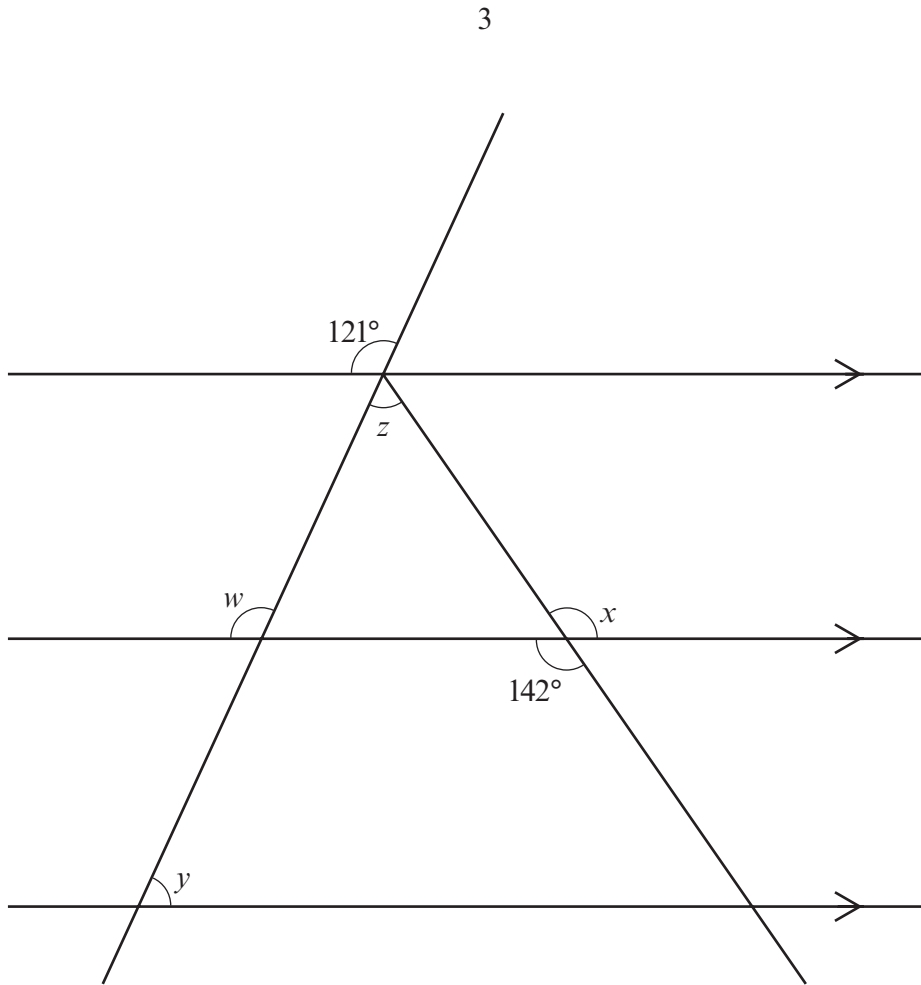
Diagram not drawn to scale

Find the size of each of the angles *w, x, y* and *z*.

....

....

....

....

$w =$ ....$^{\circ}$

$x =$ ....$^{\circ}$

$y =$ ....$^{\circ}$

$z =$ ....$^{\circ}$

[4]

2. *(a)* *You will be assessed on the quality of your written communication in this part of the question.*

Enzo is given clues to help him solve a problem.

Clues:

- The shape is a polygon
- The shape has an odd number of sides
- The shape is not a triangle
- The shape has fewer than 7 sides
- Three of the interior angles each measure 106°
- All the other angles are marked with the letter x

Solve Enzo's problem to find the size of x.

....

....

....

....

....

....

....

....

....

....

....

....

[8]

(b)
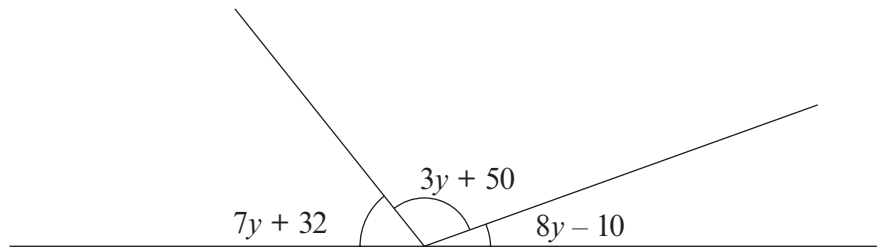
Diagram not drawn to scale

All of the angles are measured in degrees.

Find the size of each of the three angles.

....

....

....

....

....

....

....

....

$7y + 32 =$ ....° $3y + 50 =$ ....° $8y - 10 =$ ....°

[5]

3. *(a)* On the grid below, draw an enlargement of the triangle using a scale factor of 2 and centre *O*.

[3]
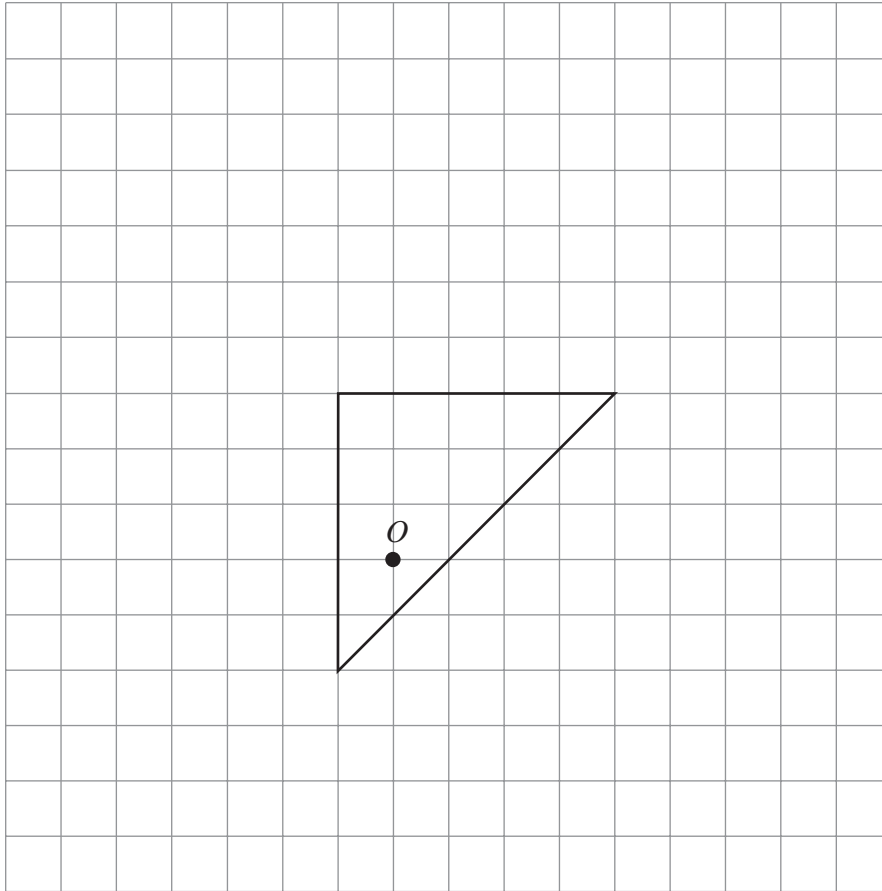
(b) Rotate the triangle *A* through 90° clockwise about the origin.

[2]

(4370-05)

(c)

North

$145°$

R

T

P
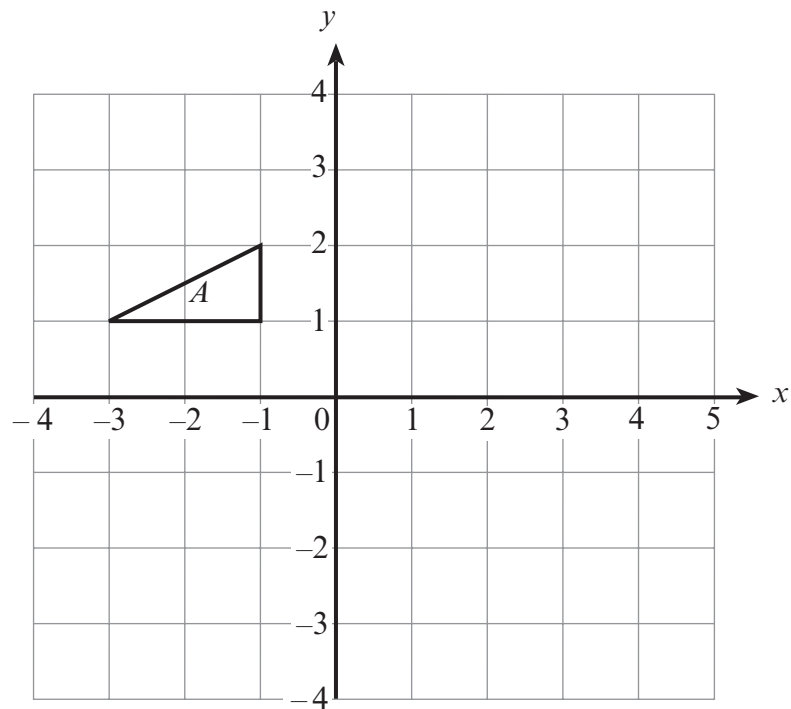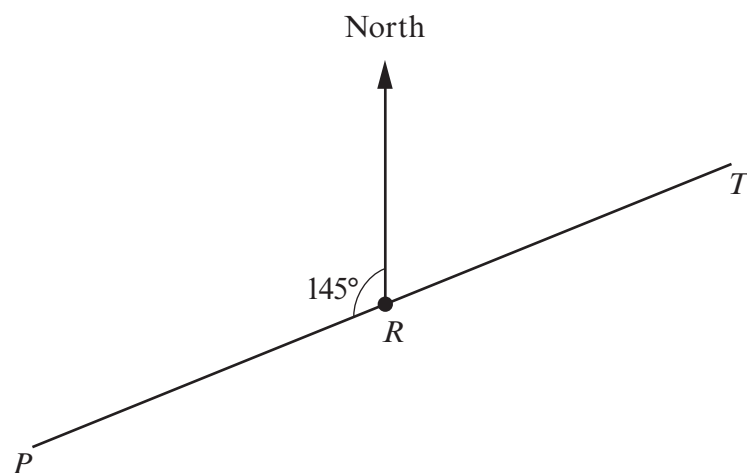
Diagram not drawn to scale

The above diagram shows three points *P*, *R* and *T* which lie on a straight line.
The bearing of *T* from *R* is 035°.
Calculate the bearing of *P* from *R*.

....

....

[2]

0 7

4. *(a)* Expand $y(y^3 + 6)$.

....

....

[2]

(b) Solve $\frac{x}{3} + 54 = 63$.

....

....

....

....

[2]

(c) Solve $\frac{36 - x}{4} = 10$.

....

....

....

....

[3]

(d) Factorise $2x^2 - 4x$.

....

....

[2]

(e) Write down the nth term of the sequence 3, 7, 11, 15, 19, ...

....

....

[2]

5. *(a)* Freddy goes to buy a ticket for a concert.
A sign by the ticket office states "20% off all original ticket prices".
Freddy comes away having paid a reduced price of £36.80 for his ticket.
What was the original price of Freddy's ticket?

[3]

(b) Freddy is paid £x per hour.
How long, in minutes, will Freddy have to work for in order to earn £y? Give your answer in terms of x and y.

[2]

6. *(a)* Use the graph paper to find the coordinates of the point of intersection of the curve $y = x^2$ and the line $x + y = 8$ in the first quadrant.

....

....

....

....

....

[6]
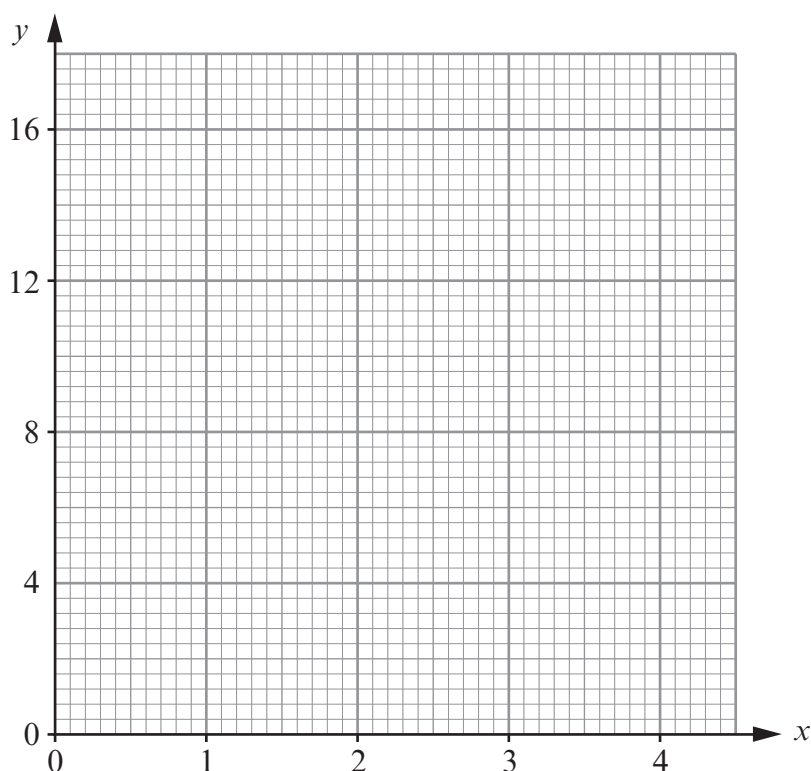
(b) **State** whether or not it is possible to find a point of intersection of the following straight lines. Show how you have made your decision and give a reason for your answer.

$$y = 3x + 4 \quad \text{and} \quad 9x - 3y = 13$$

....

....

....

....

....

....

[3]

7. Sasha works for a garden centre.
In any given week the probability that she works outdoors is 0·7.
The probability that she works during a weekend is 0·2.
Working outdoors and working weekends are independent events.

(a) Complete the following tree diagram.

Works outdoors   Works during a weekend

0·7 — Yes

0·2 — Yes

.... — No

.... — Yes

.... — No

No

....

.... — No
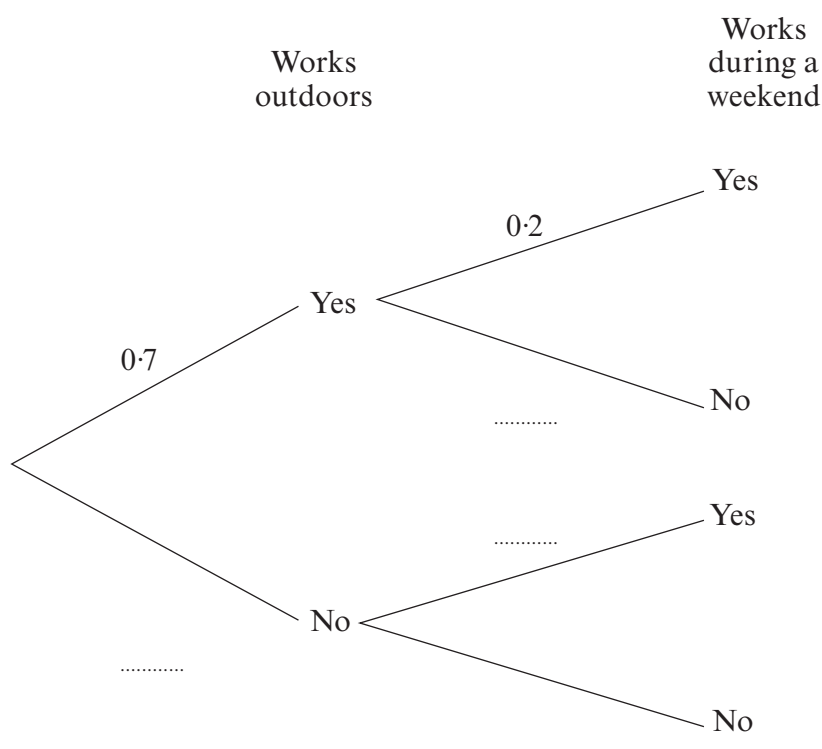
[2]

(b) Calculate the probability that next weekend Sasha will work outdoors.

....

....

....

[2]

8. *(a)* The total mass of tomatoes, in kg, produced by each of 200 plants in a greenhouse was measured.
The table shows the grouped frequency distribution for the total mass of tomatoes on each of these 200 plants.

Mass, x kg	$0 < x \leqslant 5$	$5 < x \leqslant 10$	$10 < x \leqslant 15$	$15 < x \leqslant 20$	$20 < x \leqslant 25$
Frequency	6	20	70	88	16

(i) On the graph paper below, draw a frequency diagram to show this data.

[2]

Frequency
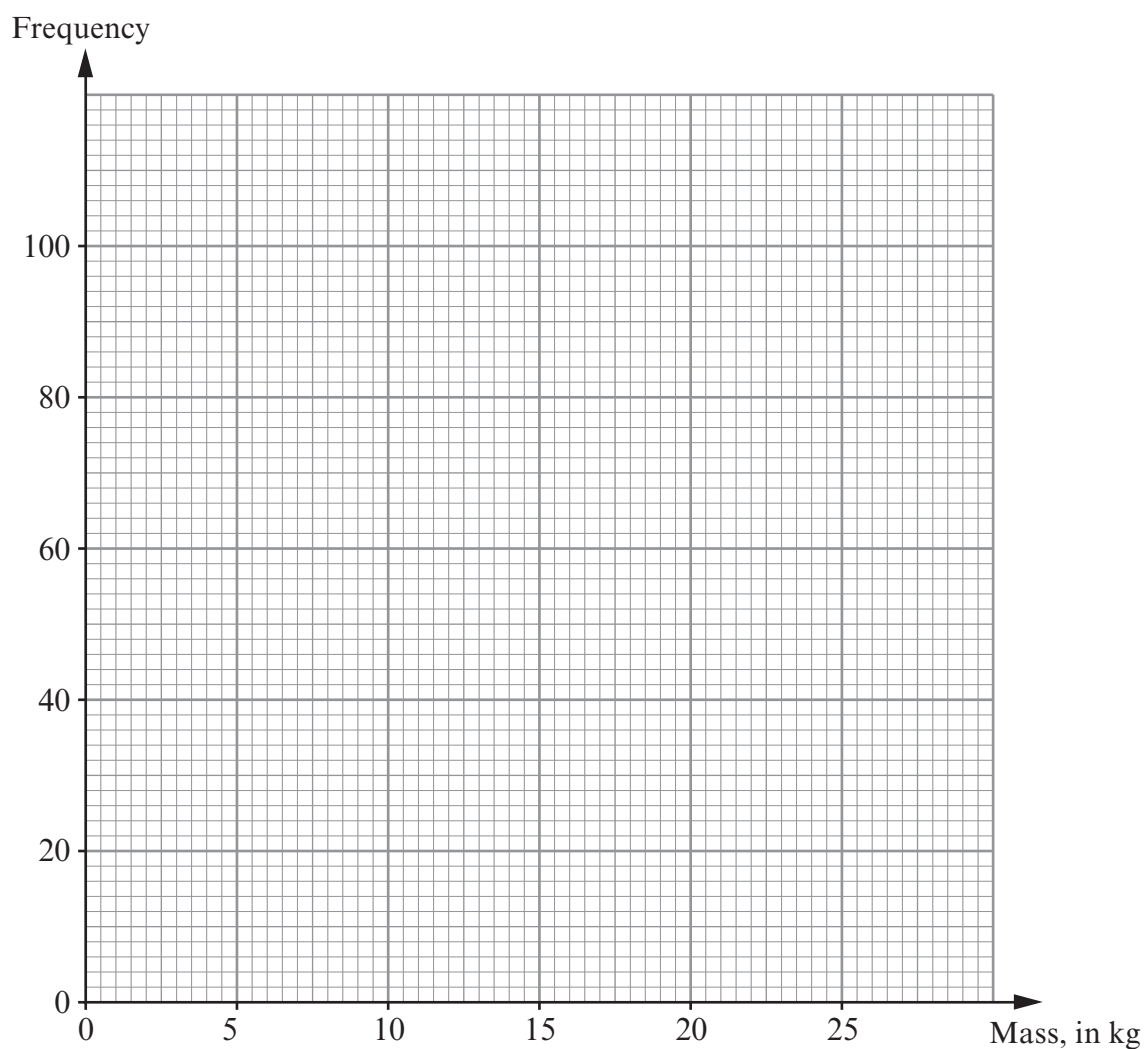
Mass, in kg

(ii) State which class interval contains the median.

....

[1]

(b) The total mass of tomatoes produced by each of 60 plants in a different greenhouse was measured. The following cumulative frequency graph illustrates the results.

Cumulative frequency
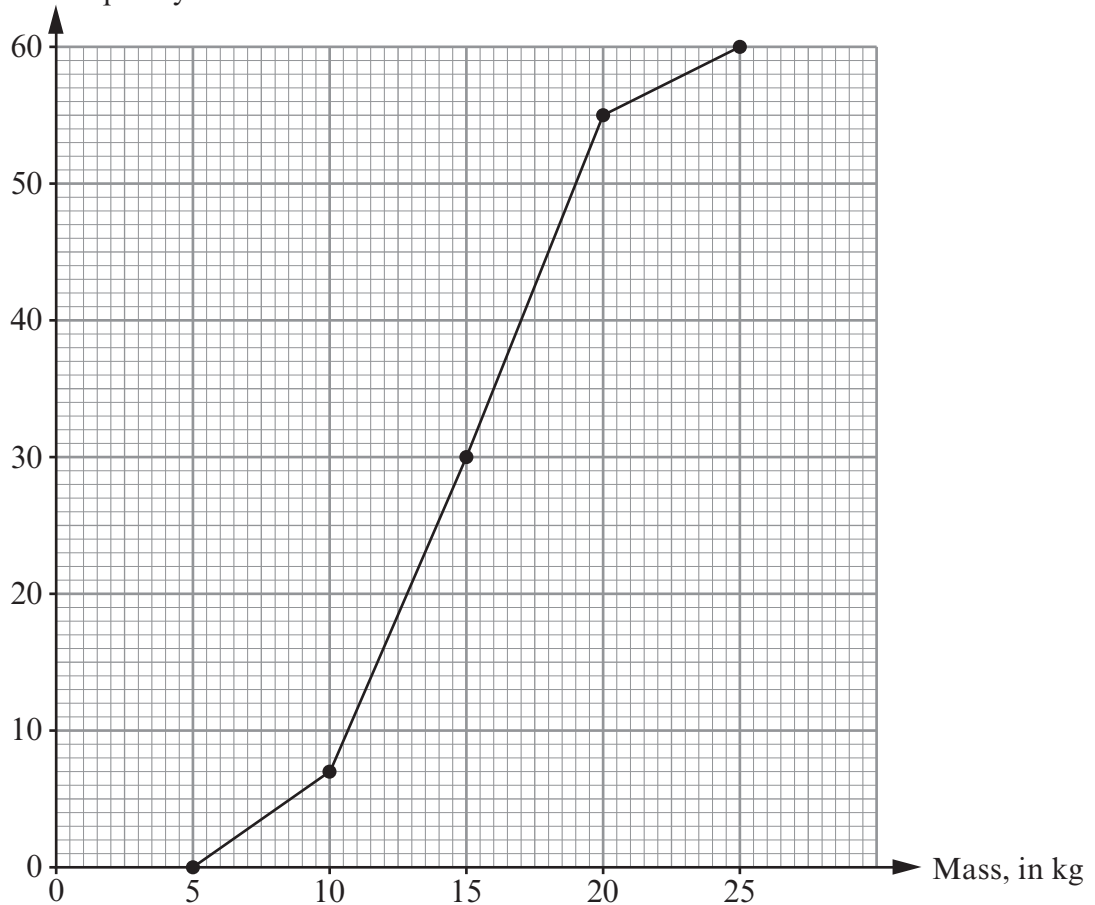
(i) Complete the grouped frequency table of the total mass of tomatoes on each plant.

Mass, x kg	$0 < x \leqslant 5$	$5 < x \leqslant 10$	$10 < x \leqslant 15$	$15 < x \leqslant 20$	$20 < x \leqslant 25$
Frequency	0	7			

....

....

[2]

(ii) Use the cumulative frequency diagram shown above to find estimates for each of the following.

The median.

....

The inter-quartile range.

....

....

[3]

(4370-05) **Turn over.**

Examiner
only

9. *(a)* Evaluate each of the following.

(i) $2^5 - 11^2$

....

....
[3]

(ii) 28^0

....
[1]

(iii) $81^{\frac{1}{4}} \times 25^{-\frac{1}{2}}$

....

....

....
[3]

(iv) $3{\cdot}4 \times 10^3 + 1{\cdot}2 \times 10^2$

....

....

....

....
[2]

(b) Estimate the value of $\dfrac{19{\cdot}843^2 \times 0{\cdot}249}{0{\cdot}0099}$.

....

....

....

....

....

....

....
[3]

(4370-05)

10. A cuboid with a volume of $912\,\text{cm}^3$ has dimensions $4\,\text{cm}$, $(x + 2)\,\text{cm}$ and $(x + 9)\,\text{cm}$.
Write down an equation in terms of x.
Hence, solve the equation to find the dimensions of the cuboid.

....

....

....

....

....

....

....

....

....

....

....

[7]

11. The coordinates of the point R are (a, b) where $a > 5$ and $b > 5$.
The point T is the reflection of the point R in the line $y = 1$.
Find the coordinates of the point T in terms of a and b.

....

....

....

....

....

....

....

[5]

12. *(a)* Find the value of $(\sqrt{45} - \sqrt{5})^2$.

....

....

....

[3]

(b) Express $0 \cdot 4\dot{7}\dot{8}$ as a fraction.

....

....

....

....

....

....

....

[2]

13. The points *A, B* and *C* lie on the circumference of a circle.

The straight line *PBT* is a tangent to the circle and $C\widehat{B}P = x$, where *x* is measured in degrees.
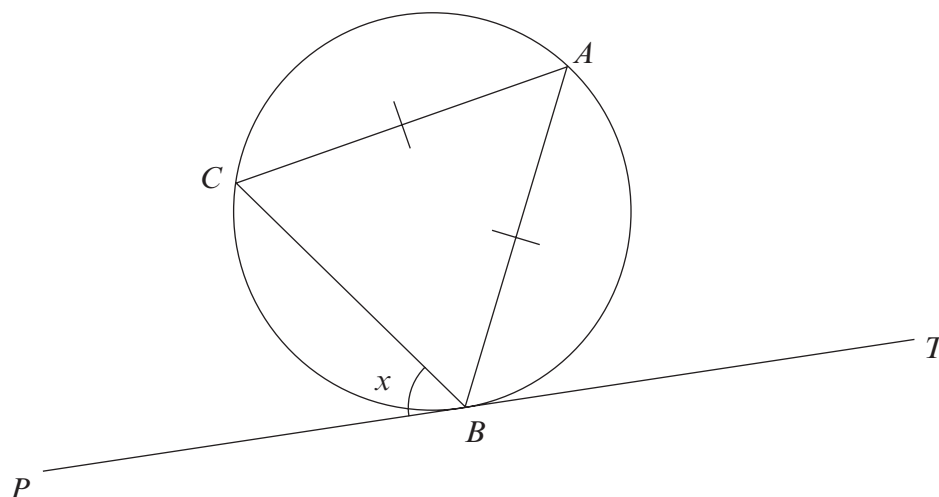
Diagram not drawn to scale

Show, giving reasons in your answer, that the size of $A\widehat{B}C$ in degrees is $90 - \frac{1}{2}x$.

....

....

....

....

....

....

....

....

[2]

14. The graph of $y = 25 - x^2$ has been drawn below.

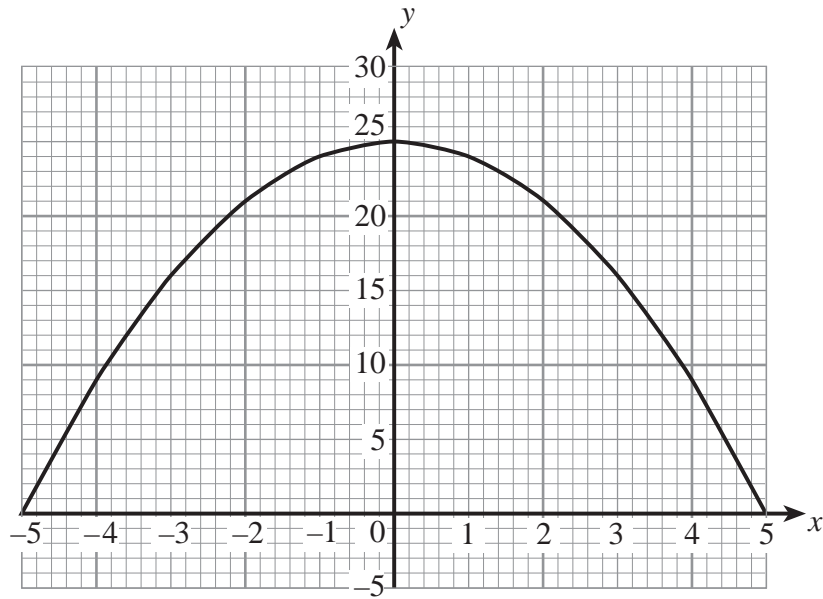

(a) Write down the gradient of the curve $y = 25 - x^2$ at $x = 0$.

....

[1]

(b) Find an estimate for the gradient of the curve $y = 25 - x^2$ at $x = 2$.

....

....

....

[3]

(c) Use the trapezium rule, with the ordinates $x = 0$, $x = 1$, $x = 2$, $x = 3$, $x = 4$ and $x = 5$, to estimate the area of the region bounded by the curve, the positive x-axis and the positive y-axis.

....

....

....

....

....

....

....

[4]

Question number	Additional page, if required. Write the question numbers in the left-hand margin	Examiner only

20