8. Given $f(x) = x^2 + 3x - 5$

Express $f(2x - 1)$ in the form $ax^2 + bx + c$

.....

(3)

---

9. The function f is such that $f(x) = kx + 3$

The function g is such that $g(x) = 2x - 4$

Given that $gf(2) = 34$

work out the value of k

.....

(3)

---

10. For all values of x,

$$f(x) = x^2 + 4$$
$$g(x) = x - 9$$

Solve $fg(x) = gf(x)$

.....

(4)

6. The line *l* is a tangent to the circle $x^2 + y^2 = 68$ at the point P.
P is the point (2, 8)

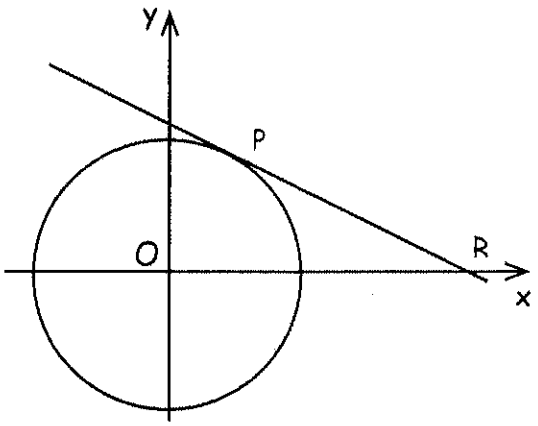
Work out the equation of the line *l*

.....

(3)

---

7. The diagram shows the circle $x^2 + y^2 = 17$



P lies on the circle and has x-coordinate 1.
The tangent at P intersects the x-axis at R.

Work out the coordinates of R

.....

(5)

5. Solve the inequality $x^2 > 4(8 - x)$

.....

(4)

---

6. Solve the inequality $3x^2 - 5x - 1 < 4x^2 + 7x + 19$

.....

(4)

---

7. Solve the inequality $2x^2 + 9x + 10 > 0$

.....

(4)

---

8. Solve the inequality $7x^2 - 22x + 16 \leq 0$

.....

(4)

8. Here are the first 5 terms of a quadratic sequence

9 17 29 45 65

Find an expression, in terms of n, for the nth term of this quadratic sequence.

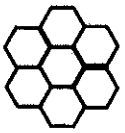
.....

(3)

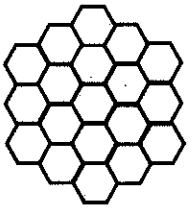
9. Here is a tile.

Here is a sequence of patterns made from these tiles.

Pattern 1



Pattern 2



Pattern 3

How many of these tiles are needed to make Pattern number 10?

.....

(5)

5. An approximate solution to an equation is found using this iterative process:

$$x_{n+1}=\frac{(x_n)^3-3}{8} \quad \text{and} \quad x_1=-1$$

a) Work out the values of x_2 and x_3

.... (2)

b) Work out the solution to 6 decimal places

..... (1)

8.

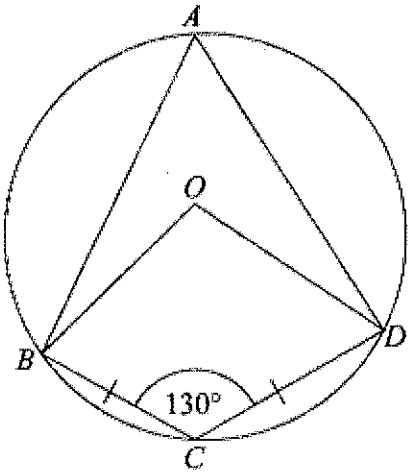


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
BC = *CD*.
Angle *BCD* = 130°.

(a) Write down the size of angle *BAD*.
Give a reason for your answer.

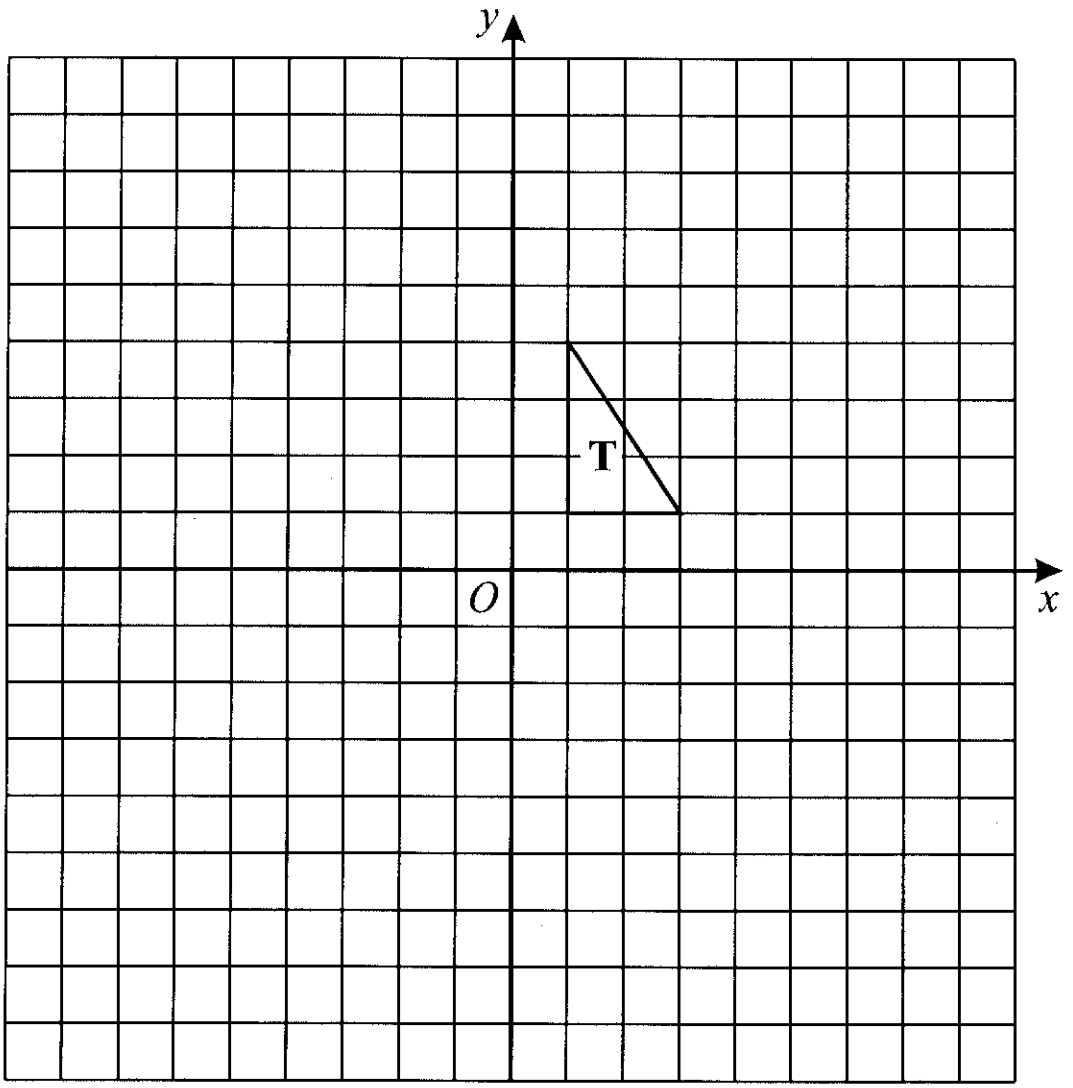
.....°
(2)

(b) Work out the size of angle *ODC*.
Give reasons for your answer.

.....°
(4)

(6 marks)

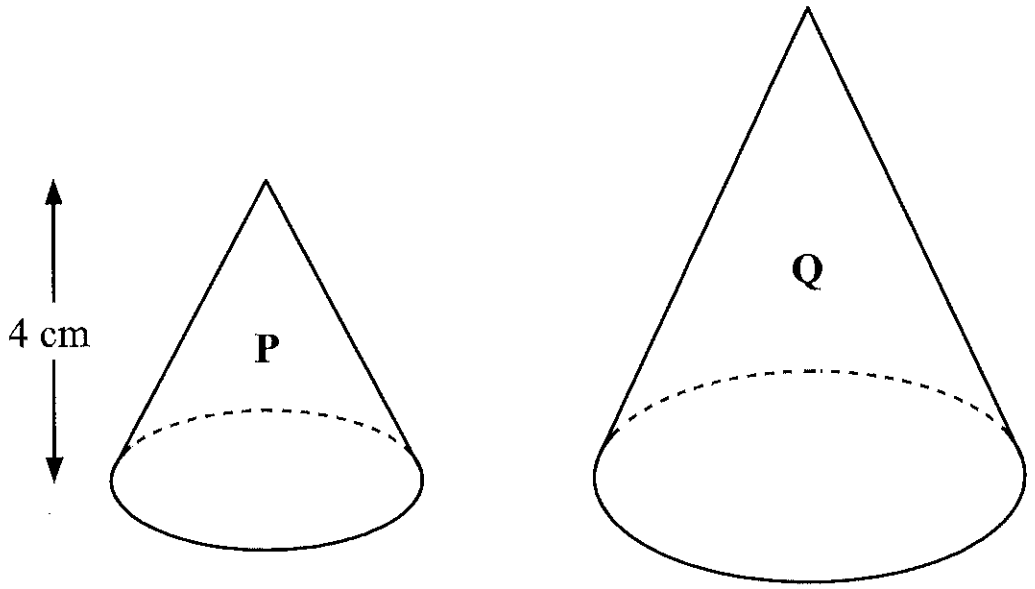
7.



Enlarge triangle **T**, scale factor –2, centre *O*.

(Total 2 marks)

7.



Two cones, P and Q, are mathematically similar.

The total surface area of cone P is 24 cm^2.
The total surface area of cone Q is 96 cm^2.

The height of cone P is 4 cm.

(a) Work out the height of cone Q.

..... cm (3)

The volume of cone P is 12cm^3

(b) Work out the volume of cone Q.

..... cm^3 (2)

7.

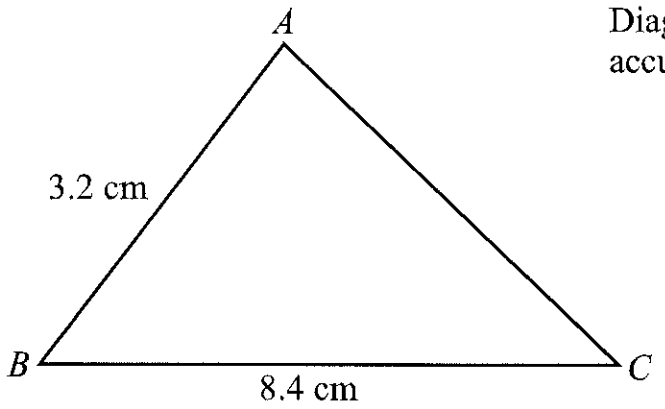


Diagram **NOT** accurately drawn

$AB = 3.2$ cm
$BC = 8.4$ cm

The area of triangle ABC is 10 cm^2.

Calculate the perimeter of triangle ABC.
Give your answer correct to three significant figures.

..... cm

(Total 6 marks)

3. The diagram shows a pyramid. The apex of the pyramid is V.

Each of the sloping edges is of length 6 cm.

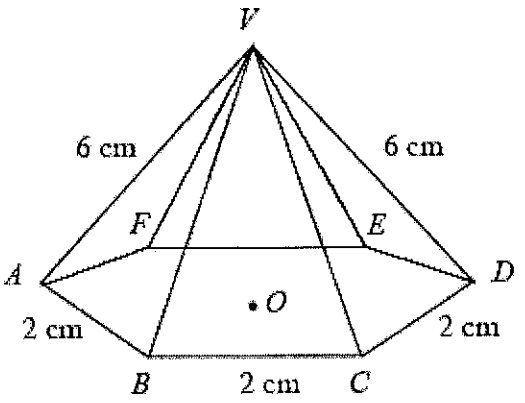


Diagram **NOT** accurately drawn

The base of the pyramid is a regular hexagon with sides of length 2 cm.

O is the centre of the base.

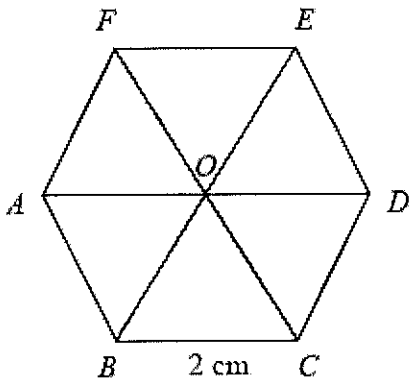


Diagram **NOT** accurately drawn

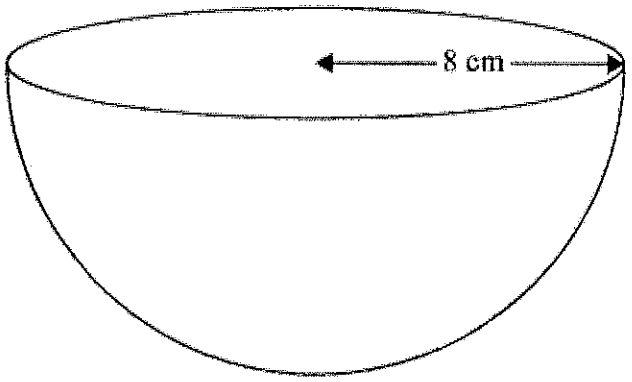
Calculate the height of V above the base of the pyramid.
Give your answer correct to 3 significant figures.

.....cm

(3)

5. The diagram shows a solid hemisphere of radius 8 cm.

Diagram **NOT** accurately drawn



Work out the total surface area of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 3 marks)

8.

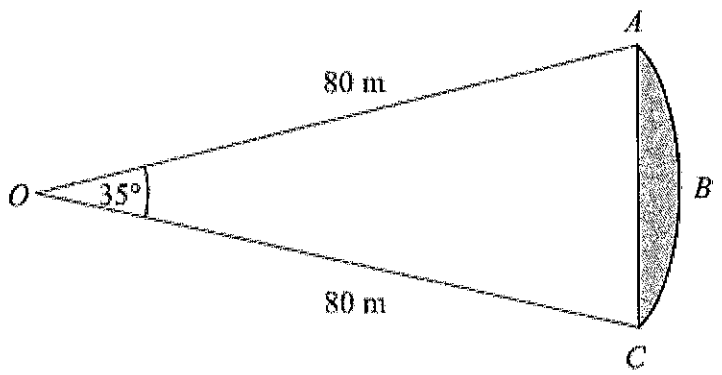


Diagram **NOT** accurately drawn

ABC is an arc of a circle centre *O* with radius 80 m.
AC is a chord of the circle.
Angle *AOC* = 35°.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... m^2

(Total 5 marks)

3.

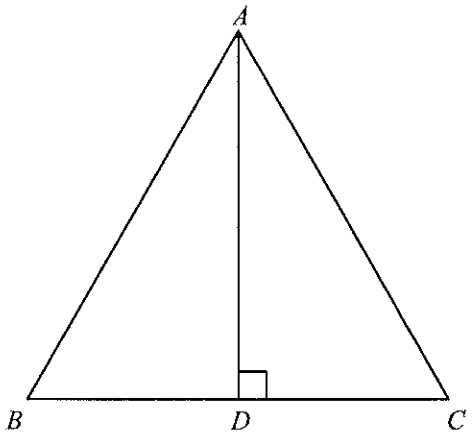


Diagram **NOT** accurately drawn

ABC is an equilateral triangle.
D lies on *BC*.
AD is perpendicular to *BC*.

Prove that triangle *ADC* is congruent to triangle *ADB*.

(Total 3 marks)

6.

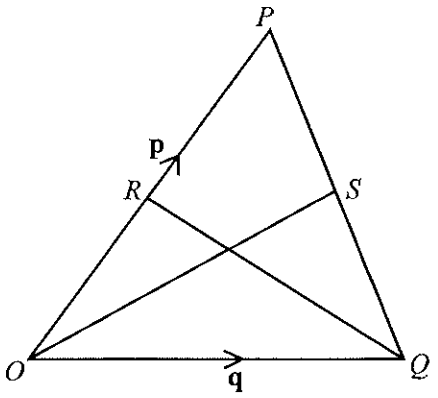


Diagram **NOT** accurately drawn

OPQ is a triangle.

R is the midpoint of OP.

S is the midpoint of PQ.

$\overrightarrow{OP} = p$ and $\overrightarrow{OQ} = q$

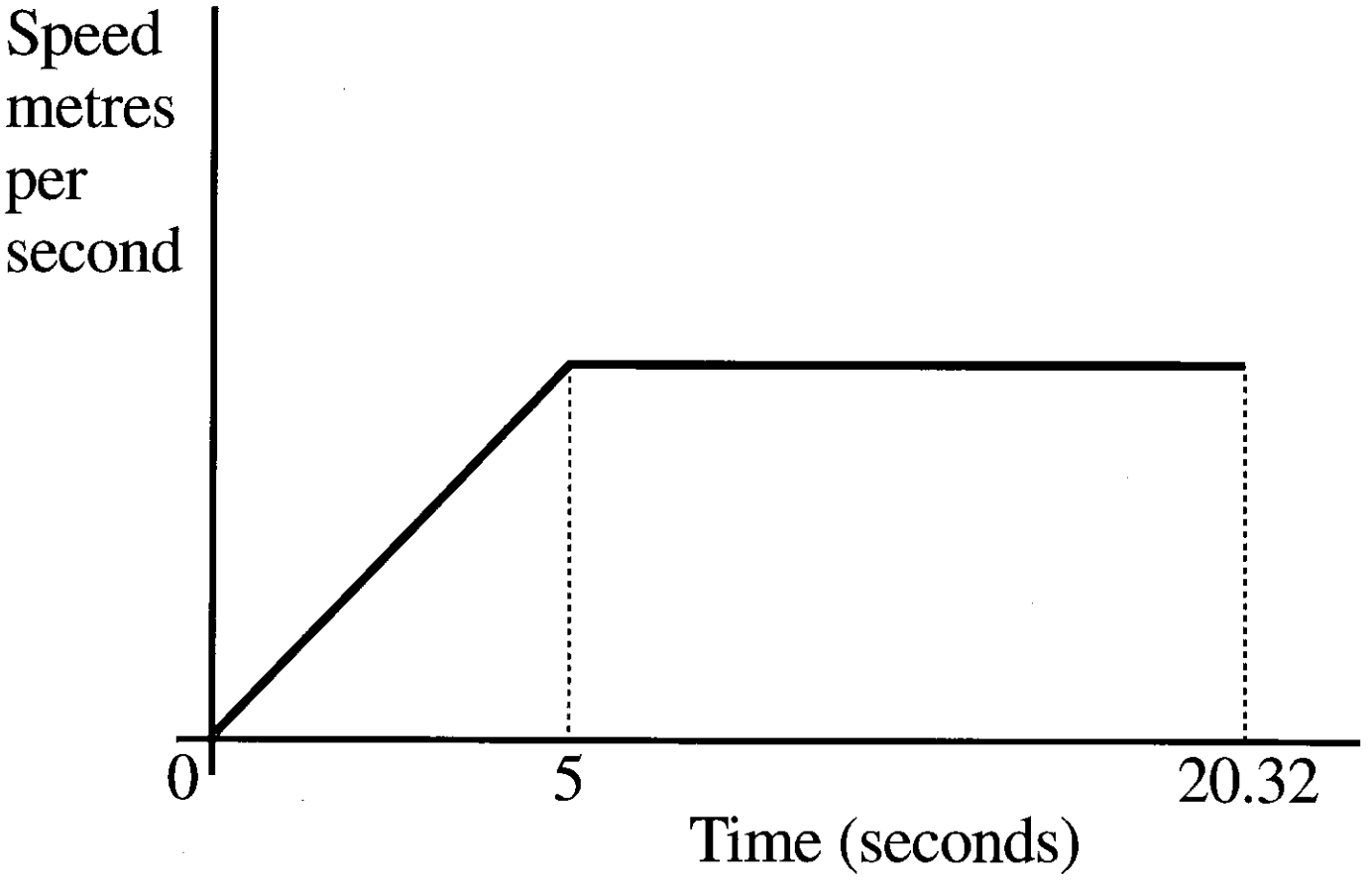
(i) Find $\overrightarrow{OS}$ in terms of p and q.

$\overrightarrow{OS}$ = ...

(ii)Show that RS is parallel to OQ.

(5 marks)

5. A sprinter runs a race of 200 m.
His total time for running the race is 20.32s.
Below is a sketch of the speed-time graph for the motion of the sprinter.



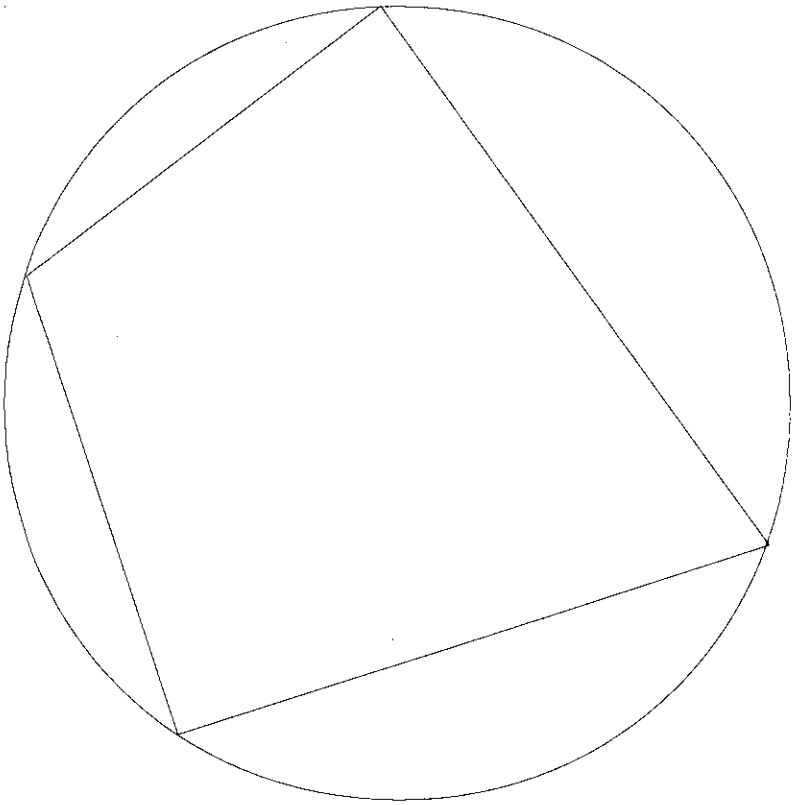
Calculate:

a) The maximum speed of the sprinter during the race

..... (4)

b) The distance covered by the sprinter in the first 5 seconds of the race

..... (2)



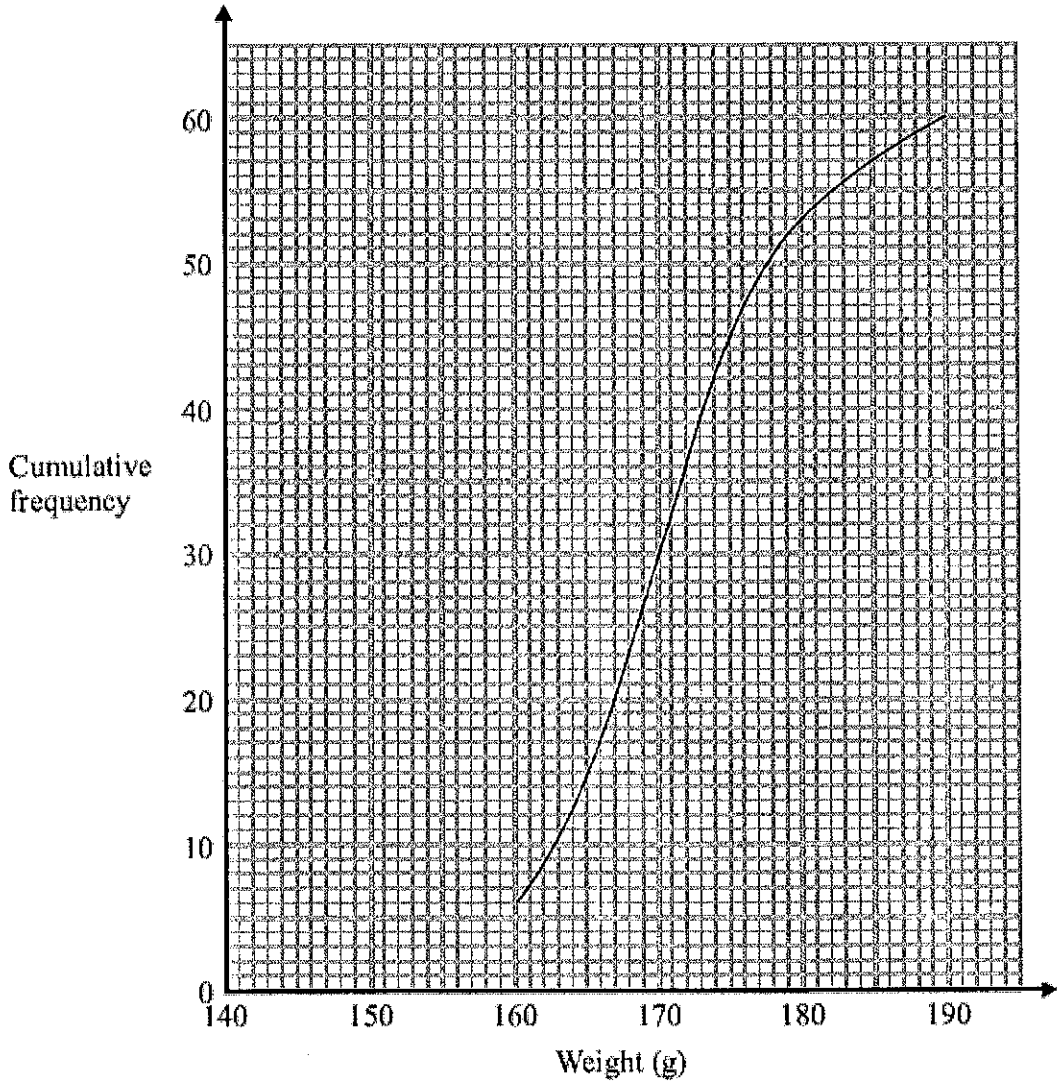
Prove that opposite angles of a cyclic quadrilateral sum to 180°

(4)

4. Harry grows tomatoes.
This year he put his tomato plants into two groups, group A and group B.

Harry gave fertiliser to the tomato plants in group A.
He did not give fertiliser to the tomato plants in group B.

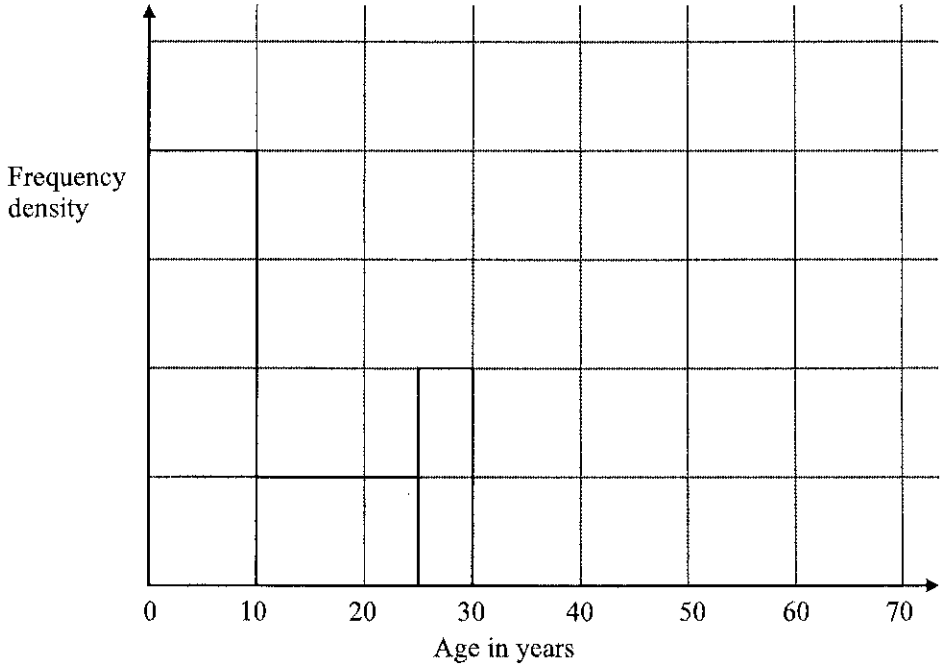
Harry weighed 60 tomatoes from group A.
The cumulative frequency graph shows some information about these weights.



(a) Use the graph to find an estimate for the median weight.

..... g
(1)

6. The incomplete table and histogram give some information about the ages of the people who live in a village.



(a) Use the information in the histogram to complete the frequency table below.

Age (x) in years	Frequency
$0 < x \leq 10$	160
$10 < x \leq 25$	
$25 < x \leq 30$	
$30 < x \leq 40$	100
$40 < x \leq 70$	120

(2)

(b) Complete the histogram.

(2)

(Total 4 marks)

4. There are three age groups in a competition.
The table shows the number of competitors in each age group.

16-18 years	19-24 years	25+ years
120	250	200

John wants to do a survey of the competitors.
He uses a stratified sample of exactly 50 competitors according to each age group.

Work out the number of competitors in each age group that should be in his stratified
sample of 50.

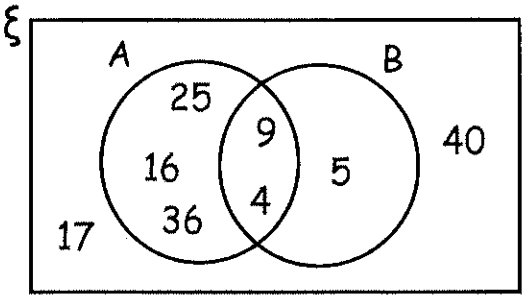
16-18 years: .....

19-24 years: .....

25+ years: .....

(Total 3 marks)

5. Here is a Venn diagram.



Write down the numbers that are in set

(a) $A \cap B$

.....

(1)

(b) $A \cup B$

.....

(1)

(c) A'

.....

(1)

One of the numbers in the diagram is chosen at random.

(d) Find the probability that the number is in set B'

.....

(1)