



MATHEMATICS PAPER 2

Time: 3 hours
Examiners: Miss Eastes,

150 marks
Moderators: Mrs. Jacobsz, Mrs. Rixon, Mrs. Thorne

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. Read the questions carefully. Answer all the questions.
2. Number your answers exactly as the questions are numbered.
3. You may use an approved, non-programmable, and non-graphical calculator, unless otherwise stated.
4. Round off your answers to **ONE DECIMAL PLACE**, where necessary unless otherwise indicated. All the necessary working details must be clearly shown.
5. It is in your own interest to write legibly and to present your work neatly.
6. Diagrams are not drawn to scale.
7. Please note that there is an information sheet provided.

Name: _____ Teacher: _____

Marking Grid (for Educators' use only)

Section A:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Marks Earned							
Total Marks	16	10	25	9	8	5	10

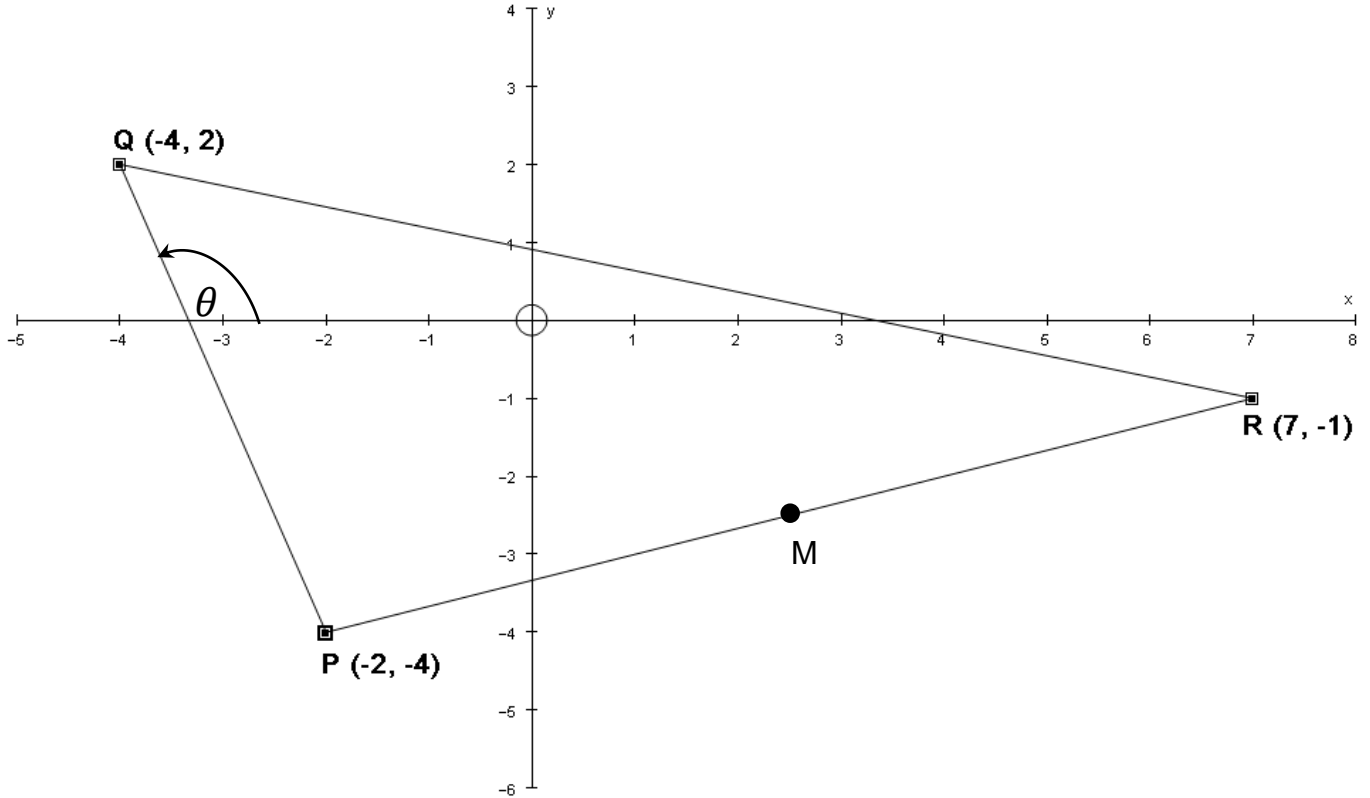
Section B:

	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	TOTAL
Marks Earned									
Total Marks	9	10	9	10	11	7	5	6	150

SECTION A

Question 1 [16]

$P(-2;-4)$, $Q(-4;2)$ and $R(7;-1)$ are vertices of ΔPQR in a Cartesian plane as shown below.
 θ is the angle of inclination of PQ .



1.1 Determine the distance of QR (Round off answer to 1 decimal place). (2)

1.2 Calculate the size of θ to the nearest degree. (5)

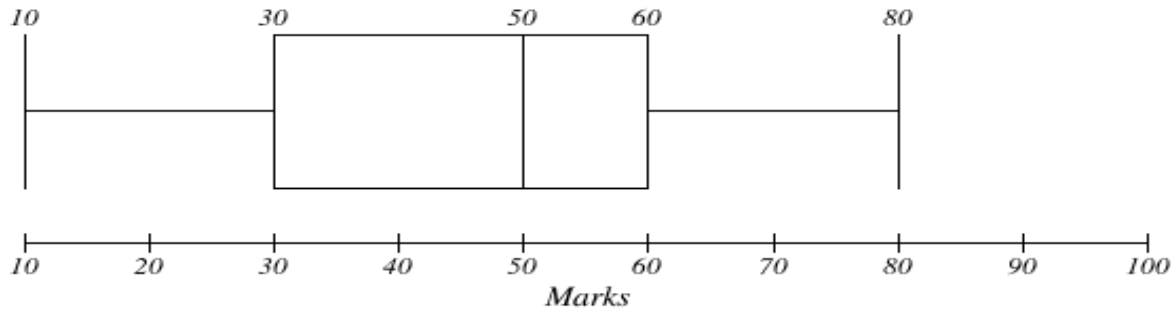
1.3 Determine the equation of a straight line that is perpendicular to PR and that passes through point M, the midpoint of PR. (7)

1.4 Prove that $\triangle PQR$ is right-angled. (2)

Question 2 [10]

Two mathematics classes, 11S and 11E, are in competition to see which class performed best in the recent trigonometry test. Below is a box and whisker diagram illustrating 11E's results as well as a table of 11 S's results. Both classes have 30 learners in them. (Marks are given as a %).

Box and Whisker Diagram for 11 E:



Marks for learners in 11S:

9	15	23	36	37	45
46	47	47	48	48	49
49	50	52	53	55	60
61	62	65	66	68	69
70	78	80	97	97	98

2.1 Write down the five-number summary for 11S. (5)

2.2 Draw the box and whisker diagram that represents 11S's marks . (3)

2.3 Determine which class did better in the trigonometry test, and give a reason for your conclusion. (2)

Question 3 [25]

3.1 Given: $\sin 34^\circ = t$. Without using a calculator, determine the value of the following in terms of t .

3.1.1 $\cos 56^\circ$ (2)

3.1.2 $\cos 34^\circ$ (3)

3.2 If $3\cos x + 2 = 0$ and $x \in [0^\circ; 180^\circ]$.

Without the use of a calculator and using a diagram, find the value of:

$9\sin x \cdot \cos x + 2\tan x$ (Leave your answer in simplest surd form) (4)

3.4 Prove, without the use of a calculator: $\frac{\sin 190^\circ \cos 225^\circ \tan 390^\circ}{\cos 100^\circ \sin 135^\circ} = -\frac{1}{\sqrt{3}}$ (6)

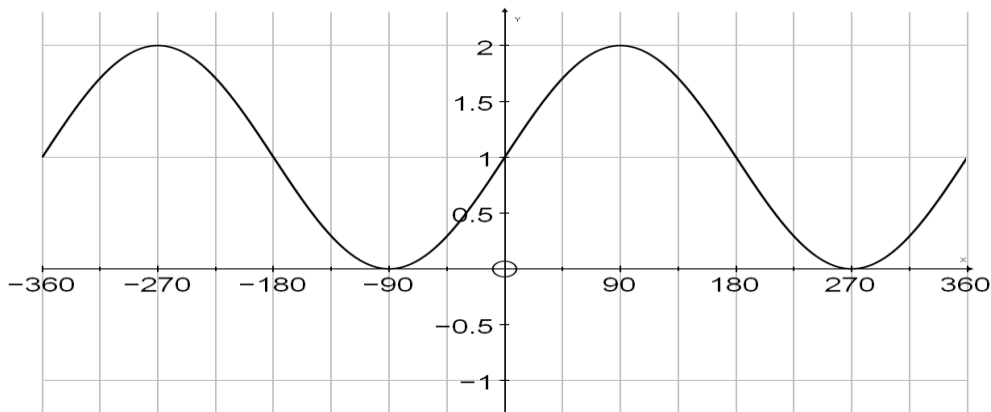
3.5 Prove that: $\frac{1 - 2 \sin^2 \theta}{\sin \theta \cos \theta} = \frac{\cos \theta}{\sin \theta} - \tan \theta$ (5)

3.6 Solve for θ if $\theta \in [-90^\circ; 90^\circ]$ and it is given that $\tan(2\theta - 10^\circ) = -3,28$ (5)

Question 4 [9]

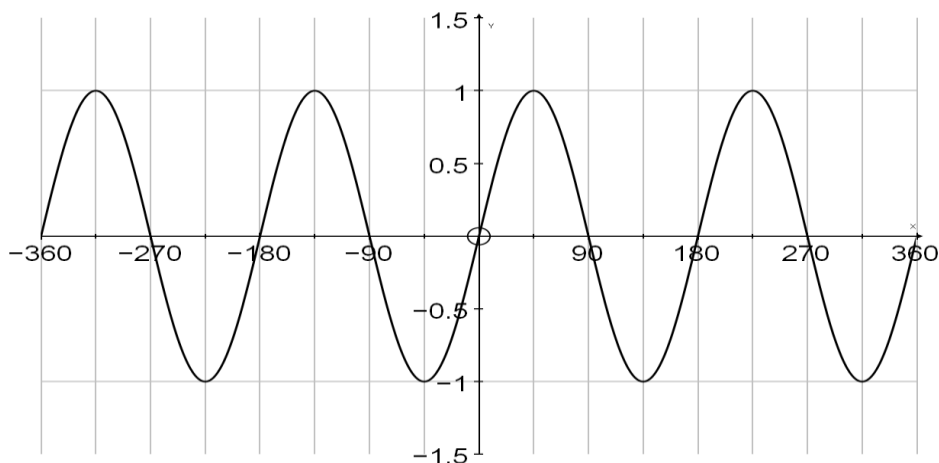
Circle the correct answer to the following questions:

4.1 The **amplitude** of the graph below is: (1)



- A: 2 B: 4 C: 1 D: 1,5

4.2 The **period** of the graph below is: (1)

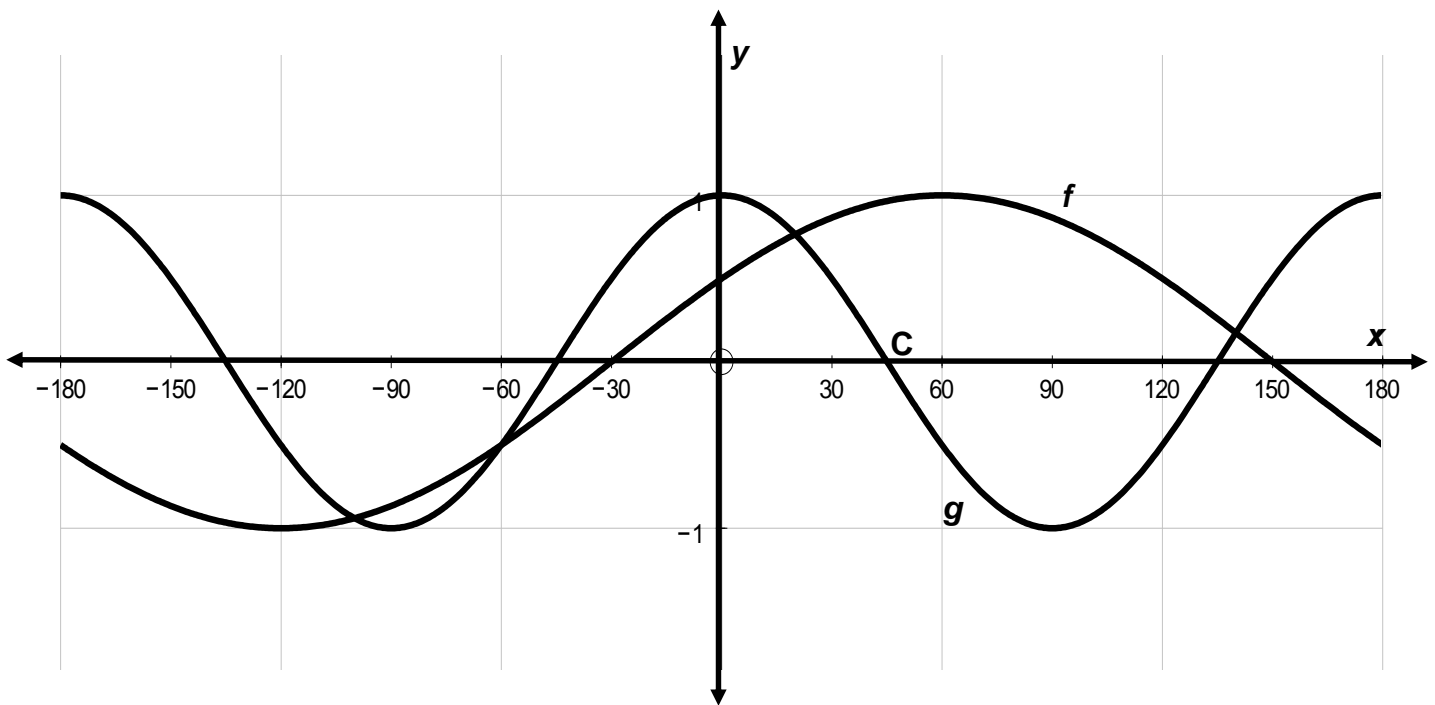


- A: 360° B: 90° C: 270° D: 180°

4.3 The maximum value of $y = -2\sin\theta - 1$ is: (1)

- A: -3 B: 1 C: -1 D: 3

4.4 The graphs below represent the functions $g(x) = \cos ax$ and $f(x) = \sin(x + b)$ where a and b are constants and $x \in [-180^\circ; 180^\circ]$.



4.4.1 Determine the values of a and b . (2)

4.4.2 What is the range of $g(x)$? (1)

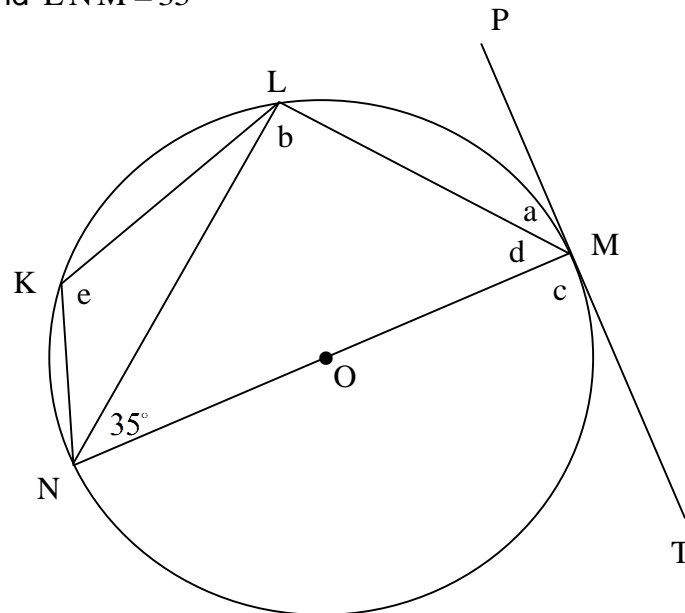
4.4.3 Write down the coordinates of C. (1)

4.4.4 For which x -values will $f(x) > 0$, if $x \in [-180^\circ; 180^\circ]$? (2)

Question 6 [5]

Refer to the diagram. PT is a tangent to circle LMNK with centre O.

NOM is a straight line and $\angle LNM = 35^\circ$



Find, with reasons, the size of the angles marked (a) to (e).
Fill in your answers in the table below:

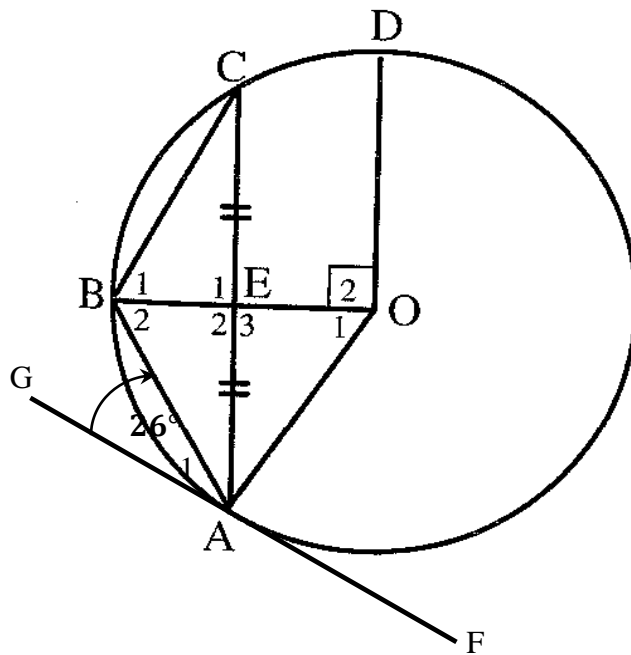
Angle	Answer	Reason
a		
b		
c		
d		
e		

(5)

Question 7[10]

In the circle centre O, $BO \perp OD$, $AE = EC$ and $\hat{A}_1 = 26^\circ$. GAF is a tangent to the circle.

Calculate the size of the following angles giving reasons for your answers:



7.1 \hat{O}_1 (4)

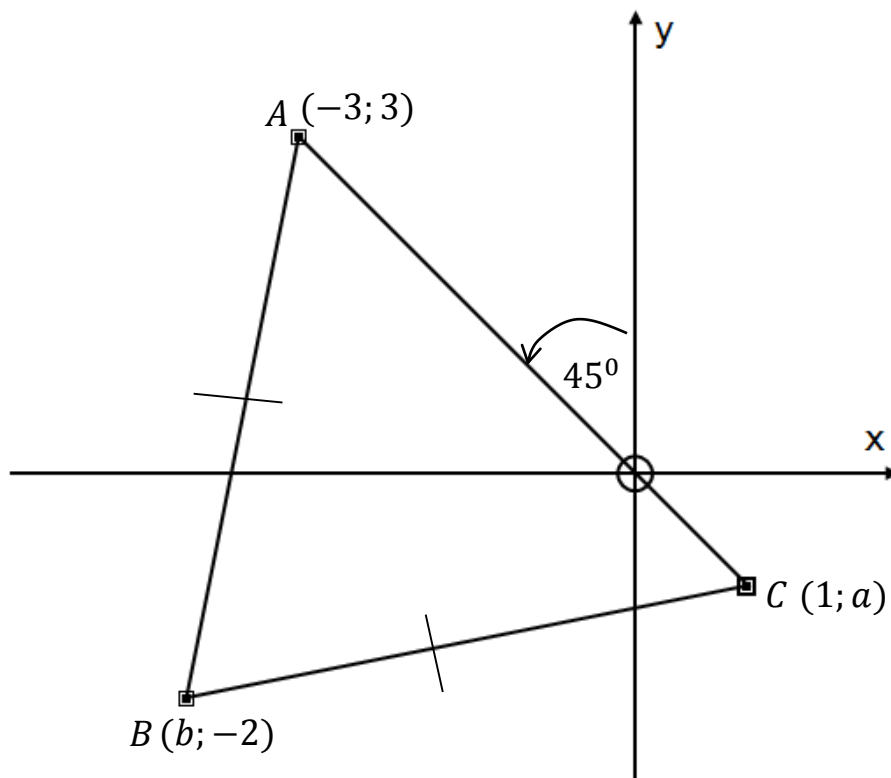
7.2 \hat{B}_1 (4)

7.3 Prove that $CA \parallel DO$ (2)

SECTION B

Question 8 [9]

Given $\triangle ABC$, with $A(-3; 3)$, $B(b; -2)$, $C(1; a)$ and $\widehat{YOA} = 45^\circ$.



8.1 Show that $C(1; -1)$.

(4)

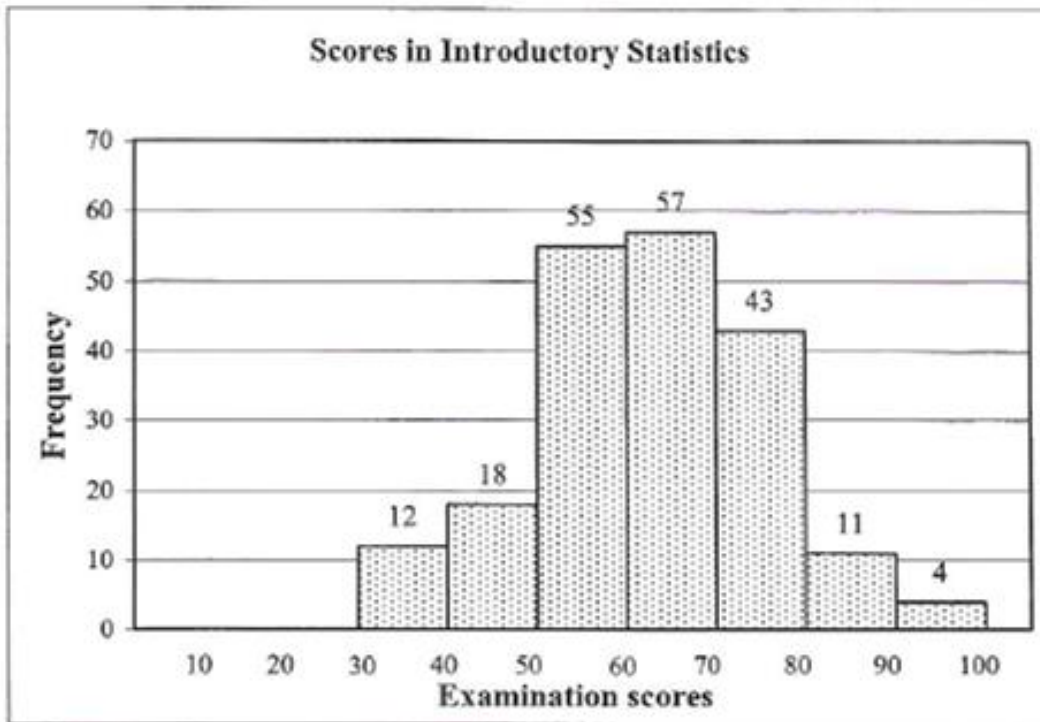
8.2 If it is given that $AB = BC$, determine the value of b .

(5)

[9]

Question 9 [10]

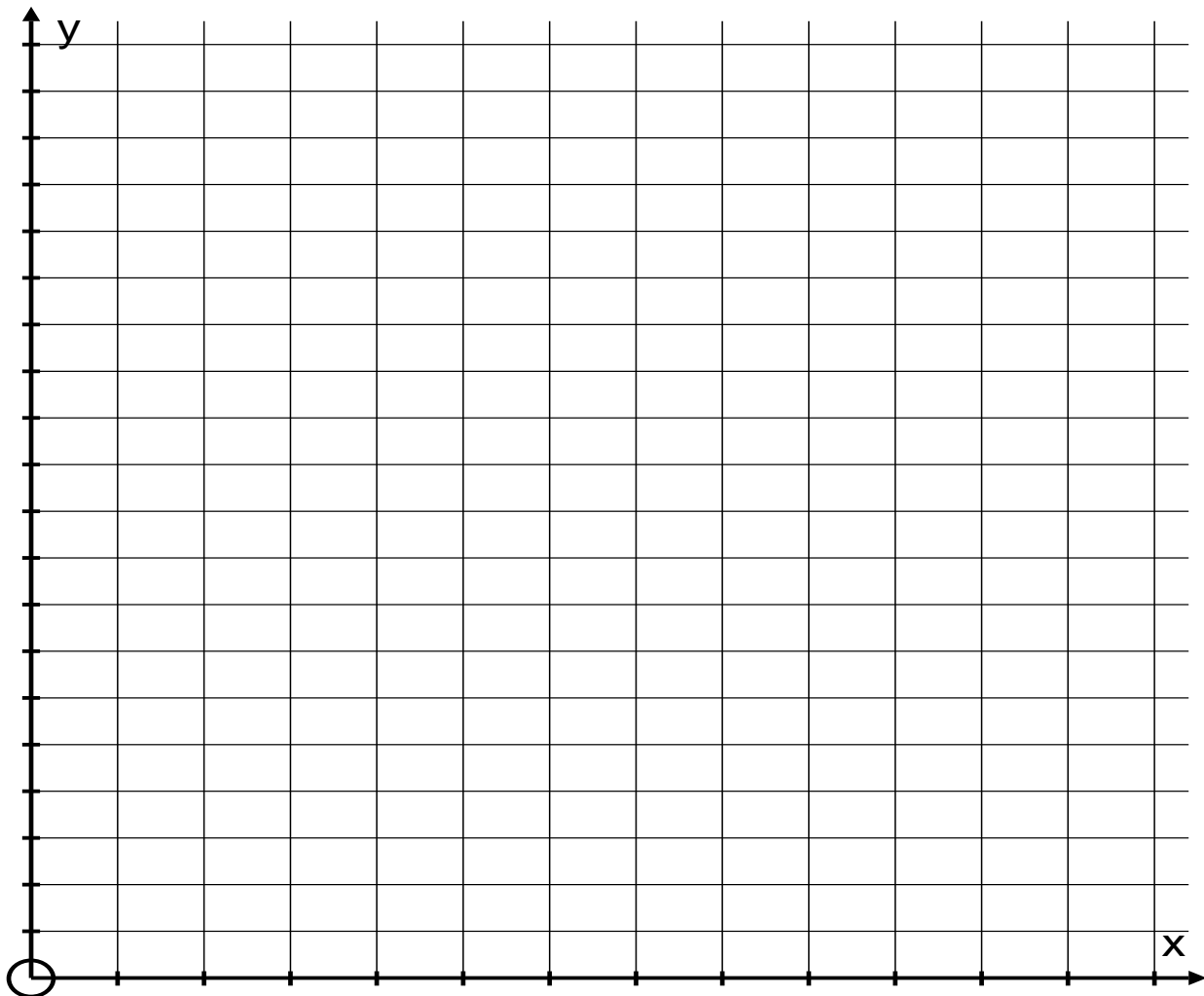
The Histogram below shows the distribution of examination scores of 200 learners in Introductory Statistics, to the nearest percent.



9.1 Complete the cumulative frequency table for the above data provided below. (2)

Scores	Frequency	Cumulative Frequency
$0 \leq x < 10$		
$10 \leq x < 20$		
$20 \leq x < 30$		
$30 \leq x < 40$		
$40 \leq x < 50$		
$50 \leq x < 60$		
$60 \leq x < 70$		
$70 \leq x < 80$		
$80 \leq x < 90$		
$90 \leq x < 100$		

9.2 Draw an ogive of the above data on the grid below. (4)



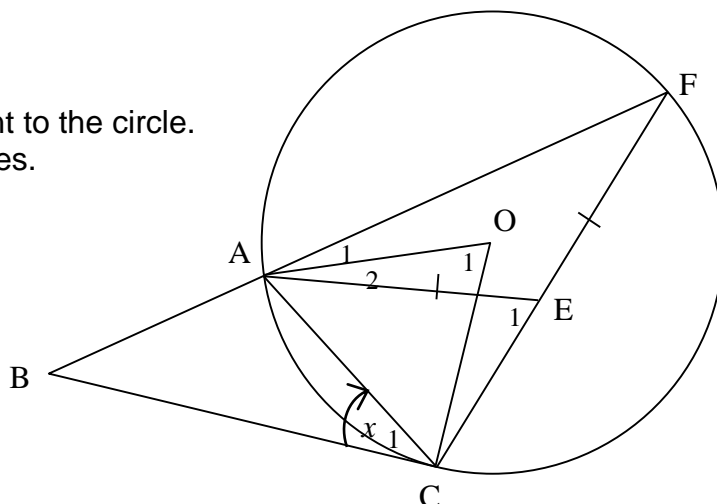
9.4 Use the ogive to estimate the values of Quartile 1 and Quartile 3 (2)

9.3 Use the ogive to estimate how many learners scored 60% or more for the examination. (2)

Question 11 [10]

O is the centre of the circle.
 AE = EF and BC is a tangent to the circle.
 BAF and CEF are straight lines.

Let $\hat{C}_1 = x$.



11.1 Find \hat{F} terms of x .

(2)

11.2 Express \hat{O}_1 in terms of x .

(2)

11.3 Express \hat{E}_1 in terms of x .

(4)

11.4 Why is OACE a cyclic quadrilateral?

(2)

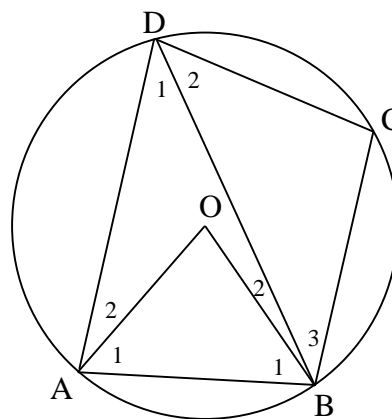
QUESTION 12 [11]

Given ABCD is a cyclic quadrilateral.

O is the centre of the circle.

OA bisects \hat{A} .

$\hat{A}_1 = x$.



12.1 Name TWO other angles equal to x , giving reasons.

(3)

12.2 Find \hat{C} in terms of x , giving a reason.

(2)

12.3 Express \hat{D}_1 in terms of x , giving reasons.

(4)

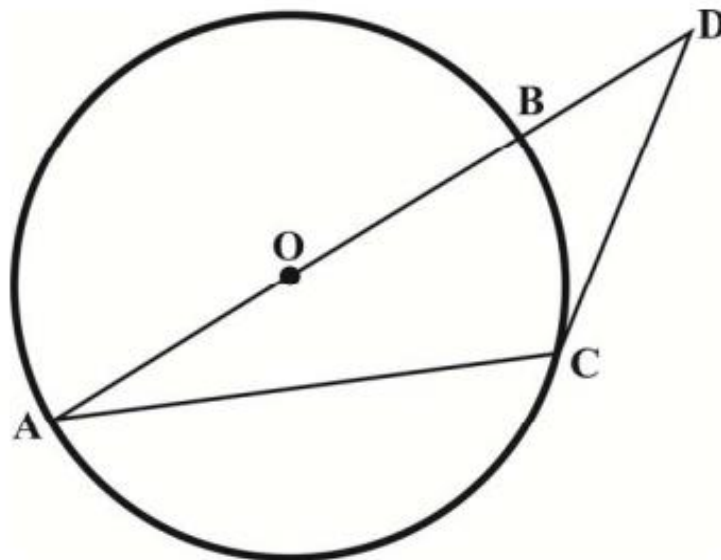
12.4 Could AD be a tangent to the circle through B,C and D?
Motive your answer.

(2)

QUESTION 13 [7]

In the diagram below, a circle centre O is drawn.

- AB is a diameter of the circle and C is a point on the circle
- AB produced meets the tangent at C at D.
- AC = DC



Determine, giving reasons, the size of \hat{A}

(7)

HINT: you will need to construct in your own line

QUESTION 14 [5]

Five numbers: a, b, c, d and e are given, and:

- $e = c$
- $e < a < b$
- d is the maximum value
- The modal number is 5
- The difference between the fourth number and the second number is 4
- The range of the numbers is 9
- The average of the numbers is 8

Determine the values of a, b, c, d and e .

(5)

QUESTION 15 [6]

The following regular cone is given with a side length of 9 m and the angle of $\widehat{ABC} = 30^\circ$.
 O is the centre of the circle base of the cone. OB is the height of the cone.

Calculate the Volume of the cone if: $V = \frac{1}{3}\pi r^2 H$. (6)

