



education

**MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA**

FURTHER EDUCATION AND TRAINING

GRADE 12

MATHEMATICS P2

AUGUST 2026 (PRE - EXAM)

MARKS: 150

TIME: 3 hours

This question paper consists of 12 pages, 1 information sheet and an answer book is provided.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the answer book provided.
3. Clearly show ALL calculations, diagrams, graphs, etc., which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You may use an approved scientific calculator (non-programmable and non-graphical), unless otherwise stated.
8. An INFORMATION SHEET with formulae is included at the end of the question paper.
9. Write neatly and legibly

QUESTION 1

- 1.1 Fifty learners wrote a National Benchmark Test for the admission to university. The test counted out of 50 marks. The learners' results were summarised in the table below:

Marks	Frequency	Cumulative frequency
$0 \leq x < 10$		4
$10 \leq x < 20$		24
$20 \leq x < 30$		39
$30 \leq x < 40$		44
$40 \leq x < 50$		50

- 1.1.1 Complete the table. (2)
- 1.1.2 Draw the histogram for the data. (2)
- 1.1.3 Write down the modal class for the data. (1)
- 1.1.4 Comment on the distribution of the data. (1)
- 1.1.5 Determine the mean estimate. (2)

- 1.2 The table below contains the mean, median, standard deviation and range of the Mathematics final exam for a large group of students.

Mean	Median	Standard deviation	Range
56	51	17,4	86

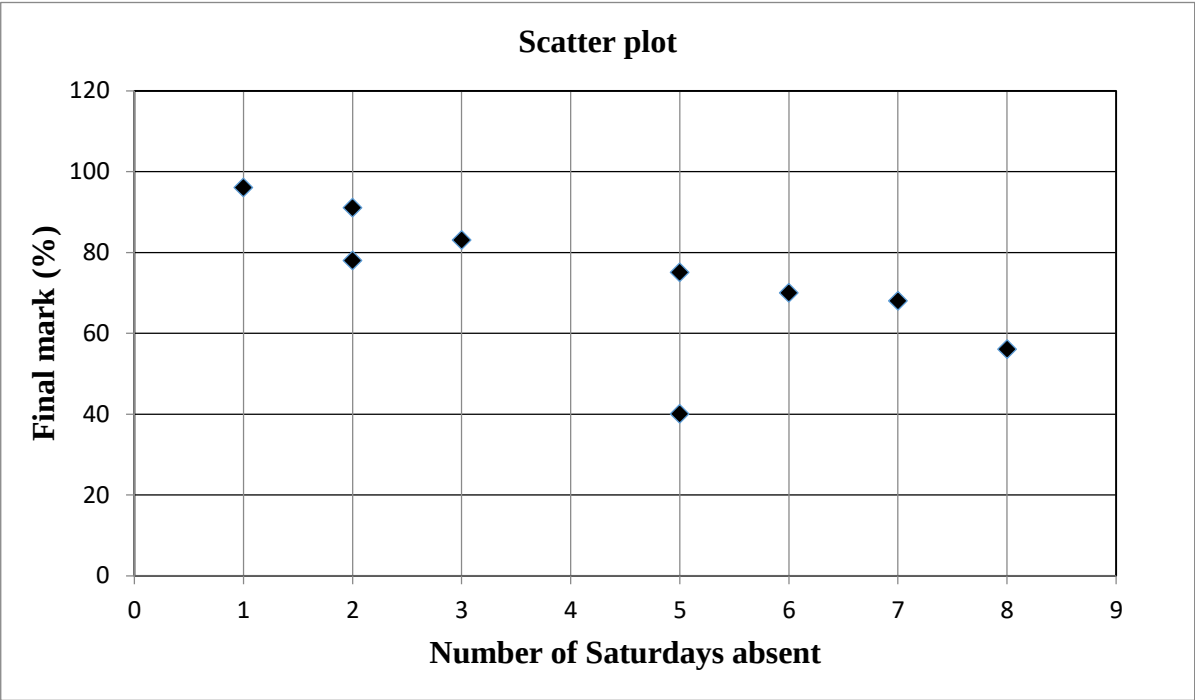
The mathematics teacher added 3 marks to each of the students' marks.
Determine each of the following for the new set of Mathematics results:

- 1.2.1 mean (1)
- 1.2.2 median (1)
- 1.2.3 standard deviation (1)
- 1.2.4 range (1)
- [12]**

QUESTION 2

A group of 9 learners attended mathematics on Saturdays over a period of 10 months. The number of Saturdays on which a learner was absent was recorded against the final mark the learner obtained. The information is shown in the table below and the scatter plot is drawn for the data.

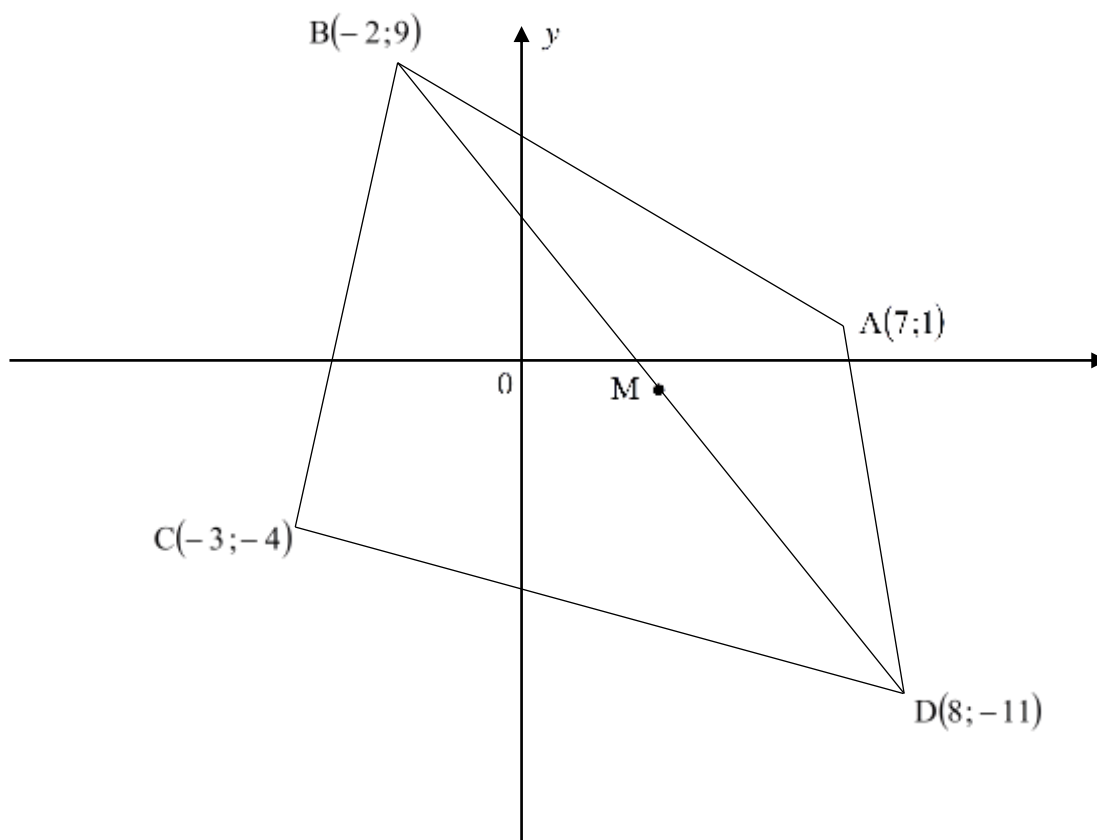
Number of Saturdays absent	1	2	2	3	5	5	6	7	8
Final mark (%)	96	91	78	83	75	40	70	68	56



- 2.1 Determine the equation of the least squares regression line. (3)
- 2.2 Draw the least squares regression line. (2)
- 2.3 Comment on the strength of the data. (2)
- 2.4 Predict the final mark of the learner who was absent for 4 Saturdays. (2)
- 2.5 By removing the outlier, what effect would this have on the correlation coefficient? (1)
- [10]

QUESTION 3

- 3.1 In the diagram below, $A(7;1)$, $B(-2;9)$, $C(-3;-4)$ and $D(8;-11)$ are the vertices of quadrilateral ABCD. M is the midpoint of BD.

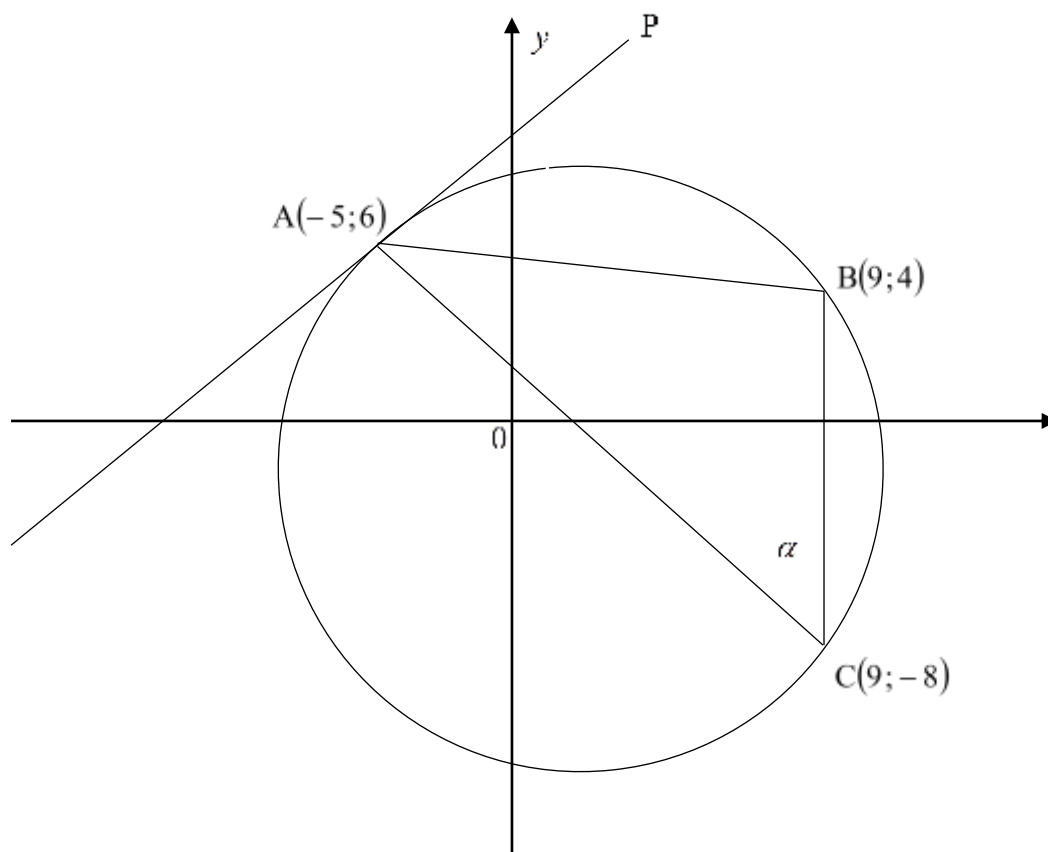


- 3.1.1 Calculate the gradient of AC. (2)
- 3.1.2 Determine the equation of AC. (2)
- 3.1.3 Show that M lies on AC. (2)
- 3.1.4 Show that $BD \perp AC$. (3)
- 3.1.5 Calculate the length of AC, leaving your answer in surd form. (2)
- 3.1.6 Hence calculate the area of ABCD. (4)
- 3.2 The equation of a circle is $(x+1)^2 + (y-2)^2 - 2(x-y) = t$.
- 3.2.1 Determine the coordinates of the centre of the circle. (4)
- 3.2.2 If the radius of the circle is $\sqrt{5}$, determine the value of t . (2)

[21]

QUESTION 4

The sketch below shows a circle passing through the three points $A(-5;6)$, $B(9;4)$ and $C(9;-8)$. AP is a tangent to the circle at A . $\hat{ACB} = \alpha$.



- 4.1 Calculate the value of α . (3)
 - 4.2 Write down, with a reason, the size of $\hat{PAB}$. (1)
 - 4.3 Determine the coordinates of the midpoint of AB. (2)
 - 4.4 Let the coordinates of the centre be $(p;q)$.
 - 4.4.1 Show that $q = 7p - 9$. (5)
 - 4.4.2 Determine the values of p and q . (4)
 - 4.5 Determine the equation of the circle. (3)
 - 4.6 If the circle above is shifted by 1 unit to the left and 2 units up. Write down the equation of the new circle. (2)
- [20]**

QUESTION 5

5.1 If $\sin \theta = \frac{4}{5}$ and $\tan \theta < 0$, determine without using a calculator and with the aid of a sketch the value of the following:

5.1.1 $\sin \theta$ (4)

5.1.2 $\cos \theta$ (1)

5.1.3 $\sin\left(\frac{\theta}{2}\right)$ (3)

5.2 Simplify without using a calculator: $\frac{\cos^2 173^\circ - \sin^2 7^\circ}{\sin 66^\circ \cos 190^\circ - \cos 66^\circ \sin 10^\circ}$ (6)

5.3 Determine the general solution for $\cos 2x + \cos x = 2$ (5)

5.4 Consider the following pattern:

$$T_1 = 2 \sin 2^\circ \cos 2^\circ$$

$$T_2 = 4 \sin 2^\circ \cos 2^\circ \cos 4^\circ$$

$$T_3 = 8 \sin 2^\circ \cos 2^\circ \cos 4^\circ \cos 8^\circ$$

$\vdots$

$$T_n = 2^n \sin 2^\circ \cos 2^\circ \cos 4^\circ \cos 8^\circ \dots \cos(2^n)^\circ$$

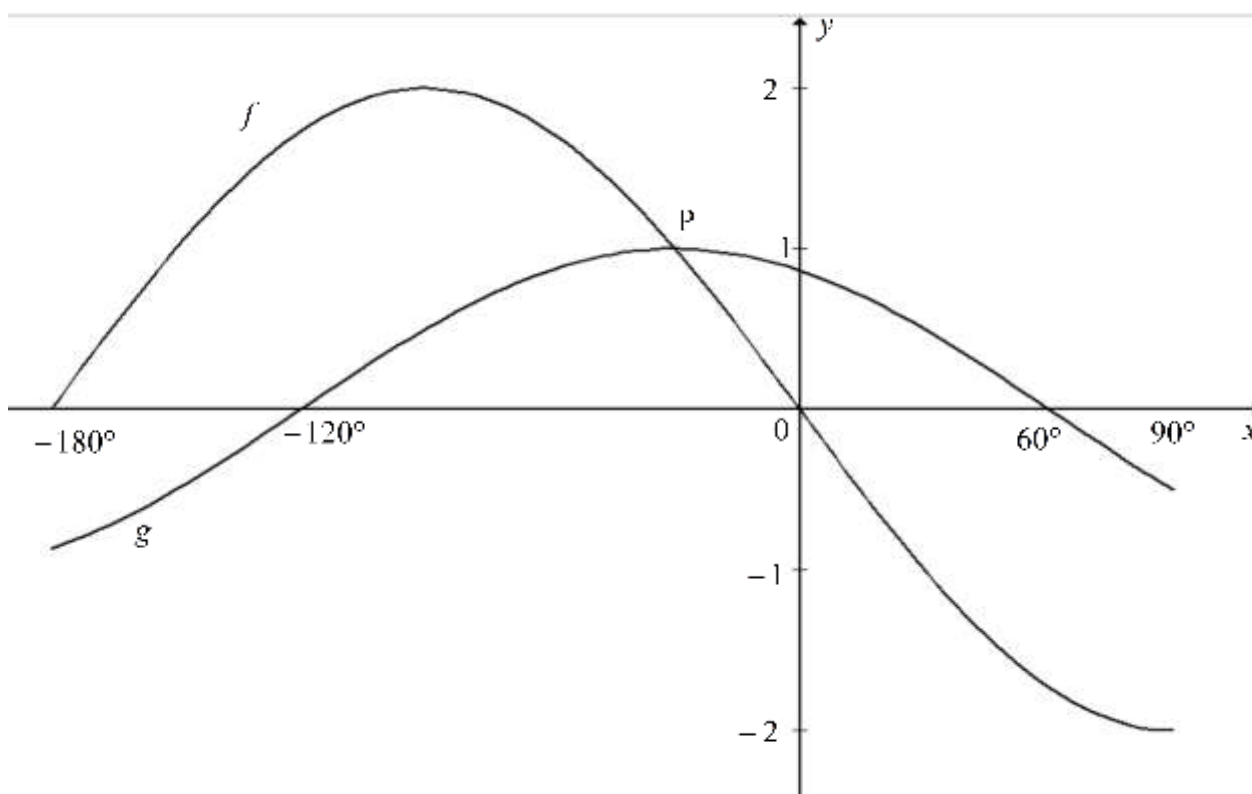
5.4.1 Determine T_n as a single trigonometric ratio. (4)

5.4.2 If $\sin 2^\circ = k$, express T_8 in terms of k . (6)

[29]

QUESTION 6

In the diagram, the graphs of $f(x) = -2\sin 2x$ and $g(x) = \cos(x + 30^\circ)$ are given for $x \in [-180^\circ; 90^\circ]$

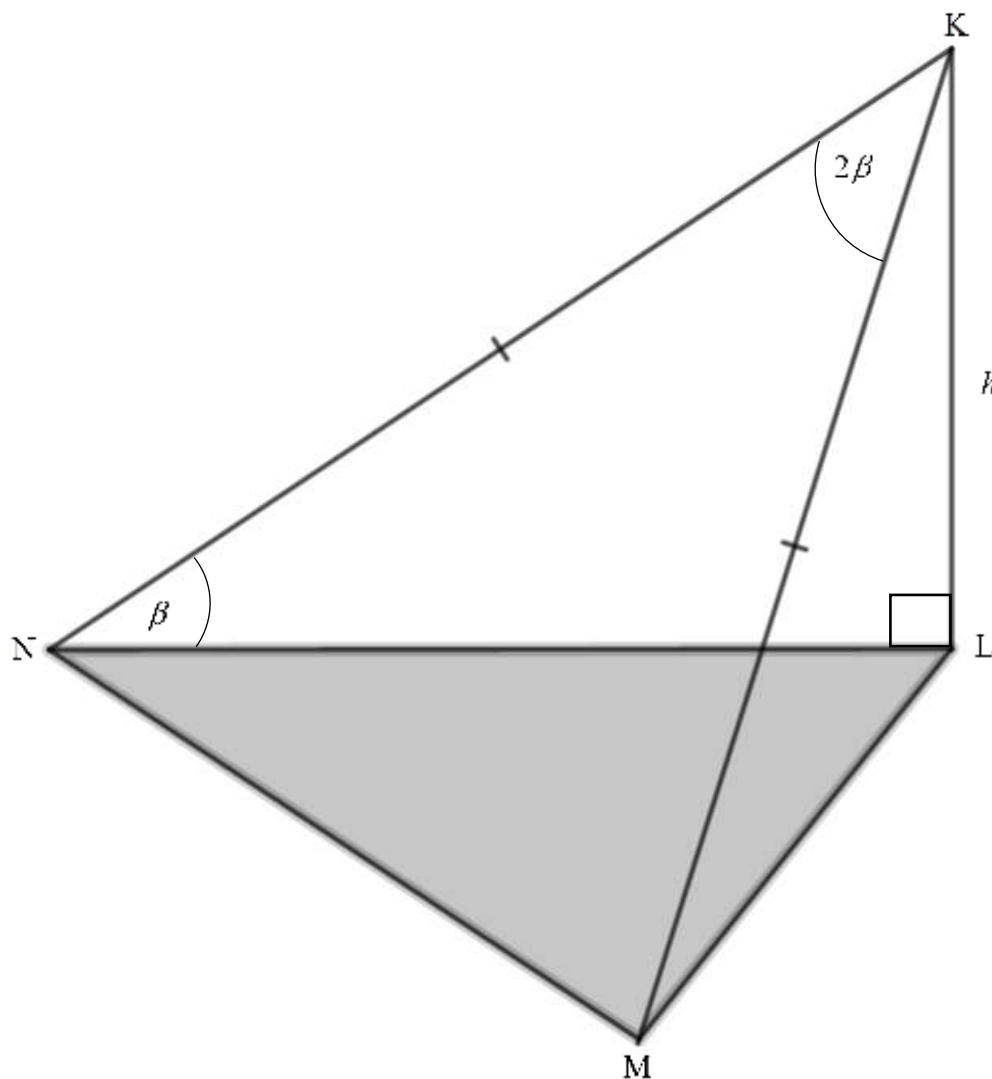


- 6.1 Write down the amplitude of f . (1)
- 6.2 Write down the range of $y = f(x) + 1$. (2)
- 6.3 The graph of f is shifted by 45° to the right. Write down the equation of the new graph. (2)
- 6.4 Determine the values of x for which $f(x) \geq g(x)$ if it is further given that $P(-30^\circ; 1)$. (2)
- 6.5 For which values of x is $x \cdot g'(x) < 0$ if $x \in [-180^\circ; 90^\circ]$? (2)

[10]

QUESTION 7

In the diagram, KL represents a pylon with a floodlight mounted on top. KL is anchored at N and M by two cables. N, M and L are all on the same horizontal plane. The height of the pylon is given as h metres and the angle elevation of K from N is β . The two cables are equal in length, i.e. $KN = KM$, and $\angle NKM = 2\beta$.



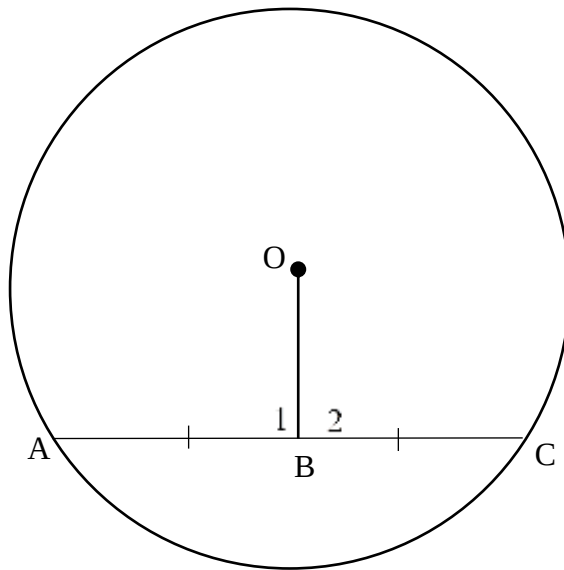
7.1 Show that $KN = \frac{h}{\sin \beta}$. (2)

7.2 Determine the distance NM in terms of h . (6)

[8]

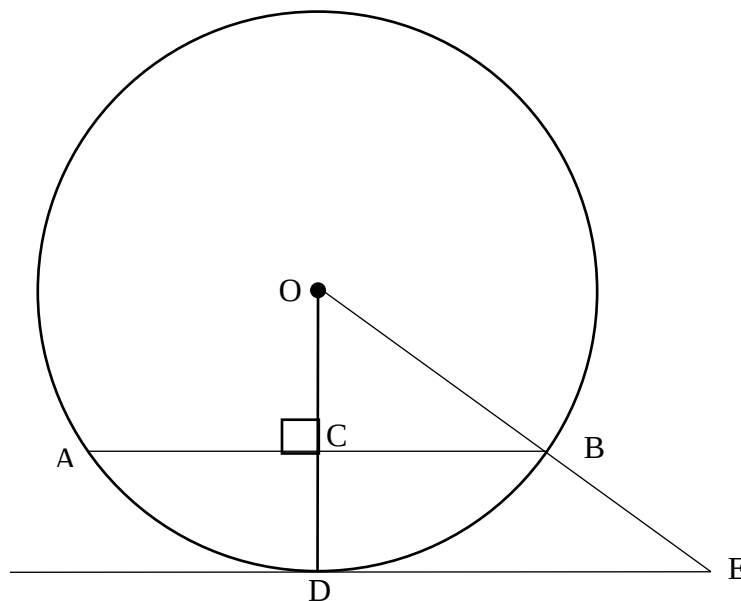
QUESTION8

- 8.1 In the diagram below, O is the centre of a circle. ABC is a chord with OB drawn such that $AB = BC$.



Prove the theorem which states that $OB \perp ABC$. (5)

- 8.2 In the diagram below, O is the centre of a circle and that $OC \perp AB$.
DE is a tangent to the circle at D. $AB = 8cm$ and $OC = 3cm$.



- 8.2.1 Prove that $DE \parallel AB$ (2)

- 8.2.2 Determine with reasons, the length of:

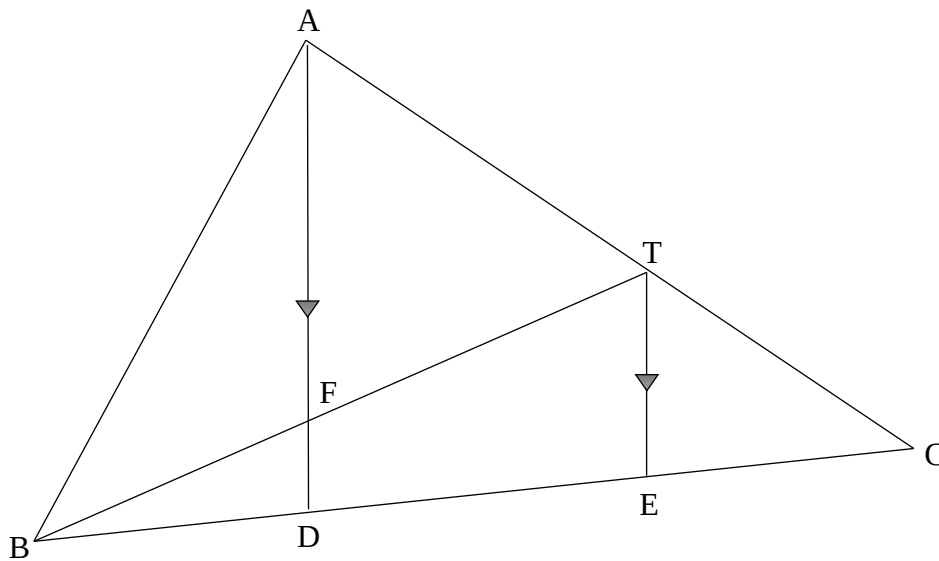
(a) CD (5)

(b) OE (4)

[16]

QUESTION 9

In the diagram below, $AD \parallel TE$, $DC = 18$ cm and $BD = 12$ cm.
In addition, $AT : TC = 2 : 1$.

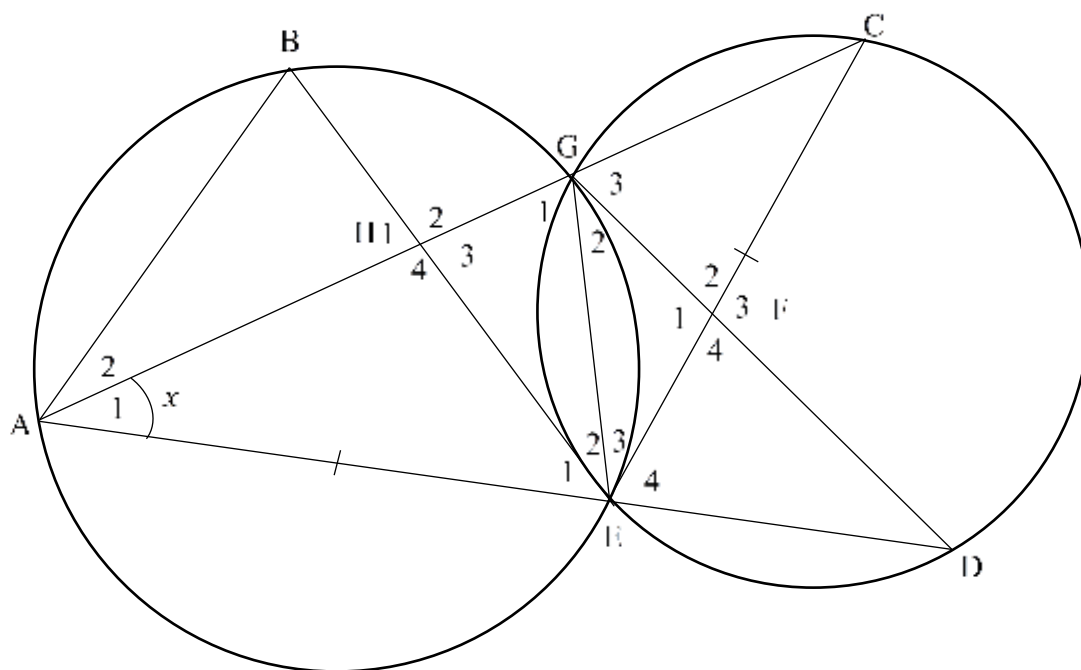


- 9.1 Determine the value of $\frac{CE}{ED}$. (2)
- 9.2 Prove that D is the midpoint of BE. (2)
- 9.3 If $FD = 2$ cm, determine with reasons, the length of TE. (2)
- 9.4 Determine the numerical value of $\frac{\text{area of } \triangle ADC}{\text{area of } \triangle ABD}$. (1)

[7]

QUESTION 10

In the diagram below, BE is a tangent to a circle CEG at E. $AE = EC$. Let $\hat{A}_1 = x$.



10.1 Name with reasons, FOUR other angles equal to x . (6)

10.2 Prove that $\triangle ABH \parallel \triangle AGE$ (3)

10.3 Prove that $\frac{AB}{AG} = \frac{AH}{EC}$. (2)

10.4 Prove that :

10.4.1 $AG = GD$ (2)

10.4.2 $EG^2 = GD \cdot GH$ (4)

TOTAL: [17]
150

INFORMATION SHEET

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

$$A = P(1 - i)^n$$

$$A = P(1 + in)$$

$$A = P(1 - in)$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1) \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

$$\text{Area of } \triangle ABC = \frac{1}{2}ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2A = \begin{cases} \cos^2 A - \sin^2 A \\ 1 - 2\sin^2 A \\ 2\cos^2 A - 1 \end{cases}$$

$$\sin 2A = 2\sin A \cos A \quad P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\hat{y} = a + bx$$