

EXAMINATION		NATIONAL SENIOR CERTIFICATE
GRADE		12
DATE		MAY/JUNE 2026
SUBJECT		MATHEMATICS
PAPER		2
MARK TOTAL		150
DURATION (HOURS)		3
NUMBER OF PAGES		15



SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE
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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

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



QUESTION 1

- 1.1 A poll of 11 high school learners showed a relationship between their physical activity, measured in hours per week, and their academic performance, measured by the percentage achieved in their final exam.

Physical Activity (Hours)	5	15	20	30	35	45	50	55	60	70	75
Average academic performance (%)	20	32	44	52	56	68	72	72	84	88	96

- 1.1.1 Draw a scatterplot of the information ON THE DIAGRAM provided. (3)
- 1.1.2 Determine the least squares regression line for the data. (2)
- 1.1.3 Draw the least squares regression line on the scatterplot drawn in **QUESTION 1.1.1**. (3)
- 1.1.4 If a learner achieved 80% in their academic performance, determine the estimated number of hours they likely would have spent being physically active. (2)
- 1.1.5 Determine the correlation coefficient for the data and comment on the correlation. (3)
- 1.2 The investigation is extended to include more learners who are enrolled in formal education and participate in physical activity in South Africa. The data is represented in the below table.

Interval (hours per week)	Frequency	Cumulative Frequency
$0 \leq x < 2$	16	16
$2 \leq x < 4$	23	A
$4 \leq x < 6$	42	81
$6 \leq x < 8$	B	109
$8 \leq x < 10$	19	128
$10 \leq x < 12$	13	141
$12 \leq x < 14$	3	144
$14 \leq x < 16$	1	145

- 1.2.1 Write down the values represented by **A** and **B**. (2)
- 1.2.2 Draw an ogive (cumulative frequency diagram) of the data given in the table above. (3)
- 1.2.3 Use your graph in QUESTION 1.2.2 to determine the median hours of the data. Indicate on the graph where the answer is determined. (2)

[20]

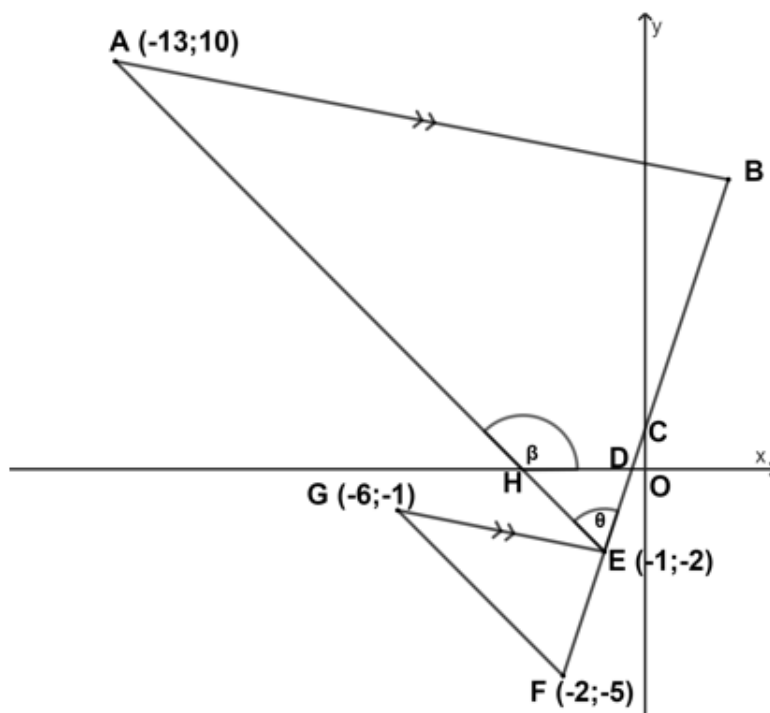


QUESTION 2

In the diagram, $\triangle ABE$ and $\triangle GEF$ are given. $A(-13; 10)$ and $E(-1; -2)$ are vertices of $\triangle ABE$.

$G(-6; -1)$, and $F(-2; -5)$ are vertices of $\triangle GEF$. $\widehat{DEH} = \theta$ and $\widehat{DHA} = \beta$.

$GE \parallel AB$. D and C are the x - and y -intercepts of line FEB respectively. The gradient of FB is 3.



2.1 Prove that $AE \parallel GF$. (4)

2.2 Determine the value of θ . (5)

2.3 Determine the coordinates of B . (6)

2.4 Prove that $\triangle ABE \parallel \triangle GEF$. (3)

2.5 Calculate: $\frac{\text{Area } \triangle ABE}{\text{Area } \triangle GEF}$ (4)

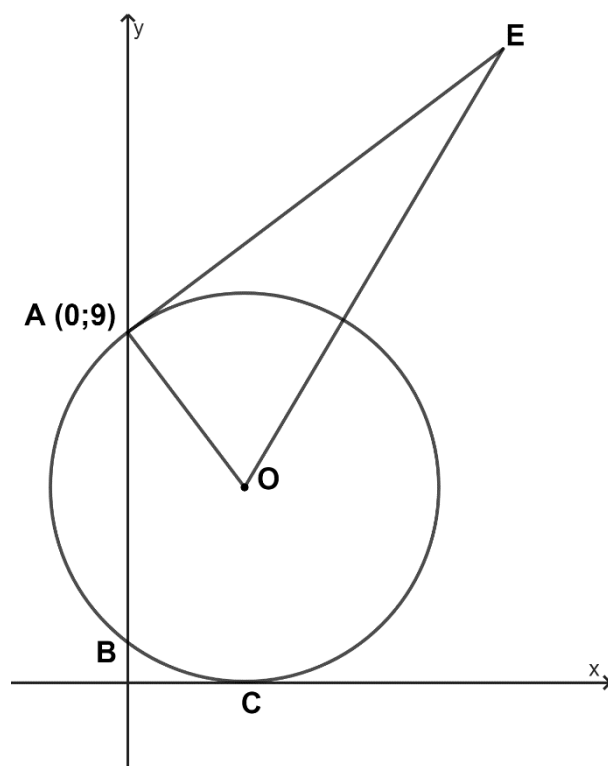
[22]



QUESTION 3

In the diagram below, the circle with centre O has the equation:

$x^2 - 6x + 9 = 10y - y^2$. AE is a tangent to the circle at point A(0; 9). The circle touches the x -axis at point C. B is a y -intercept of the circle.



- 3.1 Determine the coordinates of the centre O and the radius of the circle. (4)
- 3.2 Write down the coordinates of C. (1)
- 3.3 Determine the equation of the tangent AE. (4)
- 3.4 Determine the coordinates of B. (4)
- 3.5 Another circle with centre P ($a; 2$), and radius 4 units touches the given circle externally. Determine the possible value(s) of a . (3)

[16]



QUESTION 4

4.1 If $\sin B = -\frac{2}{3}$ and $\cos B < 0$, determine, **without the use of a calculator**, the value of:

4.1.1 $\tan(-B)$ (2)

4.1.2 $9 \sin 2B$ (3)

4.2 Simplify fully, without the use of a calculator:

$$\frac{\cos 385^\circ \cdot \cos 115^\circ \cdot \tan 60^\circ}{\sin 50^\circ \cdot \tan 30^\circ} \quad (6)$$

4.3

4.3.1 Prove that:

$$\cos(\theta - 60^\circ) - \cos(\theta + 60^\circ) = \sqrt{3} \sin \theta \quad (4)$$

4.3.2 Hence, determine the general solution of the equation:

$$\cos(\theta - 60^\circ) - \cos(\theta + 60^\circ) = 2 \sin^2 \theta \quad (6)$$

4.4 Determine, **without the use of a calculator**, the value of:

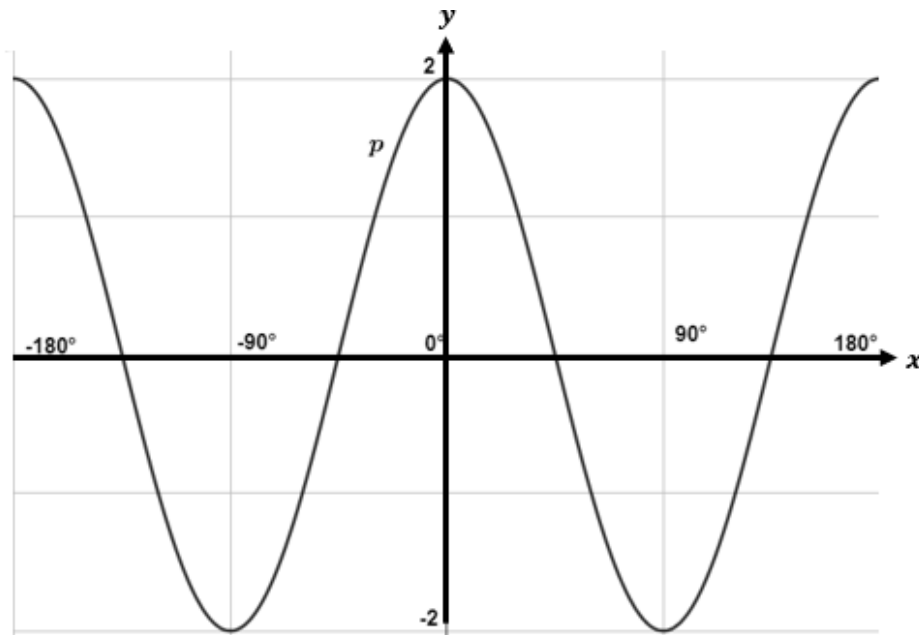
$$\cos^2 32^\circ + \cos^2 33^\circ + \dots + \cos^2 57^\circ + \cos^2 58^\circ \quad (6)$$

[27]



QUESTION 5

In the diagram below the graph of $p(x) = 2 \cos 2x$ is drawn for the interval $x \in [-180^\circ; 180^\circ]$.



- 5.1 On the same system of axes on which p is drawn, draw the graph of $q(x) = \sin 2x$ for $x \in [-180^\circ; 180^\circ]$. Clearly show all intercepts with the axes, the coordinates of the turning points and end points of the graph. (4)
- 5.2 Write down the range of $p(x) - 3$. (2)
- 5.3 Calculate the solution of $p(x) = q(x)$ in the interval $x \in [-180^\circ; 180^\circ]$. (6)
- 5.4 Hence, using the answers obtained in QUESTION 5.3 and the graph, determine the value(s) of x for which $p(x) < q(x)$ in the interval $x \in [-180^\circ; 180^\circ]$. (2)

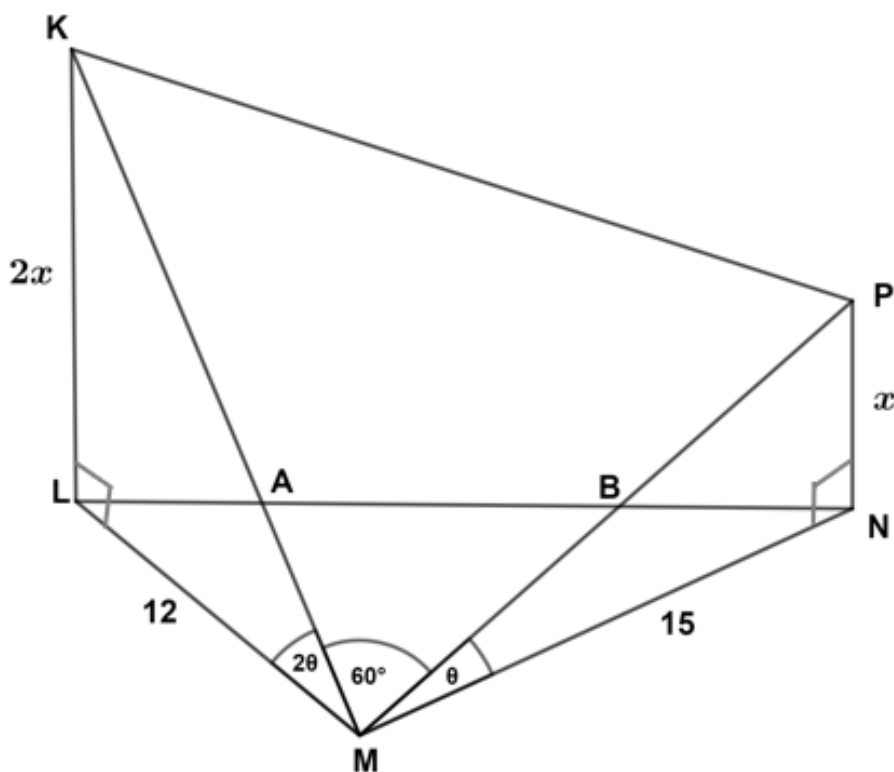
[14]



QUESTION 6

In the diagram, M, N and L are points on the same horizontal plane. KL and PN are vertical poles. Steel cables KM and PM anchor the poles at M. Another steel cable connects K and P.

$LM = 12$ m; $PN = x$ m; $\widehat{KMP} = 60^\circ$, $KL = 2x$ m, $MN = 15$ m, $\widehat{LMK} = 2\theta$ and $\widehat{PMN} = \theta$.



6.1 Show that $KM = \frac{x}{\sin \theta \cos \theta}$. (2)

6.2 Prove that $KP = \frac{x(\sqrt{\cos^2 \theta - \cos \theta + 1})}{\sin \theta \cos \theta}$. (5)

6.3 Determine the length of KP if $x = 18$ m and $\theta = 17^\circ$. (2)

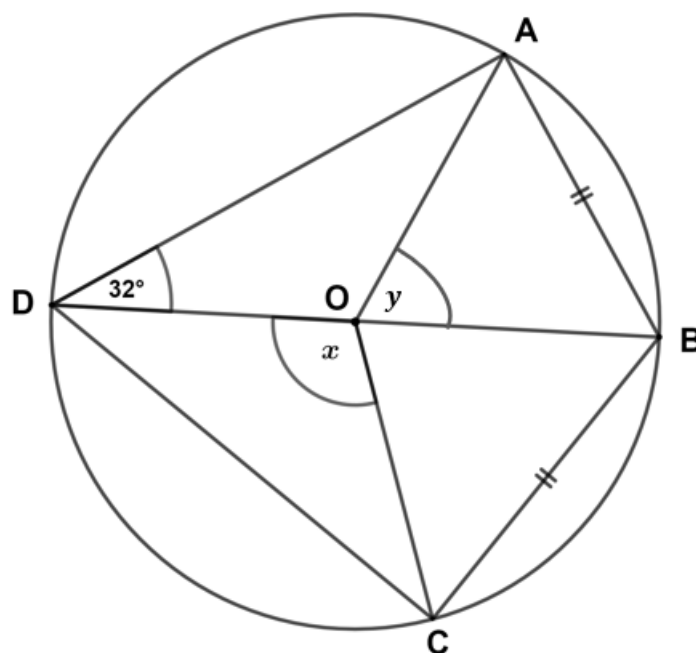
[9]



QUESTION 7

7.1 In the diagram:

- A, B, C and D are points on the circumference of the circle with centre O.
- DB is the diameter of the circle.
- $AB = BC$.
- $\widehat{ADB} = 32^\circ$.
- $\widehat{DOC} = x$.
- $\widehat{AOB} = y$.



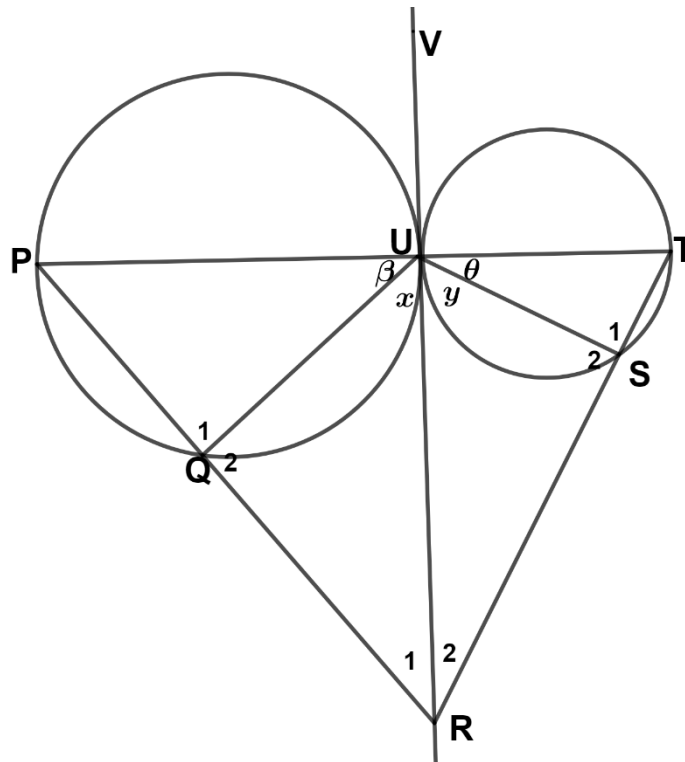
7.1.1 Determine, with reasons, the size of x . (4)

7.1.2 Determine, with reasons, the size of y . (2)



7.2 In the diagram:

- VR is a common tangent to the two given circles at U.
- P and Q are points on the larger circle.
- T and S are points on the smaller circle.
- PUT, PQR and TSR are straight lines.
- $\widehat{PUQ} = \beta$.
- $\widehat{QUR} = x$.
- $\widehat{SUR} = y$.
- $\widehat{SUT} = \theta$.



Prove, with reasons, that RQUS is a cyclic quadrilateral.

(5)

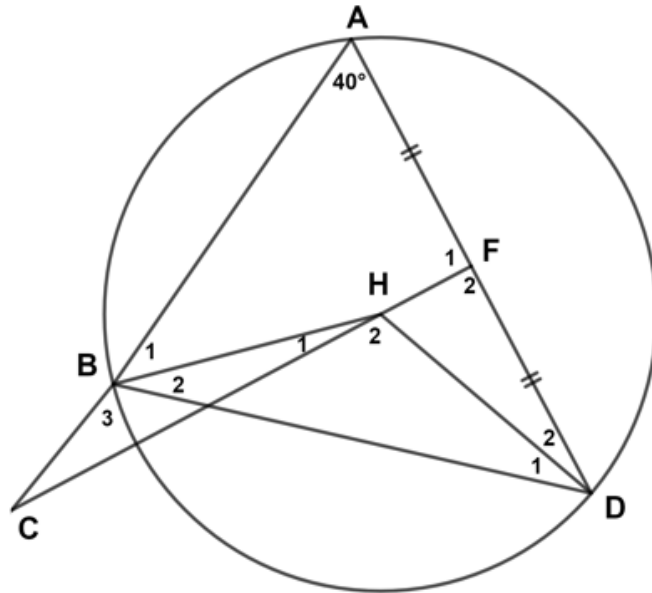
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QUESTION 8

8.1 In the diagram:

- A, B and D are points on the circumference of the circle with centre H.
- $AF = DF$.
- $\hat{A} = 40^\circ$.
- AB extended meets FH extended in C.



Determine, with reasons:

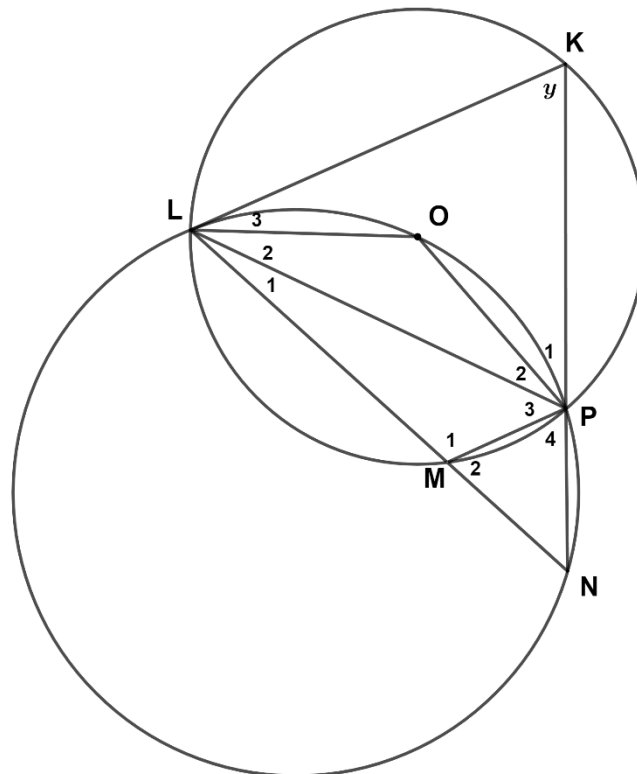
8.1.1 The size of $\hat{BHD}$. (2)

8.1.2 The size of $\hat{C}$. (2)



8.2 In the diagram:

- K, L, M and P are points on the circumference of the circle with centre O.
- LM extended intersects circle LOPN at N.
- $\hat{K} = y$.
- $LM : MN = 5 : 2$.



8.2.1 Determine, with reasons, the size of $\hat{N}$ in terms of y . (2)

8.2.2 Show that $LK \parallel MP$. (3)

8.2.3 Determine the value of $\frac{LK}{MP}$. (5)

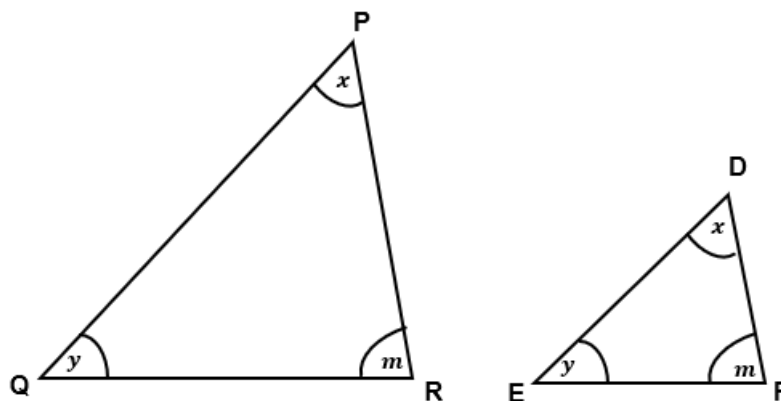
[14]

**QUESTION 9**

9.1 In the diagram below $\triangle PQR$ and $\triangle DEF$ are given with:

- $\hat{P} = \hat{D} = x$;
- $\hat{Q} = \hat{E} = y$
- $\hat{R} = \hat{F} = m$.

Prove the theorem that states that $\frac{PQ}{DE} = \frac{QR}{EF}$.

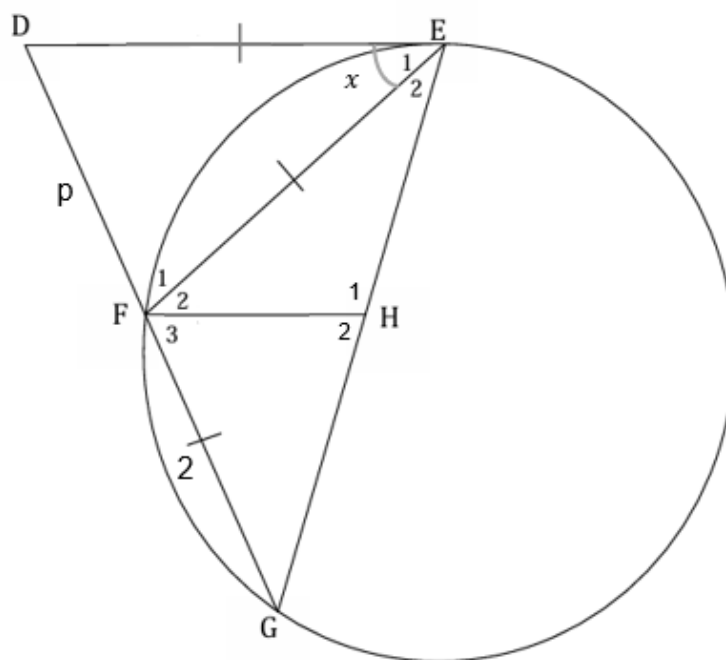


(6)



9.2 In the diagram:

- E, F and G are points on the circumference of a circle.
- DE is a tangent to the circle EFG at E.
- DFG intersect the circle at F and G.
- $DE = EF = FG$.
- FH is drawn.
- $\hat{E}_1 = x$.
- $DF = p$ units and $FG = 2$ units.



9.2.1 Prove that $p^2 + 2p = 4$. (5)

9.2.2 If $\frac{GH}{GE} = \frac{2}{p+2}$, prove that $DE \parallel FH$. (1)

9.2.3 Prove $\triangle DFE \parallel \triangle HFG$. (4)

9.2.4 Give a reason why HFDE is a cyclic quadrilateral. (1)

[17]

GRAND TOTAL: [150]



INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

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

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

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

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

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

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

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

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

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

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\bar{x} = \frac{\sum_{i=1}^n (x_i - \bar{x})}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

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

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

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$