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**GRADE 12 MATHEMATICS POST-TEST
WINTER CLASSES
2024**

MARKS: 30

TIME: 35 minutes

This paper consists of 4 pages including the cover page

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. Answers only will **NOT** necessarily be awarded full marks.
3. If necessary, answers should be rounded off to **TWO** decimal places, unless stated otherwise.
4. Number your answers correctly according to the numbering system used in this question paper.

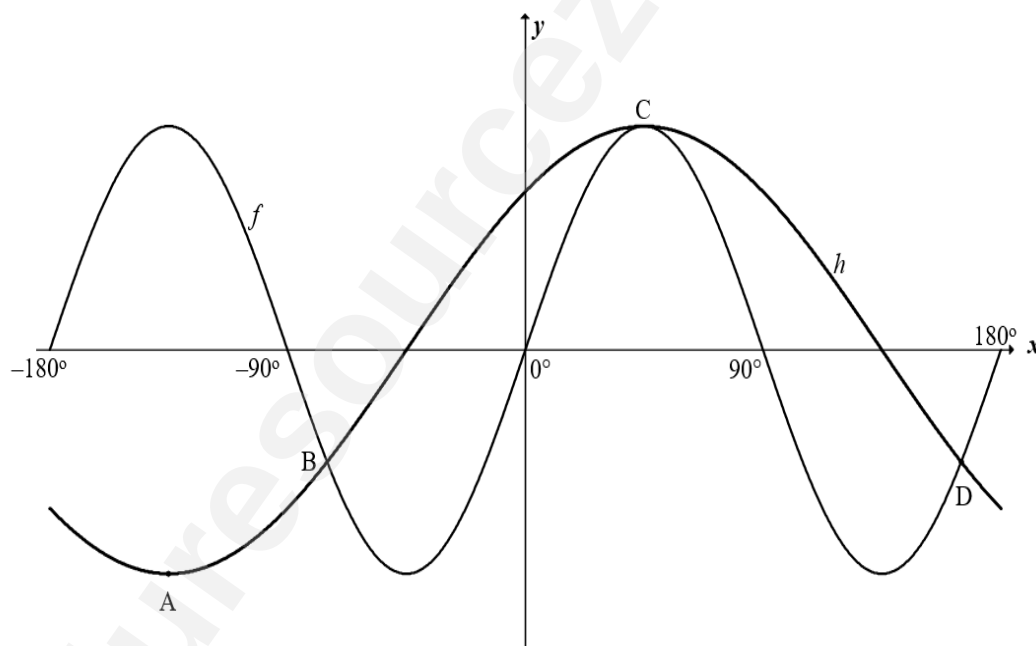
QUESTION 1

Given: $f(x) = (x+2)(x^2 - 6x + 9)$
 $= x^3 - 4x^2 - 3x + 18$

- 1.1 Calculate the coordinates of the turning points of the graph of f . (5)
- 1.2 Sketch the graph of f , clearly indicating the intercepts with the axes and the turning points. (4)
- [9]

QUESTION 2

The diagram are the graphs of $f(x) = \sin 2x$ and $h(x) = \cos(x - 45^\circ)$ for the interval $x \in [-180^\circ; 180^\circ]$. $A(-135^\circ; -1)$ is a minimum point on graph h and $C(45^\circ; 1)$ is a maximum point on both graphs. The two graphs intersect at B, C and $D\left(165^\circ; -\frac{1}{2}\right)$.

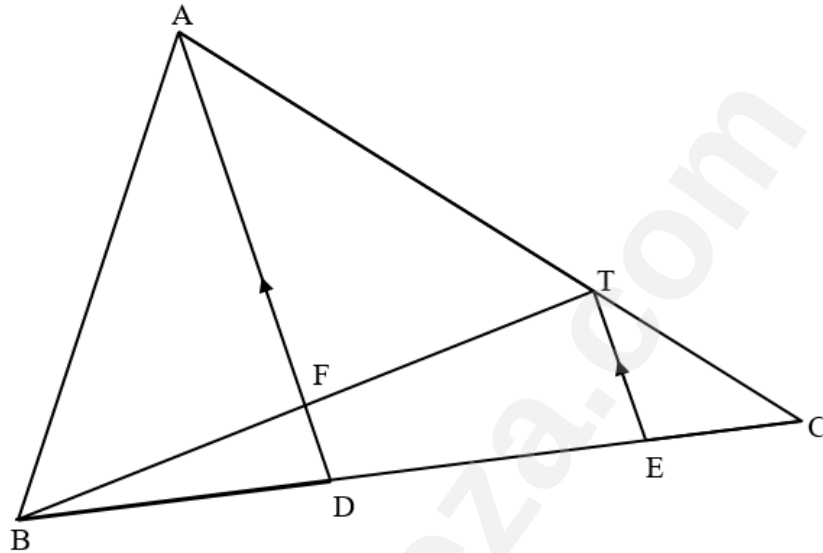


- 2.1
- 2.1.1 Write down the period of f . (1)
- 2.1.2 Determine the x -coordinate of B. (1)
- 2.1.3 Use the graphs to solve $2 \sin x \cdot \cos x \leq \frac{1}{\sqrt{2}} (\cos x + \sin x)$ for the interval $x \in [-180^\circ; 180^\circ]$. Show ALL your working. (4)
- 2.2 Determine the general solution of $-3 \cos^2 x + \cos 2x + 2 = 0$ (3)

[9]

QUESTION 3

In the figure below, D is a point on side BC of $\triangle ABC$ such that $BD = 6 \text{ cm}$ and $DC = 9 \text{ cm}$.
 T and E are points on AC and DC respectively and $TE \parallel AD$ and $AT:TC = 2:1$



- 3.1 Show that D is the midpoint of BE. (3)
- 3.2 If $FD = 2 \text{ cm}$, calculate the length of TE. (3)
- 3.3 Calculate the numerical value of:
- 3.3.1 $\frac{\text{Area of } \triangle ADC}{\text{Area of } \triangle ABD}$ (3)
- 3.3.2 $\frac{\text{Area of } \triangle TEC}{\text{Area of } \triangle ABC}$ (3)
- [12]**

TOTAL: 30 MARKS

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

$$\text{oppervlakte } \Delta ABC = \frac{1}{2} ab \cdot \sin C$$

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

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

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

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

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

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

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

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

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

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

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

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