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TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

MATHEMATICS Extended Part Module M2
PAPER

Question-Answer Book

Candidate Number

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: More about Trigonometric Functions

INSTRUCTIONS

(1) This paper consists of THREE sections, A(1), A(2) and B.

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

(4) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

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SECTION A(1) (16 marks)

1. Convert $\frac{7\pi}{12}$ radians to degrees, and convert 150° to radians in terms of π. **(3 marks)**

2. Without using a calculator, evaluate $\sin\frac{5\pi}{6} + \cos\frac{4\pi}{3} + \tan\frac{7\pi}{4}$. **(3 marks)**

3. Given that $\sin\theta = \frac{3}{5}$ and θ lies in quadrant II, find the exact value of $\sin 2\theta$ and $\cos 2\theta$. **(4 marks)**

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4. Solve the equation $2\sin^2 x - \cos x - 1 = 0$ for $0 \leq x \leq 2\pi$. **(6 marks)**

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SECTION A(2) (24 marks)

5. A sector OAB of a circle with centre O and radius 12 cm has area 48 cm^2 . Find, in radians, the angle $\angle AOB$ and the length of the arc AB. Hence find the perimeter of the sector. **(7 marks)**

6. The function $f(x) = 3\sin(2x + \frac{\pi}{3}) + 1$ is defined for $x \in R$. **(8 marks)**
(a) State the amplitude, period and range of f.
(b) Solve $f(x) = 1$ for $0 \leq x \leq \pi$.

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7. (a) Prove that $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$. **(9 marks)**

(b) Using the result in (a), solve the equation $\sin 3\theta = \sin\theta$ for $0 \leq \theta \leq \pi$.

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SECTION B (10 marks)

8. (a) Prove the identity $\frac{\sin 3x}{\sin x} = 1 + 2\cos 2x$ for $\sin x \neq 0$. **(10 marks)**

(b) Hence solve the equation $\frac{\sin 3x}{\sin x} = 2\cos^2 x$ for $0 < x < \pi$.

END OF PAPER

Answers written in the margins will not be marked.

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