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TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

Candidate Number

MATHEMATICS Compulsory Part
PAPER 1

Question-Answer Book

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: More about Trigonometry

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. Simplify the expression $\frac{\sin^2\theta}{1-\cos\theta} + \cos\theta$, where θ is an acute angle. **(3 marks)**

2. In $\triangle ABC$, AB = 8 cm, BC = 5 cm and $\angle ABC = 60^\circ$. Find the length of AC correct to 3 significant figures. **(3 marks)**

3. A vertical pole PQ stands on horizontal ground. From a point A on the ground, 10 m from the foot Q of the pole, the angle of elevation of the top P is 35°. Find the height of the pole correct to 3 significant figures. **(4 marks)**

Answers written in the margins will not be marked.
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4. In the figure, $VABCD$ is a right pyramid with a square base $ABCD$ of side 6 cm. The vertex V is vertically above the centre O of the base, and VA = 9 cm. Find the angle between the line VA and the base $ABCD$, correct to 3 significant figures. **(6 marks)**

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SECTION A(2) (24 marks)

5. In the figure, $ABCD$ is a horizontal rectangle with AB = 8 cm and BC = 6 cm. P is a point vertically above A such that PA = 5 cm. Let M be the foot of the perpendicular from A to BD. **(7 marks)**

(a) Show that $PM \perp BD$.

(b) Hence find the angle between the plane PBD and the horizontal plane $ABCD$, correct to 3 significant figures.

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6. A ship leaves port A and sails 20 km on a bearing of 040° to port B. It then sails 15 km on a bearing of 130° to port C. **(8 marks)**

(a) Find the distance AC correct to 3 significant figures.

(b) Find the bearing of C from A correct to the nearest degree.

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7. (a) Prove that $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = \frac{2}{\sin\theta}$ for $0^\circ < \theta < 180^\circ$. **(9 marks)**

(b) Hence solve the equation $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 4$ for $0^\circ < \theta < 180^\circ$, giving your answer correct to 1 decimal place.

Answers written in the margins will not be marked.

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SECTION B (10 marks)

8. In $\triangle ABC$, AB = 10 cm, AC = 7 cm and $\angle BAC = 60^\circ$. Let D be the foot of the perpendicular from B to AC. **(10 marks)**

(a) Find BD and CD.

(b) Find BC correct to 3 significant figures.

(c) Find $\angle ACB$ correct to 3 significant figures.

(d) A point P lies inside $\triangle ABC$ such that $\angle PBC = \angle PCB = 30^\circ$. Find BP correct to 3 significant figures.

END OF PAPER

Answers written in the margins will not be marked.

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