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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: Basic Properties of Circles

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. In a circle with centre O, a chord AB of length 16 cm is at a distance of 6 cm from O. Find the radius of the circle. **(3 marks)**

2. In the figure, A, B, C and D lie on a circle with centre O. The angle subtended by the arc AB at the centre is $\angle AOB = 130^\circ$. The point C lies on the major arc AB. Find $\angle ACB$. **(3 marks)**

3. In the figure, $ABCD$ is a cyclic quadrilateral. It is given that $\angle A = (3x + 10)^\circ$ and the opposite angle $\angle C = (2x - 5)^\circ$. Find the value of x and hence find $\angle A$. **(4 marks)**

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4. In the figure, TA is a tangent to a circle with centre O at the point A. The line TO meets the circle at B (nearer to T) and at C (farther from T). It is given that $TA = 12$ cm and the radius of the circle is 5 cm. **(6 marks)**

(a) Find the length of TO.

(b) Find the length of the chord AB (leave your answer in surd form).

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SECTION A(2) (24 marks)

5. In the figure, P is an external point and PA, PB are tangents to a circle with centre O, touching the circle at A and B respectively. It is given that $\angle APB = 56^\circ$. **(7 marks)**

(a) Find $\angle AOB$.
(b) Prove that $PA = PB$.
(c) If the radius of the circle is 9 cm, find the length of PA correct to 3 significant figures.

Answers written in the margins will not be marked.
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6. In the figure, AB is a chord of a circle with centre O and radius 13 cm. The perpendicular from O to AB meets AB at M. It is given that OM = 5 cm. **(8 marks)**

(a) Find the length of AB.

(b) Find the area of the minor segment cut off by the chord AB (i.e. the region between the chord AB and the minor arc AB), correct to 3 significant figures.

(c) A second chord CD is drawn parallel to AB on the opposite side of O, with CD = 24 cm. Find the distance between the chords AB and CD.

Answers written in the margins will not be marked.

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7. In the figure, A, B, C and D are points on a circle. The chords AC and BD intersect at the point E inside the circle. It is given that $\angle BAC = 38^\circ$ and $\angle ABD = 47^\circ$. **(9 marks)**

(a) Find $\angle BDC$ and $\angle ACD$.

(b) Find $\angle AED$, the angle between the chords at E.

(c) If $\angle CAD = 25^\circ$, find $\angle BEC$ and verify your answer using triangle AED.

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SECTION B (10 marks)

8. In the figure, $ABCD$ is a cyclic quadrilateral. The tangent to the circle at A is the line TAX, with T on the side of D and X on the side of B. It is given that AD bisects $\angle TAC$ and that $\angle ABC = 100^\circ$. **(10 marks)**

(a) Prove that $\angle DAC = \angle ABC - 90^\circ$ is NOT generally true; instead, using the tangent–chord angle, express $\angle TAD$ in terms of $\angle ACD$.
(b) Given that AD bisects $\angle TAC$, show that $\angle ACD = \angle BCA$.
(c) Hence show that $AB = AD$.
(d) Find $\angle ADC$ and $\angle BAC$.

END OF PAPER

Answers written in the margins will not be marked.
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