BINDURA UNIVERSITY OF SCIENCE EDUCATION

DM005: GEOMETRY AND TRIGONOMETRICAL RATIOS

Time : 3 hours

Answer 4 questions Altogether
Answer **TWO** questions from Section A and **TWO** questions from Section B

SECTION A (50 marks)

Candidates may attempt TWO questions from this section.

A1.

(a) Find the **vertices**, **Foci** and **asymptotes** of the hyperbola given by the equation

$\frac{y^2}{9} - \frac{x^2}{4} = 1$. Sketch the graph   [5]

A2

The points A(7, 1), B(7, 9) and C (1, 9) are on the circumference of a circle.

(a) Find an equation of the circle   [8]
(b) Find an equation of the tangent to the circle at B.   [8]
(c) In the diagram $\triangle$ KLM given, with P and Q lying on KL and KM respectively such that PQ ∥ LM. PM and LQ are drawn.
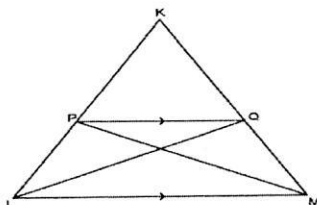
Prove that $\frac{KP}{PL} = \frac{KQ}{QM}$.   [9]

A3

(a) If M(-1; 4) is the midpoint of the line segment AB, and the coordinates of A(3; 6) are given, find the coordinates of the end point B.   [7]

(b) Determine the equation of the straight line that passes through the points P(1; 2) and Q(3; 8) in the form $y = mx + c$.   [8]

(c) A(-4; 7), B(4; 5), C(0; -1) and D(a; b) are vertices of a parallelogram ABCD.

(i)   Draw the parallelogram on a graph paper.   [3]

(ii) Find the midpoint of the diagonal AC   [2]

(iii)   Use the information that you have to find the coordinates of point D.   [2]

(iv)   Determine the equation of the straight line that passes through point A and point B on the parallelogram in the form $y = mx + c$ [3]

SECTION B (50 Marks)

Candidates may attempt **TWO** questions from this section.

A4. Solve the equation

(b) $\dfrac{\tan\theta + 2\sin\theta}{\tan\theta - 2\sin\theta} = 3$ for $0° < \theta < 180°$ [8]

(c) Show that $2\sin 15° \cos 15° = \dfrac{1}{2}$. Do not use a calculator.   [8]

(d)   (b) Determine the biggest angle in $\triangle ABC$ if $a = 8\,cm, b = 9\,cm$ and $c = 16cm$ [9]

A5

(a) Prove that $\sin 3x = 3\sin x - 4\sin^3 x$.   [8]

(b) Prove that $\dfrac{\cos(90° + 2x) + \cos^2(180° - x) + \sin^2(360° - x)}{\sin(90° - 2x)} = \dfrac{\cos x - \sin x}{\cos x + \sin x}$.   [9]
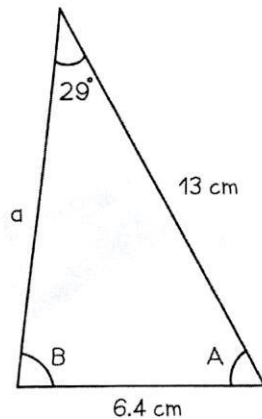
(c) Prove that $\dfrac{Sin\,A + Sin\,B}{Cos\,A + Cos\,B} = \tan\dfrac{A+B}{2}$ [8]

A6

(a) Solve the equation $\tan \theta = -\frac{1}{\sqrt{3}}$ in the interval $[0, 2\pi]$ [8]

(b) In the following triangle, all angles are acute.

Use the sine rule to find the size of angle B   [7]

(c) A man prospecting for oil in the desert leaves his base camp and drives 42km on a bearing of 032^0. He then drives 28km on a bearing of 154^0. How far is he then from his base camp?.   [10]
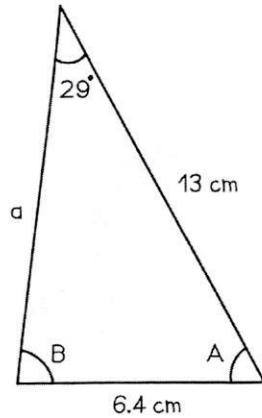
(d) Solve the equation tan θ = $-\frac{1}{\sqrt{3}}$ in the interval [0, 2π]   [8]

(e) In the following triangle, all angles are acute.

Use the sine rule to find the size of angle B   [7]

(f) A man prospecting for oil in the desert leaves his base camp and drives 42km on a bearing of 032°. He then drives 28km on a bearing of 154°. How far is he then from his base camp?.   [10]

END OF QUESTION PAPER