OCT 2024

BINDURA UNIVERSITY OF SCIENCE EDUCATION

DM005: GEOMETRY AND TRIGONOMETRICAL RATIOS.

Time: 3 hours

Candidates may attempts ALL questions in Section A and at most TWO questions in Section B. Each question should start on fresh page.

SECTION A (40 marks)

A1. 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]

A2. 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]

A3 A(-4;7), B(4;5), C(0;-1) and D(a; b) are vertices of a parallelogram ABCD.

(i) Draw the parallelogram on graph paper.

[3]

(ii) Find the midpoint of the diagonal AC.

[2]

(iii) Use 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]

A4. The points A(7;1), B(7;9) and C(1;9) are on the circumference of a circle.

(a) Find the equation of a circle.

[8]

(b) Find an equation of the tangent to the circle at B.

[7]

SECTION B (60 Marks)

Candidates may attempt TWO questions being careful to number them B5 to B7.

B5. (a) Show that $\frac{sin\,(90^o+x)cos\,x\,tan\,(-x)}{cos\,(180^o+x)} = sin\,x.$

[8]

(b) If sin 36° = m and cos 24° = n determine in terms of m and / or n

(i) cos 36°,

[5]

(ii) sin 12°.

[5]

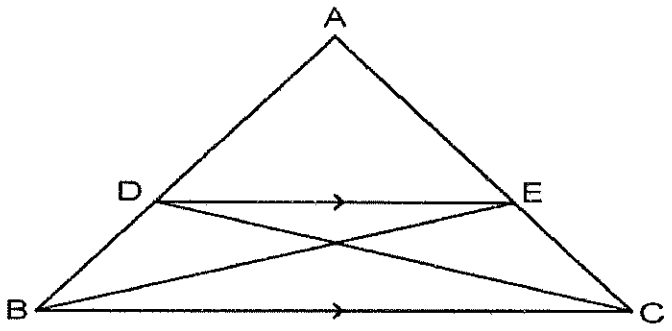
(c) Simplify $\frac{2cos\ 285^o cos\ 15^o}{cos\ (45^o - x)cos\ x - sin\ (45^o - x)sin\ x}$.

[12]

B6.(a) Calculate the value of $(sin\ 3x - cos\ 3x)^2$ if $\sin 6x = \frac{-2}{5}$.

[6]

(b) In the diagram , △ ABC has DE ∥ BC. Prove the theorem that states $\frac{AE}{EC} = \frac{AD}{DB}$.



[10]

(c). (i) Express $4sin\theta - 3cos\theta$ in the form $Rsin(\theta - \alpha)$, where $R > 0$ and $0^0 < \alpha < 90^0$, stating the value of α correct to 2 decimal places.

[4]

Hence

(ii) Solve the equation $4sin\theta - 3cos\theta = 2$,

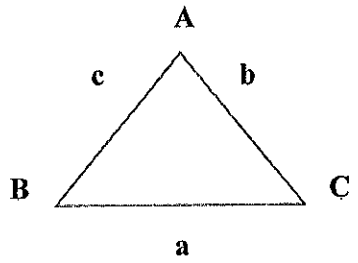
giving all values of θ such that $0^0 < \theta < 360^0$

[8]

(iii) Write down the greatest value of $\frac{1}{4sin\theta - 3cos\theta + 6}$.

[2]

B7(a). In a triangle, ΔABC, prove that $\frac{a}{Sin\,A} = \frac{b}{Sin\,B} = \frac{c}{Sin\,C}$ [8]



(b). Prove the identity. $(1 + sin\theta)(\frac{1}{cos\theta} - tan\theta) \equiv cos\theta.$ [6]

(c). Find the coordinates of the points of intersection of the line $y + 2x = 9$ and the curve $y^2 = 6x + 1$. [4]

(d). The line L_1 has the equation $2x + y = 8$. The line L_2 passes through the point A(7, 4) and is perpendicular to L_1.

(i) Find the equation of L_2. [6]

(ii) Given that the lines L_1 and L_2 intersect at the point B, find the length of AB. [6]

END OF THE PAPER