MURANG'A UNIVERSITY COLLEGE

(*A Constituent College of Jomo Kenyatta University OF Agriculture and Technology*)

University examination

School of Pure and Applied Sciences

End of Semester Examination   Certificate in Bridging Mathematics

UNIT CODE; SMB 0102   UNIT TITLE: GEOMETRY

DATE: 7th DECEMBER, 2015   TIME: 2 HRS

INSTRUCTIONS: *Answer question one and any other two questions*

QUESTION ONE (30Mks)

Q1. (a) Without using calculators or tables

(I) obtain $\tan 240^0$ leaving your answer in surd form.   (3mks)

(ii) solve for $\theta, 0^0 < \theta < 90^0$ if $\cos(3\theta + 20^0) = \sin(4\theta)$ (2mks)

(b) Calculate the number of sides of a regular polygon whose ;

(i) interior angle is 135^0 (3mks)

(ii) exterior angle is 72^0 (2mks)

(c) Draw a triangle ABC without using a protractor such that AB = 5cm

Angle ABC = 45^0 and angle BAC = 60^0.

(i) measure AC and BC

(ii) drop a perpendicular from A to BC   (4mks)

(d) Draw a line AB = 6cm. Construct the locus of point P such that AP = PB   (3mks)

(e) James whose height is 1.8m observes his shadow to be 4.8m long on the horizontal ground.

Calculate the angle of elevation to the sun at that time.   (3mks)

(f) The interior angles of a hexagon are 2x, $\frac{1}{2}$ x, x+40^0 , 110^0 , 130^0 and 160^0 .
calculate the

smallest angle.   (4mks)

(g) Construct a regular hexagon of side 4cm by inscribing it in a circle.   (3mks)

(h) Jane walks from a point A on a bearing of 30^0 for 5km and then walks due south to

a point 8km from A. calculate;

(i) Jane's new bearing from A   (1mks)

(ii) Jane's total distance covered.   (2mks)

QUESTION TWO. (20 marks)

(a)   (i) without using a protractor and/or setsquare, draw a pentagon ABCDE with AB = 8cm,

BC = 6cm, CD = 5.2cm, $<$ EAB = 150^0 , $<$ ABC = 120^0, $<$ CDE = 60^0.   (8mks)

(ii) Measure DE and angle AED   (2mks)

(b) Solve the following equations;

i   Sin(2A+ 10^0) = cos(3A), $0^0 \leq A \leq 90^0$

ii   2sin2θ + 1 = 0 $0^0 \leq \theta \leq 360^0$ [5mks]

(c)   If the angle of elevation of the top of a vertical 30m high aerial is 32^0 , how far is it to the aerial?

(5mks)

QUESTION THREE. (20 marks)

(a) Draw a line AB = 10cm. Draw a circle of radius 3cm centered at B Draw a tangent from A to a point P

on the circle you have drawn. Measure the length of the tangent and angle ABP.   (5mks)

(b) Solve the following trigonometric equations:

i 2sin^{2}x + 1 = 3sinx $0^0 \leq x \leq 360^0$

ii 3cos$^2\theta$ - 4cosθ - 4 = 0 $0^0 \leq \theta \leq 360^0$ (8mks)

(c) Evaluate cos (-210^0) without using tables or calculator leaving your answer in surd form.

(2mks)

(d) Construct triangle ABC where BC = 6cm AB = 8cm and angle ABC = 135^0 without using a protractor.

Measure $<$ BAC, $<$ BCA and line AC   (5mks)

QUESTION FOUR. (20 marks)

(a) Given that AB = $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and BC = $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$, work out;

         i   AB + BC   (1mk)

         ii $\frac{1}{2}$BC   (1mk)

         iii   -3AB   (1mk)

         iv   AB − 2CB   (2mks)

(b) Find the values of x and y if $\begin{pmatrix} 1-x \\ 3 \end{pmatrix} = \begin{pmatrix} 6 \\ 2y+1 \end{pmatrix}$ (2mks)

(c) if $\begin{pmatrix} 2 \\ 8 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ x+3 \end{pmatrix}$ are parallel vectors ,find the value of x   [4mks]

(d) (I) what is the image of triangle ABC with A(-3,5) B(2,1) C(-5,0) after a translation vector $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$?

                                                                           [3mks]

(e) From the top of a vertical cliff 80m high the angles of depression of two boats lying due west of the

      Cliff are 23^0 and 15^0 respectively. How far are the boats apart?   [6mks]