**MURANG’A HIGH SCHOOL**

**MATHS FORM 4 C.A.T. 1 – 2016 TIME: 1 HOUR**

**NAME:………………………………………….ADM.NO…………CLASS………..CL.NO……**

**Answer all the questions in the spaces provided:-**

1. Make A the subject of the formula (3 marks)

 T = $\frac{2m}{n} \sqrt{\frac{L-A}{3k}}$

2. The figure below shows a triangle **ABC** in which **AB** = 20 cm angle **BAC** = 110o and angle **ACB** = 30o. Calculate to Idp. the length **AB** and hence the area of the triangle **ABC**.

 (3 marks)



3. Solve the following quadratic equation by completing the square. (3 marks)

 2x2 – 5x + 3 = 0

4. Given the matrices A = $\left(\begin{matrix}3&2\\4&1\end{matrix}\right)$ and B $\left(\begin{matrix}1&-1\\2&3\end{matrix}\right)$ and C = AB, find the inverse of C

 (3 marks)

5. The equation of a circle is

 x2 – 8x + y2 + 12y + 16 = 0

Determine the coordinates of the centre of the circle and its radius. (3 marks)

6. Solve the equation $\frac{2}{x- 1} - \frac{1}{x+2} = \frac{1}{x} $ (3 marks)

7. Given the column vectors a = $\begin{matrix}1\\-2\\1\end{matrix}$ b= $\begin{matrix}6\\-3\\9\end{matrix}$ c = $\begin{matrix}-3\\ 2\\ 3\end{matrix}$ and that P = 2a - $\frac{1}{3} b+c$

Express P as column vector and hence calculate it’s magnitude to 3 significant figures.

 (3 marks)

8. The points **A**1(3,-8) and **B**1(-5,4) are the images of **A** and **B** under a transformation whose matrix is **T**$\left(\begin{matrix}3&1\\-1&2\end{matrix}\right)$. Find the co-ordinates of **A** and **B** (3 marks)

9. A man has 140 m of mesh wire with which he intends to fence a rectangular enclosure for rearing hens. Find the length of the enclosure which will give maximum area and hence calculate it’s area. (4 marks)

10. Jane travels at an average speed of 60 Km/h for 2 hours. She then travels a distance of 84 km at an average speed of 70 km/h. Calculate the average speed of the whole journey.

 (2 marks)

11. In the figure below **ABCDE** is a pentagon inscribed in a circle. **CX** is a tangent to the circle at **C** and **EDX** is a straight line. <**ADE** = 34o, <**CAD** = 42o, **AB** = **BC** and **BC** is parallel to **AD**



Determine giving reasons in each case

(a) <**ABC** (2 marks)

(b) <ACD (2 marks)

(c) <EAD (2 marks)

(d) <CXD (2 marks)

(e) Given length **ED** = 5 cm and **DX** = 4 cm, calculate length **CX** (2 marks)

12. On the grid provided draw triangle **ABC** whose co-ordinates are **A**(-6,5), **B**(-4,1) and **C**(3,2)

 (1 mark)

(b) Given that **A**(-6,5) is mapped onto **A**1(-6,-4) by a shear with Y-axis invariant

(i) Determine the shear matrix (2 marks)

(ii) Draw triangle **A1B1C1** the image of **ABC** under the shear and state it’s co-ordinates

 (3 marks)

(c) Triangle **A11B11C11** is the image of triangle **A1B1C1** under the transformation whose matrix

 is $\left(\begin{matrix}-1&0\\1\frac{1}{2}&-1\end{matrix}\right)$

(i) Draw triangle **A11B11C11** and state it’s co-ordinates (2 marks)

(ii) Describe fully a single transformation which maps **ABC** onto **A11B11C11** (2 marks)