DEPARTMENT OF MATHEMATICS AND PHYSICS

UMTH 17S

AMA 1002: GEOMETRY

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME ALLOWED: 2HRS

Instruction to Candidates

You should have the following for this paper

- *Mathematical Tables.*
- *Scientific Calculator.*
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This paper consists of **FIVE** questions.

Answer question **ONE** compulsory and the other **TWO** questions.

Maximum marks for each of a question are as shown.

This paper consists of **FOUR** printed pages.

SECTION A

1 (a) Define the following terms as used in Geometry

— Vector quantity

— Scalar quantity   (4mks)

  i.   A cone of base radius 3cm and height 4cm is cut off from a solid cone of base radius 6cm and height 8cm.Calculate the surface area of the frustum.   (8mks)

 ii.   Calculate the surface area of a sphere of radius 9cm,leaving your answer interms of II   (2mks)

iii.   Define the following terms

    A sector

    A segment   (4mks)

c, Find the angles marked in letters in the following figures, given that o is the centre of the circle.
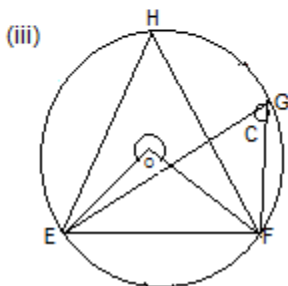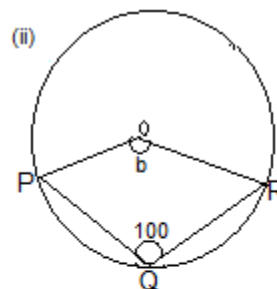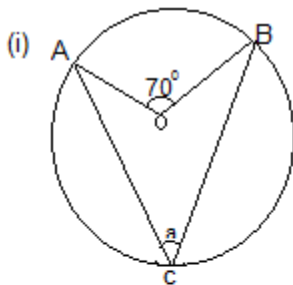
(8mks)

d, Determine which of the following pairs of vectors are parallel   (4mks)

$$a = \begin{pmatrix} 2 \\ 4 \end{pmatrix} \quad b = \begin{pmatrix} 3 \\ 6 \end{pmatrix} \quad c = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad d = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$$

SECTION B

Question two

(a) Show that $\left(\frac{1}{\cos x} - 1\right)\left(\frac{1}{\cos x} + 1\right) = tan^2 x$ (3mks)

(b) Show that $cos^2x + sin^{-2} x = 1$ and hence derive the subsequent trigonometric identities   (8mks)

C(i) A boy 12cm tall is standing 50m from a flag post on a level ground. He finds that the angle of elevation to the top of the flag post is 15^0. Calculate the height of the flag post   (6mks)

(ii) Show that:-

$$\frac{2-Cos^2x}{1+Sin^2x} = 1$$

Question three

a) The length of a cylindrical pipe is 2m. Its external radius is 2.1cm and internal radius is 1.4cm. Find the volume of the internal that was used to make it.   (6mks)

b) If the lengths of the sides of a rectangle are 4.8cm and 3.5cm. Find the length of its diagonal.   (3mks)

c) Find without using tables, the values of $sin\ Ø$ and $tan\ Ø$, if $cos\ Ø = \frac{4}{5}$ and $Ø$ is an acute angle
(5mks)

d) Given that vector AB $= \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ and BC $= \begin{bmatrix} -2 \\ 4 \end{bmatrix}$ Find
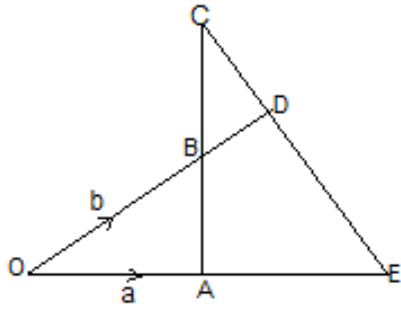
     i.   AB +BC
    ii. $\frac{1}{2}$BC
   iii.   -3AB
   iv.   AB-2BC   (5mks)

e) Define the term prism   (1mk)

Question four
    a) In the diagram below OA = a , OB =b lines AB=BC and OB:BD = 3:1

Determine vector AB, CD in terms of vector a and b. (5mks)

b) Given that vector A = $\begin{pmatrix} 2 \\ 8 \end{pmatrix}$ is parallel to vector B = $\begin{pmatrix} -4 \\ x+3 \end{pmatrix}$ calculate the value of x (5mks)

c) If A(9,4), B(-5,6) Obtain the co-ordinates of the midpoint of AB (3mks)

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

e) Given that a = $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ b = $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$ determine

    i. /b-a/ (2mks)

    ii. /a+b/ (2mks)

Question five

a) State whether each of the following quantities is a scalar or vector quantity.

    i. A temperature of 100^0c (1mk)
   ii. An accelerations of 9.8m/s^2 vertically downwards (1mk)
    iii. The weight of a 7kg mass (1mk)
    iv. The sum of £500 (1mk)
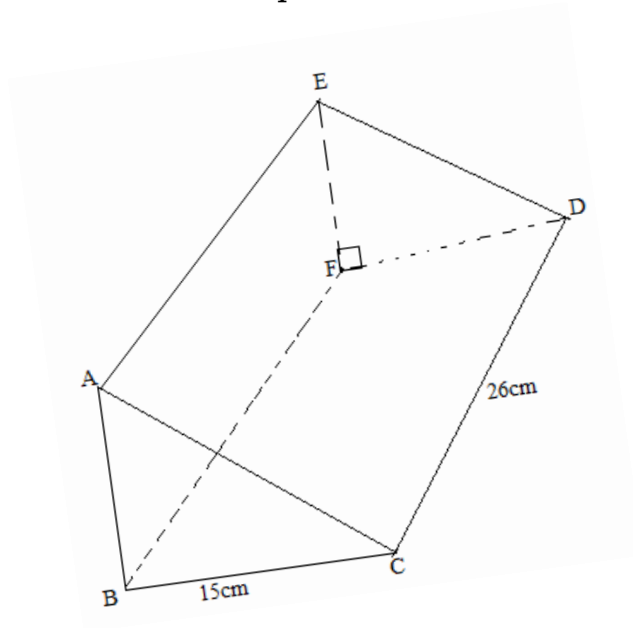   v. A north-easterly wing of 20kmtrs (1mk)

b) A girl lying at the top of a cliff, 120m high sees two rocks whose angles of depression are 10^0 and 30^0.If the rocks are in line with the floor of the cliff. Find the distance between the rocks (10mks)

c) Find the size of angle θ in the figure below
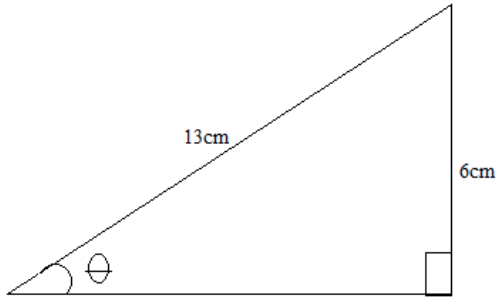
(2mks)

d) Find the surface area of the prism below.

(3mks)