Question one (compulsory)

a) Explain the meaning of the following angles:
   (i) Supplementary angles **(1mark)**
   (ii) Vertically opposite angles **(1mark)**
   (iii) Obtuse angles **(1mark)**

b) (i) Show that a triangle with sides 3,4 and 5 is aright angled triangle. **(3marks)**

   (ii) In a triangle XYZ, XY=3.5cm, YZ=4.5cm and ZX=6.5cm. Calculate the size of angle XYZ. **(3marks)**

c) Prove the following identities:
   (i) $cos^2\theta + sin^2\theta = 1$ **(3marks)**
   (ii) $1 + tan2\ \theta = sec^2\theta$ **(3marks)**
   (iii) $tan\theta + cot\ \theta = sec\theta cosec\theta$ **(3marks)**

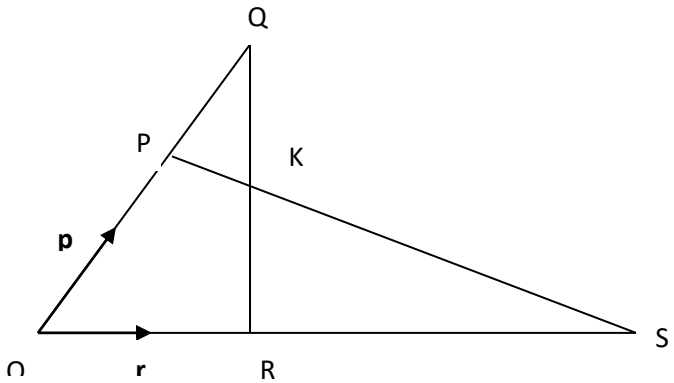
d) A cone 16cm high of base diameter 10cm is cut parallel by a plane to the base and 9cm from the base. Find the ratio of the two parts formed. **(8marks)**

e) Calculate the height of a tree if a person is 1.84m tall, and is standing 16m away from the foot of the tree, if the angle of elevation from his eye is 20^0. **(3marks)**

Question Two

a) The interior angles of a hexagon are x, (2x-30), (3x+10), (3x-10), (2x+10) and (4x-70). Calculate the value of x. **(3marks)**

b) In the figure below, OR= r, OS= 2r, OP= p and OQ=3/2p. Given that QK=mQR and PK = nPS, find the two distinct expressions in terms of p, r, m and n for OK. By equating these expressions, find the value of m and n and hence calculate the ratios QK:KR and PK:KS. **(8marks)**



c) A pyramid frustum has a square top and bottom with lengths of 6cm and 10 cm respectively. The slant height of the frustum is 12cm. if the frustum is open at both ends, calculate its surface area. **(6marks)**

d) Find the wavelength, amplitude and phase angle of $y = 3\cos(2t + 30)$ **(3marks)**

Question Three

a) Draw a triangle ABC with <BCA= 120^0, BC=33cm and BA=8.5cm. Show the locus of points 5cm from C and equidistant from CA and CB. Mark this locus 1. **(8marks)**

b) A person starts from point P and walks 5km eastwards then 8km northwards. How far and what is the bearing of his new [position from the starting point. **(5marks)**

c) Brenda walks on a bearing of 120^0 for 5km then on a bearing of 200^0 for 7km. calculate:

(i) How far is she from her starting point **(4marks)**

(ii) The bearing of her new position from her final position **(3marks)**

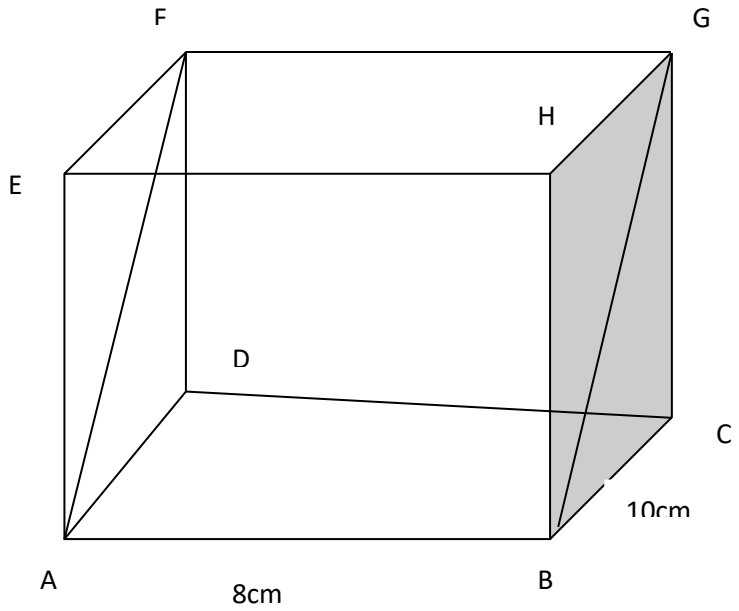
Question Four

a) In the cuboid below, AB=8cm, BC=10cm and GC=11cm. calculate:

(i) The angle between the line AG and plane ABCD **(3marks)**

(ii) The angle between lines AF and FC **(3marks)**

(iii)The angle between planes AB, GF and DCGF. **(3marks)**



b) Given the radius of the earth is 6400km, calculate the radius of:

(i) latitude 40^0N **(2marks)**

(ii) Longitude 20^0S **(2marks)**

(iii)The equator **(2marks)**

c) Two towns N and M are such that M (20^0N. 30^0E) and N (20^0N, 120^0E). Take the earth's radius to be 6370km.

(i) Calculate in kilometers, the shortest distance between M and N along the same longitude. **(3marks)**

(ii) If the time at N is 0935h, what is it at M. **(2marks)**

Question Five

a) Solve for θ in the equation below:

$\sin(\theta + 20) = \cos(3\theta + 30)$ **(3marks)**

b) By drawing a suitable graph, solve for x in the equation $3\cos(2x + 30) = 2$
Such that $-90 \leq x \leq 180^0$. **(8marks)**

c) Draw a triangle ABC with ABC $=120^0$, AB =4.5cm AC=5.5cm.

(i) Measure BC **(4marks)**

(ii) Draw the escribed circle opposite side BC and measure the distance from A to the circle's center. **(5marks)**