KCSE TRIAL 2019

MATHEMATICS PAPER 2 QUESTIONS

SECTION I (50 Marks)

Answer all the questions in this section in the spaces provided.

1. Use logarithm correct 4 decimal places to evaluate

$$\left(\frac{1.681\times 0.267}{0.042}\right)^{\frac{3}{2}}$$

2. Without using tables or a calculator, simplify , $\frac{5}{1+\cos 135}$ leaving your answer in the form of $a+b\sqrt{c}$ where a, b and c are integers. State the values of a, b and c.

3. Make p the subject of the formula.

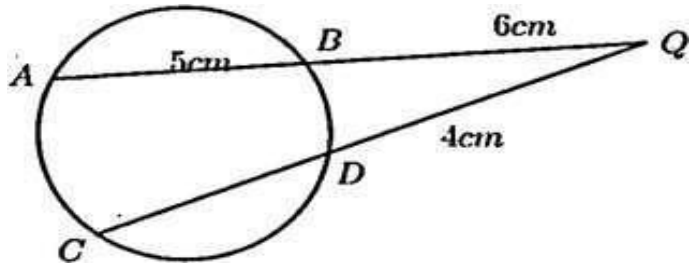
$$t=\sqrt[3]{\frac{p+n}{p}}$$

4. Mr. Ratemo bought maize and beans from a wholesaler. He then mixed the maize and beans in the ratio of 7:5. If he bought maize at sh.48 per kg and beans at sh. 108 per kg and was to make 25% profit, what should be the selling price per kg.

5. T is a transformation represented by matrix $\begin{pmatrix} 5x & 3 \\ -3 & x \end{pmatrix}$ .Under T square a square of area is mapped onto a square of area . Find the value of x .

6. Given that and that z=5i+3j+2k and that find the magnitude of vector p to 3 significant figures.

7. In the figure below AB and CD are chords of a circle that intersect externally at Q. If AB=5 cm, BQ= 6 cm and DQ = 4 cm, calculate the length of the chord CD.



8. Evaluate without using the calculator or mathematical table

$$6\log_2\sqrt[3]{512}+9\log_8\sqrt[4]{256}$$

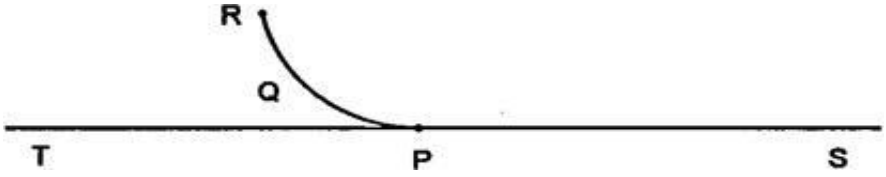
9. Find the centre and radius of a circle whose equation is given by

10. The third, fifth eighth term of an arithmetic progression form the first three terms of a geometric progression. If the first term of the arithmetic progression is 3, find the first term of the geometric progression.

11. A particle moving in a straight line passes through a fixed point O with velocity of . The acceleration of the particle t seconds after passing through O is given by Calculate the velocity of the particle when seconds.

12. Given the measurements m=1.9 cm, t=4.0 cm and s=8.2 cm, find to four significant figures the limits within which . lies $\frac{s-t}{m}$ lies.

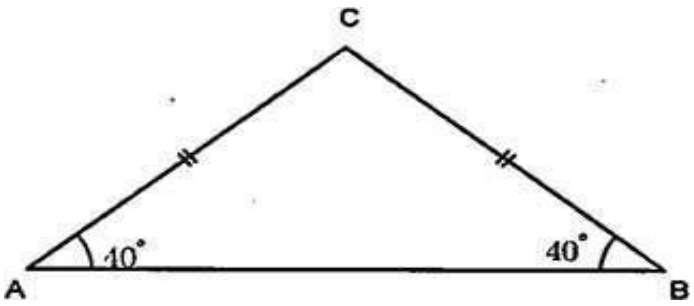
13. In the figure below, RQP is an arc of a circle centre O. Line TPS is a tangent to the circle at P. Using a ruler and a pair of compasses only, locate the centre O of the circle and hence complete the circle. Construct an equilateral triangle ABC to inscribe the circle given that points B and C are on the line TS.



14. The price of a Nissan matatu at the end of the year 2003 was Ksh.840000. If it depreciates in value by 14% and 13% in the first and second years respectively and then by 10% in the subsequent years. Calculate its value at the end of the year 2010.

15. Form a quadratic equation in x whose roots are $2.5+\sqrt{2}$ and $2.5-\sqrt{2}$, in the form where a, b and c are integers.

16. Using the triangle ABC below, shade and label the region P enclosed by the locus of P such that APB



SECTION II (50 Marks)

Answer only five questions from this section.

17. The quantities P, Q and R are such that P varies directly as the square of Q and inversely as the square root of R.

    a) Given that P =72 when Q =6 and R =16, **find;**

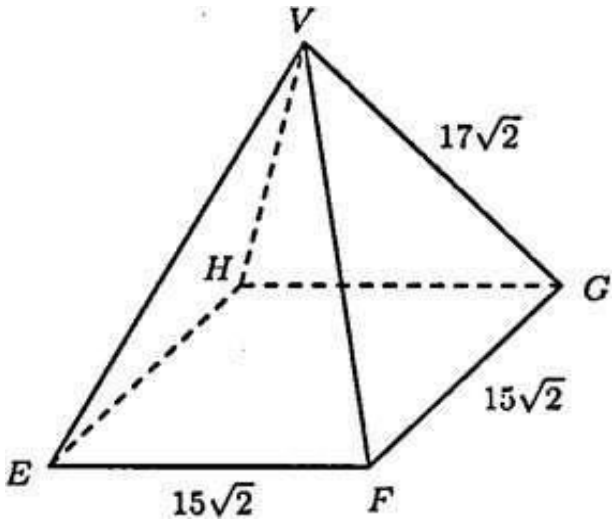
    i. The law connecting P, Q and R.
    ii. The value of P when Q = 8 and R=4
    b) If Q increases by 25% and R decreases by 36%, find the percentage change in P.

18. The gradient function of a curve is given by the expressions . If the curve passes through the

point (-4,6);

a) Find; i. The equation of the curve.
ii. The values of x at which the curve cuts the x axis.
b) Determine the area enclosed by the curve and the x axis.

19. The figure below shows a right pyramid on a square base. $EF = FG = 15\sqrt{2cm}$ and $VG = 17\sqrt{2cm}$



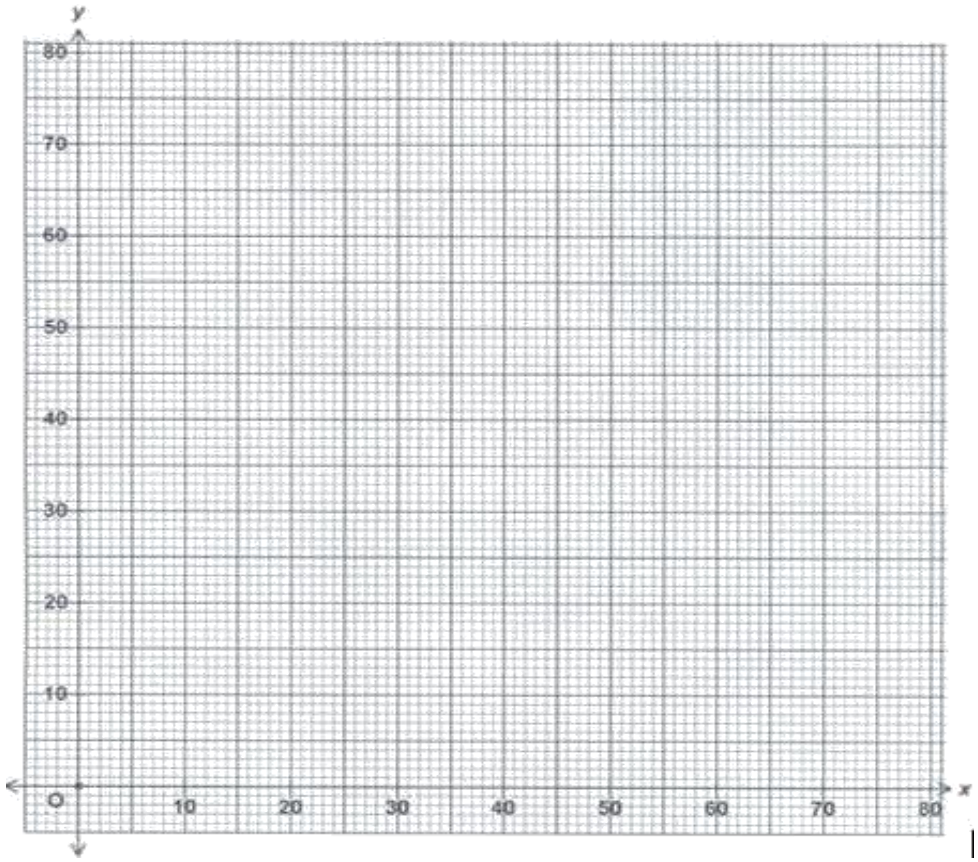
Calculate:

a) The length of EG. (2 marks)
b) The vertical height of the pyramid. (2 marks)
c) The angle between the line EV and the plane EFGH. (3 marks)
d) The angle between the plane EFV and the base EFGH. (3 marks)

20. A farmer wishes to grow two crops potatoes and beans. He has 70 hectares available for this purpose. He has 240 man days of labour available to work out the land and he can spend upto sh.180 000. The requirements for the crops are as follows:-

	Potatoes	beans
Minimum number of hectares to be sown	10	10
Man-day per hectare	2	4
Cost per hectare in sh.	3000	2000
Profit per hectare	15 000	10 000

a) If x and y represent the number of hectares to be used for potatoes and beans respectively, write down in the simplest form the five inequalities which x and y must satisfy.
b) Represent the inequalities in the same axis.



c)i) Using the graph, find the number of hectares to be used for potatoes and beans to give maximum profit.

i) Find the maximum profit.

21. Two towns P and Q both lie on the same latitude in the Northern hemisphere. P lies 530W while Q lies in the 1270E meridian.

a) Given that the distance between P and Q is 5400nm along a circle of latitude, find the latitude of the two towns and hence the position of town Q.

b) Another town R lies 450North of the Equator and on the same longitude as town Q. Find the shortest distance between P and R to the nearest km. $(\pi = \frac{22}{7}$, Radius of the Earth R =6370)

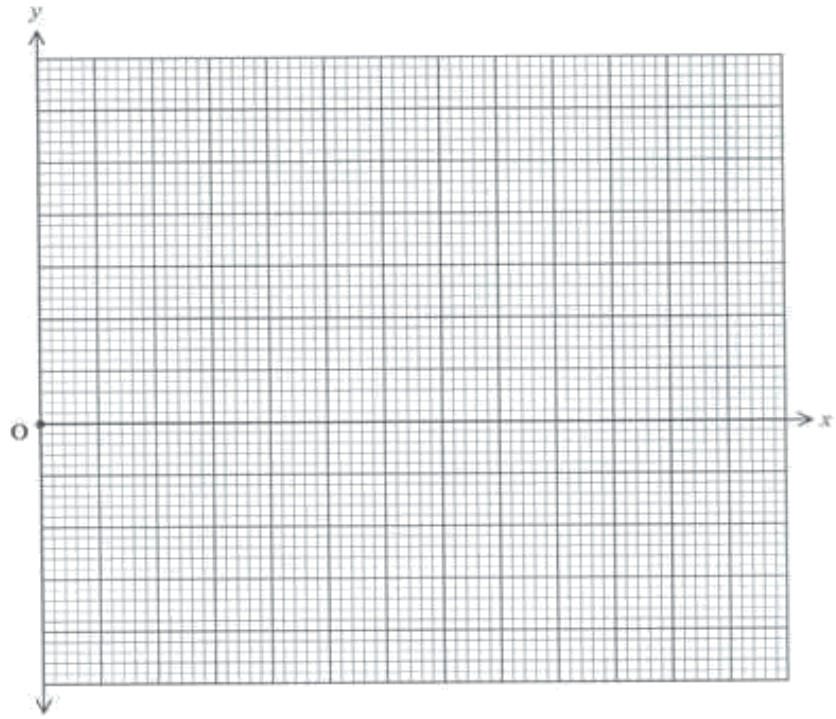
Radius of the Earth R =6370)

c) A ship sails due West from town Q on Sunday at 8.30 a.m. towards P. The speed of the ship is 30 knots. Find the local time and day when it finally docks in town P.

22. a) Complete the table below giving your values correct to 2 d.p

x^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0
$2\cos(2x-15)$	1.93			-1.93	-1.41		
$3\sin(x+30)$	1.50		3.00	2.60		0	

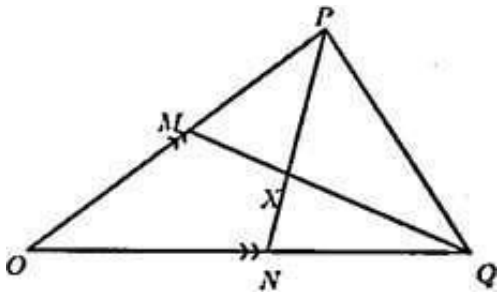
b) Using the grid provided, draw on the same axis the graph and y=3 sin (x+30)



c) Use the graph in (b) above to solve the equation

d) Find the periodic time of

23. In the figure below, **OP** =**p** and **OQ**=**q**. M is a point on **OP** such that **OM**: **PM**=2:3, **N** is a point on **OQ** such that **ON:NQ**=2:1**. PN** and **QM** intersect at X.



a) Express in terms of p and q the vectors.

i. QM
ii. PN

b) Given that **QX**=t**QM** and **PX** =h**PN**. Express

i. OX in terms **p**, **q** and **t**
ii. OX in terms **pq** and **h**

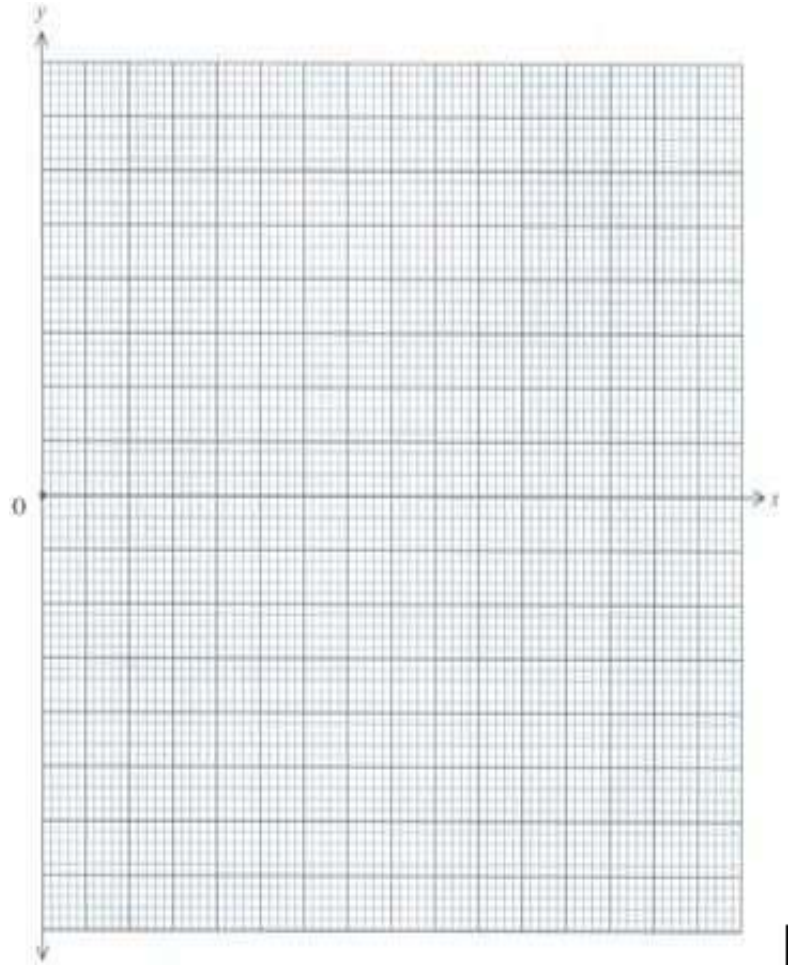
d) State the ratio in which X divides MQ.

24. Two variables x and y are believed to obey the law $y = mx + nx^2$. The following table give their corresponding values in an experiment.

x	1	2	3	4	5	6	7	8
y	6	8	6	0	-10	-24	-42	-64

a) Rewrite the equation connecting y and x into linear form.

b) Use the table and the equation obtained in (a) above to draw a suitable straight line graph.



I Determine the values of the constants m and n.
II. Hence state the law connecting x and y.