

FORM FOUR CLUSTER KCSE MODEL10

MATHEMATICS PAPER 1 QUESTIONS

SECTION I (50 Marks)

Compulsory

1. Without using mathematical tables or calculator, evaluate leaving your answer in standard form.

$$\sqrt[3]{\frac{0.00108 \div 0.58}{128000 \div 0.0002}}$$

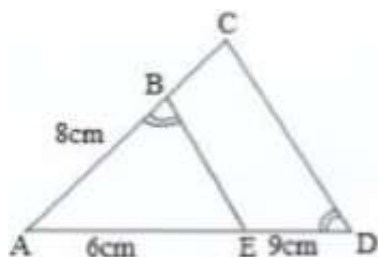
2. Given that $\sin\theta = \frac{2}{3}$ and θ is an acute angle, find without using tables or calculator $\tan^2\theta + \cos^2\theta$.

Give your answer as a mixed fraction.

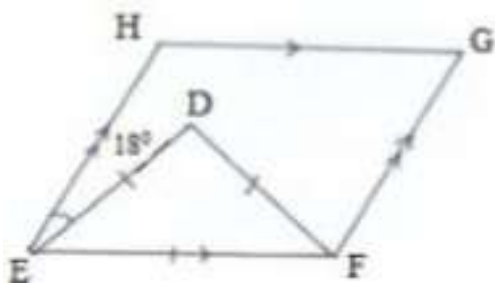
3. Solve for y in the equation below

$$8(2^2)^y = 6(2^y) - 1$$

4. In the figure below, angle ABE is equal to angle ADC. AE = 6cm, ED = 9cm and AB = 8cm. Calculate the length of BC.



5. Two numbers are in the ratio 5 : 7. When 15 is added to each number, the ratio changes to 5 : 6. Find the two numbers.
6. Rapando cycles to school a distance of 18km at a speed of X km/h. On one day, when the wind was behind him, his speed was $(x+2)$ km/h and he took 18 minutes less than the normal time to reach the school. Find X .
7. Find the range of x if, $x + 21 \geq 15 - 2x \geq x + 12$
8. In the figure below, EFGH is a rhombus and triangle DEF is equilateral. Calculate $\angle HDG$ given that $\angle HED = 180^\circ$.



9. Simplify

$$\frac{15a^2b - 10ab^2}{3a^2 - 5ab + 2b^2}$$

10. Use logarithms, correct to 4 significant figures to evaluate.

$$\left(\frac{0.032 \times 14.26}{0.006} \right)^{\frac{2}{3}}$$

11. Solve the following simultaneous equations using substitution method

$$\log_3(2x + y) = 2$$

$$\log_2(5x + 5y) = 2$$

12. The interior angle of a regular polygon is

108°

larger than the exterior angle. How many sides has

the polygon.

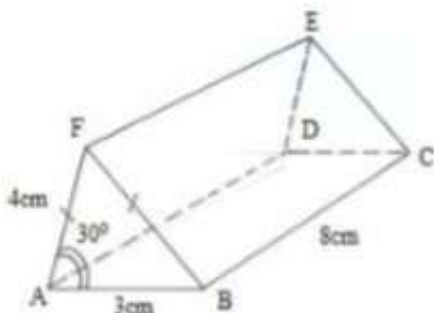
13. A Kenyan company receives US Dollars 100,000. The money was converted into Kenyan shillings in a bank which buys and sells foreign currencies as follows.

Buying in Ksh. Selling in Ksh

1US dollars 77.24 77.44

1 Starling pound 121.93 122.27

- a) Calculate the amount of money in Ksh, the Company received. (2marks)
 b) The Company exchanged the Kenya shillings calculated above into starling pounds to buy a car from Britain. Calculate the cost of the car to the nearest starling pound. (2marks)
14. A translation vectors maps P (3,1) onto P¹ (8, -1). Find the co-ordinate of A(-2,7) under the translation
15. . All prime numbers less than 15 are arranged in descending order to form a number. Write down the number formed in words and hence state the total value of 7 in the number formed.
16. The figure below is a triangular prism of uniform cross- section in which AF = 4 cm, AB= 3 cm and BC= 8 cm.

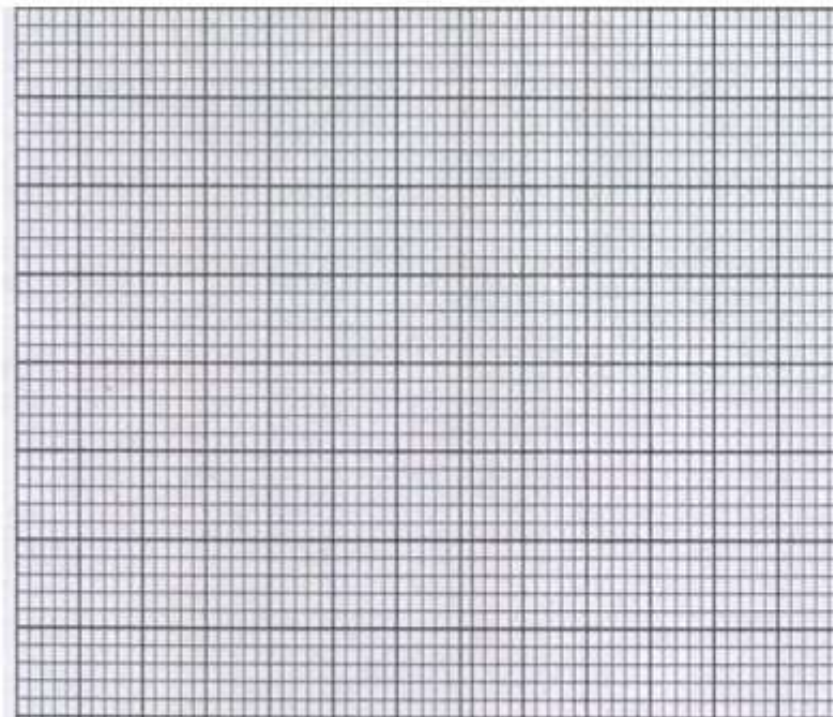


Draw the net of the prism

SECTION I I (50 Marks)

Answer any 5 questions

17. The inside of a rectangular hall measures 15m long, 9m wide and 3cm high. There are three doors measuring 2m by 2.2m and six windows, each measuring 1.5m by 1.5m. The walls of the hall are to be painted.
- a) Calculate the total area of the walls to be painted. (4marks)
- b) The paint area of 2.5m² require one litre. If the paint is sold in 4litres, determine the number of tins of paint that should be bought. (3marks)
- c) The cost of painting a 4 litre tin of paint is sh. 1700. The painter is paid fixed charge of Ksh.2000 and Ksh.30 per square metre of the wall painted. Calculate the total cost of painting the walls. (3marks)
18. A triangle has vertices P(6,0), Q(6, -5) and R(2, -5). It is mapped onto triangle P¹ Q¹R¹ by a transformation matrix given by
- $$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$



a) Draw PQR and the image triangle $P^1 Q^1 R^1$ and describe the transformation fully. (3marks)

b) Triangle $P^{11} Q^{11} R^{11}$ is the image of triangle $P^1 Q^1 R^1$ under a reflection in the line $y+x=0$. On the same grid, draw $P^{11} Q^{11} R^{11}$ and state the co-ordinates of the image triangle $P^{11} Q^{11} R^{11}$ (3marks)

c) Triangle $P^{11} Q^{11} R^{11}$ is transformed by matrix $\begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix}$

onto triangle $P^{111} Q^{111} R^{111}$
Find the area of triangle $P^{111} Q^{111} R^{111}$ (2marks)

d) What single transformation matrix maps $P^{11} Q^{11} R^{11}$ onto P Q R. Determine the transformation fully. (2marks)

19. Using a ruler and a pair of compasses only construct
i) Triangle ABC, such that $AB = 9\text{cm}$, $AC = 7\text{cm}$ and $\angle CAB = 60^\circ$. (3marks)

ii) The locus of P, such that $AP \leq BP$ (2marks)

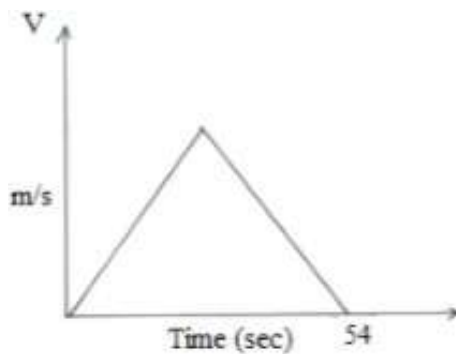
iii) The locus of Q such that $CQ \leq 3.5\text{cm}$ (2marks)

iv) Locus of R such that $\angle ACR \leq \angle BCR$ (1mark)

v) Find the area of the region satisfied by both P and Q. (2marks)

20. A 1.5m flag post is placed on top of building such that from a certain point A on the level ground the angle of elevation of the top of the flag pole is 63° . From another point B, the angle of elevation of the bottom of the flag pole is 68° . Given that A and B are 5m apart and that B is nearer the building than A. Calculate

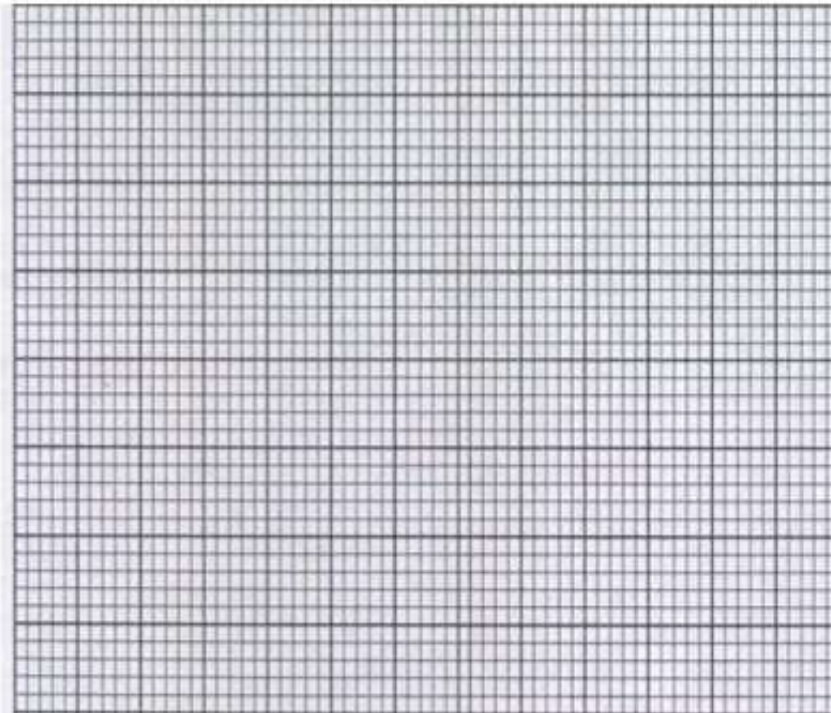
- a) The height of the building. (7marks)
- b) The angle of depression of point A from the top of the building. (3marks)
21. Three towns are situated in such a way that town B is 120km on a bearing of 30° from town A. Town C is 210km on a bearing of 110° from town A. a) Draw a sketch diagram showing the positions of the three towns. (3marks)
- b) Calculate to the nearest whole number the distance BC. (3marks)
- c) Find the bearing of C from B by calculation. (4marks)
22. The figure shows a velocity time graph of an object which accelerates from rest to a velocity V m/s then decelerates to rest in a total time of 54 seconds. If the journey is 810 m long,



- a) i) Find the value of V . (2marks)
- ii) Find the deceleration given the initial acceleration is $1\frac{2}{3} \text{ m/s}^2$ (2marks)
- b) A bus left town X at 10.45a.m and travelled towards town Y at an average speed of 60km/h. A car left town X at 11.15a.m on the same day and travelled along the same road at an average speed of 100km/hr. The distance between town X and town Y is 500km. i) Determine the time of the day when the car overtook the bus. (3marks)
- ii) Both vehicles continued towards town Y at their original speeds. Find how long the car had to wait in town Y before the bus arrived. (3marks)
23. The table below gives marks scored by 50 candidates in a mathematics test.

| Marks | 26 -30 | 31 -35 | 36 -45 | 46 - 50 | 51 -65 |
|-------------------|--------|--------|--------|---------|--------|
| No. of candidates | 5 | 8 | 16 | 14 | 7 |

- a) State the modal frequency (1mark)
- b) Calculate the mean score. (4marks)
- c) Draw a histogram and a frequency polygon on the same grid to represent the information. (5marks)



24. Write down the inequalities that satisfy the region R. Hence find area of region R. (10marks)

