

# FORM FOUR CLUSTER KCSE MODEL2

## MATHEMATICS PAPER 1 QUESTIONS

### SECTION 1 (50 Marks)

Answer all the questions from this section

1. (a) Express the number 3,375 and 315, each as a product of its prime factors. (2 marks)  
(b) Hence evaluate

$$\frac{315^2}{\sqrt[3]{3\ 375}}$$

Leave your answer in index form. (1 mark)

2. Evaluate

$$\frac{-5(23 + 41 - 85)}{40 - 75}$$

3. Find the integral values that satisfy the inequality

$$\frac{1}{2}(5x - 4) \leq x + 5 \frac{1}{2} < 3x + 1 \frac{1}{2}$$

4. Simplify the expression

$$\frac{6x^3 - 10x^2y - 24xy}{36x^3 - 64xy^2}$$

5. Solve the following simultaneous equations.

$$\log_3(3 + 4) = 2$$

$$\log_2(2 + ) = 1$$

6. Evaluate

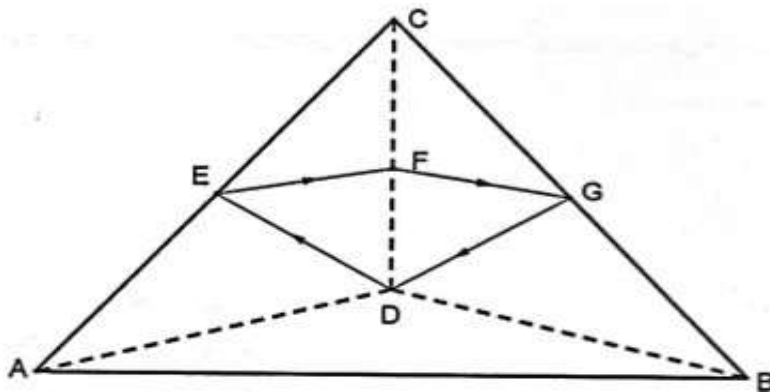
$$\frac{\frac{1}{2} \text{ of } 3 \frac{1}{2} + 1 \frac{1}{2} \left( 2 \frac{1}{2} - \frac{2}{3} \right)}{\frac{3}{4} \text{ of } 2 \frac{1}{2} \div \frac{1}{2}}$$

7. A forex bureau in Nairobi buys and sells selected foreign currencies at the rates given in the table below.

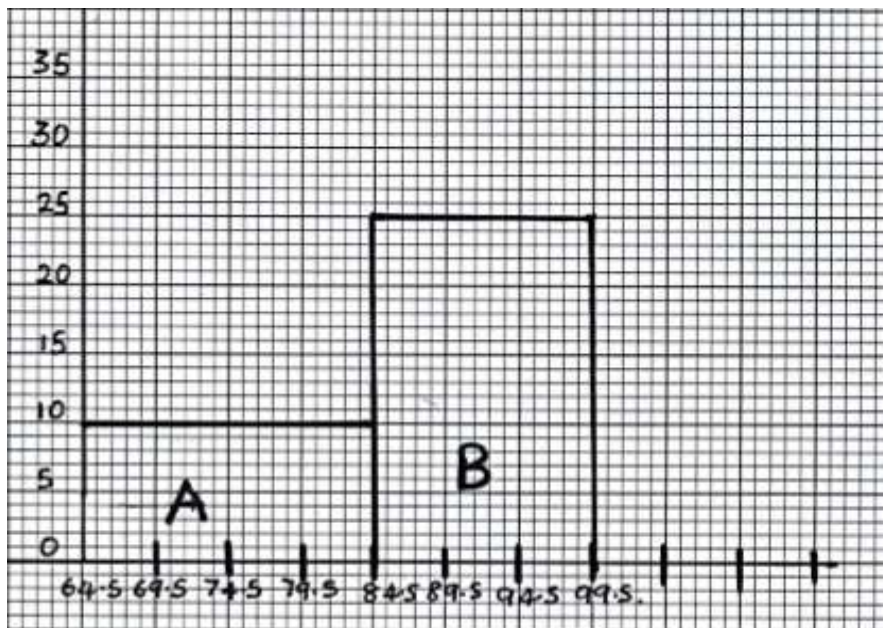
Currency	Buying (Ksh)	Selling (Ksh)
1 U.S \$	75	80
100 Uganda Shillings	4	4.50

A tourist arrived in Kenya with \$2 000. She changed the dollars into Kenyan shillings at the bureau. During her stay in Kenya, she spent a total of Ksh. 60 000. She converted all her remaining Kenyan Shillings into Ugandan Shillings at the same bureau. How much in Ugandan Shillings was she given?

8. Line L joins point A (0, 0) to B (6,-2). Find the equation of M which is perpendicular bisector to line L in the form  $ax + by + c = 0$
9. Three alarms go off at intervals of 12 seconds, 18 seconds and one second. At 6.30 p.m., the alarms went off simultaneously. Find the times when the three alarms go off simultaneously again in the next 10 minutes.
10. When the sun rays make an angle of  $48^\circ$  with the ground, the shadow cast by a vertical pole is 4 metres. How long will this shadow be when the sun's angle of elevation is  $38^\circ$ ?
11. On the surface of a tetrahedron ABCD, where E, F and G are mid points. A continuous path DEFGD is drawn as shown by the arrows below.



- a) Draw and label a net of this tetrahedron. (1 mark)
  - b) On the net show the path. (2 marks)
12. In Joshua's duka, biscuits are sold in two types of packets, A and B. Six packets of A and seven packets of B contain 84 biscuits, while three packets of A and two packets of B contain 33 biscuits. Find the number of biscuits in each type of packet.
  13. The histogram below represents the distribution of marks obtained in a test. If the frequency represented by bar B is 15, determine the frequency of the class represented by bar A.



14. One interior angle of a polygon is a right angle and each of the other interior angles is  $126^\circ$ . Calculate the number of sides of the polygon.
15. Two liquids A and B are of densities  $3.5 \text{ g/cm}^3$  and  $2.4 \text{ g/cm}^3$  respectively.  $x \text{ cm}^3$  of liquid A are mixed with  $50 \text{ cm}^3$  of liquid B. Given that the density of the resulting mixture is  $2.7 \text{ g/cm}^3$ , determine the value of  $x$ .
16. In a rhombus ABCD, the diagonal AC is of length 10 cm. Further,  $\angle DAB = 60^\circ$ . Point A below is one of the vertices of the rhombus. Use a ruler and a pair of compasses only to complete the rhombus.

A •

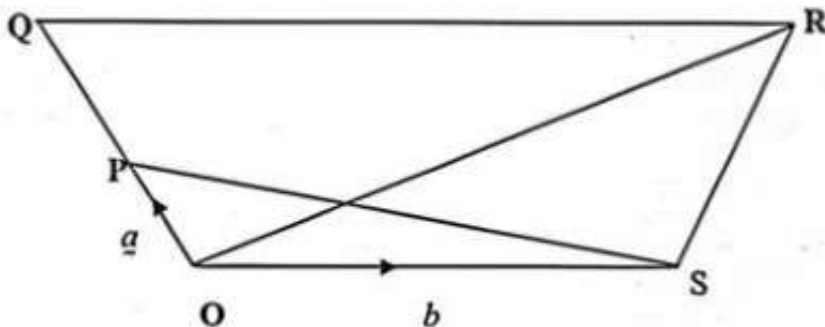
## SECTION II (50 Marks)

### Answer only five questions from this section

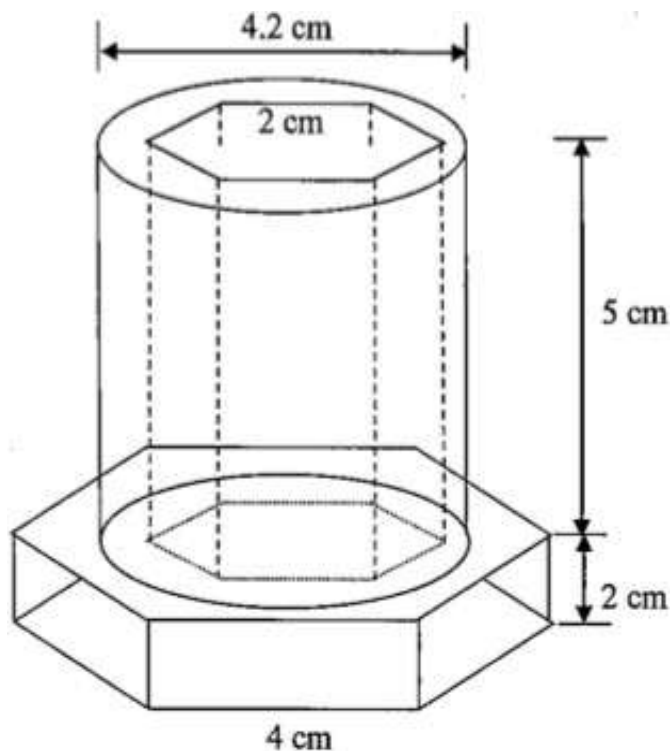
17. The sum of shs 3600 was divided equally among  $x$  homeless boys. The same sum was divided equally among  $(x+4)$  homeless girls. If each boy received shs 30 more than each girl, find the amount received by each girl.
  - a) Write an expression in terms of  $x$ , for the amount received by; i. Each of the homeless boys. (1 mark)  
ii. Each of the homeless girls. (1 mark)
  - b) Form an equation in  $x$  and hence determine the number of homeless boys. (5 marks)
  - c) Calculate the amount received by each girl. (3 marks)
18. In a certain town, there are two hardware shops, hardware A and hardware B. At hardware A, the cost of one Panga and one Jembe is sh.P and sh.J respectively. At hardware B, the cost of a Panga is higher by 20% whereas the cost of a Jembe is lower by 25%. Juma bought 4 jembes from hardware A. Alvin bought 5 pangas from hardware A. Anne bought 5 pangas and 4 jembes from hardware B.
  - a) Given that Juma spent sh.420 more than Alvin and that Anne spent a total of sh.3240, form two simplified equations to represent the information above. (2 marks)
  - b) Use a matrix method to determine the cost of one panga and that of a jembe at Hardware A. (4 marks)
  - c) Ben bought a number of pangas and jembes from Hardware B at a total cost of Ksh.2 880. If he bought two more Pangas than Jembes, determine the number of each type that Ben bought. (2 marks)
  - d) Suppose Ben had bought the Pangas and the Jembes at hardware A. Determine the price difference his expenditure in the two hardwares. (2 marks)
19. Given triangle P(2,5), Q(1,3), R(5,3) and triangle P1(-4,-2),Q1(-5,-4),R1(-1,-4)
  - a) Describe fully the transformation that maps triangle PQR onto triangle P1Q1R1. (2marks)

- b) On the same plane obtain triangle  $P''Q''R''$  the image of triangle PQR when reflected in the line  $X=0$ . State the coordinates of  $P''Q''R''$  (2 marks)
- c) Draw triangle  $P'''Q'''R'''$  the image of triangle PQR when rotated through  $-90$  about the point  $(0, 0)$ . State the coordinates of triangle  $P'''Q'''R'''$  (2 marks)
- d) Describe a single transformation that maps triangle  $P'''Q'''R'''$  onto  $P''Q''R''$  (2 marks)
- e) State a pair of triangles that are:
- oppositely congruent (1 mark)
  - directly congruent (1 mark)

20. In the diagram below  $\vec{OP}=\vec{a}$  and  $\vec{OS}=\vec{b}$ ,  $\vec{SX}=\vec{hSP}$ ,  $\vec{OQ}=3\vec{a}$  and  $\vec{QR}=\vec{2b}$



- (a) Express i.  $\vec{SP}$  in terms of  $\vec{a}$  and  $\vec{b}$  (1 mark)
- ii.  $\vec{OR}$  in terms of  $\vec{a}$  and  $\vec{b}$  (1 mark)
- b) i) Show that  $\vec{OX} = h\vec{a} + (1-h)\vec{b}$  (2 marks)
- ii) Given that  $\vec{OX} = k\vec{OR}$ , find the values of  $h$  and  $k$ . (5 marks)
- c) Determine the ratio  $OX:XR$  (1 mark)
21. Bus left Nairobi at 7.00 a.m. and travelled towards Nakuru at an average speed of 80km/hr. At 8.00 a.m. a car left Nakuru towards Nairobi at an average speed of 120km/hr. If the distance between Nakuru and Nairobi is 400 km. calculate. a) The time the bus arrived in Nakuru. (2 marks)
- b) The time of the day the two vehicles met. (4 marks)
- c) The distance from Nairobi where the two vehicles met? (2 marks)
22. Three towns are situated in such a way that town Q is 120 km on a bearing of  $030$  from P. Town R is 210 km on a bearing of  $0110$  from P. a) Draw a sketch diagram showing the positions of the three towns. (2 marks)
- b) Calculate to the nearest whole number the distance from town Q to R. (3 marks)
- c) Find the bearing of R from Q to the nearest whole number. (5 marks)
23. The solid below represents lock nut. It consists of a regular hexagonal part and a cylindrical part that has a groove which is hexagonal shaped. The diameter of the cylindrical part is 4.2 cm.



- a) Find the volume of i. The hexagonal groove part. (3 marks)  
 ii. The hexagonal base part. (3 marks)  
 b) The volume of the lock nut. (4 marks)
24. A particle moves in a straight line. It passes through point O at  $t=0$  with velocity  $V = -4$ . The acceleration  $a$  of the particle at time  $t$  seconds after passing through O is given by  $a = 10t + 1$
- a) Express the velocity  $V$  of the particle at time  $t$  seconds in terms of  $t$ . (3 marks)  
 b) Find  $V$  when  $t=3$  (1 mark)  
 c) Determine the value of  $t$  when the particle is momentarily at rest. (3 marks)  
 d) Calculate the distance covered by the particle between  $t=2$  and  $t=4$ . (3 marks)