

## 1. Compound proportions, mixtures and rates of work

1. Naliaka bought maize and beans from a wholesaler. She mixed the maize and beans in the ratio 5:3. She had bought the maize at sh.30per kg and the beans at sh.60 per kg. If she was to make a profit of 30%, what should be the selling price of 1kg of the mixture? (3 mks)
2. A carpenter makes two kinds of tables, hexagonal and rectangular. To make each hexagonal table requires 6 man-hours whereas rectangular ones require 3 man –hours each. The cost of the material for hexagonal table is sh.120 and shs.100 for the rectangular one. The profit obtained from a hexagonal table is sh.80 and a rectangular table is sh.60. The carpenter has to abide by the following conditions:
  - (i) A contract to supply at least 15 hexagonal and 10 rectangular tables per week.
  - (ii) Only 240 man-hours may be available in a week
  - (iii) His total weekly expenditure of all tables must not exceed shs.6,000
  - a) Write down all the inequalities to satisfy the three conditions above (3 mks)
  - b) On the grid provided draw the inequalities in (a) above and shade the unwanted region. (4 mks)
  - c) Using a search line, determine:
    - (i) The number of hexagonal and rectangular tables to be made to maximize profit (2 mks)
    - (ii) The maximum profit acquired from selling the tables (1 mk)
3. A machine part is a pulley system with two wheels of radii 0.5m and 2m. The centres of the wheels are 4m apart.
  - (a) If a rope is tied around the wheels externally to complete the pulley, calculate it's length. (7mks)
  - (b) If the rope is tied internally round the pulleys, it is  $1\frac{1}{3}$ m longer than if tied externally. Calculate the length of the required to 4 significant figures. (3mks)
4. A coffee blender mixes grade A and B in the ratio 3:2 respectively. If grade A costs Sh.30 per kg and B Sh.25 per kg, at what price per kg should he sell the mixture in order to make a profit of 15%? (2mks)
5. John bought 3 brands of tea A,B and C. The cost price of the three brands were Sh. 25, Sh. 30 and Sh. 45 per kilogram respectively. He mixed the three brands in the ratio 5:2:1 respectively. After selling the mixture he made a profit of 20%.
  - (a) How much profit did he make per kilogram of the mixture? (4 marks)
  - (b) After one year the cost price of each brand was increased by 12%.
    - (i) For how much did he sell one kilogram of the mixture to make 20% profit? Give your answer to the nearest 5cts (3 marks)
    - (ii) What would have been his percentage profit if he sold one kilogram of the mixture at Sh. 40.25? (3 marks)

6. Three business partners Georgina, Gilbert and Akumu decided to buy a plot worth shs.510,000. They contributed shs.30000; as a deposit in the ratio 2:3:5 respectively. They paid the balance in two months by contributing equal amounts. After one year, they sold the plot for a profit of 20% and invested the initial capital in another business. The profit was shared in the ratio 1:2:3; respectively. Find how much each partner  
 (a) contributed towards the deposit  
 (b) paid to clear the balance  
 (c) received as a profit
7. Twelve men take 20days to complete a piece of work. How long would 16 men take to do the same piece of work?
8. Mr. Kitur bought grades of tea ; Grade A costs shs.109 per kg and a kg of Grade B costs shs.81.50. In what ratio must he mix the two grades in order to make a profit of 20% by selling the mixture at Kshs.112.80per kg?
9. Mogutu and Onacha working together can do a piece of work in 6days. Mogutu working alone takes 5days longer than Onacha. How many days does it take Onacha to do the work alone?
10. Given the curve  $y = 2x^3 + \frac{1}{2}x^2 - 4x + 1$ , find the equation of the normal to the curve at  $(1, -\frac{1}{2})$
11. **A** and **B** are connected by the equation  $\mathbf{B} = \mathbf{KA} + \mathbf{M}$  where **K** and **M** are constants. The table below shows the values of **A** and corresponding values of **B**

A	1.5	3.0	4.5	6.0	7.5
B	8	11	14	17	20

- a) Draw a suitable straight line on the grid provided  
 b) State the values of K and M, hence express B in terms of A
12. The latitude and longitude of two stations **P** and **Q** are  $(47^\circ\text{N}, 25^\circ\text{W})$  and  $(47^\circ\text{N}, 70^\circ\text{W})$  respectively. Calculate the distance in nautical miles between **P** and **Q** along the latitude  $47^\circ\text{N}$
13. A coffee blender mixes 6 parts of types **A** with 4 parts of type **B**. If type A costs Kshs. 72 and type **B** costs him Ksh.66 per kg respectively at what price should he sell the mixture in order to make a profit of 5%. Give your answer to the nearest ten cent.
14. (a) (i) Paint **A** costs shs.150 per litre while **B** costs shs.160 per litre. In what proportion must **A** be mixed with **B** to produce a mixture costing shs.156 per litre  
 (ii) What must be the selling price of the mixture if a profit of 12% is to be realized?  
 (b) A cylindrical water tank can be filled to a depth of 2.1m by a pipe **P** in 2 hours. Pipe **Q** takes 7 hours to fill the tank to the same level. Pipe **R** can empty this amount of water in 6hours. Initially, the tank is empty. Pipes **P** and **Q** are turned on at 8.45a.m and pipe R at 9.45a.m. Find the depth of water in the tank at 11.45a.m
15. Two grades of tea leaves one costing sh.420 per kilogram and the other costing sh. 470 per kilogram are to be mixed in order to produce a blend worth sh.455 per kilogram. In what proportion should they be mixed?
16. The internal radius of a pipe is 0.35m. Water flows through the pipe at the rate of 45cm per second. Calculate the amount of water that passes through the pipe in  $2\frac{1}{4}$  hours in litres
17. In 2000 the total cost of manufacturing an item was ksh1250 and this was divided among the costs of material, labour and transport in the ratio of 8:14:13. In 2003 the cost of material

was doubled, labour cost increased by 30% and transport costs increased by 20%

a) Calculate the cost of manufacturing this item in 2003

b) In 2004 the cost of manufacturing the same item was Ksh1981 as a result of increase in labour costs only. Find the percentage increase in labour costs of 2004

18. Brand **A** tea costing Kshs.80 per kg is mixed with Brand **B** tea costing Kshs.100 per kg such that the mixture is sold at Kshs.114 making a profit of 20%. Find the ratio of **A:B**
19. In what proportion must teas of Kshs.76 and Kshs.84 per kg be mixed to produce a tea costing Kshs.81 per kg
20. Onyango bought 3 brands of tea **P**, **Q** and **R**. the cost price of the three brands were shs.25, shs.30 and shs.45 per kilogram respectively. He mixed the three brands in the ratio 5:2:1 respectively After selling the mixture, he made a profit of 20%
- (a) How much, profit did he make per kilogram of the mixture?
- (b) After one year, the cost price each brand was increased by 12%.
- (i) For how much did he sell one kilogram of the mixture to maintain 20% profit. Give your answers to the nearest 5cts.
- (ii) What would have been his percentage profit if he sold one kilogram of the mixture at shs.40.25?
21. A mixture contains two powders X and Y with masses in the ratio 3:11. If the mixtures Cost Shs.6.70 per kg and powder x costs Shs.5.60 per kg. Find the cost of 1kg of powder Y