UNEB U.C.E MATHEMATICS PAPER 2 2018
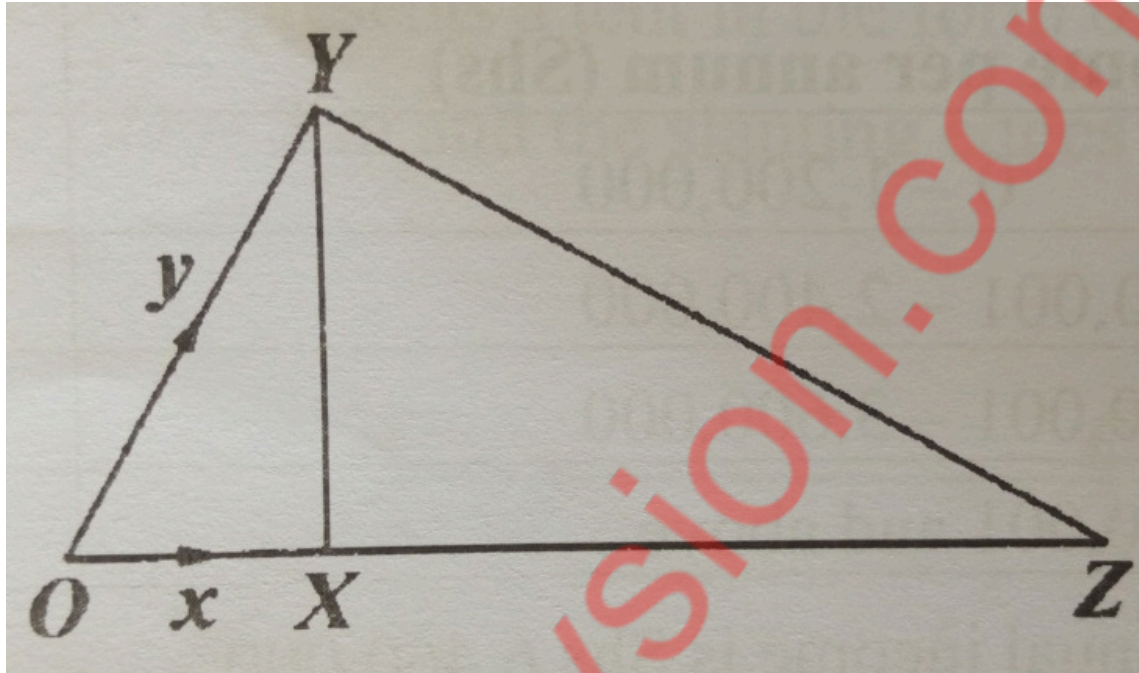
SECTION A
Answer all the questions in this section

1. Express the recurring decimal 1.633… in the form $\dfrac{a}{b}$ where a and b are integers.

2. A line passes through points (3,k) and (2,7). It is parallel to another line whose gradient is 12. Find the value of k.

3. Calculate the volume of a hemisphere whose radius is 4.9cm.

4. Given that A = {2,3,5,7,11,13,17} and B = {1,2,3,5,6,10,15,30}, find n(A#B)#

5.The diagram below shows a line which cuts the y –axis at P and the x-axis at Q
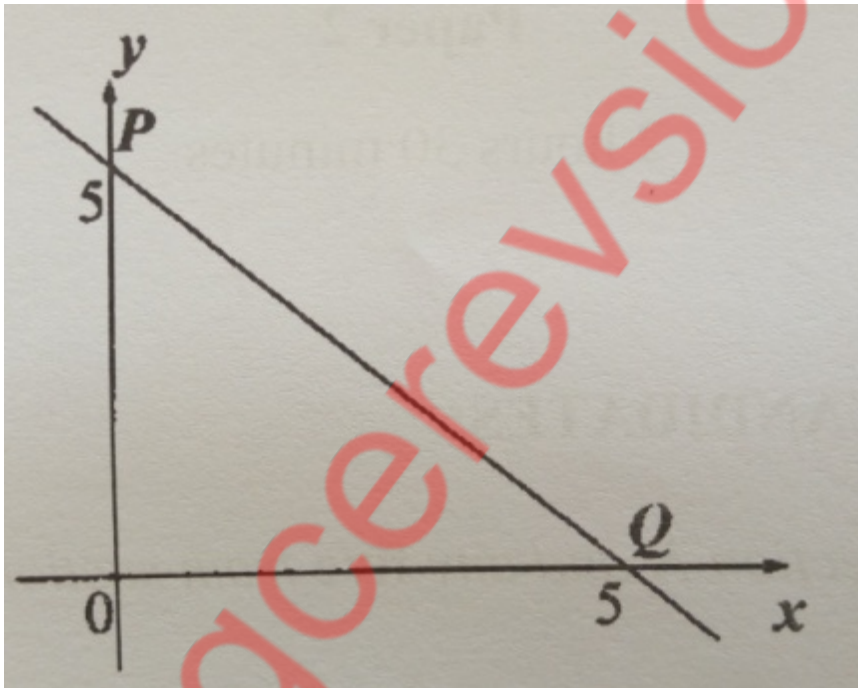
Determine the equation of the line.
If $\log_x y = 2$ and xy = 27, find the values of x and y.

7. Jane bought a television set a Shs450,000. She sold it at Shs550,000. Calculate her percentage profit.

8. Mugisha, Kate, Okello and Zziwa like the following types of foods: matooke, rice, meat and matooke respectively.
a) List the elements of the domain and range of the relation "likes"
b) Draw an arrow diagram to illustrate the relation.

9. The length of each side of a cube is $2x$ cm. The surface area of the area of the cube is 216cm^2. Find the length of each side.

10. In the diagram below, *OX=x, OY = y and OZ = 3OX*

Express *2OY + ZY* in terms of x and y

SECTION B
Answer any five questions from this section.

11. Two functions f and h are defined as $f(x) = x^2 - 1$ and $h(x) = x + 3$
Find
a) $f^{-1}(3)$
b) the value of x if $hf(x) = fh(x)$

12. At a workshop of 150 teachers, it was found that 58 drank juice (J), 66 drank water (W) and 57 drank soda (S).
10 drank water and juice, 11 drank juice and soda and 13 drank water and soda. Some of the teachers drank all the three types of drinks. All the teachers drank at least one of the drinks.
a) Show this information on a Venn Diagram
b) Find the number of teachers who drank all the three types of drinks
c) What is the probability that a teacher choosen at random did not drink water?

13. a) A car driver covered a distance of 60km at 100km/h. A lorry driver covered the same distance but took half an hour more.
Calculate the,
i) time taken by the lorry driver
ii) average speed of the lorry driver.

b) A traffic police patrol car travelling at 120km/h is chasing a taxi 0.5km away and travelling at 100km/h. How far must the police patrol car travel in order to catch up with the taxi?

14. The table below shows the tax structure on taxable income of public servants working in a certain country.

Income per annum (Shs)	Tax rate %
0 -1,200,000	12.5
1,200,000 – 2,400,000	30.0
2,400,001 – 3,600,000	36.5
3,600,001 and above	45.0

A man's gross annual income is Shs 6,460,000.
His allowances are;
Housing – Shs 125,000 per month.
Marriage – 1/10 of his gross annual income

Medical – Shs 354,000 per annum
Transport – Shs 60,000 per month

Family allowances per annum for only 3 children are as follows:
-Shs 25,000 for each child between 10 and 18years
-Shs 32,000 for each child below 9 years

He has to pay an insurance premium of Shs 48,900 per annum. He has four children with two of them below eight years, one is 16 years and the oldest is 20 years. Calculate,
a) his taxable income
b) income tax paid annually

15. The cost C, of operating a day school for one day is partly constant and partly varies as the number of students, n. It costs Shs 40,000 to run the school when there are 500 students and Shs 64,000 when there are 900 students.
a) Form an equation for the cost C and the number of students, n.
b) What would be the cost of running the school when there are 700 students?
c) If the cost running the school is Shs 82,000 per day, how many students are in the school?

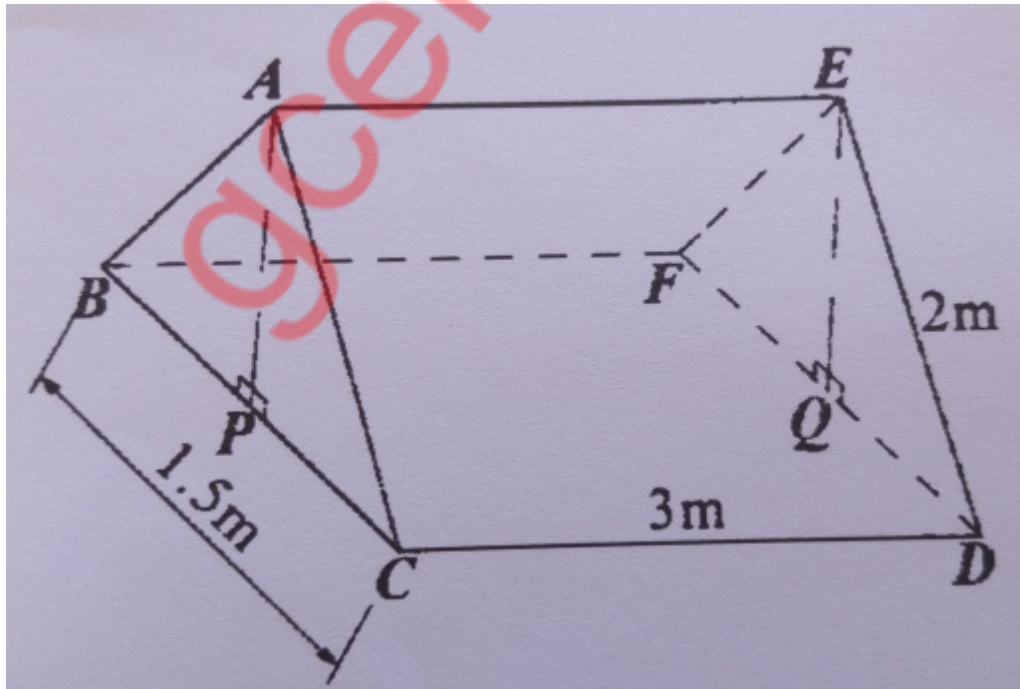16. The position vectors of points P,Q and R are

$$OP = \begin{pmatrix} -3 \\ -5 \end{pmatrix}, OQ = \begin{pmatrix} -7 \\ -1 \end{pmatrix} \text{ and } OR = \begin{pmatrix} -1 \\ 9 \end{pmatrix}$$

M is a point point such that **OM =xOQ** and **OM = OP + yPR**
Determine the:
a) vector PR
b) values of x and y
c) position vector ÓM

17. The figure below represents a tent in the form of a triangular prism ABCDEF. $\overline{BC} = 1.5\text{m}, \overline{CD} = 3\text{m}$ and the slanting edges are 2m long

Calculate the:
a) height of the tent, AP
b) angle between the lines BC and AC
c) angle between the planes ABFE and ACDE
d) angle between the line CE and the base BCDF