Name.....**Stream**.....**House**.....

DEPARTMENT OF MATHEMATICS

S.4 MATHEMATICS–2020

WEEK 1

2 HOURS : 30 MINUTES

- *Answer all the ten questions in section A and any five from section B.*
- *Any additional question(s) answered will not be marked.*

SECTION A: (40 MARKS)

1. Express $3.43\dot{2}\dot{}$ as a fraction in its simplest form. (*04 marks*)

2. Find the equation of a straight line which passes through the point (−3,5) and is parallel to the line $2y + 3x + 3 = 0$. (*04 marks*)

3. In a group of 50 students, 25 play Hockey, 30 play Football and 8 play neither game. Find the number of students who play both Hockey and Footbell.

   (*04 marks*)

4. Given that (0,5) and $B(2,3)$ are two points in a plane. Determine

   (i) the vector AB.

   (ii) $|\mathbf{AB}|$. (*04 marks*)

5. The marked price of a pair of trousers is sh.170,000. Jake allowed a discount of 5% and still made a profit of 24%. Calculate the buying price. (*04 marks*)

6. The scale of a map is given as 1 : 400,000. A road section on the ground is 80 km. Calculate

   (i) the length representing the road on the map

   (ii) the actual area of a region whose area on the map is 25 cm^2.

(*04 marks*)

7. Given that $f(x) = 2x - 8$ and $g(x) = 2x + 3$, find

   (a) $gf(x)$.

   (b) $gf\left(\frac{1}{2}\right)$.

(*04 marks*)

8. Using logarithms evaluate $(0.005691)^{\frac{1}{3}}$. (*04 marks*)

9. Find the coordinates of the point of intersection of the lines $y = 8 - 2x$ and $y = 2x$. (*04 marks*)

10. A Canadian tourist arrived in Uganda with $1500. She exchanged it to Uganda shillings(Ug.Sh.) at a rate of $1 for Ug.Sh.3640. She used Ug.Sh. 1,550,000 in hotel and inland travels. How much money in Uganda shillings did she remain with? (*04 marks*)

SECTION B: (60 MARKS)

11. (a) Three men can dig a field in 3 days. How long will it take 9 men to dig the same field working at the same rate? (*06 marks*)

   (b) A variable V varies jointly as the variable A and h. When $A = 63$ and $h = 4$, $V = 84$, find

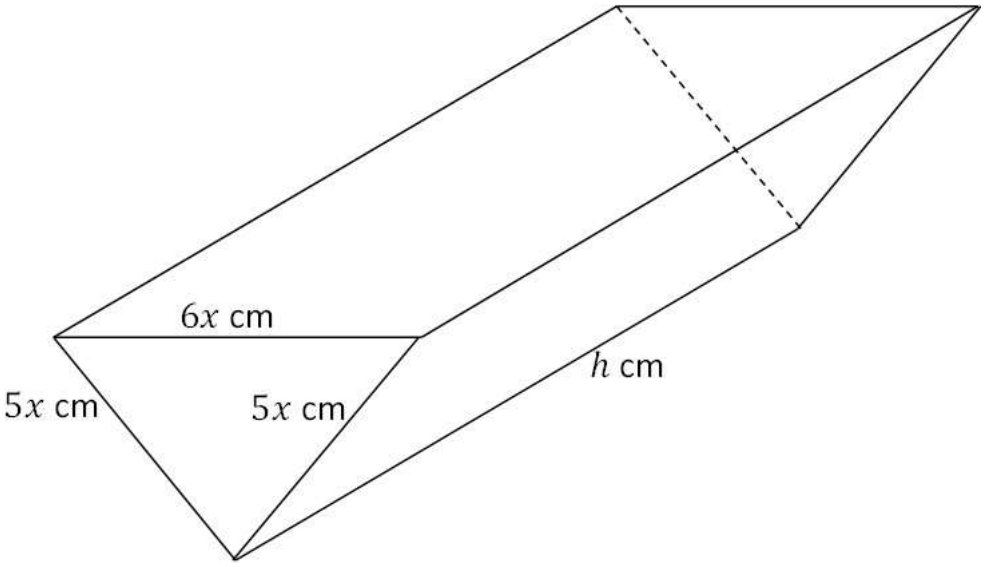
      (i) the value of V when $A = 9$ and $h = 7$. (*03 marks*)

(ii) the value of A when $V = 4.5$ and $h = 0.5$. (*03 marks*)

12. (a) Given that $g(x) = \frac{x^2}{5}$, find the value of $g^{-1}(5)$. (04 marks)

(b) Given that $f^{-1}(x) = \frac{5x-3}{3}$, $g^{-1}(x) = \frac{1-3x}{2}$, find $fg(x)$. (08 marks)

13. A container with an open rectangular top is constructed from four pieces of cardboard sheet. The two end pieces are isosceles triangles with sides $6x$ cm, $5x$ cm and $5x$ cm as shown below. The two sides pieces are rectangles of length h cm and width $5x$ cm. The total amount of cardboard sheet used is 450 cm^2.



(i) Show that $h = \frac{15 - 2.1x^2}{x}$. (*02 marks*)

(ii) Show that the volume of the container, V cm^3 is given by $540x - 28.8x^3$. (*03 marks*)

(iii) If the value of h = 12 cm, use the information in 13(i) to find the value of x and the volume of the container. (*07 marks*)

14. In a form four class of a school, a pupil who studies Arts subject does one or more of the following History(H), Geography(G) and Economics(E). In a

group of Arts pupils, $n(H) = 32$, $n(H \cap G^0 \cap E^0) = 16$, $n(H^0 \cap G \cap E^0) = 2$, $n(H^0 \cap G^0 \cap E) = 7$, $n(H \cap G) = 15$, $n(H \cap E) = 11$ and $G \cap E = 13$.

(a) Represent the above information on a Venn diagram. (*05 marks*)

(b) How many of these Arts pupils

(a) do all the subjects, (*01 marks*)

(b) do Geography, (*01 marks*)

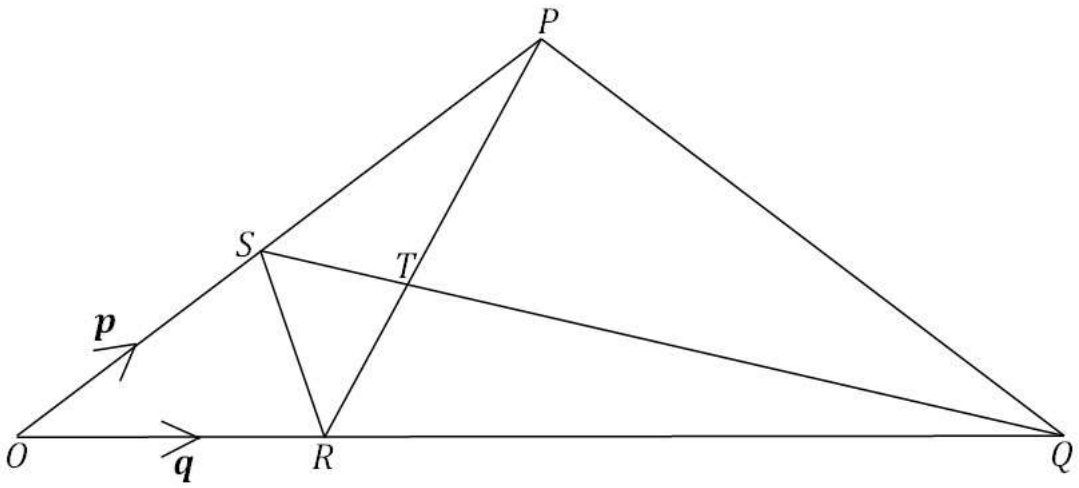
(c) do Economics. (*01 marks*)

(c) What is the probability that a pupil chosen at random is studying

(a) Economics but not History? (*02 marks*)

(b) History and Economics but not Goegraphy? (*02 marks*)

15. In the diagram below *OPQ* is a triangle in which **OS** = $\frac{1}{3}$**OP** and **OR** = $\frac{1}{3}$OQ. *T* is a point on *QS* such that **QT** = $\frac{3}{4}$**QS**. Given that **OP** = **p** and **OQ** = **q**.



(a) Express in terms of **p** and **q** the vectors

(i) **SR**. (ii)

QS.

(iii) **PT**.

(iv) **TR**. (*08 marks*)

(b) Show that *P*, *T* and *R* are collinear. (*04 marks*)

16. Tendo made a gross profit of sh. 54,000,000. 20% of the gross profit was paid in taxes. 70% of the remainder was spent on rent, wages and loan repayment in the ratio 2 : 3 : 4 respectively. Calculate the

(i) amount paid in taxes, (*03 marks*)

(ii) amount spent on rent, wages and loan repayment, (*02 marks*)

(iii) the amount of rent paid, (*03 marks*)

(iv) net profit as a percentage of the gross profit. (*04 marks*)

17. The distance from Kisoro to Mbarara is 270 km. A Tata lorry traveling at a steady non–stop speed of 40 km/hr leaves Kisoro for Mbarara at 6 : 15 am. One and a quarter hours later, a taxi mini–bus leaves Mbarara traveling at steady non–stop speed of 60 km/hr heading for Kisoro.Calculate the

(a) distance from Kisoro at which the two vehicles meet,

(b) time when the two vehicles meet,

(c) time when the taxi mini–bus arrives in Kisoro,

(d) time when the Tata lorry arrives in Mbarara,

(e) difference in the times of arrivals of the two vehicles at their respective stations. (*12 marks*)

–END–