

# KASSU JOINT EVALUATION TEST (J.E.T)

Kenya certificate of secondary education (KCSE)

## 121/1 - MATHEMATICS - Paper 1

### ALT A

**June. 2022 - 2 $\frac{1}{2}$ hours**

Name.....class..... Adm.....

Signature.....date.....

**Instructions to candidates**

- Write your name, admission number and class in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- You are reminded of the necessity of **orderly presentation** in your answers.
- The paper contains **TWO** sections: **Section I** and **Section II**.
- Answer **ALL** the questions in **Section I** and any **five** questions from **Section II**
- All answers and working must be written on the question paper in the spaces provided below each question.
- **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.**
- Marks may be given for correct working even if the answer is wrong.
- Non – programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

**For Examiner’s use only.**

**Section I**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

**Section II**

17	18	19	20	21	22	23	24	Total

**Grand Total**

## SECTION I (50 MARKS)

Answer **all** questions in this section on the spaces provided

1. An aircraft Company bought eight aircrafts for eighteen billion, nine hundred and seventy-five million, twenty-eight thousand, two hundred and forty.

(a) Write the total cost of the eight aircrafts in figures. (1mark)

(b) Calculate the cost of each aircraft. (2marks)

2. Solve for x in the equation  $\frac{3}{x+1} + \frac{2}{x+5} = \frac{1}{x-2}$  (4mks)

3. (a) The number 16200 is given as  $2^x \times 3^y \times 5^z$ . Find the value of  $x + y + z$  (1mark)

(b). When another number N is multiplied by 16200, a perfect cube is obtained. Find the least value of N (2marks)

4. Given that  $\sin \alpha^\circ = \frac{1}{\sqrt{5}}$  where  $\alpha$  is an acute angle find, without using Mathematical tables

(a)  $\cos \alpha^\circ$  in the form of  $a\sqrt{b}$ , where  $a$  and  $b$  are rational numbers (2marks)

(b)  $\tan (90-\alpha)^\circ$

2marks

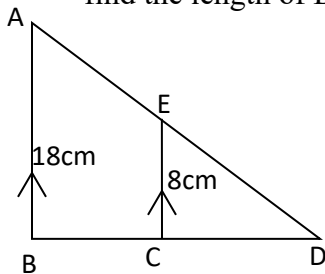
5. The area of a rhombus is  $60 \text{ cm}^2$ . If the shorter diagonal is  $8 \text{ cm}$ . Find the perimeter of the rhombus. (4 marks)

6. A  $63 \text{ kg}$  metal of density  $7,000 \text{ kg/m}^3$  is moulded into a rectangular pipe with external dimensions of  $12 \text{ cm}$  by  $15 \text{ cm}$  and internal dimensions of  $10 \text{ cm}$  by  $12 \text{ cm}$ . Calculate the length of the pipe in meters.

(3marks)

7. The position vectors of the points P, Q and R are  $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$ ,  $\begin{pmatrix} \frac{1}{2} \\ -2 \end{pmatrix}$  and  $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$  respectively. Show that P, Q and R are collinear (3marks)

8. In the triangle ABD, BA is parallel, to CE, given that BA= 18cm, CE = 8cm and AE = 6cm, find the length of DE (3marks)



9. Given the equation  $\frac{9^{4x}}{3^{2x}} = \frac{1}{9^{-4}}$ , solve for x to its simplest form. (3 marks)

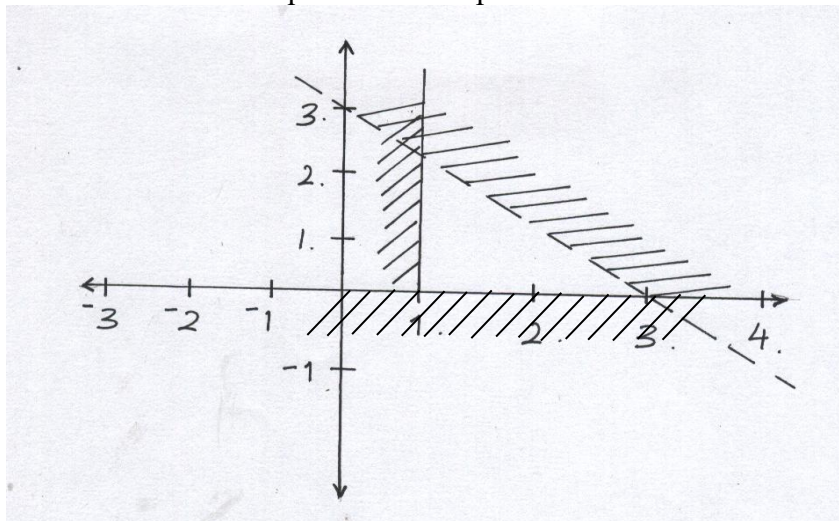
10. A Kenyan company received M US Dollars. The money was converted into Kenyan shillings in a bank which buys and sells foreign currencies.

	<u>Buying (in Ksh.)</u>	<u>Selling (in Ksh.)</u>
1 Sterling Pound	145.78	146.64
1 US Dollar	110.66	110.86

If the company received Ksh. 15,132, 000, calculate the amount M, received in US Dollars. (2marks)

11. Two interior angles of an irregular n sided polygon is 117 each. The remaining exterior angles are  $39^{\circ}$  each. Calculate the number of sides of the polygon (3marks)

12. Determine the inequalities that represent and satisfies the unshaded region (3marks)



14. There are two grades of rice, grade A and Grade B. Grade A costs Sh 80 per Kg while Grade B costs Sh 60 per Kg. In what ratio must the two be mixed in order to produce a blend costing Sh 75 per Kg. (3marks)

15. One of the three vertices of triangle ABC is A (2,-3). Point A is mapped onto  $A^1$  (-4, 7) under a reflection on mirror line  $M$ . find the equation of the mirror-line  $M$  (3marks)

16. A camp has enough food ration to last 10,000 refugees for 35 days. After 5 days, 2500 more refugees arrived in the camp. If all are now put on a half ration, how much longer will the food last? (3 marks)

**SECTION II (50 marks)**

Answer any **five** questions from this section on the spaces provided.

17. a). A particle moving at  $20\text{ m/s}$  accelerates to  $30\text{ m/s}$  in 5 seconds then travels at this speed for 10 seconds before decelerating to rest in 4 seconds. Draw a velocity –time graph and use it to calculate the distance covered by the particle in 19 seconds. (3 marks)

b). A train  $100\text{ m}$  long travelling at  $72\text{ km/h}$  overtakes another train travelling in the same same direction at  $56\text{ km/hr}$  and passes it completely in 54 seconds. Find the length of the second train. (4 marks)

ii). Find the time (how long) they would have taken to pass each other if they had been travelling at these speeds in opposite directions. (3 marks)

18. (a) Find the inverse of the matrix A , given that A is  $\begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$

(b) Jane bought 200 bags of sugar and 300 bags of rice for a total cost of shs. 850,000. Peter bought 120 bags of rice and 90 bags of sugar for a total cost of shs. 360,000. If the price of a bag of sugar is shs.  $x$  and that of rice is shs.  $y$ .

(i) Form two equations to represent the above information. (2marks)

(ii) Use matrix method to find the price of one bag of each item (3marks)

(c) Robert bought 225 bags of sugar and 360 bags of rice. He was given a total discount of shs. 33,300. If the discount on the price of a bag of rice was 2%, calculate the percentage discount on the price of a bag of sugar. (3marks)

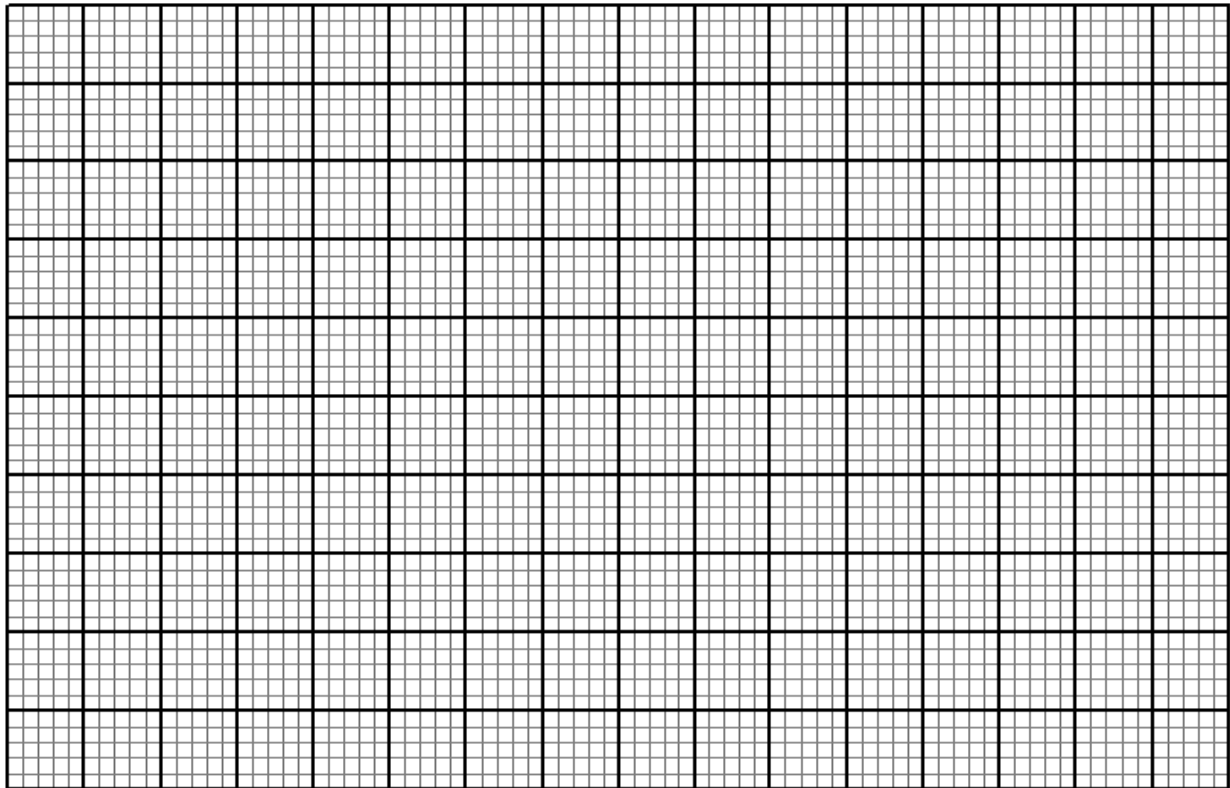


19. The table below shows scores for a form 4 class Math results in Ushindi School.

Marks	20-29	30-49	50-54	55-69	70-79	80-84	85-99
No of Students	3	12	6	15	5	7	3
f.d							

(a). Fill in the column for frequency density row on the table (2marks)

(b). Draw a histogram to represent the above data (3marks)

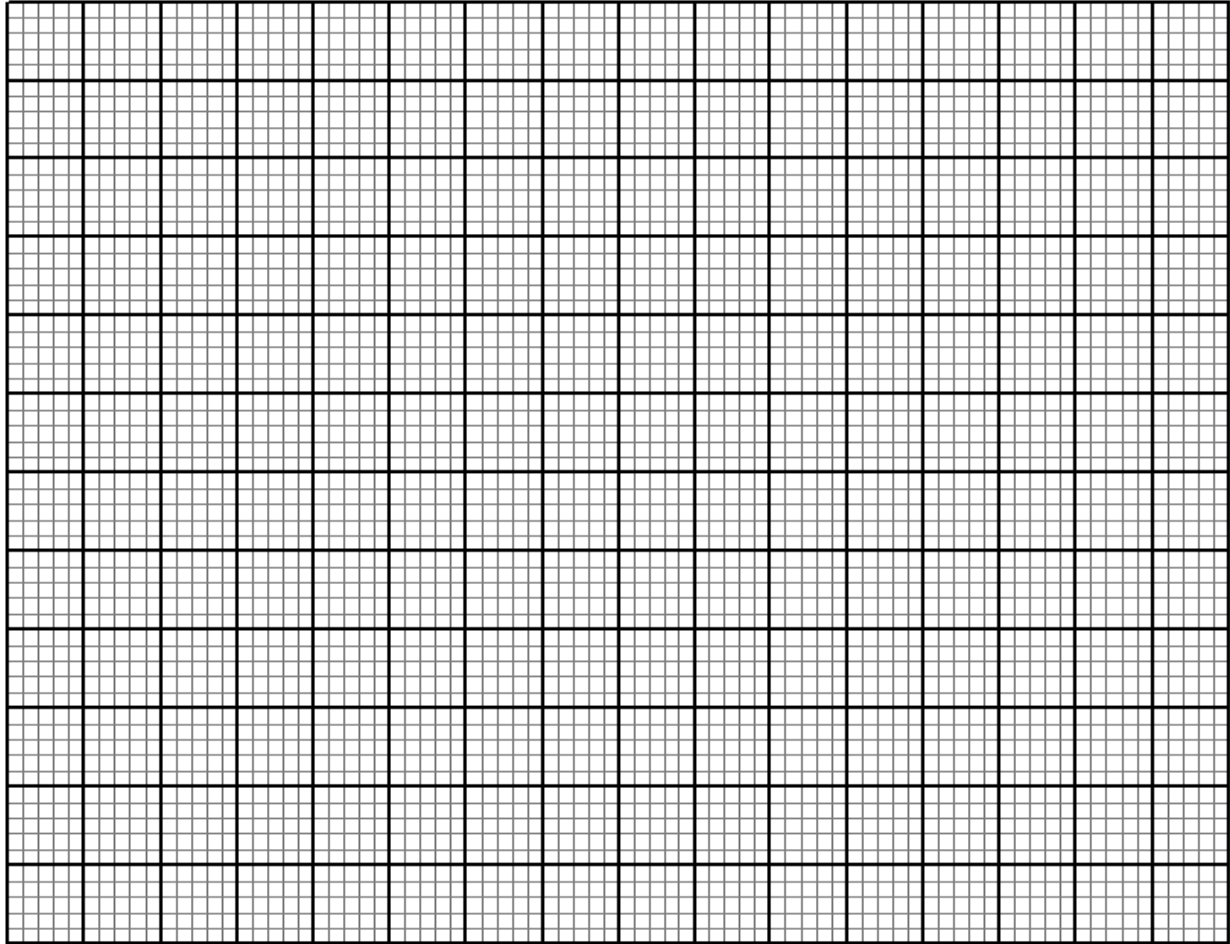


(c). By using the histogram drawn above calculate the median of the data and indicate using a line where it lies in the histogram. (5marks)

20. (a). Complete the table below for the equation  $y = 4x^3 - 3x^2 - 6x$  2marks

$x$	$-1\frac{1}{4}$	$-1$	$-\frac{1}{2}$	$0$	$\frac{1}{2}$	$1$	$1\frac{1}{2}$	$1\frac{3}{4}$
$y$	$-5$		$1\frac{3}{4}$		$-3\frac{1}{4}$		$-2\frac{1}{4}$	

b. Using a scale of 4 cm to represent 1 unit on the  $x$  axis and 2cm to represent 1 unit on the  $y$ -axis draw the graph of  $y = 4x^3 - 3x^2 - 6x$  for  $-1\frac{1}{4} \leq x \leq 1\frac{3}{4}$  on the grid provided 3marks

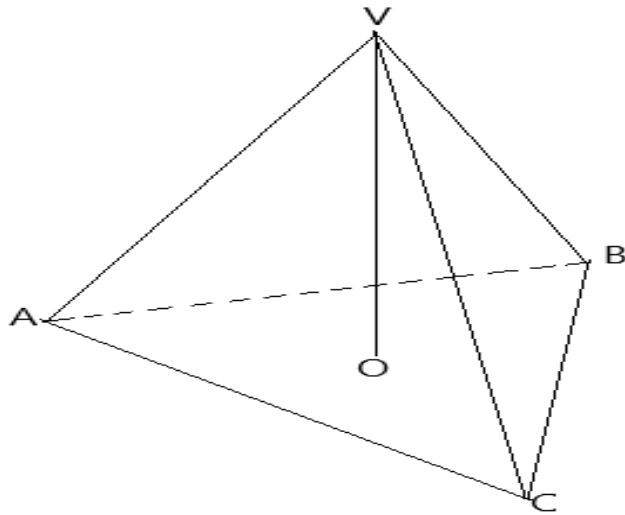


c). Use your graph to find the range of values of  $x$  for which  $y \leq -3$  (1mark)

d). Use your graph to solve the equation  $4x^3 - 3x^2 - 6x = 0$  (2marks)

e). By drawing a suitable straight-line graph on the same axes solve the equation  $-4x^3 + 3x^2 + 7x - 1 = 0$  (2marks)

21. The figure below shows a solid regular tetrahedron of side 15 cm. Point O is center of the base ABC



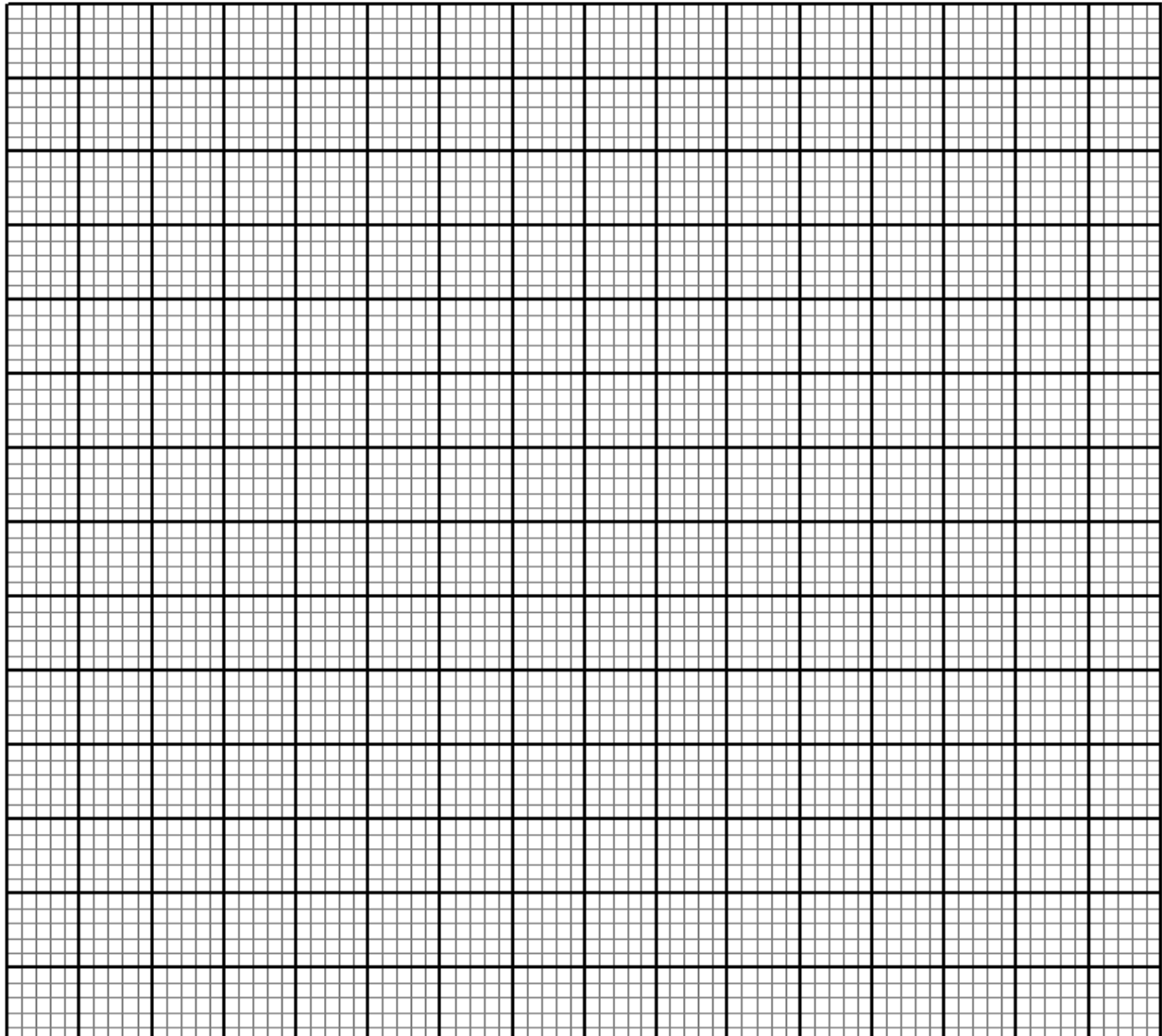
a). Calculate the perpendicular height VO of the pyramid to 1 decimal place. (3 marks)

b). The tetrahedron is cut parallel to the base ABC forming a frustrum. The slant height of the frustrum is two-thirds the slant height of the pyramid. Calculate;

(i). The volume of the frustrum. (4 marks)

(ii). The surface area of the solid frustrum (3 marks)

22. a) Draw the quadrilateral with vertices at A(-6,-1) B(-6,-4) C(3,-4) and D(3,-1)  
(1mark)



(b) On the same grid, draw the image of ABCD under enlargement centre (0,-1) scale factor  $\frac{1}{3}$ , label the image A'B'C'D'. (2marks)

(c) Draw A''B''C''D'' the image of A'B'C'D' under rotation of  $+90^\circ$  about (1,0). (2marks)

(d) Draw A'''B'''C'''D''' the image of A''B''C''D'' under reflection in the line  $y - x = 0$   
2marks

(e) Draw A<sup>IV</sup>B<sup>IV</sup>C<sup>IV</sup>D<sup>IV</sup> the image of A'''B'''C'''D''' under translation  $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$  and write down its coordinates (3marks)

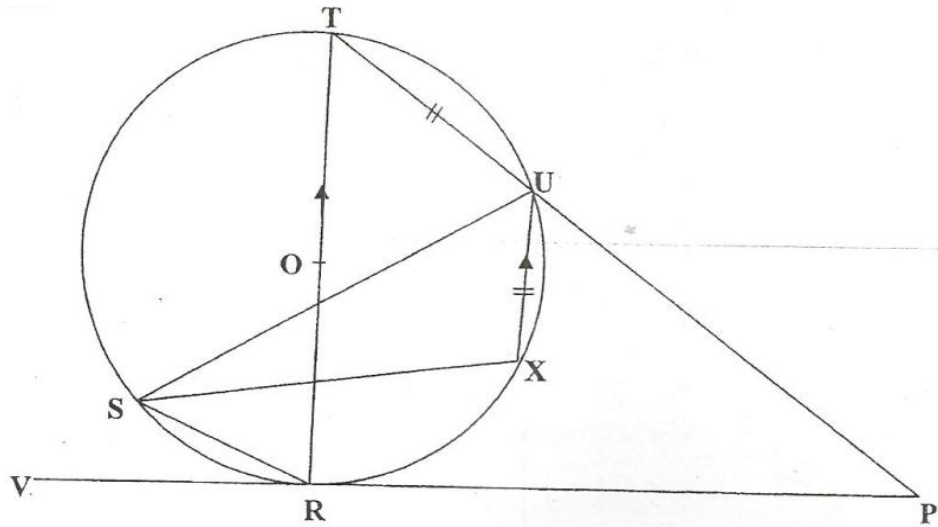
23. (a). The equation of a line  $L_1$  is  $7y - 5x - 20 = 0$ . Find the x-intercept of the equation  
(1mark)

b). Another line  $L_2$  is perpendicular to  $L_1$  and passes through  $(-5, 3)$ . Find the equation of  $L_2$ .  
(3marks)

c).  $L_3$  passes through  $(0, -3)$  and parallel to the line  $L_4$  whose equation is  $3y - 8x = 3$  find the equation of  $L_3$ .  
(3marks)

d). Calculate the coordinates of point of intersection between the lines  $L_1$  and  $L_3$ . (3marks)

24. In the figure below, O is the center of the circle TOR is the diameter and PRV is tangent to the circle at R.



Given that  $\angle SUR = 25^\circ$ ,  $\angle URP = 60^\circ$ ,  $TU = UX$  and that  $UX$  is parallel to the diameter; giving reasons calculate;

a)  $\angle TOU$  (2 marks)

b)  $\angle XUP$  (2 marks)

c)  $\angle STR$  (2 marks)

d) Reflex  $\angle SXU$  (2 marks)

e).  $\angle RPU$  (2marks)

