

MATHEMATICS PAPER 121/2 K.C.S.E 1997 QUESTIONS

SECTION 1 (52 Marks)

Answer all questions in this section

1. evaluate without using mathematical tables

$$\frac{1.9 \times 0.032}{20 \times 0.0038}$$

2. Mary has 21 coins whose total value is Kshs 72. There are twice as many five shillings coins as there are ten shillings coins. The rest are one shillings coin. Find the number of ten shillings coins that Mary has.

3. A commercial bank buys and sells Japanese yen in Kenya shillings at the rates shown below.

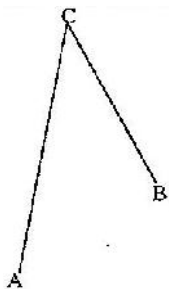
Buying
Kshs 0.5024

Selling
Kshs. 0.5446

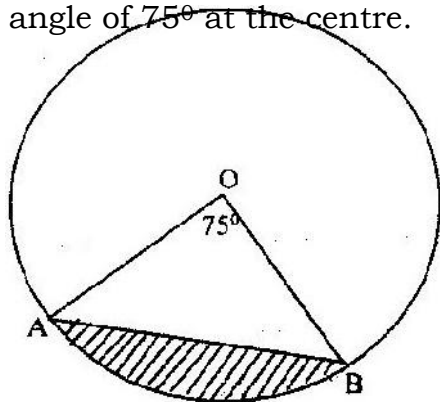
A Japanese tourist at the end of his tour of Kenya was left with Kshs 30,000 which he converted to Japanese yen through the commercial bank. How many Japanese yen did he get?

4. On the figure below construct

- (i) the perpendicular bisector of BC
- (ii) The locus of a point P which moves such a way that $\angle APB = \angle AVB$ and P is on the same side of AB on the same side of AB as C



5. The figure below represents a circle a diameter 28 cm with a sector subtending an angle of 75° at the centre.



Find the area of the shaded segment to 4 significant figures

6. A pyramid of height 10cm stands on a square base ABCD of side 6 cm

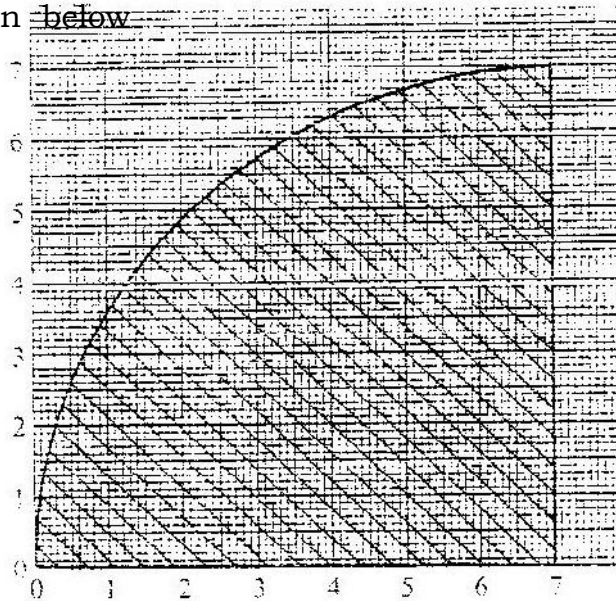
(a) Draw a sketch of the pyramid

(b) Calculate the perpendicular distance from the vertex to the side AB

7. Find the value of m in the following equation

$$\left(\frac{1}{2}\right)^m \times (81)^{-1} = 243$$

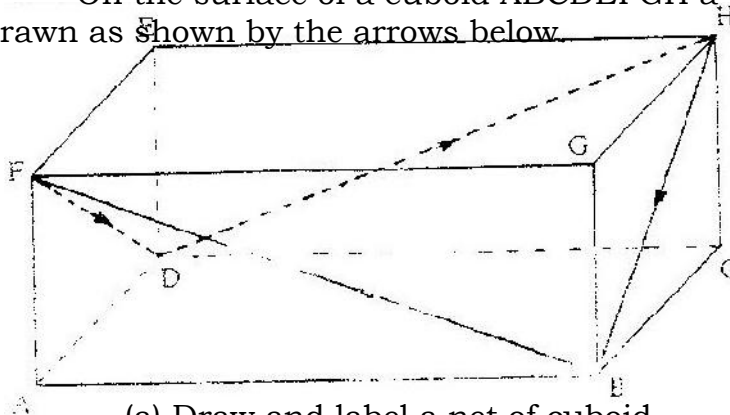
8. Use the trapezoidal rule with intervals of 1 cm to estimate the area of the shaded region below



9. Expand and simplify $(1 - 3x)^5$, up to the term in x^3

Hence use your expansion to estimate $(0.97)^5$ correct to 4 decimal places

10. On the surface of a cuboid ABCDEFGH a continuous path BFDHB is drawn as shown by the arrows below



(a) Draw and label a net of cuboid

(b) On the net show the path

11. ABC is a triangle and P is on AB such that P divides AB internally in the ratio 4:3. Q is a point on AC such that PQ is parallel to BC. If AC = 14 cm

(i) State the ratio AQ:QC

(ii) Calculate the length of QC

12. $\frac{\sqrt{14} - \sqrt{2}}{\sqrt{7} - \sqrt{2}} = \frac{\sqrt{14} + \sqrt{2}}{\sqrt{7} + \sqrt{2}}$

Find the values of a and b where b are rational numbers

13. The table below represents the mean scores in six consecutive assessment tests given a form four class

Tests	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Mean scores in percentage	48.40	56.25	50.30	49.00	45.60	57.65

Calculate the three moving averages of order 4

14. Mogaka and Onduso working together can do a piece of work in 6 days, Mogaka, working alone takes 5 days longer than Onduso. How many days does it take Onduso to do the work alone?

15. The athletes in an 800 metres race take 104 seconds and 108 seconds respectively to complete the race. Assuming each athlete is running at a constant speed. Calculate the distance between them when the faster athlete is at the finishing line.

16. A metal bar is a hexagonal prism whose length is 30 cm. The cross – section is a regular hexagon with each side of the length 6 cm.

Find

(i) the area of the hexagonal face

(ii) the volume of the metal bar

SECTION II (48 MARKS)
Answer any six questions from this section

17. A company is to construct a parking bay whose area is 135m^2 . It is to be covered with concrete slab of uniform thickness of 0.15. To make the slab cement, Ballast and sand are to be mixed so that their masses are in the ratio 1: 4: 4. The mass of m^3 of dry slab is 2, 500kg. Calculate
- (i) The volume of the slab
 - (ii) The mass of the dry slab
 - (iii) The mass of cement to be used
- (b) If one bag of the cement is 50 kg, find the number of bags to be purchased
- (c) If a lorry carries 7 tonnes of sand, calculate the number of lorries of sand to be purchased

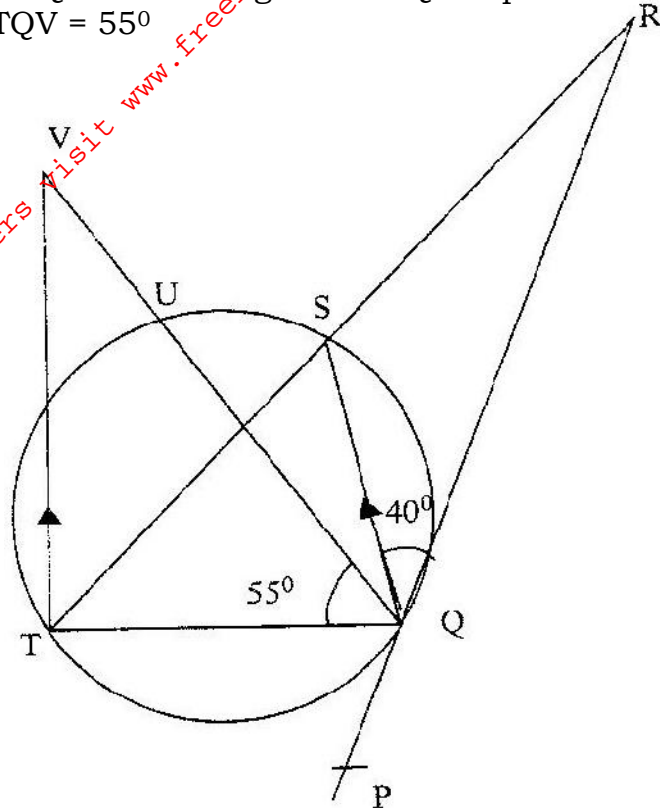
18. Complete the table below by filling in the blank spaces

x°	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
$\cos x^\circ$	1.00	0.87	0.50	0	-0.5	-0.87	-1.0	-0.87	-0.5	0	0.5	0.87	1.0
$2 \cos \frac{1}{2} x^\circ$	2.00	1.93	1.73	1.41	1.0	0.52	0	0.52	-1.00	1.47	1.73	1.93	2.00

Using the scale 1 cm to represent 30° on the horizontal axis and 4 cm to represent 1 unit on the vertical axis draw, on the grid provided, the graphs of $y = \cos x^\circ$ and $y = 2 \cos \frac{1}{2} x^\circ$ on the same axis.

- Find the period and the amplitude of $y = 2 \cos \frac{1}{2} x^\circ$
 - Describe the transformation that maps the graph of $y = \cos x^\circ$ on the graph of $y = 2 \cos \frac{1}{2} x^\circ$
19. An institute offers two types of courses technical and business courses. The institute has a capacity of 500 students. There must be more business students than technical students but at least 200 students must take technical courses. Let x represent the number of technical students and y the number of business students.
- Write down three inequalities that describe the given conditions
 - On the grid provided, draw the three inequalities
 - If the institute makes a profit of Kshs 2, 500 to train one technical students and Kshs 1,000 to train one business student, determine
 - the number of students that must be enrolled in each course to maximize the profit
 - The maximum profit.

20. In the figure below PQR is the tangent to circle at Q. TS is a diameter and TSR and QUV are straight lines. QS is parallel to TV. Angles SQR = 40° and angle TQV = 55°



Find the following angles, giving reasons for each answer

- (a) QST
 - (b) QRS
 - (c) QVT
 - (d) UTV
21. The volume $v\text{cm}^3$ of a solid depends partly on r^2 and partly on r^3 where r cm is one of the dimensions of the solid

When $r = 1$, the volume is 54.6 cm^3 and

When $r = 2$, the volume is 226.8 cm^3

- (a) Find the expression for v in terms of r
- (b) Calculate the volume of the solid when $r = 4$
- (c) Find the value of r for which the two parts of the volume are equal