

Section I (50 marks) – answer all questions in this section

- 1 Without using a calculator, evaluate; (3 Marks)

$$\frac{-8 + (-5) \times (-8) - (-6)}{-3 + (-8) \div 2 \times 4}$$

- 2 Without using mathematical tables or a calculator, evaluate; (2 Marks)

$$\frac{\sqrt[3]{675 \times 135}}{\sqrt{2025}}$$

- 3 If $\frac{\sqrt{14}}{\sqrt{7}-\sqrt{2}} - \frac{\sqrt{14}}{\sqrt{7}+\sqrt{2}} = a\sqrt{7} + b\sqrt{2}$, (4 Marks)

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

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- 4 Kenyan bank buys and sells foreign currencies using the rate shown below (3 Marks)

	<u>Buying (Ksh)</u>	<u>Selling (Ksh)</u>
Euro	86.25	86.97
100 Japanese Yen	66.26	67.26

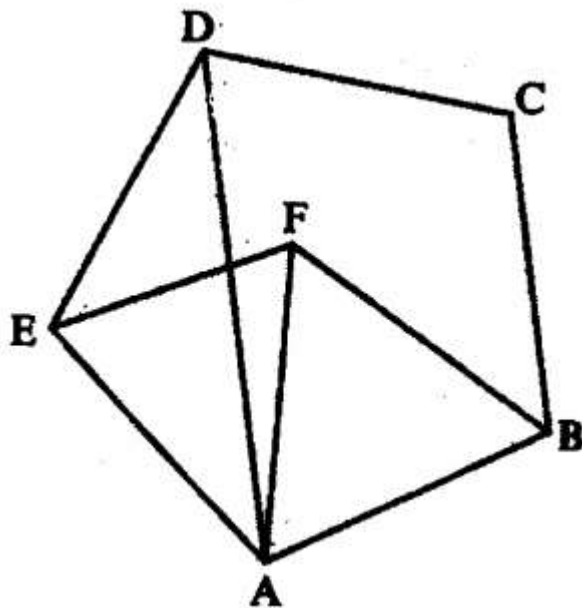
A Japanese travelling from France arrives in Kenya with 5000 Euros, which he converts to Kenyan shillings at the bank. While in Kenya he spent a total of Ksh. 289,850 and then converted the remaining Kenyan shillings to Japanese Yen at the bank. Calculate the amount of Japanese Yen that he received.

- 5 The cost price of 31'' inch flat LG TV screen is Ksh. 36,500. Mary bought a screen on hire purchase price by paying a deposit of Ksh. 12,000 and 15 monthly installments of Ksh. 2050 each. Calculate the monthly rate of interest she was charged. Give your answer to 2 decimal places. (4 Marks)

- 6 Given that $\tan x^\circ = \frac{12}{5}$. Find $\sin (90-x)^\circ$ without mathematical table or a calculator. (3 Marks)

7 Given that $\mathbf{OA} = 2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{OB} = 3\mathbf{i} - 2\mathbf{j}$. Find the magnitude of \mathbf{AB} to one decimal place. 3mks

8 In the figure below, ABCDE is a regular pentagon and ABF is an equilateral triangle



Find the size of;

a. $\angle ADE$ 1mk

b. $\angle AEF$ 1mk

c. $\angle DAF$ 1mk

9 Solve the inequality $3 - 2x < x \leq \frac{2x+5}{3}$ and show the solution on the number line 4mks

10. A line with gradient of -3 passes through the points (3, k) and (k, 8). Find the value of **k** and hence express the equation of the line in the form $ax + by = c$, where a, b and c are constants. 3mks

11. Without using mathematical tables or a calculator, evaluate; 3mks

$$6 \log_2 \sqrt[3]{64} + 10 \log_3 \sqrt[5]{243}$$

12. Make n the subject of the formula 3mks

$$E = \sqrt{\frac{x(n-x)}{n-1}}$$

13. Two variables p and q are such that p is directly proportional to x and q is inversely proportional to x . When $x = 2$ their sum is 8 and when $x = 3$ their sum is 7. Find the constants of proportionality 4mks

14. Two points P and Q have coordinates $(-2, 3)$ and $(1, 3)$ respectively. A translation maps point P to $P'(10, 10)$.
a. Find the coordinates of Q' , the image of Q under the translation 1mk

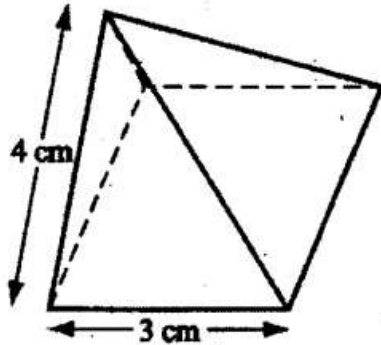
- b. The position vectors of P and Q in (a.) above are p and q respectively. Given that $mp - nq = \begin{pmatrix} -12 \\ 9 \end{pmatrix}$,
Find the values of m and n 3mks

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15. The diagram below represents a right pyramid on a square base of side 3cm. the slanting edge of the pyramid is 4cm



- a. Draw **to scale** a net of the pyramid

2mks

- b. On the net drawn, measure the height of the triangular face from the top of the pyramid.

1mk

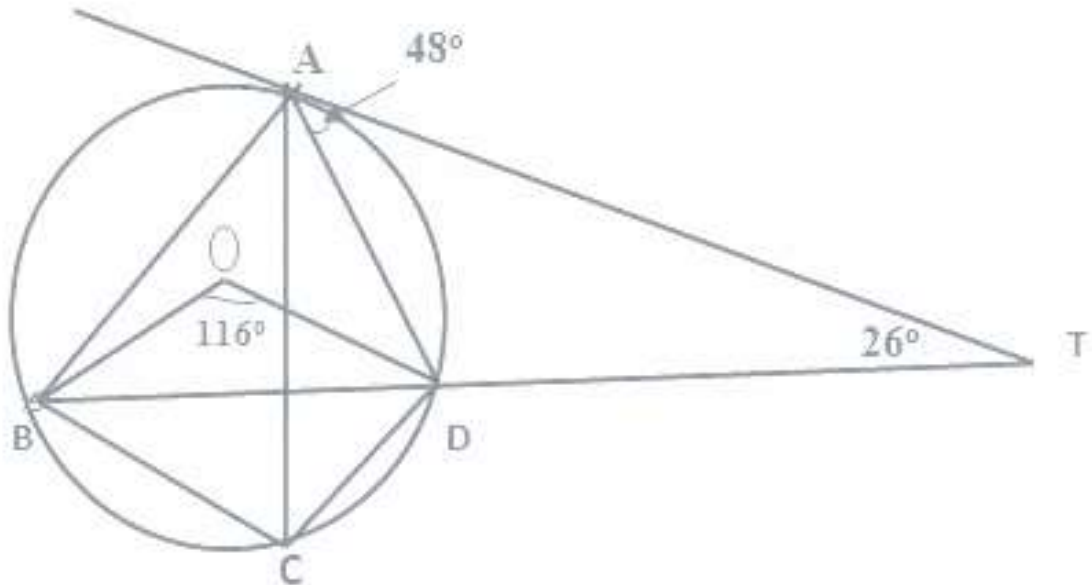
16. Using a **ruler and a pair of compass only**, construct 90° on line AB provided below;

1mk

A

Section II (50 marks) – answer only five questions in this section

17. In the figure below, TA is a tangent to the circle $ABCD$ with centre O . $\angle TAD = 48^\circ$ and $\angle BOD = 116^\circ$. $\angle ATD = 26^\circ$



Giving reasons Calculate:

a) $\angle ACD$ (2mks)

b) $\angle ABO$ (2mks)

c) $\angle ADO$ (2mks)

d) $\angle ACB$ (2mks)

e) \angle AOB

(2mks)

18. The table below shows income tax rates of a certain year.

Monthly income (Ksh)	Tax rate (%)
Up to 9680	10
9681- 18800	15
18801- 27920	20
27921- 33040	25
Over 37040	30

In that year Mr.Mwangi,s monthly earnings were as follows:

Basic salary Kshs.19600, House allowance Kshs.6, 000, medical, allowance Kshs.2840 and travelling allowance Kshs.5,000. Mr.Mwangi was entitled to a monthly personal relief of Ksh.1056 and an insurance relief of 15% of premiums paid.

a. Calculate:

2mks

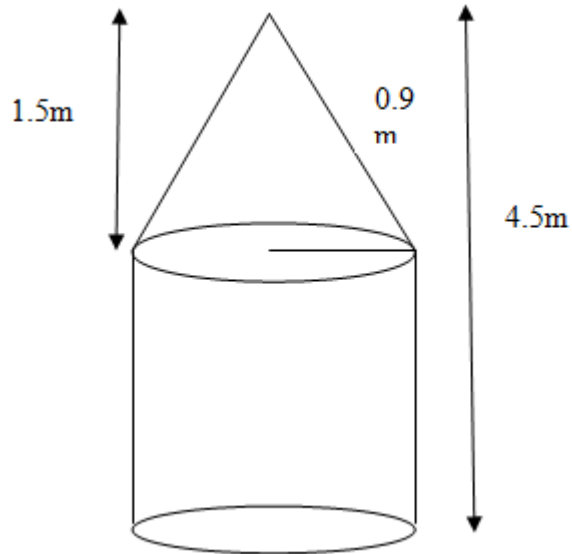
i. Mwangi's taxable income per month

ii. Monthly tax paid by Mwangi if he paid monthly insurance premiums of Ksh.3200.

4mks

- b. Bob deposited Kshs.150, 000 in a bank which paid compound interest quarterly. If at the end of second year the total amount in the bank was Ksh.213,315, calculate the rate of interest p.a 4mks

- 19 A solid S is made up of a cylindrical part and conical part. The height of the solid is 4.5m. The common radius of the cylindrical part and the conical part is 0.9 m. the height of the conical is 1.5m



- a. Calculate the volume, correct to 1 decimal place, of solid S 4mks

- b. Calculate the total surface area of solid S

4mks

- c. A square base pillar of side 1.6m has the same volume as solid S. determine the height of the pillar, 2mks
correct to 1 decimal place.

20. The table below shows marks obtained by 100 candidates at East side high school in biology examination

Marks	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94
Frequency	6	14	24	14				

a. Determine the value of x . 2mks

b. Design a frequency distribution table to represent the above data 2mks

b. State the modal class 1mk

c. Calculate the median mark 3mks

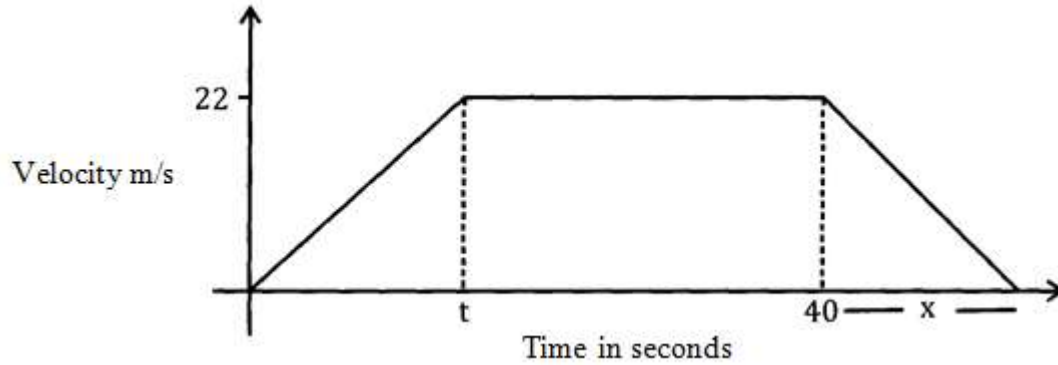
d. Calculate the mean mark. 2mks

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21. The figure below shows a velocity-time graph of journey of a car. The car starts from rest and accelerates at $2\frac{3}{4} \text{ m/s}^2$ for t seconds until it is 22 m/s .



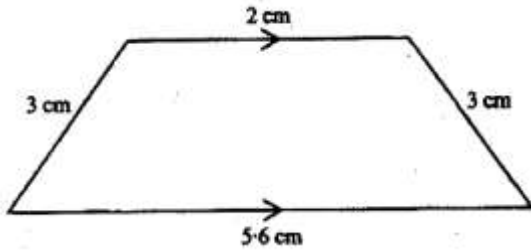
Brakes are applied bringing it uniformly to rest. The total journey is 847 m long. Find:

- a. The value of t , the acceleration time. 2mks
- b. The distance travelled during the first t seconds. 2mks
- c. The value of x , the deceleration time. 4mks

d. The rate of deceleration.

2mks

22. The diagram below (not drawn to scale) represents the cross-section of a solid prism of height 8.0cm



a. Calculate the volume of the prism

3mks

b. Given the density of the prism is 5.75 g/cm^3 , calculate its mass in grams

2mks

c. A second prism is similar to the first one but is made of a different material. The volume of the second prism is 246.24 cm^3

i. Calculate the area of the cross-section of the second prism.

3mks

- ii. Given that the ratio of the mass of the first prism to that of the second is 2:5, find the density of the second prism 2mks

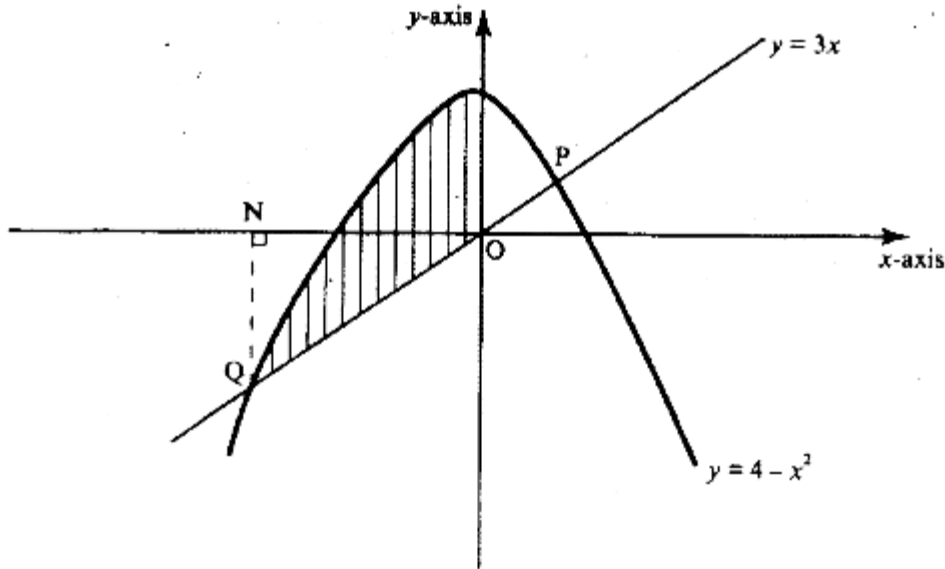
23. A bus left Mombasa and travelled towards Nairobi at an average speed of 60 km/h. After $2\frac{1}{2}$ hours, a car left Mombasa and travelled along the same road at an average speed of 100 km/h. If the distance between Mombasa and Nairobi is 500 km, determine;
- a. i. The distance of the bus from Nairobi when the car took off. 2mks
- ii. The distance the car travelled to catch up with the bus. 4mks
- b. Immediately the car caught up with the bus, the car stopped for 25 minutes. Find the new average speed at which the car travelled in order to reach Nairobi at the same time as the bus. 4mks

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24. a. The diagram below shows a sketch of the line $y = 3x$ and the curve $y = 4 - x^2$ intersecting at points P and Q



- a. Find the coordinates P and Q

4mks

- b. By correcting each number to one significant figure, approximate the value of 788×0.006 . Hence calculate the percentage error arising from the approximation.

3mks

- c. The table below shows some corresponding values of x and y for the curve represented by $y = \frac{1}{4}x^3 - 2$

X	-3	-2	-1	0	1	2	3
Y	-8.8	-4	-2.3	-2	-1.8	0	4.8

On the grid provided below, draw the graph of $y = \frac{1}{4}x^3 - 2$ for $-3 \leq x \leq 3$. Use the graph to estimate the value of x when $y = 2$.

