

3.1.3 Mathematics Alt. A Paper 1 (121/1)

In section I, of 121/1, questions 9 and 16 were performed well by a majority of the candidates, while in section II, questions 18 and 20 were very popular and were performed well. Questions 17 and 23, despite being performed well by those who choose them, were very unpopular. The majority of the candidates had weakness in questions 2, 3, 10, 11 and 13. These questions which candidates had weaknesses in are discussed below.

Question 2

Two numbers p and q are such that $p^3 \times q = 189$. Find p and q . (3 marks)

The question tested on factorization, i.e expressing numbers as products of their prime factors.

Weaknesses

Candidates were unable to write numbers as products of their prime factors and could not equate the expression to obtain values of p and q .

Expected response

$$189 = 3 \times 3 \times 3 \times 7$$

$$= 3^3 \times 7$$

$$\therefore p^3 \times q = 3^3 \times 7$$

$$p = 3, q = 7$$

Recommendations

Revise on expression of numbers as products of their prime factors.

Question 3

A trader bought maize for Ksh 20 per kilogram and beans for Ksh 60 per kilogram. She mixed the maize and beans and sold the mixture at Ksh 48 per kilogram. If she made a 60% profit, determine the ratio maize:beans per kilogram in the mixture. (4 marks)

The question tested on ratios, percentage profit and proportions.

Weaknesses

Many candidates lacked proper interpretation of percentage profit.

Expected response

Let the number of kg of maize be m and number of kg of beans be b

$$\text{Buying price} = 20m + 60b$$

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Expected response

Let the number of kg of maize be m and number of kg of beans be b

$$\text{Buying price} = 20m + 60b$$

Selling price = $48(m + b)$

$$\frac{60}{100} = \frac{48(m + b) - (20m + 60b)}{20m + 60b}$$

$$0.6 = \frac{28m - 12b}{20m + 60b}$$

$$\Rightarrow 12m + 36b = 28m - 12b$$

$$16m = 48b$$

$$\frac{m}{b} = \frac{3}{1}$$

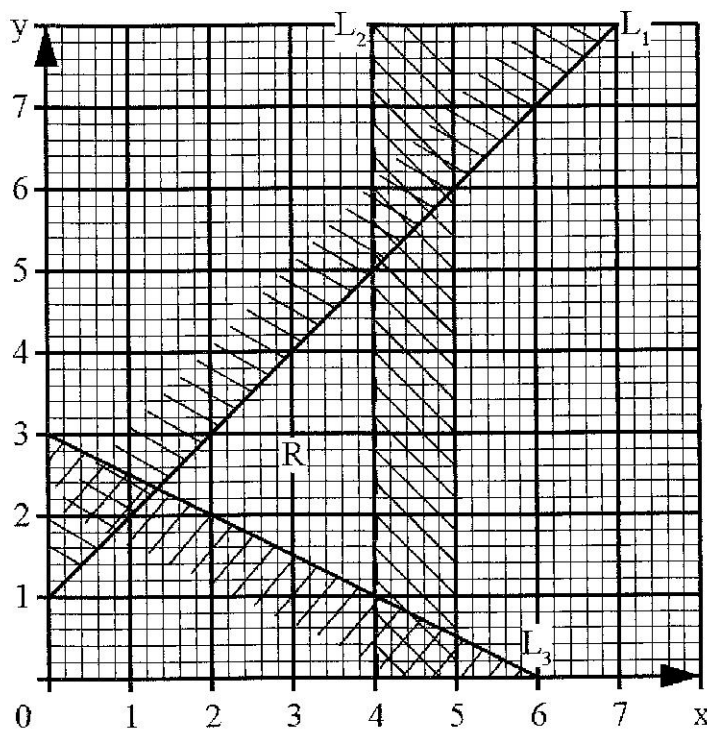
\therefore Ratio $m:b = 3:1$

Recommendations

There is need to be able to differentiate between the buying and selling prices of mixtures. Proper understanding of percentage profit is necessary.

Question 10

The diagram below shows a region R bounded by three lines L_1 , L_2 and L_3



Form the three inequalities that satisfy the given region R.

(3 marks)

The question tested on obtaining the equations of lines and then determining the inequalities representing the given region.

Weaknesses

Candidates were unable to obtain points on the lines and the equations of the lines. Thus could not get the inequalities satisfying the given region.

Expected response

$$L_1 : y - x \leq 1$$

$$L_2 : x < 4$$

$$L_3 : x + 2y \geq 6$$

Recommendations

Failure by the candidates to get the equations of the lines indicates lack of proper understanding of coordinates and graphs and finding the equations of straight lines from graphs. These topics need more emphasis.

Question 11

Murimi and Naliaka had each 840 tree seedlings. Murimi planted equal number of seedlings per row in x rows while Naliaka planted equal number of seedlings in $(x + 1)$ rows. The number of tree seedlings planted by Murimi in each row were 4 more than those planted by Naliaka in each row. Calculate the number of seedlings Murimi planted in each row.

(4 marks)

The question tested on formation and solution of quadratic equations

Weaknesses

Candidates were unable to form the required quadratic equation.

Expected response

$$\frac{840}{x} - \frac{840}{x+1} = 4$$

$$4x^2 + 4x - 840 = 0$$

$$x^2 + x - 210 = 0$$

$$(x+15)(x-14) = 0$$

$$x = 14$$

$$\text{No of seedling planted by Murimi per row} = \frac{840}{14} = 60$$

Recommendations

Teaching / learning of application of quadratic equations to real life situations need more emphasis

Question 13

Use the mid ordinate rule with six strips to find the area bounded by the curve $y = x^2 + 1$, the lines $x = -4$, $x = 8$ and the x -axis. (3 marks)

The question tested on area approximations by mid ordinate rule.

Weaknesses

Majority of the candidates were unable to obtain the mid ordinates from the given equation. Others used the trapezium rule instead.

Expected response

Mid ordinates are

x	-3	-1	1	3	5	7
y	10	2	2	10	26	50

$$\begin{aligned} \text{Area} &= 2(10 + 2 + 2 + 10 + 27 + 50) \\ &= 200 \end{aligned}$$

Recommendations

Emphasis on how to get the mid ordinates is necessary.

3.1.3 Mathematics Alt. A Paper 2 (121/2)

The best performed questions in this paper were questions 6 and 7 in section I and questions 17 and 23 in section II. Questions 17, 19 and 21 were very popular where as questions 18 and 22 were unpopular. The questions where candidates had major weaknesses in are discussed below.

Question 1

The roots of a quadratic equation are $x = \frac{-3}{5}$ and $x = 1$. Form the quadratic equation in the form $ax^2 + bx + c = 0$ where a, b and c are integers. (2 marks)

The question tested on formation of quadratic equations from given roots.

Weaknesses

Candidates substituted the roots in the general quadratic equation but could not solve for the unknowns. Could also not write a, b and c as integers.

Expected response

$$(x-1)(5x+3) = 0$$

$$5x^2 - 5x + 3x - 3 = 0$$

$$5x^2 - 2x - 3 = 0$$

Recommendations

Emphasis on formation of quadratic equations from roots is necessary.

Question 2

A tailor intended to subdivide a piece of cloth into 7 equal parts. She approximated $\frac{1}{7}$ m to 0.14m. Calculate the percentage error in the approximation. (3 marks)

The question tested on calculation of errors.

Weaknesses

Failure to obtain the absolute error.

Expected response

$$\begin{aligned} |\text{Error}| &= \frac{1}{7} - \frac{14}{100} \\ &= \frac{1}{350} \end{aligned}$$

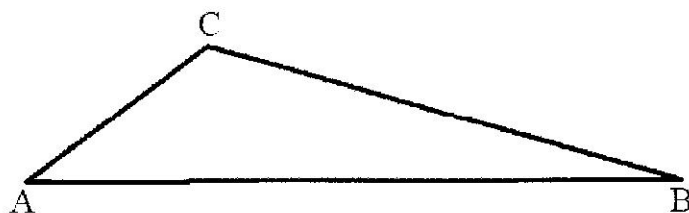
$$\begin{aligned} \% \text{ Error} &= \frac{1}{350} \div \frac{1}{7} \times 100 \\ &= \frac{1}{350} \times \frac{7}{1} \times 100 \\ &= 2\% \end{aligned}$$

Recommendations

Emphasis on how to calculate the absolute error and percentage error is necessary in the teaching/learning.

Question 9

The figure below is a triangle ABC.



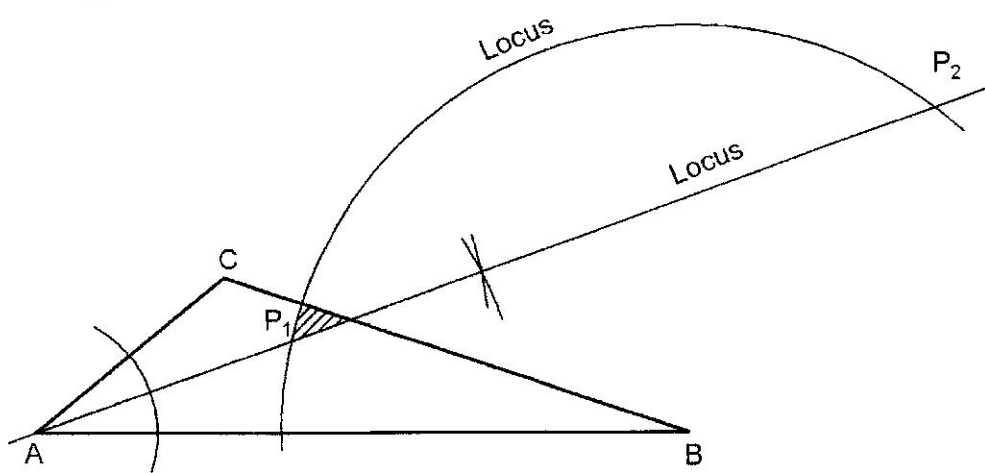
- (a) On the triangle, locate the locus of points equidistant from AC and AB and 5 cm from B. (2 marks)
- (b) Shade the region R, inside the triangle, which is less than 5 cm from B and nearer to AC than AB. (1 mark)

The question tested on locus of equidistance from lines and fixed distance from a point.

Weaknesses

Majority of the candidates could not obtain the locus of points 5cm from B.

Expected response



Recommendations

Emphasize on getting the required locus.

Question 13

A basket ball team scored the following points in 6 matches:

10, 12, 14, 16, 28 and 30.

Using an assumed mean of 15, determine the standard deviation correct to 2 decimal places.

(4 marks)

The question tested on determination of standard deviation of ungrouped data using assumed mean.

Weaknesses

Lacked understanding of the concept of standard deviation using assumed mean.

Expected response

Score	$d = x - a$	d^2
10	-5	25
12	-3	9
14	-1	1
16	1	1
28	13	169
30	15	225
$n = 6$	$\Sigma d = 20$	$\Sigma d^2 = 430$

$$\begin{aligned} \text{s.d} &= \sqrt{\frac{430}{6} - \left(\frac{20}{6}\right)^2} \\ &= \sqrt{60.56} \\ &= 7.78 \end{aligned}$$

Recommendations

More emphasis on calculating standard deviation is necessary.

Question 14

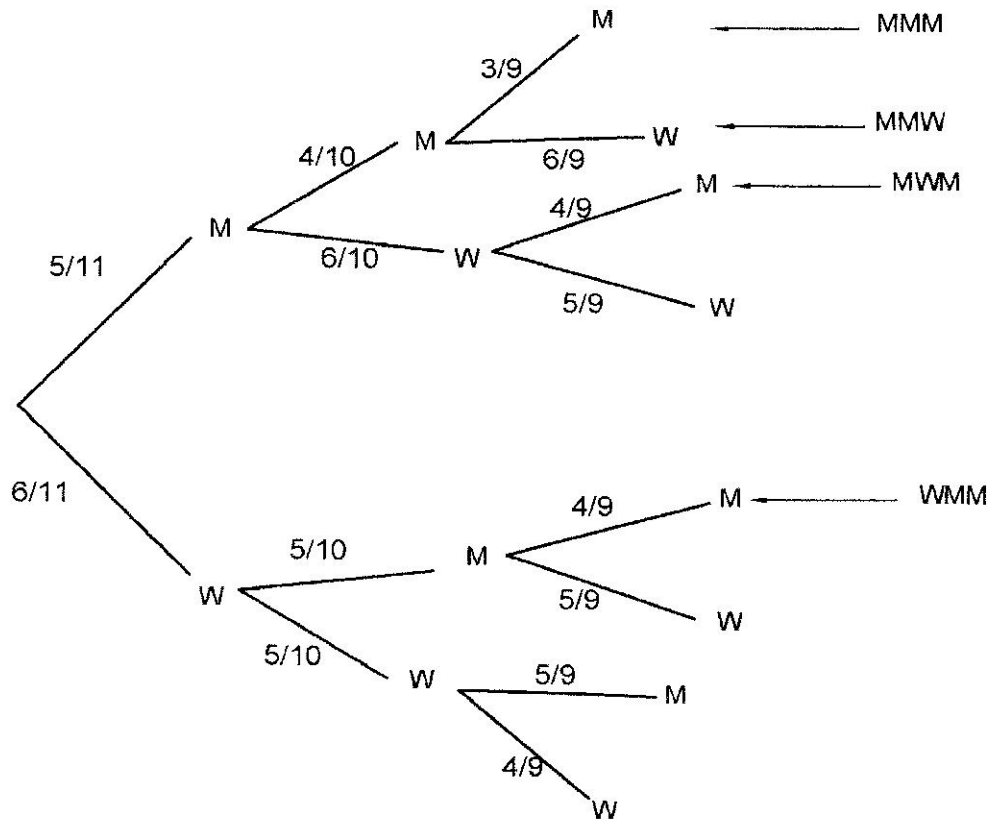
A committee of 3 people was chosen at random from a group of 5 men and 6 women. Find the probability that the committee consisted of more men than women. (4 marks)

Question tested on probability.

Weaknesses

Unable to obtain the required probabilities without replacement. Majority did with replacement.

Expected response



P (more men than women)

P(more men than women)

$$= P(\text{MMW or MWM or WMM})$$

$$= \left(\frac{5}{11} \times \frac{4}{10} \times \frac{6}{9} \right) + \left(\frac{5}{11} \times \frac{6}{10} \times \frac{4}{9} \right) + \left(\frac{6}{11} \times \frac{5}{10} \times \frac{4}{9} \right)$$

$$= \frac{4}{33} + \frac{4}{33} + \frac{4}{33}$$

$$= \frac{12}{33} \text{ or } \frac{4}{11}$$

Recommendations

Emphasize more on the concept of probabilities to avoid confusion.

Question 16

Given that $\mathbf{OA} = 3\mathbf{i} + 4\mathbf{j} + 7\mathbf{k}$, $\mathbf{OB} = 4\mathbf{i} + 3\mathbf{j} + 9\mathbf{k}$ and $\mathbf{OC} = \mathbf{i} + 6\mathbf{j} + 3\mathbf{k}$,

show that points A, B and C are collinear.

(3 marks)

The question tested on collinearity of vectors

Weaknesses

Many candidates were unable to obtain the vector \mathbf{AB} , \mathbf{BC} , \mathbf{AC} . Relating any two of the vectors and making the conclusion was also a challenge.

Expected response

$$\mathbf{AB} = \begin{pmatrix} 4 \\ 3 \\ 9 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 7 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$$

$$\mathbf{AC} = \begin{pmatrix} 1 \\ 6 \\ 3 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 7 \end{pmatrix} = \begin{pmatrix} -2 \\ 2 \\ -4 \end{pmatrix}$$

$$\mathbf{AC} = -2 \mathbf{AB}$$

$\mathbf{AB} // \mathbf{AC}$
and A is a common point
A, B and C are collinear

Recommendations

Emphasize on completing the proof and making the conclusion.

Question 18

The vertices of a rectangle ABCD are: A(0,2), B(0,4), C(4,4) and D(4,2). The vertices of its image under a transformation T are; A'(0,2), B'(0,4), C'(8,4) and D'(8,2).

- (a) (i) On the grid provided, draw the rectangle ABCD and its image A'B'C'D' under T. (2 marks)
- (ii) Describe fully the transformation T. (3 marks)
- (iii) Determine the matrix of transformation. (2 marks)
- (b) On the same grid as in (a), draw the image of rectangle ABCD under a shear with line $x = -2$ invariant and A(0, 2) is mapped onto A''(0,0). (3 marks)

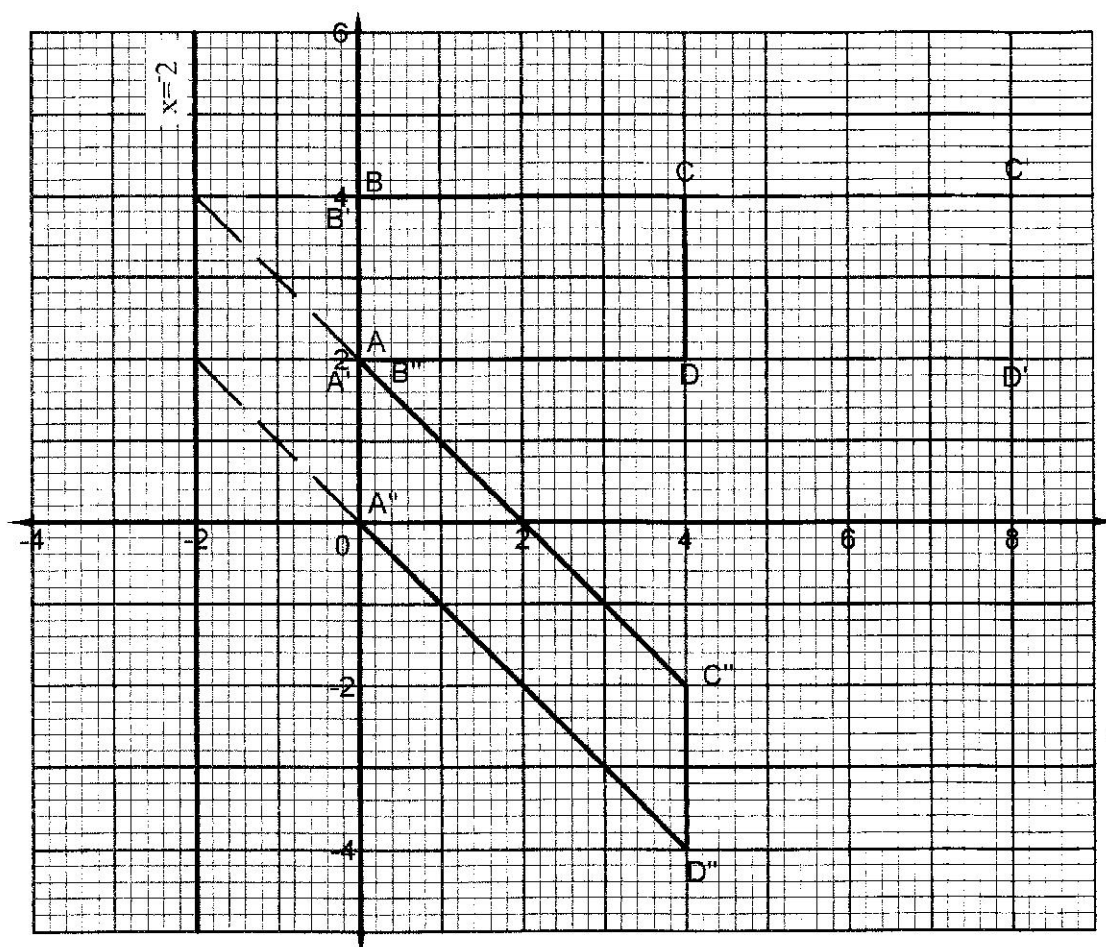
The question tested on transformations – shear and stretch.

Weaknesses

Many candidates could not get the correct stretch matrix and the shear.

Expected response

(a)(i) & (b)



(ii)

T is a stretch

S.F. = 2

$x = 0$ invariant

(iii)

$$T = \begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$$

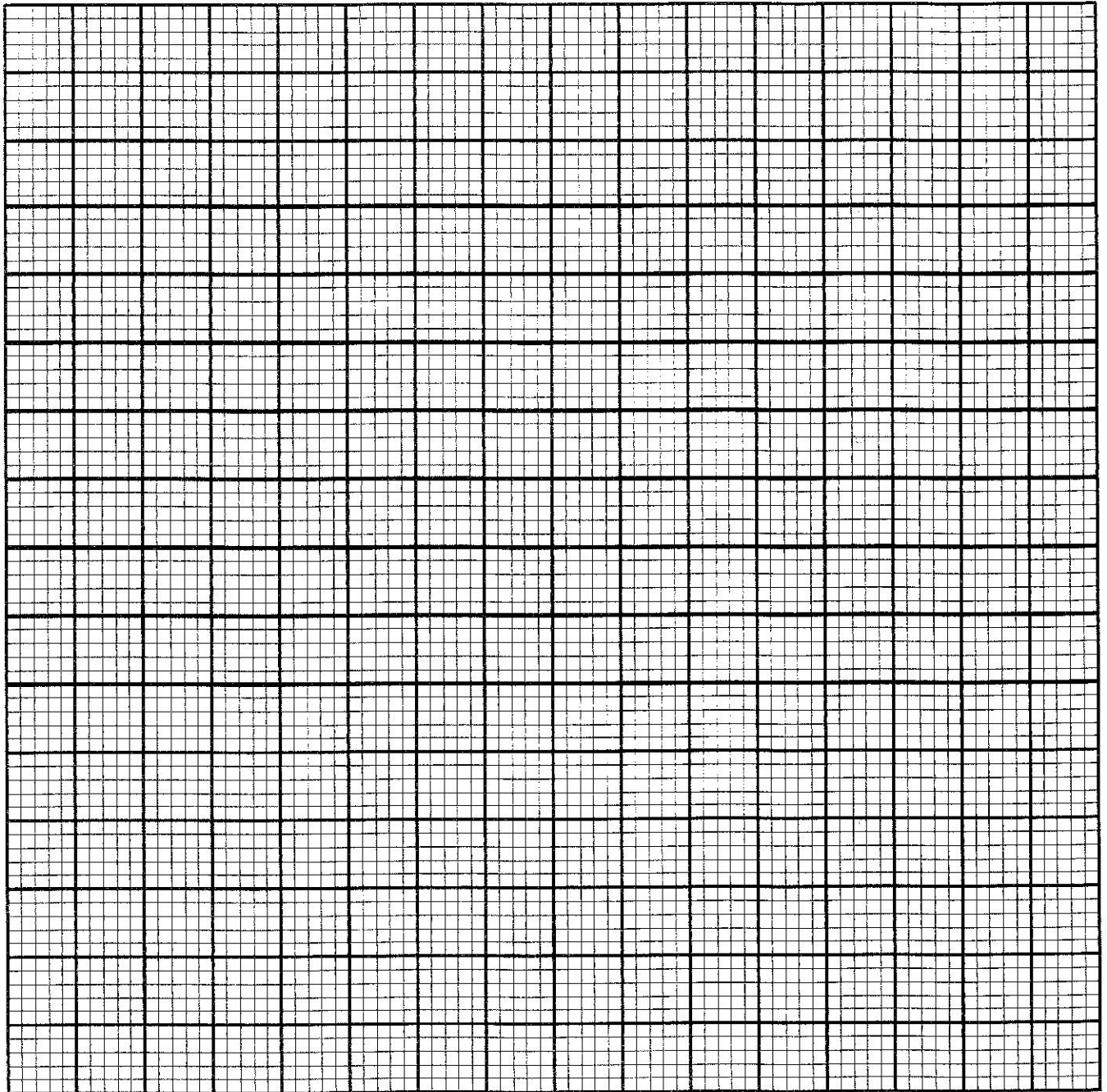
Recommendations

Emphasize more on the concepts of shear and stretch.

Question 22

A trader stocks two brands of rice A and B. The rice is packed in packets of the same size. The trader intends to order fresh supplies but his store can accommodate a maximum of 500 packets. He orders at least twice as many packets of A as of B. He requires at least 50 packets of B and more than 250 packets of A. If he orders x packets of A and y packets of B,

- (a) Write the inequalities in terms of x and y which satisfy the above information. (4 marks)
- (b) On the grid provided, represent the inequalities in part (a) above. (4 marks)



- (c) The trader makes a profit of Ksh 12 on a packet of type A rice and Ksh 8 on a packet of type B rice. Determine the maximum profit the trader can make. (2 marks)

The question tested on linear programming.

Weaknesses

Majority could not represent the inequalities correctly on the graph. Determination of the maximum profit was also a challenge to many.

Expected response

(a)

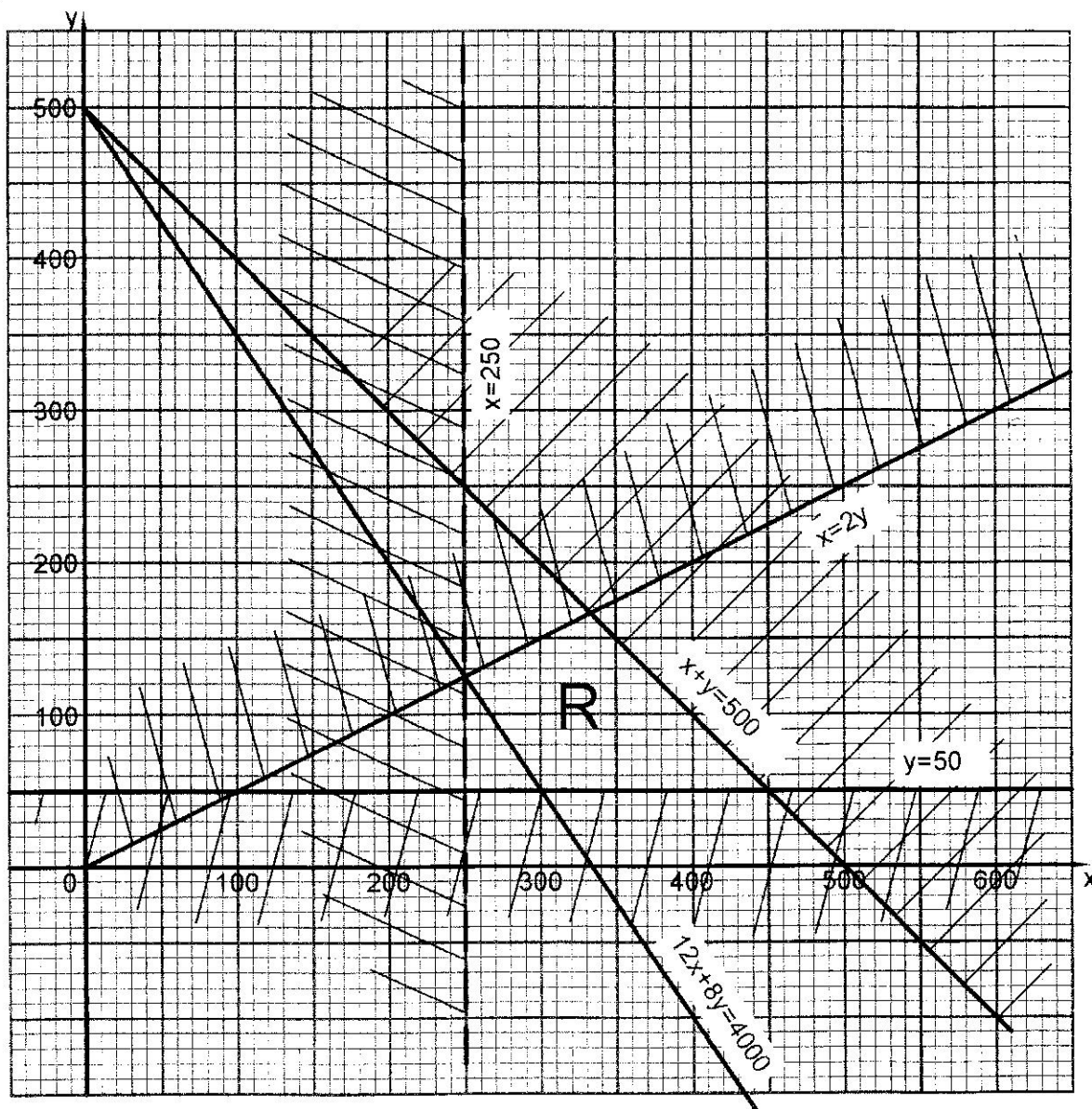
$$x + y \leq 500$$

$$x \geq 2y$$

$$y \geq 50$$

$$x > 250$$

(b)



(c)

Search line $12x + 8y = 4000$

For maximum profit $x = 450, y = 50$

$$\begin{aligned}\text{Maximum profit} &= 12 \times 450 + 50 \times 8 \\ &= \text{Ksh } 5800\end{aligned}$$

Recommendations

Emphasize more on the graphical representation of the inequalities and maximization/minimization.

Conclusion

Weaknesses were observed in some areas of the syllabus for both 121/1 and 121/2. These areas include **Equations of straight lines, inequalities, quadratics equations, Area approximations, loci and Transformations**. Application of learned concepts to real life situations was also observed to be a challenge to many candidates.

To help learners understand the concepts, it is necessary to have more applications relating to real life situations in the course of the teaching/ learning.

3.2 MATHEMATICS ALT B (122)

In the year 2017 Mathematics Alt B was tested in two papers. **Paper 1 (122/1)** and **Paper 2 (122/2)**. Each paper consisted of two sections: Section 1 (50 marks) short answer questions of not more than four marks each and Section II (50 marks), a choice of eight questions of 10 marks each where candidates answer any five.

Paper 1 (122/1) tested mainly Forms 1 and 2 work while Paper 2 (121/2) tested mainly forms 3 and 4 work of the syllabus.

This report is based on an analysis of performance of candidates who sat the year 2017 KCSE Mathematics Alt B.

3.2.1 CANDIDATES' GENERAL PERFORMANCE

Table 9: Candidates' Performance in Mathematics Alt B for the last five years 2013 - 2017

Year	Paper	Candidature	Maximum score	Mean Score	Standard Deviation
2013	1	1104	100	9.89	12.98
	2		100	7.44	9.94
	Overall		200	17.29	21.96
2014	1	1293	100	13.71	12.68
	2		100	11.16	13.28
	Overall		200	24.76	24.71
2015	1	1387	100	9.35	11.76
	2		100	7.26	12.53
	Overall		200	16.58	22.72
2016	1	1611	100	9.37	11.28
	2		100	8.02	10.60
	Overall		200	17.18	20.67
2017	1	1486	100	7.07	8.58
	2		100	13.39	13.56
	Overall		200	20.20	20.26

From the table the following observations can be made:

- (i) The subject registered an improved performance as indicated from the means.
- (ii) The means have been improving in the past three years.

3.2.2 INDIVIDUAL QUESTION ANALYSIS

The following is a discussion of some of the questions in which the candidates had major weakness in. This discussion is based on analysis of some question papers and chief examiners report.

3.2.3 Mathematics Alt. B Paper 1 (122/1)

Question 2

Three people Juma, Weru and Njeri went round a circular racing track, 3.12 km long. They all started from the same point and moved in the same direction. Juma walked at 48 m per minute, Weru ran at 120 m per minute while Njeri cycled at 156 m per minute.

If they started travelling at 0700h, find the time when they were first together again. (3 marks)

The question tested on application of LCM to real life situations.

Weaknesses

Many candidates could not calculate time given by each person and use LCM to calculate the time taken correctly.

Expected response

$$\text{Time taken: Juma } \frac{3120}{48} = 65 \text{ min,}$$

$$\text{Weru } \frac{3120}{120} = 26 \text{ min, } \text{Njeri } = \frac{3120}{156} = 20 \text{m}$$

LCM of 65, 26, 20

5	65	26	20
13	13	26	4
2	1	2	4
2	1	1	2
2	1	1	1

$$\text{LCM} = 260 \text{ min or } 4\text{h } 20 \text{ mins}$$

Time together is 1120h

Recommendations

Ensure that the students understand the concept of LCM given different situations.

Question 5

Use logarithms to evaluate:

$$\frac{84.56 \sqrt[3]{0.0027}}{0.045}$$

correct to 4 significant figures.

(4 marks)

The question required the candidates to obtain the correct logarithms of all the numbers given correctly, then add and divide by 3.

Weaknesses

Many candidates could not get all logarithms of number correctly.

Expected response

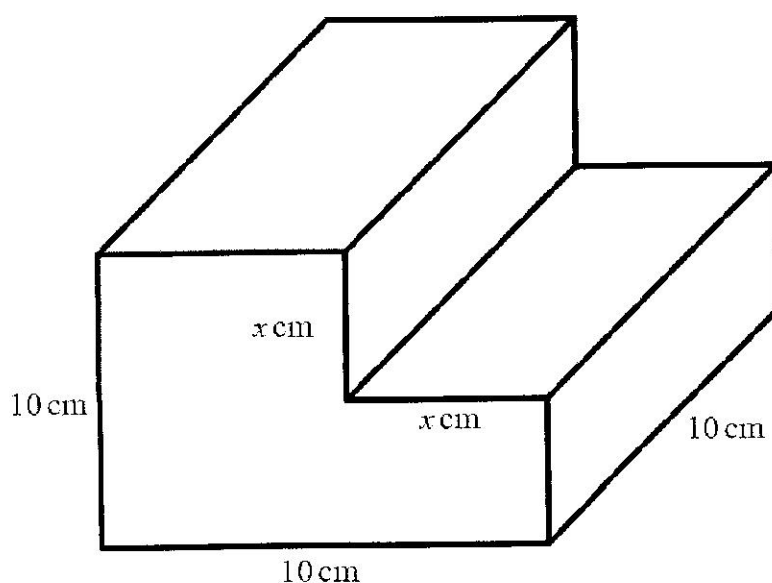
No	Log
84.56	1.9272
$(0.0027)^{1/3}$	$+ \bar{1}.1438$
$\frac{3.4314}{3}$	$\frac{1.0710}{- \bar{1}.6532}$
<u>0.045</u>	2.4178
0.7261	

Recommendations

Emphasize more on getting of all logarithms correctly and accuracy in addition, subtraction and division of logs.

Question 6

The diagram below represents a cube of side 10 cm from which a cuboid measuring x cm by x cm by 10 cm is removed as shown.



Write an expression in terms of x , for the surface area of the remaining solid. (3 marks)

Weaknesses

The candidates were not able to identify all the total number of surfaces of the solid given.

Expected response

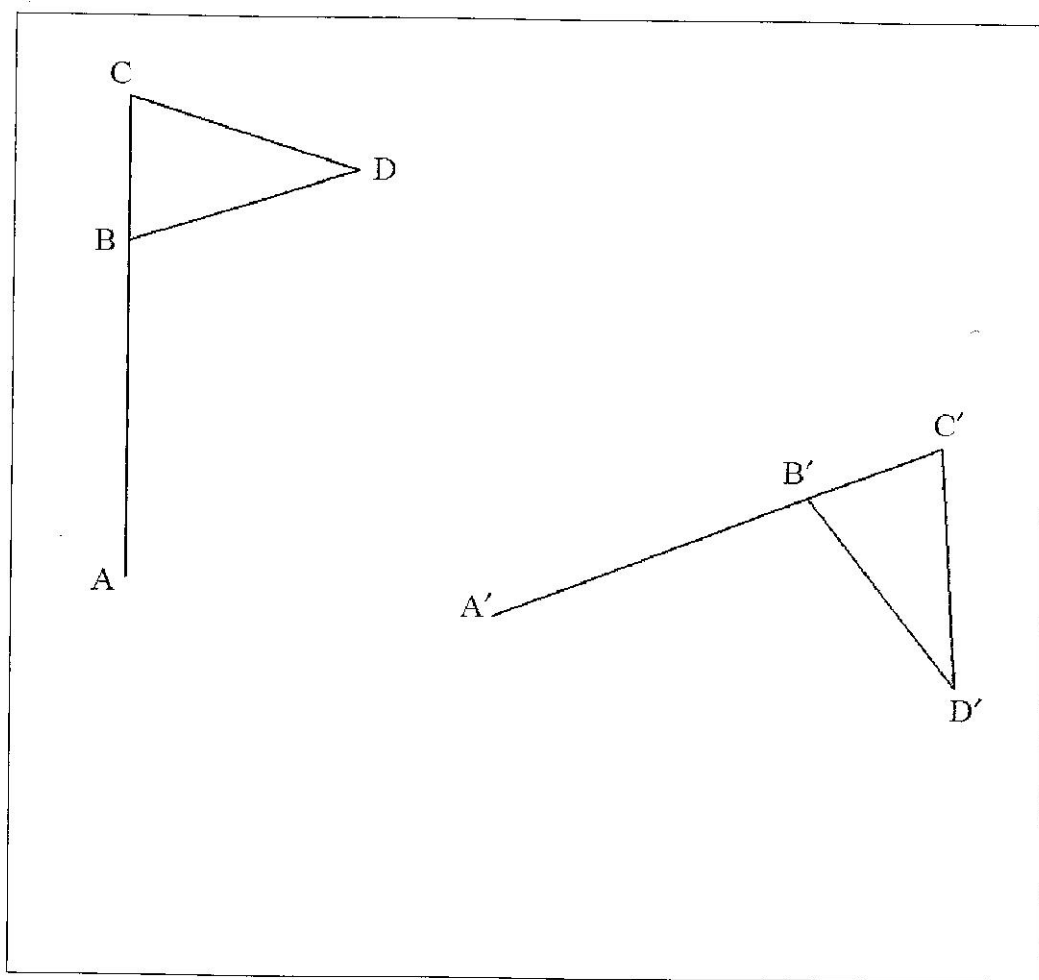
$$\begin{aligned} &4 \times 10 \times 10 + 2 \times (10 \times 10 - x^2) \\ &= 400 + 200 - 2x^2 \\ &= 600 - 2x^2 \end{aligned}$$

Recommendations

Emphasize more on practical identification of all surfaces of a solid.

Question 16

Figure $A'B'C'D'$ is the image of $ABCD$ under a rotation. By construction, determine the centre P and the angle of rotation. (3 marks)

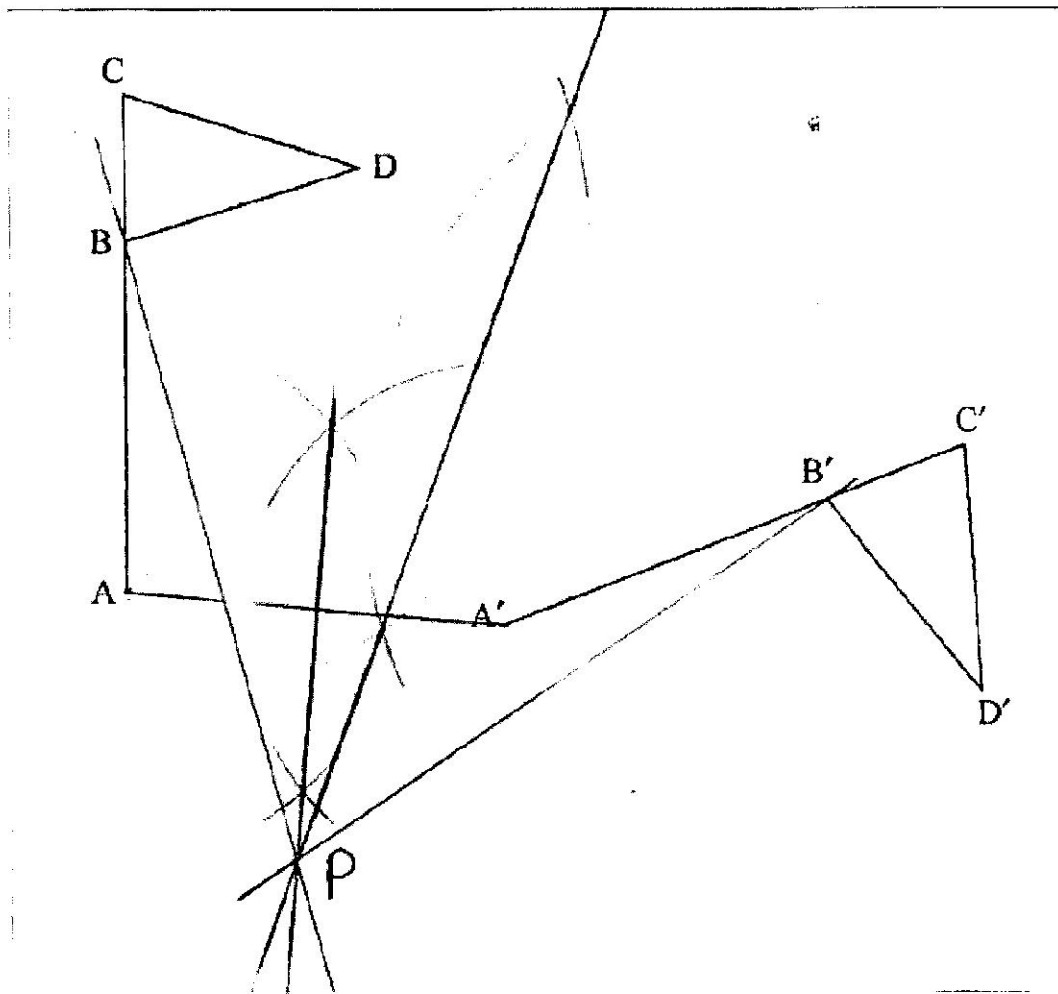


The question tested on getting the centre and angle of rotation.

Weaknesses

Candidates failed to identify the centre of rotation and thereby unable to identify the angle of rotation.

Expected response



Recommendations

Emphasize more how to identify the centre of rotation and angle of rotation without using the Cartesian plane.

Question 17

A saleslady earns a monthly salary of Ksh 60 000. She gets a commission of 4% on the value of goods she sells above Ksh 250 000 but less than Ksh 400 000. On goods sold above Ksh 400 000, she gets a commission of 7.5%.

- (a) In a certain month, she sold goods worth Ksh 525 000.
Calculate her total earnings that month. (4 marks)

- (b) In another month, she earned a total of Ksh 94 500. Find the value of goods that she sold that month. (6 marks)

The question tested on calculating the commission given after selling goods.

Weaknesses

Candidates failed to interpret the question correctly.

Expected response

(a)

$$\begin{aligned} & \frac{4}{100} \times (400000 - 250000) + \\ & \frac{7.5}{100} \times (525000 - 400000) + 60000 \\ & = 6000 + 9375 + 60000 \\ & = \text{Ksh } 75\,375 \end{aligned}$$

$$\begin{aligned} \text{(b) } 94500 &= 60000 + 6000 + x \\ x &= 28500 \end{aligned}$$

Value of goods for commission of Ksh 28500

$$\begin{aligned} &= \frac{28500}{7.5} \times 100 \\ &= \text{Ksh } 380\,000 \end{aligned}$$

$$\begin{aligned} \text{Total sale} &= 250000 + 150000 + 380000 \\ &= \text{Ksh } 780\,000 \end{aligned}$$

Recommendations

Emphasize more on the interpretation of the question based on the information given especially in relation to commission given on certain intervals.

Question 18

Lines $y + 2x = 4$ and $3x - y = 1$ intersect at point T.

- (b) A line L_2 passes through (5,4) and is parallel to L_1 . Find the equation of L_2 in the form $y = mx + c$ where m and c are constants. (2 marks)
- (c) Another line L_3 is perpendicular to L_1 at T. Find the equation of L_3 in the form $ax + by = c$ where a , b and c are integers. (3 marks)

The question tested on calculating point of intersection of two lines.

Weaknesses

Candidates failed to get the point of intersection of the two lines.

Expected response

a)

$$\begin{aligned}y + 2x &= 4 \\ -y + 3x &= 1 \\ 5x &= 5 \\ x &= 1 \\ y + 2 &= 4 \Rightarrow y = 2\end{aligned}$$

T(1,2)

Grad

$$\frac{-2-2}{3-1} = \frac{-4}{2} = -2$$

$$\frac{y-2}{x-1} = -2$$

$$y = -2x + 4$$

b) Grad = -2

$$\frac{y-4}{x-5} = -2$$

$$\Rightarrow y - 4 = -2x + 10$$

$$y = -2x + 14$$

c) Grad = $\frac{1}{2}$

$$\frac{y-2}{x-1} = \frac{1}{2}$$

$$y - 2 = \frac{1}{2}(x - 1)$$

$$2y - 4 = x - 1$$

$$-x + 2y = 3$$

Recommendations

Emphasize more on using simultaneous equation in getting the point of intersection and emphasize on how to get the equation of a line.

3.2.2 Mathematics Alt. B Paper 2 (122/2)

Question 6

A chord of a circle, radius 5 cm, subtends an angle of 30° at the centre of the circle. Determine the length of the chord, correct to 2 decimal places. (3 marks)

The question tested on calculating the length of the chord of a circle.

Weaknesses

Majority of the candidates failed to correctly identify the chord.

Expected response

Let length be x

$$\frac{x}{\sin 30^\circ} = \frac{5}{\sin 75^\circ}$$
$$x = \frac{5 \sin 30^\circ}{\sin 75^\circ}$$
$$x = 2.59$$

Recommendations

Give more exercises on identification of all the parts of the circle and their properties.

Question 15

A square QRST with vertices Q(1,1), R(3,1), S(3,3) and T(1,3) is transformed by the matrix

$$\begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \text{ to } Q'R'S'T'. \text{ Find:}$$

- (a) the area of square QRST; (2 marks)
- (b) the area of image Q'R'S'T'. (2 marks)

The question tested on matrix transformation.

Weaknesses

Candidates used the wrong order in multiplication of the matrices.

Expected response

$$\begin{aligned} \text{(a) Side of QRST} &= \sqrt{(1-1)^2 + (3-1)^2} \\ &= 2 \end{aligned}$$

$$\therefore \text{Area} = 2 \times 2 = 4$$

$$\text{(b) Area of } Q'R'S'T'$$

$$= \det. \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \times 4$$

$$= 6 \times 4$$

$$= 24$$

Recommendations

Give more practice to students on the correct order of multiplication of the matrices formed.

Question 16

Given that $\mathbf{p} = 6\mathbf{i} + 2\mathbf{j}$, determine the magnitude of \mathbf{p} , correct to 2 decimal places. (2 marks)

The question tested on determination of length of a vector.

Weaknesses

Many candidates were not able express the vectors in terms of \mathbf{i} and \mathbf{j} therefore unable to calculate the length of the vector.

Expected response

$$= \sqrt{6^2 + 2^2}$$

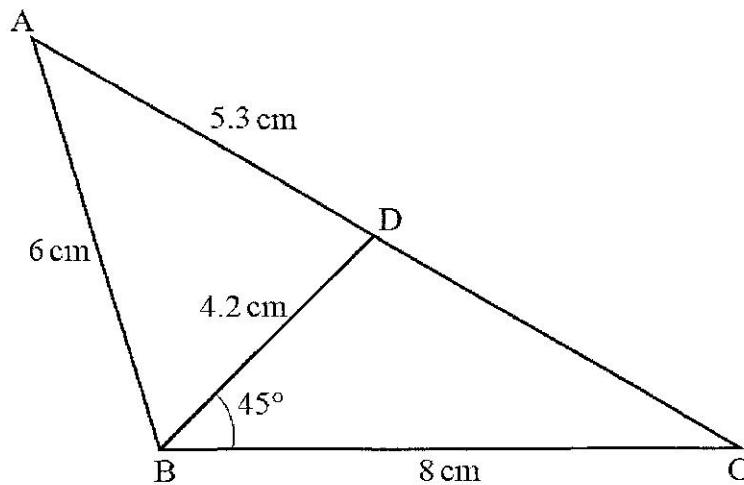
$$= \sqrt{40} = 6.32$$

Recommendations

Emphasize more on the various forms of expressing of vectors and determination of the length.

Question 20

The figure below shows triangle ABC in which $AB = 6$ cm, $BC = 8$ cm, $BD = 4.2$ cm and $AD = 5.3$ cm. Angle $CBD = 45^\circ$.



Calculate, correct to one decimal place:

- (a) the length of CD; (3 marks)
- (b) size of angle ABD; (3 marks)
- (c) size of angle BCD; (2 marks)
- (d) area of triangle ABD. (2 marks)

The question tested on application of trigonometry using sine rule and cosine rule.

Weaknesses

Most candidates could not determine when to use the sine rule or the cosine rule on the triangle given.

Expected response

- (a) Length of CD

$$CD^2 = 8^2 + 4.2^2 - 2 \times 8 \times 4.2 \cos 45^\circ$$

$$= 64 + 17.64 - 16 \times 4.2 \times 0.7071$$

$$= 81.64 - 47.52 = 34.12$$

$$CD = \sqrt{34.12} = 5.8$$

(b) Angle ABD:

$$5.3^2 = 6^2 + 4.2^2 - 2 \times 6 \times 4.2 \cos \theta$$

$$\cos \theta = \frac{36 + 17.64 - 5.3^2}{50.4}$$

$$\theta = \cos^{-1} 0.5069$$

$$\theta = 59.5^\circ$$

(c) Angle BCD:

$$\frac{\sin BCD}{4.2} = \frac{\sin 45}{5.8}$$

$$\sin BCD = \frac{4.2 \times \sin 45}{5.8}$$

$$\begin{aligned} \text{Angle BCD} &= \sin^{-1} 0.5120 \\ &= 30.8^\circ \end{aligned}$$

(d) Area of $\triangle ABD$:

$$= \frac{1}{2} \times 6 \times 4.2 \sin 59.5$$

$$= 10.9 \text{ cm}$$

Recommendations

More practice on the concept of sine rule and cosine rule for good understanding.

Question 23

Two boxes B and C contain identical balls except for the colour. Box B contains 5 violet balls and 3 green balls. Box C contains 3 violet balls and 4 green balls.

- (a) A ball is drawn at random from each box. Find the probability that both balls are of the same colour. (4 marks)
- (b) Two balls were drawn at random from each box, one ball at a time without replacement. Find the probability that:
- (i) the two balls drawn from box B or box C are violet; (4 marks)
- (ii) all the four balls drawn are violet. (2 marks)

The question tested probability using a sample space.

Weaknesses

Majority of the candidates could not get the correct sample space.

Expected response

$$\begin{aligned} \text{(a)} \quad P(VV) &= \frac{5}{8} \times \frac{3}{7} \\ &= \frac{15}{56} \end{aligned}$$

$$\begin{aligned} P(GG) &= \frac{3}{8} \times \frac{4}{7} \\ &= \frac{12}{56} \end{aligned}$$

$$\begin{aligned} P(\text{same colour}) &= \frac{15}{56} + \frac{12}{56} \\ &= \frac{27}{56} \end{aligned}$$

$$\begin{aligned} \text{(b)(i)} \quad P(V_B V_B) &= \frac{5}{8} \times \frac{4}{7} \\ &= \frac{5}{14} \end{aligned}$$

$$\begin{aligned} P(V_C V_C) &= \frac{3}{7} \times \frac{2}{6} \\ &= \frac{1}{7} \end{aligned}$$

$$\begin{aligned} \therefore P(V_B V_B) + P(V_C V_C) \\ &= \frac{5}{14} + \frac{1}{7} = \frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad P(\text{all violet}) \\ &= \frac{5}{14} \times \frac{1}{7} \\ &= \frac{5}{98} \end{aligned}$$

Recommendations

More practice is necessary on creating a correct sample space and apply it to the questions asked.