3.2 MATHEMATICS ALT B (122)

In the year 2012 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 2012 KCSE Mathematics Alt B.

3.2.1 CANDIDATES' GENERAL PERFORMANCE

Table 9: Candidates' Performance in Mathematics Alternative B in the years 2010 - 2012

Year	Paper	Candidature	Maximum score	Mean Score	Standard Deviation
2010	1 2	**1221**	100 100	20.40 17.96	16.85 15.91
2011	1 2 **Overall**	**1247**	100 100 **200**	12.11 14.65 **26.64**	12.75 15.43 **26.89**
2012	1 2 **Overall**	**1281**	100 100 **200**	9.27 9.77 **18.99**	12.48 13.48 **25.19**

From the table the following observations can be made:

(i) The subject registered a decline in performance when compared to the previous year's performance.

(ii) The mean score of the papers was quite low.

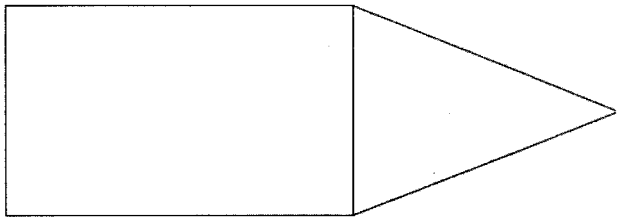
INDIVIDUAL QUESTION ANALYSIS

Mathematics Alt B has continued to have a dismal performance since its inception in 2010. With this kind of performance, most questions were poorly performed. The questions discussed below are those considered to be dismally performed.

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

Question 9

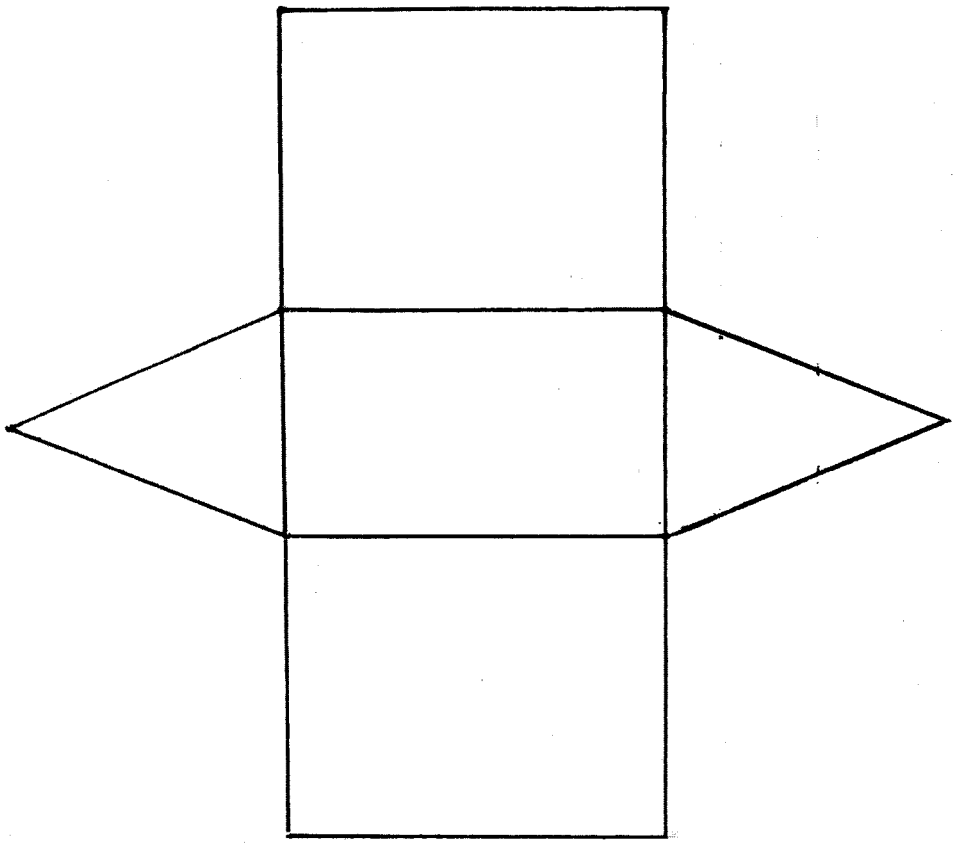
The figure below is part of a net of a triangular prism. Complete the net. (3 marks)



Weaknesses

Most candidates could not draw the net accurately. Some drew the nets of a rectangular pyramid

Expected response

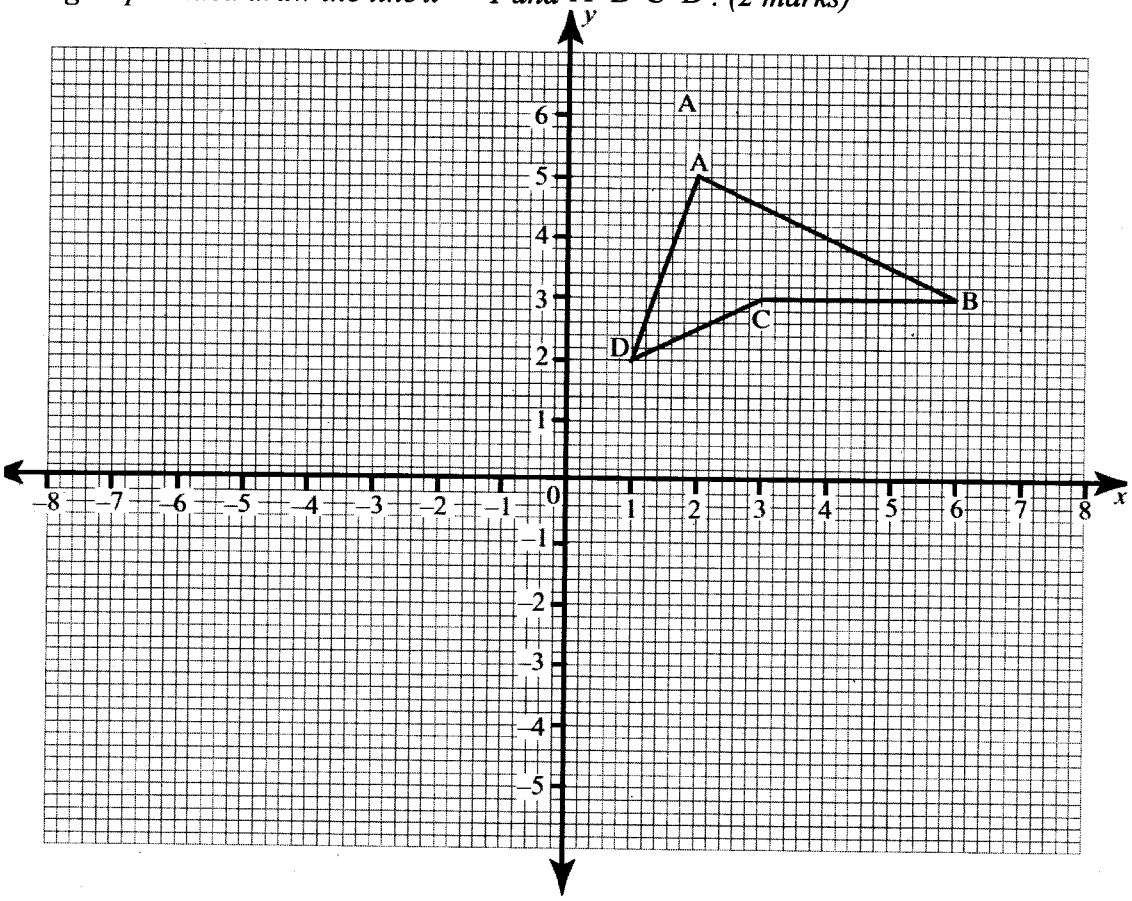


Advice to teachers

Teach different types of solids and their corresponding nets.

Question 11

Quadrilateral ABCD shown below, whose vertices are A (2, 5), B (6, 3), C (3, 3) and D (1, 2) is mapped onto A′ B′ C′ D′ *by a reflection in the line x = -1.*
(a) On the grid provided draw the line x = -1 and A′ B′ C′ D′. *(2 marks)*

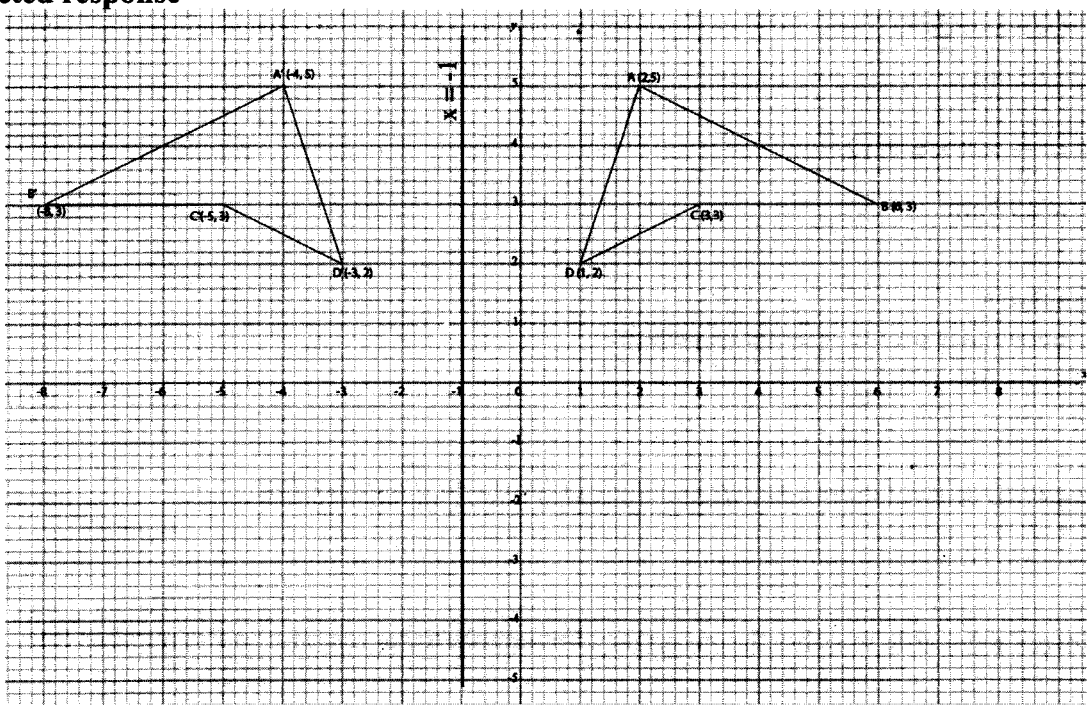


(b) State the type of congruence between quadrilateral ABCD and A′ B′ C′ D′. *(1 mark)*

Weaknesses

Many candidates could not draw the line x = -1 and instead drew y = -1. Majority also didn't know the type of congruence.

Expected response

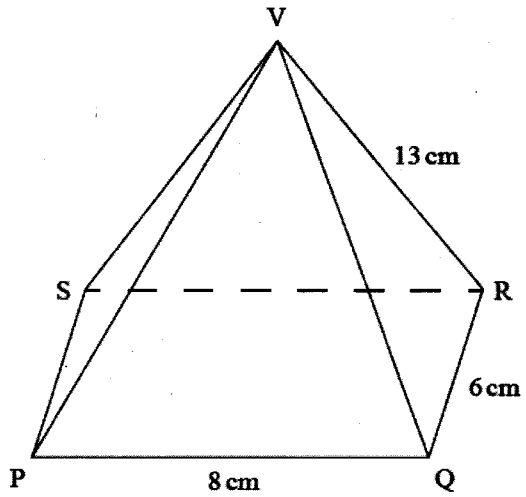


Advice to teachers

Give more exercises and help students differentiate between the lines x = a and y = b.

Question 14

The figure below represents a rectangular based pyramid VPQRS. PQ =8 cm, QR = 6 cm and VP= VQ = VR = VS = 13 cm.



Calculate:
(a) the vertical height of the pyramid; *(2 marks)*
(b) the volume of the pyramid. *(2 marks)*

Weaknesses

Candidates were unable to use the Pythagoras theorem to obtain the height of the pyramid, hence could not find the volume.

Expected response

(a) height $= \sqrt{13^2 - 5^2}$

$= 12$ cm

(b) volume $= \frac{1}{3} \times 8 \times 6 \times 12$

$= 192$ cm^3

Advice to teachers

Teach more thoroughly on the volume of prisms.

Question 15

Solve the inequality given below and represent the solution on a number line.

$-5x - 3 > 2x + 4$ *(2 marks)*

Weaknesses

Many candidates were able to solve the inequality but unable to represent it in the number line.

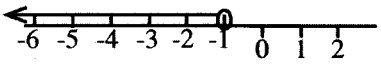
Expected response

$-5x - 3 > 2x + 4$

$-5x - 2x - 3 > 4$

$-7x > 7$

$x < -1$

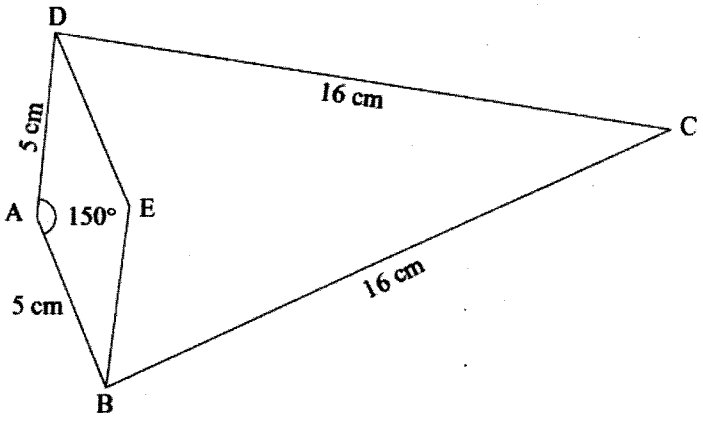


Advice to teachers

Teach more on the representation of the inequalities on the number line.

Question 18

The figure below shows a kite ABCD and a rhombus ABED. AB =AD = 5 cm, BC = DC = 16 cm and angle DAB = 150°.



Calculate:

(a) the area of the rhombus ABED; *(2 marks)*

(b) (i) the length of diagonal BD, correct to one decimal place; *(2 marks)*

(ii) the area of triangle BCD. *(3 marks)*

(c) the area of the kite ABCD. *(3 marks)*

Weaknesses

Calculation of the length BD was a challenge to most candidates

Expected response

a) $2 \times \frac{1}{2} \times 5 \times 5 \operatorname{Sin} 150^{\circ}$

$= 12.5 \text{ cm}^2$

b) (i) $\frac{\frac{1}{2}BD}{5} = \operatorname{Sin} 75^{\circ}$

$BD = 9.7$

(ii) Area of Δ BCD

$S = \frac{1}{2}(9.7 + 16 + 16) = 20.85$

$A = \sqrt{20.85(20.85 - 9.7)(20.85 - 16)^2}$

$= \sqrt{20.85 \times 11.15 \times (4.85)^2}$

$= 73.95$

c) Area of kite ABCD

$\frac{1}{2} \times 12.5 + 73.95$

$= 80.2 \text{ cm}^2$

Advice to teachers

Give more questions on application to trigonometry

Question 24

A room measuring 4x metres by (2x + 2) metres is to be carpeted leaving a uniform margin all around the walls. The dimensions of the carpet are (3x + 1) metres by 2x metres.

(a) Write an expression for the area of the carpet. *(1 mark)*

(b) If the area of the margin is 36 square metres, find:

(i) the value of x; *(3 marks)*

(ii) the area of the carpet. *(2 marks)*

(c) The carpet costs Ksh 1600 per square metre. The cost of transport and labour is 2.5% of the cost of the carpet. Calculate the total cost of carpeting the room. *(4 marks)*

Weaknesses

Candidates were unable to interpret the question to come up with the required quadratic equations

Expected response

a) $(3x + 1)2x = 6x^2 + 2x$

b) (i) $(2x + 2)4x = 6x^2 + 2x + 36$

$2x^2 + 6x - 36 = 0$

$(2x + 12)(x - 3) = 0$

$x = 3$

(ii) area of carpet

$= 3(3) + 1 + 2(3)$

$= 10 \times 6 = 60m^2$

c) Cost of carpet

$= 60 \times 1600$

$= 96000$

Cost of labour

$= 96000 \times 0.025$

$= 2400$

Total cost

$= 96000 + 2400$

$= 98400$

Advice to teachers

Give more questions on application to quadratic equations

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

Question 1

Round off each of the numbers in the expression $169.2 + \frac{92.4 \times 4.9}{14.7}$ *correct to one significant figure. Hence find the approximate value of the expression.* *(3 marks)*

Weaknesses

Candidates confused significant figures with decimal place.

Expected response

$$200 + \frac{90 \times 5}{10}$$

$$= 245$$

Advice to teachers

Distinguish clearly between significant figures and decimal places when teaching.

Question 13

An agent was paid a commission of Ksh 50 000 per annum. The commission was increased by 10% annually. Calculate the total amount of money the agent was paid in 3 years. (3 marks)

Weaknesses

Most candidates could not recognize it is a G.P

Expected response

$a = 50\,000; r = 1.1$

$$s_n = 50\,000 \times \frac{(1.1)^3 - 1}{1.1 - 1}$$

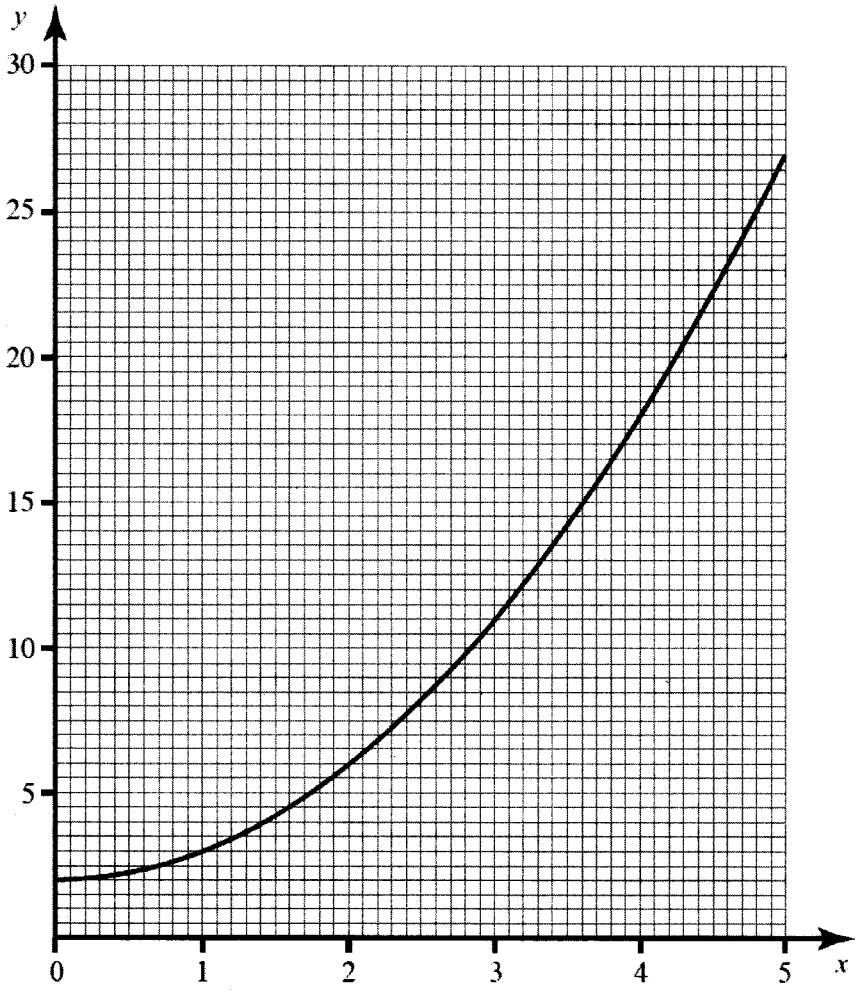
$$= 165\,500$$

Advice to teachers

Give more examples on application of G.P

Question 16

The graph below represents a curve of an equation.



Use the trapezium rule with 5 strips of equal width to estimate the area, in cm², bounded by the curve, the x -axis, x =0 and x = 5. *(3 marks)*

Weaknesses

Identifying the ordinates and use of the trapezium rule was a big challenge to the candidates.

Expected response

x	0	1	2	3	4	5
.	2	3	6	11	18	27

$y = x^2 + 2$

$Area = \frac{1}{2}\{(2+27)+2(3+6+11+18)\}cm^2$

$\frac{1}{2}\{29+2\times 38\}$

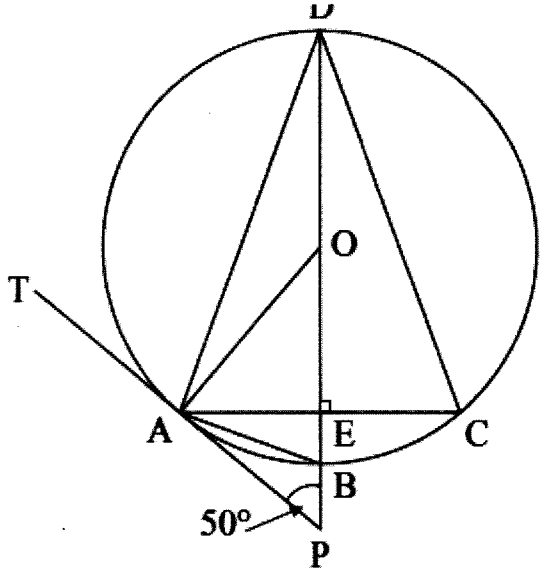
$= 52.5cm^2$

Advice to teachers

Give more practice ro students on finding the area under a curve.

Question 20

In the figure below, O is the centre of the circle of radius 2.5 cm. DOBP is a straight line and is perpendicular to the chord AC at E. Line TP is a tangent to the circle at A and angle APD = 50°.



(a) Calculate, correct to 2 decimal places, the length of:

(i) OP; *(2 marks)*

(ii) AP; *(2 marks)*

(iii) AC. *(2 marks)*

(b) Determine the size of:

(i) angle ADC; *(2 marks)*

(ii) angle ACD. *(2 marks)*

Weaknesses

Applying trigonometric ratios to find the lengths was a challenge to the candidates

Expected response

(a) (i)

$$OP = \frac{2.5}{\sin 50^\circ}$$

$$= 3.26 \text{ cm}$$

(ii)

$$AP = \frac{2.5 \sin 40^\circ}{\sin 50}$$

$$= 2.10$$

(iii)

$$AC = 2\,AE$$
$$= 2 \times 2.5 \sin 40^\circ$$

$$= 3.21$$

(b) (i)

$\angle PAC = 40^\circ$
(sum of $\angle$s in Δ AEP)

$\angle ADC = 40^\circ$
(angle in alt. segment)

(ii)

$$\angle ACD = \tfrac{1}{2}(180^\circ - 40^\circ)$$
$$= 70^\circ$$

Advice to teachers

Give students more practice on angle properties of a circle and use of trigonometric ratios