

PRINCIPAL EXAMINER'S REPORT



BOTSWANA
EXAMINATIONS
COUNCIL

JCE MATHEMATICS

2023



PAPER 2

General Comments

The 2023 performance of candidates in Mathematics Paper 2 was lower than what was expected. The most worrying scenario was that some candidates used wrong methods for some questions, while others left the questions not attempted. Questions that dealt with drawings were the most poorly done, candidates used free hand instead of rulers and vice versa.

Comments on specific questions

Section A

The questions in this section were satisfactorily done but some of the candidates clearly demonstrated that they lacked basic computational skills in dealing with numbers and operations.

1	The question was poorly done. Most candidates gave a wrong answer: 1. (students drew a pentagon with one line of symmetry hence the answer 1). Answer: 5
2	The question was well done. Most candidates managed to establish the rule to get the next term. Answer: $\frac{7}{21}$
3	The question was poorly done. The common answer was above the ground or ground floor. Answer: 1 st floor
4	It was poorly done, common errors were finding the square root of the number and multiplying it by 3 or dividing by 3. Answer: 6.7



5	<p>The question was well done and the table was well completed.</p> <p>Answer: <i>Completed table</i></p>
6	<p>The question was poorly done and most candidates drew a perpendicular line instead of a line bisector. Some did not attempt the question at all.</p> <p>Answer: <i>Perpendicular bisector</i></p>
7	<p>The question was poorly done, some candidates substituted correctly and failed to evaluate. Some common errors were: 'candidates multiplied 4 by 3', some candidates multiplied 2 by 4 and cubed the answer.</p> <p>Answer: 121</p>
8	<p>The question was well done, most candidates managed to shade two small triangles.</p> <p>Answer: <i>Two shaded small triangles</i></p>
9	<p>(a) The question was fairly done. Candidates managed to plot the points and common errors were (joining the points by free hand and or swapping of coordinates).</p> <p>Answer: <i>Correct quadrilateral shape</i></p> <p>(b) The question was poorly done: most candidates failed to use the right method/formula to get the length EH.</p> <p>Answer: 3.16</p>
10	<p>The question was poorly done. The candidates managed to multiply by 2 both side but failed to resolve the question. Common errors: some swapped A and P, others subtracted 2 both sides instead of multiplying, some left the question not attended.</p> <p>Answer: $P = \frac{2A}{t}$</p>



11	<p>The question was poorly done, candidates were able to do cross multiplication but failed to remove the brackets correctly.</p> <p>Answer: $\frac{-3x-1}{7(x+5)}$</p>
12	<p>(a) The question was well done. Most candidates managed to interpret the graph.</p> <p>Answer: P200</p> <p>(b) The question was poorly done; Most candidates could not interpret the small units in the x-axis on the graph. Common errors were that candidates gave their answers as ratios such as 1hr 35min and 1: 36 etc, which was incorrect.</p> <p>Answer: 1.6 hours</p> <p>(c) The question was poorly done. A number of candidates were not able to interpret the graph to obtain the fixed charge.</p> <p>Answer: P100</p>
13	<p>It was poorly done. Most candidates failed to identify the starting and ending coordinates for drawing the frequency polygon, hence they provided an open polygon instead of a closed polygon, which was incomplete. Some candidates used freehand to draw the frequency polygon.</p> <p>Answer: <i>Completed polygon</i></p>
14	<p>(a) The question was poorly done. Most candidates could not draw the line $y = x + 2$.</p> <p>Answer: <i>Correctly drawn line $y = x + 2$</i></p> <p>(b) The question was poorly done as candidates could not solve the equations graphically as requested or stated in the question. Candidates rather ignored the instruction and used alternative methods to solve the equations as seen by their lack of using the graph $y = -2x - 1$ and a pair of axes provided. Candidates are advised to apply themselves as per the task or instruction given.</p> <p>Answer: $x = -1$ and $y = 1$</p>
Section B	



15	<p>(a) The question was well done; candidates realized that they had to multiply the amount of money required for each point, which was P150, with the number of points given, 6 points.</p> <p>Answer: 900</p> <p>(b)(i) The question was poorly done; most candidates gave their wrong working as $\frac{2}{100} \times 1270.75 = 25.4$ which was a result of ignoring the fact that a percentage was sought, not the amount of discount per one point.</p> <p>Answer: 12%</p> <p>(b)(ii) The question was poorly done. Some candidates managed to calculate the 12% required for use as discount percentage and could not subtract the discount amount from the initial total cost amount, while others used the wrong percentages resulting in wrong output.</p> <p>Answer: P1,118.26</p>
16	<p>(a) The question was well done.</p> <p>Answer: $3x$</p> <p>(b) The question was poorly done. Some candidates multiplied 5 by x while others wrote $3x + 5x$, $3x - 5$, and some used “m” which was meters as a variable instead of x.</p> <p>Answer: $3x + 5$</p> <p>(c) It was poorly done; most candidates could not form the correct equation. Common error was: $3x + 5x = 125$.</p> <p>Answer: $3x + 5 = 125$</p> <p>(d) The question was poorly done. Candidates failed to form and solve the equation. This part was dependent on question 15(c).</p> <p>Answer: 40 cm</p>
17	<p>(a) The question was well done. Candidates managed to identify and shade the cross section.</p> <p>Answer: <i>Shaded cross section</i></p>



	<p>(b)(i) It was poorly done. Candidates failed to apply Pythagoras theorem, most students calculated the area of the triangle instead of finding the length.</p> <p>Answer: 17</p> <p>(b)(ii) The question was well done. Candidates applied the appropriate method to come up with the right answer.</p> <p>Answer: 60</p> <p>(b)(iii) The question was fairly done. Candidates managed to multiply the area of the cross section by the length. Common errors were: $15 \times 8 \times 23$, some calculated total surface area.</p> <p>Answer: 1380</p>
18	<p>(a) It was poorly done. Candidates used the wrong application of angle properties. In some cases, candidates expressed the angle as a bearing, (050°).</p> <p>Answer: Angle: 50°, Reason: Alternate Angle</p> <p>(b)(i) It was poorly done. Majority of the candidates wrote $180 - 50 = 130$, others gave wrong answers like 50,130 and 310.</p> <p>Answer: 230°</p> <p>(b)(ii) It was poorly done. Most candidates did not apply the correct trigonometric ratio. Some used the Pythagoras rule.</p> <p>Answer: 7.15km</p>
19	<p>It was poorly done. Most candidates used a positive scale factor instead of a negative scale factor. Some candidates used wrong transformations.</p> <p>Answer: triangle with vertices $(-2, -2)$; $(-4, -2)$ and $(-4, -6)$.</p>
20	<p>(a) It was poorly done. Most candidates used 10cm as an angle instead of 180°. Some calculated area, circumference of a circle instead of length of arc.</p>



	<p>Answer: 15.7 cm</p> <p>(b) It was poorly done. Most candidates added all the measurements from the trapezium. Some calculated the area of the trapezium.</p> <p>Answer: 73.4 cm</p>
21	<p>(a) It was fairly done as most candidates gave the correct response. Other common answers given were 3, 4, and 7.</p> <p>Answer: 5</p> <p>(b) It was fairly done. Some candidates wrote wrong entries especially for the totals.</p> <p>Answer: 24, 35, 72 and 18</p> <p>(c) It was poorly done. Most candidates added the x column and divided it by 5. Some calculated the range instead of the mean. Common errors were $\frac{15}{5} = 3$; $\frac{72}{5} = 14.4$, and $5 - 1 = 4$.</p> <p>Answer: 4</p>
22	<p>(a) It was fairly done. Some candidates were able to substitute and calculate the correct value of w. Though others wrote answers like 5, and 4.</p> <p>Answer: 7</p> <p>(b) It was fairly done. Most candidates were able to plot the points given correctly though they joined the lower points with a straight line instead of a free hand.</p> <p>Answer: <i>smooth curve with correct points plotted</i></p> <p>(c) It was poorly done. Most candidates did not draw the line $y = -2$ which was needed to interpret the points of its intersection with the curve, even though some candidates wrote the correct values of x through some other methods.</p> <p>Answer: $x = 1$ or $x = 2.5$</p>

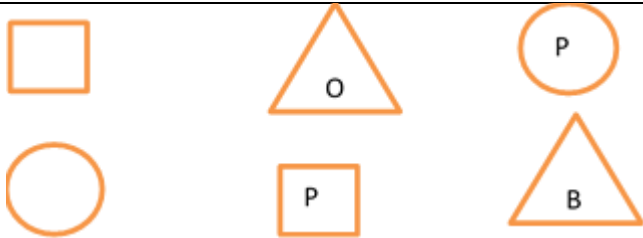


23	<p>(a) It was well done. They gave the correct response in the majority.</p> <p>Answer: $\frac{1}{4}$</p> <p>(b)(i) It was well done. They gave the correct response in the majority.</p> <p>Answer: G, H</p> <p>(b)(ii) It was poorly done. Most candidates gave fractional responses like $\frac{1}{8}, \frac{8}{8}$, and also whole number 4.</p> <p>Answer: 8</p> <p>(b)(iii) It was poorly done. Most candidates wrote wrong fractions as their answers i.e. $\frac{2}{4}, \frac{2}{8}$. Some drew the probability table and tree diagrams.</p> <p>Answer: $\frac{2}{4}$</p>
24	<p>(a)(i) The question was fairly done. Some candidates gave the correct distance. Common wrong answers are 80 km, 10km and 140km.</p> <p>Answer: 20 km</p> <p>(a)(ii) It was poorly done, most candidates divided 20 by 0.5, 20 by 1.5 and 20 x 5</p> <p>Answer: 50km/h</p> <p>(b)(i) The question was poorly done, most candidates wrongly interpreted the scale, they also had problem with drawing of the slanting line.</p> <p>Answer: <i>Correctly drawn line</i></p> <p>(b)(ii) It was poorly done. Most candidates had common errors like $\frac{140}{2.5}$, and $\frac{140}{2.45}$.</p> <p>Answer: 50.9</p>



Section C	
25.	<p>It was fairly done. Most candidates wrote some random numbers adding to 350, the seemed not to understand the meaning of consecutive. Some candidates divided 350 by 4 and gave 87.5 four times.</p> <p>Answer: <i>86,87,88,89</i></p>
26.	<p>It was fairly done. Most of the candidates were able to identify missing numbers as square numbers.</p> <p>Answer: <i>r = 16</i> <i>U = 225</i></p>
27.	<p>It was poorly done most candidates failed to disjoint consecutive numbers. Some candidates used numbers repeatedly and also used numbers that were not given.</p> <p>Answer:</p> <div style="text-align: center;"></div>
28.	<p>It was poorly done. Most candidates left the question unattempted, and most of those who attempted gave random numbers as answers.</p> <p>Answer: Bag P = 9 Bag Q = 7 Bag R = 13 Bag S = 14</p>
29.	<p>It was poorly done. Most of the candidates placed the colour letter randomly and some letters shared the shape.</p> <p>Answer:</p>



	
30.	<p>The question was poorly, instead of giving the number of possible combinations of triangles and squares, most candidates were giving number of sticks for making the triangles and squares while some candidates were presenting answers as a drawing of triangles and squares.</p> <p>Answer: <i>There were several possible combinations.</i></p>
31.	<p>It was fairly done. Most candidates just gave the given letter in alphabetical order in LMNOP or PONML which some candidates just ended earned them partial marks the distance from office to the different fields.</p> <p>Answer: <i>LMPON</i></p>
32.	<p>It was poorly done, most candidates moved more than one disc at a time. Some candidates were just filling the boxes with the discs randomly.</p> <p>Answer: <i>There were several arrangements.</i></p>