Aga Khan University Examination Board
Notes from E-Marking Center on SSC I Mathematics Examination May 2014

Introduction

This document has been produced for the teachers and candidates of SSC Part I (Class IX) Mathematics. It contains comments on candidates' responses to the 2014 Secondary School Certificate (SSC-I) Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

General Comments

This report includes overall comments on students' performance on every question and *some* specific examples of students' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. Whereas, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that require candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

This year an improvement in overall performance of the candidates is observed. However weaker responses revealed that candidates had problems with the laws of exponents, functions and application of algebraic formula to solve word problems.

Detailed Comments

Question 1

This question offered a choice between part a and b. Candidates chose to attempt both parts equally**.**

Question 1a

Better responses exhibited that the candidates had a thorough knowledge of complex numbers and had applied the basic operations masterfully to achieve the required result. One such response is shown below:

sol (a) $\frac{2-2i}{2i} \times \frac{2i}{2i}$

$= \frac{2i(2-2i)}{-4}$

$= \frac{4i+4}{-4}$

$= \frac{\cancel{4}i}{-\cancel{4}} + \frac{\cancel{4}}{-\cancel{4}}$

$= -1 - i$

Weaker responses mostly contained the common error of candidates treating it as a 'simplification' question rather than a 'proof' question. Majority of the candidates did not exhibit the knowledge of '$i = \sqrt{-1}$'. For example see the following response:

$\frac{2-2\sqrt{-1}}{2i} = -1-i$

$= \frac{2-2\sqrt{-1}(-2i)}{2i-2i} = -1-i(1+i)$

$= \frac{2-2(i)(-2i)}{2i-2i} = 1-i^2$

$= \frac{-2i^2}{\cancel{2i}-\cancel{2i}} = 1-1$

$= 2-1 = \cancel{1}-\cancel{1}$

$= 1$

Question 1b

Better responses showed that the students correctly applied the laws of exponents to calculate the answer. Some of the candidates skillfully calculated the correct answer barely in three working steps, thus clearly exhibiting their understanding of the topic and carefully avoiding lengthy and unnecessary working. One suchr response is shown below:

Solution $\sqrt{\dfrac{\overset{16}{\cancel{32}}a^2b^3c^6}{\cancel{2}b^{-3}c^2}}$

$\sqrt{16a^2b^{3+3}c^{6-2}}$

$\sqrt{4^2a^2b^6c^4}$

$(4^2a^2b^6c^4)^{1/2}$

$(4^{\cancel{2}\times 1/\cancel{2}}a^{\cancel{2}\times 1/\cancel{2}}b^{\overset{3}{\cancel{6}}\times 1/\cancel{2}_1}c^{\overset{2}{\cancel{4}}\times 1/\cancel{2}_1})$

$\boxed{4ab^3c^2}$

Ans

Weaker responses highlighted two most recurring errors: the candidates cancelled b^3 *and* b^{-3} (in the numerator and the denominator respectively) showing their inattentiveness to the negative power in the denominator. The other mistake commonly seen was that in the last step the candidates did not take square root of the co-efficient, leading to the incorrect answer containing 16 instead of 4. The weakest responses came from candidates who utterly failed to exhibit their knowledge of the laws of exponents and were merely guess-working. For example see the following response:

$\sqrt{\dfrac{\cancel{32}a^2c^{\cancel{6}3}}{\cancel{2}b^{-3}c^{\cancel{2}}}}$

$\left(\sqrt{\dfrac{16a^2c^3}{b^{-3}}}\right)^{\cancel{2}}$

$\dfrac{16ac}{b^{-3}}$ Answer

Question 2

This question offered a choice between part a and b. A vast majority of students attempted part a.

Question 2a

Better responses exhibited candidates' methodical approach to a 'proof' question. They correctly applied their understanding of union and intersection of sets and calculated both sides of the equation separately. They were also able to show that the associative law holds true. One such response is shown below:

L.H.S	R.H.S
$A \cup (B \cup C)$	$(A \cup B) \cup C$
$\cancel{(A \cup C) = \{1,2,3,4\} \cup \{}$	$(A \cup B) = \{1,2,3,4\} \cup \{2,6,4\}$
$(B \cup C) = \{2,6,4\} \cup \{4,6,8\}$	$(A \cup B) = \{1,2,3,4,6\}$
$(B \cup C) = \{2,4,6,8\}$	$(A \cup B) \cup C = \{1,2,3,4,6\} \cup \{4,6,8\}$
$A \cup (B \cup C) = \{1,2,3,4\} \cup \{2,4,6,8\}$	$= \{1,2,3,4,6,8\}$
$A \cup (B \cup C) = \{1,2,3,4,6,8\}$	

So $A \cup (B \cup C) = (A \cup B) \cup C$

Weaker responses showed lack of a comprehensive notion of sets and their union and intersection. While listing the elements, the candidates wrote it more than once if it was common to the sets. Please see the following example:

$A: \{1,2,3,4\}, B = \{2,4,6\} \quad C = \{4,6,8\}$

$AU: \{1,2,3,4,6,8\}$

$BUC = \{2,4,6\} \quad U = \{1,2,3,4,6,8\} \quad C = \{4,6,8\}$

$BUC = \{1,2,3,4,6,8\}$

$AUB = \{1,2,3,4\} \quad U = \{1,2,3,4,6,8\} \quad B = \{2,4,6\}$

$AUB = \{1,2,3,4,6\}$

$UC = \{1,2,3,4,6\} \quad C = \{4,6,8\}$

$UC = \{1,2,3,4,6,8\}$

Question 2b

Better responses reflected that the candidates had a clear understanding of the mathematical concept being assessed. For part(i), they listed all the elements of the cross product of A and B, writing each ordered pair (six in all; the first element belonging to set A and the second to set B) separated by a comma and enclosing all the ordered pairs in a set of braces. In part (ii), the candidates displayed their knowledge of functions, particularly paying close attention, while listing the ordered pairs that it was to be a **function from A to B.** Part (iii) and (iv) contained entries for which students would refer to part (ii). The students managed this task fairly well. One such response is shown below:

b. For $A = \{0,1,3\}$ and $B = \{-1,0\}$ do as directed.

i. Find $A \times B$ (1 Mark)

$A \times B = \{(0,-1),(0,0),(1,-1),(1,0),(3,-1),(3,0)\}$

ii. Find a function from A to B (1 Mark)

Into function $\{(0,-1),(1,0),(3,0)\}$

iii. Find domain of the function (1 Mark)

Domain $= \{0,1,3\}$

iv. Find range of the function (1 Mark)

Range $= \{-1,0\}$

Weaker responses made it evident that the candidates were struggling with the concept of mathematical functions. They were not careful to write out the ordered pairs, enclosed within braces and separated by commas. One such response is as follows:

b. For $A = \{0,1,3\}$ and $B = \{-1,0\}$ do as directed.

i. Find $A \times B$ (1 Mark)

$A \times B = \{(0,-1),(0,0)(1,-1),(1,0),(3,-1),(3,0)\}$

ii. Find a function from A to B (1 Mark)

A to B $= (1,0)$

iii. Find domain of the function (1 Mark)

Domain $= 1$

iv. Find range of the function (1 Mark)

Range $= 0$

Question 3

This question tested the candidates on two aspects; conversion of the logarithmic form of the equation into exponential form and calculation of the cube-root. Most of the candidates did well on this question.

Better responses displayed that the students were well versed in logarithmic functions and cube-roots. One of the examples of better responses is as follows:

$(x)^3 = 729$

$(x)^{\cancel{3}} = (9)^{\cancel{3}}$

$x = 9$

OR

$(x)^3 = 729$

$\sqrt[3]{\ }$ on b/s

$\sqrt[3]{x^{\cancel{3}}} = \sqrt[3]{729}$

$x = 9$ Answer

Weaker responses revealed that the candidates possessed neither the skill of converting logarithmic form of the equation into exponential form nor they could solve solving simple linear equations. One such response is given below:

$\log_3 729 = x$

$\log 729^3 = x$

$\log (9)^3 = x$

$3\log_{\cancel{3}} 9 = x$

$x = 9$ Ans.

Question 4

This question offered a choice between part a and b. Most candidates attempted part a.

Question 4a(i)

Better responses showed that the students substituted the given values of the variables into the algebraic expression and then simplified to get the correct answer. For example see the following response:

$= \frac{x^2y - 2z^3}{2x^2z}$

$= \frac{(-1)^2(1) - 2(2)^3}{2(-1)^2(2)}$

$= \frac{(1)(1) - 2(8)}{2(1)(2)}$

$= \frac{1 - 16}{4}$

$= \frac{-15}{4}$ Ans

Weaker responses indicated the candidates' inability in substituting the values of the given variables and the usage of arithmetical operations for the simplification of a rational expression. One such response is as follows:

$$\frac{(-1)^2(1)-2(2)^3}{2(-1)^2(2)}$$

$$\frac{+1(1)-2(8)}{2(1)-2} = \frac{1-16}{2-2} = \frac{-15}{1} = \boxed{-15}$$

Question 4a(ii)

Better responses were an exhibition of the candidates' application of the algebraic formula which led to easy simplification of the given expression. One of the responses is as follows:

$$(x^2-4)\times\frac{(x+2)}{(x-2)}$$

$$= (x)^2-(2)^2 \times \frac{(x+2)}{(x-2)}$$

$$= (x+2)(x-2)\times\frac{(x+2)}{(x-2)}$$

$$= (x+2)\times(x+2)$$

$$= (x+2)^2 \quad \underline{\text{answer}}$$

Weaker responses represented that some were not skilled at application of algebraic formulae and the simplification of algebraic expressions. One such response is given below:

$$(x^2-4)\times\frac{x+2}{x-2}$$

$$x^2-4\times x$$

$$= x^2-4 \quad \text{Ans}$$

Question 4b

Most of the candidates who opted for this question performed well.

Better responses informed that the candidates were very competent in finding the continued product by the application of the formula a^2-b^2 and taking the squares correctly. One of the better responses is shown below:

$$\left(\sqrt{a}+\frac{1}{\sqrt{b}}\right)\left(\sqrt{a}-\frac{1}{\sqrt{b}}\right)\left(a+\frac{1}{b}\right)\left(a^2+\frac{1}{b^2}\right)$$

$$= \left\{(\sqrt{a})^2-\left(\frac{1}{\sqrt{b}}\right)^2\right\}\left(a+\frac{1}{b}\right)\left(a^2+\frac{1}{b^2}\right)$$

$$= \left(a-\frac{1}{b}\right)\left(a+\frac{1}{b}\right)\left(a^2+\frac{1}{b^2}\right)$$

$$= \left\{(a)^2-\left(\frac{1}{b}\right)^2\right\}\left(a^2+\frac{1}{b^2}\right)$$

$$= \left(a^2-\frac{1}{b^2}\right)\left(a^2+\frac{1}{b^2}\right)$$

$$= (a^2)^2-\left(\frac{1}{b^2}\right)^2$$

$$= a^4-\frac{1}{b^4} \quad \text{(Answer)}$$

Weaker responses displayed that the candidates faltered in taking the squares after the application of the formula which led to inaccurate simplified form. Some candidates were altogether incapable of recognizing the situation where an algebraic expression was to be brought into use. One of the weaker responses is shown below:

sol $\left\{(\sqrt{a})^{2} - \frac{1}{(\sqrt{b})^{2}}\right\} \quad \therefore \left(\sqrt{a} + \frac{1}{\sqrt{b}}\right)\left(\sqrt{a} - \frac{1}{\sqrt{b}}\right) = \left((\sqrt{a})^2 - \frac{1}{(\sqrt{b})^2}\right)$

$= \left(a + \frac{1}{b}\right)\left(a + \frac{1}{b}\right)$

$= \left(a^2 + \frac{1}{b^2}\right)\left(a^2 + \frac{1}{b^2}\right)$

$= \left(a^4 + \frac{1}{b^4}\right)$ Ans

Question 5

This question offered a choice between part a and b. Most of the students attempted part a.

Question 5a(i)

Better responses displayed that the students identified that the given expression was the expanded form of $(a+9b)^2$. Some students used the method of 'breaking the middle-term' and arrived at the required result. One of the examples of such responses is as follows:

$a^2 + 81b^2 + 18ab$

$= (a)^2 + (9b)^2 + 2(a)(9b)$

$= (a + 9b)^2$

$= (a+9b)(a+9b)$

Weaker responses indicated that the candidates worked in a round-about fashion, needlessly adding and subtracting $18ab$. This later confused them and they deviated from the required factorized form. The candidates who tried to use 'breaking the middle-term' method chose the terms incorrectly and hence could not get the correct factorized forms. Others clearly did not realize that the given expression could be factorized as a whole-squared expression. One such response is given below:

$a^2 + 81b^2 + 18ab$

$= a^3 + 81b^3 + 18$

$= 99\ a^3 + b^3$

$\boxed{a^3 + b^3 = 99}$

Question 5a(ii)

Better responses displayed the candidates' competent use of 'breaking the middle-term' method to get the required factorized form. One such response is as follows:

Sol:- $c^2+17c+30$

$c^2+(15c+2c)+30$

$c^2+15c+2c+30$

$c(c+15)+2(c+15)$

$(c+15)\ (c+2)$ Ans...

Weaker responses showed that despite their familiarity with the method, the candidates made errors in taking the common factors which led to inaccurate results. Some of them did not *completely* factorize while others made a poor choice in breaking the middle term. A few of the candidates were clearly unable to employ the required method of factorization. See for example the following response:

middle trem bralung

$c^2+2c+15c+30$

$c(2+15+30)$

$c(2+45) = 47c\ \cancel{(2)^2+2(2)(30)+(30)^2}$

ans.

2	30
3	15
5	5
	1

$3 \times 5 = 15+2$

Question 5b

Better responses showed that the candidates were capable of applying the factor theorem to factorize a cubic polynomial and the concept of repeated factors. One such response is copied below:

$x-2=0$

$x=2$

$p(x)=x^3-3x-2$

$p(2)=(2)^3-3(2)-2$

$=8-6-2$

$=2-2$

$=0$ (It is a factor)

$$\begin{array}{r|l} & x^2+2x+1 \\ \hline x-2 & x^3-3x-2 \\ & \underline{\oplus x^3 \ominus 2x^2} \\ & 2x^2-3x \\ & \underline{\oplus 2x^2 \ominus 4x} \\ & x-2 \\ & \underline{\oplus x \ominus 2} \\ & 0\quad 0 \end{array}$$

$(x-2)(x^2+2x+1)$

$(x-2)\{x^2+1x+1x+1\}$

$(x-2)\{x(x+1)+1(x+1)\}$

$\boxed{(x-2)(x+1)\ (x+)}$ are the factors of $p(x)=x^3-3x-2$

Weaker responses demonstrated that the candidates did not possess the required knowledge of the factor theorem for the solution of the given problem. One such response is given below:

$p(x) = x^3 - 3x - 2$ $\qquad x - 2 = 0$

$p(x) = 2^3 - 3(2) - 2$ $\qquad x = 2$

$p(x) = 8 - 6 - 2$

$p(x) = 0$ $\qquad 1^{st}$ factor

$p(x) = x^3 - 3x - 2$ $\qquad x = 1$

$= (1)^3 - 3(1) - 2 \Rightarrow 1 - 3 - 2$

$p(x) = 0$ $\qquad 2^{nd}$ factor

$p(x) = x^3 - 3x - 2$

$p(x) = x^3 - 3x - 2$ $\qquad x = 2.$

$(2^3) - 3(2) - 2$

$= 8 - 6 - 2$

$p(x) = 0$ $\qquad 3^{rd}$ factor

Question 6

This question offered a choice between part a and b. Most of the candidates attempted part (a)

Question 6a

Better responses represented that the candidates had a clear concept of proportions and were skilled at dealing with the application of component property. They worked in steps to prove what was required for this question. For example see the following response:

$$\frac{a}{b} = \frac{c}{d}$$

$$\frac{5a}{4b} = \frac{5c}{4d}$$

$$\frac{5a + 4b}{4b} = \frac{5c + 4d}{4d}$$

$$\frac{5a + 4b}{b} = \frac{5c + 4d}{d}$$

$$\frac{5a + 4b}{b} = \frac{5c + 4d}{d}$$

Weaker responses could be divided into two sub-categories; one which informed that the candidates were familiar with the concept of proportions but unable to apply the component property to prove that the given ratios were equal. On the other hand, there were some responses of the candidates who failed to exhibit the understanding of proportions and the application of the properties related to proportions. One such response shown below:

$a : b = c : d$

$= \frac{a}{b} = \frac{c}{d}$ apply componendo theorm

$= \frac{a+b}{b} = \frac{c+d}{d}$ multiply 5 and 4 with a+b and c+d it give us

$= \frac{5a+4b}{b} = \frac{5c+4d}{d}$

Question 6b

Better responses indicated that the candidates were proficient at making use of K-method to prove conditional equalities involving proportions. One such example is given below:

let $\frac{a}{b} = \frac{c}{d} = k$

$\frac{a}{b} = k$ $\boxed{a = bk}$

$\frac{c}{d} = k$ $\boxed{c = dk}$

L.H.S	R.H.S
$\frac{3a+2c}{3b+2d}$	$\left(\frac{a^3}{b^3}\right)^{\frac{1}{3}}$
$= \frac{3(bk)+2(dk)}{(3b+2d)}$	$\left(\frac{b^3k^3}{b^3}\right)^{\frac{1}{3}}$
$= \frac{3bk+2dk}{3b+2d}$	$= \frac{b^{3\times\frac{1}{3}}k^{3\times\frac{1}{3}}}{b^{3\times\frac{1}{3}}}$
$= \frac{3bk+2dk}{3b+2d}$	$\frac{bk}{b}$
$= k\left(\frac{3b+2b}{3b+2d}\right)$	$= k\left(\frac{b}{b}\right)$
$= k$	$= k$

Hence $k = k$

Weaker responses indicated that the candidates were unaware of the application of the K-method. They used algebraic manipulations to prove that the R.H.S = L.H.S of the equation.

These candidates tried to equate $\frac{3a+2c}{3b+2d}$ to $\sqrt[3]{\frac{a^3}{b^3}}$ whereas the expressions on both sides of the equation were to be written in terms of K. In some cases, the candidates made use of the numerical values of K which later made it more complicated for them to prove what was asked. One such example is given below:

$$\frac{a}{b} = \frac{c}{d} \qquad \frac{3a+2c}{3b+2d} = \sqrt[3]{\frac{a^3}{b^3}}$$

$$\frac{3(bK)+2(dK)}{3b+2d} = \sqrt[3]{\frac{b^3K}{b^3}}$$

$$\frac{bK+dK}{b+d} = K^{\frac{1}{3}}$$

$$K^{\frac{1}{3}} \quad \text{Ans.}$$

Question 7

Better responses informed that the candidates calculated the determinant and the adjoint of the given matrix correctly and substitutedg these values in the formula and found the inverse of the given matrix. Consequently, they were able to verify that the multiplication of the given matrix by its inverse is the identity matrix. One such response is as follows:

the unit matrix.

$$A^{-1} = \text{Adj of } A / |A|$$

$$\Rightarrow |A| = \begin{vmatrix} -3 & 5 \\ -1 & 2 \end{vmatrix} = ad - bc = (-3)(2) - (-1)(5) = -6 + 5 = -1$$

$$\Rightarrow \text{Adj} = \begin{bmatrix} 2 & -5 \\ 1 & -3 \end{bmatrix}$$

$$\Rightarrow A^{-1} = \begin{bmatrix} 2 & -5 \\ 1 & -3 \end{bmatrix} \Big/ -1 = \begin{bmatrix} 2/-1 & -5/-1 \\ 1/-1 & -3/-1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} -2 & 5 \\ -1 & 3 \end{bmatrix}$$

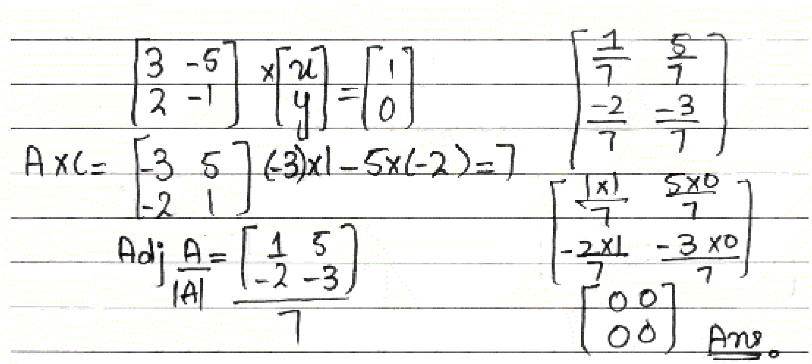
$$\Rightarrow \begin{bmatrix} -3 & 5 \\ -1 & 2 \end{bmatrix} \cdot \begin{bmatrix} -2 & 5 \\ -1 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} -3\times-2 + 5\times-1 & -1\times-2+2\times-1 \\ -3\times5 + 5\times3 & -1\times5+2\times3 \end{bmatrix}$$

$$= \begin{bmatrix} 6-5 & 2-2 \\ -15+15 & -5+6 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

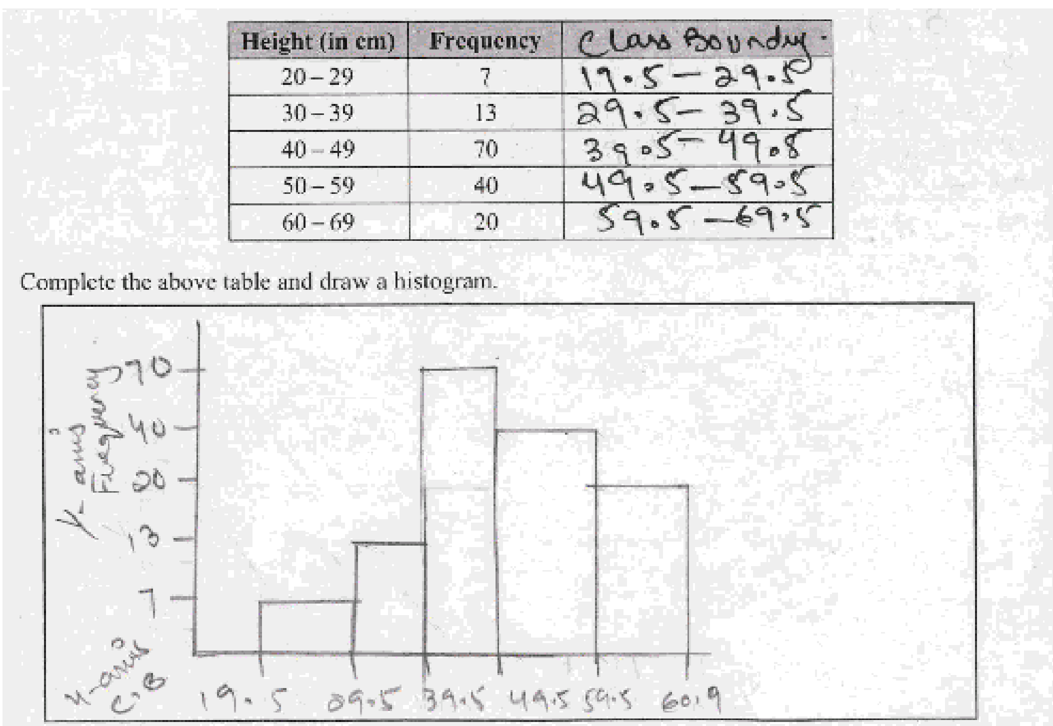
The product is equal to unit matrix

Weaker responses displayed that the candidates were able to find the inverse but they made mistakes in matrix multiplication due to which they were unable to verify the product of the matrix and its inverse is equal to the unit matrix. In some cases, responses showed that candidates had failed to find the inverse of the matrix correctly as a result they were unable to complete the required proof. This is shown in the response below:



Question 8

Better responses indicated that the candidates had filled out the table correctly by providing the class-boundaries for each class interval. Later, they constructed a histogram representing the given data. They chose a suitable scale and marked the values clearly, taking the class-boundaries and the frequencies along the *x-axis* and *y-axis* respectively. One of the examples of a better response is as follows:



Height (in cm)	Frequency	Class Boundary
20 – 29	7	19.5 – 29.5
30 – 39	13	29.5 – 39.5
40 – 49	70	39.5 – 49.8
50 – 59	40	49.5 – 59.5
60 – 69	20	59.5 – 69.5

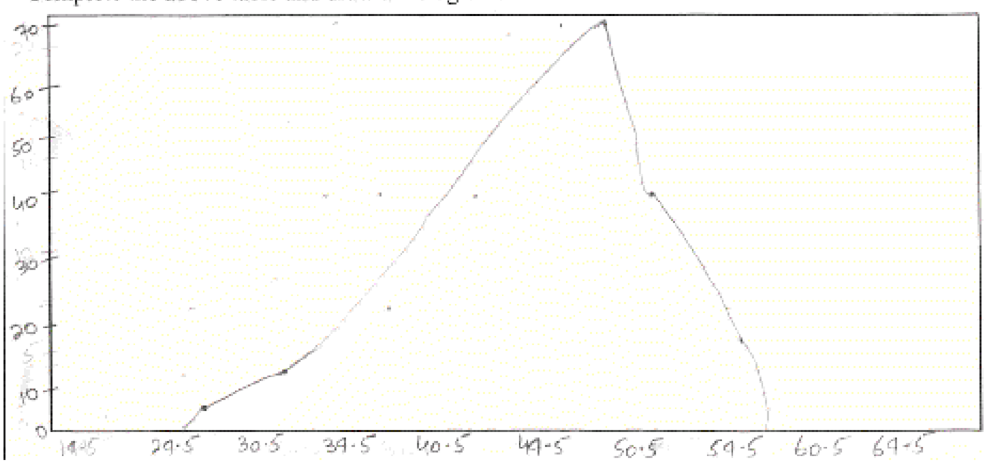
Complete the above table and draw a histogram.

Weaker responses displayed that the candidates were able to calculate the class-boundaries for each class interval but they were unable to draw the histogram appropriately. They carelessly selected the scales along *x*-axis. Therefore, the histogram had bars of unequal widths.

Some of the candidates drew the frequency polygon instead of histogram. One such response is shown below:

Height (in cm)	Frequency	Cumonunative frequency
20 – 29	7	19.5 – 24.5
30 – 39	13	24.5 – 34.5
40 – 49	70	~~40~~ 34.5 - 70.5
50 – 59	40	49.5 – 54.5
60 – 69	20	59.5 – 69.5

Complete the above table and draw a histogram.



Question 9

Question 9i

Better responses reflected that the candidates had a clear understanding of the congruence of triangles as well as the application skills required for the solution of this question. Using the theorem which states that the sum of all the angles of a triangle equals 180° , they calculated $m\angle D$ and also provided the required justification for their answer. One of the responses is shown below:

as △ ABC

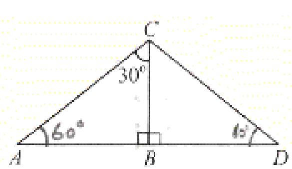
$\angle B = 90°, \angle C = 30°, \angle A = ?$ so

$\angle B + \angle C + \angle A = 180°$

$90° + 30° + \angle A = 180° \Rightarrow 120° + \angle A = 180°$

$\angle A = 180° - 120° = 60°$, as it is given that $\triangle ABC \cong \triangle DBC$

So $\angle A \cong \angle D = 60°$



Weaker responses showed that the students possessed the application skills to calculate $m\angle D$ but they lacked the ability to provide the reasoning for doing so. So, while their calculation showed they were aware of the properties of congruent triangles, they seemed to be unaware of the appropriate mathematical terminology to translate the result of their calculation into reasoning. For example, the candidates' work showed that $m\angle A = m\angle D = 60°$ but they failed to state that $\angle A$ and $\angle D$ are corresponding angles of congruent triangles. In some cases, it was evident that the candidates did not have a clear understanding of the congruence of triangles. However, they understood that the sum of all the angles of a triangle equals $180°$ and calculated incorrect values of $m\angle D$ but they did not provide a justification for their answer. For example see the following response:

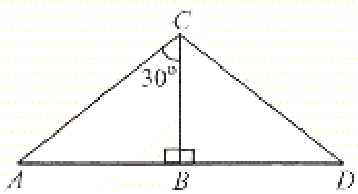
$\triangle ABC \cong \triangle DBC$

$\angle AC = \angle DC$

$\angle AC = 30°$

So $\angle DC = 30°$

$\angle AC \cong \angle DC$ beacause the corresponding sides of $\angle B$ are equal.



Question 9ii

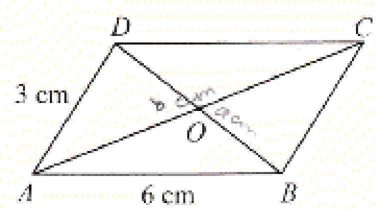
Better responses showed that the candidates calculated the values of $m\overline{BC}$ and $m\overline{OA}$, using the properties of a parallelogram, providing reasons as required. For example see the following response:

ii. In the given diagram if $ABCD$ is the parallelogram having $m\overline{AC} = b$ cm and $m\overline{BD} = a$ cm, then find $m\overline{BC}$ and $m\overline{OA}$. Also justify your answer. (2 Marks)

$m\overline{BC} = 3$ cm (opposite sides of $\parallel^m$ are congruent).

$m\overline{OA} = \frac{1}{2} \times b$ cm.

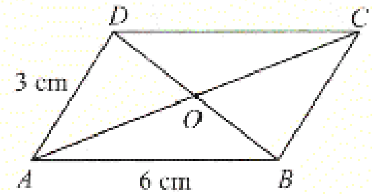
$m\overline{OA} = \frac{b}{2}$ cm (half of diagonal).



Weaker responses displayed that the candidates were only able to calculate $m\overline{BC}$ and provide the justification for their answer. One of the responses is as follows:

BC = 3

Because, if any correspon-ding triangle has opposite triangle so, They both have same measurements and angles



OA = 6 Because, it is opposite to the AB that's why both are equal

Question 10

This question offered a choice between part a and b. Most of the candidates attempted part b.

Question 10a

Better responses displayed that the candidates understood the question and studied the diagram carefully before they ventured to solve the problem. They used the properties of the internal bisector of an angle of a triangle to find $m\overline{DB}$ and $m\angle CAD$. The candidates identified the largest angle of the triangle ΔABC and gave the correct reason although it was not required. For example see the following response:

① $m\overline{CD} = m\overline{DB}$	③ $\angle C$ is the largest
$m\overline{CD} = 2cm$	angle of triangle
the $\boxed{m\overline{DB} = 2cm}$	ΔABC
② $m\angle CAD = m\angle DAB$	
$m\angle CAD = 29.4^{\circ}$	
then $\boxed{m\angle DAB = 29.4^{\circ}}$	

Weaker responses indicated that the candidates' comprehension of internal angle bisectors of a triangle was below par due to which they were unable to calculate $m\overline{DB}$. Most responses contained calculations which showed that $m\angle CAD = 58.8°$, indicating that the candidates had in fact calculated $m\angle CAB$ instead of $m\angle CAD$. However, they identified the largest angle of the triangle ΔABC correctly. One of the weaker responses is given below:

When a bisector is drawn at a Δ, it divides the Δ into two equal halves.

$\therefore$ $m\angle CAD = 29.4°$

$m\overline{DB} = 2cm$

largest angle at $\Delta ABC = m\angle ACB$ or $\angle C$.

This is because in a Δ with unequal lengths, the angle opposite to the largest side is also the largest.

Question 10b

Better responses revealed that the candidates were able find the value of a and write the ratio of $\overline{PT}$ to $\overline{TS}$ by applying their understanding of similar triangles. For example see the following response:

$\frac{PQ}{QR} = \frac{PT}{TS}$

$\frac{\cancel{8}^{2}}{\cancel{4}_{1}} = \frac{PT}{TS}$

$\frac{2}{1} = \frac{PT}{TS}$

$2:1 \therefore PT : TS$

$\frac{PQ}{TQ} = \frac{PQ+QR}{SR}$

$\frac{8}{3} = \frac{8+4}{a}$

$\frac{{}^{2}\cancel{8}}{3} = \frac{\cancel{12}^{3}}{a}$

$2a = 9$

$a = \frac{9}{2} = 4.5$

Weaker responses displayed that the candidates found the required ratio of $\overline{PT}$ to $\overline{TS}$ correctly. Interestingly, most candidates found the value of a to be 6 (which was the correct answer) but their calculation revealed that they had assumed $\overline{TQ} = 2\,\overline{SR}$ which was not given in the question. One of the weaker responses is given below:

In the parallel bisect line is half of triangle

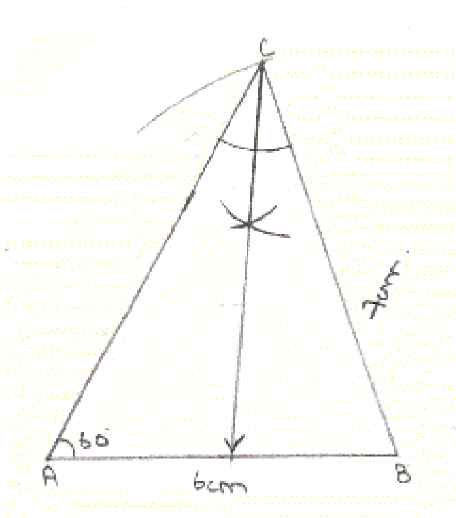
$a = 6cm$

$8:4$ $\quad \frac{\cancel{8}^{2}}{\cancel{4}_{1}}$

Ratio $= 2:1$

Question 11

Better responses informed that the candidates were very conscientious in constructing the required triangle. They worked with precision, labeled the vertices and wrote the measurements of the given sides and angle in their constructed diagram. They also followed the correct steps to draw the internal bisector of $\angle C$. One such response is given below:



Weaker responses made it evident that the candidates had not constructed the triangle as per the given measurements. In some cases, the candidates did not make use of geometrical instruments and presented free hand sketches. The angle bisector was also not constructed as shown in the following response: