EXAMINATIONS COUNCIL OF ESWATINI

Eswatini General Certificate of Secondary Education

Mathematics (6880)

Examination Report for 2024

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EGCSE MATHEMATICS

Paper 6880/01

Non-Calculator Structured Questions (Core and Extended)

General Comments

The overall performance for this paper was better than last year's performance. Although there were more candidates who got a zero mark this year, nine (9) candidates, and last year there were only six candidates who got a zero mark, the performance was better. No candidate got 60 marks this year, there were a few candidates who got single digit marks and a number of candidates got 50 and above.

Questions which proved to easier for the candidates were: **3, 7(b), 11(a), 14(a), 16(b), 17(b)** and **8(a)** and those questions which proved to be difficult to the candidates were: **2, 5, 8(b), 9, 10(b)' 11(b), 13, 14(b), 16(b), 18 and 19.**

Candidates had a misconception that the order of rotational symmetry was equal to the number of lines of symmetry. A lot of candidates failed to present their work, a wrong presentation in mathematics gives a totally wrong information which results to a loss of marks, for an example

$$\frac{5}{7}+\frac{2}{3}$$

$$\frac{5}{7}\times 3+\frac{2}{3}\times 7 \neq \frac{5\times 3}{7\times 3}+\frac{2\times 7}{3\times 7}$$

Some candidates used the concept of changing an inequality sign when dividing or multiplying by a negative number even with subtraction.

Comments on specific questions

Question 1

Candidates were expected to measure the acute angle first then subtract from 360^0 to get the reflex.

Correct answer: 316^0

- Some candidate had problems with scale reading,
- while others just gave the acute angle as an answer.

Some candidates knew they had to subtract the acute angle but they subtracted from 180^0 instead of 360^0.

Common wrong answers: 40.5^0, 44^0, 137^0

Question 2

(a) Candidates were expected to draw 6 lines of symmetry of which 3 lines through corners and 3 lines through midpoints.

Most candidates had the concept of lines of symmetry but they were betrayed by their moto-skills hence they could not draw accurately those lines passing through the midpoints.

(b) Candidates were asked to state the order of rotational symmetry.

Correct answer: 6

Candidates confused lines of symmetry to be the same as order of rotational symmetry, which is not true. This was observed from those candidates who drew 3 lines of symmetry and the order was the same as the number of lines of symmetry.

Common wrong answers: 3, 6 lines of symmetry

Question 3

Candidates were asked to find temperature at a given time. They were supposed to add the increase to the temperature at starting point (– 7 + 5)

Correct answer: – 2

This question was well done

Some candidates had problems with directed numbers, they would write – 7 + 5 = – 12. While others subtracted 5 from – 7.

Common wrong answer: – 12, +2

Question 4

Candidates were asked to add fractions. They were expected to change each fraction to equivalent fractions with common denominator, as shown below

$\frac{5}{7}+\frac{2}{3}$

$\frac{5(3)}{21}+\frac{2(7)}{21}=\frac{29}{21}=1\frac{8}{21}$

Correct answer: $1\frac{8}{21}$

This was fairly done

Candidates showed a lack of manipulation skills.

- Some candidates gave the $\frac{29}{27}$ as an answer, yet it was specified the answer must be given as a mixed number
- While others just gave added the numerators and denominators eg $\frac{5}{7}+\frac{2}{3}=\frac{7}{10}$
- And others just used calculators

Common wrong answer: $\frac{7}{10}$, $\frac{7}{21}$, $\frac{29}{21}$, 1.38

Question 5

Candidates were asked to find the number of books not issued given the percentage of books given to form 1 and a fraction of books given to form 4.

They were expected to find the books issued in form 1 and in form 4, then subtract from 700, as illustrated below

$\frac{18}{100} \times 700 + \frac{2}{7} \times 700 = 326$ books issued

Books not issued $700 - 326 = 374$

Correct answer: 374

This question was not well done.

- Instead candidates were able to find 126 books which are the books issued to form 1. Then they subtracted to get 574 and use the n find $\frac{2}{7}$ of 574 which was wrong .
- While others changed $\frac{2}{7}$ to percentage which led to premature rounding giving an inaccurate answer.

Common wrong answer: 126, 326, 371, 699.2, 410

Question 6

Candidates were asked to calculate angles using angle properties on cutting lines. Properties to be used were alternate angles, interior angles, straight angles and complimentary angles.

Correct answer: $a = 65°$, $b = 115°$, $c = 25°$

This question was fairly done.

Some candidate used protector and measured the angles

Common wrong answers : $a = 61°, 115°$, $b = 118°, 65°$, $c = 30°, 28°$

Question 7

(a) Candidates were given a data and asked to calculate the mean for the distribution. Candidates were supposed to add all the numbers and divide the sum by 10.

Correct answer: 5.4

Fairly done

- Some candidate failed to show all the steps, they came up with a wrong sum divided by 10, which was awarded M0.
- While others found the median of the distribution

Common wrong answer: 5, 3.5, 7, 54, 4.9, 27.5

(b) Candidates were asked to find the range for the distribution. They were expected to subtract the smallest number from the biggest number.

Correct answer: 7

It was well done

There were those candidates who gave the mean as a range.

Common wrong answer: 5.4, 3

Question 8

Candidates were given the word ESWATINI and asked to find the probability of:

(a) Not I.

Candidates were expected to find the possible outcomes out of the total possible outcomes.

Correct answer : $\frac{6}{8}$

This part of the question was well done

Some candidates failed to get the answer because they did not read the question, they calculated the probability of I.

Common wrong answer: $\frac{1}{4}$, 6

(b) candidates were expected to apply the concept of an event not occurring, and its probability to be 0.

Correct answer: 0, zero

This part of the question was poorly done

Candidates failed to apply the basic principle of probability for an event not happing.

Common wrong answers : $\frac{0}{8}$, none, p(0)

Question 9

(a) Candidates were asked to round off 273 to the nearest 50. They were expected to apply the fact that the counting is in fifties, and half of 50 is 25 and hence 250 + 25 = 275, so 273 lies below 275 hence answer is 250.

Correct answer: 250

This part of the question was poorly done

Candidates just rounded off to the nearest 10, while others rounded off to the nearest 100.

Common wrong answers: 260, 270, 200, 300

(b) Candidates were given $\sqrt[3]{(-6)^2 \times 3.5}$ and they were asked to evaluate.

They were expected to work out $(-6)^2 \times 3.5 = 126$ first, then find the cube-root of 126.

Correct answer: 5.01(3297935).

This was also poorly done

- Some candidates evaluated $(-6)^2 \times 3.5$ to be – 126.
- others who were able to work out 126, instead of finding cube-root they divided 126 by 3.
- Other candidates worked out square-root of 126.

Common wrong answers : $\sqrt{126}$, 126, 0, 63, –126

Question 10

(a) Candidates were asked to state the number of terms in an expression. They were expected to apply the concept that terms are separated by a plus or a minus sign.

Correct answer: 4

It was fairly done

- Some candidates confused the number of terms with terms containing variables, hence they did not count the term 5 since it had no variable.
- Some candidates counter the number of variable.

Common wrong answers: 3; *x, y, z;*

(b) (i) Candidates were asked to factorise $2xy - 4x^2$. They were expected to find the highest common factor for the two terms and use brackets.

Correct answer: $2x(y - 2x)$

It was poorly done

Some candidates partially factorised the expression, while others discarded the $2x$ and gave the $(y - 2x)$.

Common wrong answers: $x(y - 2x)$, $2(yx - 2x^2)$, $y - 2x$

(ii) Candidates were asked to factorise $x^2 - 2x - 15$. They were expected to use the theorem on factorising a quadratic equation with *a* = 1, *ac* = -15 and *a*+*c* = -2.

Correct answer: $(x - 5)(x + 3)$

This was also poorly done.

- Some candidates were solving for the values of x ,
- others were able to find factors of – 15 but these factors did no add to – 2

Common wrong answers; $x = 3$, $x = -5$; $(x + 5)(x - 3)$; $(x - 5)(x - 3)$; $x(x - 5)(x + 3)$

Question 11

Candidates were given a function $f(x) = 2x - 1$

(a) they were asked to evaluate $f(2)$, they were expected to substitute for 2 in the function.

Correct answer: 3

Question was well done

- Some candidates did not evaluate, but only substituted for 2,
- while others used wrong notation.

Common wrong answers: 4 – 1; 2(2) – 1; *f*(3), *f* = 3

(b) Candidates were asked to solve for x using the same function.

They were expected to substitute for $f(x)$ and solve the function as shown, (understand that they were finding input given output)

$f(x) = -10$

$2x - 1 = -10$

Correct answer: – 4.5 , $-\frac{9}{2}$

This was poorly done

Most candidates were evaluating $f(-10)$, while others failed to form an equation.

Common wrong answers: – 21, 5.5, 4.5

Question 12

(a) Candidates were given an equation to solve $\frac{x+7}{3} = 5$. They were expected to remove fraction by multiplying by 3 both sides of the equation then subtract a 7.

Correct answer; $x = 8$

This part was fairly done.

- Some candidates failed to remove fraction, eg, $3x + 7 = 15$, $7x = 15$, $3x + 21 = 15$,
- while others solved by inspection which resulted to M0.

Common wrong answers: – 2, 2.14,

(b) Candidates were given an inequality to solve $2a + 8 \geq 0$. They were expected to keep the inequality sign and solve for *a, a*pplying rules for solving inequalities.

Correct answer: $a \geq -4$

This part of the question was poorly done.

- Some candidates changed the inequality sign to an equal sign, resulting to M0.
- While other candidates changed the sign $\geq$ to be $\leq$ after subtracting 8, which was a wrong step.

Common wrong answers; $a \leq -4$, $a = -4$, -4

Question 13

Candidates were asked to calculate the amount of money in an account after 7 years at 4.2% compounded. They were expected to use the formula $p(1 + \frac{r}{100})^n$.

Correct answer: 1600.50

This question was poorly done.

- Most candidates did not use the formula, they used the long method which resulted to loss of marks due to pre-rounding off
- Some candidates calculated simple interest and multiplied it by 7, ($50.4 \times 7 = 352.80$)
- Those candidates who used the formula failed to use the calculator.
  Common wrong answers: 2850, 1552.8, 8752, 50.4, 353.5

Question 14

(a) Candidates were asked to solve for x in indices, they were expected to apply the law of indices with same base under multiplication (add the powers).

Correct answer : $x = 5$

This section was well done.

Some candidates gave the answer as an index.

Common wrong answer: 9^5

(b) Candidates were asked to solve for x in indices, they were expected to apply the law of indices with same base under division (subtract the powers).

Correct answer: -3

This section was poorly done.

- Candidates were adding the power yet it was division.
- Other candidates had difficulties with directed numbers.

Common wrong answers ; $x = 11$, $x = 3$

Question 15

Candidates were amount of money share amongst three friends in a given ratio 8 : 3 : 2.

They were asked to calculate the amount Zodwa received.

They were expected to divide the money into 13 equal parts and hence find zodwa's share

$$\frac{650}{13} \times 3 \equiv \frac{3}{13} \times 650$$

Correct answer: 150

This question was poorly done.

- Candidates divided 650 by 3,
- while others used 3% of 650
- And they were those who calculated for all three and pick the wrong one as an answer.
  Common wrong answers: 216, 50, 400

Question 16

Candidates were given dimensions for a cuboid 13 *m* by 16 *m* by 22 *m*.

(a) Candidates were asked to find the volume of the cuboid. They were expected to use the formula $vol = lbh$

Correct answer: 4576

This part was well done.

Some candidates added the dimensions.

Common wrong answer: 51,

(b) Candidates were asked to find the total surface area of the cuboid. They were expected to sketch the net of the cuboid and calculate the area of each face, then add all the areas.

Correct answer: 1692

This part was poorly done.

- Some candidates squared the lengths ie. $13^2 + 16^2 + 22^2$,
- Others use π in their calculations
- Some candidates calculated the volume.

Common wrong answers: 909, 4576, 208.

Question 17

(a) Candidates were to write 398 000 000 in standard form. They were expected to recal the format for a number in standard form which is $a \times 10^b$.

Correct answer : 3.98×10^8

This part was fairly done.

Some candidates just removed the zeros, while others raised to power – 8 .

Common wrong answers: 398×10^{6}, 3.98×10^{-8}, 3.9×10^{8}, 398

(b) Candidates were asked to write 7.12×10^{-4} as an ordinary number. Candidates were expected to recall how to write an ordinary from standard form.

Correct answer: 0.000712

This part was well done.

Some candidate omitted the decimal point.

Common wrong answer; 0000712, 0.00712, 71200

Question 18

Candidates were given an interior angle of a regular polygon, 150^0 and they were asked to find the number of sides of this polygon.

Candidates were expected find the size of the exterior angle and use the concept of the sum of exterior angle adding to 360^0.

Correct answer: 12 sides

This question was poorly done.

- Some candidates were able to find the size of the exterior angle, 30^0, but they divided 150^0 by 30^0 and others divided 180^0 by 30^0.
- Some candidates had no clue of the concept of interior angles.
- Some used trial and error methods hence the loss of marks.
- A few candidates used the formula for number of sides and did not divide by n ($\frac{(n-2)180}{n} = 150$) hence M0 .

Question 19

(a) Candidates were asked to draw an image of triangle A after an enlargement about the origin with scale factor 2. They were expected to recall that image, centre and object lies on the same straight line and the scale factor is measured from the point (0, 0).

Correct answer: (2,2), (4,6) and (4, 3)

This section was poorly done.

- Some candidates failed to locate the origin, they used their own center.
- While others used a different scale factor.
  Common wrong answers: different positions of triangle D.

(b) (i) Candidates were given an object and its image, they were asked to describe the single transformation that. Candidates were expected to identify the transformation and describe it fully.

Correct answer: reflection about x-axis or $y = 0$

This part was also poorly done.

Some candidates were able to identify the transformation but failed to describe it correctly, hence a loss of marks.

Others wrote a wrong spelling.

Common wrong answers: $x = 0$, *x*-line, the origin line

(ii) Candidates were expected identify the transformation and describe it correctly.

Correct answer: rotation about (0,0), $+90^0$.

This was also poorly done.

- Some candidates wrote rotational instead of rotation.
- Others had difficulty with the angle, they measure the angle, others used any angle they could think of.
- A few described a combined transformations.
- While others wrote more than one transformation.

Common wrong answers: sliding, translocation, $\frac{1}{4}$ rotation.

Question 20

Candidates were given the equation $v = 2c + 3$

(a) They were asked to rearrange the formula to make *c* the subject. They were expected to identify the order of operation, showing all the steps.

Correct answer: $c = \frac{v-3}{2}$

This part was fairly done.

- Some candidates show the correct steps but the outcome came out wrong eg

  $v = 2c + 3$

  –3 –3

  $3v = 2c$ which is wrong

- Other candidates used their own variables such as x and y.
- Others just interchanged the letters eg $c = 2v + 3$

  Common wrong answers: $c = 2v + 3$, $c = \frac{3-v}{2}$, $c = \frac{3v}{2}$

(b) Candidates were asked to calculate the value of c when $v = 3$. They were expected to substitute to their answer in (a).

Correct answer: 0

This part was well done.

Some candidates were substituted from the original equation, making it long but they were able to get the correct answer.

Common wrong answer: $\frac{0}{2}$,

EGCSE MATHEMATICS

Paper 6880/02

Calculator Structured Questions (Core and Extended)

Key Message

Candidates must show workings for all answers, especially answers that are worth more than one mark. They must also give their answers to the required level of accuracy.

General Comments

This paper was tailored for core candidates only. A very few candidates scored above 60 marks, however, there were two candidates that scored 82 and 86 marks respectively. There were several average candidates that scored above 40 marks. A reasonable number of candidates scored marks in the thirties. There were also a few candidates scoring zeros after attempting most of the questions.

Generally, all questions were attempted by candidates and were accessible to all since there were no questions that were left unattended by candidates. Time allocated for this component proved to be enough since most candidates were able to finish.

This paper provided a wide range of syllabus objectives. These objectives allowed candidates to prove how well they understood some of the concepts. There were a few 'recall' questions, most questions required the candidates to apply the concepts in real life situations. Candidates were expected to 'show', 'prove', 'interpret', and 'explain'. These types of questions proved to be a challenge since most candidates could not express themselves clearly.

The presentation of solutions showed a decline yet again in this cohort. There was an increase in the number of candidates that gave correct answers without showing any working, and this led to the candidates losing both the method marks and the accuracy marks. There were also several candidates that showed premature approximations, which led to inaccurate answers, causing the candidates to lose the accuracy marks. Candidates were also not using their calculators fully, yet this was a calculator based component, for example, there was a question that required candidates to use $\sqrt{28}$ and candidates decided to use 5.29 or 5.3, and even worse, 5. This led to them losing the accuracy marks, which could have been avoided since they were using a calculator.

There was also a new problem that was noted on the use of the calculator. Some candidates were failing to interpret what they see in the calculator screen. For example, in simplifying fractions, candidates would write 3 r 7 instead of $\frac{3}{7}$. There was an answer from the calculator that read 400 r 2619, they wrote it as $400\frac{26}{19}$. In trigonometry, instead of writing $\tan^{-1}\left(\frac{2}{3}\right)$, they wrote 2ndF tan $\frac{2}{3}$. There was quite a number of these expressions from the calculator screen that they failed to either interpret or use.

Candidates should be encouraged to show all necessary workings clearly, as well as use a suitable level of accuracy. They should also encourage them to use their calculators fully during this paper, with proper interpretations.

Questions that were easily accessible to most candidates were **Question 3(b)(ii)**, **Question 4(a)(b)(d)**, **Question 6(a)**, **Question 7(a)(ii)**, **Question 9(a)(b)(ii)**, and **Question 11(a)(i)(iii)**. Questions that proved to be the most challenging to candidates were **Question 2(a)**, **Question 5(a)**, **Question 6(c)(d)**, **Question 8(a)(ii)**, **Question 7(b)**, **Question 9(b)(i)(ii)**, **Question 10 (a)(b)(i)(ii)(c)(i)(ii)(iii)**, **Question 11(b)**, **Question 12(b)**, and **Question 13(b)**.

Comments on Specific Questions

Question 1

(a) $\sqrt{2}$ *, 3, π, 8, 9, 18, 27, 36, 37*

From the list of numbers, write down

(i) *all the prime numbers*

This part of the question was not well done. Candidates were listing the odd numbers. The few candidates that had an idea what a prime number was, included 27 as a prime number.
Common wrong answers: 3, 27, 37

Expected response: 3, 37

(ii) *all the irrational numbers*

This part was also poorly done. The prime numbers were commonly listed. Some candidates decided to write the π as 3.142, making it rational, hence lost the mark. Some decided to write the square root sign only, instead of $\sqrt{2}$.
Common wrong answers: $\sqrt{\ }$, 3.142, 3, 37

Expected response: $\sqrt{2}$, π

(iii) *all the cube numbers*

Candidates were listing square numbers or multiples of 3.

Common wrong Answers: 3, 9, 18, 27, 36 or 3, 9, 36

Expected response: 8, 27

(b) *Arrange the following in order of size, starting with the* ***smallest****.*

$\frac{3}{7}$ *42%* *0.426* $\sqrt{0.18}$ $\frac{5}{12}$

This part was fairly done by most candidates, listing the above numbers correctly, according to size. Some candidates had a difficulty in comparing when using the decimals because they were writing their decimal to 2 decimal places, or truncating them at the second decimal place, hence some decimals were the same. e.g $\frac{3}{7} = 0.42$, $\sqrt{0.18} = 0.42$, 42% = 0.42. Candidates were supposed to write the longer version of the decimals, so they can compare by place value. Other candidates tried to write every number as a percentage, leaving some percentages to be fractional and some as

decimals, then failing to compare. e.g $\frac{3}{7} = 42\frac{6}{7}$%' 0.426 = 42.6%. Candidates were supposed to write decimal percentages for all the numbers, to make it easy to compare by place values. A few candidates wrote the decimals in the answer space instead of the given numbers, hence losing the accuracy mark, even if listed in the correct order.

Expected response: $\frac{5}{12}$, 42%, $\sqrt{0.18}$, 0.426, $\frac{3}{7}$

Question 2 *Given that E = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15},*

A = {1, 2, 4, 7, 9, 10, 13, 15} and B = {Triangular numbers},

(a) *List all the elements of B.*

This question was poorly answered by most candidates. They showed lack of knowledge on triangular numbers. Most of them listed multiples of 3, including 1in their sets. Other candidates were listing elements of the compliment of set A. Others were listing odd numbers or even numbers. The few candidates that listed the triangular numbers, left out 1. They had the correct triangular diagram for the triangular numbers.

Common wrong answers: {1,3,6,9,12,15}, {3,5,6,8,11,12,14}

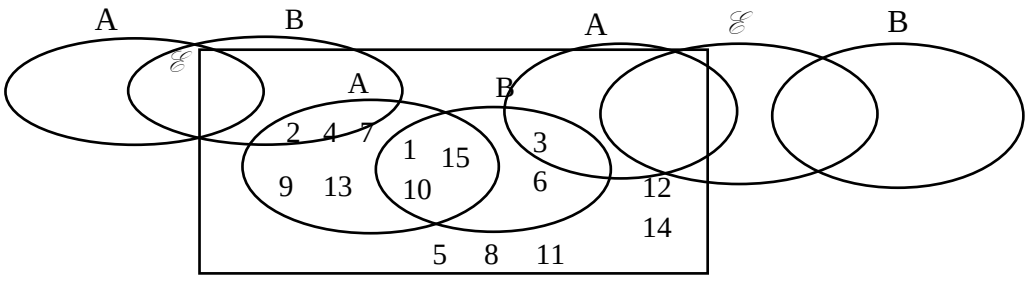
Expected response: {1,3,6,10,15}

(b) *Draw a Venn diagram to represent the information.*

This part was fairly done, using their own version of set B.

Common wrong answers included repetition of elements that are in the intersection. Some excluded the universal set, and some even drew the universal set as a set, making it difficult to fill up their Venn diagram.

Expected response:



(c) *Find* $n(A \cap B')$.

This part of the question was poorly answered. Most candidates ignored the symbol that wants the number of elements, they instead listed the elements in the set. Some candidates listed the elements in the set $A \cap B$. Some listed the elements in $(A \cap B)'$.

There were no common errors since that had varying elements in set B.

Expected response: 5

Question 3 *The monthly income of a man is E15714 before tax is deducted. He pays E2750 in income tax.*

(a) *Calculate the percentage tax rate.*

This part of the question was fairly well answered.
The most common wrong working was reciprocating the fraction. Some were subtracting the tax from the income then using that value as the denominator. A few candidates with correct workings wrote their answers to 2 significant figures instead of 3, losing the accuracy mark i.e they wrote 18 instead of 17.5.

Common wrong workings: $\frac{15714}{2750}\times 100 = 57.2$, $\frac{2750}{12964}\times 100 = 21.2$, $\frac{12964}{15714}\times 100$

Expected response: $\frac{2750}{15714}\times 100 = 17.5$

(b) *He then spends E2400 on groceries, E1600 on transport and E2000 on leisure. He saves the remainder.*

(i) *Express the amount he spends on groceries as a fraction of his monthly income. Give your answer in its simplest form.*

Most candidates did well in this question, though a few of them failed to simplify.

Some candidates tried to simplify using a calculator, but failed to interpret the value on the calculator, which was 400 r 26 19, they ended up writing their answer as $400\frac{26}{19}$ instead of $\frac{400}{2619}$. Some candidates reciprocated the fraction. Some used the amount that excluded the tax as their denominator.

Common wrong answers: $400\frac{26}{19}$, $\frac{15714}{2400}$, $\frac{2400}{12964}$

Expected response: $\frac{400}{2619}$

(ii) *Calculate the amount he saves.*

This part was well done by most candidates. The most common error was omitting the tax when subtraction the amount used. Some candidates subtracted the tax twice. Some calculated the tax using the percentage they found in (a) above, then subtracted that one, leading to a wrong answer.

Common wrong answers: E9714, E4214

Expected correct answer: E6964

Question 4 *A total of 40 students attended an Agricultural lesson. Each student was asked the number of fruit trees planted in the yard at their home. The results of the responses are shown below.*

3 4 5 4 7 7 3 2 2 6 2 2 3 7 4 3 4 2 2 3

1 7 4 4 2 4 2 3 2 5 2 2 2 4 2 6 4 4 1 3

(a) *Complete the frequency table.*

This part was well done by most candidates, even though the column for tally marks was not there. The most common error was counting the 3s, the 5s and the 7s where they got 9, 1 and 3 respectively.

Expected response:

Number of trees	Number of students
1	2
2	13
3	7
4	10
5	2
6	2
7	4

(b) *State the modal number of trees.*

This part was generally well answered. The most common error was giving the highest frequency instead of giving the variable with the highest frequency.

Common wrong answer: 13

Expected response: 2

(c)(i) *Find the range.*

This was generally well answered. The most common error was finding the difference between the highest and the lowest frequency instead of the difference between the highest and the lowest variable.

Common wrong answer: 13 – 2 = 11

Expected response: 7 – 1 = 6

(ii) *Find the median number of trees.*

This was not well done. Most candidates were arranging the variable 1,2,3,4,5,6,7, then gave 4 as the median. Others were adding 1+2+3+4+5+6+7=28, then use it to find the median position, then gave 2 as the median. Other candidates found the correct median position but then gave it as the median. Others arranged the variables correctly, and identified the median to be between 3 and 3, but the use of

a calculator was a challenge, it gave the answer as 4.5 i.e $\frac{3+3}{2}=4.5$, they did not put brackets around the numerator, which led to $3+\frac{3}{2}=4.5$

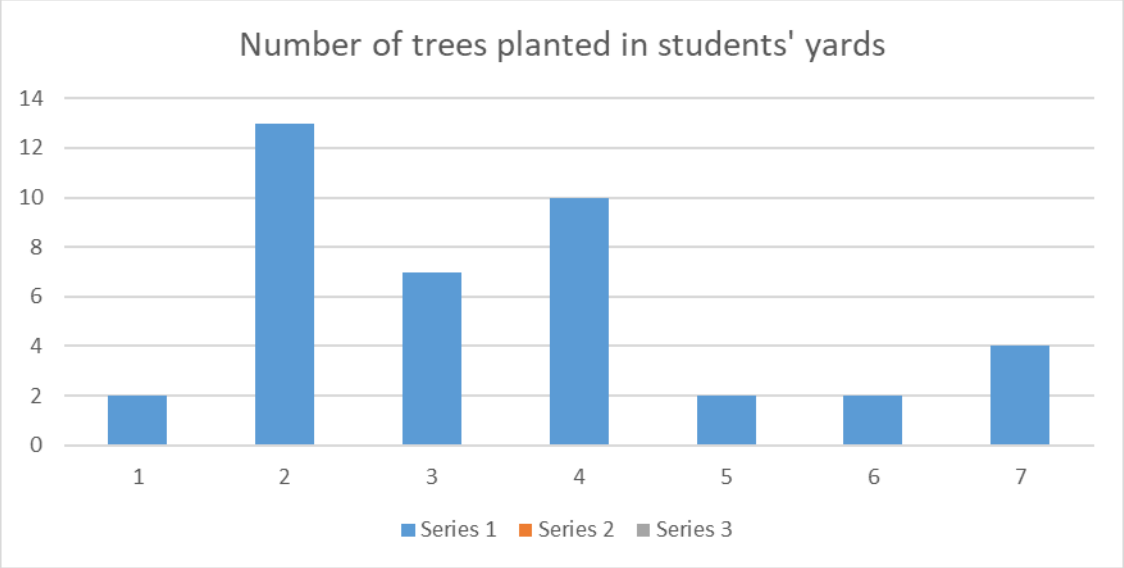
Common wrong answers: 4, 2, 20.5, 4.5

Expected response: Position: $\frac{40+1}{2}=20.5$, Median = 3

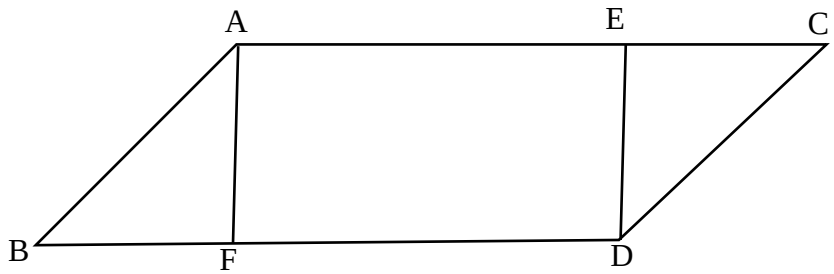
(d) *Complete the bar chart to show the number of trees planted in the students' yard.*

This part of the question was well done by most candidates. They were able to draw the correct bars with the correct heights and widths, even with their wrong frequencies. A few candidates had the correct heights but wrong widths, and they lost the marks.

Expected response:



Question 5 *ABDC is a parallelogram. BAF and CDE are right angled triangles. BF = 3 cm and DE = 6 cm.*



(a) *Complete the sentence: Triangle CDE is ……..to triangle BAF*

This part of the question was poorly done. Candidates could not come up with the correct mathematical term to use. Candidates were giving varying responses. The few that had an idea could not give the correct spelling.

Common wrong answers: similar, equal, same, equivalent

Expected response: congruent

(b) *Calculate the area of triangle CDE.*

The question was fairly answered. Some candidates could not relate the length of CE to the length of BF which is 3cm, hence they could not find the base of triangle CDE. Other candidates were using the wrong formula of Area = base × height, instead of Area = $\frac{1}{2}\times base\times height$.

Common wrong answer: 3 × 6 = 18, $\frac{1}{2}\times 6=3$, $\frac{1}{2}\times 6\times 6=18$

Expected response: $\frac{1}{2}\times 3\times 6=9$

(c) *Calculate angle ECD.*

This question was poorly done. Most candidates had an idea that trigonometry was to be used but had a challenge on how to apply it. They had a challenge in choosing the correct ratio, some were using the sine ratio and some the cosine ratio. The few that used the correct tangent ratio had a challenge, writing it wrongly as $\tan x=\frac{adj}{opp}$ even though they had the TOA. Those that had the correct fraction of $\tan x=\frac{opp}{adj}$ had a challenge with the use of the calculator. A few had their calculators in the gradient mode.

Common wrong answers: $\tan^{-1}\left(\frac{1}{2}\right)$ = 26.56°, $\tan^{-1}\left(\frac{6}{3}\right)=\frac{\tan^{-1}6}{3}$ = 26.8°, $\tan 90=\frac{6}{3}$,

$$\frac{1}{2}(180-90)=45°$$

Expected response: $\tan^{-1}\left(\frac{6}{3}\right)=63.4°$

Question 6 *The table shows the times Thembani Transport, travelling from Lomahasha to Manzini.*

	Lomahasha		*Simunye*		*Manzini*	
Thembani Transport	*Arrive*	*Depart*	*Arrive*	*Depart*	*Arrive*	*Depart*
		0600hrs	*0625hrs*	*0630hrs*	*0730hrs*	

(a) *State the arrival time of Thembani Transport in Simunye.*

Generally, well done by most candidates.

Common wrong answers: 0625 min, 6:25, 0630hrs

Expected response: 0625hrs

(b) *Find the time taken by Thembani Transport to travel from Lomahasha to Manzini.*

This part was generally well answered by most candidates. They were able to subtract the departure time from the arrival time. The challenge to some candidates was to present the answer correctly.

Common wrong answers: 1 hr 25 min, 1:30 hrs, 01:30 min, 1:30, 13:30

Expected response: 1 hour 30 min

(c) *If the average speed of Thembani Transport from Lomahasha to Manzini is 60km/h, show that the distance between Lomahasha and Manzini is 90 km.*

This part was poorly done by most candidates. They could not answer a 'show' question since they were using the 90km to prove that the time taken is 1.5 hrs. Some were interpreting the speed to 1 hr = 60 km, hence 30min = 30 km, therefore 60km + 30km = 90km.

Expected response: 60 km/h × 1.5 hrs = 90 km.

(d) *On the return journey, the bus departed from Manzini at 1355hrs. The average speed for the return journey was 75 km/h. Find the time Thembani Transport arrived in Lomahasha.*

This part proved to be a challenge to most candidates, it was poorly done. The challenge was finding the time taken to travel from Manzini to Lomahasha. Some were able to find the time taken to be 1.2 hrs, which to them translated to 1hr 20 min, 1hr 15min to others.

Common wrong answers: 1806h, 1607h, 1515h, 1510h

Expected response: 1507h

Question 7 *The salary of a car salesman is made up of a fixed amount and a commission. The commission is proportional to the number of cars he sells in a month. The following is part of a graph that shows the salary the salesman can earn in a month.*

(a) *Use the graph to find*

(i) *the fixed amount of his salary per month.*

This part was fairly well answered by most candidates. A few candidates had a challenge of interpreting the graph, and the meaning of fixed amount.

Common wrong answers: E9000, E1000

Expected response: E4000

(ii) *the salary earned when 4 cars are sold.*

This part was accessible to most candidates. It was well answered. Candidates were able to read the value against 4 cars.

Common wrong answer: E4000

Expected response: E6000

(iii) *the gradient of the straight line.*

The correct gradient was rarely found here. Most candidates were using the wrong formula for the gradient, $m = \frac{x_1 - x_2}{y_1 - y_2}$ instead of $m = \frac{y_1 - y_2}{x_1 - x_2}$. Most candidates also read the coordinates wrongly e.g they read (2,5000) as (2,5). Some were not even reading that are on the line.

Common wrong answers: $\frac{1}{2}, \frac{1}{500}$, 1000

Expected response: 500

(b) *State the information given by the gradient of the line.*

Candidates could not interpret the gradient of the line. Most candidates were describing the graph, not the gradient. They were describing a coordinate, which represented the salary, than the gradient which only represented the commission.

Expected response: commission per car.

(c) *Find the salary earned if 24 cars are sold in a month.*

This part was poorly done. Candidates could not find the equation of the line, then use it to find the salary for the 24 cars. The few candidates that got the correct answer tried to find a sequence from the graph, then used it until they got to 24 cars.

Common wrong answers:E12000. E96000, E21600, E24000

Expected response: Salary = 500 × number of cars + E4000 = E16000

Question 8 **(a)** *Solve*

(i) $7 - x = 2(x - 1)$

This part was fairly done. Some candidates could not open the brackets correctly. Some were not able to collect like terms correctly.

Common wrong workings: * 7 – x = 2(x – 1) → 6x = 2x – 1

$$*7 - x = 2(x - 1) \rightarrow 7 - x = 2x - 1 \rightarrow 8 = 3x \rightarrow x = 2\frac{2}{3}$$

Expected response: 7 – x = 2(x – 1) → 7 – x = 2x – 2 → 9 = 3x → x = 3

(ii) $x^2 = 13x - 42$

Candidates were expected to write the equation in the form of $ax^2 + bx + c = 0$, factorise, then solve by equating each term to zero. Most candidates did not write the equation in the above form, instead, they found factors of 42, then wrote double brackets by trial, and used those to solve. Other candidates tried to use the quadratic formula which yielded wrong results since their constants were not correct. This question was generally poorly answered.

Common wrong workings: $*(x - 6)(x + 7) \rightarrow x = 6, x = -7$

$$*(x + 6)(x - 7) \rightarrow x = -6, x = 7$$

$$*(x + 6)(x + 7) \rightarrow x = -6, x = -7$$

Expected response: $x^2 - 13x + 42 = 0 \rightarrow (x - 6)(x - 7) \rightarrow x = 6, x = 7$

(b) *Factorise* $2pxy - 8x$

This part of the question was generally well answered. Candidates were able to factorise fully. A few candidates factorised partially, losing part of the marks. A few divided the expression by the common factor, hence left with only one factor, and lost all the marks.

Common wrong answers: $2(pxy - 4x)$, $x(2py - 8)$, $py - 4$

Expected response: $2x(py - 4)$

Question 9 *Lomasontfo and Xolile were each given E5 as pocket money. Both of them bought muffins, apples and sweets. Each muffin costs E1.50, each apple costs 80c and each sweet costs 20c. This information can be represented in matrix form as shown.*

$$\begin{pmatrix}1.50 & 0.8 & 0.2\end{pmatrix}$$

(a) *State the order of the matrix above.*

This part of the question was well answered by most candidates.

Common wrong answers: 3 by 1, (1,3), 1 row 3 columns, row matrix

Expected response: 1 by 3

(b) *Lomasontfo bought 2 muffins, 1 apple and 1 sweet. Xolile bought 1 muffin, 2 apples and 2 sweets. This information can be represented in matrix form as shown.*

$$\begin{pmatrix}2 & 1\\ 1 & 2\\ 1 & 2\end{pmatrix}$$

(i) *Work out* $\begin{pmatrix}1.50 & 0.8 & 0.2\end{pmatrix}\begin{pmatrix}2 & 1\\ 1 & 2\\ 1 & 2\end{pmatrix}$

This part was not well done. Candidates were able to multiply, but could not write products in the correct position in the resultant matrix, resulting in wrong order of final matrix.

Common wrong workings: $*\begin{pmatrix}1.5\times2+0.8\times1+0.2\times1\\ 1.5\times1+0.8\times2+0.2\times2\end{pmatrix}=\begin{pmatrix}4\\ 3.5\end{pmatrix}$

$$*\begin{pmatrix}1.5\times2+0.8\times1+0.2\times1\\ 1.5\times1+0.8\times2+0.2\times2\end{pmatrix}=(4+3.5)=(7.5)$$

$$*\begin{pmatrix}1.5\times2 & 1.5\times1\\ 0.8\times1 & 0.8\times2\\ 0.2\times1 & 0.2\times2\end{pmatrix}=\begin{pmatrix}3 & 1.5\\ 0.8 & 1.6\\ 0.2 & 0.4\end{pmatrix}$$

$$*(1.5\times21+0.8\times12+0.2\times12)=(43.5)$$

*(4,3.5)

*Impossible

Expected response: $(1.5\times2+0.8\times1+0.2\times1 \quad 1.5\times1+0.8\times2+0.2\times2)=(4 \quad 3.5)$

(ii) *State the information represented by the resulted of the matrix multiplication above.*
Candidates could hardly give the information represented by the resultant matrix. A variety of responses were seen. Some were explaining how they performed the multiplication. Some stated that it represented the amount spent by both girls, or it represented the costs of buying the items.

Expected response: Amount spent by each.

(iii) *Find the amount of money Lomasontfo was left with.*

This part was accessible to most candidates. It was generally well answered. Candidates did not use their resultant matrix to answer, but calculated the amount used by Lomasontfo, then subtracted their answer from E5.

Common wrong answers: E4, E2.50

Expected response: E1

Question 10

Generally, this question was poorly done. Candidates could not write the expected expressions, leading to them having a difficulty in answering the whole question.

Athlete A and athlete B ran a relay in two days. Each day the athletes ran a combined distance of 50 km. On Day 1 of the race, athlete A ran a distance of x km.

(a) *Write the distance that was run by athlete B on Day 1, in terms of x.*

This part was poorly done. The correct expression was not there. Others even ignored the x, and just divided the 50 equally.

Common wrong answers: 50, 25, x – 50 , x = 50 – x , $\frac{50}{x}, \frac{x}{50}$

Expected response: 50 – x

(b) *On Day 2, athlete A ran half the distance he ran on Day 1.*

Write in terms of x the distance that was ran by

(i) *athlete A on Day 2.*

Poorly done. Candidates divided what they had in (a) above by 2.

Common wrong answers: 25, 12.5, $\frac{50-x}{2}, \frac{1}{2x}$

Expected response: $\frac{x}{2}$

(ii) *athlete B on Day 2.*

Poorly done. Candidates were expected to subtract their answers in (i) above from 50. Candidates could not come up with a correct expression. They gave varying answers.

Common wrong answers: 37.5, 12.5 $\frac{50-x}{2}$

Expected response: $50 - \frac{x}{2}$

(c) *The distance run by athlete B on Day 2 is three times the distance he ran on Day 1.*

(i) *Form an equation in terms of x.*

Candidates were expected to form an equation by taking their answer in b(ii) and equate it to three times part (a) above. Most candidates failed to do that, so correct equations were hardly seen since most of the answers above were not correct. There were no common errors.

Expected response: $50 - \frac{x}{2} = 3(50 - x)$

(ii) *Solve the equation for x.*

The equations were hardly seen, so there was nothing to solve. Hence there were no common errors.

Expected response: $50 - \frac{x}{2} = 3(50 - x)$ → 100 – *x* = 300 – 6*x* →5*x* = 200 → *x* = 40

(iii) *Find the total distance covered by each athlete in the two days of the race.*

Candidates were expected to find the total distance ran by each athlete. Since most of them did not have the value of *x*, correct answers were hardly seen. For athlete A, they were supposed to add their value of x to their b(i). For athlete B, they were supposed to add their (a) and their b(ii).

Common wrong answers: athlete A = 50, 37.5, 12.5

Athlete B = 37.5, 62.5

Expected response: athlete A = 60, athlete B = 40

Question 11

(a) *Candidates were given a grid that shows a straight line with the equation x + y = 1.*

They were also given the equation of a curve $y = x^2 – 5$.

(i) *Complete the tables for the x and y values of the curve $y = x^2 – 5$.*

x	*−4*	*−3*	*−2*	*−1*	*0*	*1*	*2*	*3*	*4*
y	*11*	*4*		*−4*	*−5*	*−4*	*−1*		*11*

This part of the question was well done by most candidates. They were able to substitute the *x* values into the equation to work out the *y* values that were missing.

Common wrong answers: 1, − 4

Expected response: − 1, 4

(ii) *On the grid, draw the graph of $y = x^2 - 5$.*

Candidates were able to plot the coordinates correctly. Most of them were able to draw a smooth curve through the plotted points, getting a parabola. Some joined the points with a ruler, especially around the turning point, leading to them losing some marks. A few plotted (−2,−1) at (−2,1) which resulted in distorted graphs, which did not get marks.

Expected response: A smooth parabola, passing through all the correct coordinates, with a minimum point at (0,−5), and the y-axis being the line of symmetry.

(iii) *Write down the coordinates of the points of intersection of the graph of $y = x^2 - 5$ and the line $x + y = 1$.*

This part was well answered by most candidates that had correct graphs and even those with wrong graphs because they passed through the points of intersection. Most of them were able to red the points of intersection correctly. The common wrong answers was reading the coordinates wrongly.

Common wrong answers: (−2,−1), (−1,2), (4,−3), (3,4)

Expected response: (2,−1) and (−3,4)

(b) *Write the equation $4x + 3y = 6$ in the form $y = mx + c$.*

Candidates were expected to transpose the formula to make *y* the subject. This part was poorly done by most candidates. Most of them had no idea how to answer the question. Others even tried to find coordinates to use for the gradient. The few candidates that tried to transpose to *y* had challenges with signs, and did not know what to do with the 3 that was a coefficient of *y*.

Common wrong answers: 3y = 4x + 6, 3y = 4x – 6, 3y = 6 – 4x, $y = \frac{4x-6}{3}$, $y = \frac{6-4x}{3}$

Expected response: $y = -\frac{4}{3}x + 2$

Question 12

A piece of paper is cut to form the net of a cone. The net is a sector of a circle with radius 8 cm. The sector angle is 270°.

(a) *Calculate the area of the sector.*

This part of the question was not well done. Most candidates found the area of a circle using the formula πr^2. Some candidates found the area of the minor sector using the formula $\frac{90}{360}\pi r^2$. Others used the formula for the circumference instead of the formula for the area, $\frac{270}{360} \times 2\pi r$. Candidates were expected to use the formula $\frac{270}{360}\pi r^2$ to find the area of the sector. Other candidates that used the correct formula used 3.14 instead of 3.142 or the value in the calculator, which compromised their accuracy, hence lost some marks.

Common wrong answers: $*\pi \times 8^2 = 201.06$

$$*\frac{90}{360}\times\pi\times 8^2 = 50.26$$

$$*\frac{270}{360}\times 2\times\pi\times 8 = 37.7$$

Expected response: $\frac{270}{360}\times\pi\times 8^2 = 150.796$

(b) *The paper is then folded to form a cone. The length of the major arc is 12π cm. Calculate the radius of the cone.*

This question proved to be difficult for most candidates. They were not able to relate the length of the major arc to the circumference of the base of the cone. They were expected to equate the 12π to the length of the circumference, 2π*r*, then solve for the radius.

Common wrong answers: $\frac{12\pi}{2} = 18.8$, 12π = 37.699, $\frac{12}{2} = 6$, $\frac{8}{2} = 4$

Expected response: 12π = 2πr → *r* = 6

(c) *The height of the cone is* $\sqrt{28}$ *cm. Calculate the volume of the cone. [V=* $\frac{1}{3}\pi r^2 h$ *]*

This part was poorly done. This was due to the fact that most candidate did not have the correct value of the radius of the cone. Most of them used the 8 cm as their radius, and some used the value of the radius they found in (b) above. Another challenge was using the $\sqrt{28}$ *cm* that was given as the height of the cone, most of them were using an approximate value instead of the exact value. They used 5.29, 5.3 or even 5, which compromised their accuracy, leading to loss of marks.

Common wrong answers: $*\frac{1}{3}\times\pi\times 8^2\times\sqrt{28} = 354.6$

$$*\frac{1}{3}\times\pi\times 18.8^2\times\sqrt{28} = 1958.5$$

Expected response: $\frac{1}{3}\times\pi\times 6^2\times\sqrt{28} = 199.48$

Question 13

A pole MN is held vertically on horizontal ground. The pole is 4 m long. A point P is 6 m away from the base of the pole.

(a) *Calculate*

(i) *the angle of elevation of N from P.*

This part was fairly done because most candidates were able to identify the angle of elevation of N from P. They were also able to identify the correct trigonometric ratio to use. The main challenge was the

use of the calculator, feeding the calculator properly. Some of the candidates with the correct working used the gradient mode, leading to a wrong answer

Common wrong answers:* $\tan^{-1}\frac{4}{6}$, feeding calculator $\frac{\tan^{-1}4}{6}$ = 12.66

$$* \tan^{-1}\frac{6}{4} = 56.3\,, \quad \frac{\tan^{-1}6}{4} = 20.1$$

$$* \tan^{-1}\left(\frac{4}{6}\right) = 37.4 \text{ (gradient mode)}$$

Expected response: $\tan^{-1}\left(\frac{4}{6}\right) = 33.7$

(ii) *the distance PN.*

This part of the question was generally well done. Most candidates were able to use the Pythagoras rule to find the missing side. Some used trigonometry, using the answer they got in (i) above.

Common wrong answers: 4 + 6 = 10, $4^2 + 6^2 = 52$

Expected response: $\sqrt{6^2+4^2} = \sqrt{52} = 7.21$

(b) *The pole MN is then moved a distance x m from its original position. The new position of N is N', and of M is M'. The angle of elevation of N' from P is 25°.*
Find x.

This part proved to be a challenge to most candidates. Most of them could not figure out a method of solving this problem. Candidates were expected to find the length PM' using the tangent ratio, then subtract the given length of *PM*, to find the value of *x*. Candidates could not find the length of PM'. The few that tried to find PM' had a challenge of making the adjacent the subject in the ratio, most had *adjacent = 4 tan 25* instead of

adjacent = $\frac{4}{\tan 25}$. The ones that got it write did not subtract the 6, to get the value of *x*.

Common wrong answer: 8.578

Expected response: PM' = $\frac{4}{\tan 25}$ = 8.578 →PM = 8.578 – 6 = 2.578

EGCSE MATHEMATICS

Paper 6880/03

Calculator Structured Questions (Extended)

General Comments

The candidate's performance showed that most of them had a challenge in answering the questions as expected. The overall performance of the candidates was more or less the same as that of the previous year. Only about two candidates managed to score a total of 80 marks. The lowest score recorded was 1 out of 80. There were several single digit scores recorded and a lot of candidates scored below 30 for most of the centres.

Questions that proved to be difficult for the candidates were **Q3(b),Q4(b), Q7,Q8,Q10(b),Q12(c),Q15(a),Q15(b),Q16(b),Q18 and Q21.**

Questions that were easily accessible for candidates were **Q2(a), Q4, Q5(b), Q6(a), Q10(a) and Q19(a).**

Candidates are advised to read questions carefully before answering and avoid using very long methods for questions requiring only 1 mark because this can lead to loss of time e.g. **Q7(b)** where they used sine and cosine formula instead of equating corresponding angles of similar figures.

Candidates displayed lack of skill on the use of the scientific calculator. This was evident in **Q1,** where most of them failed to convert 0.055π and tan 10˚ into decimals.

Premature approximations leading to inaccurate responses thus loss of accuracy marks was common. Candidates should be encouraged to write down the long version of their answers and then use them in further calculations. Also, they should present non exact angles in degrees to one decimal place if the question does not specify the level of accuracy. Candidates are also advised to refrain from rounding off exact answers.

Most candidates showed lack of rounding off skills and lost marks e.g. **Q1, Q3(a), Q18 and Q19(b).**

Comments on specific questions

Question 1

The candidates were given a list of the following numbers; 17% , $\frac{68}{399}$, 0.055π ,

tan 10˚ & 0.107 and required to arrange them in order of size starting with the smallest.

This question was not easily accessible to the candidates since quite a number of them failed to properly convert the given numbers to decimals especially 0.055π and tan 10˚. Tan 10˚was affected by the wrong individual's calculator mode e.g.

tan 10 ˚ = 0.158(grad) = 0.648(rad). Those who tried converting either rounded their answers to 2decimal places e.g. 17%(0.17) and $\frac{68}{399}$ (0.17) making it very difficult for them to compare the two. Some converted 17% to a decimal as 17 thus making it the largest. Some gave their arrangement in form of the decimals obtained not in the original given forms of the numbers.

Expected response: 0.107 , 17% , $\frac{68}{399}$, 0.055π , tan 10˚

Question 2

Work out the following without using a calculator, showing all your working.

(a) $3\frac{3}{5}-1\frac{2}{3}$

This part was well answered by most of the candidates. Some candidates could not show all the working clearly indicating that they used their calculator despite the instruction not to use them. A few failed to change $3\frac{3}{5}$ correctly to $\frac{18}{5}$ but instead got $\frac{17}{5}$ or $\frac{3\times3+5}{5}=\frac{14}{5}$.

Some were able to get $\frac{18}{5}-\frac{5}{3}$ but failed to properly write it under the same denominator and ended up having $\frac{18-5}{15}=\frac{13}{15}$ instead of $\frac{3(18)-5(5)}{15}=\frac{29}{15}$

Expected response: $\frac{29}{15}$ **or** $1\frac{14}{15}$

(b) $\frac{7}{9}\div\frac{5}{3}$

This part was generally well answered as well. However errors emanated from multiplying by the reciprocals of both fractions e.g. $\frac{9}{7}\times\frac{3}{5}$ resulting to $\frac{27}{35}$ or multiplying $\frac{9}{7}\times\frac{5}{3}$ to give $2\frac{1}{7}$. Some left their answer un simplified as $\frac{21}{45}$.

Common wrong answers: $\frac{27}{35}$ **,** $\frac{21}{45}$ **and** $2\frac{1}{7}$

Expected response: $\frac{7}{15}$

Question 3

(a) Candidates were given the number 134.9758 and expected to write it correct to the nearest thousandth.

This was poorly done since quite a number of them had a common wrong answer of 134.9760.

Expected response: 134.976

(b) *Mpho said all prime numbers are odd numbers. Give an example to show that Mpho is not correct.*

This part was not well done. Most of the candidates were seem to have no idea of what was expected of them since they failed to write the example of the prime number which is not odd. Some gave a list of odd numbers with 2 inclusive and others gave a list of odd numbers and even numbers. Others gave a list of prime numbers and further substantiated with wrong explanations. Some defined what a prime number was without answering the question.

Expected response: 2

Question 4

The candidates were asked to write

(a) (i) *0.375 as a fraction in its simplest form*,

This was generally well answered with only a few failing to simplify $\frac{375}{1000}$ or leaving their answer as $\frac{15}{40}$.

Expected response: $\frac{3}{8}$

(ii) *0.375 as a percentage*,

Was well done by most of the candidates except for only a few who rounded off the correct exact answer on their calculator to 38%.

Expected response: 37.5

(b) *37.5 cm in kilometres*,

This part proved challenging to most of the candidates. They either multiplied 37.5 by 1 000 to get 375 000 = 3.75×10^4 or divided 37.5 by 10 000 to give 3.75×10^{-3}. Some left their answer as 0.000375 without converting to standard form.

Common wrong answers: 3.75×10^4, 0 000375 and 3.75×10^{-3}

Expected response: 3.75×10^{-4}

(c) *Write one hundred and thirty-four thousand and four in numeric form.*

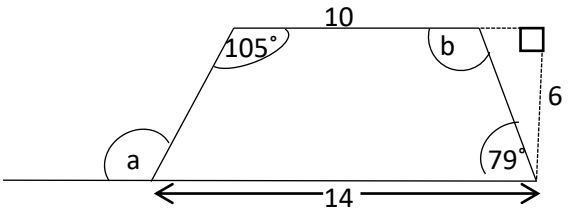
Most of the candidates easily lost this simple mark.

Common wrong answers: 134 04, 134 0004 and 103 404

Expected response: 134 004

Question 5

A trapezium shown below was given



(a) *Candidates were asked to find the value of a and the value of b*.

This part was poorly done. Some had a = 180 - 79 = 101 and b = 105 (assumed angles were equal to the given ones).

Expected response: (a) a = 105

b = 101

(b) Candidates were required to calculate the area of the trapezium.

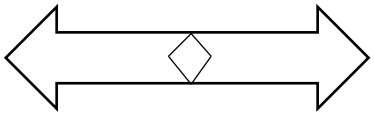
This was fairly done , however some substituted incorrectly on the formula and had either $\frac{1}{2}\times 14+10\times 6$ or $\frac{1}{2}\times 14\times 6$ or (10+14)6 or $\frac{1}{2}\times 14\times 10\times 6$ and getting wrong answers instead of $\frac{1}{2}(14+10)\times 6$ to get 72.

Common wrong answer: 67, 42, 144 and 72^2 (since given dimensions had no units).

Expected response: 72

Question 6

The candidates were given the two dimensional figure and expected to



(a) *draw all the lines of symmetry of the figure*,

This part was very well done. Very few had 4 lines of symmetry.

Common wrong answer: 4 lines of symmetry

Expected response: two correct lines of symmetry

(b) *state the order of rotational symmetry of the figure.*

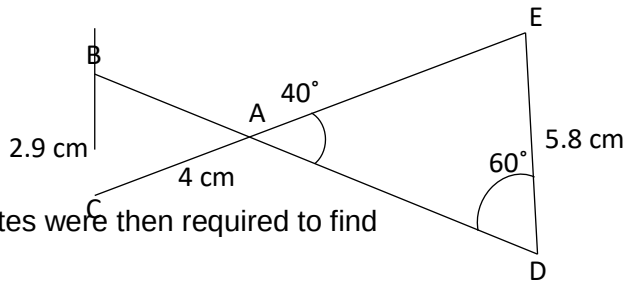
This was fairly done.

Common wrong answers: 2 × 2, 4, clockwise, 180˚

Expected response: 2

Question 7

The following diagram showing two similar triangles *ABC* and *ADE* was given to the candidates.



Candidates were then required to find

(a) the length of *AE*,

Majority of the candidates managed to get the required answer 8 using similarity whereas some used the sine formula and obtained 7.81. Most of those who used the sine formula rounded their answer from the calculator and wrote 7.8 which led to the loss of the accuracy mark and some had

$\sin^{-1}\left(\frac{5.8\sin 60}{40}\right) = 7.21$ instead of $\frac{5.8\sin 60}{\sin 40} = 7.81$.

Common wrong answers: 7.8, 7.21

Expected response: 8 (similarity) or 7.81(sine formula)

(b) $B\hat{C}A$.

This part was easily accessible for those candidates who remembered relationship between corresponding angles of similar figures.

Common wrong answers: 40˚ coming from the ratio 2.9: 5.8= x:80
60˚ Assuming ΔBCA||| ΔADE

Expected response: 80˚

Question 8

The question expected the candidates to solve the trigonometric equation

$\tan x^\circ = -\frac{5}{12}$ for $0 \leq x \leq 360$.

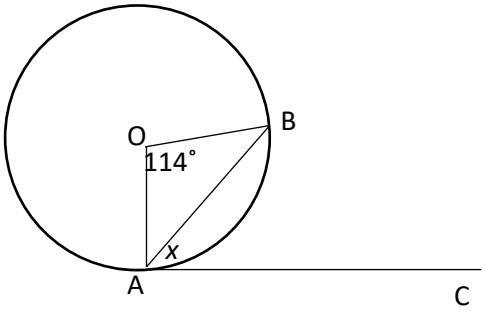
This question seemed a bit difficult for most of the candidates since they got the – 22.6 or 22.6 but then would have 180 - – 22.6 = 202.6 .Some would show the 4 quadrants but did not know how to use them to find the required angles.

Common wrong answers: – 22.6, 22.6 and 202.6

Expected response: 157.4 or 337.4

Question 9

Candidates were required to find the angle *x* in the circle with centre O and tangent AC to the circle.



This question was poorly answered. They really struggled to get the required 57. A common wrong answer was 33 obtained from $\frac{180-114}{2}$. 114˚ was commonly misread as 144 which led to a common wrong answer of 72 as

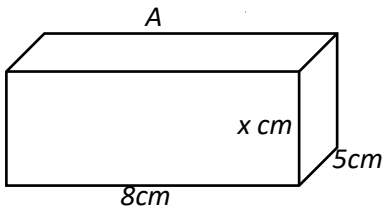
follows; $90 - \left(\frac{180-144}{2}\right)$. Some assumed that $O\hat{B}A = B\hat{A}C = \frac{90}{2}$ = 45 (taken as alternate angles).

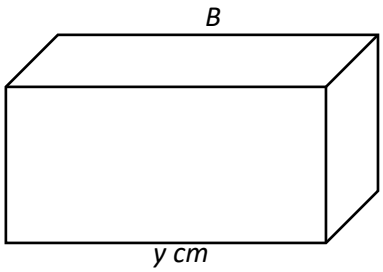
Common wrong answers: 72, 33 and 45

Expected response: 57

Question 10

Two similar cuboids A and cuboid B were given.





The volume of cuboid A is 120 cm^3.

(a) Candidates were asked to find the value of *x*.

This part was well done.

Common wrong answers: 5

Expected response: 3

(b) *The candidates were given that the volume of cuboid B was 405 cm^3 and required to work out the value of y.*

This proved to be one of the most inaccessible question for most of the candidates. Most of the them used the ratio 120:405=8: y, which resulted to
y = 27 since they could not remember the relationship between ratio of sides and ratio of volumes for similar figures. Quite a number of those who remembered the relationship used prematurely rounded answers e.g.

$\frac{8(7.4)}{4.9}$=12.08 instead of $\frac{8\sqrt[3]{405}}{\sqrt[3]{120}}$=12 which led to a loss of accuracy marks and some used the ratio
8^3 : y = 120 : 405, hence obtained 1728 instead of
8^3: y^3 = 120: 405.

Common wrong answers: 27 , 12.08 and 1728

Expected response: 12

Question 11

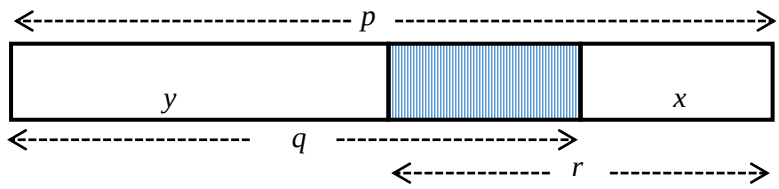
The candidates were expected to find the value of k given $\underline{a} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}, \underline{b} = \begin{pmatrix} 4 \\ 7 \end{pmatrix}$ $\underline{c} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$ and $\underline{c} = k\underline{a} + \underline{b}$.

This question was generally well answered.

Common wrong responses: $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$ or 3k +4 = 10 simplified as 7k=10 hence k = $1\frac{3}{7}$

Expected response: 2

Question 12



(a) *Candidates were asked to express the length x in terms of p and q.*

Quite a number were unable to get the correct expression but ha either q – p or p<q.

Expected response: p – q.

(b) Candidates were required to e*xpress the length y in terms of p and r.*

This part was also not well answered. Candidates got $\frac{p}{q}$ or left un simplified expressions like p + – r **or** r – (p – q)**.**

Expected response: p – r

(c) *Hence write the length of the shaded part in terms of p, q and r.*

Poorly done by the majority of the candidates. They failed to simplify

p – (p – q) – (p – r) to q + r – p. or gave their answer as r – (p – q) or r – p – q

Common wrong answers: r – (p – q) or r – p – q or p – (p – q) – (p – r).

Expected response: r + q – p

Question 13

The candidates were asked to solve the double inequality $4 \leq \frac{11-x}{2} < 8$

This question proved inaccessible for most of the candidates. Most of them solved it up to $-3 \leq -x < 5$ but failed to reverse the inequality after dividing by – 1 hence their solution was $3 \leq x < -5$ instead of $3 \geq x > -5$.

Others had $4 \times 2 \leq \frac{11-x}{2} \times 2 < 8 \times 2$ which gave them either $8 \leq 22 - 2x < 16$ or $16 \leq 11 - x < 64$.

Some other common errors: **(i)** Use of equality sign instead of inequality sign

(ii) Splitting the double inequality into two different inequalities and solving separately resulting in difficulties in merging the two answers obtained.

Expected response: $-5 < x \leq 3$

Question 14

Candidates were required to solve the equation $\frac{8-x}{2} = \frac{2x+2}{5}$.

This was not well done since several candidates failed to clear the fractions correctly and ended up having 2(8 – *x*) = 5(2*x* +2) hence their *x* = $\frac{1}{2}$. Those who managed to clear the fractions correctly failed to remove the brackets properly i.e.

5(8 – x) = 2(2x+2) was then simplified to 40 – *x* = 4*x* +2 giving *x* = 7.6.

Common wrong answers: 7.6 **,** $\frac{1}{2}$

Expected response: 4

Question 15

Candidates were given f(*x*) = 3 – 6*x*, fg(*x*) = 3 – 4*x* and f(*x*)h(*x*) = 6*x* – 12x^2.

They were expected to find

(a) g(*x*),

The correct answer $\frac{2}{3}x$ was rarely seen. This was one of the most challenging questions for the candidates. Candidates seem not to have understood the demand of the question. Some substituted fg(x) into f(x). Some would divide as follows: $\frac{3-4x}{3-6x}$ and then cancelled the 3's and the *x* terms on both numerator and denominator to get $\frac{2}{3}$.

Expected response: $\frac{2}{3}x$

(b) Candidates were required to find h(*x*),

This was also poorly done and was left blank by some candidates. Those who tried would have $\frac{6x-12x^2}{3-6x}$ but fail to simplify and others would substitute as follows; 3 – 6*x* × h(x)= 6x – 12x^2 would omit the bracket in 3 – 6*x* and hence simplified incorrectly to 3 – 6*x*h(*x*) = 6x – 12x^2.

Expected response: 2*x*

(c) Finding $f^{-1}(x)$ was fairly done. However some of those who opted to use the algebraic method left their answer as $f^{-1}(x)= \frac{3-y}{6}$ and those who used the flow diagram could not reach to the correct answer.

Expected response: $\frac{3-x}{6}$**.**

Question 16

Candidates were asked to write the equations of the lines in the form y = mx + c

(a) *Line passing through (– 1, – 1) and (2, 8)*.

This part was not well done. Candidates would use m = $\frac{change\ in\ x}{change\ in\ y}$ resulting to m= $\frac{1}{3}$ instead of m= $\frac{change\ in\ y}{change\ in\ x}$ =3, then could not find correct y intercept hence wrong equation. Others even failed to simplify m= $\frac{9}{3}$ to 3 and presented their answer as $y = \frac{9}{3}x + 2$ instead of $y = 3x+2$.

Expected response: $y = 3x + 2$

(b) *Line perpendicular to the line 2y + 10x = 4, passing through (0, 5)*

This was also poorly done since most candidates took the gradient of the line 2y +10x = 4 as 5 thus gradient of perpendicular line as $-\frac{1}{5}$ leading to wrong equations.

Expected response: $y = \frac{1}{5}x + 5$

Question 17

Candidates were expected to find the coordinates of *A* for the two lines with equations 3x + y = 11 and 5x – 2y = 22 intersecting at *A*.

This question was generally well answered. Only a few mixed up the x and y coordinate and had (– 1, 4) instead of (4, – 1).

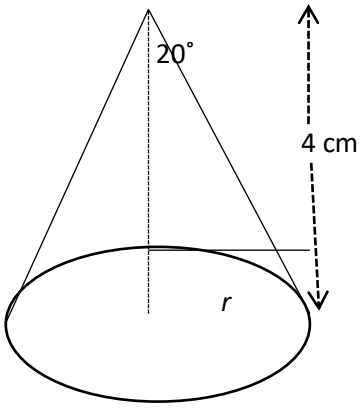
Common wrong answers: (0, 11) due to failure to eliminate one variable correctly.

$(4, -\frac{1}{2})$ after an attempt to find midpoint.

Expected response: (4, – 1)

Question 18

(a) Candidates were asked to calculate the base area of a cone with a perpendicular height of 4cm and whose angle between the slant height and perpendicular height is 20˚.



This part was generally well done although some would use the prematurely rounded value of r (1.46) and this shifted the base area of the cone from 6.66 to 6.70. Some treated the 4cm as the hypotenuse then their r = 4sin20= 1.3681 which then gave the base area of the cone as 5.88.

Common wrong answers: 6.70, 5.88

Expected response: 6.66

(b) Candidates were given the volume of a hemisphere as 134cm^3 and asked to *calculate*

(i) *the radius of the hemisphere*,

Candidates proved not to have recognised that the given volume was for a hemisphere not a sphere thus equated 134 to $\frac{4}{3}\pi r^3$ instead of 134 = $\frac{2}{3}\pi r^3$. Those who used the correct formula, 134 = $\frac{2}{3}\pi r^3$, then used a prematurely rounded figure e.g. r = $\sqrt[3]{64.1}$ instead of $\sqrt[3]{63.98}$.

Common wrong answer: 3.17

Expected response: 4.00

(ii) *the curved surface area of the hemisphere*.

This part was also not well answered by the candidates who took the solid as a sphere instead of a hemisphere and hence used the formula $4\pi r^2$ instead of $2\pi r^2$ hence obtained 126 instead of 101.

Common wrong answers: 126

Expected response: 101

Question 19

(a) Candidates were required to state the modal class for the given information on the frequency table.

Time	Frequency
35 - 45	3
46 - 65	17
66 - 70	9
71 - 85	21
86 - 95	4

This was well done by most of the candidates. Only a few gave the frequency of 21 instead of 75 – 85 and some gave both 21 and 75 – 85.

Common wrong answers: 21 or both 21 and 75 – 85

Expected response: 71 – 85

(b) Candidates were expected to calculate an estimate of the mean using the table below.

Time	Frequency
36 - 65	20
66 - 85	30
86 - 95	4

This part was generally well answered although a wrong midvalue of 50.2 instead of 50.5 for 36 – 65 was commonly used e.g. $\frac{50.2(20)+75.5(30)+90.5(4)}{54}=\frac{3631}{54}=67.2$.

Common wrong answer: 67.2

Expected response: 67.4

Question 20

A possibility space diagram showing two dice, A and B, thrown at the same time was given.

The candidates were then asked to find the probability that

(a) *the number on die A is 3,*

Common wrong answers: 6, $\frac{6}{30}$ and $\frac{6}{12}$

Expected response: $\frac{1}{6}$

(b) *the numbers on both dice are prime,*

Common wrong answers: 9 , $\frac{9}{30}$ and $\frac{4}{36}$

Expected response: $\frac{9}{36}$

(c) *the product of the two numbers is 12.*

Common wrong answers: 4 , $\frac{4}{30}$

Expected response: $\frac{4}{36}$

Question 21

The candidates were given a grid with the unshaded region represented by $x \geq 2$ shown. They were required to shade unwanted regions on the same axes to show the regions satisfied by the inequalities

$x \geq 2$ $y - x > -2$ $7y + 5x \leq 35$.

Most candidates had a challenge in answering this question. Some left it un attempted. Most of them mixed up the dotted and solid lines i.e. used solid line for

$y - x > -2$ and dotted line for $7y + 5x \leq 35$. Some even shaded the wanted region despite the instruction to shade the **unwanted** region.

Expected response: shaded region below dotted line passing through (2,0) and (5,3) **and** shaded region above solid line passing through (0,5) and (7, 0).

EGCSE MATHEMATICS

Paper 6880/04

Calculator Structured Questions (Core and Extended)

General Comments

There were 8198 candidates who wrote this paper. The responses from candidates missed key Mathematical concept interpretation. Set symbols, names of transformations and the significance of the first term in a sequence were some of the useful information that was needed by candidates to correctly respond to questions.

At least 8% of the candidates were able to reach a score of 80 marks. Several scores were below 20 marks. Less than 40 (0.05%) candidates scored no points in the examination. Candidates struggled to effectively illustrate the deductive reasoning skills required in questions involving the probability of dependant events, magnitude of vectors from diagrams and finding distance in graphs involving non-uniform acceleration.

This paper required candidates to be able to be able to convert statements from surds to indices before they could find a derivative function and use it to find a gradient. The candidates were expected to be able to interpret question requirements and align relevant methods needed to score a mark. Paying attention to instructions stated in a question was another necessary skill for this paper. Ability to classify content, such as linear, quadratic and cubic functions was essential for effective answering of questions. Training on use of multiple methods as steps in answering questions is recommended. Application of correct order of operations when changing the subjects in formulae posed as a barrier towards earning marks.

There were very impressive methods used by candidates. There was a great improvement in the illustration of working. This was evident in cases where candidates opted for longer methods and still arrived at correct answers.

The questions that proved most challenging to candidates were questions **5 (b)**(instantaneous rate of change), **6(a),9(a),(b)**(derivatives of functions involving negative fractional indices), **12(b)**(probability of dependant and consecutive events),**8(a),(b)** (changing subjects of a formula and finding inverse functions), **13(a)**(magnitude of vectors from diagrams) and **6(b)**(volume of hollow solids).

The questions that presented minimal difficulty to candidates were question **5(a)**(reading a coordinate point), **11(a)**(evaluating cumulative frequencies) and **2(b)**(finding missing terms in a sequence). Practice of writing solutions in the correct spaces of the question paper is also recommended.

Comments on specific questions

Question 1

(a) (i) A high number of candidates were able to come up with a list of correct prime from the universal set. There was a common misconception of including 1 and 9 as prime numbers. Some listed all odd numbers as prime numbers.

Common incorrect responses were: {1,3,5,7,9,11} and {1,2,3,5,7,11}

The expected correct response was {2, 3, 5, 7, 11}.

(ii) The candidates were required to list all prime factors of 60, that are less than 12. Candidates provided a list of all factors of 60 up to 12 leading to, the common incorrect answers given as: {1,2,3,4,5,6,10,12}

The expected correct response was: {2, 3, 5}.

(iii) Using appropriate Sets symbols was a challenge to most candidates. Abou 90% of candidates could not give a correct response in this question. The common wrong answers given were; $A \cap B$ *or* $A \in B$.

The expected correct response was; $B \subset A$

(b) (i) A well answered question. Those candidates who missed some points were the ones who ignored the already filled regions and opted to re-calculate entries for each region of the Venn diagram.

The expected correct answers in the regions were; 4, 36, 54.

(ii) The question required candidates to find the number of students who chose exactly two subjects from the three. The error committed resulted from either including those who chose 3 subjects or selecting only one of the cases instead of all the three expected. The frequently occurring wrong responses were; 7, 57 and 36.

The expected correct response was 47.

(iii) This was one of the easily accessible question to a majority of candidates. The few who could not score the point were those who excluded the members that were outside the 3 sets, yet they were still in the Universal set. The only common incorrect answer was: 83.

The expected correct response was 85.

(iv) Interpretation of set symbols proved to be difficult for most of the candidates.

The expected correct response was 40.

Question 2

(a) This question was well answered by a vast majority of candidates. Some gave the n^{th} term expression. Common incorrect answers were : n+4, 4n+3 and x+4

The anticipated correct answer was: add 4.

(b) The candidates who could not score points ignored the first tern given in the sequence. They used 3 as their first term, The common wrong answer was; 31

The expected final answer was; 35.

(c) To find the value of n, when the n^{th} term is 51, some candidates either divided 51 by 4 or subtracted 4 from 51. The resulting wrong responses were: 12,75 and 47.

The expected correct response was 12.

Question 3

(a) (i) Candidates found the question moderately accessible. A mix-up of the features of transformations were given in the responses. Some wrong answers were: A reflection in the centre (-1,5) or a reflection in the line -1 or y--1. They would leave the variable in the equation of the line.

The expected correct answer was: a reflection in the line $x = -1$.

(ii) Error in the spelling of translation was common in the responses. The wrong responses were: translocation by vector $\begin{pmatrix} -8 \\ -6 \end{pmatrix}$. They would state the vertical direction in place of the horizontal direction in the vector.

The expected correct response was Translation by vector $\begin{pmatrix} -6 \\ -8 \end{pmatrix}$**.**

(a) (i) some candidates were able to correctly use the given matrix to transform figure A. However, some transformed any of figure B and C. Some would correctly plot only 2 out of the 3 coordinates points.

The expected correct answer was a triangle with vertices: $(5,-1),(5,-4),(7,-2)$**.**

(ii) The wrong responses include the mention of one or two of the following; Reflection, scale factor, $-90°\ anticlockwise, 90°\ anticlockwise\ and\ vector$**.**

The expected response was; Rotation of 90°, $clockwise$**, centre (0,0)**

(c) At least 80% of the candidates could not gain the full marks in this question, because they produced an incorrect matrix with interchanged diagonals, $\begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix}$. **The expected response was;** $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$

Question 4

(a) Most of the candidates found this question very accessible, mistakes made included, the use of Pythagoras' rule, stating the cosine formula with a 4 or omitting the 2 multiplying the last term of the formula. Some of the statements that brough wrong answers were: $\sqrt{(7^2+5^2} = 8.60$ and $\sqrt{4cos153}$. Answers resulting from incorrect rounding were: 11.8 and 11.6.

The anticipated response was: $\sqrt{7^2+5^2-2\times7\times5cos153} = 11.7$

(b) An impressive mastery of the use of the sine formula was demonstrated in the responses. One frequently occurring incorrect response was a result of calculating angle *BAC* instead of angle *ACB*; **The expected correct answer was: 15.8cm**

(c) There were few wrong responses arising only from first calculating part (d) then stating part c without showing the related method.

The expected correct answer was: $cos^{-1}\frac{6}{11.7} = 59.1°$

The correct response was to find the compliment of 59.1. That resulted into 30.9°.

Question 5

(a) One of the most well answered question. Candidates were able to correctly read a plotted point.

The expected correct answer was:6.7 ± 0.1

(b) 99% of the candidates did not draw the expected tangent at t = 6. They opted to use $\frac{v-u}{t}$, yet the graph did not indicate that the acceleration was constant. The commonly incorrect response was

$\frac{7.2-0}{6} = 1.21.$

The expected correct answer was: 0.4 to 0.6

(c) The majority of candidates (90%) used the method; $d = s \times t$, to find the distance, yet they were required to find the area under the graph. The common wrong answer was; $2 \times 3.6 = 7.2.$

The expected correct response was: 3.6 ± 0.1**.**

Question 6

(a) Using the vertical height (6) of the cone instead of the slant height (6,5) led to loss of marks. The most frequently occurring error was: $A = \pi \times 2.5 \times 6 = 47.$

The expected correct response was: $\pi \times 2.5 \times 6.5 = 51.05.$

(b) Candidates mistakenly mixed up the cylinder and cone radii. Some added the two volumes instead of subtracting thr cone volume from the volume of the cylinder. Therefore, the incorrect responses were: $V = \frac{1}{3}\pi \times 3^2 \times 7 = 65.97$ and $V = \pi \times 2.5^2 \times 6$

The expected correct response was: $\boldsymbol{V = \left(\pi \times 3^2 \times 7\right) - \left(\frac{1}{3}\pi \times 2.5^2 \times 6\right) = 159.}$

Question 7

(a) Failing to correctly apply the rule of Pythagoras was a challenge to most candidates. They only multiplied the 2 sides of the right -angled triangle and equated that to the hypotenuse. The wrong response was: $(x+5)(x-2) = 17$ or $(x+5)^2 + (x-2)^2 = 17$

The expected correct steps leading to forming the given equation were: $(x+5)^2 + (x-2)^2 = 17^2$ *leading to* $2x^2 + 6x - 260 = 0$.

(b) Most candidates missed the key instruction of solving by factorising. They used other methods such as the quadratic formula and completing the square.

The expected correct answer was: $(x+13)(x-15) = 0, x = -13 \; or \; x = 10.$

(c) Some candidates forcefully used the formula, $\frac{1}{2}absinC$, by using long methods to calculate the necessary sides and angles. Popular wrong answers were: $\frac{1}{2} \times 17 \times 15$ and 65.

The expected correct answer was: $\frac{1}{2} \times 8 \times 15 = 60$

Question 8

(a) (i) The question was accessible to about 80% of the candidates. Those candidates who could not score points either performed partial factorisation or factorised one term. The common wrong answers were: $2x(4x - 10x) \; and \; 4x(x - 5x)$.

The expected correct response was: $4x^2(2 - 5x)$

(ii) Although candidates demonstrated familiarity with the concept of factorising a difference of 2 squares, they presented a solution with errors. Some of their wrong responses include; $\left(\frac{4}{9} + 5x\right)\left(\frac{4}{9} - 5x\right)$

The expected correct answer was: $\left(\frac{2}{3} + 5x\right)\left(\frac{2}{3} - 5x\right).$

(b) (i) The inverse operations expected to be applied in changing the subject of a formula were not orderly performed. The resulting wrong responses include expanding $(x-7)^3$, the arising wrong answer was, $y = 4 + x^3 + 7^3$

The correct response was; $x = 7 + \sqrt[3]{y-4}$.

(ii) This question proved easily accessible for 80% of the candidates. The common arror shown was giving a function in terms of y instead of x. The resulting wrong response was: $g^{-1}(x) = 7 + \sqrt[3]{y-4}$.

The anticipated corrected response was: $g^{-1}(x) = 7 + \sqrt[3]{x-4}$.

(c) The challenge in a majority of candidates was expanding 3 brackets. They only focused on 2 brackets and added the terms in the third bracket. The wrong response was commonly:
$2x^2 - x - 3(x+3) = 2x^2 - 4x - 9$

The expected final answer was : $2x^3 + 5x^2 - 6x - 9$

(d) (i) One of easily accessible question. The wrong response was excluding the variable in the working resulting into: **:** $2^4 x = 16x$.

The expected final answer was : $16x^4$.

(ii) Candidates had a problem simplifying fractional indices. Some incorrect answers were: $\frac{2y}{3x^{-1}}$ and $\frac{2y^2}{3x}$.

The expected final answer was:$\frac{2y}{3x}$.

Question 9

(a) (i) Candidates struggled with applying laws of indices. They multiplied the base by the power, instead instead of multiplying the base by itself, 3 times. The resulting common error was:

$18 - 12 + 9 = 15$.
The expected response was: $24 - 12 + 9 = 21$.

(ii) Instead of using the first derivative, candidates calculated another coordinate point , then used $\frac{rise}{run}$. They missed that the equation is not linear.

The expected response was: finding the gradient at x=2 using the derivative function; $9x^2 - 6x$. The answer was 24.

(iii) Correct answers to this question were rarely given. Some candidates assumed the equation to be quadratic, and used $x = \frac{-b}{2a}$. Some used the second derivative.

The expected correct response was: $x = 0$ or $x = \frac{2}{3}$

(b) (i) Candidates illustrated difficulty in converting expressions from index form to radical form and vice-versa. They could not find derivatives of expressions involving negative indices. The wrong answers were; $3x + 7$ *and* $3 + 7 = 10$.

The expected correct response was: $\frac{-3}{x^2}+7$.

(ii) Candidates had difficulty in differentiation of negative fractional indices. The wrong responses were;$x^{\frac{1}{2}}$ or $\frac{1}{\sqrt{x}}$

The expected correct response was: $\frac{1}{2\sqrt{x}}$

Question 10

(a) The question posed as a challenge to most candidates who made errors when they were in the process of clearing 3 denominators. Multiplying each fraction by the LCM of the 3 denominators resulted into several wrong answers. Multiplying only two out of the 3 fractions was another mistake committed by candidates. Some popular incorrect responses were: $3x-4=\frac{46}{6x+18}$ **,that yielded;** $18x^2+30x-118=0$. Since the final answer was given in the question,

The expected steps in the correct response were:
$\frac{3(x-2)+2}{6}=\frac{23}{x+3}$, $(3x-4)(x+3)=138$ and $3x^2+5x-12=138$.

(b) There was an improvement in the use of the quadratic formula. This was evident in the accurate valuation of the discriminant (b^2-4ac) by a large number of candidates. They could not earn marks because they used a short division line that divided only the discriminant in the quadratic formula. The popular expressions that led to wrong answers were: $x=-5\pm\frac{\sqrt{1825}}{6}$ or $\frac{-5\pm\sqrt{1775}}{6}$ and $\frac{5\pm\sqrt{1825}}{6}$.

The expected correct response was: $\frac{-5\pm\sqrt{1885}}{6}$ = 6.29 or -7.95

Question 11.

(a) This question was easily accessible to most candidates.

The expected response was: 18, 6, 50.

(b) A high percentage of candidates were able to adequately answer this question. There were those who used lines to produce a polygon instead of a curve. A few produced bar graphs instead of the expected curve. Some plotted lower- class boundaries and mid-class values instead of upper-class bounds to plot the cumulative frequency curve.

The expected solution was a smooth s-shaped curve joining plots of (upper class boundaries, cumulative frequencies)

(c) (i) More than 15% of the candidates calculated the median position using the amount of money instead of the number of people. They interchanged the variables. The frequently occurring inaccurately step was, $median\ positio=\frac{1}{5}\times 150$. This led to 35 as the common wrong answer.

The expected correct response was 54 to 60.

(d) (ii) A mistake made by a vast majority of the candidates was, subtracting the lower quartile position from the upper quartile position then stating that as their interquartile. The common wrong answer was: IQR= $\frac{3}{4}n-\frac{1}{4}n=37.5-12.5=25$.

The expected solution was: IQR= U.Q – L.Q = (68 to 74)– (40 to 44) = 24 to 34.

(c) (iii) The challenge demonstrated by for 65% of the candidates was adding the number of people who spent E90 to those who spent E115 instead of subtracting the least from the higher value. The common incorrect responses were: 44+48=92 or 3+6 = 9.

The expected correct answer was; $\mathbf{6-3=3\pm1}$

Question 12

(a) This question proved to be the most challenging to answer correctly. Candidates subtracted 0.14 from 0.7, as a result the common wrong responses were ; 0.56 and $.14\times0.7=0.098$.

The expected correct response was; $\frac{0.14}{0.7}=0.2$

(b) (i) Only 2% of the candidates correctly answered this question. A common error arose from adding all the probabilities in the last column of the tree diagram. This gave 0.44

The expected correct response was: 0.41

(ii) Less than 20 or (0.2%) of the candidates were able to arrive at the correct answer in this question. The only error displayed was, multiplying 0.41 by 5. Some who correctly arrived at the answer lost some marks from over-rounding their answer to 0.01 (1significant figure).

The expected correct response was: 0.01158562.

(iii) The candidates who could not arrive at $(0.41)^5$ had a huge challenge at getting the expected answer of 0.9285.

The expected correct response was: $\mathbf{1-(0.41)^5=0.92850757}$

Question 13

(a) This item was also most challenging to candidates. They multiplied the vectors instead of adding. They could not pay attention to the addition sign. The common wrong approach used was: $\binom{0}{5}\binom{t}{0}, 5t=89$.

Another common error was incorrect interpretation of operations involving square roots. This was evident in this common error; $\sqrt{5^2}+\sqrt{t^2}=t+5=9.43\ and\ t=4.43$

The expected correct approach was: $\binom{0}{5}+\binom{t}{0}=\binom{t}{5}$**, finding the magnitude of the vector then yields;** $\sqrt{5^2+t^2}=\sqrt{89}$ **, t =8.**

(b) The question proved to be a challenge to candidates. They added the lengths of the 2 sides forming the angle. Others calculated angle *SPT* instead of angle *STP*. One frequently identified error was; $\cos^{-1}\frac{5}{\sqrt{89}}$, where they mixed up sides used in trigonometric ratios. Using the opposite side in a cosine ratio instead of the adjacent and hypotenuse.

The expected response was: $\mathbf{S\widehat{T}P=32.0^\circ}$.