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EGCSE MATHEMATICS

Paper 6880/01

Non-Calculator Structured Questions (Core and Extended)

General Comments

Candidates appeared to have enough time to answer all questions as most were able to finish the paper. The paper seemed to be more challenging to the learners than the previous papers. There were some cases where candidates left some questions unanswered, however this wasn't due to time but some level of unpreparedness on the candidates. On this paper, no learner was able to score full marks and we had a number of them getting zeros.

There was a general concern on the use of mathematical instruments and calculators:

Mathematical instruments: candidates either didn't have instruments and some had them but couldn't use them properly, worst case scenario being failure to draw a line of a given length.

Calculators: it was evident that most learners didn't use calculators in this paper though some solutions could be easily worked out using a calculator. It was also noted that some learners used calculators without showing any work hence lost a great deal on method marks.

The following questions were too easy and accessible to most learners; **Question 15, Question 20 (a)** and **Question 17.** We also had questions which were challenging to most learners. These were: **Question 14, Question 2, Question 4, Question 19 (a) (ii), Question 12** and **Question 16.** These questions needed understanding and reasoning.

Comments on specific Questions

Question 1

This question was on applications of directed numbers. Candidate could have used their calculators for accurate responses to avoid challenge of operations on directed numbers. Learners would write correct mathematical statements but fail to evaluate the responses

(a) Candidates were required to find a difference. It was fairly done.
Common wrong responses were -13 and 11.

The expected response was 13.

(b) This was an application of directed numbers (subtraction). It was poorly done.
Common wrong responses were 1 and 3.
The expected response was -3.

(c) This was another application of directed numbers in which learners had to add directed numbers. It was fairly done.
Common wrong responses were -6 and -11.
The expected response was: 6.

Question 2

Candidates were required to arrange given numbers of different formats in order of size, starting with the largest. This was poorly done. Candidates thought 77.7% was the largest, some couldn't identify which is larger between 0.77 and 0.7777…

Common wrong responses were: the numbers written as decimals, 77.7%, $\frac{7}{9}$, $0, -0.77, \frac{-7}{9}$ and 0, 77.7%, $\frac{7}{9}$, $-0.77, \frac{-7}{9}$.

The expected response was $\frac{7}{9}, 77.7\%, 0, -0.77, -\frac{7}{9}$

Question 3

Candidates were required to divide a mixed number by a fraction. This was fairly done. Some candidates used calculators instead of showing the step of multiplying by the reciprocal; some showed all the steps but couldn't multiply properly.

Common wrong responses were $\frac{55}{4}$, $\frac{16}{55}$ and $\frac{55}{20}$.

The expected response was:

$$\frac{11}{4} \div \frac{4}{5} = \frac{11}{4} \times \frac{5}{4} = \frac{55}{16} = 3\frac{7}{16}$$

Question 4

(a) Learners were expected to write a number in standard form. This was poorly done as candidates seemed to lack basic knowledge of standard form.

Common wrong responses were: 245×10^{3}, 245×10^{-5}, 2.45×10^{3} and 2.45^{-3}.

The expected response was 2.45×10^{-3}.

(b) Candidates were required to use calculators to evaluate expression giving their responses in standard form. This was badly done as they tried working that out manually.

Common wrong responses were 6.149965×10^{11}, 2.885×10^{5} and 2.885×10^{12}.

The expected responses was 6.14965×10^{11}.

Question 5

Candidates were required to calculate simple interest over the given period. This was poorly done. Candidates calculated total investment, interest for one year or interest for 30 years instead of 30 months. Some calculated compound interest.

Common wrong responses were E135900, E86825 and E4530.

The expected response was $\frac{6}{100} \times 75500 \times \frac{30}{12} = E11325$.

Question 6

(a) Candidates were required to write a name of a seven-sided polygon. This was poorly done. Common
Wrong responses were sevenagon, hectagon and hexagon.
Correct response was heptagon.

(b) Candidates were required to write a name of a triangle with two equal sides. This was fairly done.
Most candidates had an idea of the name, but the correct spelling was a serious issue.
Common responses were: isolence, iscosceles, isolate and some other words close to isosceles.
Correct response was isosceles.

(c) Candidates were required to state the name of a regular quadrilateral. This was fairly done. A few candidates couldn't write the proper spelling.
Some Common wrong responses were rhombus, kite, equilateral, quadrilateral and polygon.
The expected response was square.

Question 7

Candidates were required to construct a triangle of given sides. This was well done. A few candidates couldn't use proper measurements while others had no construction arcs or wrong arcs (compass point placed at random position or arcs hand-drawn).

Question 8

(a) Candidates were required to factorise using common factors. This was fairly done. Candidates either divides both terms by the common factor or factorise wrong, some to an extent that resulted in double brackets.
Common wrong responses were $2a-3$, $7a(2-3)$ and some strange responses with double brackets.
The expected responses was $7(2a-3)$.

(b) Candidates were required to remove brackets and simplify the given expression. This was well done. Some candidates could expand the brackets but failed to simplify.
Common responses were $7x-10$, $7x^2-2$ and a few ended up with solutions of an equation.
The expected response was $3x - 6+4+4x = 7x - 2$.

Question 9

Candidates were required to solve an inequality. This was fairly done. Most could get the method marks but could not get accuracy mark due to wrong response, response not simplified or trying to write response as a decimal hence losing marks on unaccepted level of accuracy.

Common wrong responses were $y = 1\frac{5}{6}$, $y < 1\frac{5}{6}$, $y > \frac{-11}{-6}$ and $y > 8.3$.

The expected response was $y > 1\frac{5}{6}$.

Question 10

Candidates were required to multiply a vector by a scalar then add another vector. This was fairly done. Learners either couldn't multiply or couldn't add properly. Some candidates omitted brackets on final response or wrote the vectors as fractions.

Common wrong responses were $\frac{7}{-5}$, $\left(\frac{7}{-5}\right)$,$\begin{pmatrix}6\\-5\end{pmatrix}$, $\begin{pmatrix}7\\-2\end{pmatrix}$and $\begin{pmatrix}3\\-6\end{pmatrix}$.

The expected response was $\begin{pmatrix}7\\-5\end{pmatrix}$.

Question 11

Candidates were required to find missing terms in ratios. This was fairly done. Some candidates could not match the terms in the ratios; some treated the question as a sharing problem.

Common wrong response was 2.04.

The expected response was 1.5.

Question 12

(a) Candidates were required to evaluate the function at the given value of x. This was fairly done. Instead of multiplying 5 by $\frac{2}{3}$ some candidates wrote $5\frac{2}{3}$.

Common wrong responses were 0.333, 2.7 and $2\frac{2}{3}$.

The expected response was $5\times\frac{2}{3}-3=\frac{1}{3}$.

(b) Candidates were required to find the inverse of the function. This was poorly done. Candidates would substitute 0.333 or $-\frac{2}{3}$ for *x* in the function.

Common wrong responses were: 5(0.333), $-\frac{1}{3}$ or a blank space

The expected response was $\frac{x+3}{5}$.

Question 13

Candidates were required to apply volume of a cuboid to find the height. This was fairly done. Candidates showed the 'checking' part instead of showing how to get the height. Some wrote the correct answer without the necessary working.

Common wrong responses were 24+6=30, 24-6 =18 and 1296 – 24 x 6 = 1152..

The expected response was $\begin{array}{c} 24\times 6\times h=1296 \\ h=9 \end{array}$.

Question 14

Candidates were required to use inequalities to describe a shaded region. This was poorly done. It seemed as if candidates had no idea of what inequalities are as some wrote coordinates and equations of straight lines. Others attempted the inequalities but used < and > instead of the inclusive signs.

The expected response was $\begin{array}{c} y\leq 5 \\ x\geq 1 \\ y\geq 2x-2 \end{array}$.

Question 15

(a) Candidates were required to write the coordinates of a given point. This was well done. It was one of the most accessible questions in the paper.
Common wrong response was (2,1).

The expected response was (1, 2).

(b) Candidates were required to plot a point given its coordinates. This was well done.
Common responses were plotting (-1,3), (-1, -1) or writing letter C where a point is supposed to be plotted.

Question 16

Candidates were required to find the size of an interior angle of a regular pentagon. This was poorly done. Common responses were 72, 540 and 900. A few candidates asked where the diagram is and didn't response the question.

The expected response was $180-\frac{360}{5}=108$.

Question 17

(a) Candidates were required to state the angle of elevation given the angle of depression. This was poorly done.
Common wrong responses were 117 from 180-63 and 27 from 90-63.

The expected response was 63.

(b) Candidates were supposed to find bearing of Q from P given the bearing of P from Q. This was poorly done.

Common wrong response was 40 and a few 63s (from part **(a)**).

The expected response was $320-180=140$.

Question 18

Candidates were required to measure a reflex angle. This was fairly done. Candidates would measure the acute angle or split the reflex into a straight angle and an obtuse angle but couldn't calculate the size of the reflex.

Common wrong responses were 40, 140 and 220 (from 180+40).

The expected response was 320.

Question 19

(a) **(i)** Candidates were required to find a sector angle using property of angles on a straight line or around a point. This was fairly done.

The common wrong response was 15.

The expected response was 75.

(ii) Candidates were required to find areas of four sectors. This was poorly done. Most candidates could not identify the fact that they had to find the area of a sector.

Common wrong responses were 60 (from 15×4) and 300 from 75×4.

The expected response was $4\times\frac{75}{360}\times\pi\times5\times5=65.4$

(b) Candidates were required to state the order of rotational symmetry for a figure. This was poorly done.

Common wrong responses were clockwise, 15, 4 lines of symmetry.

The expected response was 4.

Question 20

In this question candidates were expected to read and interpret a bar chart.

(a) Candidates were required to find total frequency from a bar chart. This was well done.

Common wrong responses were 28, 8, and 26.

The expected response was 27.

(b) Candidates were required to find the number of learners who got grades that are lower than C. This part was poorly done.

Common wrong responses were: 12, 0 and none

The Expected responses was: 13

(c) On this part, candidates were required to state the mode from the bar chart. This was poorly done.

Common wrong responses were 8, A and D, and 5.

The Expected response was *E.*

Question 21

(a) Candidates were required divide two algebraic terms. This was poorly done. Candidates either factorized or divided and left the response with a negative index.

Common wrong responses were $3x^2y$, $12xy(x^2 \div 3y)$ and $3x^2y^{-1}$.

The Expected responses was $\frac{x^2}{3y}$.

(b) In this part, candidates were required to subtract algebraic fractions. This was fairly done. Common mistakes were omitting the denominator, multiplying only one term of the two-termed numerator, and wrongly simplifying the simplified fraction.

The common wrong responses were $3x+2$, $\frac{5x-(2)x-1}{10}=\frac{3x-2}{10}$ and $\frac{3x+1}{5}$.

The expected response was

$$\frac{5x-2(x-1)}{10}$$
$$=\frac{5x-2x+2}{10}$$
$$=\frac{3x+2}{10}$$

EGCSE MATHEMATICS

Paper 6880/02

Calculator Structured Questions (Core and Extended)

General Comments

This was the first session where this paper was written by core candidates only. It was also written after a very challenging situation where the world was faced with an international disaster of covid-19.

This paper provided a wide range of syllabus objectives. Some objectives allowed candidates to prove how well they understood some concept, and how well they can apply them to real life situations. There were also syllabus objectives that requested candidates to describe, and that proved to be a challenge to most candidates, showing that candidates are still lacking in using the Mathematical language.

There was an increase in the number of candidates who left a lot of blank response spaces. Some candidates gave responses without showing any working. Premature approximations were also common. This led to inaccurate responses, where they lost the accuracy marks. Teachers are therefore advised to encourage candidates to show all necessary working and avoid premature approximations.

Questions that proved to be easy for most candidates in this paper were **Question 2(b)**, **Question 3(a)(i)**, **Question 7(a)** and **Question 13(a)**.

Questions that proved to be difficult for most candidates were **Question 4(a)(i)**, **Question 4(b)**, **Question 7(b)**, **Question 8(c)**, **Question 13(c)** and **Question 14(b) (i),(iii).**

Candidates were able to attempt all questions in this paper, indicating that the time allowed to write this paper was enough for all candidates.

Comments on Specific Questions

Question 1

(a) *Write 86 as a product of its prime factors.*

This question was fairly answered by most candidates. They had an idea of what prime factors were, other than writing the product of primes. Most ended up listing the prime factors of 86. Others included 1, as a prime factor too.

Common wrong responses were 1 × 2 × 43, {1,2,43}, {2,43}

The expected response was 2 × 43.

(b) *Write* $4^5 \div 4^{-8}$ *as a single power of* 4.

It was generally well answered by most candidates. They displayed the concept very well.

Common wrong responses were 1^{13}, 4^{-3}, 4^{-13}, 67 108 864

The expected response was 4^{13}.

(c) *Evaluate* $16^{\frac{1}{2}} + 3 \times 3^2$

This question was generally well responseed. Some candidates had a challenge in finding the value of $16^{\frac{1}{2}}$. They found it to be either 8 or $\frac{33}{2}$.

Common wrong responses were $8 + 27 = 35$ and $\frac{33}{2} + 27 = 43.5$.

The expected response was 31.

(d) *Express* 1 *in index form using base* 5.

It was generally well answered.

Common wrong responses were $5^1, 1^5, \frac{1}{5}, \quad 1 \times 1 \times 1 \times 1 \times 1$.

The expected response was 5^0.

Question 2

Triangle ABC is a right-angled triangle. Angle BAC is 90°. AB is 5cm. AC = 6cm. AB is parallel FE. (A sketch of the triangle was given.)
Calculate the size of

(a) *angle ACB,*

This question was well done by a number of candidates. Some candidates had an idea that they were supposed to use trigonometry but did not know how to use it when finding an angle. A few candidates had their calculators in the gradient mode.

Common wrong responses were 44.2°, 45°, 30° and 50.2°.

The expected response was 39.8°.

(b) *angle FEC*.

It was well done by most candidates since it required the use of sum of angles in a triangle.

Common wrong responses were 45°,60°and 39.8°.

The expected response was 50.2°.

Question 3

(a) **(i)** *Fill in the missing terms in the sequence.*

51, 43, 35, ……, 19, ……., 3

This question proved to be the easiest to most candidates. It was well done.

The expected response was 27 and 11.

(ii) *State the term-to-term rule of the sequence in **(i)** above.*

This part was poorly done by most candidates. They had an idea of what was required but failed to put it in writing. It was as if they are not familiar with the term 'term-to-term rule'.

Common wrong responses were $x-8,\quad n-8,\quad n^{th}-8$, and decrease by 8.

The expected response was Subtract 8.

(b) *The rent of a house is increased from E2500 to E3650. Find the percentage increase*.

This was fairly well answered by most candidates. Some candidates used the selling price instead of the buying price as a denominator.

Common wrong responses were

$\frac{1150}{3650}\times 100 = 31.5\%,\quad \frac{2500}{3650}\times 100 = 68.4\%,\quad \frac{3650}{2500}\times 100 = 146\%$.

The expected response was 46%.

Question 4

The area of a rectangle is 79.2 cm^2. The length of the rectangle is 26.4 cm.

(a) **(i)** *Calculate the width of the rectangle.*

This question was poorly done by most candidates. It showed that most candidates lacked the concept of solving simple equations. Candidates had the correct equation of $79.2 = 26.4w$, where *w* was the width. Instead of dividing by 26.4, they subtracted the 26.4. Other candidates just divided the 26.4 by 2.

Common wrong responses were 52.8 cm and13.2 cm.

The expected response was 3 cm.

(ii) *Calculate the length of a diagonal of the rectangle*.

This part was also poorly done. Most learners had no idea how to find the length of a diagonal, they were using different wrong methods. Very few candidates attempted the use of the Pythagorus rule. There were no Common wrong responses.

The expected response was 26.6 cm.

(b) *Describe the symmetries of a rectangle.*

This question proved to be difficult for most candidates. They seemed not to understand what the term 'describe' meant. Some decided to describe what a rectangle is. Others decided to describe where the lines of symmetry are situated in a rectangle. Others even drew the rectangle, showing the lines of symmetry. The part of the order of rotational symmetry was rarely mentioned in their lengthy descriptions.

The expected responses were 2 *lines of symmetry and rotational symmetry of order* 2.

Question 5

(a) *Calculate the value of* $\frac{9.3\times 618.3}{11.4+89.56}$, *correct to* 2 *decimal places*.

This question was fairly done. Some candidates failed to write the response to 2 decimal places, instead they wrote it to 3 significant figures, some even wrote it to 2 significant figures. Some candidates had a challenge in the correct use of the calculator. They just punched in the expression as is, without inserting any brackets, which led to wrong responses.

Common wrong responses were 56.95, 57.0, 57 and 593.96.

The expected response was 56.96.

(b) *A family consumes* $\frac{3}{5}$ *of a loaf of bread each day. Find the least number of Loaves of bread the family needs to buy in 7 days.*

This part was generally well done, besides the fact that candidates were not able to apply 'the least' correctly. They were able to get the 4.2 loaves but could not round it up to 5 loaves. Some candidates even related the situation to their everyday life where a loaf of bread have 20 slices, where some were able to come up with the 5 loaves as final response.

Common wrong responses were 4 loaves and 4.2 loaves.

The expected response was 5 *loaves.*

Question 6 *Candle wax is moulded into a sphere of radius 4.2 cm, (as shown).*

[V of sphere = $\frac{4}{3}\pi r^3$*, S. Area =* $4\pi r^2$*]*

(a) (i) *Calculate the surface area of the sphere.*

This question was generally well answered. Most candidates were able to use the correct formula correctly. Some candidates multiplied the radius by 2, instead of squaring it even though they copied the formula correctly. A few candidates used the formula for the volume to calculate the surface area. Some even used the formula for the area of a circle.

Common wrong responses were 105.6, 110.8, 55.4 and 221.

The expected response was 222 cm^2.

(ii) *Calculate the volume of the sphere.*

Generally, well responded. A few candidates used the formula for the surface area. Some misread $\frac{4}{3}$ for $\frac{3}{4}$ in the formula for volume.

Common wrong responses were 174.56, 232.75 and 173.6.

The expected response was 310 cm^3.

(b) *The sphere is melted down. Smaller spheres of volume 30 cm^3 are moulded from the wax. Find the number of complete spheres that can be moulded from the wax.*

Most candidates were able to divide the volume by the 30, but they failed to give the correct accuracy as the final response required. A few candidates subtracted the 30 from the volume. Some candidates divided the surface area by the 30.

Common wrong responses were 10.3, 5.8 and 7.39.

The expected response was 10 *spheres.*

Question 7 *Figure PQRS is a rhombus*. [*PQRS was accurately drawn*]

(a) *Measure and write down the length of the diagonals QS and PR.*

This question was generally well done. Some candidates had a challenge in accurately reading the lengths.

Common wrong responses were *QS* = 3.5, 3.9 and *PS* = 6.2, 6.5.

The expected responses were *QS* = 3.6 to 3.8 and *PS* = 6.6 to 6.8.

(b) *Hence, find the area of the rhombus.*

This part of the question was poorly done by most learners. They struggled to come up with a formula for the area of a rhombus. They were supposed to divide it into triangles, then find the sum of the areas of the triangles.

Common wrong response was Multiplying the lengths of the diagonals.

The expected response was 11.88 to 12.92.

Question 8

Jane bought x pens costing E19.60 each. She bought y pencils costing E2.50 each. She spent a total of E133 to buy the pens and the pencils.

(a) *Form an equation for the total cost of the pens and the pencils that Jane bought.*

This question was fairly responded. They had a challenge with the decimals and the currency, leading to awkward equations such as $E19.60x + E2.50y = E133$.

Common wrong responses were $x + y = 133$ and $19.6x + 2.5x = 133$.

The expected response was $19.6x + 2.5y = 133$.

(b) *Jane bought a total of 19 pens and pencils. Form an equation for the total number of pencils and pens that she bought.*

This part of the question was poorly done. Candidates rarely came up with the correct equation.

Common wrong responses were $19x + 19y = 133$, $x + y = 133$, $p + p = 19$ and $x + y = 38$.

The expected response was $x + y = 19$.

(c) *Solve the equations in part (a) and part (b) to find the number of pens and the number of pencils she bought.*

This part was poorly done. Most candidates had wrong equations in **part (a)** and in **part (b)**, and they could hardly solve them simultaneously. Even the few that had correct equations failed to solve them simultaneously. The decimals in **part (a)** seemed to frustrate them, eventually failing to solve the equations. A few candidates solved them by trial and were able to get the correct responses.

The expected response was *5 pens and 14 pencils.*

Question 9

(a) *Make T the subject of the formula* $R = \frac{2T}{3y}$.

This question was fairly done. A few candidates struggled, having challenges with removing the denominator, they were subtracting every term, to remove from one side.

Common wrong responses were $T = \frac{R - 3y}{2}$, $T = R3y - 2$.

The expected response was $T = \frac{3Ry}{2}$.

(b) *Calculate the value of T when R = 52 and y = 44.8.*

This part was generally well done. Most candidates were not substituting into their expressions of *T*, but rather substitute into the original expression, then solve for the *T*. A few made mistakes by not multiplying denominator by 3 or by not dividing by 2 at the final stage.

Common wrong responses were 6988.8 and 1164.8.

The expected response was *3494.4.*

Question 10

(a) *Factorise* $x^2 - 49$.

This question was poorly done by most candidates, they came up with different expressions.

Common wrong responses were $(x-7)^2$, $(x-49)(x+49)$, $(x)(x)-(7)(7)$.

The expected response was $(x-7)(x+7)$.

(b) *Solve the equation* $\frac{7d-3}{4} - \frac{2d}{3} = 1$

This question was fairly done. Most candidates had a challenge in removing the denominator. They were able to show the intention to multiply by 12, then got wrong equations as they remove the brackets. Some multiplied only the left hand side. Some opted to write the left hand side as a single fraction, then ended up multiplying the right hand side by 12, twice.

Common wrong response was $\frac{10}{13}$.

The expected response was $\frac{21}{13}$.

(c) *Line l is drawn in the diagram below. [x-y plane with line l was given].*

(i) *Find the gradient of line l.*

This question was poorly done. Some candidates knew the formula for the gradient but they were using coordinates that were not on the line.

Some were using $\frac{\Delta x}{\Delta y}$ instead of $\frac{\Delta y}{\Delta x}$.

The expected response was – 2.

(ii) *State the y-intercept of the line.*

This part was fairly done. Candidates were able to give the y-intercept though some were giving it as a coordinate.

Common wrong response were −2, (− 2, − 4) and x = − 2.

The expected response was – 4.

(iii) *Write down the equation of the line.*

This question was generally well responded by most candidates. Even those that did not get **part (i)** and **part (ii)** were able to come up with correct equation. A few candidates wrote an expression, without the *y* variable.

Common wrong responses were $x = -2$, $y = -4$, $-2x - 4$ and $y = -2m - 4$.

The expected response was $y = -2x - 4$.

Question 11

The marks obtained by a group of 25 students in a mathematics test are shown in the frequency table. [Frequency table was given].

(a) **(i)** State the mode.

This part of the question was well done. Some candidates gave the highest frequency as the mode. A few candidates had a challenge in differentiating between the mode, median and the mean. Some wrote the response of the mean or the median where they were supposed to write the mode.

Common wrong response were 8 and 45.

The expected response was 60.

(ii) *Find the median.*

This question was fairly done. Some candidates wrote the median position as their median. Others expanded the frequency table into a raw distribution before identifying the median.

Common wrong responses were $\frac{45+60}{2} = 52.8$, $\frac{25+1}{2} = 13$ and 60.

The expected response was 45.

(iv) *Calculate the mean.*

This part of the question was poorly done. Most candidates did not seem to know how to find the mean from a frequency table, though they seemed to have an idea of what the mean is. Some just added the marks without multiplying by the frequency and divided by 25 or by 6.

Common wrong responses were $\frac{34+40+45+60+70+76}{6}=54.17$ and $\frac{325}{25}=13$.

The expected response was 50.92.

(b) *A student is chosen at random from the group.*

Find the probability that the student scored

(i) *less than 60 marks in the test,* his part was well done by most candidates.

The expected response was $\frac{14}{25}$.

(ii) *more than 60 marks,*

This part was fairly done. Some candidates included even those that got 60.

Common wrong response was $\frac{11}{25}$.

The expected response was $\frac{3}{25}$.

(iii) *at least 60 marks.*

This part of the question was fairly done. Some candidates had a challenge in interpreting ‘at least’, they only counted up to 60 and excluded the ones above 60.

Common wrong response was $\frac{8}{25}$.

The expected response was $\frac{11}{25}$.

(c) *A pie chart is to be drawn to show the information from the frequency table.*

Calculate the sector angle for the number of students who obtained 45 marks.

This part was fairly done. Some candidates used denominator 45. Some of those with the correct denominator multiplied by 100, instead of 360.

Common wrong responses were 56, 28, 108 and 101.

The expected response was 100.8°.

(d) *If the pass mark was 50, calculate the percentage of the students who passed the test.*

This part of the question was very well done by most candidates. Some candidates were using denominator 50, instead of 25. Some were multiplying by 360 instead of 100.

Common wrong response were 22 and 79.2.

The expected response was 44%.

Question 12

In the diagram, line AP is parallel to line BD. Triangle ABC is isosceles. Angle ABC is 50°. P is a point on AC produced. [A sketch of the information was given].

Find

(a) *Angle BAC,*

This part was generally well responseed by most candidates.

Common wrong responses were130° and 50°.

The expected response was *65°.*

(b) *Angle BCP,*

This question was fairly well responseed, using angles in a triangle.

Common wrong responses were 50°, 130° and 65°.

The expected response was 115°.

(c) *Angle CBD.*

This part of the question was generally well responseed.

Common wrong responses were 50°, 130° and 65°.

The expected response was *65°.*

Question 13

Shapes A and B are shown. [Shapes A and B were geometrical quadrilateral drawn on an x-y grid].

(a) *Shape B is mapped to shape C by a translation, vector* $\begin{pmatrix} -8 \\ -3 \end{pmatrix}$*. Draw and label shape C .*

This part was generally well answered by most candidates.

The expected response was *Shape with vertices at* (−2,−7), (−4,−5), (−6,−5), (−6,−7).

(b) *Shape A is mapped onto shape D by a reflection in* $x = -1$. *Draw and label shape D.*

This part of the question was fairly done.

Common wrong response was A reflection in the *y*-axis.

The expected response was *Shape with vertices at* (−4,4), (−4,2), (−6,2), (−6,6).

(c) *Enlarge shape A by scale factor* $-\frac{1}{2}$, *centre (0,0), and name the image F.*

This part of the question was poorly done by most candidates. Some candidates enlarged with a positive scale factor, using any centre. Some even got bigger shapes than the original shape.

The expected response was *A shape with vertices at* (−2,−1), (−1,−1), (−2,−3), (−1,−2).

Question 14

Triangle KLM is a right-angled triangle. Angle KLM is 90°. KL = (x+3) cm and LM = (x − 5) cm.

[A sketch of the triangle was given].

(a) *Write an expression, in terms of x, for the area of the triangle.*

This part of the question was fairly done by most candidates. They just had a challenge in writing it correctly by leaving out the brackets.

Common wrong responses were $\frac{1}{2} \times x + 3 \times x - 5, \quad x + 3 \times x - 5$.

The expected response was $\frac{1}{2}(x+3)(x-5)$.

(b) *The area of the triangle is 16.5 cm*^{2}.

(i) *Form an equation in terms of x for the area of the triangle and show that it reduces to* $x^2 - 2x - 48 = 0$.

This part was poorly done by most candidates. Some did not even use the 16.5 cm^2. Some decided to factorise and solve the given equation. Others just equated the left hand side of the equation to 16.5, then attempted to solve. The few candidates that were able to equate their expression to 16.5 had a challenge in opening the double brackets, because they multiplied the first bracket by the half, then there were no double brackets after that.

The expected response was $\frac{1}{2}(x-5)(x+3)=16.5$

$$(x-5)(x+3)=33$$

$$x^2-5x+3x-15=33$$

$$x^2-2x-48=0$$

(ii) *Solve the equation* $x^2-2x-48=0$. *Show your working.*

This part was fairly responseed. Some candidates attempted the quadratic formula and failed to do it correctly. Some were able to factorise correctly but then failed to solve the equation.

Common wrong responses were −8 and 6.

The expected response was 8 and −6.

(iii) *Find the length of KL.*

This part of the question was poorly done by most candidates. Even those with correct responses in the above parts failed to give the correct response. Most candidates seemed not to understand what was expected of them.

Common wrong response was x + 3.

The expected response was 11 cm.

EGCSE MATHEMATICS

Paper 6880/03

Calculator Structured Questions (Extended)

General Comments

The overall performance of the candidates in this component was below average as expected for extended candidates. The expectation was that candidates will perform much better since this was relatively an easier paper in the extended component. There were less than 5 candidates who scored a total score of 80 and a score of 0 was also recorded. There were very few scores exceeding 70 with most scores below 30. Quite a number of scores were below 20 marks.

Candidates performed much better in the first 10 questions and **Q23**. Most candidates had difficulty responding from **Q11** – **Q22**, where they were only able to respond to only certain parts of these questions which were worth a fewer marks. The time allocated for this component seemed enough since candidates were able to attempt almost all the questions except for Q10(b) which was perhaps too challenging .

Questions that presented the least difficulty were **Question 1, Question 2, Question 3, Question 8, Question 14(a), Question 15(a)** and **Question 23**. Those that proved to be difficult were **Question 4, Question 5, Question 7, Question 10(b), Question 12, Question 14(b), Question 15(b), Question 17, Question 18, Question 19** and **Question 22**.

Candidates had a tendency of writing correct responses without showing any working e.g., **Q1**, **Q15(a)** and **Q20**, which lead to a loss of all the marks allocated for these questions. Learners should be encouraged to always show all their working, avoid very long methods where short methods could easily lead to the correct response e.g. **Q19(b)**, avoid rounding off exact responses e.g. **Q22(b)(i)**, avoid premature rounding off responses and use 3.142 or calculator value for π instead of using 3.14.

Comments on Specific Questions

Question 1

Candidates were expected to express 0.35 as a fraction in its simplest form, showing their working clearly.

This question was fairly well done.

Common wrong response was $\frac{0.35}{100}$.

The expected response was $\frac{35}{100}=\frac{7}{20}$.

Question 2

Candidates were required to list the numbers; 0.3784, 0.7483, 0.0874, 0.3074 in order of size, starting with the smallest.

This was generally well responded with a few of them misplacing one of the decimals.

Common errors: Arranging decimals in descending order and some used whole numbers instead of decimals.

Correct arrangement: 0.0874, 0.3074, 0.3784, 0.7483

Question 3

Candidates were supposed to evaluate $\frac{2}{5}+\frac{1}{3}$, showing all working.

This question was well responded to, however weak candidates simply added numerators and denominators i.e. $\frac{2+1}{5+3}=\frac{3}{8}$.

Other common wrong responses: $\frac{3(2)+5(1)}{15}=\frac{6+6}{15}=\frac{12}{15}$ and 11 without denominator.

The expected response was $\frac{11}{15}$.

Question 4

Candidates were required to find the price of an item before VAT, given the price of the item including VAT at 14% as E513.

This question proved to be challenging to most candidates hence poorly done.
Most candidates failed to recognize that this problem involved reverse percentages.

Common wrong response was 86% of E513 = E441.18.

The expected response was $\frac{513}{1.14}$ = 450.

Question 5

Stating the number of lines of symmetry and the order of rotational symmetry of the circle divided into two semi circles was a big challenge for most candidates.

Common wrong responses were infinity, many **or** 1, for both **(a)** and **(b)** as they treated it as a normal circle and ignored the diameter dividing the circle into two semicircles.

The expected responses were **(a)** 2

(b) 2

Question 6

Solving the equation 6 – 5*x* = 3*x* + 10 was fairly done.

However, some candidates failed to collect like terms properly thus they either had – 8*x* = 16 **or** – 2*x* = 4 **or** 8*x* = 16, hence their wrong responses were *x* = – 2 **or** *x* = 2.

Some occasionally omitted the negative sign and gave their response as *x* = $\frac{1}{2}$ instead of *x* = $-\frac{1}{2}$

.

Very few left their response un simplified as *x* = $-\frac{4}{8}$.

The expected response was (*x*) = $-\frac{1}{2}$.

Question 7

The question was poorly done. Candidates were given a pool of probability terms to choose from to describe given probabilities. However, this question was poorly done. They seemed not to be familiar with the terminology used in defining probability, there was a lot of guesswork and others even gave fractions instead of the given words.

The expected responses ware **(a)** Certain (for the probability of an event to occur is 1)

(b) Impossible (for the probability of an event to occur is 0)

(c) Unlikely (for the probability of an event to occur is 0.002)

Question 8

This question was generally well answered since 63˚ was very much common but failed to give the correct explanation.

Common wrong responses were supplementary, alternating, parallel or interior.

The expected response was 63, corresponding.

Question 9

Candidates were asked to find M^{-1}, given that the determinant of M is k and $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$.

This question was poorly done. Some left it blank, and some seemed to be confused by the use of too many variables and ended up replacing the variables with their own numbers. Some did not see the given k as the determinant and gave their response as $\frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ instead of $\frac{1}{k}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$.

Other Common wrong responses were $k\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$, $\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$, $\frac{1}{k}\begin{pmatrix} a & -c \\ -b & d \end{pmatrix}$

and $\frac{1}{k}\begin{pmatrix} -a & b \\ c & -d \end{pmatrix}$.

The expected response was $\frac{1}{k}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$.

Question 10

(a) Quite a number of the candidates were able to solve the inequality $\frac{x+1}{2} \leq \frac{x-2}{5}$

Common wrong response was failure to clear the fraction properly resulting to $2(x + 1)$ $(\leq)$ $5(x – 2)$.

Those who were able to clear the fraction correctly, failed to remove brackets properly i.e. they either had $5x + 5 \leq 2x – 2$ or $5x + 1 \leq 2x – 4$ hence wrong solutions.

Some failed to collect their like terms correctly whereas some replaced the inequality sign with an equal sign in the working stages and recalled the inequality sign in their response.

Some continued with the LCM of 10 up to the response i.e. $\frac{5(x+1) \leq 2(x-2)}{10}$ and giving their response as $\frac{x \leq -3}{10}$

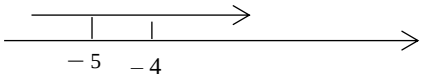
Other Common wrong responses were $x = – 3$ **,** $x \geq – 3$ and $x \leq 4$.

The expected response was $x \leq – 3$.

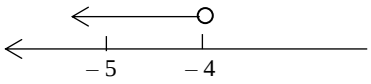
(b) Students were required to represent the inequality $t > – 5$ on a number line.

Most students did not attempt it at all so the response space was occasionally found blank.

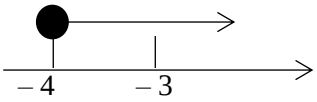
Some candidates were showing a region in a plane and some showed $t \geq – 5$ on the number line and some even showing a double inequality $– 5 \leq t \leq 0$ and some had an arrow on top of – 5 with no un shaded ring. e.g.



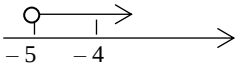
Some candidates used a reversed number line.



Another common wrong response was



The expected response was

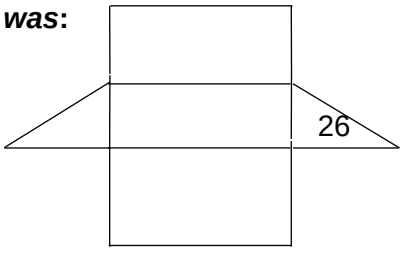


Question 11

Candidates were given a triangular prism and were expected to sketch the net of the prism.

Correct sketch was very rare. Some sketches had equal rectangles, and some had the correct rectangles but the two triangles were not right angled. Some rectangles were drawn as parallelograms. Some candidates had no idea of a net and even drew a netball net

***The expected response was*:**



NOT TO SCALE

Question 12

The question required candidates to calculate the percentage increase in the mass of a baby with an original mass at birth of 3.8 kg and final mass at three months of 5.1 kg.

This question was fairly done.

Common wrong responses were

$\frac{3.8}{5.1}\times 100 = 74.5$ or $\frac{1.3}{5.1}\times 100 = 25.5$ or $\frac{5.1(100)}{3.8}134.2$ **.**

Some students gave their response as 34% (correct to 2 significant figures) instead of 34.2 or better.

The expected response was 34.2 %.

Question 13

(a) Candidates were asked to write *y* in terms of *x* and *z* , given that *y* varies directly as (*x*+1) and inversely as *z* and that *y* = – 3 when *x* = 2 and *z* = 5.

This part proved to be a challenge to most candidates.

Common wrong responses were: $y = \frac{5(x+1)}{z}$,y = $\frac{k(x+1)}{z}$ and $y = \frac{kx+1}{z}$ without calculating *k* and substituting it in the equation.

Some candidates calculated *k* as – 5 but did not substitute it in the equation.

The expected response was $y = \frac{-5(x+1)}{z}$.

(b) Candidates were asked to find *y* when *x* = 11 and *z* = – 15 This part was well done by the candidates who had the correct value of *k* .

Common wrong response was *y* = – 4 .

The expected response was *y* = 4 .

Question 14

(a) Writing the next two terms for the sequence 9, 5, 1, – 3 , ... was not a problem for most candidates so this part was well done with a very few candidates writing only one term or even three terms.

The expected response was – 7, –11.

(b) Candidates were expected to find the *n*th term of the sequence in **(a)**. This part was a bit challenging for the candidates. Very few remembered the general formula for the *n*th term of an arithmetic sequence.

Common wrong responses were $n - 4$ and $4n + k$.

The expected response was $-4n + 13$.

Question 15

(a) Candidates were given the equation $V = \frac{1}{2}\pi r^2 h$ and asked to find V when $r = 3.4$ and $h = 8.7$ and this was well done.

Common errors were;

Some candidates used 3.14 for π instead of 3.142 or calculator π hence they lost the accuracy mark. Some candidates displayed the correct response (158) without any substitution shown which lead to the loss of all the 2 marks allocated for this question.

Common wrong response was157.898 when using 3.14 for π.

The expected response was 158.

(b) Candidates were supposed to express r in terms of V and h for the equation,

$V = \frac{1}{2}\pi r^2 h$.

This part was poorly done. Some candidates failed to clear the fraction properly hence they ended up leaving their responses as $r = \sqrt{\frac{v}{\frac{1}{2}\pi h}}$.

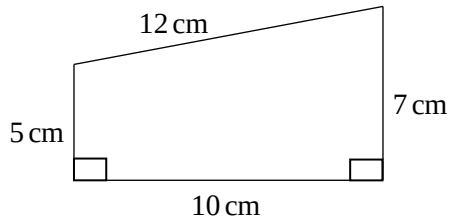
Common errors: Evaluating by substituting the values of r and h given in (a) instead of changing the subject **or** attempting to clear the fraction incorrectly by squaring V, instead of multiplying by 2 **or** multiplying all the variables by 2 and end up with $2V = 2\pi 2r^2 2h$ **or** subtracting πh instead of dividing by it.

Common wrong responses were $r = \sqrt{2V - \pi h}$ and $r = \sqrt{\frac{V^2}{\pi h}}$.

The expected response was $r = \sqrt{\frac{2V}{\pi h}}$.

Question 16

Candidates were required to calculate the area of the following trapezium.



This question was fairly well done.

Common errors were Some candidates used 12 cm instead of 10 cm as the height of the trapezium hence their area = $\frac{1}{2}(5+7)\times 12$. Others divided it into two triangles and treated both triangles as right angled triangles thus their areas were = $\frac{1}{2}(5)(10)+\frac{1}{2}(12)(7)$ and $\frac{1}{2}(10)(7)+\frac{1}{2}(5)(12)$.

Common wrong responses were 72, 67 and 65.

The expected response was 60.

Question 17

Candidates were given part of a distance time graph for Mr Ngobese's journey from home to a village and back home.

(a) Candidates were required to complete the distance time graph using the given information.

This part was poorly done because they had a challenge of calculating the distance of 105 km from 70 km/hr and 1hr 30 min, using d = sp x t, for the first stage of the duration of the journey. They simply considered the distance as 70 km from the given 70 km/hr so their distance went as far as either 150 or 160 km instead of 185km. The second stage was correctly drawn. The last stage was also a challenge since they could not calculate the time correctly from the given speed.

Common wrong errors were Graph treated as speed time graph therefore their calculation for the distance for the first extension = 80 km/h + 70 km/h = 150 km.

The expected response was straight lines from (1030, 80) to (1200, 185)

(1200, 185) to (1215, 185)

(1215, 185) to (1415, 0)

(b) In this part, candidates were required to state the distance of the village from Mr Ngobese's home.

This was well done since most were able to correctly interprete and read their graphs.

Common wrong responses: 160 km and 150 km.

The expected response was 185.

(c) This part was well responded. Most candidates were able to read Mr Ngobese's home arrival time from their distance time graph.

The expected response was 1415.

Question 18

Candidates were given three triangles, *U*, *V* and *S* on a grid and that *R* (*U*) = *V*.

(a) Candidates were required to describe transformation *R* fully.

This part was not well done.

Most candidates were able to recognize the transformation as either rotation or enlargement but would give incomplete description of the transformations **or** describe wrongly **or** describing more than one transformation **or** mixing descriptions.

Common wrong response was none.

The expected response was Enlargement, centre (–2, –2), sf = – 1 **or** Rotation, centre (– 2, – 2), angle 180˚

(b) In this part candidates were given that triangle *S* can be mapped onto triangle *V* by transformation *P* followed by a transformation *Q* and were required to identify transformations *P* and *Q*.

This was well done since most candidates identified correctly the transformations as enlargement and reflection. Very few confused reflection with rotation.

Some common wrong responses were shear, stretch and rotation.

The expected response were enlargement and reflection.

Question 19

Candidates were given a cube of side length 10 cm.

(a) This part required candidates to calculate the length of a diagonal *FZ*. This was poorly done as most calculated *FZ* as $\sqrt{200}$ with the assumption that *HF* = 10 cm.

Common wrong response was14.1.

The expected response was 17.3.

(b) Candidates were asked to calculate the angle between the diagonal *FZ* and the base *EFGH*.

This was poorly done. Candidates were able to identify the required angle but used their wrongly calculated *FZ* correctly in one of the trigonometric ratios. Some used very long methods like the sine or cosine formula without reaching the correct response. Premature rounding affected the accuracy of some of the candidates.

Common wrong responses were 45.2˚ and 35.4˚.

The expected response was 35.3.

Question 20

Candidates were given a table with the results of 270 students' heights measured and required to calculate an estimate of the mean height of the students.

This was fairly done by the good candidates.

Common wrong errors were $\frac{10\times f}{270}$, $\frac{(lower\,class\,or\,upperclass)\times f}{270}$, $\frac{midvalues\times f}{8}$

and $\frac{midvalues\times f}{200}$.

The expected response was $\frac{43830}{270}$ = 162.

Question 21

Question required candidates to simplify $\frac{x^2+3x}{x^2+5x+6}$

This was fairly attempted. Some were able to factorise the numerator but the denominator was incorrectly factorized as (x – 2) (x – 3) or x (x+5) + 6

Common wrong responses were cancelling the x^2 on both the numerator and denominator giving $\frac{3x}{5x+6}$.

Correctly factorized numerator and denominator but failing to cancel out common term (x+3), to simplify thus leaving their response as

$$\frac{x(x+3)}{(x+2)(x+3)}$$

The expected response was $\frac{x}{x+2}$.

Question 22

(a) Candidates were given a list of probabilities for mutually exclusive events in a table and were required to find the missing probability. This part was well done.

Common wrong responses were 0.95 and 0.5.

The expected response was 0.05.

(b) **(i)** Candidates were required to calculate the probability of two combined events by multiplication.

This part was poorly done. Some of those who calculated correctly ended up rounding the exact response 0.3249 to 0.325. Most of them assumed there were 100 children in the survey, thus treated this as a conditional probability problem hence they had $\frac{57}{100} \times \frac{56}{99}$.

Common wrong responses were $\frac{57}{100} \times \frac{56}{99}$,and 0.57 + 0.57 = 1.14.

The expected response was 0.57 × 0.57 = 0.3249

(ii) Candidates were required to calculate the probabilities of combined events by multiplication and addition. This was poorly done.

Most had only one product (0.38×0.05), $\frac{38}{100} \times \frac{56}{99}$ and 0.38 + 0.05.

Common wrong response were 0.019 and 0.43.

The expected response was (0.38 × 0.05) + (0.38 × 0.05) = 0.038.

Question 23

Candidates were given the graph of a line L and asked to find the gradient of the line in (a) and to write down the equation of the line in (b).

(a) This part was well responded with a few candidates calculating $\frac{\text{change in } x}{\text{change in } y}$ instead of $\frac{\text{change in } y}{\text{change in } x}$.

Some used the formula $\frac{\text{rise}}{\text{run}}$ correctly but did not note that the line had a negative gradient.

Common wrong responses were $-\frac{1}{2}$ and 2.

The expected response was – 2.

(b) This was well done since candidates were able to read the y- intercept correctly and substitute it in the general equation, $y = mx + c$. Those who attempted to calculate the y – intercept could not calculate it correctly hence they failed to write the correct equation.

Common wrong responses were $y = -\frac{1}{2}x + 6$ and $y = 2x + 6$

The expected response was $y = -2x + 6$.

(c) Candidates were required to draw the graph of the line $y = 3x + 14$.

This was fairly done. Some candidates either drew any line or added squares on the y axis from – 9 to –14 since the –14 (y - intercept) did not show on the grid.

The expected response was line passing through (2, –8) and (6, 4).

(d) Candidates were asked to write down the point of intersection of the two lines.

This part was well done since candidates were able to read their point of intersection correctly.

The expected response was (4, –2).

EGCSE MATHEMATICS

Paper 6880/04

Calculator Structured Questions (Core and Extended)

General Comments

The paper proved to be challenging for most candidates. There were several 'form and solve questions'. Candidates seemed to have expected straight forward questions requiring them to, for example, find the volume of a cylinder instead of forming a quadratic equation resulting from their knowledge of the correct formula of the volume of a cylinder.

This paper required candidates to be familiar with all the necessary formulae in the EGCSE mathematics syllabus. Also to have completed the syllabus coverage involving both core and extended material.

Candidates were required to carefully read and understand questions. There was an improvement in the showing of working, as various relevant methods of attempting responses to questions were shown.

Comments on specific questions

Question 1

(a) A large number of candidates were able to get the correct median as a response to this question. Common errors arose from dividing the sum of 43 and 53 by 2 resulting into 48 as Common wrong responses. Some did not rearrange the data from the smallest to the highest, resulting to 93 as another common wrong response.

(b) Incorrect addition in the numerator gave responses such as 52 and 53 as the mean instead of 52.4

(c) The question was well accessible for most candidates. The common wrong response of 41 arose from dividing the 82 by 2.

Question 2

(a) A vast majority of candidates were able to get the score in this question. However, some would introduce brackets when collecting the x-terms eventually getting $1-(2x+5x)+3v=1-3x+3v$ *or* $1-7x+3v$ as a common wrong responses.

(b) Although some were able to find the correct numerator, they could not bring together the numerator expression with the relevant denominator. The final response they presented was not a fraction. common wrong response was; $\frac{y}{3}-\frac{2y}{5}=5y-6y$.

(c) While numerous candidates gained the partial mark, a lot of them gave a response that was not in its simplest form. $\frac{12z-11z}{2z^2}$ was the common wrong response.

Question 3

(a) This was the most accessible question. The only few errors resulted from interchanging the matrices to calculate K – L instead of L – K.

(b) Some incorrect responses came from errors in addition of directed numbers.

(c) A major group of candidates were able to gain all the marks in this question. There were those who made the mistake of multiplying the column in the first matrix by the row in the second matrix resulting in a 1by 1 matrix.

(d) Some candidates gave the word, “impossible” as the response. Matrix multiplication skills seemed lacking to some.

Question 4

(a) **(i)** The main aspect to understand in order to effectively respond to this question was that, only the cosine formula works in calculating the size of any of the angles if all the sides of a triangle are given with none of the angles. Most candidates could not realise that. They tried using the sine formula and got stuck. Those who successfully used the cosine formula mostly arrived at the required response. Some could not arrive at the given response because of errors in order of operations and inability to make cos *QPR* the subject of the formula. After getting to the step $49=356-320\cos QPR$ they lost marks by getting an error filled next step of ; $\cos QPR=\frac{49}{36}$.

(b) **(ii)** The question was partially responded by most candidates. Most candidates were able to use the sine or cosine formula to find the acute angle. Instead of finding the obtuse angle, they just stopped at the acute angle 40.2°.

(c) **(iii)** This question required candidates to first find angle RPS or angle PRS, then use the sine ratio or any of the three trigonometry ratios to find side SR. impressive

responses were found from many candidates. Although some responses arose from long methods, there were minimal errors made in accuracy.

(d) This was one of the most challenging questions to candidates was this one, in which they assumed triangle NOL to be right angled and gave $\cos MON = \frac{4}{4.7}$ as a common wrong response. They were expected to use the sine formula for the area of a triangle to calculate the angle MON.

Question 5

(a) The question proved to be difficult for most candidates. The equation they were expected to form depended on their ability to correctly recall the equation $V = \pi r^2 h$ used in calculating the volume of a cylinder. Although correct substitution of the radius expression was done, errors made in the collection of like terms resulted in loss of marks. The formula for volume of a cone $V = \frac{1}{3}\pi r^2 h$ was used by most candidates, who could not successfully arrive at the correct final response.

(b) A great majority of candidates were able to access this question. Those who gave both responses to 3 significant figures, lost some marks. Candidates continued to use a short division line that divided only the discriminant resulting in a wrong quadratic formula. There were however several responses arising from the use of completing the square as an alternative method. Some wrong responses were: $x = -8 \pm \frac{\sqrt{176}}{8} = 9.66 \quad or -6.34$ and 0.658 or -2.66.

(c) Most were able to get this one correct from their response in (b), because this question did not specify any degree of accuracy**.**

Question 6

(a) A well responded question. Those who scored wrongly, gave 70° as a response arising from assuming that angle *GFE* and EDH were opposite angles of a cyclic quadrilateral. It was obtained by subtracting 110 from 180.

(b) The candidates mixed up the angle properties of a circle and they were inaccurately applied in the question. As a result, 55° and 35° were Common wrong responses obtained from diving either 110 or 70 by 2.

(c) A majority of candidates were able to realise that the angle required was in the same segment as angle *GCE.* The same wrong responses of 55° and 35° were given as in (b).

(d) A fair attempt was shown resulting in 110°,120° and 70° as wrong responses arising from correct application of the angle at the centre being twice the angle at the circumference if they are subtended by the same chord.

(e) Candidates assumed that GOEF was a rhombus with equal opposite angles. Their wrong response of 70° was a result of 180° – 110° ,because GOH and GOE form a straight-line angle.

Question 7

(a) **(i)** candidates struggled with using appropriate inequality signs. They sometimes used A and B in the place of variables x and y. The most notable wrong responses were: $x+y=25 \, or \, x+y<25$.

(ii) This was easily accessible with only an inclusive inequality as a frequently seen wrong response.

(iii) A lot of candidates who had a good idea of the cost function lost marks due to an inequality sign facing the opposite direction to the one expected.

The Expected response was: $80x + 60y > 1200$

(b) The only correct boundary line drawn was y=x, the others would have either the x or y-intercept wrong. A few, who had correct boundary lines lost marks due to wrongly shaded regions.

(c) This one of the questions which was hardly responded. However, those who attempted responding, lost marks for choosing decimal coordinate points such as (12.5, 10,5) which represented half a packet of washing powder. Some other wrong responses resulted from using a simplified cost function of 4x+3y instead of 80x+60y. Emphasis should be made during teaching, that the cost or profit function should not be simplified.

Question 8

(a) The question expected candidates to understand that probabilities will be affected by conditions preceding that event. It was one of the most inaccessible questions in the paper. Some wrong responses were those involving both numerator and denominator reduced by 1 in the second event, resulting into $f=\frac{3}{11}, g=\frac{3}{11}, h=\frac{2}{11}$ as wrong responses.

(b) **(i)** Another Not well answered question. Candidates used the original information

when balls were replaced. The mark scheme was also a bit harsh as it did not allow part marks for at least two correct branches. Those who had the (y, y) and (b, b) branches correct lost marks for getting the (w, w) probabilities wrong.

(ii) Misinterpreting exactly one blue ball to mean at least one blue ball led to many candidates giving five probabilities with the (blue, blue)-branch included.

(c) The statement "the ball was replaced" led capable candidates to assume that the 4 events were a result of the ball being replaced each time after pecking. This led to 4 probabilities with denominator 12 instead of 12,11, 10 and 9 respectively.

Question 9

(a) Candidates were required to multiply every term by x and then solve the resulting quadratic equation by the method of factorising. Most candidates could not get the correct equation after clearing the fraction with denominator x. The errors in multiplication yielded the following wrong responses.

$2x-12-5x=0$

$x=-4$

The expected response was $2x-\frac{12}{x}=5$ which yielded $\begin{matrix}2x^2-12-5x=0\\ x=-1.5\ or\ x=4\end{matrix}$.

There were good responses that arose from using the method of completing the square and the quadratic formula. Although some lost part of the marks due to mistakes incurred whilst trying to use the quadratic formula and completing the square.

(b) A large group of the candidates lost marks by attempting to remove the square root. As they squared both sides of the equal sign, they made an error in not squaring the denominator 6.

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Question 10

(a) A few candidates obtained the correct equation. The most common error was using the y-intercept in line R instead of (-3).

Common wrong responses were $y=-\frac{1}{5}x+7$, using -5 as the gradient and $y=-\frac{1}{5}-3$.

(b) Strange notation in the method of finding the midpoint resulted into some candidates getting only one coordinate point instead of 2. Candidates wrote $\frac{-5+-7,4+10}{2}=\frac{-12-14}{2}=13$.

Error in addition of directed numbers yielded a common wrong response of (-1, 7), where only one coordinate point was correct.

(c) This question was hardly responded correctly by most candidates. A few of the common responses resulted from subtracting the squares of the *x* and *y* displacements instead of adding, for instance, $d = \sqrt{(0 - -5)^2} - (-3 - 4)^2$. There were some good responses that were obtained from realising that the length of AC is the same as the magnitude of vector AC.

The expected correct response was $\sqrt{25 + 49} = \sqrt{74}$= 8.60

Question 11

(a) The question required candidates to illustrate all the key steps used when completing the square in a quadratic equation. A lot of the candidates were able to leave a coefficient of 1 in the x^2 term, by dividing all terms by 2. They however could not further divide the middle coefficient by 2 before squaring. This error produced a wrong step of $(x + \frac{3}{2})^2 = \frac{7}{2} + (\frac{3}{2})^2$

(b) In this question candidates were required to form an equation connecting the area and perimeter of a rectangle. Most of them were familiar with the formula for finding area of a rectangle but the perimeter proved to be a challenge. Those who were able to correctly form the equation did not understand that 'representing *l* in terms of *b'* meant, "make *l* the subject of the equation". Their final equation showed *l* on both sides of the equal sign.

The common wrong response was $l = \frac{2l + 2b}{b}$.

(c) **(i)** This question proved difficult and challenging for most candidates. They were required to use either the sine or cosine ratio to form an equation connecting the hypotenuse and the side *WM, then solve it.* Those who were able to form the equation, attempted to solve it before finding the value of sine30 as 0.5 and they got stuck at that point.

The expected solution was

$$\sin 30 = \frac{x + 2}{3x}$$
$$\frac{1}{2} = \frac{x + 2}{3x}$$
$$3x = 2x + 4$$
$$x = 4$$

(ii) A number of those who were able to arrive at the value of x in **(c)(i)**, were able to correctly evaluate BW. The response space indicated that MW was required, most

candidates wisely calculated both sides.

The expected correct response was $Bw = \sqrt{108} = 10.4$

Question 12

When proving congruency, the candidates merely restated the relationship between corresponding sides using the ratios given in the question. The common wrong responses were; DO: OE = 1:1, CO: OF = 1:1. The question was hence poorly answered. There were however some very good responses, where the given vectors were used to show that all the sides of triangle DOC were equal to those of triangle EOF.

(a) Most candidates used the ratio 1:2 to find the area of triangle AOD. This yielded a popular wrong response of 10 square units.

(b) The question was fairly well done by most candidates. Some only stated that $\overrightarrow{AB} = \overrightarrow{2EF}$ without giving a specific breakdown of the value of vector AB and EF, before drawing the conclusion. Some candidates lost marks for not paying attention to the direction of each vector. This led to interchanged signs, where $\overrightarrow{AB} = 2b + 2a$.

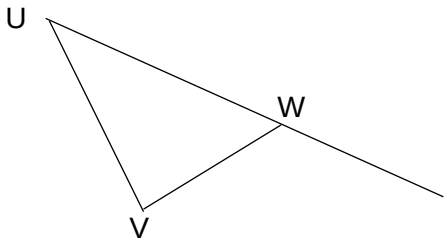
There was other good demonstration of vector understanding, where candidates used column vectors and drew the conclusion from the scalar multiple presentation. For example,

$EF = \begin{pmatrix} -a \\ b \end{pmatrix}, AB = \begin{pmatrix} -2a \\ 2b \end{pmatrix}$

$AB = 2EF$

Question 13

(a) **(i)** A majority of candidates found this question very accessible. Some lost marks by first drawing side UV, followed by the longer side UW and the smallest side VW last. These did not get a triangle, but a flag figure**.**



(ii) A well answered question. Errors were made when some candidate measured the

obtuse angle WVU instead of angle UWV. The resulting popular wrong response was 115°.

(b) **(i)** Candidates struggled with forming the equation. They interpreted, '*3 cm longer than ND*' as '*3 times ND*'. A common wrong equation of $3x + x + 2x = 19$ gave x = 3.167 as the response.

(ii) A popular wrong response of 3 times their **b(i)**, was given.

Question 14

(a) **(i)** After adding 2 both sides of the equal sign, most candidates could not continue. Some of those who arrived at cos z = 0.5, used the trial and improvement method to arrive at 60° and 300°.

(ii) The question expected candidates to factorise b and use the zero-product rule to solve the resulting equation. The error made was ;

$$b - 2bh = 0$$

$$b = 2bh$$

$$h = \frac{b}{2b} = \frac{1}{2}$$

Learners should be made aware why a numerical value arising from division by a variable in solving an equation does not yield an acceptable solution to another variable.

(b) This question was not well attempted. Instead of equating the first derivative of the function to the gradient of the tangent and solving, candidates tried a long method. They equated the 2 equations to solve simultaneously. Although this was an acceptable equivalent method, most candidates got stuck when they arrived at a quadratic equation to be solved for the suitable x- coordinate. They were other impressive responses arising from implicit differentiation.

Although all these methods were acceptable, the expected shortest solution was:

$4x - 8 = 8$ $\quad y = 8x - 44$

$4x = 16$ and $y = 32 - 44$,coordinates of A = (4. -12)

$x = 4$ $\quad y = -12$