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Examiners' Report
Principal Examiner Feedback

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Paper 1FR

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Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see many students clearly showing their working. Students were less successful in using set theory, polygons and working with prime factors.

On the whole, working was shown and was easy to follow through. There were some instances where students failed to read the question properly. For example, in Q3, some students did not answer the question but simply worked out 13.33…..Some students could not recall the conversion that there are 1000 m*l* in 1 litre.

A striking weakness in students was solving problems with perimeters, finding HCF and LCM using indices, applying Pythagoras theorem and working out the surface area of a cuboid. On the whole, problem solving questions and questions assessing mathematical reasoning were not tackled well, this was particularly apparent in questions 17 and 24.

Question 1

At the start of the paper students were presented with a very familiar style of question on types of numbers and the four operations and they were almost all able to achieve full marks.

Question 2

(a) This part was answered well. Misspellings were condoned. A common error was to write equilateral.

(b) This part proved to be more challenging with a significant number of students either drawing in no lines of symmetry or drawing in only the vertical line of symmetry or drawing in only the horizontal line of symmetry or drawing in the correct lines of symmetry with additional diagonal lines. It was disappointing to see students just drawing dashes/arrows where the lines of symmetry pass through.

(c) There were plenty of correct answers seen, but both 1 and 4 were common incorrect answers. 180° was given by a few students who clearly partially understood the question.

Question 3

(a) Generally, this part was answered well. Some students did not realise that 1 m = 100 cm. Some common incorrect answers were 60 or 6.

(b) Generally, this part was answered well. Some students did not realise that 1 kg = 1000 g. Some common incorrect answers were 45 or 450.

(c) Students generally answered this question well. Many students multiplied ~~by~~ 3 by 1000 and then divided by 225 and then left their answer as 13.3… or 14. Some students did not multiply 13 by 225 to find the amount of fruit juice used and some did not round down to 13. Some students did not know the conversion from litres to millilitres as they were multiplying by 100. Most knew to divide by 225, so a common answer was 1 from 300/225. Repeated addition was

used often with 225m*l* to reach 3000 m*l*. The alternative method of dividing 3 by 1000 and then using this answer to divide into 3 was rarely seen. Students are encouraged to read the question carefully as they did not subtract 2925 from 3000 to find the answer.

Question 4

(a) This part was answered well. Students should be applauded as most were able to interpret the key correctly.

(b) This was well answered as the majority of students drew a square for Cruise and two and a quarter squares for Skiing correctly. Very occasionally small squares were drawn in the pictogram which were credited if correct.

(c) Almost all students were able to gain the two marks here for giving the correct probability using a correct notation. Understanding the answer was $\frac{7}{40}$ but writing in an unacceptable probability form such as 7 : 40 was seen but not awarded the marks. A common incorrect answer was $\frac{1}{40}$.

Question 5

(a) The overwhelming majority of students were able to find the next term of the number sequence, although some also wrote down the sixth term.

(b) Most students were able to successfully communicate their use of the term to term rule, although the occasional response simply explained that the difference between the terms was added to 22, rather than specifying the value of this difference.

(c) A large number of students were not able to offer a full explanation. Some simply stated that 256 is in the sequence while others stated that 256 is not a multiple of 5

Question 6

(a) In this question students were asked to put five decimal values in order of size, however, there was a sizeable minority who were unable to do so correctly, a lack of attention to detail meant that students 'lost' numbers from the original list or mis-copied them.

(b) This part was answered well. Occasionally students gave an answer of $\frac{70}{100}$.

(c) If students did not pick up both marks for simplifying the fraction, they were mostly able to pick up a mark for an unsimplified fraction. Some students also mixed up the numerator and denominator and gave an answer of $\frac{48}{30}$ or $\frac{8}{5}$.

(d) This part was answered well.

(e) Students found this question challenging. Only a small number of students were able to gain full marks. Many students were unable to make a start to the question, failing to gain a mark for working out the fraction of number of beads left in the bag. The most common error was to

use a trial and improvement method by choosing random numbers and then trying to find $\frac{1}{2}$ or $\frac{2}{5}$ of the random number. A minority of students worked out $\frac{1}{2}$ or 0.1 but did not progress any further.

Question 7

(a) Collecting like terms was well done, although the directed number aspect is still an issue for some. The most commonly seen error was simplifying to $2c - 7d$ or $9cd$.

(b) Only a small number of students were not able to multiply two algebraic terms.

(c) A large majority could solve the equation, with an algebraic method seen regularly. Clear algebraic working was not required and there were many who did not write any algebra at all, this could still gain full marks if done correctly. A few misinterpreted $5r$ as meaning $5 + r$ and worked accordingly to find a value for r that fitted their invented equation, scoring no marks.

Question 8

(a) The correct answer of 135° was given by the majority of students. Occasionally, the wrong answer of 45° was seen.

(b) Many students worked out the correct answer of 56° by identifying that the sum of the angles should come to 360°. However, a majority of students lost marks by not giving a correct reason. Students should learn the correct wording of the reason: Angles around a point add up to 360° not, for example, circles add up to 360°.

Question 9

This question was challenging to some students. Many students worked out 40% of 2500 giving an answer of 1000 gaining the first mark. Often, they went on to subtract 300 and 1000 from 2500 to find 1200 and then making no progress. A common error was to find the ratio 3 : 7 of 1000 or 1300 thus losing the final two marks. Some students subtracted 300 from 2500 and then tried to find 40% of their answer.

Question 10

It was clear that there was a lot of misunderstanding regarding the information given using set language. It was not uncommon to see the numbers 31, 18 and 27 transferred directly onto the Venn diagram and the outside of the circles left blank. Weaker students were usually able to pick up one mark by starting with 18 in the intersecting sets.

Question 11

The majority of students gave the correct answer to this question. Of those that didn't, the most common error was for students to find the products correctly but then divide by the sum of the number of eggs (15) rather than the sum of the frequencies (36) which was given in the question. The other error was to divide the sum of the number of eggs by 6. A common arithmetic error was to evaluate 0×5 as 5 rather than 0.

Question 12

Both parts of this question proved challenging to weaker students.

(a) Most students appreciated that the transformation involved a reflection, although some described it as rotational symmetry or as a translation. Occasionally, the line of symmetry was incorrectly stated as the mirror line –1.

(b) Most students were able to enlarge the given shape by a Scale Factor of 2, but were not able to correctly use the centre of enlargement, so the shape was in an incorrect place; this attempt was awarded 1 mark. Even when they drew the guidelines correctly from the vertices, they were unable to complete this correctly. A common answer given by the students was to draw the enlarged shape with vertices (0, 0), (6, 0) and (0, 4).

Question 13

(a) Most of the students could correctly take out a single common factor, while the remainder seemed not to understand what was required. The most common incorrect answer was $9x$ from attempting to subtract 15 from 6.

(b) It was encouraging to see many fully correct answers of $T = 200c - 50d$. However, almost equally often, $T = c - d$ was given as an answer; this gained students one mark. Many students wrote down $200c$ or $50d$ in the working space but did not progress any further.

Question 14

Many students could use their calculator to find the correct answer, although a few scored only one mark for part of the calculation worked out correctly, and some gave completely wrong answers, probably from not understanding the order of operations and not knowing how to use their calculator, for example, $\sqrt{7.4 + 5.1^2 \div 3}$ not realising that the whole expression is not square rooted. A common incorrect answer was 4.0087…… which came from this calculation.

Question 15

(a) Most students gained at least one mark for giving at least 4 of the correct integers. There were some errors interpreting the difference between the inequality symbols with confusion as to whether –2 and 3 should be included. Some students appeared to have misunderstood the question and gave a final answer of 5 to indicate how many integers met the inequality.

(b) Fully correct solutions for this inequality question were rare with students often marking a region greater than or equal to 1 rather than less than or equal to 1 and not shading the inside of the circle. Others put circles at both ends of the line with one open and one closed. Many students shaded a circle at 1 and drew a line without an arrowhead that did not reach at least –3, thus losing the mark.

Question 16

Generally, this question was well answered. Many students gave the correct answer of 195 with working shown. A minority of students subtracted 0.65 from 1 and then multiplied by 300 to obtain an answer of 105. Students are encouraged to read the question carefully. Students should know the difference when a number is required and when a probability is asked for.

Question 17

This question was poorly attempted. Students across all ability ranges found this question challenging. While some students appreciated the need to square the given values and then subtract, at least as many squared the values and added them, denying them any marks. A surprisingly large number simply used the given values in a variety of ways, for example adding the lengths or doubling them or multiplying them, strategies that clearly led nowhere. A few attempted to use trigonometry to find an angle, but not anything beyond this, and, somewhat inevitably, their efforts did not lead to any degree of success. Some students who did find the value of 9.6 could not progress any further as they did not know how to find the perimeter of the shape correctly. Many students did not find the missing length of 3.2 (12.8 – 9.6).

Question 18

Many students had 3 correct values out of 4 in the table; the one incorrect value was without exception when $x = -2$, the incorrect answer being y = 7; this is putting -2^2 into the calculator rather than $(-2)^2$. Many were able to gain a method mark for plotting at least 5 points correctly but then often joined them with line segments rather than a curve. A surprisingly large number of students did not attempt to plot even the given points.

Question 19

The marks were well spread out in this question with many failing to score at all. Those who adopted a systematic approach usually found the three correct numbers. Trial and improvement was more likely to score one or two marks. Some students felt that they could manipulate 74 to be the median by putting it in the middle of their list, regardless of the order of the numbers. Similarly, the range was sometimes taken to be the difference between the first and last numbers instead of the lowest and highest values. A common error was to find the highest value as 84 and then work out 84 – 16 to find 68 as the lowest value. There were a few instances where an attempt was made to involve the mean, usually in place of the median.

Question 20

(a) This part of the question asked for the LCM of 36 and 120 but more students gave the common factor 12 as their answer than the correct multiple of 360. A good number were at least able to gain one of the two marks for showing the prime factors of both 36 and 120, most commonly on a 'factor tree'.

(b) This part was understood by only a tiny handful of students. They were asked to find the HCF 8, where some of the powers were given as letters. A small number were able to gain one mark for writing out two correct powers out of 3. Many did not attempt this question.

Question 21

Most of the students failed to realise the significance of the different speeds and the need to calculate the time of the journey first. The most common error made in this question was by those students who assumed that average speed was found by finding the mean of the three speeds and then calculated, unnecessarily, the speed from Anesey to Breigh. Conversion between hours and minutes was poor most of the time; often 50 minutes was written as 0.8 hours. A minority of students found the correct time taken from Breigh to Clando in hours and a few used 3.15 as their time. Some students worked out the distance from Clando to Duckbridge but instead of using $\frac{5}{6}$ they used 0.8 thus losing the method mark unless $\frac{5}{6} = 0.8$ was written down. Students are encouraged not to use decimals as frequently they will lose the accuracy marks. Centres should remind students that if they do work in decimals, to use a minimum of 2 decimal places and preferably more.

Question 22

(a) Most students could write a number given in standard form as an ordinary number.

(b) Common incorrect answers where 0.000 06 had to be written in standard form, were for the power to be given as 5 instead of −5 or as another incorrect power. Other incorrect answers seen were a value that included the digit 6, a fractional equivalent or writing the answer missing out the × 10. Students need to know how to write the calculator display in an acceptable form.

(c) The majority of the students could not answer this part of the question. Many students left it blank as they could not use their calculator since the powers were large numbers. Some gave their answer as 2.5×10^{188} still gaining the first mark. The lack of understanding of indices caught many students out.

Question 23

(a) Many students gave the correct answer of x^9 but a minority gave an incorrect answer of x^{20}.

(b) Students were being tested on the use of the power laws $(ab)^n = a^n b^n$ or alternatively the use of $(4y^2)^3 = 4y^2 \times 4y^2 \times 4y^2$ followed by the application of a simpler rule. Common incorrect answers were to write down $12y^5$ or $4y^5$ where the power of y had been treated incorrectly. It was disappointing to see many students could not recall any of these index rules.

(c) Many incorrect solutions were seen and the main error was to write the signs the wrong way round in the brackets e.g. $(n - 4)(n + 3)$ or $(n + 4)(n - 3)$ or $(n + 4)(n + 3)$; one mark was awarded for this. Students should ensure they have the correct factors by multiplying back as a useful check for this type of question. Other incorrect answers such as $n(n - 7) + 12$ were seen. A number of students factorised correctly, but then went on to solve the expression as though it were an equation equal to zero. Even though they weren't penalised for doing this, it does show that students should read the question carefully and reflect on whether or not it is an expression that needs factorising or an equation which needs solving.

Question 24

This question was poorly attempted. Some students found the area of all the **six** sides, it was clearly written in the question that 'to cover the four sides and the top'. Frequently students calculated the volume rather than the surface area. Many could not use reverse percentages to find the cost of the paint prior to the 10% increase in price. Often students worked out 117 and then divided by 15 to find 7.8 but did not round up their answer, thus incorrectly calculating 7.8×24.50, to find the total cost of the paint. Students need to be reminded that when answering practical questions of this nature to work in realistic numbers, in this case whole tins of paint. It was encouraging to see many students writing their method clearly.

Summary

Based on their performance in this paper, students should:

- learn the difference between LCM and HCF
- learn how to apply Pythagoras theorem
- learn how to find the surface area of a cuboid
- show clear working when answering problem solving questions
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the answer.

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