ANSWERS AND NOTES
FIRST MATHEMATICS CHALLENGE PAPER
2023

Question .	Answer	Commentary
1	B	The totals are 0, 4, 2, 2 and 0 so the greatest total is 4, answer B. The question is about quick mental arithmetic and recognition of the greatest answer
2	C	The illustration indicates the way forward, the blocks are piled up to a height of 16 cm and hence we need 16 ÷ 2 = 8, answer C.
3	B	How many packs of 5 are needed to provide for 12 friends, 12 ÷ 5, but we need a whole number of packs, not 2 and a bit, so the answer is 3, answer B
4	B	Writing down all the numbers between 1 and 40 that have a 3 in them and counting them is one way of doing it. Another way would be to say that there is one between 0 and 10, one between 11 and 20, one between 21 and 29, then 10 for every one from 30 to 39, plus one extra for 33, giving 14 in all, answer B
5	D	A common shopping application, the cost of a pack is £1.20, so the second pack costs 60p giving a total cost of £1.80, answer D.
6	E	Use of table facts will show that only 60, answer E, divides exactly by 5, 3 and 2.
7	A	If the basic unit of area is taken as half of one of the identical squares, then 3 of 16 units are shaded, giving 3/16 of the whole shape is shaded, answer A
8	D	At the first box, 2 X 0 = 0 so the question mark needs to be replaced by a number which, when 2 is subtracted gives an answer of 1, i.e. replaced by 3, answer D

9	E	Again, recognition of the basic unit, the number of apples, which is half of the fruit in the bowl. So, the oranges, pear and bananas, totalling 9 pieces of fruit in all, must be the other half. Hence there are 18 pieces of fruit in the bowl, answer E.
10	C	This could be done by filling in the grid and counting up the even answers. But recognition that multiplying by an even number produces an even answer means that the rows and columns headed by an even number will produce the even answers and hence there are 16 even numbers for answers, answer C
11	A	The four rules, each based on a mathematical idea (even, row, column), eliminate in turn one of the options. The first rule eliminates option C, the second rule option D, the third rule option B, the fourth rule option E; leaving option A as the code fitting all the rules.
12	C	In any sequence of consecutive integers, adding the first and the last, the second and the second last, the third and the third last etc gives the same total. So in this case, 1 + 12 = 13, 2 + 11 = 13, 3 + 10 = 13, etc,; thus 3 must be paired with 10, answer C. This gives a very quick way to add up a sequence of consecutive integers, add together the first and the last, and halve the answer. This represents the average of all the numbers so now multiply by the number of numbers in the sequence to get the total.
13	E	Distinguishing figurate and written numbers amongst the data, the process of getting Ellie to the kick off on time takes 15 + 20 + 5 + 7 = 47 minutes. So, working back from the kick off time 8.45, Ellie needs to wake up at 7.58 a.m., answer E
14	B	Bearing in mind that the numbers involved can be only positive single digit numbers, 15 factorises as 3 X 5. The yellow parallelogram is then either 3 or 5. If it is 5, then on dividing 5 into the value of the red triangle to get a value of 2 means that the triangle is of value 10, not a single digit number. Hence the yellow parallelogram has value 3, which means that the red triangle must be of value 6, answer B in order to give an answer of 2 when divided by 3. To complete the array and provided a check on the working, the green pentagon has a value of 2 so that 6 − 2 = 4 and 2 + 5 = 7.

15	E	Rebecca Violet drinks half the grape juice, i.e., she drinks 450 − 360 = 90, 90g. So, the mass of the grape juice is 2 X 90 = 180g. and hence the mass of the glass is 450 − 180 = 270g, answer E
16	D	Each calculation could be done separately and the answers looked at to see which one was odd. But better, and quicker, is to use number facts to find the last digit of each calculation. In A, 7 + 9 = 16, even; in B, 0 + 6 = 6, even; in C, 6 ÷ 3 = 2, even; in D 3 X 9 = 27, odd; in E 33 − 5 = 28, even. So the answer is D.
17	A	If the three data statements are "added" together then we are buying two blue monsters, two pink monsters and two yellow monsters for £22. Therefore, the cost of buying one monster of each colour is £11, answer A
18	D	Again, this is about taking a basic unit, in this case the width of the rectangle. The length is then two widths and the whole perimeter, six widths. Six widths are equal to 48 cm so one width must be 8 cm and the length 16 cm, answer D.
19	C	This question is about applying logic to the information given. Working through the statements: A finishes in front of C, but we do not know by how many places. D finishes two places in front of A, so we have D, a space, then A and somewhere behind A is C B finishes just behind C, so now we have, D, a space, A, then somewhere behind A, C, and then B. The only friend we have no information about is E, but we have a space between D and A, so E must be between D and A, which means the five friends finish in the order D, E, A, C, B. Therefore, A finishes in 3rd place, answer C
20	C	Leo is 12 years old, his cousin, Polly, is three times his age. That is, Polly is 36 years old. It is tempting now to simply double Polly's age because Leo's age has been doubled. But Leo's age has increased by 12 years and so Polly's must do so as well. That is Polly will be 36 + 12 = 48 years old, answer C.