Answers and Commentary for First Mathematics Challenge 2024

Question	Answer	Commentary
1	E	Students may work through the given alternatives but those thinking more mathematically will spot that 20 must have a factor of 5 and the only option with 5 as part of the pair of factors is option E
2	A	3km in 1 hour means 6km in 2 hours, speed or direct proportion, giving answer A
3	D	The question is about recognising the meaning of the words "different" and "odd" in a mathematical context. Use of the criterion of "different" eliminates options A and B; use of the criterion of "odd" eliminates options B and E; leaving C and D. The numbers in C total 69, those in D, 67. Giving D as the answer.
4	E	By adding a star to 3 we get 25 which means star must be 22. The difference between the star and the triangle is 5, so the triangle must be 5 less than the star i.e. it is 17, answer E. Secondary students might see this question as being about simultaneous equations but here the logic of the two statements about the star and the triangle is all that is needed to solve the question.
5	C	If Flora has 5 sunflowers, Istry has 3 times as many, i.e. 3 X 5 = 15. So, they have altogether, 5 + 15 = 20 sunflowers, answer C
6	C	Questions such as this often appear in children's comics or the children's section of a newspaper or magazine. The question is about recognising triangles which are made up of other triangles. In this case there are clearly 8 small triangles but two larger ones, each made up of 4 smaller triangles, may be discerned. This gives 10 triangles in the diagram, answer C
7	E	The question is about units and recognising the basic units and calculating how many make up the large unit. In this case, 10 buckets fill the pond, 5 milk bottles fill the bucket and 4 jugs fill a milk bottle. Therefore 4 x 5 X 10 = 200 jugs full are required to fill the pond, answer E
8	B	In time, we all move on together. So, if my father was 35 on my seventh birthday, I will have moved on 7 years at my fourteenth birthday and hence so must my father giving 35 + 7 = 42, answer B.
9	B	Our friendly ant walks the shortest side, then the shortest side plus 1cm, then the shortest side plus 2cm, then the shortest side plus 3cm. That means the ant has walked the shortest

		side 4 times plus 6cm, which is given as 46cm. Hence 4 of the shortest side must be 40cm and so the shortest side is 10cm, answer B. Alternatively, 46 divided by 4, the number of sides walked, is 11 and a bit, so the sides might be 11, 12, 13, 14 which gives a total distance of 50cm, too big! So why not try, 10, 11, 12, 13, which gives 46, just right, and the answer 10 for the shortest side, i.e. B.
10	D	The picture of the cow and the chicken are of some help here. There are 20 cows and the number of chicken legs is equal to the number of cows' legs, i.e. 20 X 4 = 80. Therefore there must be 40 chickens since all the chickens have (we hope) 2 legs. 20 cows and 40 chickens gives 60 animals altogether, answer D.
11	B	3 X 5 gives 15 so adding another 5 gives 20 which is 4 X 5. Hence 5, answer B, is the number first thought of.
12	B	Surrounding the red shaded area are 4 triangles, which are each equal in area to half of one of the red squares, and 4 triangles which are each equal in area to a quarter of one of the red squares. Therefore, the unshaded area is equal to the area of 3 red squares. Hence the total area is equal to 8 red squares and the shaded area, the red squares, is 5/8 of the whole area, answer B.
13	E	There are 5 choices for the first topping and then only 4 for the second because the two toppings must be different. So, for each of the first topping there are 4 choices, i.e. 20 (=5 X 4) combinations altogether. BUT ham and pineapple, for example, is just the same as pineapple and ham. Hence the actual number of different combinations is 20/2 = 10, answer E.
14	C	Looking at the units column, 3 of the same thing has to give an 8 in the units column. The only digit that works for this is 6, since 3 X 6 = 18. So, there is 1 to carry into the 10s column to add to 3 X 6 = 18 to give 198. The digit is 6, answer C
15	E	Bethany has a candle 15 cm long, but the bottom 1cm will not burn so the effective length of candle to burn is 14 cm. The candle will burn at 2cm per hour giving 7 hours of burning. Therefore, if the candle is lit at 11.00 am it will stop burning at 6.00 pm, answer E.
16	B	We are interested in boys who cannot read music, so first let us tackle how many boys there are in the choir. There are 35 children in the choir, 20 of which are girls. So we know that there are 15 boys in the choir. Next, the reading music: there are 20 children who can read music of which 14 are girls. Hence there are 6 boys who can read music. With 15 boys in

		the choir, 6 of whom can read music, that means 9 boys cannot read music, answer B
17	A	To check if a number divides by 3, we may add up the digits and then see if the sum of digits divides by 3. If it does, then the original number divides by 3. In this case the sum of the digits of 2024 is 8. So the question now becomes, of the given answers, which could we add to 8 to make a number divisible by 3? And of the options given, only 4 added to 8, gives 12, is divisible by 3, giving A as the answer. Alternatively, we may divide 2024 by getting 674 remainder 2. A remainder of 3, 6 etc would mean the new number divides exactly by 3 and only answer A, would produce a remainder divisible by 3 when added to the 2 remainder.
18	B	The key here is to realise that the this is not several subtractions, but one, 100,000 – 11110 = 88,890, answer B
19	C	The grid is 4 X 4 = 16 squares which means that any tile from those given that is made up of a number of squares that does not divide into 16 will not cover the grid. The only tile meeting this criterion is C. Of course, it is easy to see that tiles A and B will cover the grid with no overlaps etc. It is less easy to see that tiles D and E will do so, but they do. And so, by elimination, we arrive at tile C.
20	B	Ramesh is fourth in the queue and Peter and Sam come as a unit, Sam first and then Peter. Since there is only one place behind Ramesh, the Sam and Peter combination must either be first and second in the queue or second and third. But Qureshi is ahead of Peter and so must be ahead of Sam as well. So, we have the order Qureshi, Sam, Peter, Ramesh, Thelma, with Qureshi first in the queue, answer B.