WMC 2020 Upper Primary Qualifying Round Solutions

Section A

1. **E** $12 + 6 = 18$ children have their favourite colour as brown. $4 + 5 = 9$ children have their favourite colour as green. Then $18 - 9 = 9$ more children have their favourite colour as brown rather than green.

2. **A** Since We can compare each of the fractions by placing them under a common denominator.

3. **C** We can subtract 7007000 without changing the remainder since 7 divides 7007000. The remainder when we divide 10 by 7 is 3.
One may also just divide the number.

4. **D** This can of course be done by direct computation but a less error prone method is: $19 + 99 + 19 \times 99 = 99 + 19 + 19 \times 99 = 99 + 19 \times 100 = 99 + 1900 = 1999$

5. **B** The point must be 4 points above the bottom left point, and 3 points to the left of the top right point. So the point is B.

6. **A** This can be done by careful computation. A neater and less error prone method is to notice that there are 9 block towers with an average height of 3 blocks, giving a total of $3 \times 9 = 27$ blocks. To see the average height it's helpful to pair the towers of heights 1 and 5 and the two towers of height 2 with the two towers of height 4.

7. **E** There are 3 ways to go from V to W, 2 ways to go from W to X and 3 to go from X to Y. Therefore $3 \times 2 \times 3 = 18$ total ways.

8. **D** Let S be the amount Sibongle drinks. Ishaan drinks two thirds of S. Then $S + \frac{2}{3}S = 750$. This solves to $S = 450$. If a learner isn't quite familiar with algera yet this can also be solved by plugging in the given options.

9. **C** Each picture has 5 more dots than the last. It is then easy to see that the n^{th} picture has $5n + 2$ dots. This gives us the equation $5n + 2 = 257$ which solves to $n = 51$.
Alternatively if the learner isn't comfortable with algebra the observation that each image has 5 more dots than the last lets us reason, that to add 50 dots requires 10 new pictures and to add 250 dots requires 50 new pictures. As the first image has 7 dots the $51st$ will have $7 + 250 = 257$ dots.

10. **B** There is a well known trick for testing when a large number is divisible by 11. Which is to alternatively add and subtract digits. The original number is a multiple of 11 if and only if the alternating digit sum is a multiple of 11. So $1-2+3-4+5-A+7-8 = 2-A$ is a multiple of 11, the only digit which works for this is $A = 2$. This can also be solved by trying to 10 (or 5 if you look at the given options) possible values for A.

11. **D** They are 4, 13, 22, 31, 40, 103, 112, 121, 130, 202, 211, 220, 301, 310, 400, 1003, 1012, 1021, 1030, 1102 , 1111, 1120, 1201, 1210, 1300, 2002 and 2011.
To avoid missing any it's helpful to break into cases and sub-cases. For example those numbers which are less than 4 digits (broken into the subcases of what is in the hundreds column), which numbers are four digits long and begin with a 1 and which are four digits long and begin with a 2.

12. **B** The diagram can be split into four identical (up to rotation) squares. Each of these has $\frac{1}{4}$ shaded. So $\frac{3}{4}$ of each smaller square is unshaded and so $\frac{3}{4}$ of the original square is unshaded.

13. **E** This can be shown by undoing the operations on each choice. For example, 45 came from 43 which came from 34 which came from 17. The others all run into problems. For example. 39 would have come from 37 which would have come from 73 which is odd and can't be double any whole number.

14. **D** First observe the the proportions of the rectangle are $2:3$ because two long sides are equal to three short sides. As a long and a short side add up to 20 cm this makes the rectangles 8 cm by 12 cm. So each has an area of $96cm^2$ and thus the whole shape is $480cm^2$.

15. **D** Call the radius of the circles r. The height of the rectangle is then $2r$ and the length $2r + 20$. Which makes the perimeter $8r + 40 = 240$, which solves to $r = 25$.