

WMC 2019 Middle Primary Final Round Solutions

Section A

1. **21**

This can be done by long division.

2. **420**

In the numerator $1 \times 2 \times \cdots \times 19$ cancels out and we have $20 \times 21 = 420$ remaining.

3. **40m**

The width of the rectangle is $91 \div 13 = 7$. So the perimeter of the rectangle is $2 \times (7 + 13) = 2 \times 20 = 40$.

4. **40 bicycles and 20 tricycles**

Let a and b be the number of bicycles and tricycles in the store respectively. Since there is a total of 60 vehicles we have that $a + b = 60 \iff b = 60 - a$. The number of wheels is $2a + 3b$ since each of the a bicycles have two wheels and the b tricycles each have 3 wheels. This gives that $2a + 3b = 140$. Now since $b = 60 - a$ we have that $2a + 3(60 - a) = 140 \implies a = 20$. Then $b = 60 - 20 = 40$.

5. **3**

The page numbers that were removed are 25, 26, 27, 28, 29, 30. 25 and 26 are on opposite sides of the same sheet. Similarly 27 and 28 are on opposite sides of the same sheet and 29 and 30 share the third sheet.

6. **R270**

A 20 percent increase would mean the book costs $\frac{120}{100} \times 300 = R360$. Now if this price decreases by 75 percent it would cost $\frac{75}{100} \times 360 = R270$.

7. **1400**

First observe that the ten million rand comprises 200000 actual notes. $200000 \times 140 = 28000000mm$. Now to convert from millimetres to kilometres we divide by $1000 \times 1000 = 1000000$. So the length in kilometres is $28km$

8. **27**

The trick here is to write $999 \times 777 = 1000 \times 777 - 777 = 777000 - 777 = 776223$. So the sum of the digits is $7 + 7 + 6 + 2 + 2 + 3 = 27$.

9. Saturday

The Wednesdays must be on the *2nd*, the *16th* and the *30th*. So the *12th* will be on a Saturday.

10. 34

There are 10 two-digit numbers that begin with a 5. There are 9 two-digit numbers that end with a 5. But since we count 55 twice, there are $19 - 1 = 18$ two-digit numbers that contain a 5. Similarly there are 18 two-digit numbers that contain a 6. Now the numbers 56 and 65 contain both, so there are $18 + 18 - 2 = 34$ numbers that contain a 5 or a 6.

Section B

11. Suppose the first die gives the number a and the second die gives the number b . There are $6 \times 6 = 36$ different observations for a and b . Now they add up to 6 when we observe $(1, 5)$, $(2, 4)$, $(3, 3)$, $(4, 2)$ or $(5, 1)$ which makes 5 pairs. So the probability that the numbers add up to 6 is $\frac{5}{36}$.
12. In an hour the eldest sister can paint a third of the wall, the middle sister can paint a quarter of the wall and the youngest sister can paint a sixth of the wall. So together they can paint

$$\frac{1}{3} + \frac{1}{4} + \frac{1}{6} = \frac{4 + 3 + 2}{12} = \frac{9}{12} = \frac{3}{4}$$

of the wall in an hour meaning that they can paint a quarter of the wall in $60 \div 3 = 20$ minutes. So to paint the whole wall they would need $20 \times 4 = 80$ minutes = 1 hour and 20 minutes.