RIPMWC 2015 Round2 – Open

1. Calculate $\left[10\frac{1}{20}+(3-0.85)\div\frac{5}{6}\right]\div 505.2$

2. A pair of positive integers (a, b) are such that the highest common factor of a and b is 31 and the least common multiple of a and b is 12090. How many different pairs of such integers are there? [Note that the pairs (1, 2) and (2, 1) are considered as different]

3. Calculate $1\frac{1}{10}+4\frac{1}{40}+7\frac{1}{88}+10\frac{1}{154}+13\frac{1}{238}+16\frac{1}{340}$

4. Calculate $\dfrac{1}{2015^3-2014\times\left(2015^2+2016\right)}$

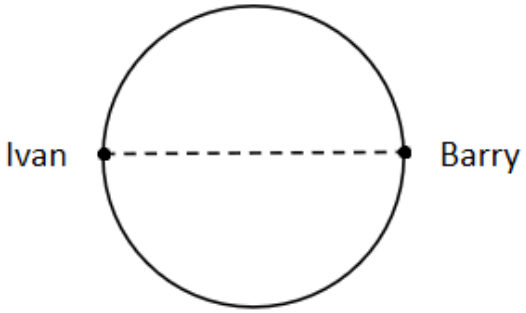
5. In the following addition, A, B, C, D and E represent different non-zero digits.

$$\begin{array}{ccccccc} A & B & C & D & E & D & B \\ & B & C & D & E & D & B \\ & & C & D & E & D & B \\ & & & D & E & D & B \\ & & & & E & D & B \\ & & & & & D & B \\ + & & & & & & B \\ \hline A & A & A & A & A & A & A \end{array}$$

What is the 5-digit number $ABCDE$?

6. In a bag of marbles, the number of blue marbles is $\frac{3}{7}$ of the number of green marbles. 98 marbles are removed from the bag, of which the number of blue marbles removed is $\frac{5}{9}$ times the number of green marbles removed. The number of remaining blue marbles is $\frac{2}{7}$ times the number of remaining green marbles. Find the total number of marbles that were in the bag originally.

7. Ivan and Barry travel around a circular track at uniform speeds in opposite directions, starting from 2 ends of a diameter as shown in the diagram. They start at the same time and they first meet after Barry has travelled 90 m. They meet a second time 50 m before Ivan has completed one lap. Find the circumference of the track.



8. Find the last 2 digits of $6^{2015} + (2015 \times 6) + 2015^6$

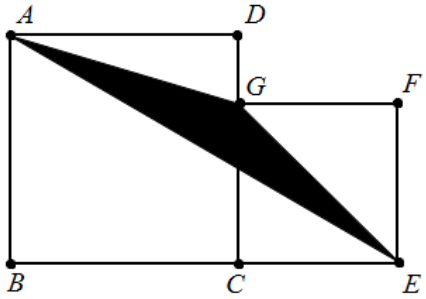
9. How many 3-digit numbers are there with exactly 2 of its digits the same?

10. In country *X*, a car registration number consists of 4 different digits chosen from 1, 2, 3, 4, 6 and 8, followed by 2 different letters chosen from the word *BUCKLEY*. Find the number of different car registration numbers if the car registration number must contain 4, 8 and *B*.

11. All positive integers 1, 2, 3, 4, 5, ... are coloured green, except 1, which is coloured blue. Any positive integer which is either 21 or 22 more than a blue number will be repainted blue. What is the largest positive integer that will remain green?

12. Calculate $\frac{1}{3^7+1}+\frac{1}{3^7+3}+\frac{1}{3^7+3^2}+\frac{1}{3^7+3^3}+\ldots+\frac{1}{3^7+3^{13}}+\frac{1}{3^7+3^{14}}$

13. As shown in the figure below, *ABCD* and *CEFG* are both squares. Given that *EF* = 18 cm and *B*, *C* and *E* are on a straight line, find the area of triangle *AEG* in cm^2.



14. A shopkeeper sold packets of salt and sugar in his provision shop. He sold each packet of salt at $5 each and each packet of sugar at $9 each. He started with a total of 350 packets of either salt or sugar. Not all the packets were sold and his total income was $2015. What was the minimum number of packets of sugar that the hawker could have sold?

15. In the diagram below, *ABCD* is a parallelogram with an area of 1 cm^2 and F is a point on *BC* such that *BF* = 3*FC*. *E* is the point of intersection of the lines *AG* and *DF*. Find the area of the triangle *CEF* in cm^2.