RIPMWC 2013 Round 1

1. If $A = 3659993665789325876 \times 344983488378276$, then the number of digits in A is

   A. 36
   B. 35
   C. 34
   D. 33
   E. None of the above

2. Calculate the sum

   $$1 + 2 + 3 - 4 - 5 - 6 + 7 + 8 + 9 - 10 - 11 - 12 + \ldots$$

   $$\ldots - 2008 - 2009 - 2010 + 2011 + 2012 + 2013$$

   A. 3012
   B. 3021
   C. 3033
   D. 3042
   E. None of the above

3. The number of positive integers less than 2013 divisible by neither 5 nor 7 is

   A. 1370
   B. 1374
   C. 1378
   D. 1380
   E. None of the above

4. How many whole numbers less than 4444 give reminder 12 when divided by 14, 14 when divided by 16, and 16 when divided by 18?

   A. 5
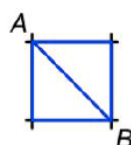   B. 6
   C. 7
   D. 8
   E. None of the above

5. Calculate:

$$\frac{1\times(9\times9+7)}{11}+\frac{2\times(98\times9+6)}{111}+\frac{3\times(987\times9+5)}{1111}+\ldots+\frac{8\times(98765432\times9+0)}{111111111}$$

A. 324
B. 252
C. 288
D. 280
E. None of the above

6. Four chemicals, W, X, Y and Z are mixed together using the following procedure: One part of W is mixed with three parts of X to get 10 ml of mixture A. Two parts of mixture A is then mixed with three parts of Y to get 10 ml of mixture B. Finally, four parts of the mixture B is mixed with one part of Z to get 10 ml of mixture C. What is the ratio of W to Z in the mixture C?
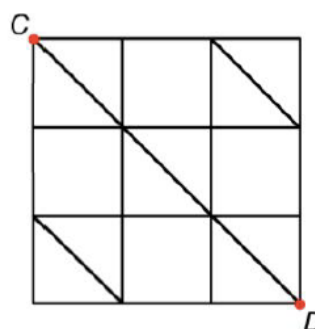
A. 2:7
B. 3:8
C. 4:9
D. 2:5
E. None of the above

7. Look at the picture, there are 3 ways of going from A to B. You can only move left to right, top to bottom or diagonally from top to bottom. You cannot pass twice on the same line for each way.

Following the same rule, how many different ways are there to go from C to D?
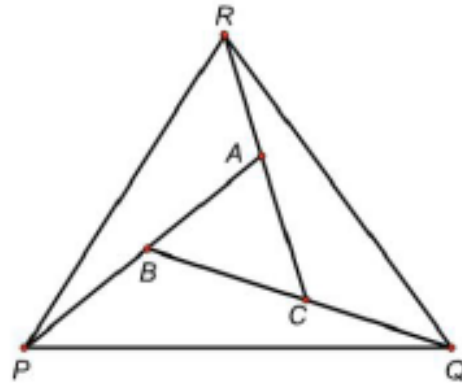
A. 45
B. 39
C. 41
D. 43
E. None of the above

8. In the ancient kingdom of Utopia, its citizens can use *n* coins to buy anything that costs 1 cent, 2 cents, 3 cents, … and so on up to $1 without needing any change. Given that coins only come in the denomination of 1 cent, 5 cents, 10 cents, 20 cents and 50 cents, what is the smallest possible value of *n*?

   A. 8
   B. 9
   C. 10
   D. 11
   E. None of the above

9. In $\triangle PQR$, *CAR*, *ABP* and *BCQ* are straight lines such that $AR = AC$, $BP = BA$ and $CQ = CB$. If the area of $\triangle ABC$ is 2.4 cm^2, then find the are of $\triangle PQR$ in cm^2.

   A. 16
   B. 16.2
   C. 16.6
   D. 17
   E. None of the above

10. 20 pupils chose to study English, Malay and Tamil. Each Pupil must select at least 2 languages. There were 12 pupils studying English, 15 studying Malay and 18 studying Tamil. How many pupils studied all the 3 languages.

   A. 3
   B. 4
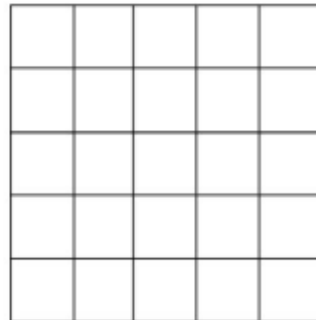   C. 5
   D. 6
   E. None of the above

11. The natural numbers are arranged in a triangular array as shown below and the rows are labelled.

1	Row 1
2 3	Row 2
4 5 6 7	Row 3
8 9 10 11 12 13 14 15	Row 4
…	…

Find the sum of the middle 2 numbers which are in the same row as 2013.
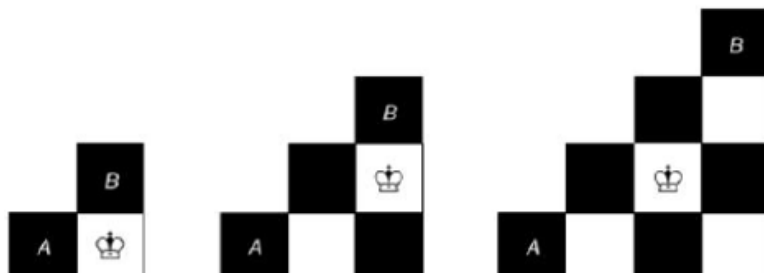(For example, in Row 4, the middle 2 numbers are 11 and 12 and their sum is 23)

A. 3067
B. 3070
C. 3071
D. 3074
E. None of the above

12. A window has 25 transparent panes in the form of grid as shown below. In how many ways can one colour 22 of these panes blue so that the window looks the same from inside and outside the house.

A. 50
B. 52
C. 56
D. 60
E. None of the above

13. Anthony was investigating a new game similar to chess, except it is played on a triangular board and a King can move one square right or up (but not left of down). He is counting the number of ways, T_2, T_3 and T_4 to get from A to B on different sized boards. He has investigated boards of size 2, 3, and 4 and found that $T_2 = 1$, $T_3 = 2$ and $T_4 = 5$.
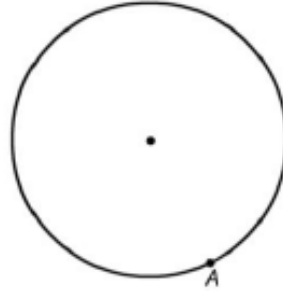Find the value of T_5.

A. 14
B. 15
C. 16
D. 17
E. None of the above

14. Three women *X*, *Y* and *Z* started their morning walk around a circular track from the same point *A*. with *X* and *Y* going in the anti-clockwise direction and *Z* going in the clockwise direction. The speeds of both *X* and *Y* are 170 meters per minute and 130 meters per minute respectively. *Z* met *X* after 18 minutes. She then met *Y* after another 3 minutes.

Find the circumference of the circular track in meter.

A. 4260
B. 4520
C. 4800
D. 5040
E. None of the above

15. Evaluate

$$\left(\frac{1}{3}+\frac{3}{4}+\frac{2}{5}+\frac{5}{7}+\frac{7}{8}+\frac{9}{20}+\frac{10}{21}+\frac{11}{24}+\frac{19}{35}\right)\times(2013\times2013-2009\times2017)$$

A. $78\frac{1}{3}$

B. $79\frac{2}{5}$

C. $80\frac{1}{2}$

D. $81\frac{2}{7}$

E. None of the above

16. Calculate the sum

$$\frac{1^2+1+1}{1\times 2}+\frac{2^2+2+1}{2\times 3}+\frac{3^2+3+1}{3\times 4}+\ldots+\frac{2012^2+2012+1}{2012\times 2013}$$

A. $2012\dfrac{2012}{2013}$

B. 2013

C. $2013\dfrac{1}{2013}$

D. $2013\dfrac{2012}{2013}$

E. None of the above

17. A number A has 2013 digits and is divisible by 9.
   The sum of all digits of A is a.
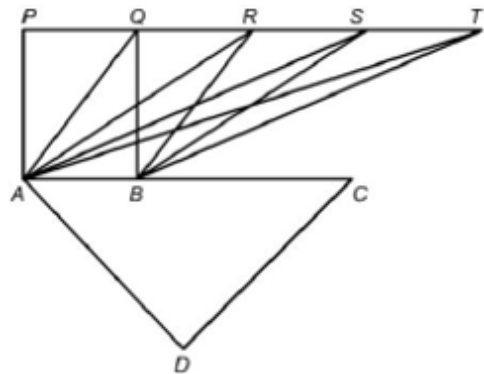   The sum of all digits of a is b.
   The sum of all digits of b is c.
   Find the value of c.

   A. 14
   B. 18
   C. 27
   D. Cannot be determined
   E. None of the above

18. As shown in the diagram above, $\triangle ACD$ is isosceles, with $AD = CD$ and
   $ADC = 86°$. Given also that PT is parallel to AC, the points Q, R and S are on PT and
   B on AC are such that $AB = PQ = QR = RS = ST$. If $\angle DAT = 87°$ and
   $PAC = 90°$, find $\angle AQB + \angle ARB + \angle ASB + \angle ATB$ in degrees.

   A. 46
   B. 48
   C. 50
   D. 52
   E. None of the above

19. School X and Y participated in RI Primary Mathematics World Contest 2012. Both schools did well with all their participants obtaining either high distinction, distinction or merit. The number of high distinction from each school was the same. The Ratio of the percentage of pupils who obtained high distinction from School X to that from School Y was 5 : 6. The ratio of the number of pupils who obtained distinction from School X to that from School Y was 7 : 4. The percentage of pupils who obtained distinction was 20% for both schools. If 40% of the pupils from School X obtained merit, what was the percentage of the pupils from School Y who obtained high distinction?

A. 36
B. 38
C. 40
D. 44
E. None of the above

20. Find the remainder when $(2013201320137919)^{2013}$ is divided by 99.

A. 8
B. 98
C. 12
D. 42
E. None of the above