# RIPMWC 2010 Round1

1. Using only brackets, +, -, ×, ÷, we can form the number 400 from multiple 4's as follows:

$$(4\times4\times4+4\times(4+4)+4)\times4$$

or

$$(4\times4+4)\times(4\times4+4)$$

Again using only brackets, +, -, ×, ÷. What is the minimum number of 10's required to form the number 2010?

(Select the correct answer from those given below)

A 4
B 5
C 6
D 7
E None of the above

2. Each time the two hands of a standard 12-hour clock form a straight line, a bell chimes once. From 01 00 on a certain day to 01 00 the next day, how many chimes will be heard?

(Select the correct answer from those given below)

A 22
B 40
C 42
D 44
E None of the above

3. How many pairs of positive integers (m, n) satisfy the equation mn = 2010?

(Select the correct answer from those given below)

A 10
B 12
C 14
D 16
E None of the above

4. The sum of digits of 2010 is 2 + 0 + 1 + 0 = 3. The next number after 2010 that has the same sum of digits as 3 is 2100. Let a, b, c be the next 3 numbers after 2100 that has the same sum of digits as 3. What is the value of a + b + c ?

(Select the correct answer from those given below)

A 23022

B 23033

C 30033

D 30222

E None of the above

5. Find the sum $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\frac{31}{32}+\frac{63}{64}+\frac{127}{128}+\frac{255}{256}$.

(Select the correct answer from those given below)

A $6\frac{249}{256}$

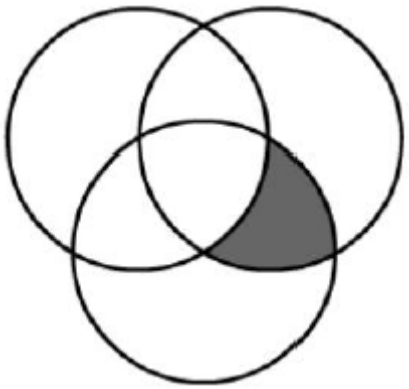
B $6\frac{253}{256}$

C $7\frac{1}{256}$

D $7\frac{79}{256}$

E None of the above

6. As shown in the diagram below, each of the three circles with radius 2 cm passes through the centres of the other two circles. Taking $\pi$ to be $\frac{22}{7}$, the area of the shaded region in $cm^2$ is



(Select the correct answer from those given below)

A $1\frac{6}{7}$

B $1\frac{19}{21}$

C $2\frac{2}{21}$

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

E None of the above

7. Suppose you are writing odd positive integers in a row, without blank spaces, as shown below

$$1357911131\ 5...$$

What will be the $1000^{th}$ digit?

(Select the correct answer from those given below)

A 1

B 3

C 5

D 7

E 0

8. Four pupils Aaron, Bob, Charles and Dean took a mathematics examination in which each of their answer is either correct or wrong. Aaron got correct half of the total questions plus 7 questions, Bob got correct one third of the total questions plus 17 questions, Charles got correct one fourth of the total questions plus 22 questions and Dean got correct one fifth of the total questions plus 25 questions. There are between 1 and 100 questions in the examination. Which pupil got the most questions correct?

   (Select the correct answer from those given below)

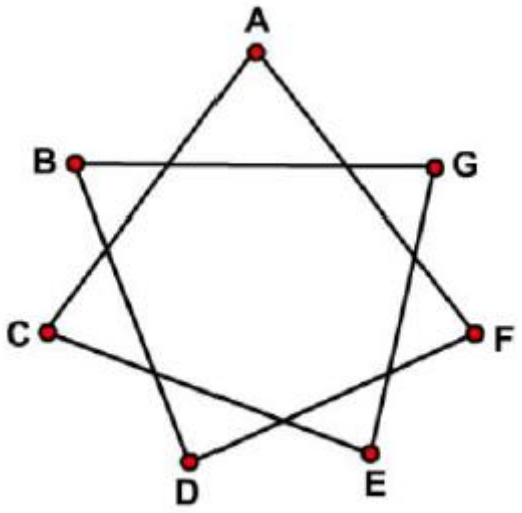
   A Aaron only
   B Bob only
   C Charles only
   D Dean only
   E None of the above

9. The last digit of $2008^3 - 2007^3 + 2006^3 - 2005^3 + ... + 2^3 - 1^3$ is

   (Select the correct answer from those given below)

   A 4
   B 5
   C 6
   D 8
   E None of the above

10. In the figure shown below, find $\angle A+\angle B+\angle C+\angle D+\angle E+\angle F+\angle G$.




(Select the correct answer from those given below)

A 450°

B 480°

C 520°

D 550°

E None of the above

11. Find the value of the expression

$$\left(1+\frac{1}{2}+\frac{1}{3}+...+\frac{1}{8}\right)\times\left(\frac{1}{2}+\frac{1}{3}+...+\frac{1}{9}\right)-\left(1+\frac{1}{2}+\frac{1}{3}+...+\frac{1}{9}\right)\times\left(\frac{1}{2}+\frac{1}{3}+...+\frac{1}{8}\right)$$

(Select the correct answer from those given below)

A $\frac{1}{8}$

B $\frac{7}{72}$

C $\frac{1}{9}$

D $\frac{6}{63}$

E None of the above

12. The sum of digits of the product $\underbrace{44\ldots44}_{\text{Ten 4s}}\times 1\underbrace{99\ldots998}_{\text{Nine 9s}}$ is

(Select the correct answer from those given below)

A 86

B 88

C 90

D 94

E None of the above

13. There are 12 points on a circle such that the distances between adjacent pairs of points are all equal. How many right angled triangles can be formed by joining any 3 of the points?

(Select the correct answer from those given below)

A 60

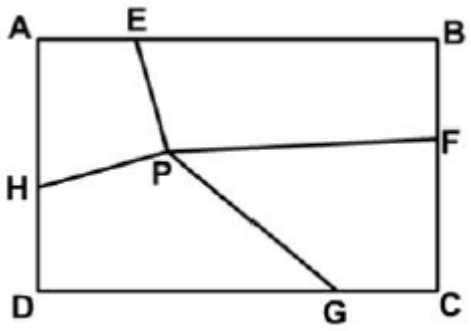
B 64

C 70

D 72

E None of the above

14. ABCD is a rectangle with AB = 8 cm and AD = 5 cm. Points E, F, G and H on AB, BC, DC and AD are such that AE = BF = GC = HD = 2 cm. P is a point in the interior such that the area of AEPH is 6 $cm^2$. What is the area of PFCG in $cm^2$ ?




(Select the correct answer from those given below)

A 10

B $10\frac{1}{2}$

C $11\frac{1}{2}$

D 12

E None of the above

15. How many different words can you form from the letters ABCD, where a word is a sequence of one to four letters, using each letter at most once (for example DC and CADB) ?

(Select the correct answer from those given below)

A 60

B 62

C 64

D 68

E None of the above

16. A seven-digit telephone number $\overline{abcdefg}$ is called memorable if the number $\overline{abc}$ is the same as at least one of $\overline{def}$ or $\overline{efg}$. Assuming that every digit in the telephone number can range from 0 to 9, how many memorable telephone numbers are there?

    (Select the correct answer from those given below)

    A 19810
    B 19910
    C 19990
    D 20100
    E None of the above

17. There are 8 consecutive traffic lights along a straight road. Each light remains green for 1.5 minutes, yellow for 4 seconds and red for 1.5 minutes. The light are synchronised so that each light turns red 10 seconds after the preceding one turns red. What is the longest inteval of time, in seconds, during which all the 8 lights are green?

    (Select the correct answer from those given below)

    A 18
    B 20
    C 22
    D 25
    E None of the above

18. To decorate a rectangular notice-board which is $71\frac{1}{2}$ cm long and $40\frac{1}{3}$ cm wide, John is only allowed to use square papers. If it must be done such that the square papers do not overlap or extend beyond the edges of the notice-board, what is the minimum number of square papers needed?

    (Select the correct answer from those given below)

    A 429
    B 858
    C 1716
    D 5148
    E None of the above

19. A rectangle with the same perimeter as a square has $\frac{3}{4}$ its area. Find the ratio of the breadth of the rectangle to its length.

(Select the correct answer from those given below)

A 1 : 3
B 3 : 10
C 2 : 5
D 1 : 4
E None of the above

20. A car travels from town X to town Y along a highway. An hour after starting, it meets with an accident and is detained by the traffic police for half an hour, after which it proceeds at $\frac{3}{4}$ of its former speed and arrives $3\frac{1}{2}$ hours late. Had the accident happened 90 km farther along the highway, it would have arrived 3 hours late. Find the distance between town X and town Y in km.

(Select the correct answer from those given below)

A 400
B 465
C 550
D 600
E None of the above