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## Part A

1.  $1 - \frac{1}{1 + \left(\frac{1}{2011}\right)}$  is equal to

- (A)  $\frac{1}{2012}$       (B)  $\frac{1}{2011}$       (C)  $\frac{2010}{2012}$       (D)  $\frac{2011}{2012}$       (E) None of these
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2. The value of  $29 \cdot 71 + 29^2$  is

- (A) 1290      (B) 2900      (C) 7100      (D) 7129      (E) None of these
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3. Three planets revolving in the same direction around the same star are in a straight line with the star. The first planet completes one revolution in 4 years, the second one in 6 years and the third one in 9 years. In how many years will the three planets return to their current position?

- (A) 18      (B) 24      (C) 30      (D) 36      (E) 42
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4. Alice, Bernard and Carole are arranged in a line. If Alice cannot be in the middle, in how many ways can the kids be arranged?

- (A) 1      (B) 2      (C) 3      (D) 4      (E) 6
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5. Ahcène and Nabil are counting pennies. Counting the pennies by threes, Ahcène finds that two are left out at the end. Counting the same pennies by fours, Nabil also finds that two are left at the end. Among the following numbers, which one can possibly be the number of pennies?

- (A) 11      (B) 12      (C) 13      (D) 14      (E) None of these
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6. One third of the birds in a cage are blue. Forty of the 60 females are blue, while 25% of the males are blue. How many birds are in the cage?

- (A) 60      (B) 120      (C) 180      (D) 240      (E) 300
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7. The largest of four consecutive integers is twice as large as the smallest. The sum of these four integers is

- (A) 10      (B) 14      (C) 18      (D) 24      (E) None of these
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8. There are 36 students in a class. The ratio of boys to girls is 4 : 5. How many girls are in the class?

(A) 15                      (B) 16                      (C) 20                      (D) 24                      (E) 25

9. There are 15 marbles in a box. They come in three colors: green, blue and red. There are seven times as many blue marbles as red marbles. How many green marbles are in the box?

(A) 3                      (B) 4                      (C) 5                      (D) 6                      (E) 7

10. John spent almost all his money in four stores. In each of these stores, he spent half of the money that he had going in plus \$1. At the end, he was left with \$1. How much money did John have at the beginning?

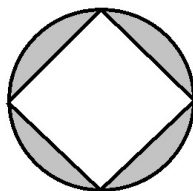
(A) \$4                      (B) \$10                      (C) \$22                      (D) \$46                      (E) \$94

## Part B

11. A bike has a large wheel and a small wheel. In order to cover a given distance, the large wheel makes 100 revolutions while the small wheel makes 150 revolutions. The large wheel has a circumference that is 1 m longer than the small wheel circumference. What is the length of the given distance?

(A) 100 m                      (B) 200 m                      (C) 300 m                      (D) 400 m                      (E) 500 m

12. A square is inscribed in a circle of radius one. The area of the shaded region is



(A)  $\pi - 2$     (B)  $\frac{\pi}{2}$     (C)  $\pi - 1$     (D)  $2\pi - 2$     (E) Not enough information

13. A rectangle is 110 cm long and 88 cm wide. The rectangle is to be cut into squares that are all the same size. The entire rectangle is to be used. What is the largest possible area, in  $\text{cm}^2$ , of each of the squares?

(A)  $2^2$                       (B)  $8^2$                       (C)  $11^2$                       (D)  $22^2$                       (E)  $88^2$

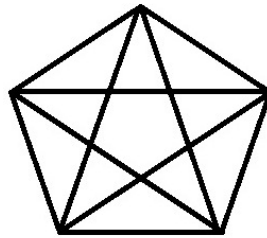
14. What is the ones digit of  $9^{9^9}$ ?

(A) 1            (B) 3            (C) 7            (D) 9            (E) None of these

15. The government decides to use new coins so that only 3 cent and 7 cent coins are used. Some amounts, like 5 cents, cannot be made exactly using the new coins. Which is the largest amount that cannot be made exactly with the new coins?

(A) 8 cents      (B) 9 cents      (C) 10 cents      (D) 11 cents      (E) 12 cents

16. How many triangles are there in the following diagram?



(A) 20            (B) 25            (C) 30            (D) 35            (E) None of these

17. Of the numbers below, which is the largest that could be the perimeter of some triangle of which two sides have lengths 4 and 5?

(A) 13                      (B) 15                      (C) 17                      (D) 19                      (E) 21

18. Mark and Tom are playing with two six sided coloured dice. On each die the faces are painted blue or red. They throw both dice at once and Mark wins if the upper faces of the dice are of the same colour, while Tom wins if they are different colours. Each player has exactly the same chance to win. If the first die has one blue face and five red faces, how many red faces are there on the second die?

(A) 1                      (B) 2                      (C) 3                      (D) 4                      (E) 5

19. Pierre wrote all the integers from one to 99. What is the sum of all the digits used to write down those integers? For instance, the sum of the digits used to write down 11, 12 and 13 is equal to nine.

(A) 405      (B) 450      (C) 810      (D) 900      (E) None of these

20. Sports cars are driven by men and each has two women as passengers. Sedan cars are driven by women and each has three men as passengers. If there are a total of 12 cars carrying a total of 43 persons, including the drivers, how many sports cars are there?

(A) 3      (B) 5      (C) 7      (D) 9      (E) None of these

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## Part C

21. Two cyclists ride along a circular path whose circumference is 10 km. The two cyclists start at the same time, from diametrically opposite positions. The first cyclist goes at a constant speed of 30 km/h in the clockwise direction, while the second goes at a constant speed of 20 km/h in the counter clockwise direction. They both cycle for 1 hour. How many times do they meet?

(A) 2      (B) 3      (C) 4      (D) 5      (E) 6

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22. If  $x^2 + x - 1 = 0$ , then  $x^3 + 2x^2 + 2011$  is equal to

(A) 2009      (B) 2010      (C) 2011      (D) 2012      (E) 2013

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23. Albert, Bob and Carl are digging identical holes in a field. When Albert works with Bob, they dig a hole in four hours. When Albert works with Carl, they dig a hole in three hours. When Bob works with Carl, they dig a hole in two hours. How many hours does it take Albert to dig a hole when he works alone?

(A) 9 hours      (B) 12 hours      (C) 24 hours      (D) 36 hours      (E) 40 hours

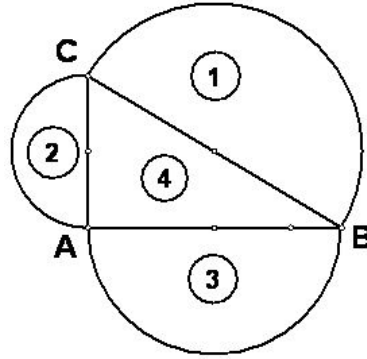
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24. In a village there are 100 houses. There is a dog in 90 houses, a cat in 80 houses, a rabbit in 75 houses and a turtle in 65 houses. Among those 100 houses, how many, at least, have a dog, a cat, a rabbit and a turtle?

(A) 5      (B) 10      (C) 15      (D) 20      (E) None of these

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25. Let  $ABC$  be a right triangle whose area is equal to ④.  $AB$ ,  $AC$  and  $CB$  are the diameters of three semicircles whose areas are equal to ①, ② and ③ respectively. Which of the following statements is true?

- (A) ② + ④ = ①  
(B) ② + ① = ③ + ④  
(C) ② + ③ = ①  
(D) ② + ④ = ① + ③  
(E) Not enough information



26. Daryl leaves Fredericton by car and drives at constant speed. At noon, his distance traveled, in kilometers, is a two digit number. At 1 PM, the distance traveled is the same two digits, reversed. At 2 PM, the distance traveled is the same two digits as at noon, but separated by a zero. At what speed is Daryl driving?

- (A) 45 km/h   (B) 50 km/h   (C) 55 km/h   (D) 61 km/h   (E) 106 km/h