

**Question 1 (Numerical reasoning, inequalities)**

If  $x - y > x$  and  $x + y > y$ , then we can conclude that

- A.  $x > 0, y > 0$
- B.  $x < 0, y < 0$
- C.  $y > x > 0$
- D.  $x < 0, y > 0$
- E.  $x > 0, y < 0$

Ans: E

**Question 2 (Counting Numbers)**

How many numbers  $n$  have the property that both  $\frac{n}{2}$  and  $2n$  are four-digit whole numbers?

- A. 1499
- B. 1500
- C. 2499
- D. 2500
- E. None of the above

Ans: B

**Question 3 (Work Rate)**

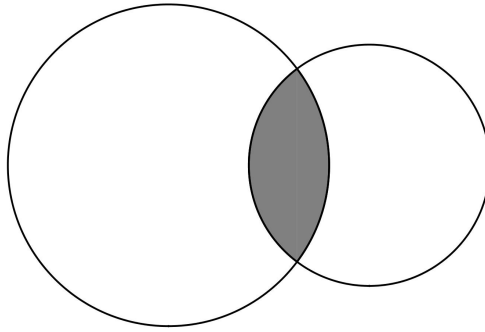
Team A takes 10 days to complete a project. Team B takes 30 days to complete the same project. The two teams now work together on the same project. Meanwhile, Team A rests for 2 days and Team B rest for 8 days. None of the team rests on the same day. How many days are needed to complete the same project?

- A. 11
- B. 12
- C. 13
- D. 14
- E. None of the above

Ans: A

**Question 4 (Ratio)**

The area of the shaded region is equal to  $\frac{1}{7}$  of the area of the big circle and it is equal to  $\frac{1}{5}$  of the area of the small circle. The difference between the area of the big circle and the small circle is  $18 \text{ cm}^2$ . What is the area of the small circle?



- A.  $36 \text{ cm}^2$
- B.  $72 \text{ cm}^2$
- C.  $90 \text{ cm}^2$
- D.  $126 \text{ cm}^2$
- E. None of the above

Ans: C

#### Question 5 (Pattern)

If the odd numbers are grouped in the following way:

$$\{1\}; \{3,5\}; \{7,9,11\}; \{13,15,17,19\}; \dots$$

what is the middle number in the 15<sup>th</sup> group?

- A. 113
- B. 209
- C. 211
- D. 225
- E. None of the above

Ans: D

#### Question 6 (Volume)

If the height of a cube is increased by 3 cm, it will become a cuboid (rectangular box) and the total surface area will be increased by  $72 \text{ cm}^2$ . What is the volume of the cube?

- A.  $27 \text{ cm}^3$
- B.  $64 \text{ cm}^3$
- C.  $125 \text{ cm}^3$
- D.  $216 \text{ cm}^3$
- E.  $343 \text{ cm}^3$

Ans: D

#### Question 7 (Percentage)

The original price of a ticket was \$10. When the price of the ticket was reduced, the number of customers increased by 50%, but the amount of money received only increased by 20%. What is the new reduced ticket price?

- A. 1
- B. 2
- C. 3
- D. 4
- E. None of the above

Ans: B

#### Question 8 (Number Logic)

In a group of five friends, the sums of the ages in each group of four comprising of them are 124, 128, 130, 136, and 142. What is the age of the youngest?

- A. 21
- B. 23
- C. 29
- D. 35
- E. None of the above

Ans: B

#### Question 9 (Ratio)

The ratio of the difference, the sum and the product of two numbers is 1:7:24. The product of the two numbers is \_\_\_\_\_

- A. 24
- B. 48
- C. 72
- D. 96
- E. None of the above

Ans: B

#### Question 10 (HCF, LCM)

The highest common factor of two whole numbers is 20. The lowest common multiple of these two whole numbers is 200. If the sum of these two whole numbers is 140, what is the difference of these two whole numbers?

- A. 60
- B. 100
- C. 120
- D. 180
- E. None of the above

Ans: A

**Question 11 (Factor Theorem)**

If  $x + 3$  is a factor of both  $-x^2 + 4x + a$  and  $x^2 - x + b$ , determine the value of  $a + b$ .

- A. 9
- B. 12
- C. 21
- D. 33
- E. None of the above

Ans: A

**Question 12 (Remainder)**

What is the remainder of  $1234^{2017} \div 7$ ?

- A. 1
- B. 2
- C. 3
- D. 4
- E. None of the above

Ans: B

**Question 13**

Evaluate the expression below.

$$\frac{201}{1+2} + \frac{201}{1+2+3} + \frac{201}{1+2+3+4} + \frac{201}{1+2+3+4+5} + \dots + \frac{201}{1+2+3+\dots+200}$$

- A. 199
- B. 200
- C. 201
- D. 202
- E. None of the above

Ans: A

**Question 14**

Which one of the following integers can be expressed as the sum of 100 consecutive positive integers?

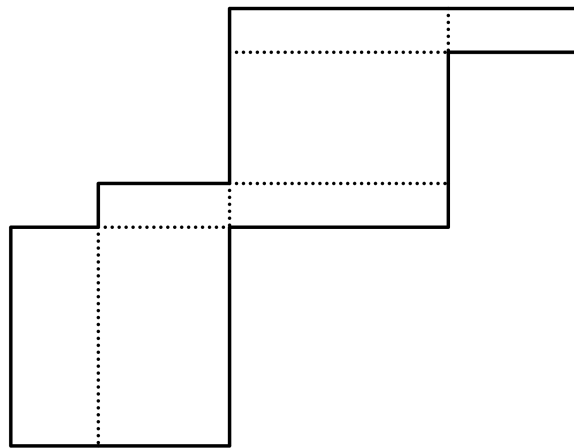
- A. 1,627,384,950

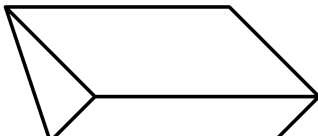
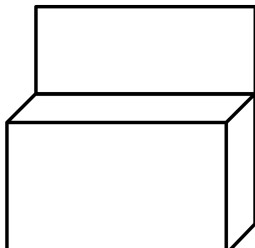
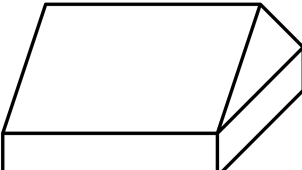
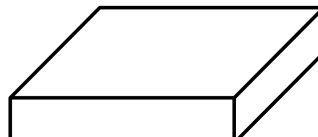
- B. 2,345,678,910
- C. 3,579,111,300
- D. 4,692,581,470
- E. 5,815,937,260

Ans: A

**Question 15 (Spatial Visualization)**

Which one of the following options can be folded from the diagram below?



- A. 
- B. 
- C. 
- D. 

E. None of the above

Ans: B

## Part B

### Question 16 (Arithmetic)

It is given that  $A = 1.01 \times 1.19 + 1.02 \times 1.18 + 1.03 \times 1.17 + \dots + 1.10 \times 1.10$ . Find the value of A. (Round off to the nearest whole number)

Ans: 12

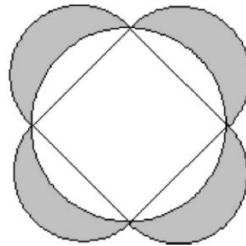
### Question 17 (Primes, Number logic)

What is the smallest positive integer which cannot occur as the difference between two positive prime numbers?

Ans: 7

### Question 18 (Geometry, Circles)

A square is inscribed in a circle with diameter 2. Four smaller circles are then constructed with their diameters on each of the sides of the square. Determine the shaded area.



Ans: 2

### Question 19 (Cryptarithm)

After adding the digit '4' on the right of a 4-digit number, a new 5-digit number is formed. The difference between these two numbers is 9787. What is the value of the original 4-digit number?

Ans: 1087

### Question 20 (Counting)

In how many ways can you walk up a flight of stairs which has 7 steps if you can take 1 or 2 steps at a time?

(For example, you can walk up a flight of stairs which has 3 steps in 3 different ways: 1-1-1, 1-2 or 2-1)

Ans: 21

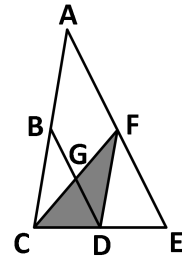
### Question 21 (Factors, Number logic)

The numbers from 1 to 2017 are listed in the following order: First all numbers which are *not* divisible by 3 are listed in increasing order. Then all numbers which are divisible by 3 but *not* by  $3^2$  are listed in increasing order. Then all numbers which are divisible by  $3^2$  but *not* by  $3^3$  are listed in increasing order, and so on. What is the last number in this list? (Give the entire number, not just its last digit.)

Ans: 729

**Question 22 (Area)**

In the diagram, the area of triangle ACE is  $56 \text{ cm}^2$ , which is twice of the area of the parallelogram ABDF. What is the area of the triangle CDF? (The diagram is not drawn to scale)



Ans:  $14 \text{ cm}^2$

**Question 23 (Arithmetic)**

Determine the value of the expression  $70 + 77 + 84 + 91 + \dots + 357 + 364$ .

Ans: 9331

**Question 24 (Algebraic manipulation)**

Let  $a, b$  and  $c$  be non-zero real numbers such that  $a + \frac{1}{b} = 5$ ,  $b + \frac{1}{c} = 12$  and  $c + \frac{1}{a} = 13$ .

Find  $abc + \frac{1}{abc}$ .

Ans: 750

**Question 25 (Pattern, Telescoping Series)**

The expression below can be simplified to an integer. What is that integer?

$$9700 \times \left( \frac{1}{1 \times 4 \times 7} + \frac{1}{4 \times 7 \times 10} + \frac{1}{7 \times 10 \times 13} + \dots + \frac{1}{94 \times 97 \times 100} \right)$$

Ans: 404