



Previous Year Questions (GATE ECE): Numerical Ability

(1 Mark Questions)

Year: GATE ECE 2026

Question 1: Real numbers y , p , and n (all greater than 1) satisfy

$$(\log_{p^{1/n}} y)(\log_{y^{1/n}} p) = 16$$

where the logarithms are taken to the bases $p^{1/n}$ and $y^{1/n}$. The value of n is _____

A: 2

B: 4

C: 8

D: 16

Answer: B

Solution:

Let

$$A = \log_{p^{1/n}} y \text{ and } B = \log_{y^{1/n}} p$$

Given,

$$AB = 16$$

Now use the change of base formula:

$$\log_{p^{1/n}} y = \frac{\log y}{\log p^{1/n}}$$

Since

$$\log p^{1/n} = \frac{1}{n} \log p$$

we get

$$\log_{p^{1/n}} y = \frac{\log y}{\frac{1}{n} \log p} = n \frac{\log y}{\log p} = n \log_p y$$

Similarly,

$$\log_{y^{1/n}} p = \frac{\log p}{\log y^{1/n}} = \frac{\log p}{\frac{1}{n} \log y} = n \frac{\log p}{\log y} = n \log_y p$$

So,

$$AB = (n \log_p y)(n \log_y p)$$

That is,

$$AB = n^2 (\log_p y)(\log_y p)$$

Now we use the standard property:

$$\log_p y \cdot \log_y p = 1$$

Therefore,

$$AB = n^2$$

But given that

$$AB = 16$$

So,

$$n^2 = 16$$

Since $n > 1$,

$$n = 4$$

Hence, the value of n is

$$4$$

So, the correct option is B.

Year: GATE ECE 2025

Question 2: The 12 musical notes are given as $C, C^\sharp, D, D^\sharp, E, F, F^\sharp, G, G^\sharp, A, A^\sharp$.

Frequency of each note is $\sqrt[12]{2}$ times the frequency of the previous note. If the frequency of the note C is 130.8 Hz, then the ratio of frequencies of notes $F^\sharp$ and C is:

A: $\sqrt[6]{2}$

B: $\sqrt{2}$

C: $\sqrt[4]{2}$

D: 2

Answer: B

Solution:

To calculate the ratio of the frequencies of the notes $F^\sharp$ and C , we use the given information about musical notes and their frequencies.

The twelve musical notes are: $C, C^\sharp, D, D^\sharp, E, F, F^\sharp, G, G^\sharp, A, A^\sharp, B$, with each note's frequency being $\sqrt[12]{2}$ times the frequency of the previous note. This factor, $\sqrt[12]{2}$, is the common ratio.

Given:

The frequency of note C is 130.8 Hz.

Note $F^\sharp$ is the 7th term in this sequence, while C is the 1st term.

Therefore, the ratio of the frequencies of $F^\sharp$ and C can be calculated as follows:

$$\text{Common ratio} = \sqrt[12]{2} = 2^{1/12}$$

To find the frequency ratio:

$$\text{Ratio of frequencies of } F^\sharp \text{ and } C = \frac{\text{Frequency of } F^\sharp}{\text{Frequency of } C} = \frac{130.8 \times (2^{1/12})^6}{130.8} = 2^{1/2} =$$

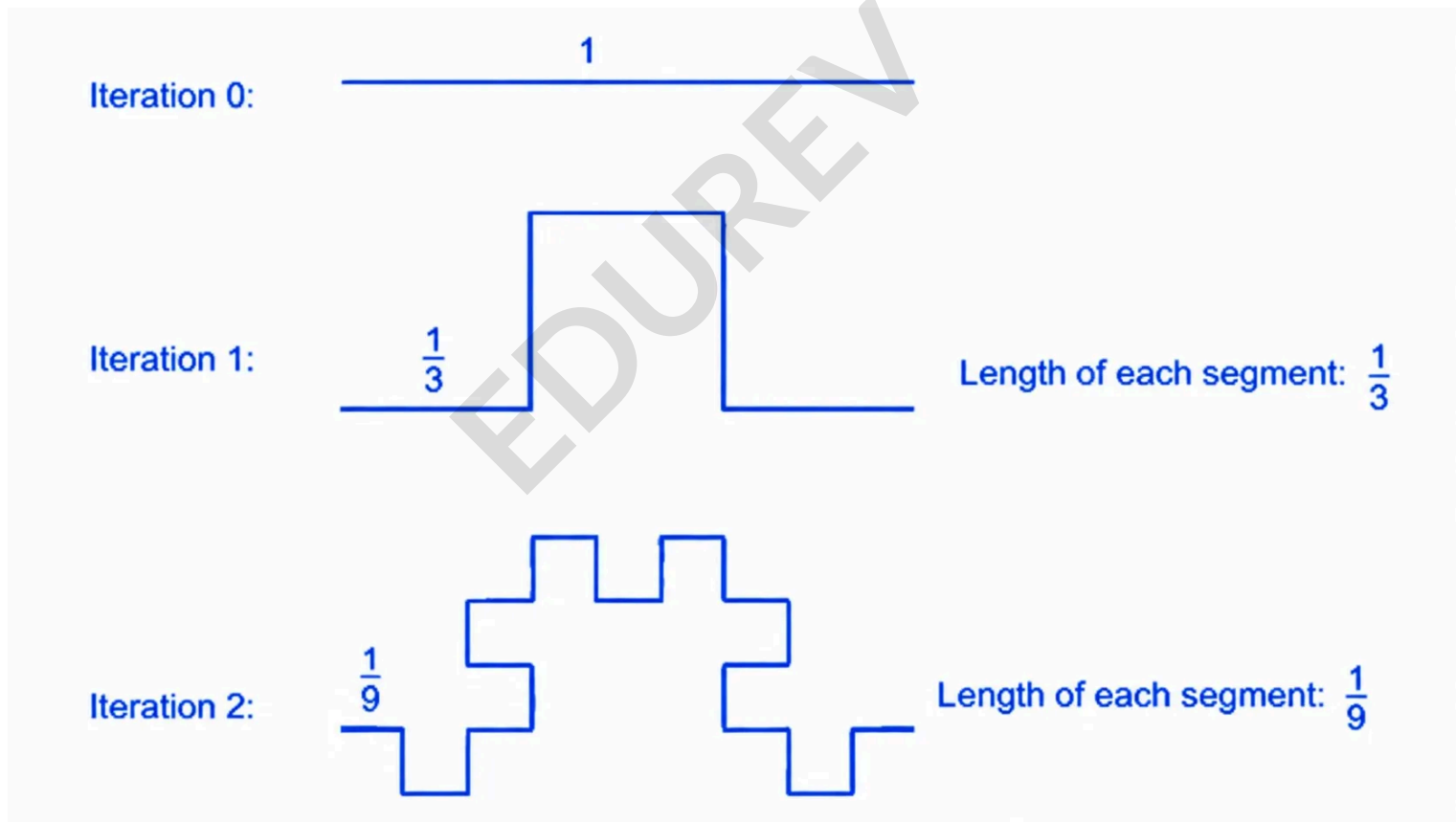
Thus, the ratio of the frequencies of notes $F^\sharp$ and C is $\sqrt{2}$.

Year: GATE ECE 2025

Question 3: The following figures show three curves generated using an iterative algorithm.

The total length of the curve generated after 'Iteration n ' is:

Note: The figures shown are representative.



- A: $\left(\frac{5}{3}\right)^{\frac{n}{2}}$
 B: $\left(\frac{5}{3}\right)^n$
 C: $\left(\frac{5}{3}\right)^{2n}$
 D: $\left(\frac{5}{3}\right)^{n(2n-1)}$

Answer: B

Solution:

$$\text{Iteration 0: } [1 \text{ segment} \times 1] = 1$$

$$\text{Iteration 1: } [5 \text{ segments} \times \frac{1}{3}] = \frac{5}{3}$$

$$\text{Iteration 2: } [25 \text{ segments} \times \frac{1}{9}] = \frac{25}{9} = \left(\frac{5}{3}\right)^2$$

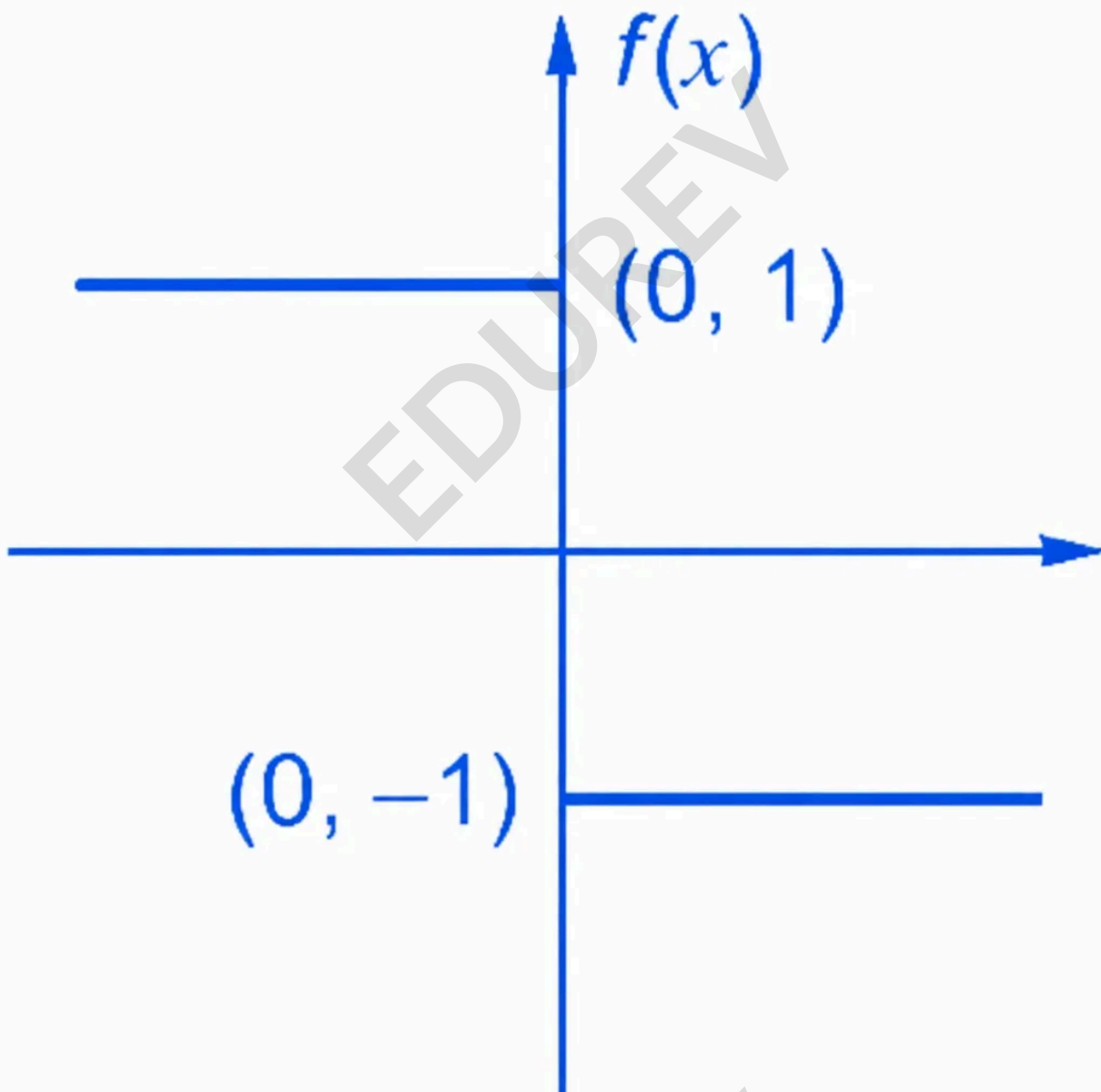
$$\text{Iteration } n: \text{Length} = \left(\frac{5}{3}\right)^n$$

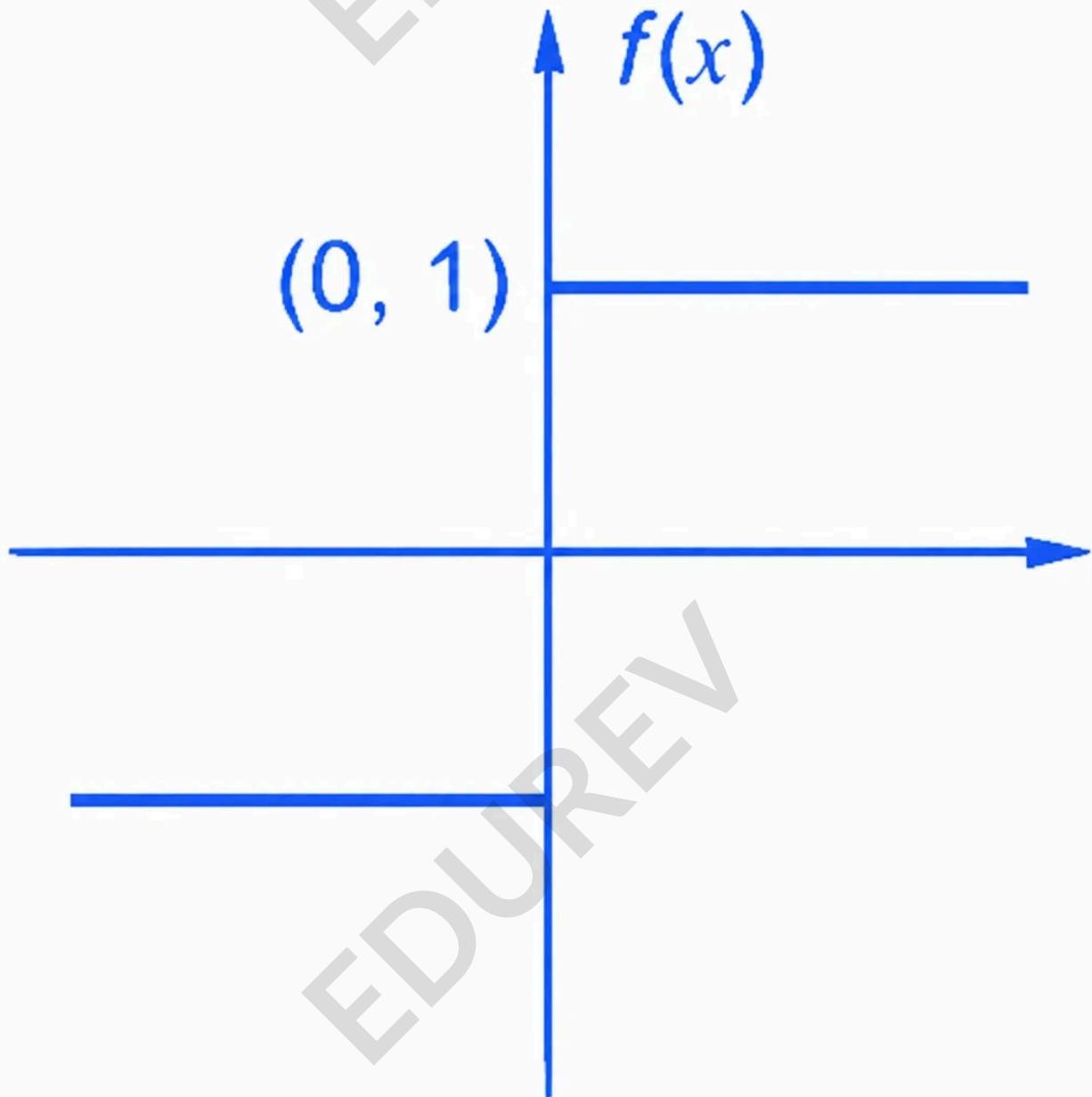
Year: GATE ECE 2025

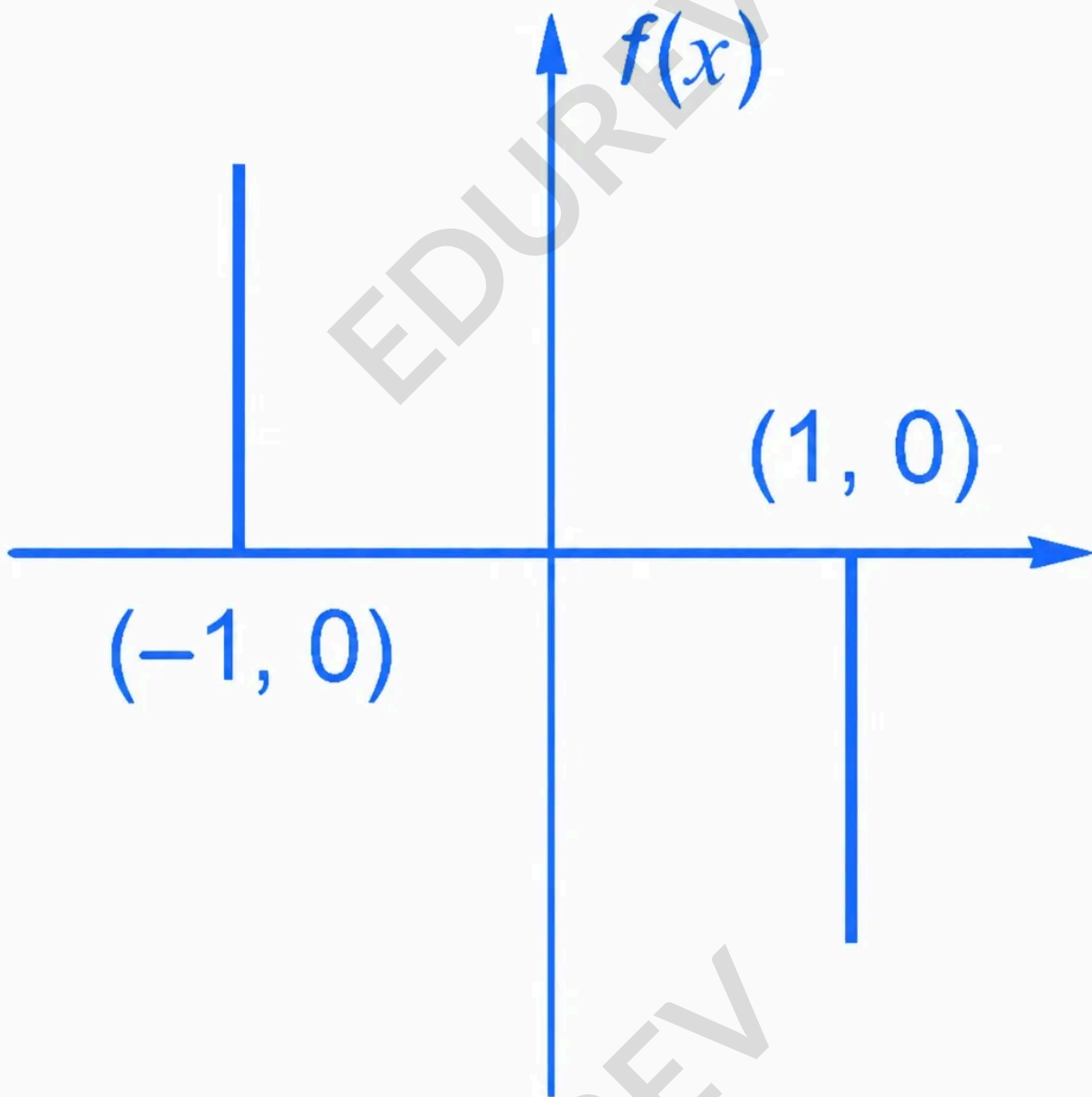
Question 4: Which one of the following plots represents $f(x) = -\frac{|x|}{x}$, where x is a non-zero real number?

Note: The figures shown are representative.

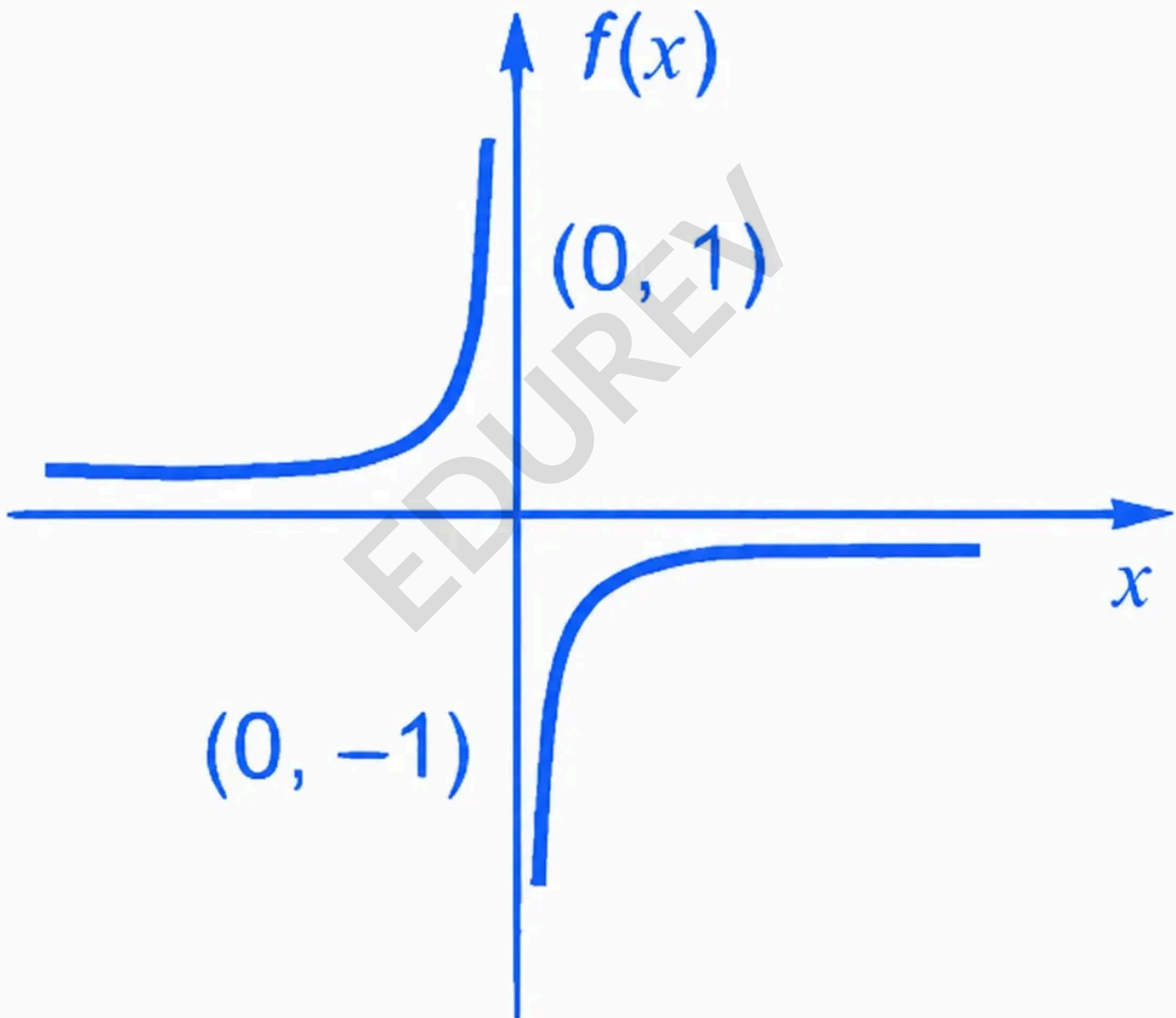
A:



**B:****C:**



D:



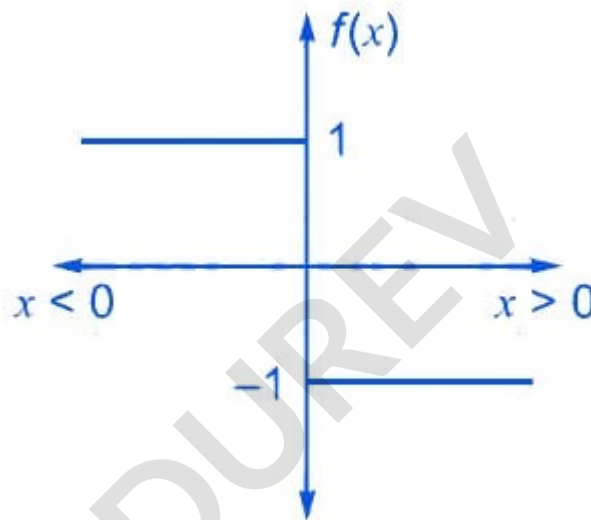
Answer: A

Solution:

$$f(x) = \frac{-|x|}{x}, \forall x \in R$$

$$f(x) = \begin{cases} \frac{-(-x)}{x} = 1; & x < 0 \\ \frac{-x}{x} = -1; & x \geq 0 \end{cases}$$

Graph:



Year: GATE ECE 2024

Question 5: Five years ago, the ratio of Aman's age to his father's age was 1:4, and five years from now, the ratio will be 2:5. What was his father's age when Aman was born?

A: 28 years

B: 30 years

C: 35 years

D: 32 years

Answer: B

Solution:

To solve this problem, let's define some variables:

Let Aman's current age be x .

Let his father's current age be y .

The problem gives us two conditions:

1. Five years ago, the ratio of Aman's age to his father's age was 1:4.

This can be expressed as:

$$\frac{x - 5}{y - 5} = \frac{1}{4}$$

Rewriting it, we have:

$$4(x - 5) = y - 5$$

$$4x - 20 = y - 5$$

$$y = 4x - 15$$

2. Five years from now, the ratio will be 2:5.

This can be expressed as:

$$\frac{x + 5}{y + 5} = \frac{2}{5}$$

Rewriting it, we have:

$$5(x + 5) = 2(y + 5)$$

$$5x + 25 = 2y + 10$$

$$5x + 15 = 2y$$

$$2y = 5x + 15$$

We now have a system of two linear equations:

Equation 1: $y = 4x - 15$

Equation 2: $2y = 5x + 15$

We can solve these equations to find the values of x and y .

Substitute y from Equation 1 into Equation 2:

$$2(4x - 15) = 5x + 15$$

$$8x - 30 = 5x + 15$$

$$8x - 5x = 15 + 30$$

$$3x = 45$$

$$x = 15$$

Now, use the value of x to find y :

$$y = 4x - 15$$

$$y = 4(15) - 15$$

$$y = 60 - 15$$

$$y = 45$$

Aman's current age (x) is 15 years, and his father's current age (y) is 45 years.

To find out the father's age when Aman was born, we have to subtract Aman's current age x from his father's current age y :

$$\text{Father's age when Aman was born} = y - x = 45 - 15 = 30$$

So, the correct answer is:

Option B: 30 years

Year: GATE ECE 2024

Question 6: For a real number $x > 1$,

$$\frac{1}{\log_2 x} + \frac{1}{\log_3 x} + \frac{1}{\log_4 x} = 1$$

The value of x is

A: 4

B: 12

C: 24

D: 36

Answer: C**Solution:**

To solve the equation $\frac{1}{\log_2 x} + \frac{1}{\log_3 x} + \frac{1}{\log_4 x} = 1$ for a real number $x > 1$, let's start by letting:

$$\log_2 x = a$$

$$\log_3 x = b$$

$$\log_4 x = c$$

Using the change of base formula for logarithms, we can express a , b , and c in terms of common logarithms (base 10) or natural logarithms (base e). For simplicity, we will use the natural logarithm ($\ln$):

$$a = \frac{\ln x}{\ln 2}$$

$$b = \frac{\ln x}{\ln 3}$$

$$c = \frac{\ln x}{\ln 4}$$

We know from properties of logarithms that:

$$\ln 4 = \ln(2^2) = 2\ln 2$$

Therefore,

$$c = \frac{\ln x}{2\ln 2} = \frac{a}{2}$$

Now replacing a , b , and c in the original equation, we get:

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$$

Substituting the expressions for a , b , and c , we have:

$$\frac{\ln 2}{\ln x} + \frac{\ln 3}{\ln x} + \frac{2\ln 2}{\ln x} = 1$$

Combining the terms on the left-hand side, we get:

$$\frac{\ln 2 + \ln 3 + 2\ln 2}{\ln x} = 1$$

Simplifying the numerator, we get:

$$\frac{3\ln 2 + \ln 3}{\ln x} = 1$$

This implies:

$$3\ln 2 + \ln 3 = \ln x$$

Exponentiating both sides to solve for x , we get:

$$x = e^{\ln x} = e^{3\ln 2 + \ln 3}$$

Using properties of exponents, we can simplify this to:

$$x = e^{\ln(2^3 \cdot 3)} = 2^3 \cdot 3 = 8 \cdot 3 = 24$$

So, the value of x is:

24

Thus, the correct option is:

Option C

Year: GATE ECE 2024

Question 7: The greatest prime factor of $(3^{199} - 3^{196})$ is

A: 13

B: 17

C: 3

D: 11

Answer: A

Solution:

To find the greatest prime factor of $3^{199} - 3^{196}$, let's simplify the expression first:
 $3^{199} - 3^{196}$

We can factor out the common term 3^{196} from both parts of the expression:
 $3^{199} - 3^{196} = 3^{196} (3^3 - 1)$

Next, we need to simplify the term inside the parentheses:

$$3^3 = 27 \text{ so } 3^3 - 1 = 27 - 1 = 26$$

Thus, the expression becomes:

$$3^{196} (26)$$

We now need to find the greatest prime factor of the number 26, because 3^{196} is composed entirely of the prime factor 3. The number 26 can be factored as:

$$26 = 2 \times 13$$

The prime factors of 26 are 2 and 13. Among these, the greatest prime factor is 13.

Therefore, the greatest prime factor of $3^{199} - 3^{196}$ is:

Option A: 13

Year: GATE ECE 2023

Question 8: What is the smallest number with distinct digits whose digits add up to 45?

A: 123555789

B: 123457869

C: 123456789

D: 99999

Answer: C

Solution:

To find the answer, we need to start with the smallest digit and keep adding larger digits until we get to 45. We want to use distinct digits, so we can't repeat any of them.

Starting with the digit 1, we can add the digits 2, 3, 4, 5, 6, 7, 8, and 9 in order until we reach the sum of 45. The resulting number is:

(C) 123456789

Therefore, the correct answer is option (C).

Year: GATE ECE 2023

Question 9: In a class of 100 students,

(i) there are 30 students who neither like romantic movies nor comedy movies,

(ii) the number of students who like romantic movies is twice the number of students who like comedy movies, and

(iii) the number of students who like both romantic movies and comedy movies is 20.

How many students in the class like romantic movies?

A: 40

B: 20

C: 60

D: 30

Answer: C

Solution:

Let's denote the set of students who like romantic movies by R , the set of students who like comedy movies by C , and the universal set (the set of all students in the class) by U . We are given that:

(i) $n(U) = 100$ (there are 100 students in the class).

(ii) $n(R) = 2n(C)$ (the number of students who like romantic movies is twice the number of students who like comedy movies).

(iii) $n(R \cap C) = 20$ (the number of students who like both romantic and comedy movies is 20).

(iv) $n(R' \cap C') = 30$ (the number of students who like neither romantic nor comedy movies is 30).

The total number of students is 100, which means that $n(A \cup B) = 100$ - the number of students who like neither romantic nor comedy movies.

$$n(A \cup B) = 100 - n(R' \cap C') = 100 - 30 = 70$$

We want to find R , the number of students who like romantic movies. We can use the formula :

$$n(R \cup C) = n(R) + n(C) - n(R \cap C)$$

Substituting the values we know, we get:

$$70 = 2C + C - 20$$

$$\Rightarrow 90 = 3C$$

$$\Rightarrow C = 30$$

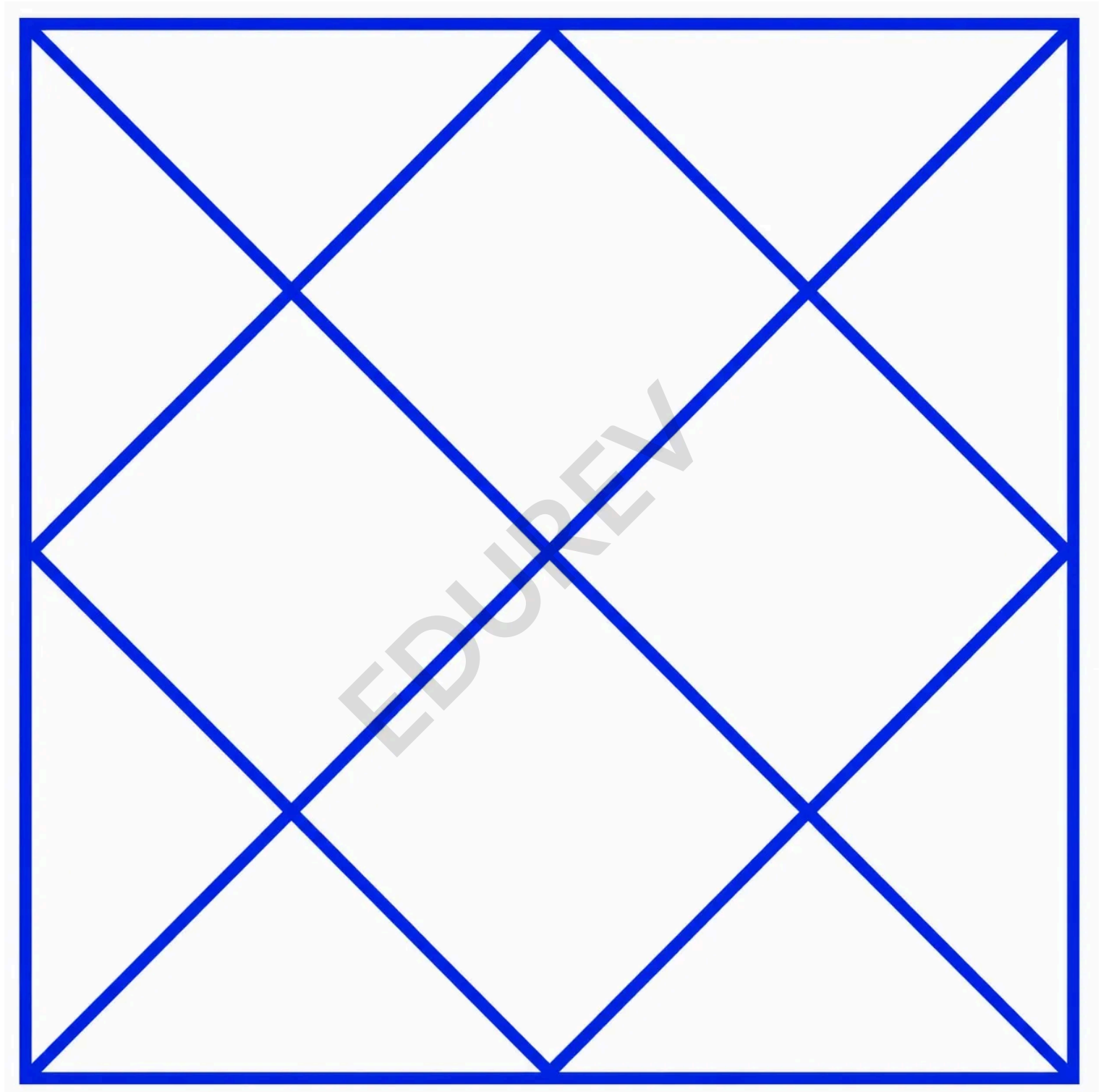
Since $R = 2C$, we have:

$$R = 2(30) = 60$$

Therefore, 60 students in the class like romantic movies.

Year: GATE ECE 2023

Question 10: How many rectangles are present in the given figure?



A: 8

B: 9

C: 10

D: 12

Answer: C

Solution: Number of rectangle = 10 as square is also called as rectangle.

Year: GATE ECE 2022

Question 11: A sum of money is to be distributed among P, Q, R, and S in the proportion 5 : 2 : 4 : 3, respectively.

If R gets Rs. 1000 more than S, what is the share of Q (in Rs.) ?

A: 500

B: 1000

C: 1500

D: 2000

Answer: D

Solution:

$$P = 5x, Q = 2x, R = 4x, S = 3x$$

Given : R gets Rs. 1000 more than S

$$4x - 3x = 1000$$

$$x = 1000$$

$$\text{Share of Q} = 2x = 2 \times 1000 = \text{Rs. 2000}$$

Year: GATE ECE 2022

Question 12: A trapezium has vertices marked as P, Q, R and S (in that order anticlockwise). The side PQ is parallel to side SR.

Further, it is given that, PQ = 11 cm, QR = 4 cm, RS = 6 cm and SP = 3 cm. What is the shortest distance between PQ and SR (in cm) ?

A: 1.80

B: 2.40

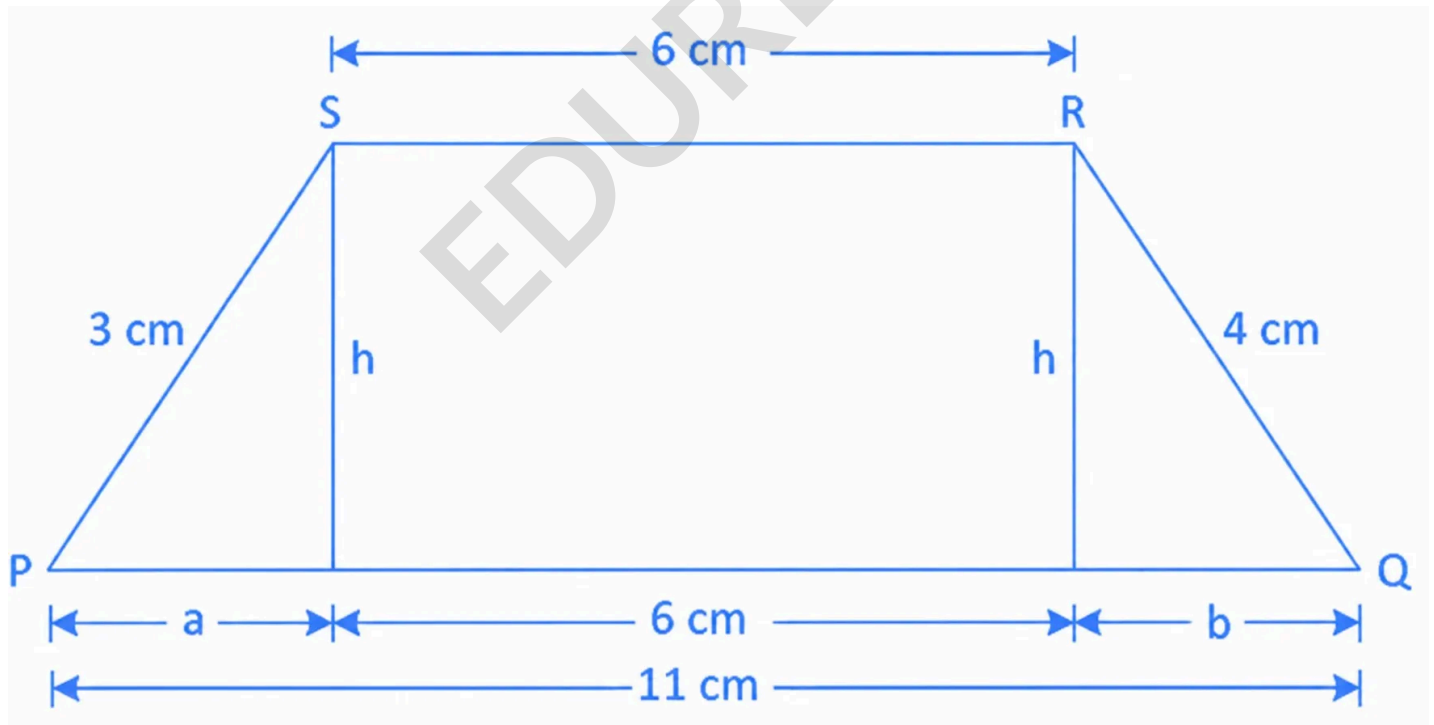
C: 4.20

D: 5.76

Answer: B

Solution:

Given :



Trapezium PQRS

h is distance between parallel sides,

$$a + b = 11 - 6 = 5$$

From its diagram,

$$h^2 + b^2 = 16 \dots\dots (i)$$

$$h^2 + a^2 = 9 \dots\dots (ii)$$

$$b^2 - a^2 = 7$$

$$(b + a)(b - a) = 7$$

$$5(b - a) = 7$$

$$(b - a) = \frac{7}{5}$$

$$(b + a) = 5 \dots\dots (iii)$$

$$2b = \frac{7}{5} + 5 = \frac{32}{5}$$

$$b = \frac{16}{5}$$

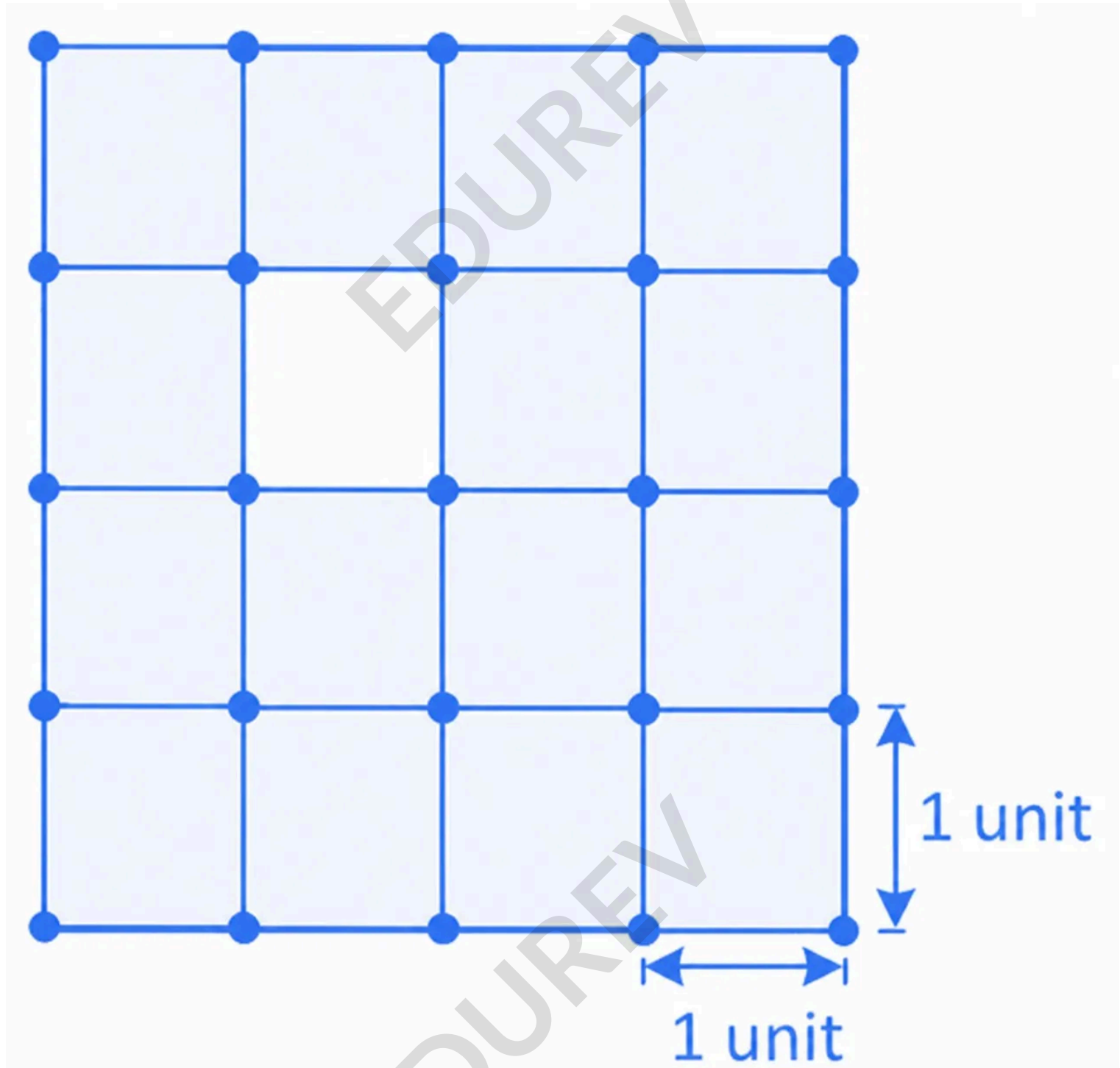
From equation (i),

$$h^2 = 16 - \left(\frac{16}{5}\right)^2 = 16 - \frac{256}{25} = \frac{400 - 256}{25} = \frac{144}{25}$$

$$h = \sqrt{\frac{144}{25}} = \frac{12}{5} = 2.4$$

Year: GATE ECE 2022

Question 13: The figure shows a grid formed by a collection of unit squares. The unshaded unit square in the grid represents a hole.



What is the maximum number of squares without a "hole in the interior" that can be formed within the 4×4 grid using the unit squares as building blocks?

A: 15

B: 20

C: 21

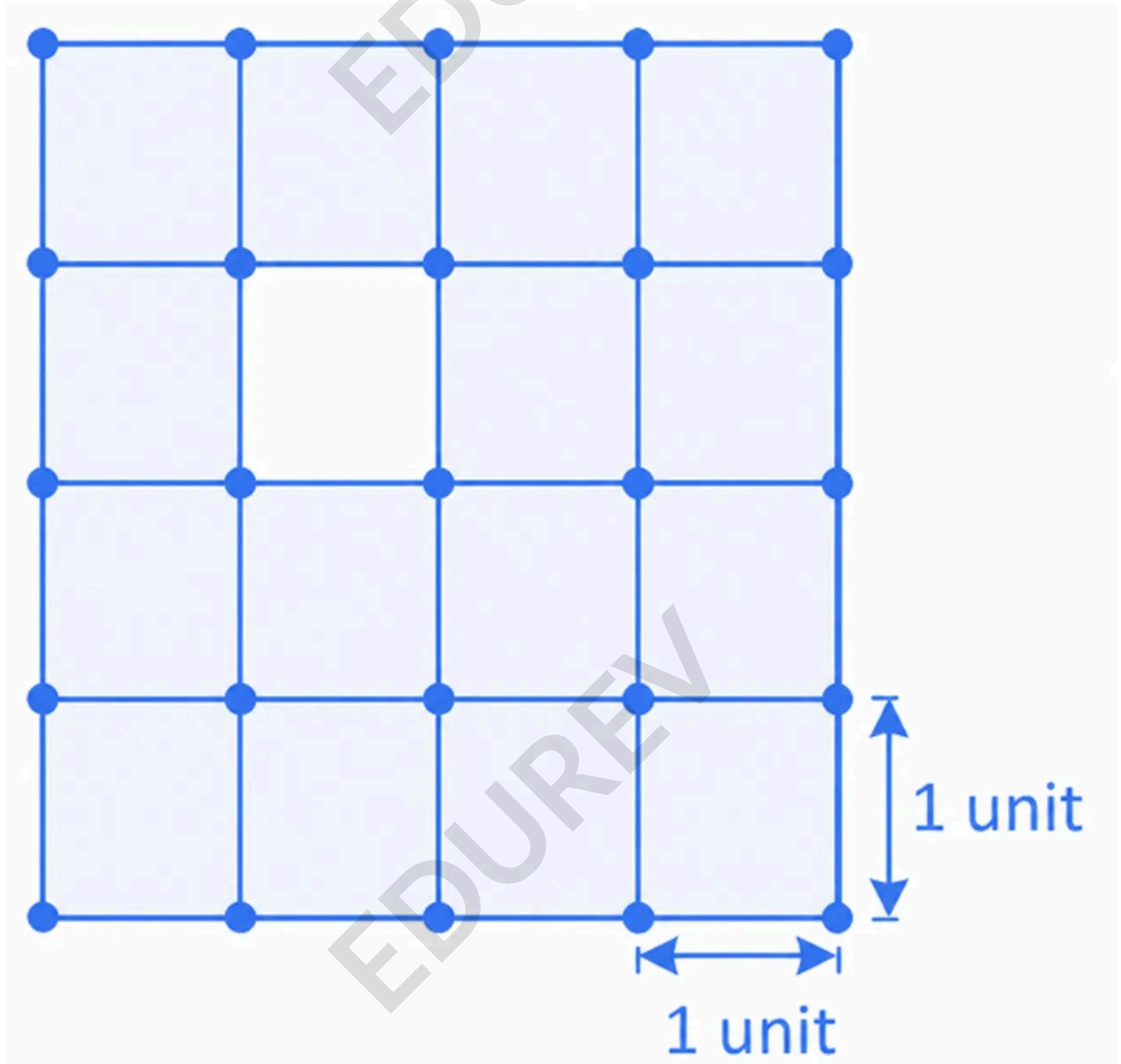
D: 26

EDUREV

REV

Answer: B

Solution:



Number of squares without hole

$$4 \times 4 - 1 = 16 - 1 = 15$$

These are (1×1) squares

$$\text{Now } 2 \times 2 \text{ squares} = 5$$

$$\text{Total number of squares} = 15 + 5 = 20$$

Year: GATE ECE 2022

Question 14: Four points $P(0, 1)$, $Q(0, -3)$, $R(-2, -1)$, and $S(2, -1)$ represent the vertices of a quadrilateral. What is the area enclosed by the quadrilateral?

A: 4

B: $4\sqrt{2}$

C: 8

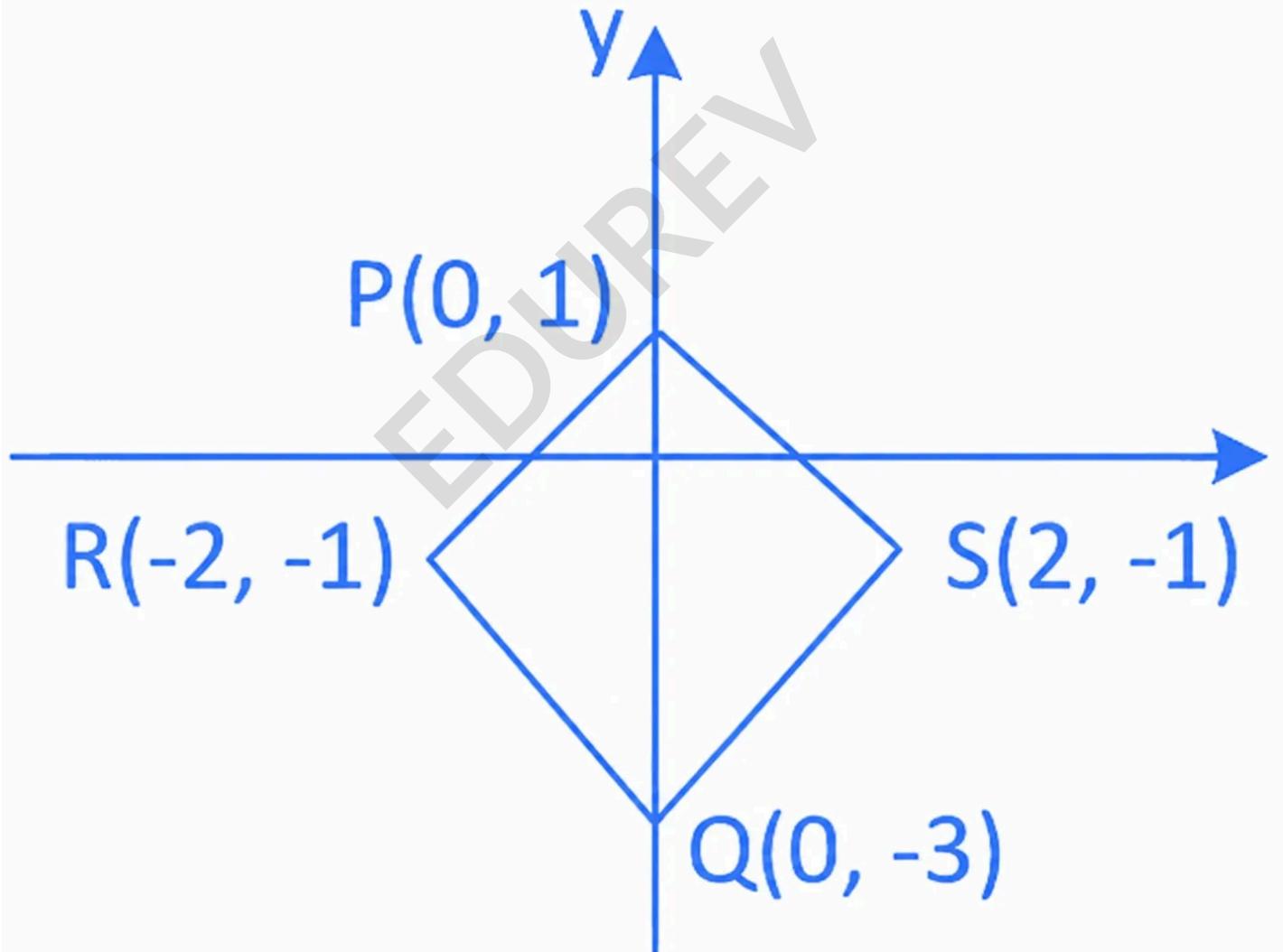
D: $8\sqrt{2}$

Answer: C

Solution:

Given the points $P(0, 1)$, $Q(0, -3)$, $R(-2, -1)$, and $S(2, -1)$ which form the vertices of a quadrilateral, we need to determine the area enclosed by this quadrilateral.

The quadrilateral can be denoted as PSQR.



To find the side lengths, we can use the distance formula: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

The side PS can be calculated as:

$$PS = \sqrt{(2 - 0)^2 + (-1 - 1)^2} = \sqrt{4 + 4} = \sqrt{8}$$

Similarly, for QS:

$$QS = \sqrt{(2 - 0)^2 + (-1 + 3)^2} = \sqrt{4 + 4} = \sqrt{8}$$

For QR:

$$QR = \sqrt{(0 + 2)^2 + (-3 + 1)^2} = \sqrt{4 + 4} = \sqrt{8}$$

And for PR:

$$PR = \sqrt{(-2-0)^2 + (1+1)^2} = \sqrt{4+4} = \sqrt{8}$$

Since all sides are equal, we check the diagonals to confirm it is a square.

The diagonal PQ is:

$$PQ = \sqrt{(0-0)^2 + (1+3)^2} = \sqrt{0+16} = 4$$

And the diagonal RS is:

$$RS = \sqrt{(2+2)^2 + (-1+1)^2} = \sqrt{16+0} = 4$$

Both diagonals are equal, confirming that the quadrilateral is a square.

The area of a square is given by the side length squared. Therefore, we have:

$$\text{Area of square} = (\sqrt{8}) \times (\sqrt{8}) = 8 \text{ square units}$$

Year: GATE ECE 2021

Question 15: p and q are positive integers and $\frac{p}{q} + \frac{q}{p} = 3$, then $\frac{p^2}{q^2} + \frac{q^2}{p^2} =$

A: 11

B: 3

C: 9

D: 7

Answer: D

Solution: Given, $\frac{p}{q} + \frac{q}{p} = 3$

Squaring on both sides, we get

$$\frac{p^2}{q^2} + \frac{q^2}{p^2} + 2\frac{pq}{qp} = 9$$

$$\Rightarrow \frac{p^2}{q^2} + \frac{q^2}{p^2} + 2 = 9$$

$$\Rightarrow \frac{p^2}{q^2} + \frac{q^2}{p^2} = 9 - 2 = 7$$

Year: GATE ECE 2021

Question 16: The current population of a city is 11,02,500. If it has been increasing at the rate of 5% per annum, what was its population 2 years ago?

A: 9,92,500

B: 9,95,006

C: 12,51,506

D: 10,00,000

Answer: D

Solution: Current population of a city = 1102500

Increasing rate per annum = 5%

Let the population of city 2 yrs ago = x

By compound interest formula, we have

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow 1102500 = x\left(1 + \frac{5}{100}\right)^2$$

$$\Rightarrow 1102500 \times \frac{100 \times 100}{105 \times 105} = x$$

$$\Rightarrow x = 1000000$$

$\therefore$ The population of city 2 yrs ago = 1000000

Year: GATE ECE 2020

Question 17: A superadditive function $f(\cdot)$ satisfies the following property

$$f(x_1 + x_2) \geq f(x_1) + f(x_2)$$

Which of the following functions is a superadditive function for $x > 1$?

A: $\sqrt{x}$

B: e^x

C: $\frac{1}{x}$

D: e^{-x}

Answer: B

Solution:

Given : $f(x_1 + x_2) \geq f(x_1) + f(x_2) \quad x > 1$

Consider, $x_1 = 2$ and $x_2 = 3$

Checking from options we have

For option (A),

$$\sqrt{2+3} \geq \sqrt{2} + \sqrt{3}$$

$$2.236 \geq 3.146$$

For option (B),

$$e^{2+3} \geq e^2 + e^3$$

$148.41 \geq 27.47$ it holds the inequality

For option (C),

$$\frac{1}{2+3} \geq \frac{1}{2} + \frac{1}{3}$$

$$\frac{1}{5} \geq \frac{5}{6}$$

$$0.2 \geq 0.8$$

For option (D),

$$e^{-(2+3)} \geq e^{-2} + e^{-3}$$

$$e^{-5} \geq e^{-2} + e^{-3}$$

$$6.73 \times 10^{-3} \geq 0.135 + 0.049$$

$$6.73 \times 10^{-3} \geq 0.184$$

$$0.00673 \geq 0.184$$

Hence, the correct option is (B).

Year: GATE ECE 2019

Question 18: It would take one machine 4 hours to complete a production order and another machine 2 hours to complete the same order. If both machine work simultaneously at their respective constant rates, the time taken to complete the same order is _____ hours.

A: $\frac{4}{3}$

- B: $\frac{3}{4}$
C: $\frac{2}{3}$
D: $\frac{7}{3}$

Answer: A

Year: GATE ECE 2019

Question 19: Five different books (P, Q, R, S, T) are to be arranged on a shelf. The books R and S are to be arranged first and second respectively from right side of the shelf. The number of different orders in which P, Q and T may be arranged is _____.

- A: 6
B: 2
C: 12
D: 120

Answer: A

Year: GATE ECE 2018

Question 20: If the number 715 ■ 423 is divisible by 3 (■ denotes the missing digit in the thousandths place), then the smallest whole number in the place of ■ is _____.

- A: 2
B: 0
C: 6
D: 5

Answer: A

Year: GATE ECE 2018

Question 21: A 1.5 m tall person is standing at a distance of 3 m from a lamp post. The light from the lamp at the top of the post casts her shadow. The length of the shadow is twice her height. What is the height of the lamp post in meters?

- A:** 1.5
B: 3
C: 4.5
D: 6

Answer: B

Year: GATE ECE 2018

Question 22: What is the value of $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \dots$?

- A:** $\frac{7}{4}$
B: $\frac{3}{2}$
C: $\frac{4}{3}$
D: 2

Answer: C

Year: GATE ECE 2017 Set 2

Question 23: A rule states that in order to drink beer one must be over 18 years old. In a bar, there are 4 people. P is 16 years old, Q is 25 years old, R is drinking milkshake and S is drinking beer. What must be checked to ensure that the rule is being followed?

- A:** Only P's drink
B: Only P's drink and S's age
C: Only S's age
D: Only P's drink, Q's drink and S's age

Answer: B

Year: GATE ECE 2017 Set 2

Question 24: 500 students are taking one or more courses out of Chemistry, Physics, and Mathematics. Registration records indicate course enrolment as follows: Chemistry (329), Physics (186), Mathematics (295), Chemistry and Physics (83), Chemistry and Mathematics

(217), and Physics and Mathematics (63). How many students are taking all 3 subjects?

A: 37

B: 43

C: 47

D: 53

Answer: D

Year: GATE ECE 2017 Set 2

Question 25: Fatima starts from point P, goes North for 3 km, and then East for 4 km to reach point Q. She then turns to face point P and goes 15 km in that direction. She then goes North for 6 km. How far is she from point P, and in which direction should she go to reach point P?

A: 8 km, East

B: 12 km, North

C: 6 km, East

D: 10 km, North

Answer: A

Year: GATE ECE 2017 Set 1

Question 26: In the summer, water consumption is known to decrease overall by 25%. A water Board official states that in the summer household consumption decreases by 20%, while other consumption increases by 70%.

Which of the following statement is correct?

A: The ratio of household to other consumption is 8/17

B: The ratio of household to other consumption is 1/17

C: The ratio of household to other consumption is 17/8

D: There are errors in the official's statement

Answer: D

Year: GATE ECE 2017 Set 1

Question 27: 40% of deaths on city roads may be attributed to drunken driving. The number of degrees needed to represent this as a slice of a pie chart is

- A:** 120
- B:** 144
- C:** 160
- D:** 212

Answer: B

Year: GATE ECE 2017 Set 1

Question 28: Some tables are shelves. Some shelves are chairs. All chairs are benches. Which of the following conclusions can be deduced from the preceding sentences?

- (i)** At least one bench is a table
- (ii)** At least one shelf is a bench
- (iii)** At least one chair is a table
- (iv)** All benches are chairs

- A:** Only (i)
- B:** Only (ii)
- C:** Only (ii) and (iii)
- D:** Only (iv)

Answer: B

Year: GATE ECE 2016 Set 3

Question 29: It takes 10 s and 15 s, respectively, for two trains traveling at different constant speeds to completely pass a telegraph post. The length of the first train is 120 m and that of the second train is 150 m. The magnitude of the difference in the speeds of the two trains (in m/s) is _____.

- A:** 2.0

- B:** 10.0
C: 12.0
D: 22.0

Answer: A

Year: GATE ECE 2016 Set 3

Question 30: The number that least fits this set: (324, 441, 97 and 64) is _____.

- A:** 324
B: 441
C: 97
D: 64

Answer: C

Year: GATE ECE 2016 Set 2

Question 31: Given $(9 \text{ inches})^{1/2} = (0.25 \text{ yards})^{1/2}$, which one of the following statements is TRUE?

- A:** 3 inches = 0.5 yards
B: 9 inches = 1.5 yards
C: 9 inches = 0.25 yards
D: 81 inches = 0.0625 yards

Answer: C

Year: GATE ECE 2016 Set 2

Question 32: S, M, E and F are working in shifts in a team to finish a project. M works with twice the efficiency of others but for half as many days as E worked. S and M have 6 hour shifts in a day, whereas E and F have 12 hours shifts. What is the ratio of contribution of M to contribution of E in the project?

- A:** 1:1

B: 1:2

C: 1:4

D: 2:1

Answer: B

Year: GATE ECE 2016 Set 1

Question 33: In a huge pile of apples and oranges, both ripe and unripe mixed together, 15% are unripe fruits. Of the unripe fruits, 45% are apples. Of the ripe ones, 66% are oranges. If the pile contains a total of 5692000 fruits, how many of them are apples?

A: 2029198

B: 2467482

C: 2789080

D: 3577422

Answer: A

Year: GATE ECE 2016 Set 1

Question 34: Michael lives 10 km away from where I live. Ahmed lives 5 km away and Susan lives 7 km away from where I live. Arun is farther away than Ahmed but closer than Susan from where I live. From the information provided here, what is one possible distance (in km) at which I live from Arun's place?

A: 3.00

B: 4.99

C: 6.02

D: 7.01

Answer: C

Year: GATE ECE 2015 Set 1

Question 35: If $\log_x \left(\frac{5}{7}\right) = \frac{-1}{3}$, then the value of x is

A: 343/125

B: 125/343

C: -25/49

D: -49/25

Answer: A

Year: GATE ECE 2015 Set 1

Question 36: Operators $\square, \diamond, \rightarrow$ are defined by : $a \square b = \frac{a-b}{a+b}$; $a \diamond b = \frac{a+b}{a-b}$; $a \rightarrow b = ab$. Find the value of $(66 \square 6) \rightarrow (66 \diamond 6)$.

A: -2

B: -1

C: 1

D: 2

Answer: C

Year: GATE ECE 2015 Set 3

Question 37: Find the missing sequence in the letter series below:

A, CD, GHI, ?, UVWXY

A: LMN

B: MNO

C: MNOP

D: NOPQ

Answer: C

Year: GATE ECE 2015 Set 3

Question 38: If $x > y > 1$, which of the following must be true?

(i)	$\ln(x) > \ln(y)$
(ii)	$e^x > e^y$
(iii)	$y^x > x^y$
(iv)	$\cos(x) > \cos(y)$

- A:** (i) and (ii)
B: (i) and (iii)
C: (iii) and (iv)
D: (ii) and (iv)

Answer: A

Year: GATE ECE 2015 Set 2

Question 39: Ram and Ramesh appeared in an interview for two vacancies in the same department. The probability of Ram's selection is $\frac{1}{6}$ and that of Ramesh is $\frac{1}{8}$. What is the probability that only one of them will be selected?

- A:** $\frac{47}{48}$
B: $\frac{1}{4}$
C: $\frac{13}{48}$
D: $\frac{35}{48}$

Answer: B

Year: GATE ECE 2013

Question 40: In the summer of 2012, in New Delhi, the mean temperature of Monday to Wednesday was 41°C and of Tuesday to Thursday was 43°C . If the temperature on Thursday was 15% higher than that of Monday, then the temperature in $^\circ\text{C}$ on Thursday was

- A:** 40

B: 43

C: 46

D: 49

Answer: C

Year: GATE ECE 2012

Question 41: If $(1.001)^{1259} = 3.52$ and $(1.001)^{2062} = 7.85$, then $(1.001)^{3321} =$

A: 2.23

B: 4.33

C: 11.37

D: 27.64

Answer: D

Year: GATE ECE 2011

Question 42: There are two candidates P and Q in an election. During the campaign, 40% of the voters promised to vote for P, and rest for Q. However, on the day of election 15% of the voters went back on their promise to vote for P and instead voted for Q. 25% of the voters went back on their promise to vote for Q and instead voted for P. Suppose, P lost by 2 votes, then what was the total number of voters?

A: 100

B: 10

C: 90

D: 95

Answer: A

Year: GATE ECE 2010

Question 43: 25 persons are in a room. 15 of them play hockey, 17 of them play football and 10 of them play both hockey and football. Then the number of persons playing neither hockey nor football is:

- A: 2**
B: 17
C: 13
D: 3

Answer: D

(2 Marks Questions)

Year: GATE ECE 2026

Question 1: Let P_k represent the perimeter of a square with sides of length k . The value of the expression $P_1 + P_2 + P_3 + \dots + P_{10}$ is ____.

- A: 55**
B: 110
C: 220
D: 440

Answer: C

Solution:

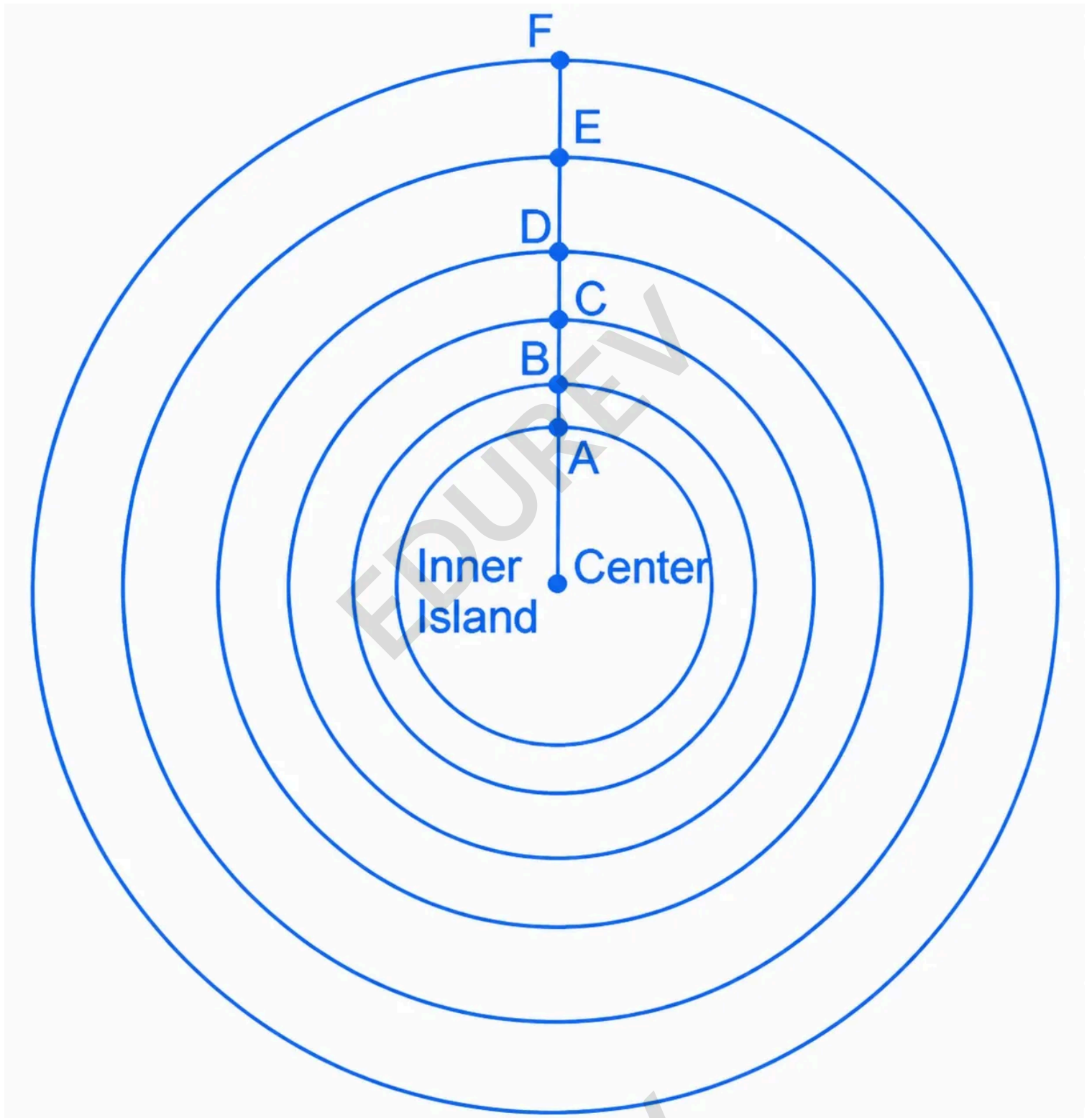
$$\begin{aligned}
 P_1 &= 4 \\
 P_2 &= 8 \\
 P_3 &= 12 \\
 P_1 + P_2 + P_3 + \dots + P_{10} &= 4 + 8 + 12 + \dots + 40 \\
 &= 4(1 + 2 + 3 + \dots + 10) \\
 &= 4 \times \frac{10 \times 11}{2} = 220
 \end{aligned}$$

Year: GATE ECE 2026

Question 2: The city of Atlantis was crafted by the God of the seas, Poseidon. It was made of alternating concentric circular rings of land (shaded) and water (not shaded) as represented in the figure (not to scale). The radius of Inner Island was 2.5 stades (a unit of length used in ancient Greece). The water surrounding Inner Island was one stade wide (length AB). This

was surrounded by two pairs of alternating rings of land and water. The first pair of land and water was two stades wide each (lengths BC and CD), and the outer pair is three stades wide each (lengths DE and EF).

The ratio of the surface area of the land to that of the water in the city of Atlantis is _____ (round off to two decimal places).



A: 0.45

B: 0.60

C: 0.75

D: 0.90

Answer: C**Solution:**

$$AB = r_1 = 2.5, AC = r_2 = 3.5$$

$$AD = r_3 = 5.5, AE = r_4 = 7.5$$

$$AF = r_5 = 10.5, AG = r_6 = 13.5$$

$$L = L_1 + L_2 + L_3$$

$$= \pi r_1^2 + \pi(r_3^2 - r_2^2) + \pi(r_5^2 - r_4^2)$$

$$= \pi(2.5)^2 + \pi(5.5^2 - 3.5^2) + \pi(10.5^2 - 7.5^2) = 78.25\pi$$

$$W = W_1 + W_2 + W_3$$

$$= \pi(r_2^2 - r_1^2) + \pi(r_4^2 - r_3^2) + \pi(r_6^2 - r_5^2)$$

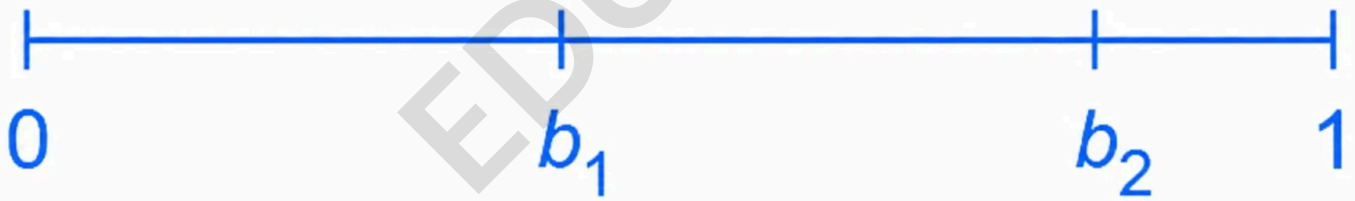
$$= \pi(3.5^2 - 2.5^2) + \pi(7.5^2 - 5.5^2) + \pi(13.5^2 - 10.5^2) = 104\pi$$

$$\frac{L}{W} = \frac{78.25\pi}{104\pi} = 0.75$$

Year: GATE ECE 2025

Question 3: A stick of length one meter is broken at two locations at distances of b_1 and b_2 from the origin (0), as shown in the figure. Note that 0

Note: All lengths are in meter. The figure shown is representative.



A: $b_1 < 0.5$

B: $b_2 > 0.5$

C: b_2

D: $b_1 + b_2 < 1$

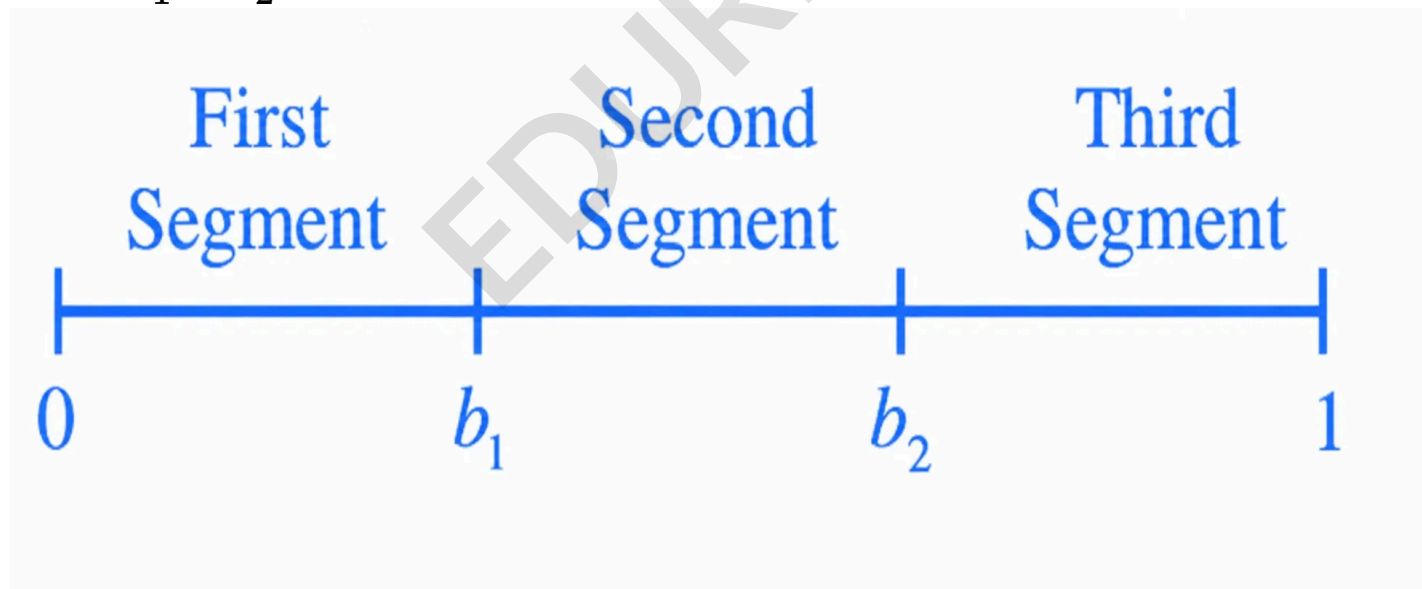
Answer: D

Solution:

Given :

(i) A stick of length one meter is Broken at two locations at distance of b_1 and b_2 from the origin (0).

(ii) $0 < b_1 < b_2 < 1$



Triangle inequality theorem :

A triangle can be formed if the sum of any two sides is greater than the third side.

(i) b_1 (first line (or) segment)

(ii) $b_2 - b_1$ (second line (or) segment)

(iii) $1 - b_2$ (third line (or) segment)

(1)

$$b_1 + (b_2 - b_1) > (1 - b_2)$$

$$b_2 > 1 - b_2$$

$$2b_2 > 1$$

$$b_2 > 0.5 \text{ [Condition satisfied]}$$

(2)

$$b_1 + (1 - b_2) > (b_2 - b_1)$$

$$b_1 + 1 - b_2 > b_2 - b_1$$

$$2b_1 - 2b_2 + 1 > 0$$

$$b_2 < b_1 + 0.5 \text{ [Condition satisfied]}$$

(3)

$$(b_2 - b_1) + (1 - b_2) > b_1$$

$$b_2 - b_1 + 1 - b_2 > b_1$$

$$-2b_1 + 1 > 0$$

$$2b_1 < 1$$

$$b_1 < 0.5 \text{ [Condition satisfied]}$$

Hence, the correct option is (D).

Year: GATE ECE 2025

Question 4: The table lists the top 5 nations according to the number of gold medals won in a tournament; also included are the number of silver and the bronze medals won by them.

Based only on the data provided in the table, which one of the following statements is **INCORRECT**?

Nation	Gold	Silver	Bronze
USA	40	44	41
Canada	39	27	24
Japan	20	12	13
Australia	17	19	16
France	16	26	22

A: France will occupy the third place if the list were made on the basis of the total number of medals won.

B: The order of the top two nations will not change even if the list is made on the basis of the total number of medals won.

C: USA and Canada together have less than 50% of the medals awarded to the nations in the above table.

D: Canada has won twice as many total medals as Japan.

Answer: C**Solution:**

Nation	Gold	Silver	Bronze
USA	40	44	41
Canada	39	27	24
Japan	20	12	13
Australia	17	19	16
France	16	26	22

Total medals awarded to the nations = 376

Medals awarded to USA = 125

Medals awarded to Canada = 90

Medals awarded to USA and Canada = $90 + 125 = 215$

$$\therefore \frac{215}{376} \times 100 = 57.18\%$$

⇒ USA and Canada together have 57.18% of the total medals awarded to the nations.

Year: GATE ECE 2025

Question 5: An organization allows its employees to work independently on consultancy projects but charges an overhead on the consulting fee. The overhead is 20% of the consulting fee, if the fee is up to . 5, 00, 000. For higher fees, the overhead is . 1, 00, 000 plus 10% of the amount by which the fee exceeds . 5,00,000. The government charges a Goods and Services Tax of 18% on the total amount (the consulting fee plus the overhead). An employee of the organization charges this entire amount, i.e., the consulting fee, overhead, and tax, to the client. If the client cannot pay more than . 10,00,000, what is the maximum consulting fee that the employee can charge?

A: 7, 01, 438

B: 7, 24, 961

C: 7, 51, 232

D: 7, 75, 784

Answer: B**Solution:**Let, consultation fee = X

Case (i):

If $X \leq 5,00,000$ Overhead = 20% of $X = 0.2X$ Total cost = $X + 0.2X = 1.2X$ Tax = 18% of $1.2X = \left(\frac{18}{100}\right)1.2X = 0.216X$ Total amount paid by client = $1.2X + 0.216X = 1.416X$

Given that, the client can only pay 10,00,000.

$$\Rightarrow 1.416X = 10,00,000$$

$$\Rightarrow X = 7,06,215$$

Case (ii):

If $X > 500000$

$$\begin{aligned}\text{Overhead} &= 1,00,000 + 10\%[X - 500000] \\ &= 1,00,000 + 0.1[X - 500000]\end{aligned}$$

$$\begin{aligned}\text{Total cost} &= X + 100000 + 0.1[X - 500000] \\ &= 1.1X + 50000\end{aligned}$$

$$\text{Tax} = \frac{18}{100}(1.1X + 50000) = 0.198X + 9000$$

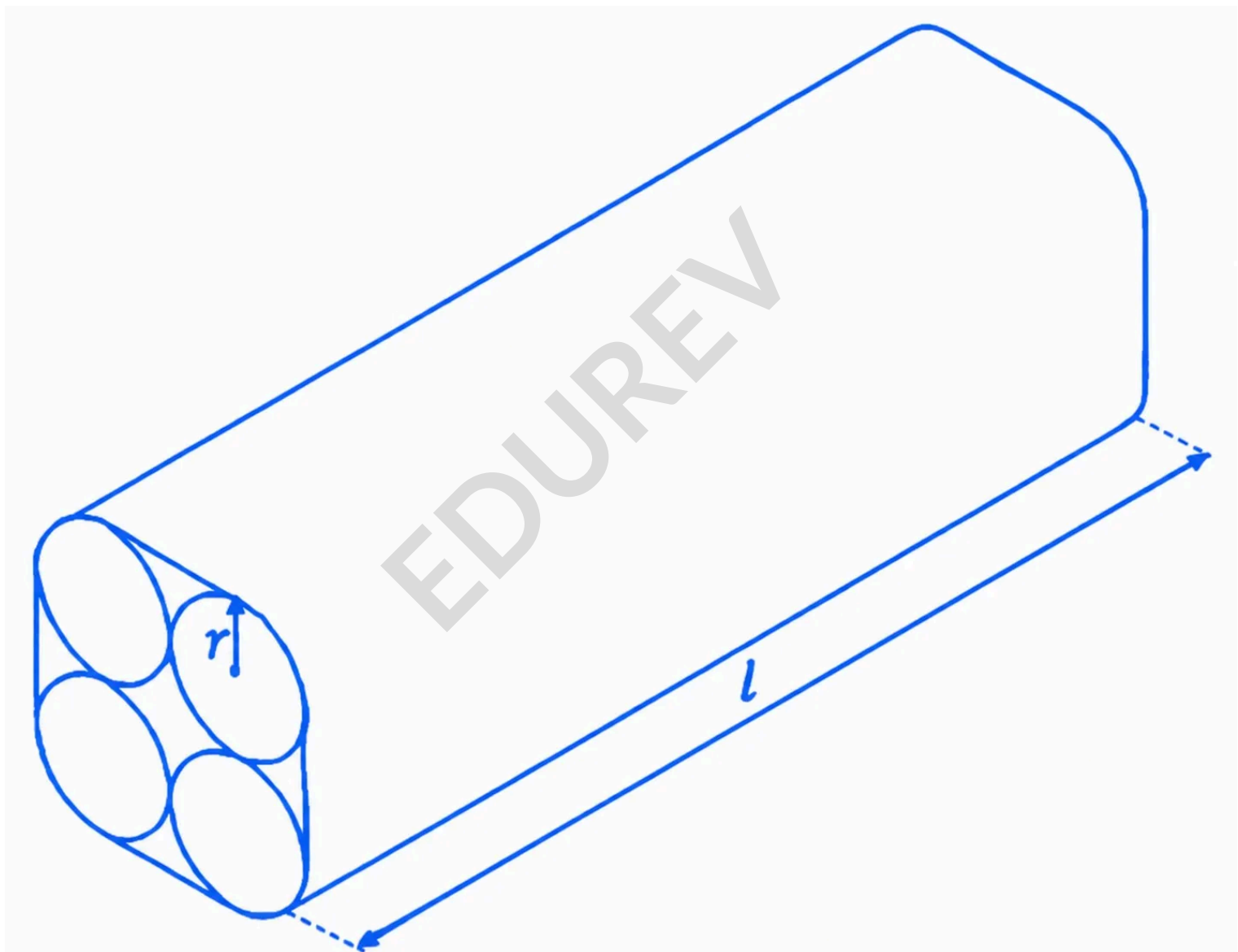
$$\text{Total amount paid by client} = 1.1X + 50000 + 0.198X + 9000 = 1.298X + 59000$$

Given that, the client can only pay 1000000

$$\begin{aligned}\Rightarrow 1.298X + 59000 &= 1000000 \\ X &= 724,961\end{aligned}$$

 $\therefore$ Maximum consultation fee that the client can afford = 724961.**Year: GATE ECE 2024**

Question 6: Four identical cylindrical chalk-sticks, each of radius $r = 0.5$ cm and length $l = 10$ cm, are bound tightly together using a duct tape as shown in the following figure.



The width of the duct tape is equal to the length of the chalk-stick. The area (in cm^2) of the duct tape required to wrap the bundle of chalk-sticks once, is

A: $20(4 + \pi)$

B: $20(8 + \pi)$

C: $10(8 + \pi)$

D: $10(4 + \pi)$

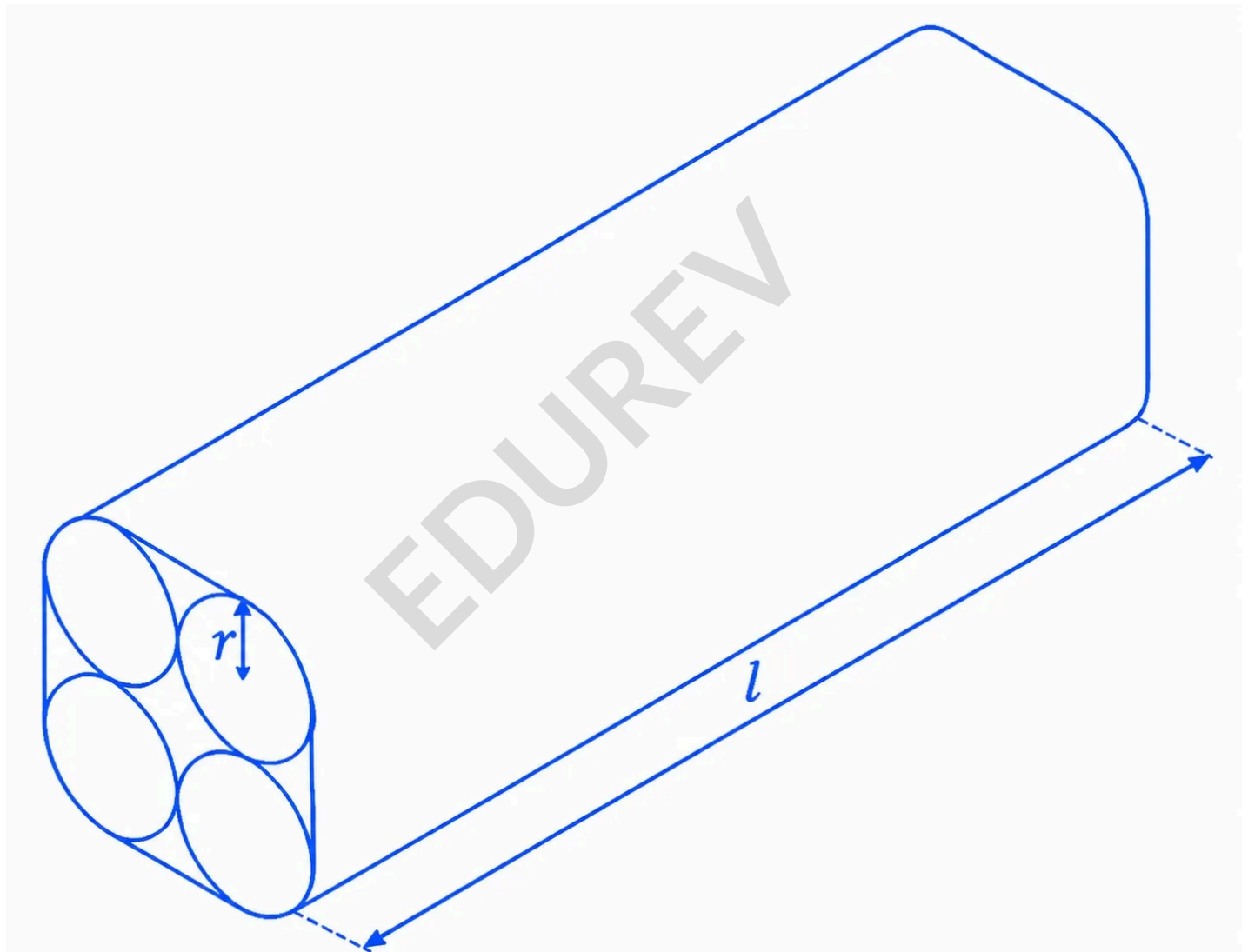
Answer: D

Solution:

Given :

Radius of chalk stick $r = 0.5 \text{ cm}$

Length of chalk stick $l = 10 \text{ cm}$



Width of duct tape is equal to length of chalk stick

Width of duct tape $= 10 \text{ cm}$

$$\begin{aligned}
 \text{Length of duct tape} &= 2r + 2r + 2r + 2r + 2\pi r \\
 &= 8r + 2\pi r \\
 &= 8 \times 0.5 + 2\pi(0.5) \\
 &= 4 + \pi
 \end{aligned}$$

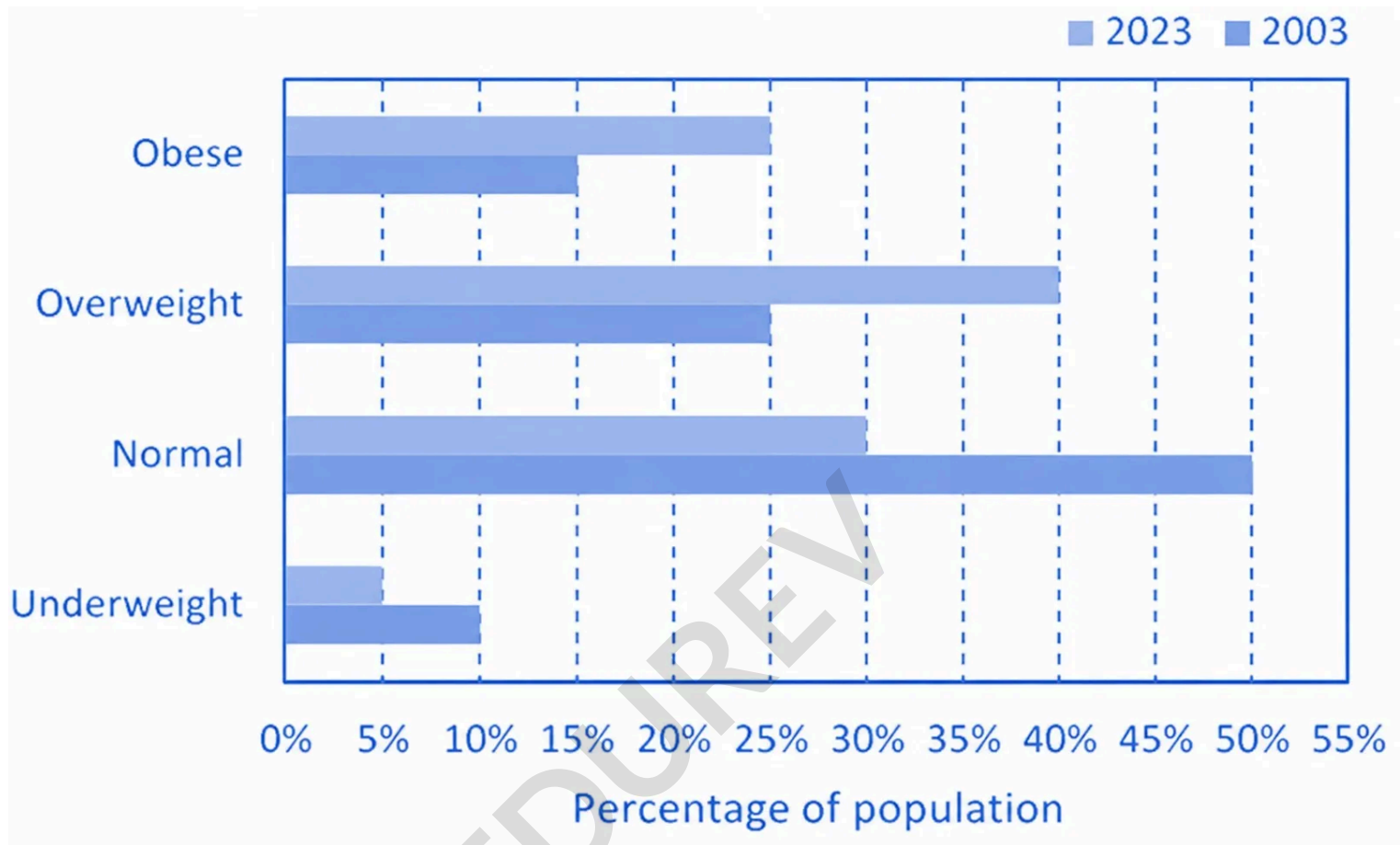
Area of tape $= \text{Length} \times \text{Width}$

$$= 10(4 + \pi)$$

Hence, the correct option is (D).

Year: GATE ECE 2024

Question 7: The bar chart shows the data for the percentage of population falling into different categories based on Body Mass Index (BMI) in 2003 and 2023.



Based on the data provided, which one of the following options is **INCORRECT**?

- A: The ratio of the percentage of population falling into overweight category to the percentage of population falling into normal category has increased in 20 years.
- B: The ratio of the percentage of population falling into underweight category to the percentage of population falling into normal category has decreased in 20 years.
- C: The ratio of the percentage of population falling into obese category to the percentage of population falling into normal category has decreased in 20 years.
- D: The percentage of population falling into normal category has decreased in 20 years.

Answer: C

Solution:

Year: GATE ECE 2024

Question 8: Two identical sheets A and B, of dimensions $24\text{ cm} \times 16\text{ cm}$, can be folded into half using two distinct operations, FO1 or FO2.

In FO1, the axis of folding remains parallel to the initial long edge, and in FO2, the axis of folding remains parallel to the initial short edge.

If sheet A is folded twice using FO1, and sheet B is folded twice using FO2, the ratio of the perimeters of the final shapes of A and B is

A: 14:11

B: 11:14

C: 18:11

D: 11:18

Answer: A**Solution:**

To determine the ratio of the perimeters of the final shapes of sheets A and B after folding, we need to carefully apply the folding operations specified in the problem.

First, let's examine sheet A, which will be folded twice using FO1 (folding parallel to the long edge).

The initial dimensions of sheet A are 24 cm (long edge) and 16 cm (short edge).

After the first fold using FO1, the dimensions become:

Long edge: 24 cm (remains unchanged)

Short edge: $16 \text{ cm} / 2 = 8 \text{ cm}$

After the second fold using FO1, the dimensions become:

Long edge: 24 cm (remains unchanged)

Short edge: $8 \text{ cm} / 2 = 4 \text{ cm}$

Thus, the final dimensions of sheet A are 24 cm by 4 cm. The perimeter of this shape is:

$$\text{Perimeter of A} = 2 \times (24 + 4) = 2 \times 28 = 56 \text{ cm}$$

Now, let's examine sheet B, which will be folded twice using FO2 (folding parallel to the short edge).

The initial dimensions of sheet B are 24 cm (long edge) and 16 cm (short edge).

After the first fold using FO2, the dimensions become:

Long edge: $24 \text{ cm} / 2 = 12 \text{ cm}$

Short edge: 16 cm (remains unchanged)

After the second fold using FO2, the dimensions become:

Long edge: $12 \text{ cm} / 2 = 6 \text{ cm}$

Short edge: 16 cm (remains unchanged)

Thus, the final dimensions of sheet B are 6 cm by 16 cm. The perimeter of this shape is:

$$\text{Perimeter of B} = 2 \times (6 + 16) = 2 \times 22 = 44 \text{ cm}$$

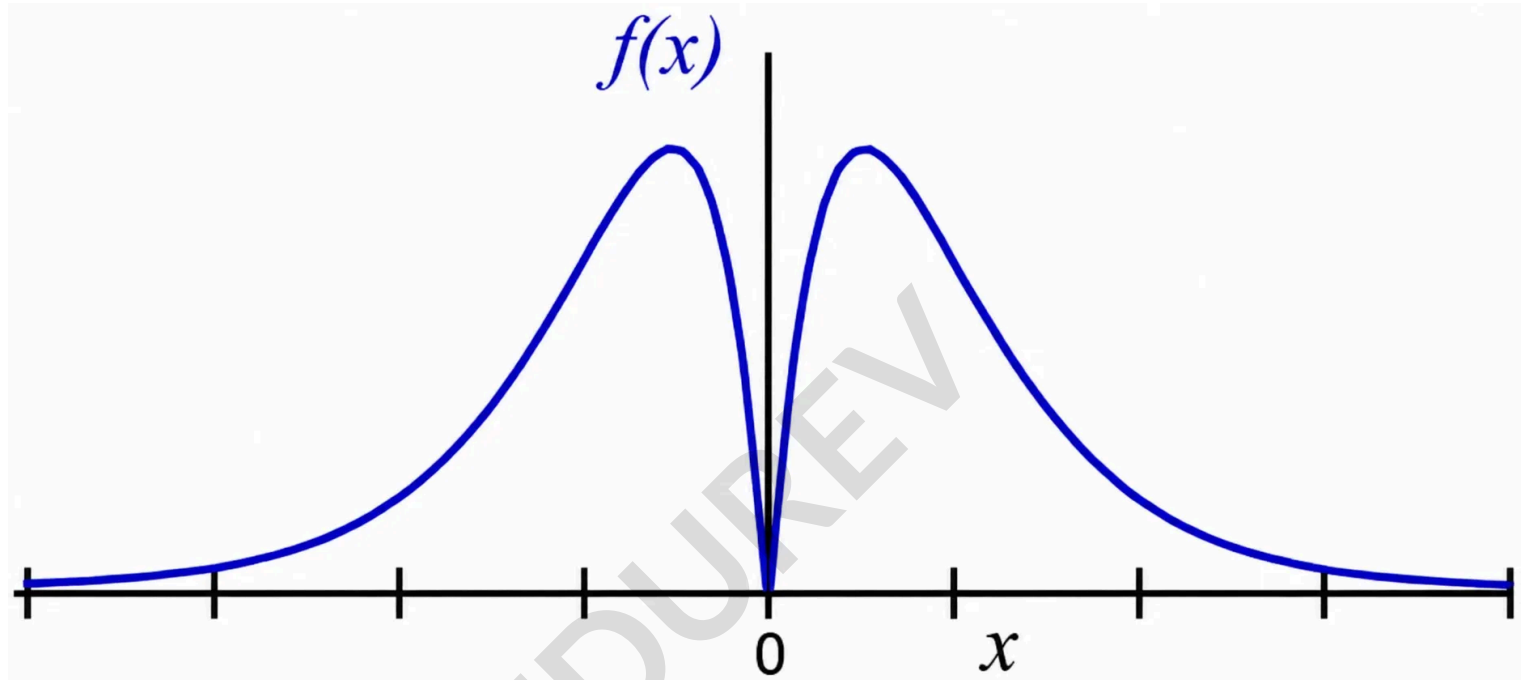
To find the ratio of the perimeters of the final shapes of sheets A and B, we compute:

$$\text{Ratio} = \frac{\text{Perimeter of A}}{\text{Perimeter of B}} = \frac{56}{44} = \frac{28}{22} = \frac{14}{11}$$

Therefore, the ratio of the perimeters of the final shapes of A and B is 14:11, which corresponds to option A.

Year: GATE ECE 2023

Question 9: Which one of the following options represents the given graph?



A: $f(x) = x^2 2^{-|x|}$

B: $f(x) = x 2^{-|x|}$

C: $f(x) = |x| 2^{-x}$

D: $f(x) = x 2^{-x}$

Answer: A

Solution: Since, the given function is an even function. Option (A) is only represents the even function.

Year: GATE ECE 2023

Question 10: Out of 1000 individuals in a town, 100 unidentified individuals are covid positive. Due to lack of adequate covid-testing kits, the health authorities of the town devised a strategy to identify these covid-positive individuals. The strategy is to:

- (i) Collect saliva samples from all 1000 individuals and randomly group them into sets of 5.**
- (ii) Mix the samples within each set and test the mixed sample for covid.**
- (iii) If the test done in (ii) gives a negative result, then declare all the 5 individuals to be covid negative.**
- (iv) If the test done in (ii) gives a positive result, then all the 5 individuals are separately tested for covid.**

Given this strategy, no more than _____ testing kits will be required to identify all the 100 covid positive individuals irrespective of how they are grouped.

- A: 700**
- B: 600**
- C: 800**
- D: 1000**

Answer: A**Solution:**

To solve this problem, we need to calculate the maximum number of testing kits required based on the given strategy. Let's break down the process step-by-step:

1. There are 1000 individuals, and they are grouped into sets of 5. Thus, the number of groups is:

$$\frac{1000}{5} = 200$$

2. Each set of 5 individuals is tested as a mixed sample. So, initially, 200 tests are conducted (one for each group).

3. If any of these mixed sample tests are positive, then the 5 individuals in that group are tested separately. Let's examine the worst-case scenario where all the covid positive cases are distributed such that it maximizes the number of tests required.

4. Since there are 100 covid positive individuals, the worst-case scenario is where each positive individual is the only positive case in its group of 5. This maximizes the number of groups that test positive because finding one positive case in a group means the entire group needs to be retested individually.

5. So, in the worst case, the number of groups that test positive is 100 (one for each positive individual, spread across a minimum of 100 groups).

6. For each of these 100 groups that test positive, all 5 individuals are tested again. This leads to:

$$100 \times 5 = 500 \text{ tests}$$

adding these to the initial 200 tests gives:

$$200 + 500 = 700 \text{ tests}$$

So, the maximum number of testing kits required would be 700. Hence, the correct answer is:

Option A: 700

Year: GATE ECE 2023

Question 11: A $100\text{ cm} \times 32\text{ cm}$ rectangular sheet is folded 5 times. Each time the sheet is folded, the long edge aligns with its opposite side. Eventually, the folded sheet is a rectangle of dimensions $100\text{ cm} \times 1\text{ cm}$.

The total number of creases visible when the sheet is unfolded is _____.

A: 32

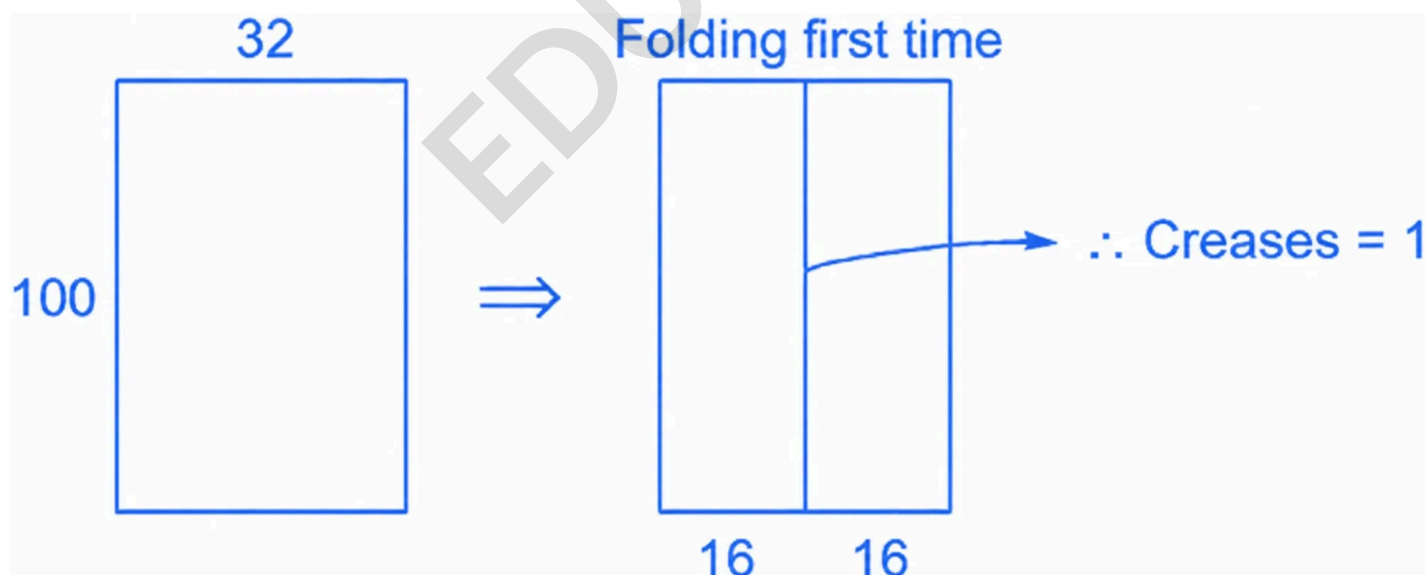
B: 5

C: 31

D: 63

Answer: C

Solution:



$$\begin{aligned}\therefore \text{After folding 5 times} &= 1 + 2^1 + 2^2 + 2^3 + 2^4 \\ &= 1 + 2 + 4 + 8 + 16 = 31\end{aligned}$$

Year: GATE ECE 2022

Question 12: Consider the following inequalities.

(i) $2x - 1 > 7$

(ii) $2x - 9 < 1$

Which one of the following expressions below satisfies the above two inequalities?

A: $x \leq -4$

B: $-4 < x \leq 4$

C: $4 < x < 5$

D: $x \geq 5$

EDUREV

Answer: C**Solution:**

To determine the expression that satisfies both inequalities, we'll solve them separately first.

Starting with inequality (i):

$$2x - 1 > 7$$

Step 1: Add 1 to both sides of the inequality:

$$2x - 1 + 1 > 7 + 1$$

This simplifies to:

$$2x > 8$$

Step 2: Divide both sides by 2:

$$\frac{2x}{2} > \frac{8}{2}$$

This simplifies to:

$$x > 4$$

Next, we solve inequality (ii):

$$2x - 9 < 1$$

Step 1: Add 9 to both sides of the inequality:

$$2x - 9 + 9 < 1 + 9$$

This simplifies to:

$$2x < 10$$

Step 2: Divide both sides by 2:

$$\frac{2x}{2} < \frac{10}{2}$$

This simplifies to:

$$x < 5$$

Now we combine the results from both inequalities:

From (i) we have $x > 4$

From (ii) we have $x < 5$

Combining these two results, we get:

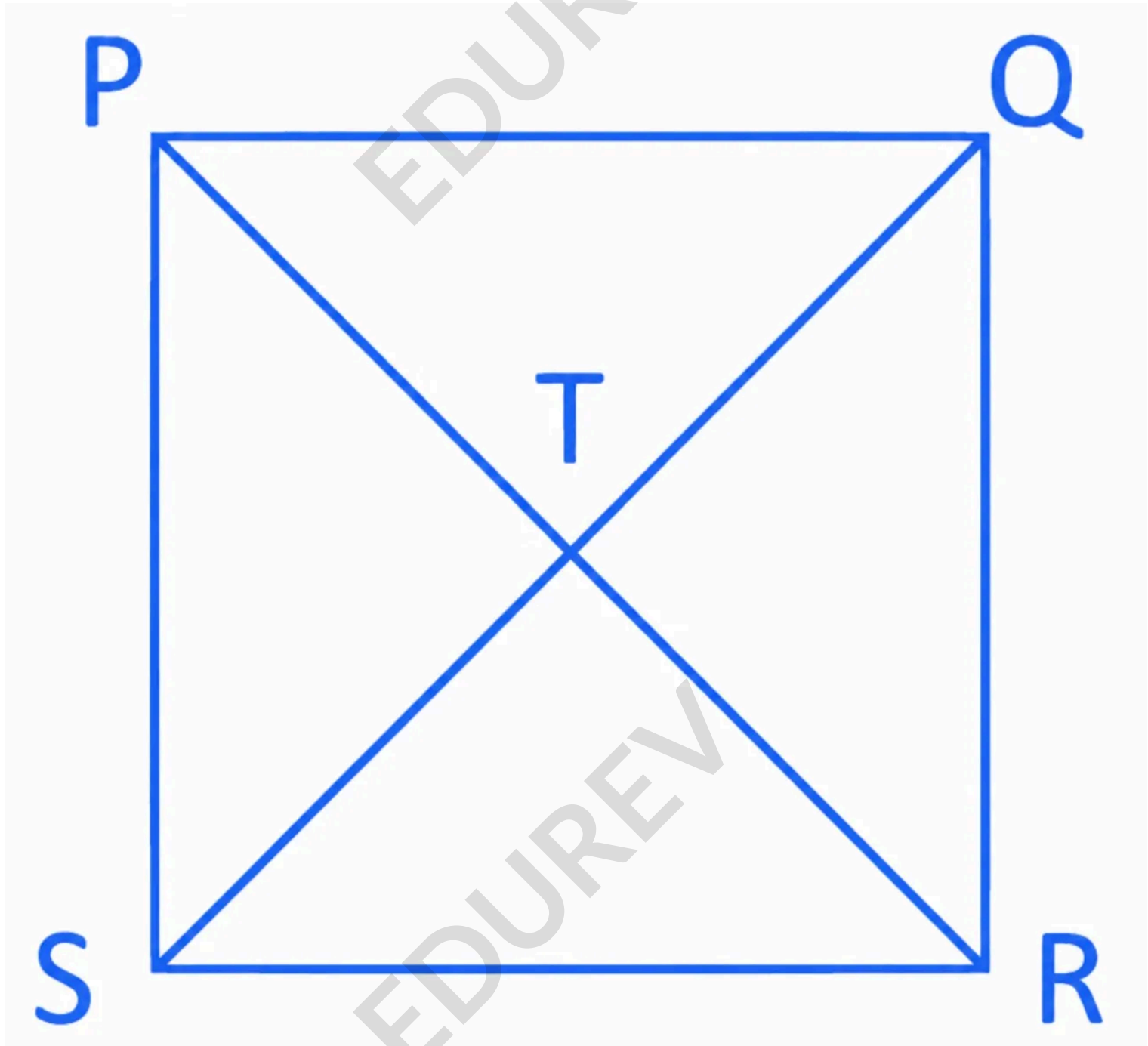
$$4 < x < 5$$

Therefore, the option that satisfies both given inequalities is:

Option C: $4 < x < 5$

Year: GATE ECE 2022

Question 13: Consider the following square with the four corners and the center marked as P, Q, R, S and T respectively.



Let X, Y and Z represent the following operations :

X : rotation of the square by 180 degree with respect to the S-Q axis.

Y : rotation of the square by 180 degree with respect to the P-R axis.

Z : rotation of the square by 90 degree clockwise with respect to the axis perpendicular, going into the screen and passing through the point T.

Consider the following three distinct sequences of operation (which are applied in the left to right order).

(1) XYZZ

(2) XY

(3) ZZZZ

Which one of the following statements is correct as per the information provided above?

A: The sequence of operations (1) and (2) are equivalent

B: The sequence of operations (1) and (3) are equivalent

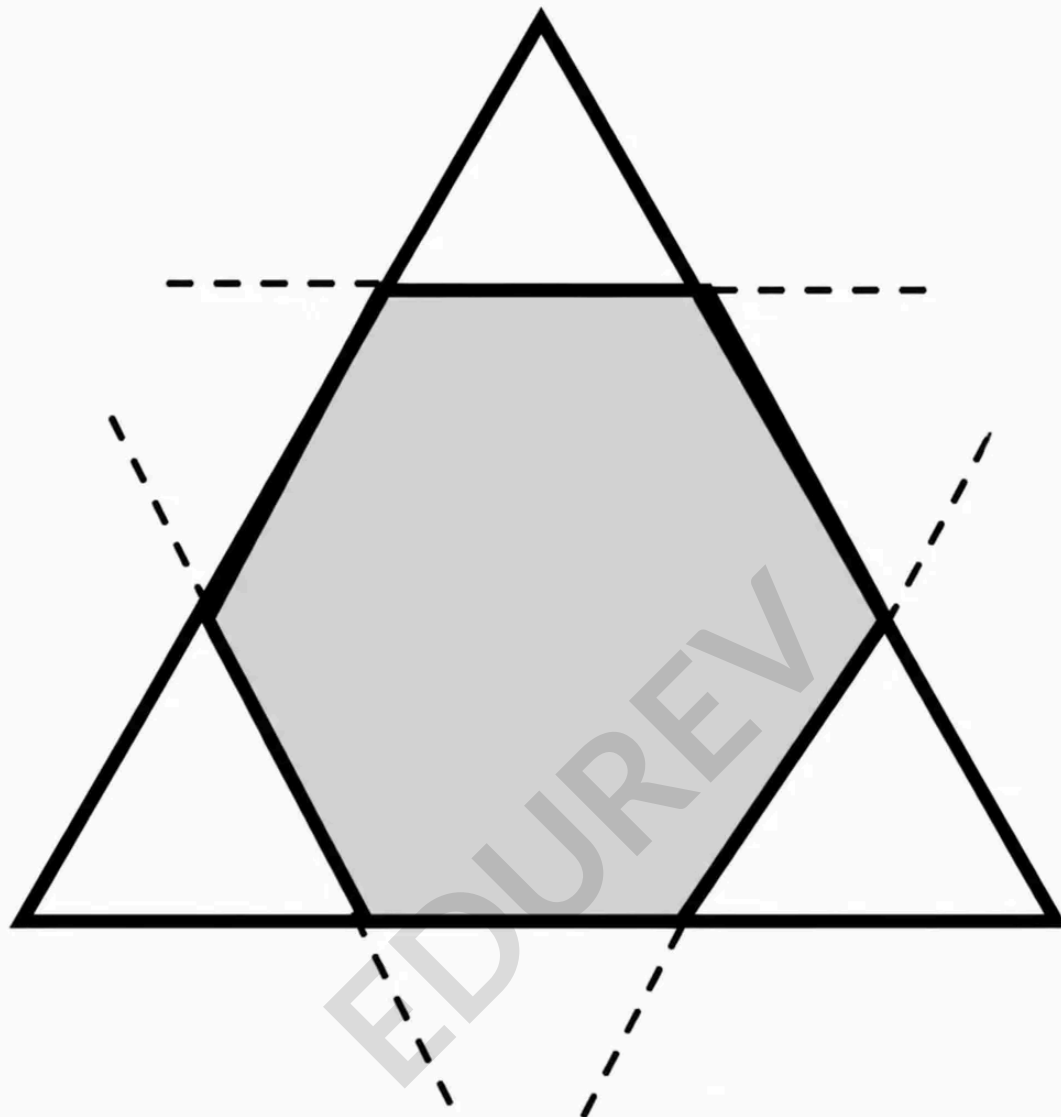
C: The sequence of operations (2) and (3) are equivalent

D: The sequence of operations (1), (2) and (3) are equivalent

Answer: B

Year: GATE ECE 2021

Question 14:



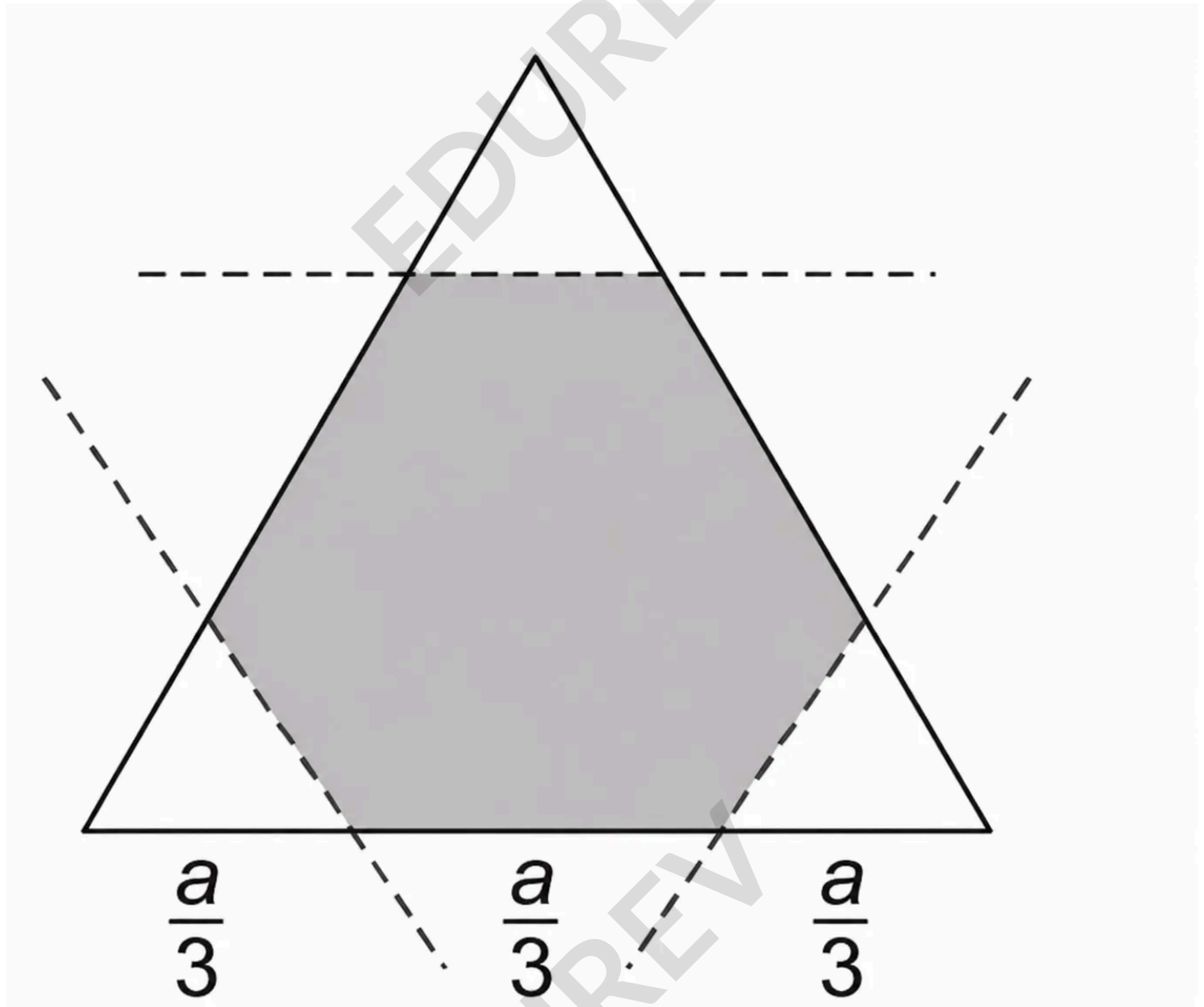
Corners are cut from an equilateral triangle to produce a regular convex hexagon as shown in the figure above.

The ratio of the area of the regular convex to the area of the original equilateral triangle is

- A: 4 : 5**
- B: 2 : 3**
- C: 3 : 4**
- D: 5 : 6**

Answer: B

Solution:



In regular hexagon, each interior angle = 120° ,

So, if we cut corners of an equilateral triangle, then the removed triangles are also equilateral triangles.

$\therefore$ Let, side of original equilateral triangle = a units

Then side of regular hexagon = $\frac{a}{3}$ units

From formula we know, Area of regular hexagon = $\frac{3\sqrt{3}}{2}(\frac{a}{3})^2$

And Area of equilateral triangle = $\frac{\sqrt{3}}{4}(a)^2$

$$\begin{aligned}\therefore \text{Required Ratio} &= \frac{3\sqrt{3}}{2}\left(\frac{a}{3}\right)^2 : \frac{\sqrt{3}}{4}(a)^2 \\ &= 2 : 3\end{aligned}$$

Year: GATE ECE 2021

Question 15: Consider a square sheet of side 1 unit. In the first step, it is cut along the main diagonal to get two triangles. In the next step, one of the cut triangles is revolved about its short edge to form a solid cone. The volume of the resulting cone, in

A: $\frac{2\pi}{3}$

B: 3π

C: $\frac{\pi}{3}$

D: $\frac{3\pi}{2}$

Answer: C

Solution: Volume of right circular cone :

$$\begin{aligned}V &= \frac{1}{3}\pi r^2 h \\ &= \frac{\pi}{3}\end{aligned}$$

Year: GATE ECE 2021

Question 16:

The number of minutes spent by two students, X and Y, exercising every day in a given week are shown in the bar chart above.

The number of days in the given week in which one of the students spent a minimum of 10%

more than the other student, on a given day, is

A: 7

B: 5

C: 4

D: 6

Answer: D

Solution: In sunday, required percentage $= \frac{65 - 55}{55} \times 100 = 18.18\%$

In saturday, required percentage $= \frac{60 - 50}{50} \times 100 = 20\%$

In friday, required percentage $= \frac{35 - 20}{20} \times 100 = 75\%$

In thursday, required percentage $= \frac{60 - 55}{55} \times 100 = 9.09\%$

In wednesday, required percentage $= \frac{60 - 50}{50} \times 100 = 20\%$

In tuesday, required percentage $= \frac{65 - 55}{55} \times 100 = 18.18\%$

In monday, required percentage $= \frac{70 - 45}{45} \times 100 = 55.55\%$

Except Thursday, there are total 6 days in which one of the students spent a minimum of 10% more than the other student.

Hence, the correct option is (D).

Year: GATE ECE 2020

Question 17: a, b, c are real numbers. The quadratic equation $ax^2 - bx + c = 0$ has equal roots, which is β , then

A: $\beta^3 = \frac{bc}{(2a^2)}$

B: $\beta^2 = ac$

C: $\beta = \frac{b}{a}$

D: $b^2 \neq 4ac$

Answer: A

Solution:

Given : a, b, c are real numbers

$$ax^2 - bx + c = 0 \dots (i)$$

Given, equation (i) has equal roots, which is β .

Now, product of the roots will be

$$\beta \cdot \beta = \frac{c}{a}$$

$$\beta^2 = \frac{c}{a} \dots (ii)$$

Sum of the roots will be,

$$\beta + \beta = \frac{b}{a}$$

$$2\beta = \frac{b}{a}$$

$$\beta = \frac{b}{2a} \dots (iii)$$

Multiplying equation (ii) and (iii),

$$\beta^3 = \frac{bc}{2a^2}$$

Hence, the correct option is (A).

Year: GATE ECE 2020

Question 18: The following figure shows the data of students enrolled in 5 years (2014 to 2018) for two schools P and Q. During this period, the ratio of the average number of the students enrolled in school P to the average of the difference of the number of students enrolled in schools P and Q is

A: 31: 23

B: 23: 8

C: 23: 31

D: 8: 23

Answer: B

Solution:

Average students enrolled in

$$P = \frac{3 + 5 + 5 + 6 + 4}{5} = \frac{23}{5}$$

Average of difference of students enrolled :

$$\text{School } P \text{ and } Q = \frac{2 + 1 + 3 + 1 + 1}{5} = \frac{8}{5}$$

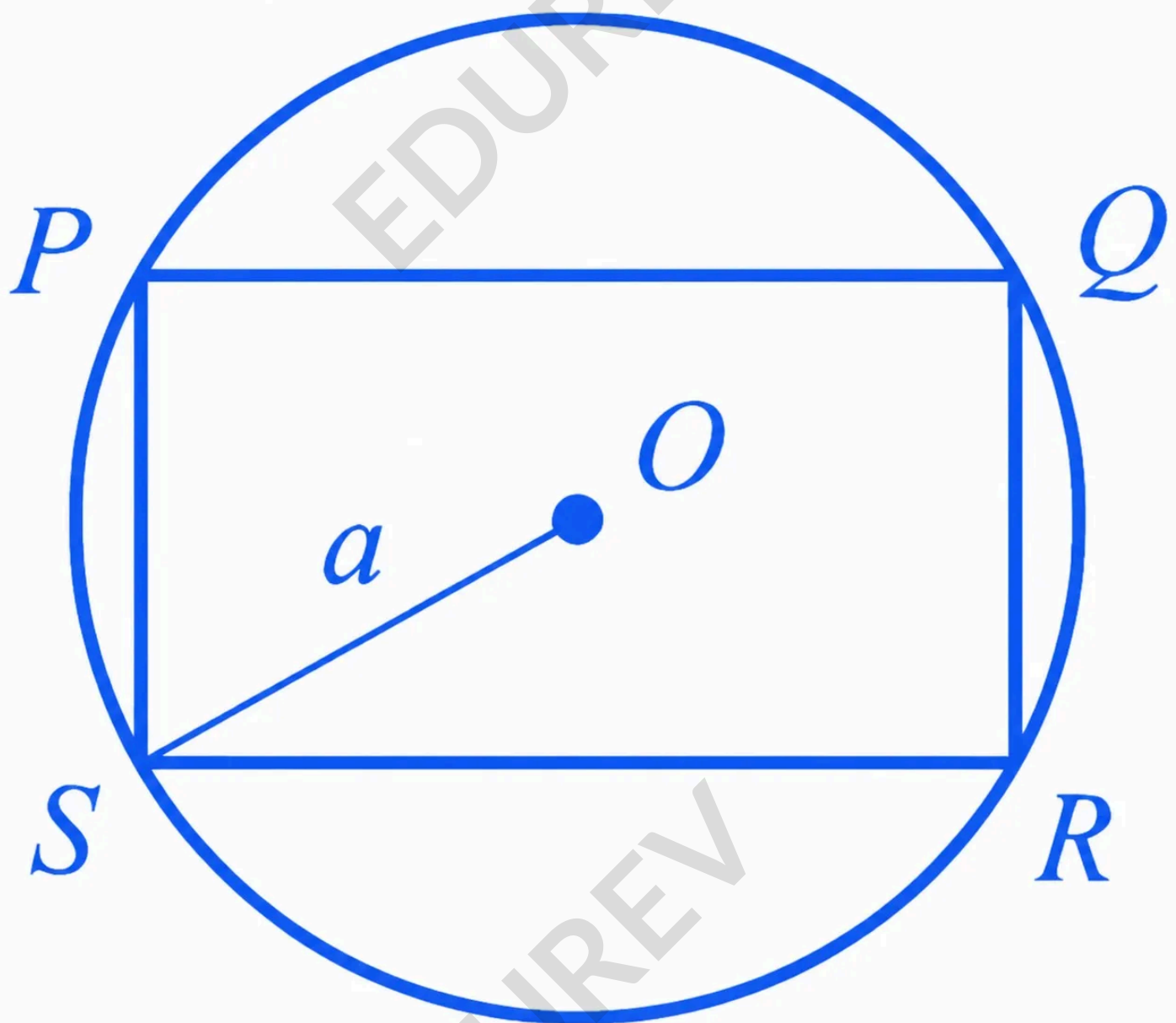
Ratio of average students enrolled in school P to the ratio of average of difference of students enrolled in school P and Q

$$= \frac{23/5}{8/5} = 23:8$$

Hence, the correct option is (B).

Year: GATE ECE 2020

Question 19: A circle with center O is shown in the figure. A rectangle $PQRS$ of maximum possible area is inscribed in the circle. If the radius of the circle is a , then the area of shaded portion is _____ .



- A:** $\pi a^2 - a^2$
B: $\pi a^2 - 3a^2$
C: $\pi a^2 - \sqrt{2}a^2$
D: $\pi a^2 - 2a^2$

Answer: D

Solution:

Let, l and b be the length and breadth of rectangle respectively.

Using Pythagoras theorem, we get

$$4a^2 = l^2 + b^2$$

$$b = \sqrt{4a^2 - l^2}$$

Area of rectangle is, $A = l \times b$ $A = l \times b = l \times \sqrt{4a^2 - l^2}$

For maxima or minima, $\frac{dA}{dl} = 0$

$$l \times \frac{1}{2\sqrt{4a^2 - l^2}} \times (-2l) + \sqrt{4a^2 - l^2} = 0$$

$$\sqrt{4a^2 - l^2} = \frac{l^2}{\sqrt{4a^2 - l^2}}$$

$$4a^2 - l^2 = l^2$$

$$l = \sqrt{2}a$$

$$b = \sqrt{4a^2 - 2a^2} = \sqrt{2}a$$

∴ Maximum area of rectangle PQRS is,

$$\sqrt{2}a \times \sqrt{2}a = 2a^2$$

$$\begin{aligned} \text{Area of shaded portion} &= (\text{Area of circle}) - (\text{Area of rectangle}) \\ &= \pi a^2 - 2a^2 \end{aligned}$$

Hence, the correct option is (D).

Year: GATE ECE 2020

Question 20: It is quarter past three in your watch. The angle between the hour hand and the minute hand is ____ .

A: 22.5°

B: 15°

C: 7.5°

D: 0°

Answer: C

Solution:

Positions of hour and minute hands of watch is shown in figure

The displacement of hour hand during every 12 hours is 360° .

The required angle between the hands at quarter past 3⁰ is equal to the angle made by hour hand in 15 minutes as the minute hand is now at the same position where, the hour hand was present at 3 'O clock.

In $12 \times 60 \text{ min}$, angle made = 360°

In 1 min, angle made = $\left(\frac{360}{12 \times 60}\right)^{\circ}$

In 15 min, angle made = $\left(\frac{360}{12 \times 60} \times 15\right)^{\circ} = 7.5^{\circ}$

Hence, the correct option is (C).

Year: GATE ECE 2019

Question 21: Two design consultants, P and Q, started working from 8 AM for a client. The client budgeted a total of USD 3000 for the consultants. P stopped working when hour hand moved by 210 degrees on the clock. Q stopped working when the hour hand moved by 240 degrees. P took two tea breaks of 15 minutes each during her shift, but took no lunch break. Q took only one lunch break for 20 minutes, but no tea breaks. The market rate for consultants is USD 200 per hour and breaks are not paid. After paying the consultants, the client shall have USD _____ remaining in the budget.

A: 000.00

B: 300.00

C: 166.67

D: 433.33

Answer: C

Year: GATE ECE 2019

Question 22: The bar graph in Panel (a) shows the proportion of male and female illiterates in 2001 and 2011. The proportions of males and females in 2001 and 2011 are given in Panel (b) and (c), respectively. The total population did not change during this period. The percentage increase in the total number of literates from 2001 to 2011 is _____.

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A: 33.43

B: 35.43

C: 30.43

D: 34.43

Answer: C

Year: GATE ECE 2019

Question 23: Five people P, Q, R, S and T work in a bank. P and Q don't like each other but have to share an office till T gets a promotion and moves to the big office next to the garden. R, who is currently sharing an office with T wants to move to the adjacent office with S, the handsome new intern.

Given the floor plan, what is the current location of Q, R and T ? [O = office, WR = Wash room]

A:

B:

C:

D:

Answer: C

Year: GATE ECE 2018

Question 24: Two alloys A and B contain gold and copper in the ratios of 2 : 3 and 3 : 7 by mass, respectively. Equal masses of alloys A and B are melted to make an alloy C. The ratio of gold to copper in alloy C is

A: 6 : 11

B: 5 : 10

C: 7 : 13

D: 9 : 13

Answer: C

Year: GATE ECE 2018

Question 25: Leila aspires to buy a car worth Rs. 10,00,000 after 5 years. What is the minimum amount in Rupees that she should deposit now in a bank which offers 10% annual rate of interest, if the interest was compounded annually?

A: 5,00,000

B: 6,21,000

C: 6,66,667

D: 7,50,000

Answer: B

Year: GATE ECE 2017 Set 2

Question 26: A contour line joins locations having the same height above the mean sea level. The following is a contour plot of a geographical region. Contour lines are shown at 25 m intervals in this plot.

Which of the following is the steepest path leaving from P?

A: P to Q

B: P to R

C: P to S

D: P to T

Answer: B

Year: GATE ECE 2017 Set 2

Question 27: Each of P, Q, R, S, W, X, Y and Z has been married at most once. X and Y married and have two children P and Q, Z is grandfather of the daughter 'S' of P. Further Z and W married and are parents of R. Which one of the following must necessarily be FALSE?

A: X is the mother in law to R

B: P and R are not married to each other

C: P is son of X and Y

D: Q cannot be married to R

Answer: B

Year: GATE ECE 2017 Set 2

Question 28: The number of 3 digit numbers such that the digit 1 is never to the immediate right of 2 is

A: 781

B: 791

C: 881

D: 891

Answer: C

Year: GATE ECE 2017 Set 2

Question 29: 1200 men and 500 women can build a bridge in 2 weeks. 900 men and 250 women will take 3 weeks to build the same bridge. How many men will be needed to build the bridge in one week?

A: 3000

B: 3300

C: 3600

D: 3900

Answer: C

Year: GATE ECE 2017 Set 1

Question 30: S, T, U, V, W, X, Y and Z are seated around a circular table. T's neighbors are Y and V. Z is seated third to the left of T and second to the right of S. U's neighbors are S and Y: and T and W are not seated opposite each other. Who is third to the left of V?

A: X

B: W

C: U

D: T

Answer: A

Year: GATE ECE 2017 Set 1

Question 31: There are 3 Indians and 3 Chinese in a group of 6 people. How many subgroups of this group can we choose so that every subgroup has at least one Indian?

A: 52

B: 56

C: 48

D: 44

Answer: B

Year: GATE ECE 2017 Set 1

Question 32: Trucks (10 m long) and cars (5 m long) go on a single lane bridge. There must be a gap of at least 20 m after each truck and a gap of at least 15 m after each car. Trucks and cars travel at a speed of 36 km/h. If cars and trucks go alternately, what is the maximum number of vehicles that can use the bridge in one hour?

A: 1440

B: 1200

C: 720

D: 600

Answer: A

Year: GATE ECE 2017 Set 1

Question 33: A contour line joins locations having the same height above the mean sea level. The following is a contour plot of a geographical region. Contour lines are shown at 25 m intervals in this plot.

The path from P to Q is best described by

A: Up-Down-Up-Down

B: Down-Up-Down-Up

C: Down-Up-Down

D: Up-Down-Up

Answer: C

Year: GATE ECE 2014 Set 1

Question 34: The exports and imports (in crores of Rs.) of a country from 2000 to 2007 are given in the following bar chart. If the trade deficit is defined as excess of imports over exports, in which year is the trade deficit $\frac{1}{5}$ th of the exports?

A: 2005

B: 2004

C: 2007

D: 2006

Answer: D

Year: GATE ECE 2014 Set 1

Question 35: For submitting tax returns, all resident males with annual income below Rs 10 lakh should fill up Form P and all resident females with income below Rs 8 lakh should fill up Form All people with incomes above Rs 10 lakh should fill up Form R, except non residents with income above Rs 15 lakhs, who should fill up Form S. All others should fill Form T. An example of a person who should fill Form T is

A: a resident male with annual income Rs 9 lakh

B: a resident female with annual income Rs 9 lakh

C: a non-resident male with annual income Rs 16 lakh

D: a non-resident female with annual income Rs 16 lakh

Answer: B

Year: GATE ECE 2014 Set 1

Question 36: Find the odd one from the following group:

W,E,K,O

I,Q,W,A

F,N,T,X

N,V,B,D

A: W,E,K,O

B: I,Q,W,A

C: F,N,T,X

D: N,V,B,D

Answer: D

Year: GATE ECE 2014 Set 1

Question 37: A train that is 280 meters long, traveling at a uniform speed, crosses a platform in 60 seconds and passes a man standing on the platform in 20 seconds. What is the length of the platform in meters?

Answer: 560

Year: GATE ECE 2014 Set 1

Question 38: You are given three coins: one has heads on both faces, the second has tails on both faces, and the third has a head on one face and a tail on the other. You choose a coin at random and toss it, and it comes up heads. The probability that the other face is tails is

A: $1/4$

B: $1/3$

C: $1/2$

D: $2/3$

Answer: B

Year: GATE ECE 2013

Question 39: What is the chance that a leap year, selected at random, will contain 53 Sundays?

A: 2/7

B: 3/7

C: 1/7

D: 5/7

Answer: A

Year: GATE ECE 2013

Question 40: Find the sum to n terms of the series $10 + 84 + 734 + \dots$

A: $\frac{9(9^n + 1)}{10} + 1$

B: $\frac{9(9^n - 1)}{8} + 1$

C: $\frac{9(9^n - 1)}{8} + n$

D: $\frac{9(9^n - 1)}{8} + n^2$

Answer: D

Year: GATE ECE 2012

Question 41: The data given in the following table summarizes the monthly budget of an average household.

The approximate percentage of the monthly budget NOT spent on savings is

A: 10 %

B: 14 %

C: 81 %

D: 86 %

Answer: D

Year: GATE ECE 2012

Question 42: There are eight bags of rice looking alike, seven of which have equal weight and one is slightly heavier. The weighing balance is of unlimited capacity. Using this balance, the minimum number of weighings required to identify the heavier bag is

A: 2

B: 3

C: 4

D: 8

Answer: A

Year: GATE ECE 2012

Question 43: One of the legacies of the Roman legions was discipline. In the legions, military law prevailed and discipline was brutal. Discipline on the battlefield kept units obedient, intact and fighting, even when the odds and conditions were against them.

Which one of the following statements best sums up the meaning of the above passage?

A: Thorough regimentation was the main reason for the efficiency of the Roman legions even in adverse circumstances.

B: The legions were treated inhumanly as if the men were animals.

C: Discipline was the armies' inheritance from their seniors.

D: The harsh discipline to which the legions were subjected to led to the odds and conditions being against them.

Answer: A

Year: GATE ECE 2012

Question 44: Raju has 14 currency notes in his pocket consisting of only Rs. 20 notes and Rs. 10 notes. The total money value of the notes is Rs. 230. The number of Rs. 10 notes that Raju has is

A: 5

B: 6

C: 9

D: 10

Answer: A

Year: GATE ECE 2011

Question 45: Three friends, R, S and T shared toffee from a bowl. R took $\frac{1}{3}$ rd of the toffees, but returned four to the bowl. S took $\frac{1}{4}$ rd of what was left but returned three toffees to the bowl. T took half of the remainder but returned two back into the bowl. If the bowl had 17 toffees left, how many toffees-were originally there in the bowl?

A: 38

B: 31

C: 48

D: 41

Answer: C

Year: GATE ECE 2011

Question 46: Given that $f(y) = |y| / y$, and q is any non-zero real number, the value of $|f(q) - f(-q)|$ is

A: 0

B: -1

C: 1

D: 2

Answer: D

Year: GATE ECE 2011

Question 47: The sum of n terms of the series $4 + 44 + 444 + \dots$ is

A: $(4/81)[10^{n+1} - 9n - 1]$

B: $(4/81)[10^{n-1} - 9n - 1]$

C: $(4/81)[10^{n+1} - 9n - 10]$

D: $(4/81)[10^n - 9n - 10]$

Answer: C

Year: GATE ECE 2011

Question 48: The horse has played a little known but very important role in the field of medicine. Horses were injected with toxins of diseases until their blood built up immunities. Then a serum was made from their blood. Serums to fight with diphtheria and tetanus were developed this way. It can be inferred from the passage that horses were

A: given immunity to diseases

B: generally quite immune to diseases

C: given medicines to fight toxins

D: given diphtheria and tetanus serums

Answer: B

Year: GATE ECE 2011

Question 49: The fuel consumed by a motorcycle during a journey while traveling at various speeds is indicated in the graph below.

The distances covered during four laps of the journey are listed in the table below

From the given data, we can conclude that the fuel consumed per kilometre was least during the lap

A: P

B: Q

C: R

D: S

Answer: B

Year: GATE ECE 2010

Question 50: If $137+276=435$ how much is $731+672$?

A: 534

B: 1403

C: 1623

D: 1513

Answer: C

Year: GATE ECE 2010

Question 51: Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1st January. The age difference between any two successive siblings (that is born one after another) is less than 3 years. Given the following facts:

i. Hari's age + Gita's age > Irfan's age + Saira's age.

ii. The age difference between Gita and Saira is 1 year. However, Gita is not the oldest and Saira is not the youngest.

iii. There are not twins.

In what order were they born (Oldest first)?

A: HSI G

B: SGHI

C: IGSH

D: IHSG

Answer: B

Year: GATE ECE 2010

Question 52: 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long will it take to build the wall?

A: 20 days

B: 18 days

C: 16 days

D: 15 days

Answer: D

Year: GATE ECE 2010

Question 53: Given digits 2,2,3,3,3,4,4,4,4 how many distinct 4 digit numbers greater than 3000 can be formed?

A: 50

B: 51

C: 52

D: 54

Answer: D

Year: GATE ECE 2010

Question 54: Modern warfare has changed from large scale clashes of armies to suppression of civilian populations. Chemical agents that do their work silently appear to be suited to such warfare; and regretfully, there exist people in military establishments who think that chemical agents are useful tools for their cause.

Which of the following statements best sums up the meaning of the above passage:

A: Modern warfare has resulted in civil strife.

B: Chemical agents are useful in modern warfare.

C: Use of chemical agents in warfare would be undesirable.

D: People in military establishments like to use chemical agents in war.

Answer: C