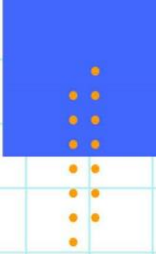




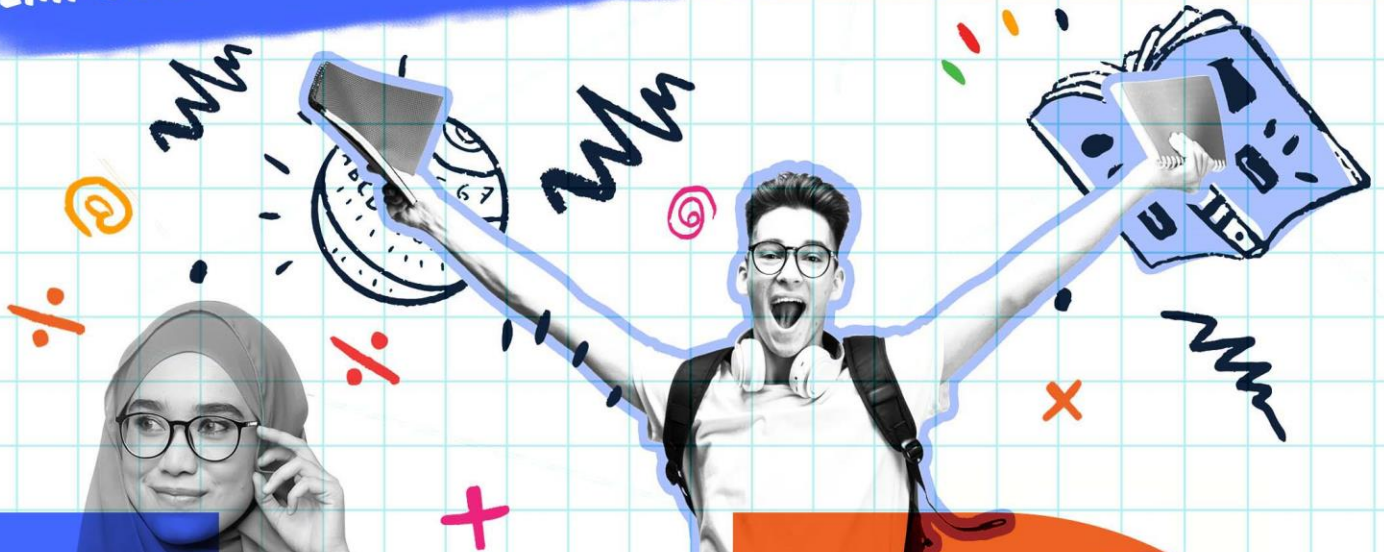
The Institute of
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ICAP NATIONAL MATHS CHAMPIONSHIP 2023

EMPOWER YOUR POTENTIAL, CONQUER WITH NUMBERS!



SPECIMEN QUESTIONS

$$\sqrt{3}$$



Foundation

1. Javed earns p amount (Rs.) for every w hours of work. Which expression represents the amount of money, in Rupees, Javed earns for $39w$ hours of work? **Easy**
- (a) **$39p$**
(b) $p/39$
(c) $p + 39$
(d) $p - 39$
2. The value of z is 1.13 times 100. The value of z is what percent greater than 100? **Medium**
- (a) 11.3
(b) **13**
(c) 130
(d) 213
3. A certain park has an area of 11,863,808 square yards. What is the area, in square miles, of this park? (**1 mile = 1,760 yards**) **Difficult**
- (a) 1.96
(b) **3.83**
(c) 3,444.39
(d) 6,740.8

Arithmetic

1. During a sale, the original prices of all the items in a clothing store have been reduced by 20%. What is the sale price of a jacket with an original price of Rs. 50 ?

Easy

- (a) Rs. 12
- (b) Rs. 30
- (c) Rs. 36
- (d) Rs. 40**

- 2.

Food	Protein	Cost (Rs.)
1 large egg	6 grams	3.6
1 cup of milk	8 grams	2.4

Medium

The table above shows the amount of protein in two foods and the cost of each food. Based on the table, what is the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk?

- (a) 1 : 2
- (b) 2 : 3
- (c) 3 : 4
- (d) 2 : 1**

3. The value of a collectible comic book increased by 167% from the end of 2021 to the end of 2022 and then decreased by 16% from the end of 2022 to the end of 2023. What was the net percentage increase in the value of the collectible comic book from the end of 2021 to the end of 2023?

Difficult

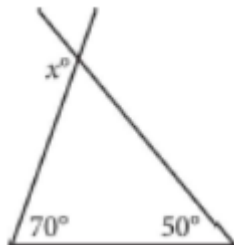
- (a) 124.28%**
- (b) 140.28%
- (c) 151.00%
- (d) 209.72%

Algebra

1. Dawood bought some potatoes and celery. The potatoes cost **Rs. 69** per kg, and the celery cost **Rs. 99** per kg. If Dawood spent **Rs. 534** in total and bought twice as many kg of celery as kg of potatoes, how many kg of celery did Dawood buy? **Easy**
- (a) 2
(b) 2.5
(c) 2.67
(d) 4
2. A company that provides whale-watching tours takes groups of 21 people at a time. The company's revenue is Rs. 80 per adult and Rs. 60 per child. If the company's revenue for one group consisting of adults and children was Rs. 1,440, how many people in the group were children? **Medium**
- (a) 3
(b) 9
(c) 12
(d) 18

Geometry

1. **Easy**



In the figure above, two sides of a triangle are extended. What is the value of x ?

- (a) 110
(b) 120
(c) 130
(d) 140

Probability

1. For a particular machine that produces beads, 29 out of every 100 beads it produces have a defect. A bead produced by the machine will be selected at random. What is the probability of selecting a bead that has a defect?
- (a) $\frac{1}{2,900}$
 (b) $\frac{1}{29}$
 (c) **$\frac{29}{100}$**
 (d) $\frac{29}{10}$

Easy

2. **Penguin Exhibit**

Type of penguin	Male	Female	Total
Chinstrap	41	59	100
Emperor	8	27	35
Gentoo	49	54	103
Macaroni	42	40	82
Total	140	180	320

Medium

The number of penguins in a zoo exhibit, sorted by gender and type of penguin, is shown in the table above.

Which type of penguin has a female population that is the closest to being $\frac{1}{3}$ of the total female penguin population in the exhibit?

- (a) **Chinstrap**
 (b) Emperor
 (c) Gentoo
 (d) Macaroni

- 3.

Rhesus factor	Blood type			
	A	B	AB	O
+	33	9	3	37
-	7	2	1	x

Difficult

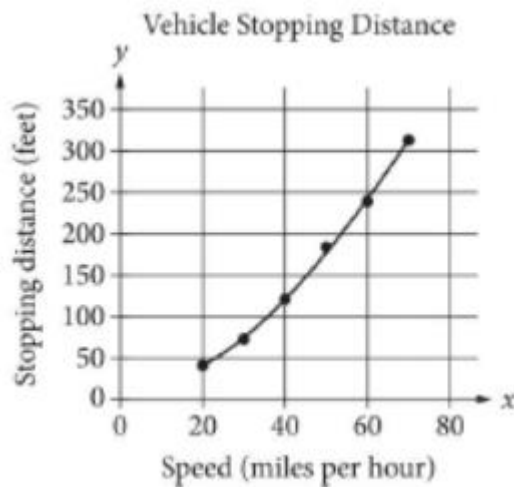
Human blood can be classified into four common blood types—A, B, AB, and O. It is also characterized by the presence (+) or absence (–) of the rhesus factor. The table above shows the distribution of blood type and rhesus factor for a group of people. If one of these people who is rhesus negative (–) is chosen at random, the probability that the person has blood type B is $\frac{1}{9}$. What is the value of x ?

- (a) **The correct answer is 8.**

Statistics

1. A study was done to determine a new car's stopping distance when it was traveling at different speeds. The study was done on a dry road with good surface conditions. The results are shown below, along with the graph of a quadratic function that models the data.

Easy



According to the model, which of the following is the best estimate for the stopping distance, in feet, if the vehicle was traveling 55 miles per hour?

- (a) 25
 (b) 30
 (c) **210**
 (d) 250
2. In which of the following tables is the relationship between the values of x and their corresponding y -values nonlinear?

Medium

(a)

x	1	2	3	4
y	8	11	14	17

(b)

x	1	2	3	4
y	4	8	12	16

(c)

x	1	2	3	4
y	8	13	18	23

(d)

x	1	2	3	4
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y	6	12	24	48
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3.

	Masses (kilograms)					
Ali	2.4	2.5	3.6	3.1	2.5	2.7
Mohsin	x	3.1	2.7	2.9	3.3	2.8

Difficult

Ali and Mohsin each collected six rocks, and the masses of the rocks are shown in the table above. The mean of the masses of the rocks Mohsin collected is 0.1 kilogram greater than the mean of the masses of the rocks Ali collected. What is the value of x ?

- (a) The correct answer is **2.6**.

Number theory questions

- What is the largest two-digit prime number? Easy
a) 97
b) 89
c) 79
d) 67
- If n is a positive integer such that both n and $n+1$ are prime, what is n ? Hard
a) 2
b) 3
c) 4
d) 5