

Numerical Ability

# TCS Digital Test Preparation Series

## About me

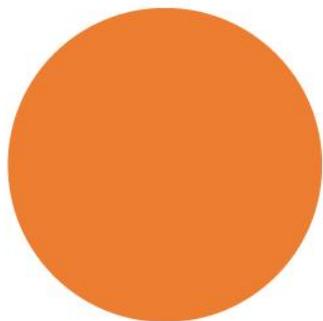
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- Years of experience- 2.7 Years
- Areas of expertise-Python, Machine Learning and AI.
- TCS Digital Cleared.
- Gold Medalist in Academics in the branch of Mechanical and Automation Engineering in 2019 at Amity University.
- Pursuing B.Sc. in Data Science and Programming from IIT Madras.

# Pattern

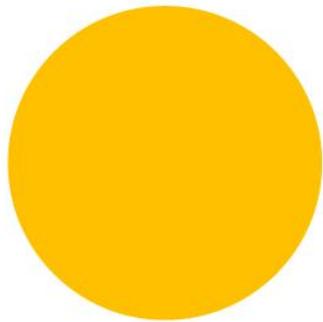
Topic Name	Marks per Item	No of Items	Time
Numerical Ability	1	15	40 mins

- **Negative marking-You must read all instructions carefully. If there is any negative marking, it will be clearly mentioned in the instructions.**
- **For more details, please visit this link - <https://www.tcs.com/careers/tcs-off-campus-hiring> .**

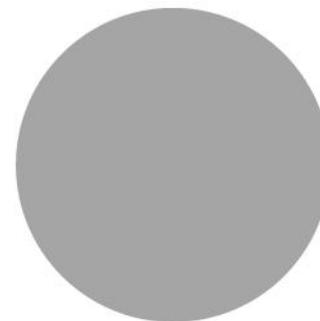
# Approach



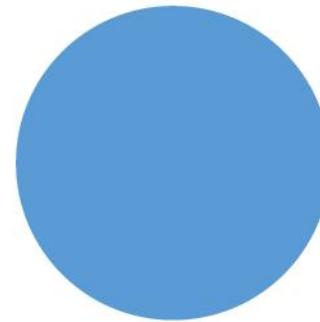
Complete understanding of questions covered during the Session.



Go through the link provided in the resource slide and try to solve them.



Try to attempt practice assignment questions.



Try to attempt questions from the book details of which have been provided in the resources slide.

# Problems on Permutations & Combinations



# Formulas

- **Permutation formula:** Permutation is defined as arrangement of  $r$  things that can be done out of total  $n$  things. This is denoted by  ${}^n P_r$ , which is equal to  $n!/(n-r)!$
- **Combination formula**
  - Combination is defined as selection of  $r$  things that can be done out of total  $n$  things. This is denoted by  ${}^n C_r$ , which is equal to  $n!/(r!(n-r)!)!$
  - As per the Fundamental Principle of Counting, if a particular thing can be done in  $m$  ways and another thing can be done in  $n$  ways, then either one of the two can be done in  $m + n$  ways and both of them can be done in  $m \times n$  ways.

# Formulas

- **Addition:** If there are two jobs such that they can be accomplished independently in  $a$  and  $b$  ways respectively, then either of the two jobs can be accomplished in  $(a + b)$  ways.
- **Multiplication:** If there are two jobs such that one of them can be completed in  $p$  ways, and after its completion in any one of these  $p$  ways, the second job can be completed in  $q$  different ways, then the two jobs (in succession) can be completed in  $p \times q$  ways

# Formulas

## Properties of ${}^nC_r$

- Prop I:  ${}^nC_r = {}^nC_{n-r}$  for  $0 \leq r \leq n$
- Prop II: Let  $n$  and  $r$  be non-negative integers such that  $r \leq n$ . Then  ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$
- Prop III: Let  $n$  and  $r$  be non-negative integers such that  $1 \leq r \leq n$ . Then  ${}^nC_r = (n/r) \cdot {}^{n-1}C_{r-1}$

## Sample Question 1

**How many even numbers of four digits can be formed with the digits 0, 1, 2, 3, 4, 5, 6 and 7; no digit being used more than once?**

1. 400
2. 420
3. 750
4. 210

# Sample Question Solution 1

Answer : Option 3

Lets do some basic combination math

Here no. of digits = 8

Case – I where '0' occurs at unit place

Unit place can be filled in 1 way (0) ; Ten's place can be filled in 7 ways

Hundred's place can be filled in 6 ways ; Thousand's place can be filled in 5 ways ;

Using fundamental principle of multiplication the required no. =  $1 \times 7 \times 6 \times 5 = 210$ ;

Case – II When 0 does not occur at unit place

Unit place can be filled in 3 ways (2, 4, 6); Thousand place can be filled in 6 ways; (one of the six digits other than zero); Hundred place can be filled in 6 ways; Ten's place can be filled in 5 ways. Required number of ways =  $3 \times 6 \times 6 \times 5 = 540$ ; Total number of numbers =  $210 + 540 = 750$

## Sample Question 2

- In a class, there are 15 boys and 10 girls. The teacher wants to select a boy or a girl so as to represent the class in a function. In how many ways can the teacher make the selection?

## Sample Question Solution 2

Here the teacher has to perform either of the following two jobs.

- Selecting a boy among 15 boys or
- Selecting a girl among 10 girls.

The first task can be accomplished in 15 ways and the second in 10 ways. By fundamental principle of addition, either of the two jobs can be accomplished in:  $15 + 10 = 25$  ways. Hence, the teacher can make the selection of either a boy or a girl in 25 ways.

## Sample Question 3

In how many ways can 3 non- identical rings be worn in 5 fingers ?

## Sample Question Solution 3

Such questions in which things are to be distributed amongst someone or something, NOTE that the things to be distributed always comes in the power.

So total ways of distributing the rings amongst the 5 fingers will be  $5^3$ .The total ways thus come out to be 125.

OR , we can say that there are 5 ways for the first ring, 5 for the second and 5 for the 3rd ring so the total cases would be  $5*5*5=125$  cases.

## Sample Question 4

- In how many ways can 4 letters be posted in 3 letter boxes?

## Sample Question Solution 4

Since each letter can be posted in any one of the three letter boxes, so a letter can be posted in 3 ways. So, the total number of ways in which all four letters can be posted =  $3^4$  ways.

# Ratio and Proportions



# Formulas

- Equivalent Ratios Let us divide a Pizza into 8 equal parts and share it between Ram and Sam in the ratio 2:6. The ratio 2:6 can be written as  $2/6; 2/6 = 1/3$  We know that  $2/6$  and  $1/3$  are called equivalent fractions.
- Proportion is represented by the symbol ‘=’ or ‘::’  
If the ratio  $a : b$  is equal to the ratio  $c : d$ , then  $a, b, c, d$  are said to be in proportion.  
Using symbols we write as  $a : b = c : d$  or  $a : b :: c : d$
- When 4 terms in proportion, then the product of the two extremes (i.e. the first and the fourth value) should be equal to the product of two middle values (i.e. the second and the third value).
- **FOURTH PROPORTIONAL:**  
If  $a : b = c : d$ , then  $d$  is called the fourth proportional to  $a, b, c$ .
- **THIRD PROPORTIONAL:**  $a : b = c : d$ , then  $c$  is called the third proportion to  $a$  and  $b$ .

## Sample Question 5

When a sum of money was equally distributed among 49 children, each child received Rs. 20. If the same amount is equally distributed among children, such that each child gets Rs. 3.5, find the number of children.

- A. 280
- B. 246
- C. 245
- D. 240

## Sample Question Solution 5

### Option A

$$\text{Number of children } \alpha \frac{1}{\text{Amount}} \Rightarrow N \alpha \frac{1}{A} \Rightarrow N = \frac{k}{A}$$

$$49 = \frac{k}{20} \Rightarrow k = 49 \times 20 \Rightarrow N = 49 \times 20 / 3.5 = 280.$$

## Sample Question 6

The ratio of two numbers is 9 : 5. If 9 is added to the greater number and 5 is subtracted from the smaller number, the greater number becomes thrice the smaller one. Find the numbers.

- A. 72, 40
- B. 18, 10
- C. 36, 20
- D. None of these

## Sample Question Solution 6

### Option C

Present ratio = 9 : 5. ∴ actual values are  $9x$  and  $5x$ .

Hence  $9x + 9 : 5x - 5 = 3 : 1 \Rightarrow x = 4$ . ∴ numbers are  $9(4) = 36$  and  $5(4) = 20$ .

## Sample Question 7

A piece of string 70 cm in length was cut into pieces, the ratio of whose lengths was 3: 7. Find the length of longest piece.

- a) 21 cm
- b) 70 cm
- c) 49 cm
- d) 7cm

## Sample Question Solution 7

Sol : Option C

Explanation: Total length = 70 cm. Ratio is 3:7 ∴ Length of longest piece is  $(70 \times 7) / 10 = 49\text{cm}$

## Sample Question 8

Divide Rs. 390 among 3 persons A, B and C such that 3 times A's share, 2 times B's share and 4 times C's share are all equal. The shares of A, B and C are respectively

- A. Rs. 120, Rs. 180, Rs. 90
- B. Rs. 60, Rs. 90, Rs. 45
- C. Rs. 240, Rs. 157, Rs. 90
- D. None of these

## Sample Question Solution 8

### Option A

$$3A = 2B = 4C. \text{ Also } A + B + C = 390. \therefore A + \frac{3A}{2} + \frac{3A}{4} = 390$$
$$\Rightarrow (4 + 6 + 3)A = 390 \times 4 \Rightarrow A = 120, \therefore B = 180 \text{ and } C = 90$$

Probability

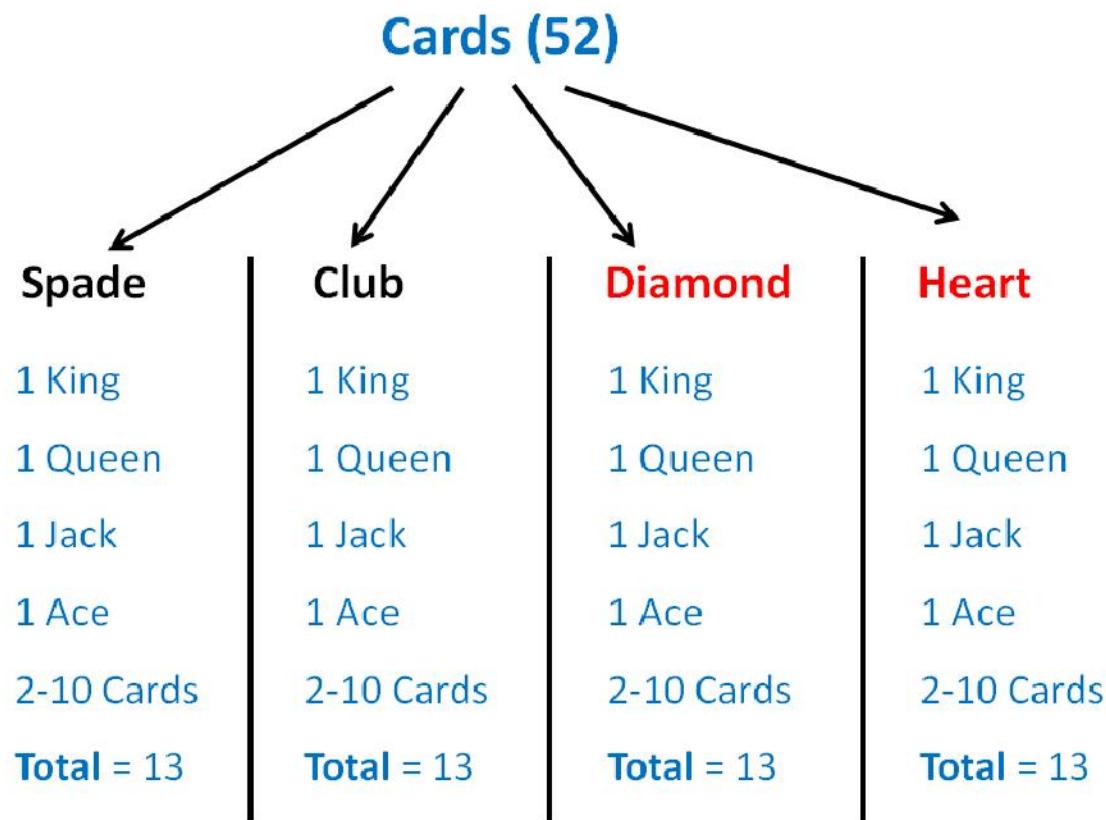


# Formulas

- **Events in Probability:**
- When we perform any experiment, there are some outcomes which are called events. Let us study the different types of events can occur.
- **Trial and Elementary Events:** If we repeat a random experiment under exact conditions, it is known as trial and all the possible outcomes are known as elementary events. E.g. if we throw a dice it is called a trial and getting 1, 2, 3, 4, 5 or 6 is called elementary event.
- **Compound Event:** When two or more elementary events are combined it is known as compound event. When we throw a dice, getting a prime number is compound event as we can get 2, 3, 5 and all are elementary.
- **Exhaustive Number of Cases:** It is the total possible outcome. When we throw a dice total number of cases are 6. When we throw a pair of dice exhaustive number of cases is 36.
- **Mutually Exclusive Events:** It means simultaneous occurrence is not possible. In case of tossing a coin, either head will come or tail will come. So, both are mutually exclusive events.
- **Equally Likely Cases:** It means chances are equal. When we throw a dice, each outcome has equal chance. So it is case of equally likely.
- **Favorable Events:** Desired outcome of an elementary event is called Favorable event. E.g. when we throw a dice and it is asked that what is the probability of getting a multiple of 3? In this case favorable cases are 2 (3 and 6) and total cases are obviously 6.
- **Independent Events:** Two events are called independent if outcome of one event is not affecting the outcome of other. If we toss a coin and throw a dice then outcome of coin is independent of outcome of coin, both are independent events.

# Formulas

- Probability Equations:  $P(A) \leq 1$ ,  $P(A) + P(\bar{A}) = 1$ .
- Addition theorem:  $P(X \text{ or } Y) = P(X) + P(Y) - P(X \cap Y)$
- or  $P(X \cup Y) = P(X) + P(Y) - P(X \cap Y)$
- **Mutually exclusive events:** Two events are mutually exclusive if they cannot occur simultaneously. For n mutually exclusive events, the probability is the sum of all probabilities of these events:
  - $p = p_1 + p_2 + \dots + p(n-1) + p(n)$
  - or
  - $P(A \text{ or } B) = P(A) + P(B)$  where A and B denote mutually exclusive events.
- **Independent events:** Two events are independent if the occurrence of one event does not influence the occurrence of other events. Therefore, for n independent events, the probability is the product of all probabilities of independent events:
  - $p = p_1 \times p_2 \times \dots \times p(n-1) \times p(n)$
  - or  $P(X \text{ and } Y) = P(X) \times P(Y)$ , where X and Y denote independent events
  - **Odds in favor of certain event = No. of successes: No. of failures**
  - **Odds against of an event = No. of failures: No. of successes**



## Sample Question 9

A coin is tossed four times, if H = head and T = tail, what is the probability of the tosses coming up in the order HTHH?

1.  $3/16$
2.  $1/16$
3.  $5/16$
4.  $7/16$

## Sample Question Solution 9

**Sol:** Option 2

**Explanation:** Coin is tossed four times. The total possible outcomes = 16.

Favorable outcomes = 1. Because HTHH can come only in one way, Probability = 1 / 16

## Sample Question 10

Two cards are drawn in succession from a pack of 52 cards, without replacement. What is the probability, that the first is a Queen and the second is a Jack of a different suit?

1.  $1/52$
2.  $1/13$
3.  $4/13$
4.  $1/221$

## Sample Question Solution 10

**Sol: Option 4**

**Explanation:** The probability of first Queen =  $4 / 52$

The probability of Second Jack of different suit =  $3 / 51$

Reqd. Probability =  $(4/52) \times (3/51) = (1/13) \times (1/17) = (1/221)$

## Sample Question 11

The probability of A's winning a game of chess against B is  $\frac{2}{3}$ . What is the probability that A will win at least 1 of a total of two games?

1.  $\frac{1}{27}$
2.  $\frac{19}{27}$
3.  $\frac{2}{27}$
4.  $\frac{8}{9}$

## Sample Question Solution 11

Sol : Option 4

Reqd. Probability =  $1 - (A \text{ not winning even one Game out of } 3) = 1 - (1/3)^2 = 1 - (1/9) = (8/9)$

## Sample Question 12

What is the probability that a non-leap year will have 53 Mondays?

1.  $52/53$
2.  $51/52$
3. 1
4. None of these

## Sample Question Solution 12

**Sol : Option 4**

Non Leap Year = 52 Weeks and one Day.

Prob. of one days Day being Monday =  $1 / 7$

Therefore, Reqd. Prob. =  $1 / 7$

# Profit and Losses

# Formulas

- **Cost Price (CP):** The price, which is paid to acquire a product, is called cost price. All the overhead expenses (transportation, taxes etc.) are also included in the cost price.
- **Selling Price (SP):** The sum of money, which is finally received for the product i.e. the price at which the product is finally disposed off is called the Selling price.
- **Marked Price (MP):** The price, which is listed or marked on the product, is also known as quotation price/printed price/catalogue price/invoice price.
- **Profit:** If selling price is greater than Cost price, then excess of SP to CP is called Gain or Profit.  
$$\text{PROFIT} = \text{SELLING PRICE} - \text{COST PRICE}$$
E.g. Let the cost price of a quintal of rice be Rs 1000 and the shopkeeper sells the same for Rs 1125 per quintal, then profit =  $1125 - 1000 = \text{Rs. } 125$  per quintal.
- **Loss:** If selling price is less than Cost price, then excess of CP to SP is called Loss.  
$$\text{LOSS} = \text{COST PRICE} - \text{SELLING PRICE}$$
E.g. Let the cost price of a score of mangoes be Rs. 220. If the fruit vendor retails each mango for Rs. 10, then cost price per mango =  $\text{Rs. } 220/20 = \text{Rs. } 11/\text{mango}$  (As you know one score has 20 items)  
Selling price =  $\text{Rs. } 10 / \text{mango} \therefore \text{Loss} = \text{Rs. } 11 - \text{Rs. } 10 = \text{Re. } 1 \text{ per mango}$ 

Note: Profit and loss percentage is always calculated on cost price, unless otherwise specified. Now let us come to profit loss formula in percentage, which will be followed by questions on profit and loss.
- **Profit percentage formula:** The profit percent can be calculated as:  
$$\text{Profit \%} = 100 \times \text{Profit/Cost Price.}$$
- **Percentage Loss:** The loss percent can be calculated as;  
$$\text{Loss \%} = 100 \times \text{Loss/Cost Price.}$$

# Formulas

## When profit% and loss% is same:

If two items are sold each at Rs X, one at a gain of p % and the other at a loss of p %, then the two

transactions have resulted in an overall loss of  $\frac{p^2}{100}$  %, and the absolute value of the loss Rs.  $\frac{2 \cdot p^2 \cdot x}{100^2 - p^2}$

## Equal % profit & loss on the same cost price of two articles:

If the cost price of two items is X, and one is sold at a profit of p % and the other at a loss of p %, then the two transactions have resulted in no gain or no loss.

**Trade Discount:** Discount on the Marked Price to attract customers is known as Trade Discount.

**Note:** The discount is always taken as a % of the Marked Price, unless otherwise specified.

**Example:** Let the list price of an article be Rs. 450. A discount of 5% on its list price is announced.

Then, the new selling price =  $450 * 95/100 = \text{Rs } 427.5$ .

**Cash Discount:** In addition to trade discount, the manufacturer may offer an additional discount called the Cash Discount if the buyer makes full payment within a certain specified time. Cash Discount is usually offered on the net price (the price after subtracting discount from the marked price).

Therefore,

$$\text{Cash Price} = \text{Net Price} - \text{Cash Discount}$$

# Formulas

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# Formulas

**False Weight:** If a trader professes to sell his goods at cost price, but uses false weights, then

$$\text{Gain\%} = \left[ \frac{\text{Error}}{(\text{True Value}) - \text{Error}} \times 100 \right]$$

**Successive Discounts:** When a tradesman offers more than one discount to the customer, then the total discount offered is calculated by applying the method of decimals, learned in the topic of percentages.

**Note:** When the SP of x articles is equal to CP of y articles, what is the profit percent earned?

$$\text{Profit percent} = \frac{100 * \text{difference in } x \text{ and } y}{x}$$

- $\text{Gain\%} = \frac{\text{Gain} * 100}{C P}$
- $\text{Loss\%} = \frac{\text{Loss} * 100}{C P}$
- $C.P. = \left( \frac{100}{100 + \text{Gain}} \right) * S.P$
- $S.P. = \left( \frac{100 + \text{Gain\%}}{100} \right) * C.P$
- $S.P. = \left( \frac{100 - \text{Loss \%}}{100} \right) * C.P$
- $C.P. = \left( \frac{100 \%}{100 - \text{Loss\%}} \right) * S.P$

## Sample Question 13

What should each of the forty shirts be sold at, the cost of each of which is Rs. 500, so as to get a profit equal to the selling price of 20 of them?

## Sample Question Solution 13

**Sol:** S.P. of 20 Shirts = S.P of 40 Shirts – C.P. of 40 Shirts

$$20 \text{ S.P.} = 40 \text{ S.P} - 40 \times 500 \Rightarrow 20 \text{ S.P.} = 20000 \Rightarrow \text{S.P.} = \text{Rs. } 1000.$$

## Sample Question 14

A man sells a TV set for Rs. 4,800 and makes a profit of 20 %. He sells another TV at a loss of 16 %. If on the whole, he neither gains nor loses, find the selling price of the second TV set.

- A. Rs. 3,800
- B. Rs. 4,400
- C. Rs. 4,200
- D. Rs. 4,600
- E. Rs. 3,500

## Sample Question Solution 14

Sol : Option C

SP of first TV = Rs. 4800, the CP of first TV =  $4800 \times 100/120 =$  Rs 4000, so the profit earned is Rs. 800. Now he must get a loss of Rs. 800 by selling second TV as he neither gaining nor losing on the whole.

Now Rs. 800 must be 16% of the CP of the second TV i.e.  $800 \times 100/16 =$  Rs. 5000, but the question is asking the SP of the second TV, which will be  $5000 - 800 =$  Rs. 4200.

## Sample Question 15

Parveen bought 80 kg of rice for Rs. 760 and sold it at a loss of as much money as he received for 15 kg rice. At which price did he sell the rice?

- A. Rs. 9 / kg
- B. Rs. 8 / kg
- C. Rs. 8.5 / kg
- D. Rs. 10 / kg
- E. Rs. 10.6 / kg

## Sample Question Solution 15

Sol : Option B

Let the SP per kg be Rs. x. Total sales = Rs  $80x$  and total loss will be  $15x$  (i.e. the selling price of 15 kg.). Total Cost Price = Rs. 760.

Now  $SP + Loss = Cost\ Price \Rightarrow 80x + 15x = 760 \Rightarrow 95x = 760$   
 $\Rightarrow x = 760/95 = \text{Rs } 8.$

## Sample Question 16

I make a profit of 20% by selling an article. What would be the profit percent if it were calculated on the selling price instead of the cost price?

- A. 10 %
- B. 20%
- C. 30%
- D. 16.67%
- E. 12.5%

## Sample Question Solution 16

Sol : Option D

Let CP = 100 then SP = 120. Profit % if it was calculated on SP will be  
 $\Rightarrow 20/120 \times = 16.67\%$

# Equations



# Formulas

- The standard form of a quadratic equation is:  $ax^2+bx+c = 0$  where a, b and c are known values and  $a \neq 0$ . Also, x is a real variable.
- If the value of a is 0, then the equation will become a linear equation.
- A root of the equation  $f(x) = 0$  is when the value of x makes  $f(x) = 0$ . We can say that  $x = a$  is the root of  $f(x) = 0$ . Here,  $f(a)$  is the value of the polynomial  $f(x)$  at  $x = 0$  and is obtained by replacing x by a in  $f(x)$ .
- If there is a quadratic equation  $ax^2 + bx + c = 0$ , then the roots of this equation will be:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- In the above mentioned formula,  $b^2 - 4ac$  is the discriminant as it can discriminate between the possible types of solutions:
- When we have a positive value of  $b^2 - 4ac$ , then we will get two Real solutions
- When the value of  $b^2 - 4ac$  is zero, then we will get only one Real solution
- When we have a negative value of  $b^2 - 4ac$ , then we will get two Complex solutions (i.e. the answer will include imaginary numbers)
- Let the roots of the equation  $ax^2 + bx + c$  be  $\alpha$  and  $\beta$ .
- Then, the sum of the roots:  $\alpha + \beta = -b/a$
- The product of the roots =  $\alpha \beta = c/a$
- If  $p + \sqrt{q}$  is a root of a quadratic equation, then its other root is  $p - \sqrt{q}$
- When  $D \geq 0$ , then  $ax^2 + bx + c$  can be expressed as a product of two linear factors.
- If  $\alpha$  and  $\beta$  are the roots of  $ax^2 + bx + c$ , then we can write it as:  $x^2 - (\alpha + \beta)x + \alpha\beta = 0$

# Formulas

- A Linear Equation in one variable is defined as  $ax + b = 0$  or  $ax = c$ , where  $a$ ,  $b$  and  $c$  are real numbers. Also,  $a \neq 0$  and  $x$  is an unknown variable.
- The solution of the equation  $ax + b = 0$  is  $x = -b/a$ . We can also say that  $-b/a$  is the root of the linear equation  $ax + b = 0$ .
- A Linear Equation in two variables is of the  $ax + by + c = 0$  or  $ax + by = d$  type where  $a$ ,  $b$ ,  $c$  and  $d$  are constants and also, both  $a$  and  $b$  are not equal to 0.
- **Substitution Method**-Find the value of one variable say  $y$  in terms of the other i.e.  $x$ . from either equation. Then substitute the value of  $y$  so obtained in the other equation. Therefore, we have a single equation in one variable  $x$ . Now solve this equation for  $x$ . In the end, substitute the value of  $x$ , thus obtained, in first step and find the value of  $y$ .
- **Method of Elimination**-Multiply both the equations with such numbers so as to make the coefficients of one of the two unknowns numerically same. To get an equation containing only one known, subtract or add the two equations. Solve this equation to get the value of the unknown. In either of the two original equations, substitute the value of the unknown. Thus, by solving that, the value of the other unknown is obtained.
- **Short – Cut Method**-Let us consider two equations as:  $a_1x + b_1y = c_1$  and  $a_2x + b_2y = c_2$ . Then, the solution will be written as  $x/(b_1 c_2 - b_2 c_1) = y/(c_1 a_2 - c_2 a_1) = (-1)/(a_1 a_2 - b_1 b_2)$  i.e.  $x = -(b_1 c_2 - b_2 c_1)/(b_1 c_2 - b_2 c_1)$  and  $y = (c_1 a_2 - c_2 a_1)/(a_1 b_2 - a_2 b_1)$ . Suppose, we have two linear equations:  $a_1x + b_1y = c_1$  and  $a_2x + b_2y = c_2$
- If  $a_1/a_2 = b_1/b_2$ , the system will have only one solution that will be consistent. The graphs of this type of equation will have intersecting lines.
- If  $a_1/a_2 = b_1/b_2 = c_1/c_2$ , the system will be consistent with numerous solutions. The graphs of this type of equation will have coincident lines.
- If  $a_1/a_2 = b_1/b_2 \neq c_1/c_2$ , the system will have no solution and will be inconsistent. The graphs of this type of equation will have parallel lines.

## Sample Question 17

In the question, two equations I and II are given. You have to solve both the equations and establish the correct relation between x and y and choose the correct option.

I.  $(x - 1)^2 = 0$

II.  $y^2 = 1$

1.  $x > y$
2.  $x < y$
3.  $x \geq y$
4.  $x \leq y$
5. either  $x = y$  or relation cannot be established

# Sample Question Solution 17

**Answer (Detailed Solution Below)**

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Option 3 :

$$x \geq y$$

## Sample Question 18

A rectangular garden has an area of  $735\text{m}^2$ . If length is decreased by 7m and breadth is increased by 7m, then it became a square. Find the area of the square (in  $\text{m}^2$ ).

- A. 625
- B. 784
- C. 484
- D. 676

## Sample Question Solution 18

Sol : Option B

Let length = l, breadth = b, Area = lb = 735.

Given  $l - 7 = b + 7$  = side of square.

So  $l = b + 14 \Rightarrow$  So  $b(b + 14) = 735 \Rightarrow b^2 + 14b - 735 = 0 \Rightarrow (b + 35)(b - 21) = 0$   
 $\Rightarrow b = 21$ . So side of square =  $21 + 7 = 28 \Rightarrow$  Area =  $(28)^2 = 784$ . Hence 2<sup>nd</sup> option.

## Sample Question 19

**For what value of h, the system of equations, $hx-y-2=0$  and  $6x-2y-3=0$  has a unique solution?**

A - 2

B - 3

C - 4

D - 5

# Sample Question Solution 19

**Answer - B**

**Explanation**

For, a unique solution, we must have  $a_1/a \neq b_1/b_2$   
 $h/6 \neq -1/-2 \Rightarrow h/6 \neq 1/2 \Rightarrow h = 3$

Correction-It should be  $a_1/a_2=b_1/b_2$

## Sample Question 20

The sum of the squares of two consecutive odd natural numbers is 130. Find those numbers.

- A. 3, 5
- B. 7, 9
- C. 5, 7
- D. 7, -9

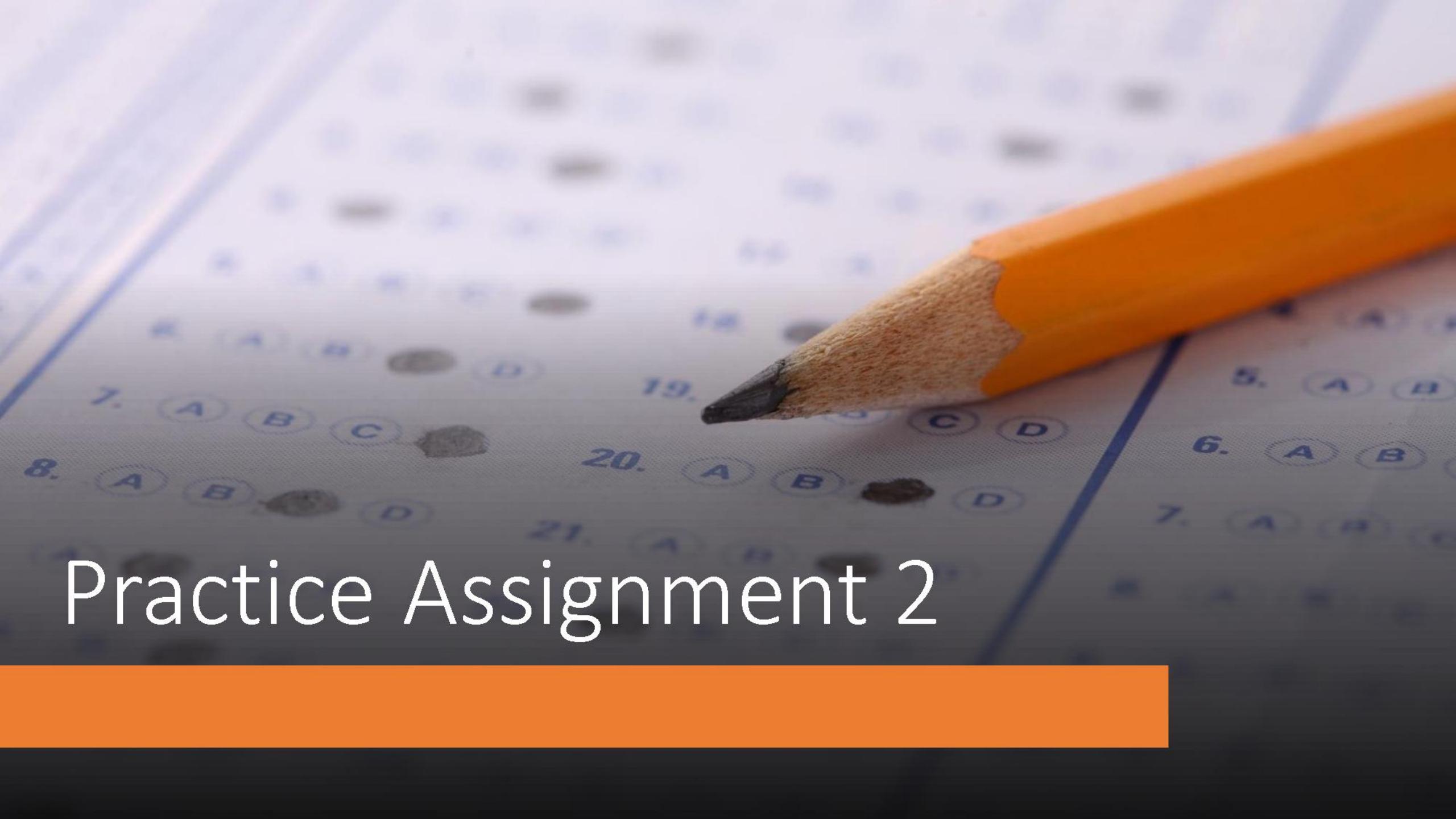
## Sample Question Solution 20

**Sol : Option B**

Two consecutive odd natural nos. are  $x$  and  $x + 2$

$$\Rightarrow x^2 + (x + 2)^2 = 130 \Rightarrow x = 7 \therefore \text{nos. are } 7 \text{ & } 9.$$

# Practice Assignment 2



## Practice Question 1.1

The ratio of the measures  $\angle A$  and  $\angle B$  of a triangle ABC is 3 : 2. The ratio of the measures of  $\angle B$  and  $\angle C$  is 4 : 5. Find the measure of largest angle of the triangle ABC.

- a)  $72^\circ$
- b)  $78^\circ$
- c)  $48^\circ$
- d)  $60^\circ$

## Practice Question Solution 1.1

**Sol : Option A**

**Explanation:**  $\angle A : \angle B = 3 : 2$ .  $\angle B : \angle C = 4 : 5$ .  $\therefore \angle A : \angle B : \angle C = 6 : 4 : 5$ .

$\therefore$  actual values are  $6x$ ,  $4x$  and  $5x$ . So  $6x + 4x + 5x = 180 \rightarrow 15x = 180 \rightarrow x = 12$ . So angles are  $6(12) = 72$ ,  $4(12) = 48$  and  $5(12) = 60$

## Practice Question 1.2

If  $6m - n = 4m + 13n$ , find the value of  $2m + n : 2m - 3n$ .

- a) 14:11
- b) 15:14
- c) 15:11
- d) None of these

## Sample Question Solution 1.2

**Sol : Option B**

**Explanation:**  $6m - n = 4m + 13n \rightarrow m = 7n$ .  $\therefore$  Required ratio =  $(2m+n : 2m-3n)$   
 $= 15n : 11n \rightarrow 15 : 11$ .

### Practice Question 1.3

Which number when added to each of the numbers 24, 32 and 42 would make the sums to be in continued proportion?

- a) 4
- b) 5
- c) 6
- d) 8

## Practice Question Solution 1.3

**Sol : Option D**

**Explanation:** Let the number to be added is  $x$ .  $\therefore (24+x) / (32+x) = (32+x) / (42+x)$ .

Solving for  $x$ , we get  $x = 8$ .

## Practice Question 1.4

There are 145 students in the first three standards. The ratio of number of students in the first and the second standards is 2 : 3, while that of students in standards second and third is 4: 3. Find the number of students in 2<sup>nd</sup> standard.

- a) 40 yrs
- b) 60 yrs
- c) 45 yrs
- d) 65yrs

## Practice Question Solution 1.4

**Sol : Option B**

**Explanation:** Total students = 145. Ratio of students in 1st and 2nd standards = 2 : 3

Ratio of students in 2<sup>nd</sup> and 3<sup>rd</sup> standards = 4 : 3

Hence combined ratio i.e. 1<sup>st</sup>: 2<sup>nd</sup>: 3<sup>rd</sup> is 8 : 12 : 9.

∴ Number of students in each standard =  $(145 \times 8)/29 = 40$ ,  $(145 \times 12)/29 = 60$  and  $(145 \times 9)/29 = 45$ .

## Practice Question 1.5

The ratio of the present ages of John and Jim is 5 : 3. Four years hence it will be 3 : 2. Find the present age of John.

- a) 5yrs
- b) 5 yrs
- c) 10 yrs
- d) 20yrs

## Practice Question Solution 1.5

**Sol : Option D**

**Explanation:** : Present ratio = 5 : 3. ∴ actual values are  $5x$  and  $3x$ . So  $(5x + 4) / (3x + 4) = 3/2 \rightarrow x = 4$

So present ages are 20 yrs and 12 yrs.

## Practice Question 1.6

The ratio of the length and the breadth of a rectangle is  $3 : 5$  and its area is  $1.35 \text{ cm}^2$ . Find the length of the rectangle.

- a) 9 cm
- b) 0.9 cm
- c) 0.09 cm
- d) 90 cm

## Practice Question Solution 1.6

**Sol : Option B**

**Explanation:** Area of a rectangle = LB. Ratio of sides = 3 : 5.  $\therefore (3x)(5x) = 1.35 \rightarrow x = 0.3.$

$\rightarrow$  Length of the rectangle = 3 (0.3) = 0.9 cm and breadth = 5(0.3) = 1.5 cm.

## Practice Question 1.7

The ratio of A's salary to B's was 4 : 5. A's salary is increased by 10% and B's by 20%, what is the ratio of their salaries now?

- A. 14:11
- B. 15:14
- C. 11:15
- D. None of these

## Practice Question Solution 1.7

Option C

Present ratio = 4 : 5. Increase of 10% and 20%. ?New ratio of salaries will be  $4 \times 1.1 : 5 \times 1.2 = 11 : 15$ .

## Practice Question 1.8

The ratio of the first and second-class fares between the two stations is 6 : 4 and the number of passengers traveling by first and second-class is 1 : 30. If Rs. 2100 is collected as fare, what is the amount collected from first class passengers?

- A. Rs.250
- B. Rs. 200
- C. Rs. 150
- D. Rs. 100

## Practice Question Solution 1.8

### Option D

Ratio of the amounts collected from 1<sup>st</sup> and 2<sup>nd</sup> class =  $(6 \times 1):(4 \times 30) = 1 : 20$ .  $\therefore$  Amount collected from 1st class passengers =  $\frac{1}{21} \times 2100 = 100$ .

## Practice Question 1.9

Find the ratio of the diagonal of a square of side 30 cm, to its side.

- A.  $\sqrt{2}: 3$
- B.  $\sqrt{3}: 4$
- C.  $1 : \sqrt{2}$
- D.  $\sqrt{2}: 1$

## Practice Question Solution 1.9

### Option D

Diagonal of a square =  $\sqrt{2}$  side. Hence this is the required ratio. So the required ratio is  $\sqrt{2}: 1$ .

## Practice Question 1.10

300 coins consists of 1 rupee, 50 paise and 25 paise coins, their values being in the ratio of 10 : 4 : C. Find the number of coins of each type.

- A. 100, 80, 120
- B. 80, 90, 100
- C. 100, 100, 80
- D. 60, 80, 100

## Practice Question Solution 1.10

Option A

Value of rupee coins = 10 i.e. 10 coins. Value of 50 p coins = 4 i.e. 8 coins. Value of 25 p coins = Rs. 3 i.e. 12 coins.  $\therefore$  Ratio of coins = 10 : 8 : 12  $\Rightarrow$  5 : 4 : 6.  $\therefore$  Number of rupee coins =  $5/15 \times 300 = 100$ . Number of 50 P coins =  $4/15 \times 300 = 80$  and Number of 25 P coins =  $6/15 \times 300 = 120$

## Practice Question 1.11

**The number of straight lines that can be drawn out of 12 points of which 8 are collinear is**

1. 39
2. 29
3. 49
4. 59

## Practice Question Solution 1.11

Answer : Option 1

The required number of lines=  ${}^{12}C_2 - {}^8C_2 + 1 = 1 + 66 - 28 = 39$

## Practice Question 1.12

**In a cricket championship, there are 21 matches. If each team plays one match with every other team, the number of teams is**

1. 7
2. 9
3. 10
4. None of these

## Practice Question Solution 1.12

Answer : Option 1

Let  $n$  be the number of teams.

$${}^nC_2 = 21$$

$$(n(n-1)/2) = 21$$

$$\Rightarrow n(n-1) = 42 \therefore$$

$$\Rightarrow n = 7$$

## Practice Question 1.13

There are 10 questions in an exam. In how many ways can a person attempt at least one question?

## Practice Question Solution 1.13

**Solution:** A person can attempt 1 question or 2 questions or ....till all 10 questions. One question out of ten questions can be attempted in  ${}^{10}C_1 = 10$  ways. Similarly, two questions out of ten questions can be attempted in  ${}^{10}C_2 = 45$  ways. Going ahead by the same logic, all ten questions can be attempted in  ${}^{10}C_{10} = 1$  way. Hence the total number of ways =  $10 + 45 + 120 + \dots + 1 = 1023$  ways (Using the formula of Combination)

## Practice Question 1.14

**The number of four-digit telephone numbers having at least one of their digits repeated is**

1. 9,000
2. 1,00,00
3. 3,240
4. 4960

## Practice Question Solution 1.14

Answer : Option 4

The number of four-digit telephone numbers which can be formed using the digits of 0, 1, 2,..., 9 is  $10^4$ .

The number of four digit telephone numbers which have none of their digits repeated is  ${}^{10}P_4 = 10 \times 9 \times 8 \times 7 = 5040$

Hence the required number = $10^4 - 5040 = 4960$

## Practice Question 1.15

**A round table conference is to be held among 25 delegates from 25 countries. In how many ways can they be seated if two particular delegates are always to sit together?**

1.  $23!$
2.  $2! \times 23!$
3.  $3! \times 23!$
4. None of these

## Practice Question Solution 1.15

Answer : Option 2

Treating 2 particular delegates who are to sit together as one person, we have only 24 persons. These 24 persons can be seated at a round table in  $23!$  Ways. But 2 particular persons can be arranged among themselves in  $2!$  ways.  $\therefore$  Required no  $= 2! \times 23!$

## Practice Question 1.16

**Given 5 line segments of lengths 2, 3, 4, 5, 6 and 7 units. Then the number of triangles that can be formed by joining these lines is**

1.  ${}^6C_3$
2.  ${}^6C_3 - 7$
3.  ${}^6C_3 - 5$
4.  ${}^6C_3 - 1$

## Practice Question Solution 1.16

Answer : Option 2

We know that in any triangle the sum of two sides is always greater than the third side.  $\therefore$  the triangle will not be formed if we select segments of lengths (2, 3, 5) , (2, 3, 6), (2,3,7), (3,4,7),(2,4,7), (2,5,7) and (2, 4, 6). Hence number of triangles formed =  ${}^6C_3 - 7$

## Practice Question 1.17

**A gentleman has 5 friends to invite. In how many ways can he send invitation cards to them if he has four servants to carry the cards?**

1. 16
2. 64
3. 1024
4. 1458

## Practice Question Solution 1.17

Answer : Option 3

Here each card can be carried by any of the four servants.  
∴ Required number =  $4 \times 4 \times 4 \times 4 \times 4 = 4^5 = 1024$

## Practice Question 1.18

**A box contains three white balls, four black balls and three red balls.  
The number of ways in which three balls can be drawn from the box  
so that at least one of the balls is black is**

1. 50
2. 100
3. 150
4. 200

## Practice Question Solution 1.18

Answer : Option 2

The required number of ways

(a) 1 black and 2 others =  ${}^4C_1 \cdot {}^6C_2 = 4 \times 15 = 60$

(b) 2 black and 1 other =  ${}^4C_2 \cdot {}^6C_1 = 6 \times 6 = 36$

(c) All the three black =  ${}^4C_3 = 4$

Total =  $60 + 36 + 4 = 100$

## Practice Question 1.19

**In how many ways can 5 boys and 5 girls can be seated in a row so that boys and girls are placed alternately?**

1.  $5!$
2.  $5! \times 2!$
3.  $2 \times 5! \times 5!$
4. None of thes

## Practice Question Solution 1.19

Answer : Option 3

The 5 boys and 5 girls can be seated in  $5!5!$  ways. There are further two cases when the arrangement starts with boy or girl. Thus the required number of arrangements is  $2 \times 5! \times 5!$

## Practice Question 1.20

**In how many ways can you rearrange the word JUMBLE such that the rearranged word starts with a vowel?**

1. 120
2. 240
3. 360
4. 60

## Practice Question Solution 1.20

- Answer : Option 2

JUMBLE is a six-lettered word. Since the rearranged word has to start with a vowel, the first letter can be either U or E. The balance 5 letters can be arranged in  ${}^5P_5$  or 5! ways. Total number of words =  $2 \times 5! = 240$ .

## Practice Question 1.21

Two dice are thrown, what is the probability that both the dices are not having the same number.

1.  $1/4$
2.  $5/6$
3.  $1/9$
4.  $1/12$

## Practice Question Solution 1.21

**Sol: Option 2**

Explanation: Total possible outcomes = 36. Favorable outcomes of having same number = 6 [(1, 1) (2, 2) (3, 3) (4, 4) (5, 5) (6, 6)].

Probability of both the dices having same number =  $6 / 36 = 1 / 6$

Required probability =  $1 - 1 / 6 = 5 / 6$

## Practice Question 1.22

Determine the probability that a number chosen at random from the digits 1, 2, 3, ..... , 10 will be a multiple of 4.

1.  $1/4$
2.  $1/3$
3.  $1/5$
4.  $1/2$

## Practice Question Solution 1.22

**Sol: Option 3**

Explanation: Total possible outcomes = 10. Favorable outcomes = 2.  
(i.e. 4,8).

Probability =  $2 / 10 = 1 / 5$

## Practice Question 1.23

If a dice is thrown twice, what is the probability of not getting a one on either throw?

1.  $1/12$
2.  $1/18$
3.  $25/36$
4.  $12/36$

## Practice Question Solution 1.23

- **Sol: Option 3**

Explanation: Out of total 36 possible outcomes, getting 1 on either draw can happen in = 11 ways

$$\text{Reqd. Probability} = 1 - (\text{Probability of Getting one on either draw}) = 1 - 11 / 36 = 25 / 36$$

## Practice Question 1.24

Determine the probability that a digit chosen at random from the digits 1, 2, 3, ...12 will be odd.

1.  $1/2$
2.  $1/9$
3.  $5/9$
4.  $4/9$

## Practice Question Solution 1.24

- **Sol: Option 1**

Explanation: Total no. of Digits = 12. Equally likely cases = 12.  
There are six odd digits. Probability =  $6 / 12 = 1 / 2$

## Practice Question 1.25

What is the probability that both A and B will pass the examination?

1.  $1/6$
2. 1
3.  $2/3$
4.  $1/3$

## Practice Question Solution 1.25

**Sol : Option 1**

Probability that A will pass in exam =  $1/2$

So, Probability that A will fail in exam =  $1/2$ .

Probability that B will pass in exam =  $1/3$

So, Probability that B will fail in exam =  $2/3$ .

Probability that both will pass in the exam = Probability that A will pass  
and probability that B will pass

$$= 1/2 \times 1/3 = 1/6$$

## Practice Question 1.26

What is the probability that only 1 person [either A or B] will pass the examination?

1. 1
2.  $1/2$
3.  $1/3$
4.  $2/3$

## Practice Question Solution 1.26

**Sol : Option 2**

Probability that only one person will pass is when A passes and B fails or A fails and B passes.

$$= (1/2) \times (2/3) + (1/2) \times (1/3) = 1/2$$

## Practice Question 1.27

What is the probability that at least one person will pass the examination?

1. 1
2.  $1/2$
3.  $1/3$
4.  $2/3$

## Practice Question Solution 1.27

**Sol : Option 4**

Probability that at least one person, will pass, so the possibilities can be (A pass and B fails), or (A fails and B pass) or (Both A and B pass)  
 $(1/2) \times (2/3) + (1/2) \times (1/3) + (1/2) \times (1/3) = 2/3$

## Practice Question 1.28

Three cards are drawn together from a pack of 52 cards at random.  
What is the probability that all the cards are Diamonds?

1.  ${}^4C_3 / {}^2C_3$
2.  ${}^{13}C_3 / {}^{52}C_3$
3.  ${}^{26}C_3 / {}^{52}C_3$
4.  ${}^8C_3 / {}^{52}C_3$

## Practice Question Solution 1.28

**Sol : Option 2**

There are 13 diamonds. Three diamonds out of 13 diamonds can be taken out in  ${}^{13}C_3$  ways.

Total number of sample spaces =  ${}^{52}C_3$

Required probability =  ${}^{13}C_3 / {}^{52}C_3$

## Practice Question 1.29

One bag contains 8 blue balls and 6 Green balls; another bag contains 7 blue balls and 5 green balls. If one ball is drawn from each bag, determine the probability that both are blue?

1.  $1/2$
2.  $1/3$
3.  $1/4$
4.  $1/5$

## Practice Question Solution 1.29

Bag I	Bag II
8 blue	7 blue
6 green	5 green

**Option 2** Probability of getting blue ball from bag I = 8 / 14

Probability of getting blue ball from bag II = 7 / 12

Hence reqd. Prob. =  $(8/14) \times (7/12) = (1/3)$

## Practice Question 1.30

1 ball is drawn at random from a box containing 4 red balls, 5 white balls and 6 blue balls, what is the probability that the ball is a red ball?

1.  $1/7$
2.  $2/15$
3.  $4/15$
4.  $1/15$

## Practice Question Solution 1.30

**Sol : Option 3**

Total possible outcomes = 15. (i.e. One out of 15 balls).

Favorable outcomes (one out of 4 red balls) = 4.

Reqd. Probability =  $4 / 15$

## Practice Question 1.31

By selling an article for Rs 600 more, Karthik would have made 5% profit on his sale instead of a 11% loss. What was his cost price?

- A. Rs. 3750
- B. Rs. 4000
- C. Rs. 2250
- D. Rs. 6,000
- E. Rs. 4750

## Practice Question Solution 1.31

**Sol : Option A**

$$CP = (\text{Difference in SP}) \div (\% \text{ Difference in profit}) = 600/(5-(-11)) \times 100 = \\ (600/16) \times 100 = \text{Rs}3750$$

## Practice Question 1.32

If a retailer marks up his price by 30 % and then allows a 30 % discount, what is his percentage profit or loss?

- A. 9 % gain
- B. 8 % gain
- C. 8% loss
- D. 9 % loss
- E. 5% loss

## Practice Question Solution 1.32

**Sol : Option D**

$$\text{Net loss} = x^2/100\% = 900/100 = 9\%$$

### Practice Question 1.33

An orange vendor makes a profit of 10% by selling oranges at a certain price. If he charges Rs. 1.4 higher per orange he would gain 30%. Find the original price at which he sold an orange.

- A. Rs. 6
- B. Rs. 5.80
- C. Rs. 6.25
- D. Rs. 6.70
- E. Rs 7.70

## Practice Question Solution 1.33

Sol : Option E

Rs. 1.4 is the increase in absolute, 20% is the increase in percentage. Thus those two can be equated. Hence it can be concluded that 1.4 is 20% of the price i.e. the CP of one orange is  $1.4/0.20 = \text{Rs. } 7$ . The SP per orange in the first case is  $7 \times 1.1 = \text{Rs. } 7.70$ . Hence option is E.

## Practice Question 1.34

Divya made a profit of 25% when selling a Salwar Kameez at Rs. 4,000. Find the cost price of the same dress.

- A. Rs. 4,800
- B. Rs. 3,650
- C. Rs. 3,200
- D. Rs. 3,000
- E. Rs. 2,700

## Practice Question Solution 1.34

Sol : Option C

$$\text{Old CP} = 4000 \times (100/125) = 3200$$

## Practice Question 1.35

What profit percent is made by selling an article at a certain price if by selling at four-fifth of that price there may be a loss of 12 %?

- A. 10 %
- B. 25 %
- C. 42 %
- D. 20 %
- E. 35%

## Practice Question Solution 1.35

Sol : Option A

Such question can be better answered by thinking in the reverse order. Let the CP = 100, there is a loss of 12% in the final case i.e. SP =  $100 - 12 = \text{Rs } 88$ . Now this Rs. 88 is the four-fifth of the selling price as per the question. The original selling price will be  $88 \times 5/4 = \text{Rs. } 110$ . CP = 100. There is a profit of Rs. 10, which is nothing but 10%, as the CP is taken to be Rs. 100

### Practice Question 1.36

A man purchases two pens for Rs. 740. He sells one at 12 % profit and the other at a 8 % loss. Then he neither gains nor loses. Find the cost price of each pen (in Rs.).

- A. 324, 416
- B. 296, 444
- C. 288, 452
- D. 365, 375
- E. 272, 468

## Practice Question Solution 1.36

**Sol : Option B**

CP of 2 pens = 740. Let CP of 1<sup>st</sup> pen is x and CP of 2<sup>nd</sup> pen is y.

Since there is no profit and loss in the whole transaction, so 12% of x = 8% of y

$\Rightarrow x:y = 2:3$

Hence the cost of first pen =  $(2/3) \times 740 = \text{Rs}296$  and that of the second pen =  $(3/5) \times 740 = \text{Rs}444$

## Practice Question 1.37

After selling a watch, Mihir found that he had made a loss of 12 %. He also found that had he sold it for Rs. 45 more, he would have made a profit of 8 %. The actual initial loss was what percentage of the profit earned, had he sold the watch for 8 % profit?

- A. 66.67 %
- B. 145 %
- C. 150 %
- D. 160 %
- E. 180%

## Practice Question Solution 1.37

Sol : Option C

As profit and loss are calculated of the same figure i.e. the cost price. Hence you can straightaway find 12% is what percent of 8% i.e.  $100 \times 12/8 = 150\%$ .

### Practice Question 1.38

The profit earned when an article is sold for Rs. 1050 is 14 times the loss incurred when it is sold for Rs. 375. At what price should the article be sold if it is desired to make a profit of 20 %?

- A. Rs. 410
- B. Rs. 420
- C. Rs. 504
- D. Rs. 475
- E. Rs. 495

## Practice Question Solution 1.38

Sol : Option C

If L represents the loss, then  $14L$  represents the profit and the sum of the two is difference of the two selling prices. Hence  $15L = 1050 - 375 = \text{Rs } 675 \Rightarrow L = 675/15 = \text{Rs } 45$  Since the second SP = Rs 375, so the CP =  $375 + 45 = 420$ . The SP to have 20% profit is  $420 \times 1.2 = \text{Rs. } 504$

### Practice Question 1.39

A man sells an article at a profit of 8 per cent. If the cost price were 10 per cent less and the selling price Rs. 18 less, his profit would have been 15 per cent. Find the cost price of the article.

- A. Rs. 430
- B. Rs. 450
- C. Rs. 220
- D. Rs. 380
- E. Rs. 400

## Practice Question Solution 1.39

Sol : Option E

Let CP of the article = 100 ∴ Old SP = 108. New CP = 90. As the profit is 15%, so the new SP =  $90 \times 115/100 = 103.5$ . The difference in the two selling prices =  $108 - 103.5 = \text{Rs } 4.5$  If difference in SP is 4.5 then CP = 100, If difference in SP is 18 then CP =  $(100/4.5) \times 18 = \text{Rs } 400$

## Practice Question 1.40

A dishonest dealer professes to sell his goods at a profit of 15 percent and also weighs 833.33 grams in place of a kg. Find his actual gain percent.

- A. 32 % gain
- B. 38% gain
- C. 42 % gain
- D. No gain no loss
- E. 40 % gain

## Practice Question Solution 1.40

Sol : Option B

Uses 833.33 gms instead of 1000 gms

$$\therefore \% \text{ profit} = (1000 - 833.33 / 833.33) \times 100 = 20\%$$

Shopkeeper also states that he makes a gain of 15%. There will be a mutual impact of the two as well. So the formula that can be applied is  $x + y + xy/100$ . Applying that you get the answer as  $20 + 15 + (20)(15)/100 = 38\%$

## Practice Question 1.41

**For what value of h, the system of equations,  $x+2y+7 = 0$  and  $2x+hy+14= 0$  have an infinite number of solutions?**

A - 3

B - 4

C - 5

D - 6

## Practice Question Solution 1.41

**Answer - B**

**Explanation**

For infinite solutions, we have  $a_1/a_2 = b_1/b_2 = c_1/c_2$ ;  
 $h1/2 = 2/h = 7/14 \Rightarrow h=4$ .

## Practice Question 1.42

**For what value of h, the system of equations,  $hx-10y-3=0$  and  $3x-5y-7=0$  has no solutions?**

A - 6

B - 5

C - 4

D - 3

## Practice Question Solution 1.42

**Answer - A**

**Explanation**

For no solution, we have  $a_1/a_2 = b_1/b_2 \neq c_1/c_1$   
 $\therefore h/3 = -10/-5 \neq -3/-7 \Rightarrow h = 6$

## Practice Question 1.43

**Given  $217x + 131y = 913$  and  $131x + 217y = 827$ . Then  $x,y$  are**

A - 1,6

B - 3,2

C - 12,13

D - 16,18

## Practice Question Solution 1.43

**Answer - B**

**Explanation**

$$217x + 131y = 913 \dots (a)$$

$$131x + 217y = 827 \dots (b)$$

It is a special case in which coefficients of x and y in (a) are interchanged in (b)

Adding (a) and (b), we get :  $348(x+y) = 1740 \Rightarrow x+y = 5$   
 $\dots (a)$

Subtracting (b) from (a), we get:  $86(x-y) = 86 \Rightarrow x-y = 1$   
 $\dots (b)$

Adding (a) and (b), we get:  $x= 3, y= 2$

## Practice Question 1.44

**Given  $(x+y-8)/2 = (x+2y-14)/3 = (3x+y-12)/11$ . Then x,y are**

A - 1,7

B - 2,7

C - 2,6

D - 1,5

# Practice Question Solution 1.44

**Answer - D**

**Explanation**

Taking first two parts, we get:

$$(x+y-8)/2 = (x+2y-14)/3$$

$$\Rightarrow 3(x+y-8) = 2(x+2y-14)$$

$$\Rightarrow 3x+3y-24 = 2x+4y -28$$

$$\Rightarrow x - y = -4 \dots (1)$$

Taking last two parts, we get:

$$(x+2y-14)/3 = (3x+y-12)/11$$

$$\Rightarrow 11(x+2y-14) = 3(3x+y-12)$$

$$\Rightarrow 11x + 22y - 154 = 9x + 3y - 36$$

$$\Rightarrow 2x + 19y - 118 \dots (2)$$

Multiplying (1) by 2 and subtracting from (2) we get,

$$21y = 126$$

$$\Rightarrow y = 6$$

Putting  $y = 6$  in (1), we get:  $x = 2$

$$\Rightarrow x = 2, y = 6$$

## Practice Question 1.45

The sum of a natural number and its reciprocal is  $50/7$ . What is the number?

- A. 7
- B. 10
- C.  $1/5$
- D. 5

## Practice Question Solution 1.45

**Sol : Option A**

$$x + \frac{1}{x} = 50/7 \Rightarrow x = 7$$

## Practice Question 1.46

If the roots  $x_1$  and  $x_2$  of the quadratic equation satisfy the condition  $7x_2 - 4x_1 = 47$ . The quadratic expression is  $x^2 - 2x + c = 0$ , find the value of  $c$ .

- A. - 15
- B. 15
- C. - 6
- D. None of these

## Practice Question Solution 1.46

**Sol : Option A**

$$x_1 + x_2 = +2 \quad \dots \dots \dots (1),$$

$$\text{Also } -4x_1 + 7x_2 = 47 \quad \dots \dots \dots (2)$$

Solving (1) & (2) we get  $x_1 = -3$  and  $x_2 = 5$

$$\therefore x_1 x_2 = -15 = c$$

## Practice Question 1.47

If  $(x^2 - y^2) = 16$  and  $xy = -15$ . Which of the following is a possible value of  $(x + y)$ , if  $(x + y)$  is a positive number.

- A. 3
- B. 2
- C. 5
- D. None of these

## Practice Question Solution 1.47

Sol : Option B

$$x^2 - y^2 = 16 \text{ and } xy = -15, (x + y) > 0 = ?$$

$$x = -15/y, (-15/y)^2 - y^2 = 16, 225/y^2 - y^2 = 16$$

$$y^4 + 16y^2 - 225 = 0$$

$$y^2 = -25, 9 \text{ or } y = \pm 3 \text{ (avoiding complex roots)}$$

Putting values  $x = \pm 5$  for  $y = 3$  and  $x = \pm 5$  for  $y = -3$

$$\text{Therefore } (x+y) = 5+3 = 8, -5+3 = -2$$

$$\text{Or } (x+y) = 5-3 = 2, -5-3 = -8$$

Therefore,  $x+y = 2$  or  $8$  (because  $x+y > 0$ ).

## Practice Question 1.48

The difference between the roots of a quadratic equation  $6x^2 + wx + 1 = 0$  is  $1/6$ . If  $w > 0$ , then the value of  $w$  is

- A. 6
- B. -5
- C. 5
- D. 10

## Practice Question Solution 1.48

**Sol : Option C**

Let  $\alpha, \beta$  are the roots of the equation, then

$$\alpha + \beta = -w/6, \alpha\beta = 1/6, \alpha - \beta = 1/6 \text{ and } w > 0$$

$$\text{Solving } \alpha = (-w+1)/12, \beta = (-w-1)/12,$$

$$\text{Therefore, } (1-w)/12 \times (-1-w)/12 = 1/6$$

$$\text{Solving } w = \pm 5 \text{ as } w > 0, w = 5$$

Thus, option C is the answer

## Practice Question 1.49

The base of a triangle is greater than twice its height by 1 cm. The area of the triangle is 18 sq. cm. Find the base and height of the triangle.

- A. 18 cm, 2 cm
- B. 9 cm, 4 cm
- C. 6 cm, 9 cm
- D. 6 cm, 7 cm

## Practice Question Solution 1.49

Sol : Option B

$$B = 2H + 1$$

$$\text{Area} = B * H/2 \Rightarrow 18 = (2H + 1)/2$$

$$H = 4, B = 9$$

## Practice Question 1.50

The sum of the squares of two consecutive natural numbers is 85. Find those numbers.

- A. 6, 7
- B. 5, 8
- C. 6, 8
- D. -8, 6

## Practice Question Solution 1.50

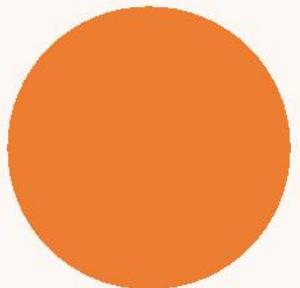
**Sol : Option A**

Two consecutive natural nos. are  $x$  and  $x + 1$ .

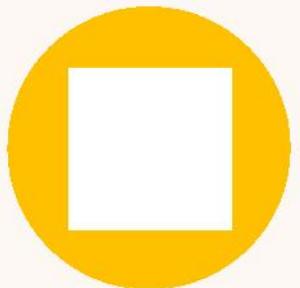
$$\Rightarrow x^2 + (x + 1)^2 = 85 \Rightarrow x = 6. \therefore \text{nos. are } 6 \text{ and } 7.$$



# Resources and Books



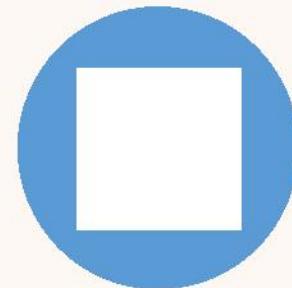
Fast Track Objective Arithmetic by Rajesh Verma –  
Arihant Publication.



<https://www.indiabix.com/aptitude/questions-and-answers/>



<https://prepinsta.com/tcs-digital/>



<https://www.hitbullseye.com/Quant>

Thank you

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