Success is our right. We will definitely succeed!"

— Anil Nagar, Founder & CEO, Adda Education

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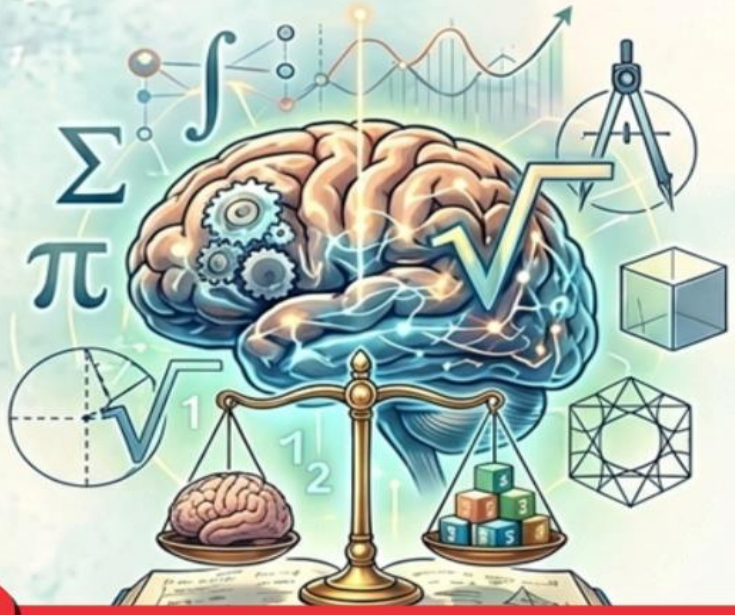
English Edition

TNPSC MATHS

Aptitude+Reasoning

BASED ON LATEST SYLLABUS



FEATURES

- Fully covers both the 'Aptitude' and 'Reasoning' Syllabus for the TNPSC Group 1, 2/2A, and 4 examinations.
- Includes simple explanations and solutions for fundamental aptitude topics such as Simplification, Percentage, HCF & LCM, Ratio and Proportion, Simple Interest - Compound Interest - Area - Volume - Time and Work.
- Provides exclusive notes for the Reasoning section, covering topics like Logical Reasoning, Puzzles, Dice, Visual Reasoning, and Alpha-numeric/Number Series.
- Includes 2025 Previous Years' Questions (PYQs) for TNPSC examinations.

Content

Aptitude

Logical Reasoning

1	Alpha-Numeric Series
2.	Coding & Decoding
3.	Direction & Distance
4.	Ranking
5.	Arithmetic Operations
6.	Calendar
7.	Seating Arrangement
8.	Puzzle
9.	Visual Reasoning
	TNPSC 2025 Reasoning - Previous Year Questions (PYQ's)

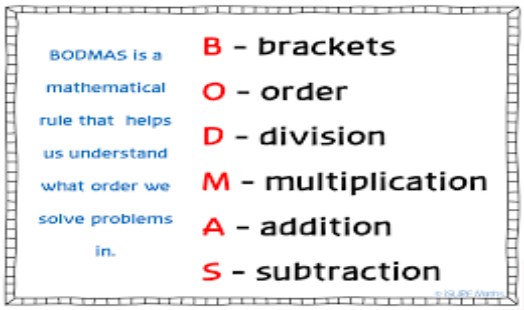
Aptitude

01 Simplification

Common Types of Questions:

- Basic BODMAS
- Fractions & Mixed Fractions
- Decimals
- Percentages
- Exponents & Indices
- Surds
- Basic Algebraic Identities
- Number Series

Type 1: Basic Bodmas



1. Simplify the expression: 4 + 2 × (3 - 1)

Sol: 4 + 2 × (3 - 1) = 4 + 2 × (2) =4 + 4

Ans: 8

2. Calculate: 12 ÷ 2 × 3 – 5

Sol: 12 ÷ 2 × 3 – 5 = 6×3 – 5 = 18 - 5

Ans: 13

Practice Problems:

1. Calculate: 15 ÷ (3 + 2) – 4

(a) 1 (b) 3
(c) -1 (d) 0

2. Evaluate the expression: (3 + 5) × (4 - 2)²

(a)30 (b) 32
(c)23 (d) 22

3. Calculate: 12 × (4 + 3)÷ 2 – 5³

(a) 83 (b) -73
(c) -83 (d) 73

4. If 57 - (42 - {37 - (20 - x)}) = 176 ÷ (8 ÷ 2), find x

(a) 12 (b) 11
(c) 10 (d) 8

5. Simplify: 15 × (5 + 3) ÷ 4 − 6

(a) 24 (b) 20
(c) 14 (d) 36

Answers:									
1.	(c)	2.	(b)	3.	(c)	4.	(d)	5.	(a)

Solution:

1. 15 ÷ (3 + 2) – 4 = 15 ÷ 5 – 4 = 3 – 4

Ans: -1

2. $(3 + 5) \times (4 - 2)^2 = (8) \times (2)^2 = 32$

3. $12 \times (4 + 3) \div 2 - 5^3 = 12 \times (7) \div 2 - 125$

$= 12 \times \frac{7}{2} - 125$

$= 42 - 125$

Ans : -83

4. 57 - (42 - {37 - (20 - x)}) = 176 ÷ (8 ÷ 2)

57 – (42 – {37 – 20 +x}) = 176 ÷ 4

57 – (42 – 37 + 20 - x) = 44

57 – 42 + 37 – 20 + x = 44

32 + x = 44

Ans: x = 8

5. 15 × (5 + 3) ÷ 4 − 6 = 15 × (8) ÷ 4 – 6

= 15 × 2 – 6

x = 24

Type 2: Fractions & Mixed Fractions

Example problems:

1. Simplify $7\frac{3}{10} + (-10\frac{7}{21})$

- Convert $7\frac{3}{10}$ to improper fraction

  $7\frac{3}{10} = \frac{7\times10+3}{10} = \frac{73}{10}$
- Convert $-10\frac{7}{21}$ to improper fraction

  $-10\frac{7}{21} = -\frac{10\times21+7}{21} = -\frac{217}{21}$
- $\frac{73}{10} - \frac{217}{21} = -\frac{637}{210}$

Ans: $-3\frac{7}{210}$

2. Simplify $[\,3\frac{1}{4} \div \{\,1\frac{1}{4} - \frac{1}{2}(\,2\frac{1}{2} - \frac{1}{4} - \frac{1}{6})\,\}\,]$

- Convert all mixed fractions to improper fractions

  $[\,\frac{13}{4} \div \{\,\frac{5}{4} - \frac{1}{2}(\,\frac{5}{2} - \frac{1}{4} - \frac{1}{6})\,\}\,]$
- $[\,\frac{13}{4} \div \{\,\frac{5}{4} - \frac{1}{2}(\,\frac{25}{12})\,\}]$

  $[\,\frac{13}{4} \div \{\,\frac{5}{4} - \frac{25}{24}\}]$

  $[\,\frac{13}{4} \div (\,\frac{5}{24})\,]$

  $[\,\frac{13}{4} \times (\frac{24}{5})]$

Ans: $\frac{78}{5}$

3. Simplify $1 \div (\frac{5}{7}$ of $6\frac{3}{10}) - \frac{2}{9}$

Sol. $1 \div (\frac{5}{7} \times \frac{63}{10}) - \frac{2}{9}$

$1 \div \frac{9}{2} - \frac{2}{9}$

$\frac{2}{9} - \frac{2}{9} = 0$

Ans: 0

4. Simplify $\frac{2}{7} - \{(\frac{1}{4} \times \frac{3}{2}) - \frac{5}{6}\}$

Sol. $\frac{2}{7} - \{(\frac{1}{4} \times \frac{3}{2}) - \frac{5}{6}\}$

$\frac{2}{7} - \{\frac{3}{8} - \frac{5}{6}\}$

$\frac{2}{7} - \{-\frac{11}{24}\}$

$\frac{2}{7} + \frac{11}{24}$

Ans: $\frac{125}{168}$

5. Convert $1.\overline{45}$ into $\frac{p}{q}$ form

Sol. $1.\overline{45} = 1\frac{45}{99} = \frac{144}{99}$

Ans: $\frac{16}{11}$

6. Convert $0.\overline{769}$ into $\frac{p}{q}$ form

Sol. $0.\overline{769} = \frac{769}{999}$

Ans: $\frac{769}{999}$

Practice Problems:

1. If $\frac{x}{y} = \frac{4}{5}$ Find the value of $\frac{4}{7} + (\frac{2y-x}{2y+x})$

(a) 0 (b) 1

(c) 2 (d) 3

2. Simplify $\frac{9.6 \times 9.6 \times 9.6 - 5.4 \times 5.4 \times 5.4}{9.6 \times 9.6 + 9.6 \times 5.4 + 5.4 \times 5.4}$

(a) 2.4 (b) 4.2

(c) 3.2 (d) 2.3

3. Convert $0.36\overline{9}$ into $\frac{p}{q}$ form

(a) $\frac{333}{900}$ (b) $\frac{69}{90}$

(c) $\frac{369}{999}$ (d) $\frac{369}{900}$

4. Find $\frac{1}{4}$ of $2\frac{1}{5}$

(a) $\frac{11}{20}$ (b) $\frac{5}{11}$

(c) $\frac{7}{20}$ (d) $\frac{9}{11}$

5. Simplest form of $\frac{92}{115}$ is

(a) $\frac{2}{3}$ (b) $\frac{2}{5}$

(c) $\frac{3}{5}$ (d) $\frac{4}{5}$

Answers:									
1.	(b)	2.	(b)	3.	(a)	4.	(a)	5.	(d)

Solution:

1. Given that $\frac{x}{y} = \frac{4}{5}$

$x = 4$, $y = 5$

$\frac{4}{7} + (\frac{2y-x}{2y+x}) = \frac{4}{7} + (\frac{2\times5-4}{2\times5+4})$

$= \frac{4}{7} + (\frac{10-4}{10+4})$

$= \frac{4}{7} + \frac{6}{14}$

$= \frac{14}{14}$

Ans: 1

2. $\frac{9.6 \times 9.6 \times 9.6 - 5.4 \times 5.4 \times 5.4}{9.6 \times 9.6 + 9.6 \times 5.4 + 5.4 \times 5.4}$, assume a = 9.6, b = 5.4

$= a^3 - b^3$ $(a^3 - b^3 = (a - b)\, a^2 + ab + b^2)$

$a^2 + ab + b^2$

$= (a - b)(a^2 + ab + b^2)$

$(a^2 + ab + b^2)$

$= (a - b) = (9.6 - 5.4)$

Ans: 4.2

3. $0.36\overline{9} = \frac{369-36}{900}$

Ans: $\frac{333}{900}$

4. $\frac{1}{4}$ of $2\frac{1}{5} = \frac{1}{4} \times \frac{11}{5}$

Ans: $= \frac{11}{20}$

5. Simplest form of $\frac{92}{115}$

Both the numbers (92,115) divisible by 23

Ans: $\frac{4}{5}$

Type 3: Decimal numbers:

Multiplication of Decimal numbers The number of decimal digits in the product of two decimal numbers is equal to the sum of the number of decimal digits that are multiplied.

Examples

1. Find the Product

(i) 0.3×0.2 **Ans**: 0.12

(ii) 0.6×0.06 **Ans:** 0.006

Division of Decimal numbers:

Dividing decimal by decimal:

- Change the divisor to a whole number by moving the decimal point to the rightmost place
- Move the decimal point in the dividend to as many places as the decimal point in the divisor is moved
- Place the decimal point in the answer (quotient) directly above the new decimal position in the dividend.
- Divide like a whole number.

Examples:

2. Simplify:

(i) $5.4 \div 0.6$

$54 \div 6 = 9$

Ans: 9

(ii) $0.05 \div 0.5$

Ans: 0.1

Practice Problems: (PYQ)

1. $4.59 \times 1.8 \div 3.6 + 5.4$ of $\frac{1}{9} - \frac{1}{5} = ?$

(a) 3.015 (b) 2.705

(c) 2.695 (d) none of these

2. Find the value of $(4.9)^2$
(a) 24.81 (b) 24.09
(C) 20.01 (d) 24.01

3. $\frac{17.28 \div ?}{3.6 \times 0.2} = 2$
(a) 120 (b) 1.20
(C) 12 (d) 0.12

4. Simplify (1350 ÷ 15 – 5) ÷ (47.5 -15 × 2.5)
(a) 85 (b) 10.5
(c) 10 (d) 8.5

5. Simplify $\frac{1}{10} \times \frac{1}{10}$
(a) 0.01 (b) 0.001
(c) 0.0001 (d) 0.1

6. Simplify 0.8+ {0.6÷ (0.3×0.5)} =?
(a) 8.4 (b) 4.8
(c) 4.4 (d)4.2

Answers:											
1	(c)	2	(d)	3	(c)	4	(d)	5	(a)	6	(b)

Solution:

1. (c): Step 1: 1.8 ÷ 3.6 = 1/2
So, 4.59 × 1/2 = 2.295
Step 2: 5.4 × 1/9 = 0.6
Step 3:1/5 = 0.2
Step 4: 2.295 + 0.6 – 0.2 = 2.695
2.695

2. (d): 4.9 × 4.9 = 24.01
24.01

3. (c): Step 1: 3.6 × 0.2 = 0.72
Step 2: $(17.28 \div ?) \div 0.72 = 2$
17.28÷?=1.44
Step 3: $? = 17.28 \div 1.44 = 12$
12

4. (d): Numerator:
1350 ÷ 15 = 90
90 – 5 = 85
Denominator:
15 × 2.5 = 37.5
47.5 – 37.5 = 10
Final: 85 ÷ 10 = 8.5
8.5

5. (a): $\frac{1}{10} \times \frac{1}{10}$ = 1/100 = 0.01
0.01

6. (b): Step 1: 0.3 × 0.5 = 0.15
Step 2: 0.6 ÷ 0.15 = 4
Step 3: 0.8 + 4 = 4.8
4.8

Type 4: Percentages:

Percentages:
Percentage means a part out of 100.
The word *percent* comes from the Latin "per centum", which means per hundred.

Basic Conversions
- $x\% = \frac{x}{100}$
- 50% = 1/2
- 25% = 1/4
- 20% = 1/5
- 10% = 1/10

Example Problems:

1. What is 25% of 240?
Sol. 25% = 25/100 = 1/4
1/4 × 240 = 60
Ans: 60

2. A number is increased by 20% and then decreased by 20%. Find the net change.
Sol. Let the number = 100
Increase 20% → 120
Decrease 20% of 120 = 24
New value = 120 – 24 = 96
Net change = 100 – 96 = 4% decrease
Ans: 4% decrease

3. If 60% of a number is 180, find the number.
Sol. 60% = 60/100
Number = 180 × (100/60)
Number = 300
Ans: 300

4. What percent of 150 is 45?
Sol. Percentage = (45 / 150) × 100 = 30%
Ans: 30%

5. A student scored 360 out of 450 marks. Find the percentage.
Sol. Percentage = (360 / 450) × 100
(4 / 5) × 100
= 80%
Ans: 80%

6. If 40% of A = 60% of B, then A : B = ?
Sol. 40% of A = 60% of B
$\frac{40}{100}A = \frac{60}{100}B$
$A : B = 60 : 40 = 3 : 2$
Ans: 3 : 2

7. The price of an article is increased by 20%. By what percent must it be decreased to restore the original price?
Sol. Increase factor = 120 Required decrease %
$= \frac{20}{120} \times 100 = 16\frac{2}{3}\%$
Ans: 16⅔%
When a value is increased by x%, the required percentage decrease to return to the original value is:

$$\text{Required decrease \%} = \frac{x}{100+x} \times 100$$

7. The population of a town increases by 10% in the first year and 20% in the second year. Find the total percentage increase.
Sol. Net increase %
$= a + b + \frac{ab}{100} = 10 + 20 + \frac{10 \times 20}{100}$
$= 30 + 2 = 32\%$
Ans: 32

8. Convert the fraction $\frac{23}{30}$ as percent

Sol. $\frac{23}{30} \times 100$

Ans:76.66% or 76⅔%

9. Convert 60% into fraction

Sol. $\frac{60}{100} = \frac{6}{10} = \frac{3}{5}$

Ans: $\frac{3}{5}$

10. There are 560 students in a school. Out of 560 students, 320 are boys. find the percentage of girls in that school?

Sol. First find the number of girls:

Total students = 560

Number of boys = 320

Girls = 560 − 320 = 240

Now find the percentage of girls:

Percentage of girls $= \frac{240}{560} \times 100 = \frac{3}{7} \times 100 \approx 42.86\%$

Percentage of girls in the school = 42.86%

Practice Problems:

1. What is 50% of 90?

(a) 40 (b) 45

(c) 50 (d) 55

2. The price of an article is first increased by 10% and then increased again by 20%. The total increase is:

(a) 30% (b) 32%

(c) 28% (d) 25%

3. 25% of a number is 150. What is 60% of the same number**?**

(a) 300 (b) 360

(c) 400 (d) 450

4. In a school, 40% of the students are girls. If the number of boys is 360, what is the total number of students?

(a) 500 (b) 600

(c) 550 (d) 650

5. If 35% of a number is added to itself, the result is 270. What is the number?

(a) 180 (b) 200

(c) 150 (d) 160

6. A number is increased by 20% and then decreased by 20%. What is the net result?

(a) No change (b) 2% increase

(c) 4% decrease (d) 5% decrease

7. If 35% of a number is 210, what is the number?

(a) 500 (b) 550

(c) 600 (d) 650

8. The population of a town decreases from 50,000 to 45,000. What is the percentage decrease?

(a) 8% (b) 9%

(c) 10% (d) 12%

9. If A scores 45 marks out of 75, what is his percentage?

(a) 55% (b) 60%

(c) 65% (d) 70%

10. In an exam, 75% students passed. If 300 students appeared, how many failed?

(a) 50 (b) 65

(c) 75 (d) 80

Answers									
1. b	2.b	3.b	4.b	5.b	6.c	7.c	8.c	9.b	10.c

Solution:

1. Soln:

50% means half (1/2).

Half of 90 = 45

Ans: B) 45

2. Soln:

Net % change= a + b+ $\frac{100}{ab}$

a =10%, $b = 20\%$

$= 10 + 20 + \frac{10 \times 20}{100} = 30 + 2 = 32\%$

Ans: 32%

3. Soln:

25% (number) = 150

$\frac{1}{4}$(number) = 150

Number = 600

60% of 600 = 360

Ans: 360

4. Soln:

Let the total number of students = x.

- Girls = 40% of x
- Boys = 60% of x(since $100\% - 40\% = 60\%$)

Given:

60% of x = 360

0.6x = 360

x = 360/0.6 = 600

Ans: Total number of students = 600

5. Soln:

Let the number be x.

35% of the number = $0.35x$

Given: $x + 0.35x = 270$

$1.35x = 270$

$= \frac{270}{1.35} = 200$

Ans: The number is 200

6. Soln:

Here:

- $x = 20$
- $y = 20$
- Net % change $= 20 - 20 - \frac{20 \times 20}{100} = 0 - 4 = -4\%$

Ans: The number undergoes a 4% decrease overall.

7. Soln:

Let the number be x.

Given: 35% of $x = 210$

$0.35x = 210$

$x = \frac{210}{0.35} = 600$

Ans: The number is 600

8. Soln:

Original population = **50,000** New population = **45,000**

Decrease = $50{,}000 - 45{,}000 = 5{,}000$

Percentage Decrease Formula

Percentage Decrease $= \frac{\text{Decrease}}{\text{Original Value}} \times 100$

$\frac{5{,}000}{50{,}000} \times 100 = 10\%$

Ans: **Percentage decrease = 10%**

9. Soln:

Percentage formula:

Percentage $= \frac{\text{Marks obtained}}{\text{Total marks}} \times 100$

$\frac{45}{75} \times 100 = \frac{3}{5} \times 100 = 60\%$

Ans: A's percentage = 60%

10. Soln:

Total students = **300**

Passed = **75% of 300**

$0.75 \times 300 = 225$

Failed students:

$300 - 225 = 75$

Ans: Number of students who failed = 75

Type 5: Exponents & Indices:

Exponents & Indices:

When a number is written as repeated multiplication of the same number, we use exponents (indices).

Example

$4 \times 4 \times 4 = 4^3$

- $4 \rightarrow$ base
- $3 \rightarrow$ exponent / index

Laws of Exponents

1. Product Rule: $a^m \times a^n = a^{m+n}$ Eg: $2^3 \times 2^4 = 2^7$

2. Quotient Rule: $\frac{a^m}{a^n} = a^{m-n}(a \neq 0)$

Eg: $\frac{5^6}{5^2} = 5^4$

3. Power of a Power: $(a^m)^n = a^{mn}$ Eg: $(3^2)^4 = 3^8$

4. Power of a Product: $(ab)^n = a^n b^n$

Eg: $(2 \times 5)^3 = 2^3 \times 5^3$

5. Power of a Quotient: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

6. Zero Exponent: $a^0 = 1(a \neq 0)$

7. Negative Exponent: $a^{-n} = \frac{1}{a^n}$

8. Fractional Exponent: $a^{\frac{m}{n}} = \sqrt[n]{a^m}$ eg: $27^{\frac{2}{3}} = (\sqrt[3]{27})^2 = 9$

Example Problems

1. Evaluate : $(256)^{0.16} \times (16)^{0.18}$

Soln:

Rewrite everything as powers of 2:

- $256 = 2^8$
- $16 = 2^4$
- $(2^8)^{0.16} = 2^{8 \times 0.16} = 2^{1.28}$
- $(2^4)^{0.18} = 2^{4 \times 0.18} = 2^{0.72}$
- $2^{1.28} \times 2^{0.72} = 2^{(1.28+0.72)} = 2^2$

***Ans*: 4**

2. $\frac{2^7 \times 4^3}{8^2} = ?$

Soln: Write everything with base 2

- $4 = 2^2 \Rightarrow 4^3 = (2^2)^3 = 2^6$
- $8 = 2^3 \Rightarrow 8^2 = (2^3)^2 = 2^6$
- $2^7 \times 2^6 \div 2^6$

Multiplication: add powers :

$2^{7+6} = 2^{13}$

Division: subtract powers :

$2^{13-6} = 2^7$

Ans: 2^7 *or* 128

3. Find: $(5^{-2})^3 \times 5^4$

Soln:

$5^{-6} \times 5^4 = 5^{-2}$

$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

Ans: $\frac{1}{25}$

4. Simplify $16^{\frac{3}{4}}$

Soln:

$16 = 2^4$

$\left(2^4\right)^{\frac{3}{4}} = 2^3$

Ans: **8**

5. Find x $\frac{5^{x+1}}{5^{x-2}} = 125$

Soln:

$5^{x+1-(x-2)} = 5^3$

$5^3 = 125$

Ans: $x = 0$

6. Evaluate $\frac{4^{n+1} - 4^{n-1}}{4^{n-1}}$

Soln:

Take 4^{n-1} common.

$= \frac{4^{n-1}(4^2-1)}{4^{n-1}}$

$= 16 - 1$

Ans: 15

7. Find the value of $\left(\frac{-1}{216}\right)^{-\frac{2}{3}}$

Soln:

$\left(\frac{-1}{6^3}\right)^{-\frac{2}{3}}$

Negative power means reciprocal: $= (-6^3)^{\frac{2}{3}}$

Apply power rule:

$\left(6^3\right)^{\frac{2}{3}} = 6^2$

Ans: 36

Practice Problems:

1. Simplify $(4^{n+1} - 4^n) \div 4^n$

(a) 1 (b) 2

(C) 3 (d) 4

2. Evaluate $(5^0 + 2^3)$

(a) 8 (b) 9

(C) 10 (d) 11

3. If $3^{x+1} = 9^{x-1}$ find x.
(a) 1 (b) 2
(C) 3 (d) 4

4. Find the value of $\left(\frac{1}{(27)^{-\frac{2}{3}}}\right)$
(a) 3 (b) 6
(C) 9 (d) 27

5. If $3^{x+2} = 27$ find x.
(a) 0 (b) 1
(C) 2 (d) 3

Answers									
1	c	2	b	3	C	4	C	5	b

Solution:

1. Soln: Given $(4^{n+1} - 4^n) \div 4^n$
Take n as common
$$\frac{4^n(4-1)}{4^n} = 4 - 1$$
Ans: = 3

2. Soln:
5^0 =1(any non-zero number to power 0 is 1)
$2^3 = 8$
1+8=9
Ans: 9

3. Soln:
Given $3^{x+1} = 9^{x-1}$
$3^{x+1} = 3^{2(x-1)}$
As bases are same , take powers alone
X+1 = 2(x – 1)
2x -x = 1+2
X = 3
Ans: 3

4. **Soln:**
Rewrite $\frac{1}{27}$as a power of 3: $\frac{1}{27} = 3^{-3}$ Now raise it to $-\frac{2}{3}$,
Ans: 9

5. **Soln:**
Given: $3^{x+2} = 27$
$3^{x+2} = 3^3$
Bases are same, so equal the power
X+2 = 3
X = 1
Ans: 1

Type 6: Surds:

A surd is an irrational number that is written in the form of a root (√, ∛, etc.) and cannot be simplified into a rational number.
Examples: √2, √3, ∛5 Not surds: √4 = 2, √9 = 3

Example Problems

1. Simplify √72 + √32
Soln: √72 = √ (36 × 2) = 6√2 √32 = √ (16 × 2) = 4√2
Now add like surds: 6√2 + 4√2 = 10√2
Ans: 10√2

2. Find the value of:$(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})$
Soln:
Use the identity $(a + b)(a - b) = a^2 - b^2$
Here,$a = \sqrt{5}, b = \sqrt{3}$
$(\sqrt{5})^2 - (\sqrt{3})^2 = 5 - 3 = 2$
Ans: 2

3. Rationalize the denominator: $\frac{3}{\sqrt{7}}$

Soln: Multiply numerator and denominator by √7: $\frac{3}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$
Ans: $\frac{3\sqrt{7}}{7}$

4. Simplify: $\sqrt{18} \times \sqrt{2}$
Ans: $\sqrt{36} = 6$

5. Find the value: $\frac{\sqrt{3}}{\sqrt{5}} + \frac{\sqrt{5}}{\sqrt{3}}$
Soln:
Take LCM of denominators √5 and √3 = √15
$\frac{\sqrt{3}}{\sqrt{5}} = \frac{3}{\sqrt{15}}, \frac{\sqrt{5}}{\sqrt{3}} = \frac{5}{\sqrt{15}}$ Add the fractions:
$\frac{3}{\sqrt{15}} + \frac{5}{\sqrt{15}} = \frac{8}{\sqrt{15}}$
Ans: $\frac{8}{\sqrt{15}}$

6. Find the value of: $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} + \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}$
Soln:
Use identity: $\frac{a+b}{a-b} + \frac{a-b}{a+b} = \frac{2(a^2+b^2)}{a^2-b^2}$ Here, $a = \sqrt{7}, b = \sqrt{5}$
$\frac{2(7+5)}{7-5} = \frac{24}{2} = 12$

7. Find the value of:$(\sqrt{2}+\sqrt{3})^2$
Soln:
$(a + b)^2 = a^2 + b^2 + 2ab$
$= 2 + 3 + 2\sqrt{6}$
$= 5 + 2\sqrt{6}$
Ans: $5 + 2\sqrt{6}$

8. Find the value of:
$\sqrt{7}(\sqrt{7} + \sqrt{5}) - \sqrt{5}(\sqrt{7} - \sqrt{5})$
Soln:
$(7 + \sqrt{35}) - (\sqrt{35} - 5)$
$7 + \sqrt{35} - \sqrt{35} + 5 = 12$
Ans: 12

Practice Problems:

1. Which of the following is a surd?
(a) √16 (b) √25
(c) √7 (d) 9

2. Rationalize the denominator $\frac{1}{\sqrt{3}}$
(a) $\frac{1}{3}$ (b) $\frac{\sqrt{3}}{3}$
(c) $\frac{\sqrt{3}}{2}$ (d) $\sqrt{3}$

3. Simplify $\sqrt{18} + \sqrt{50}$
(a) $8\sqrt{2}$ (b) $13\sqrt{2}$
(c) $4\sqrt{2}$ (d) $7\sqrt{2}$

4. Simplify $(\sqrt{2}+5)(\sqrt{2}-5)$
(a) −23 (b) −21
(c) 23 (d) 21

5. Find the value of $(\sqrt{11}+\sqrt{5})(\sqrt{11}-\sqrt{5})$
(a) 6 (b) 16
(c) 121 (d) 55

Answers									
1	c	2	B	3	a	4	A	5	b

Solution:

1. **Soln:**
A surd is an irrational number that is written in the form of a root (√, ∛, etc.) and cannot be simplified into a rational number.
So, Ans: $\sqrt{7}$

2. **Soln:**
Multiply numerator and denominator by √3:
$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
Ans: $\frac{\sqrt{3}}{3}$

3. **Soln:**
$\sqrt{18} = \sqrt{(9 \times 2)} = 3\sqrt{2}$ $\sqrt{50} = \sqrt{(25 \times 2)} = 5\sqrt{2}$
$3\sqrt{2} + 5\sqrt{2} = 8\sqrt{2}$
Ans: $8\sqrt{2}$

4. **Soln:**
Using $(a+b)(a-b) = a^2 - b^2$
$= (\sqrt{2})^2 - 5^2$ $= 2 - 25 = -23$
Ans: −23

5. **Soln:**
Using $(a+b)(a-b) = a^2 - b^2$
$= (\sqrt{11})^2 - (\sqrt{5})^2$ $= 11 - 5 = 6$
Ans: 6

Type 7: Basic Algebraic Identities

IMPORTANT ALGEBRA FORMULAS

1) $(a+b)^2 = a^2 + 2ab + b^2$
2) $(a-b)^2 = a^2 - 2ab + b^2$
3) $a^2 - b^2 = (a-b)(a+b)$
4) $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
5) $(a-b)^3 = a^3 - b^3 - 3ab\,a - b)$
6) $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
7) $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$
8) $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
9) $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$
If $a+b+c = 0$, then $a^3 + b^3 + c^3 = 3abc$
10) $(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$
11) $(a+b)^2 - (a-b)^2 = 4ab$

Example Problems

1. Find the value using identity: $(98)^2 - (2)^2$
Soln:
$a^2 - b^2 = (a-b)(a+b)$
$(98)^2 - (2)^2 = (98+2)(98-2)$
$= 100 \times 96$
Ans: 9600

2. Simplify: $(x+7)(x-7)$
Soln:
$a^2 - b^2 = (a-b)(a+b)$
$(x+7)(x-7) = x^2 - 49$
Ans: $x^2 - 49$

3. If $x + \frac{1}{x} = 5$, find $x^2 + \frac{1}{x^2}$
Soln:
Given: $x + \frac{1}{x} = 5$
Square both sides
$\left(x + \frac{1}{x}\right)^2 = 5^2$
Use identity $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2x^2 + \frac{1}{x^2} + 2 = 25$
$x^2 + \frac{1}{x^2} = 23$
Ans: 23

> Note: Shortcut method If $x + \frac{1}{x} = n$, find $x^2 + \frac{1}{x^2}$
> Answer for $x^2 + \frac{1}{x^2}$ will be $n^2 - 2$

4. If $x - \frac{1}{x} = 7$ Find $x^2 + \frac{1}{x^2}$
Soln:
Given: $x - \frac{1}{x} = 7$
Square both sides
$(x - \frac{1}{x})^2 = 7^2$
Use identity $(x - \frac{1}{x})^2 = x^2 + \frac{1}{x^2} - 2x^2 + \frac{1}{x^2} - 2 = 49$
$x^2 + \frac{1}{x^2} = 51$
Ans: 51

> Note: Shortcut method If $x - \frac{1}{x} = n$, find $x^2 + \frac{1}{x^2}$
> Answer for $x^2 + \frac{1}{x^2}$ will be $n^2 + 2$

5. If $x + \frac{1}{x} = 4$, find $x^3 + \frac{1}{x^3}$.
Soln:
use the identity $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
$\left(x + \frac{1}{x}\right)^3 = x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right)$
Substitute the given value:
$4^3 = x^3 + \frac{1}{x^3} + 3 \times 4$
$64 = x^3 + \frac{1}{x^3} + 12$
$x^3 + \frac{1}{x^3} = 52$
Ans: 52

6. If $a + b = 7$ and $a^2 + b^2 = 29$, find ab.
Soln:
Use identity: $a^2 + b^2 = (a+b)^2 - 2ab$
Substitute values:
$29 = 49 - 2ab$
$2ab = 20$
$ab = 10$
Ans: 10

7. If $x^2 + \frac{1}{x^2} = 6$, find $x^4 + \frac{1}{x^4}$.

Soln:

Square the given expression: $\left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \frac{1}{x^4} + 2$

$36 = x^4 + \frac{1}{x^4} + 2$

$x^4 + \frac{1}{x^4} = 34$

8. Simplify $\frac{a^3}{a-b} + \frac{b^3}{b-a}$ (PYQ)

Soln:

Change the denominator $\frac{b^3}{b-a} = -\frac{b^3}{a-b}$

So, $\frac{a^3}{a-b} + \frac{b^3}{b-a} = \frac{a^3}{a-b} - \frac{b^3}{a-b}$

Take common denominator

$= \frac{a^3-b^3}{a-b}$

: Use identity $a^3 - b^3 = (a-b)(a^2+ab+b^2)$

$= \frac{(a-b)(a^2+ab+b^2)}{a-b}$ Ans: (a^2+ ab + b^2)

Example Problems

1. Simplify $\frac{a^2+2ab+b^2}{a+b}$

(a) $a - b$ (b) $a + b$

(c) ab (d) $a^2 + b^2$

2. Simplify $\frac{x^3-y^3}{x-y}$

(a) $x^2 - y^2$ (b) $x^2 + xy + y^2$

(c) $x^2 - xy + y^2$ (d) $x + y$

3. Simplify $\frac{m^4-n^4}{m-n}$

(a) $(m + n)(m^2 + n^2)$ (b) $(m - n)(m^2 + n^2)$

(c) $m^3 + n^3$ (d) $m^4 - n^4$

4. Simplify $\frac{p^3}{p-q} + \frac{q^3}{q-p}$

(a) $p^2 - pq + q^2$ (b) $p^2 + pq + q^2$

(c) $p^3 - q^3$ (d) $p - q$

5. If $a + \frac{1}{a} = 6$ Find $a^2 + \frac{1}{a^2}$

(a) 32 (b) 34

(c) 36 (d) 38

6. If $y - \frac{1}{y} = 3$ Find $y^2 + \frac{1}{y^2}$

(a) 9 (b) 13

(c) 11 (d) 15

7. If $x - \frac{1}{x} = 2$ Find $x^2 - \frac{1}{x^2}$

(a) 2 (b) $4\sqrt{2}$

(c) 6 (d) 8

8. Find $\frac{(9.8)^3 - (6.8)^3}{(9.8)^2 + 9.8 \times 6.8 + (6.8)^2}$

(a) 3 (b) 2

(c) 16.6 (d) 9.8 + 6.8

9. *If* $\frac{(x^2-1)}{(x+1)} = 4$ Find x

(a) 1 (b) 2

(c) 3 (d) 5

10. Simplify : $\frac{x^2}{x^4-y^4} - \frac{y^2}{x^4-y^4}$

(a) x^2+y^2 (b) 1

(c) $\frac{1}{x^2+y^2}$ (d) 0

Answers									
1 b	2b	3a	4b	5b	6c	7b	8a	9d	10c

Solution:

1. Soln:

Given $\frac{a^2+2ab+b^2}{a+b}$

$= \frac{(a+b)^2}{a+b}$ $(a+b)^2 = a^2+2ab+b^2$

Ans: a+b

2. Soln:

Given $\frac{x^3-y^3}{x-y}$

$= \frac{(x-y)(x^2+xy+y^2)}{(x-y)}$

$= x^2 + xy + y^2$

3. Soln:

Given $\frac{m^4-n^4}{m-n}$

$\frac{(m^2+n^2)(m^2-n^2)}{(m-n)}$

$= \frac{(m^2+n^2)(m+n)(m-n)}{(m-n)}$

Ans: = $(m^2 + n^2)$ (m + n)

4. Soln:

Given $\frac{p^3}{p-q} + \frac{q^3}{q-p}$

$\frac{p^3}{(p-q)} - \frac{q^3}{(p-q)}$

$= \frac{(p^3+q^3)}{(p-q)}$

$= \frac{p-q(p^2-pq+q^2)}{(p-q)}$

Ans: = $(p^2 - pq + q^2)$

5. Soln:

Given: $a + \frac{1}{a} = 6$ Find $a^2 + \frac{1}{a^2}$

Squaring both sides:

$(a + 1/a)^2 = 6^2$

$a^2 + 2 + 1/a^2 = 36$

$a^2 + 1/a^2 = 36 - 2$

$a^2 + \frac{1}{a^2} = 34$

6. Soln:

Given $y - \frac{1}{y} = 3$ Find $y^2 + \frac{1}{y^2}$

Squaring both sides:

$(y - 1/y)^2 = 3^2$

$y^2 - 2 + 1/y^2 = 9$

$y^2 + 1/y^2 = 9 + 2$

$y^2 + \frac{1}{y^2} = 11$

7. Soln:

Given: $x - \frac{1}{x} = 2$ Find $x^2 - \frac{1}{x^2}$

We know $(x + 1/x)^2 = (x - 1/x)^2 + 4$ [$(a + b)^2 - (a - b)^2 = 4ab$]

So, $(x + 1/x)^2 = 2^2 + 4 = 8$

$x + 1/x = \pm 2\sqrt{2}$

Now, $x^2 - 1/x^2 = (x + 1/x)(x - 1/x)$

$= (\pm 2\sqrt{2})(2)$

$= \pm 4\sqrt{2}$

8. Soln:

Given:

Using $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$:

$= \frac{(9.8 - 6.8)\,[(9.8)^2 + 9.8\times6.8 + (6.8)^2]}{[(9.8)^2 + 9.8\times6.8 + (6.8)^2]}$

$= 9.8 - 6.8$

Ans: 3

9. Soln:

Given: $\frac{(x^2 - 1)}{(x+1)} = 4$

$x^2 - 1 = 4x + 4$

$x^2 - 4x - 5 = 0$

$(x - 5)(x + 1) = 0$

$x = 5$ or $x = -1$

10. Soln:

Given: $\frac{x^2}{x^4-y^4} - \frac{y^2}{x^4-y^4}$

$= \frac{(x^2 - y^2)}{(x^4 - y^4)}$

$= \frac{(x^2 - y^2)}{(x^2 + y^2)(x^2 - y^2)}$

$= \frac{1}{(x^2 + y^2)}$

Type 8: Number Series

A Number Series is a sequence of numbers arranged in a specific order by following a fixed rule or pattern.

Example Problems

1. Find the missing number
   2, 5, 8, 11, ?

Soln: Difference = +3 11 + 3 = 14

Ans: 14

2. 3, 6, 12, 24, ?

Soln: Each term × 2 24 × 2 = 48

Ans: 48

3. 1, 4, 9, 16, ?

Soln: $1^2, 2^2, 3^2, 4^2$ Next = $5^2 = 25$

Ans: 25

4. 5, 10, 8, 16, 14, ?

Soln: ×2, −2 pattern 14 × 2 = 28

Ans: 28

5. 2, 6, 3, 9, 4, ?

Soln: Odd terms: 2, 3, 4

Even terms: 6, 9, ? (+3) ? = 12

Ans: 12

Practice Problems:

1. 2, 6, 12, 20, ?
(a) 24 (b) 28
(c) 30 (d) 32

2. 4, 7, 13, 22, 34, ?
(a) 46 (b) 48
(c) 49 (d) 52

3. 2, 3, 5, 9, 17, ?
(a) 25 (b) 33
(c) 31 (d) 35

4. 3, 5, 11, 21, 43, ?
(a) 63 (b) 65
(c) 87 (d) 85

5. 10, 12, 16, 24, 40, ?
(a) 56 (b) 64
(c) 68 (d) 72

Answers									
1	c	2	c	3	b	4	d	5	d

Solution:

1. Soln:

Observe the pattern:

1 × 2 = 2 2 × 3 = 6

3 × 4 = 12 4 × 5 = 20

So the next term is: 5 × 6 = 30

2. Soln:

Find the differences between consecutive terms:

7 − 4 = 3 13 − 7 = 6

22 − 13 = 9 34 − 22 = 12

Differences are increasing by +3 each time.

Next difference = 15

34 + 15 = 49

3. Soln:

Find the differences:

3 − 2 = 1 5 − 3 = 2

9 − 5 = 4 17 − 9 = 8

The differences are doubling: 1, 2, 4, 8

Next difference = 16

So, 17 + 16 = 33

Ans: 33

4. Soln:

Observe the pattern:

3 × 2 − 1 = 5 5 × 2 + 1 = 11

11 × 2 − 1 = 21 21 × 2 + 1 = 43

The pattern alternates ×2 − 1, ×2 + 1

Next term: 43 × 2 − 1 = 85

Ans: 85

5. Soln:

Find the differences between consecutive terms:

12 − 10 = 2 16 − 12 = 4 24 − 16 = 8 40 − 24 = 16

The differences are doubling: 2, 4, 8, 16

Next difference = 32

So, 40 + 32 = 72

Ans: 72

04 Algebra

Multiplication of Algebraic Expressions

While multiplying algebraic expressions, follow these steps:

Step 1: Multiply the Signs

First multiply the signs of the terms.

- Like signs give positive (+)
  (+) × (+) = +
  (−) × (−) = +
- Unlike signs give negative (−)
  (+) × (−) = −
  (−) × (+) = −

Step 2: Multiply the Coefficients

Multiply the numerical coefficients (numbers) of the terms.

Example: $3x \times 4x = 12x^2$

Here, $3 \times 4 = 12$

Step 3: Multiply the Variable Factors

Multiply the variables using the laws of exponents.

If x is a variable and $m, n$are positive integers:

$x^m \times x^n = x^{m+n}$

Example

$x^3 \times x^4 = x^{3+4} = x^7$

Here, the exponents are added when the bases are the same.

Another Example

$5x^2 \times 3x^3$

Multiply coefficients: $5 \times 3 = 15$

Add exponents: $x^{2+3} = x^5$

Ans: $15x^5$

Polynomial and Algebraic Expression

A polynomial is a special type of algebraic expression.

The main difference between an algebraic expression and a polynomial is the power (exponent) of the variables.

Algebraic Expression	Polynomial
May contain whole numbers, fractions, or negative numbers as the powers of variables.	Contains only whole numbers as the powers of variables.
Exponents can be fractional or negative.	Exponents must be non-negative whole numbers (0, 1, 2, 3, ...).
Example: $4x^{3/2} - 3x + 9\frac{2y^2}{y} + 5 - 33x^{-2} - 4x + 1$	**Example**: $4x^2 - 3x + 92y^6 + 5y^3 - 3$

Key Point

- All polynomials are algebraic expressions.
- But not all algebraic expressions are polynomials.

Division of Algebraic Expressions

Division of algebraic expressions means dividing one algebraic term or expression by another. While dividing, we divide the coefficients and apply the laws of exponents to the variables.

Rule for Division of Powers

If $x$is a variable and $m, n$are positive integers:

$x^m \div x^n = x^{m-n}$

This means when the same bases are divided, their exponents are subtracted.

Steps for Division

Step 1: Divide the numerical coefficients.

Step 2: Divide the variable parts using exponent rules.

Step 3: Write the simplified result.

Example Problems

1. $12x^5 \div 3x^2$

Divide coefficients: $12 \div 3 = 4$

Subtract exponents: $x^{5-2} = x^3$

Ans: $4x^3$2. $20a^6b^4 \div 5a^2b$ Coefficients: $20 \div 5 = 4$

$a^{6-2} = a^4$

$b^{4-1} = b^3$

Ans: $4a^4b^3$3. $18x^7y^3 \div 6x^4y$ Coefficients: $18 \div 6 = 3$

$x^{7-4} = x^3$

$y^{3-1} = y^2$

Ans: $3x^3y^2$

Identities

An identity is an equation that is satisfied for all values of the variable(s).

Now, let us recollect four well-known identities:

1. Square of a sum
$(a + b)^2 = a^2 + 2ab + b^2$

2. Square of a difference
$(a - b)^2 = a^2 - 2ab + b^2$

3. Difference of two squares
$a^2 - b^2 = (a + b)(a - b)$

4. Product of two binomials
$(x + a)(x + b) = x^2 + (a + b)x + ab$

Example Problems

1. Find the area of the square whose side is $(x-2)$units.

Formula:

Area of a square = (side)^2

Area $= (x - 2)^2$ Using the identity

$(a - b)^2 = a^2 - 2ab + b^2$

Let $a = x$ and $b = 2$

$(x - 2)^2 = x^2 - 2(x)(2) + 2^2 = x^2 - 4x + 4$

Area of the square = $x^2 - 4x + 4$ square units

2. Find the area of the rectangle whose length and breadth are $(y+4)$units and $(y-3)$units.
Formula: Area of a rectangle = length × breadth
Area $= (y+4)(y-3)$
$(y+4)(y-3) = y(y-3)+4(y-3)$
$= y^2-3y+4y-12$
$= y^2+y-12$
Area of the rectangle = y^2+y-12 square units

Important Algebraic Identities

1. Cube of a Sum
$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$

2. Cube of a Difference
$(a-b)^3 = a^3-3a^2b+3ab^2-b^3$

3. Product of Three Binomials
$(x+a)(x+b)(x+c) = x^3+(a+b+c)x^2+(ab+bc+ca)x+abc$

4. Sum of Cubes
$a^3+b^3 = (a+b)(a^2-ab+b^2)$

5. Difference of Cubes
$a^3-b^3 = (a-b)(a^2+ab+b^2)$

Factorisation in Algebra

Factorisation means expressing an algebraic expression as a product of two or more factors.

In simple words, it is the reverse process of multiplication or expansion.

Example:
$x^2+7x+10$
Find two numbers whose sum = 7 and product = 10
Numbers: 5 and 2
$x^2+7x+10 = (x+5)(x+2)$

Example problems

1. If 7 is added to a given number to give 19. Find the number

Soln:
Let the number be n.
When 7 is added to this number: $n+7$
The result is 19.
Therefore, the equation is $n+7=19$

2. The sum of 4 times a number and 18 is 28.

Soln:
Let the number be x.
4 times the number: $4x$
Adding 18:
$4x+18$
The result is 28.
Therefore, the equation is $4x+18=28$
x = 10/4 x = 2.5

Practice Problems:

1. If $x+\frac{1}{x}=5$ find the value of $x^2+\frac{1}{x^2}$
(a) 21 (b) 23
(c) 25 (d) 27

2. If $2x+3=15$ find the value of x^2-4x+5
(a) 10 (b) 12
(c) 14 (d) 17

3. If $a+b=10$ and $ab=21$ find the value of a^2+b^2
(a) 58 (b) 52
(c) 60 (d) 64

4. Find the value of $(x+3)^2-(x-3)^2$
(a) $6x$ (b) $12x$
(c) $9x$ (d) $18x$

5. If $x-\frac{1}{x}=3$ find the value of $x^2+\frac{1}{x^2}$
(a) 7 (b) 9
(c) 11 (d) 13

6. If $(x+y)^2=49$ and $xy=10$ find the value of x^2+y^2
(a) 27 (b) 29
(c) 31 (d) 33

7. If $a-b=6$ and $ab=8$ find the value of a^2+b^2
(a) 40 (b) 44
(c) 52 (d) 60

8. Find the value of $(2x+3)^2-(2x-3)^2$
(a) $12x$ (b) $48x$
(c) $36x$ (d) $24x$

Answers	
1. b	5. c
2. d	6. b
3. a	7. c
4. b	8. d

Solution:

1. Step 1: Square both sides
$\left(x+\frac{1}{x}\right)^2 = 5^2$
Step 2: Use identity
$\left(x+\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}+2$
So, $x^2+\frac{1}{x^2}+2=25$
Step 3: Find the value
$x^2+\frac{1}{x^2}=25-2$
$x^2+\frac{1}{x^2}=23$
Ans: 23

2. Given: $2x+3=15$
Step 1: Find x
$2x=15-32x=12x=6$
Step 2: Substitute $x=6$in the expression
$x^2-4x+5=6^2-4(6)+5=36-24+5=17$
Ans: 17

3. Given:
$a+b=10ab=21$
We need to find: a^2+b^2
Step 1: Use the identity
$(a+b)^2=a^2+b^2+2ab$
Step 2: Substitute the values
$10^2=a^2+b^2+2(21)100=a^2+b^2+42$
Step 3: Find a^2+b^2
$a^2+b^2=100-42a^2+b^2=58$
Ans: 58

4. **Step 1:** Expand both squares
$(x+3)^2 = x^2 + 6x + 9 (x-3)^2 = x^2 - 6x + 9$
Step 2: Subtract
$(x^2 + 6x + 9) - (x^2 - 6x + 9) = x^2 + 6x + 9 - x^2 + 6x - 9 = 12x$
Ans: $\boxed{\mathbf{12x}}$

5. **Step 1:** Square both sides
$\left(x - \frac{1}{x}\right)^2 = 3^2$
Step 2: Use the identity
$\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2$ So,
$x^2 + \frac{1}{x^2} - 2 = 9$
Step 3: Find the value
$x^2 + \frac{1}{x^2} = 9 + 2x^2 + \frac{1}{x^2} = 11$
Ans: 11

6. Step 1: Use the identity
$(x+y)^2 = x^2 + y^2 + 2xy$
Step 2: Substitute the values
$49 = x^2 + y^2 + 2(10) 49 = x^2 + y^2 + 20$
Step 3: Find $x^2 + y^2$
$x^2 + y^2 = 49 - 20 x^2 + y^2 = 29$
Ans: 29

7. Step 1: Use the identity
$(a-b)^2 = a^2 + b^2 - 2ab$
Step 2: Substitute the values
$6^2 = a^2 + b^2 - 2(8) 36 = a^2 + b^2 - 16$
Step 3: Find $a^2 + b^2$
$a^2 + b^2 = 36 + 16 a^2 + b^2 = 52$
Ans: 52

8. Step 1: Use the identity
$(a+b)^2 - (a-b)^2 = 4ab$
Here, $a = 2x$ and $b = 3$
Step 2: Substitute
$4ab = 4(2x)(3) = 24x$
Ans: $\boxed{\mathbf{24x}}$

07 Average

Average is a single value that represents the typical or central value of a group of numbers. It shows the overall value of the data.

Formulas

When One Value is Added:

$$\text{New Average} = \frac{\text{Old Sum} + \text{New Value}}{n+1}$$

When One Value is Removed:

$$\text{New Average} = \frac{\text{Old Sum} - \text{Removed Value}}{n-1}$$

Change in Average:

Change in Sum = Change in Average × Number of items

Average Speed:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

Numbers	Average
First n natural numbers	(n+1)/2
First n even numbers	n+1
First n odd numbers	N

EXAMPLE PROBLEMS:

1. The average marks of 10 students is 80. What is the total marks?

Soln:

Total = Average × Number
= 80 × 10 = 800.

2. The average of 7 consecutive numbers is 20. Find the largest number.

Soln:

For consecutive numbers, the average is the middle number.
Since there are 7 numbers, the 4th number is the middle number.
So the numbers are: 20 − 3, 20 − 2, 20 − 1, 20, 20 + 1, 20 + 2, 20 + 3
= 17, 18, 19, 20, 21, 22, 23
Largest number: 23
Ans: 23

3. The average of 5 numbers is 18. Four numbers are 15, 20, 25, and 10. Find the fifth number.

Soln:

Total = 18 × 5 = 90
Sum of given numbers = 15 + 20 + 25 + 10 = 70
Fifth number = 90 − 70 = 20
Ans: 20

4. The average age of 10 students is 15 years. When a teacher joins, the average becomes 16 years. Find the teacher's age.

Soln:

- Old Sum = Old Average × n
- New Value = value added (teacher's age)
- n = original number of items

$$\text{New Average} = \frac{\text{Old Sum} + \text{New Value}}{n+1}$$

Old average = 15
n = 10
Old Sum: $15 \times 10 = 150$
Let teacher's age = x

$$16 = \frac{150+x}{11}$$

$$16 \times 11 = 150 + x$$

$$176 = 150 + x$$

$$x = 26$$

Ans: Teacher's age = 26 years

5. A train travels 1 km at 120 km/hr and the next 1 km at 40 km/hr. Find the average speed.

Soln:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

Step 1: Total Distance
1 + 1 = 2 km
Step 2: Time for each distance
Time = Distance ÷ Speed
First 1 km: $\frac{1}{120}$ hr
Next 1 km: $\frac{1}{40}$ hr
Step 3: Total Time

$$\frac{1}{120} + \frac{1}{40}$$

$$\frac{1}{120} + \frac{3}{120} = \frac{4}{120} = \frac{1}{30} \text{ hr}$$

Step 4: Average Speed

$$\text{Average Speed} = \frac{2}{1/30}$$

$$= 2 \times 30$$

$$= 60 \text{ km/hr}$$

Ans: Average speed = 60 km/hr

6. The average of 8 numbers is 25. If each number is multiplied by 2, what will be the new average?

Soln:

Concept: If every number is multiplied by a constant, the average is also multiplied by the same constant.
New Average = Old Average × Multiplier
Step 1: Given
Old average = 25
Multiplier = 2
Step 2: Calculate new average
New Average = 25 × 2
= 50

Ans: New average = 50

7. The average of 5 numbers is 30. If each number is increased by 5, find the new average.

Soln:

Concept: If the same number is added to every value, the average also increases by that number.
New Average = Old Average + Increase

Step 1: Given
Old average = 30
Increase in each number = 5

Step 2: Find new average
New Average = 30 + 5
= 35

Ans: New average = 35

8. The average of the first 9 natural numbers is?

Soln:

Natural numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9
Average of first n natural numbers = $\frac{n+1}{2}$
Here n = 9
Average = $\frac{9+1}{2}$
= $\frac{10}{2}$ = 5

9. The average of 5 consecutive odd numbers is 19. Find the largest number.

Soln:

Step 1: Property of Consecutive Numbers
For odd number of consecutive numbers, the average is the middle number.
Since there are 5 numbers, the 3rd number is the middle number.
Middle number = 19

Step 2: Write the numbers
Consecutive odd numbers differ by 2.
So the numbers are: 19 – 4, 19 – 2, 19, 19 + 2, 19 + 4 = 15, 17, 19, 21, 23

Step 3: Largest number
Largest = 23

Ans: 23

10. The average of 5 numbers is 18. If one number 20 is replaced by 30, find the new average.

Soln:

Step 1: Find the total of 5 numbers
Total = Average × Number of values
= 18 × 5 = 90
Step 2: Adjust the total
One number 20 is replaced by 30.
Increase in total: 30 − 20 = 10
New total: 90 + 10 = 100

Step 3: Find the new average
New Average = $\frac{100}{5}$ = 20

Ans: New average = 20

Practice Problems:

1. The average of 10 numbers is 35. If each number is increased by 4, find the new average.
(a) 37 (b) 38
(c) 39 (d) 40

2. The average marks of 12 students is 60. If the marks of one student (48) are excluded, find the new average.
(a) 60 (b) 61
(c) 62 (d) 63

3. The average of 8 numbers is 25. If two numbers 20 and 30 are replaced by 40 and 50, find the new average.
(a) 28 (b) 35
(c) 32 (d) 30

4. The average of first n natural numbers is 20. Find n.
(a) 39 (b) 38
(c) 40 (d) 41

5. The average of 10 numbers is 16. The average of the first 6 numbers is 12. Find the average of the remaining 4 numbers.
(a) 20 (b) 21
(c) 22 (d) 24

6. The average of 7 numbers is 24. If the average of the first 4 numbers is 21, find the average of the last 3 numbers.
(a) 28 (b) 29
(c) 30 (d) 32

7. The average speed of a car travelling 60 km at 30 km/hr and 60 km at 60 km/hr is:
(a) 36 km/hr (b) 40 km/hr
(c) 45 km/hr (d) 48 km/hr

8. A cricket player has an average of 40 runs in 10 innings. In the 11th innings, he scores 60 runs. In the 12th innings, he scores 80 runs. Find his new average.
(a) 45 (b) 41
(c) 42 (d) 44

9. The average of 40 numbers is 50. Later it was found that the number 80 was wrongly written as 20. Find the correct average.
(a) 50.5 (b) 51
(c) 51.5 (d) 52

10. The average age of 30 students in a class is 14 years. If the teacher's age is included, the average becomes 15 years. Find the teacher's age.
(a) 40 (b) 45
(c) 46 (d) 48

Answers	
1. c	6. a
2. b	7. b
3. d	8. a
4. a	9. c
5. c	10. b

Solution:

1. Soln:

Concept: If the same number is added to every value, the average also increases by that number.
New Average = Old Average + Increase
Given
Step 1:
Old average = 35
Increase in each number = 4
Step 2: Find the new average
New Average $= 35 + 4 = 39$
Ans: New average = 39

2. Soln:
Step 1: Total marks of 12 students
Total $= 60 \times 12 = 720$
Step 2: Subtract excluded marks
$720 - 48 = 672$
Total marks of remaining 11 students = 672
Step 3: Find new average
New Average $= \frac{672}{11} = 61$
Ans: 61

3. Soln:
Step 1: Find the total of 8 numbers
Total = Average × Number of values
$= 25 \times 8 = 200$
Step 2: Subtract the removed numbers
$20 + 30 = 50$
$200 - 50 = 150$
Step 3: Add the new numbers
$40 + 50 = 90$
$150 + 90 = 240$
Step 4: Find the new average
New average $= \frac{240}{8} = 30$
Ans: New average = 30

4. Soln:
Average of first n natural numbers:
Average $= \frac{n+1}{2}$
$\frac{n+1}{2} = 20$
$n + 1 = 40$
$n = 39$
Ans: n = 39

5. Soln:
Step 1: Total of 10 numbers
$16 \times 10 = 160$
Step 2: Total of first 6 numbers
$12 \times 6 = 72$
Step 3: Total of remaining 4 numbers
$160 - 72 = 88$
Step 4: Average of remaining 4 numbers
$\frac{88}{4} = 22$
Ans: 22

6. Soln:
Step 1: Total of 7 numbers
$24 \times 7 = 168$
Step 2: Sum of first 4 numbers
$21 \times 4 = 84$
Step 3: Sum of last 3 numbers
$168 - 84 = 84$
Step 4: Average of last 3 numbers
$84 \div 3 = 28$
Ans: Average of the last 3 numbers = 28

7. Soln:
Step 1: Find time taken for each part
Time = Distance ÷ Speed
First 60 km: $60 \div 30 = 2$ hours
Next 60 km: $60 \div 60 = 1$ hour
Step 2: Total distance and total time
Total distance→ $60 + 60 = 120$ km
Total time→ $2 + 1 = 3$ hours
Step 3: Average speed
Average speed $= \frac{\text{Total distance}}{\text{Total time}}$
$= \frac{120}{3} = 40$ km/hr
Ans: Average speed = 40 km/hr.

8. Soln:
Step 1: Total runs in first 10 innings
$40 \times 10 = 400$
Step 2: Add runs of 11th and 12th innings
$400 + 60 + 80 = 540$
Step 3: Total innings→12
Step 4: New average
$540 \div 12 = 45$
Ans: New average = 45 runs.

9. Soln:
Step 1: Find the wrong total
Total $= 50 \times 40 = 2000$
Step 2: Find the error
The number 80 was written as 20.
Difference: $80 - 20 = 60$
Step 3: Correct the total
$2000 + 60 = 2060$
Step 4: Find the correct average
$\frac{2060}{40} = 51.5$
Ans: Correct average = 51.5.

10. Soln:
Step 1: Total age of 30 students
$30 \times 14 = 420$
Step 2: When teacher is included
Total persons = 31
New average = 15
$31 \times 15 = 465$
Step 3: Find teacher's age
$465 - 420 = 45$
Ans: Teacher's age = 45 years.

10 Mixture & Alligation

A mixture problem involves combining two or more ingredients having different prices or concentrations.
Usually asked in:

- Profit & Loss
- Percentage
- Ratio
- Time & Work (sometimes)

Alligation is a shortcut method to find the ratio in which two ingredients are mixed.
It is mainly used when:

- Two different prices are mixed
- Two different concentrations are mixed

ALLIGATION RULE

Cost Price of Dearer (C1)
\ /
\ /
Mean Price (M)
/ \
/ \
Cost Price of Cheaper (C2)

Formula:
Ratio $= (C1 - M) : (M - C2)$
Where:

- C1 = Dearer price
- C2 = Cheaper price
- M = Mean price

Example Problems

1. Milk costs ₹40 per litre and water costs ₹10 per litre. In what ratio should they be mixed to get mixture at ₹25 per litre?

Soln:

40
\
\
25
/
/
10

Cross subtract:
40 − 25 = 15
25 − 10 = 15
Ratio = 15 : 15 = 1 : 1

2. Rice at ₹60/kg and ₹40/kg are mixed to get ₹50/kg. Find ratio.

60
\
50
/
40

60 − 50 = 10
50 − 40 = 10
Ratio = 1 : 1

Shortcut Trick
If mean is exactly middle of two numbers → Ratio = 1 : 1
When 3 Ingredients Are Mixed
First mix two → Find mean
Then mix with third → Apply alligation again.

Important Formulas

1. Mean Price Formula: Mean Price $= \frac{(C1 \times Q1) + (C2 \times Q2)}{Q1 + Q2}$

2. Replacement Type Question
If some quantity removed and replaced:
Final Quantity $= V\left(1 - \frac{r}{V}\right)^n$
Where:

- V = Total quantity
- r = Quantity removed
- n = Number of times

Example Problems

1. Milk at ₹48/L is mixed with water to get mixture at ₹36/L. Find the ratio of Milk: Water.

Solution

Milk = 48
Water = 0
Mean = 36
Dearer (Milk) = 48
\ /
\ /
\ /
Mean = 36
/ \
/ \
/ \
Cheaper (Water) = 0
Cross Subtract
48 − 36 = 12
36 − 0 = 36
So, ratio = 12: 36
Simplify → 1: 3
Ratio = 12: 36 = 1: 3
This is Water: Milk
Asked → Milk: Water
So,
Ans = 3 : 1

2. Rice costing ₹60/kg is mixed with rice costing ₹45/kg to get a mixture worth ₹54/kg. Find the ratio.

Soln:

Dearer = 60

\ /

\ /

\ /

Mean = 54

/ \

/ \

/ \

Cheaper = 45

Cross Subtract

60 − 54 = 6

54 − 45 = 9

Ratio = 6 : 9

Simplify → 2 : 3

Ratio = 6 : 9 = 2 : 3

Since 45 is cheaper,

Ratio = Cheaper : Dearer = 2 : 3

Asked → Rice ₹60 : Rice ₹45

Reverse → 3 : 2

Ans: 3:2

3. In what ratio must tea costing ₹120/kg be mixed with tea costing ₹80/kg to gain 20% profit by selling mixture at ₹120/kg?

Step 1: Find Mean Price

Selling price = 120

Profit = 20%

Cost price of mixture = 120/1.2 = ₹100

Dearer = 120

\ /

\ /

\ /

Mean = 100

/ \

/ \

/ \

Cheaper = 80

Cross Subtract

120 − 100 = 20

100 − 80 = 20

Ratio = 20 : 20

Ans: → 1 : 1

Alligation gives:

4. 30g alloy contains 80% gold. How much pure gold must be added to make it 90% pure?

Soln:

Gold in alloy = 80% of 30 = 24g

Let x be added gold.

$\frac{24+x}{30+x} = 0.9$

24 + x = 27 + 0.9x

0.1x = 3

x = 30g

5. A vessel contains 20L milk. 5L removed and replaced with water. Process repeated twice.

How much milk left?

Formula:

Replacement Type = Milk left $= V\left(1-\frac{r}{V}\right)^n$

$= 20\left(1-\frac{5}{20}\right)^2$

$= 20\ (0.75)^2$

$= 20 \times 0.5625$

$= 11.25\text{L}$

6. A shopkeeper mixes 25% water in milk and sells at cost price. Find his profit %.

Soln:

Let 1L milk cost ₹40

Water added = 0.25L

Total = 1.25L

Sold at ₹40 per litre

Total SP = 1.25 × 40 = 50

Profit = 10

$\frac{10}{40} \times 100 = 25\%$

Ans: Profit = 25%

7. Milk worth ₹40/L is mixed with 20 L of milk worth ₹60/L. Find the mean price.

Soln:

Mean Price $= \frac{(20\times40)+(20\times60)}{40}$

$= \frac{800+1200}{40}$

$= \frac{2000}{40} = ₹50$

8. Rice ₹40/kg mixed with ₹60/kg in ratio 3:2. Find mean price.

Soln:

Mean $= \frac{(40\times3)+(60\times2)}{5}$

$= \frac{120+120}{5}$

$= ₹48$

9. A container contains 100 litres of pure milk. 20 litres of milk is taken out and replaced with water. This process is repeated two times. Find the quantity of milk left in the container after the second replacement.

Soln:

Replacement Formula Milk left $= V\left(1-\frac{r}{V}\right)^n$

Where:

- $V = 100\text{L}$ (initial quantity)
- $r = 20\text{L}$ (removed each time)
- $n = 2$(number of times replaced)

Substitute Values

$= 100\left(1-\frac{20}{100}\right)^2$

$= 100\left(\frac{80}{100}\right)^2$

$= 100\left(\frac{4}{5}\right)^2$

$= 100 \times \frac{16}{25}$

$= 64$

Ans: Milk left = 64 litres

Water present = 36 litres

10. A shopkeeper mixes two varieties of rice costing ₹30/kg and ₹50/kg. In what ratio should they be mixed so that by selling at ₹46/kg, he gains 15%?

Soln:

Step 1: Find Cost Price of Mixture

Selling Price (SP) = ₹46

Gain = 15%

$$CP = \frac{SP \times 100}{100 + Gain}$$

$$CP = \frac{46 \times 100}{115}$$

$$CP = 40$$

Mean Cost Price = ₹40/kg

Step 2: Apply Alligation

50

\

\

40

/

/

30

$50 - 40 = 10$

$40 - 30 = 10$

Ratio: $10 : 10 = 1 : 1$

Ans: Required Ratio = 1: 1

The shopkeeper must mix both varieties in equal quantity.

Practice Problems:

1. A container has 80 L of milk. 20 L is removed and replaced with water once. How much milk is left?
(a) 50 L (b) 60 L
(c) 64 L (d) 70 L

2. A 100 L container is full of milk. 10 L is removed and replaced with water. This process is repeated twice. How much milk remains?
(a) 90 L (b) 80 L
(c) 72.9 L (d) 81 L

3. Rice costing ₹20/kg is mixed with rice costing ₹30/kg. In what ratio must they be mixed to get a mixture worth ₹25/kg?
(a) 1: 2 (b) 2: 1
(c) 1: 1 (d) 3: 2

4. A trader mixes ₹40/kg and ₹60/kg rice. At what ratio should they be mixed so that the mixture costs ₹50/kg?
(a) 1: 1 (b) 2: 3
(c) 3: 2 (d) 4: 1

5. Tea costing ₹80/kg is mixed with tea costing ₹120/kg. In what ratio should they be mixed to get ₹100/kg?
(a) 1: 2 (b) 1: 1
(c) 2: 1 (d) 3: 2

6. A 200 L mixture of milk and water is in ratio 3: 2. 40 L mixture is removed and replaced with water once. Find the new ratio.
(a) 4: 3 (b) 12: 13
(c) 9: 11 (d) 3: 5

7. A vessel contains 90 L milk. 18 L is removed and replaced with water twice. Find the Milk left?
(a) 57.6 L (b) 60 L
(c) 64 L (d) 72 L

8. A shopkeeper mixes two qualities of rice costing ₹25/kg and ₹45/kg. If mixture is sold at ₹38/kg with no profit, find the ratio.
(a) 3: 2 (b) 2: 3
(c) 7: 13 (d) 4: 1

9. A 150 L container full of milk. 30 L removed and replaced with water three times. Milk left?
(a) 75 L (b) 90 L
(c) 80 L (d) 76.8 L

10. In what ratio must ₹30/kg rice be mixed with ₹50/kg rice so that the mixture when sold at ₹46/kg gives 15% gain?
(a) 1: 1 (b) 2: 1
(c) 1: 2 (d) 3: 2

Answers			
1.	b	6.	b
2.	d	7.	a
3.	c	8.	c
4.	a	9.	d
5.	b	10.	a

Solution:

1. **Given:**
- Total milk = **80 L**
- Removed = **20 L**
- Replaced with water (once)

Milk removed = 20 L out of 80 L

Fraction removed = $\frac{20}{80} = \frac{1}{4}$

So, fraction of milk left = $1 - \frac{1}{4} = \frac{3}{4}$

Milk left $= 80 \times \frac{3}{4}$

$= 60$ L

Ans: 60 L

Formula method: Milk left $= V\left(1 - \frac{r}{V}\right)^n$

Milk left $= 80\left(1 - \frac{20}{80}\right)^1$

$= 80\left(1 - \frac{1}{4}\right)$

$= 80 \times \frac{3}{4}$

$= 60$ L

Milk remaining = 60 L

2. Given:
- $V = 100$L
- $R = 10$L
- $n = 2$

Milk left $= 100\left(1 - \frac{10}{100}\right)^2$

$= 100\left(1 - \frac{1}{10}\right)^2 = 100\left(\frac{9}{10}\right)^2$

$= 100 \times \frac{81}{100} = 81$ L

Ans: 81 L

3. Given:
- Cost price 1 = ₹20/kg
- Cost price 2 = ₹30/kg
- Mean price = ₹25/kg

Alligation Chart:

20 30

\

25

/

Now find differences: $30 - 25 = 5$
$25 - 20 = 5$
Ratio of cheaper : costlier
$= 5:5$
$= 1:1$
Ans: Rice costing ₹20/kg and ₹30/kg must be mixed in the ratio 1 : 1.

4. Given:
- Cheaper rice = ₹40/kg
- Costlier rice = ₹60/kg
- Mean price = ₹50/kg

Alligation Chart
40 60
\ /
50
/ \
Now find differences: $60 - 50 = 10$
$50 - 40 = 10$
Ratio of cheaper: costlier
$= 10:10 = 1:1$
Ans: The rice should be mixed in the ratio 1 : 1.

5. Given:
- Cheaper tea = ₹80/kg
- Costlier tea = ₹120/kg
- Mean price = ₹100/kg

Alligation Calculation
Difference between costlier and mean:
$120 - 100 = 20$
Difference between mean and cheaper:
$100 - 80 = 20$
Ratio of cheaper : costlier
$= 20:20 = 1:1$
Ans: The tea should be mixed in the ratio 1 : 1.

6. Given:
Total mixture = **200 L**
Initial ratio (Milk : Water) = **3 : 2**
Total parts = 3 + 2 = 5
Milk = $\frac{3}{5} \times 200 = 120$L
Water = $\frac{2}{5} \times 200 = 80$L
40 L mixture removed
Since mixture is removed, milk and water are removed in same ratio (3:2)
Milk removed = $\frac{3}{5} \times 40 = 24$L
Water removed = $\frac{2}{5} \times 40 = 16$L
Remaining:
Milk = $120 - 24 = 96$L
Water = $80 - 16 = 64$L
40 L water added
New water = $64 + 40 = 104$L
Milk remains = 96 L
New Ratio
Milk: Water→ 96: 104
Divide by 8:
12: 13
Ans: New ratio = 12 : 13

7. **Given:**
- $V = 90$L
- $R = 18$L
- $n = 2$

Milk left $= 90\,(1-\frac{18}{90})^2 = 90\,(1-\frac{1}{5})^2$
$= 90\left(\frac{4}{5}\right)^2$
$= 90 \times \frac{16}{25}$
$= \frac{1440}{25}$
$= 57.6$ L
Ans: Milk left = 57.6 L

8. Given:
- Cheaper rice = ₹25/kg
- Costlier rice = ₹45/kg
- Mean price (no profit) = ₹38/kg

Differences: $45 - 38 = 7$
$38 - 25 = 13$
Ratio of cheaper: costlier $= 7:13$
Ans : Rice costing ₹25/kg and ₹45/kg should be mixed in the ratio $\boxed{7:13}$

9. **Given:**
- $V = 150$L
- $R = 30$L
- $n = 3$

Milk left $= 150\,(1-\frac{30}{150})^3$
$= 150\left(1-\frac{1}{5}\right)^3$
$= 150\left(\frac{4}{5}\right)^3$
$= 150 \times \frac{64}{125}$
$= \frac{9600}{125} = 76.8$ L
Ans: Milk left = 76.8 L

10. Given:
- Selling Price (SP) = ₹46/kg
- Gain = 15%

We know: $SP = CP \times \frac{115}{100}$
$46 = CP \times 1.15$
$CP = \frac{46}{1.15}$
$CP = 40$
So, the mean cost price = ₹40/kg
Alligation Method
Cheaper rice = ₹30/kg
Costlier rice = ₹50/kg
Mean price = ₹40/kg
Differences
$50 - 40 = 10$
$40 - 30 = 10$
Ratio of cheaper: costlier
$= 10:10$
$= 1:1$
Ans: The rice should be mixed in the ratio $\boxed{1:1}$

15 Problems on Ages

Problems on Ages are quantitative aptitude questions that involve calculating the current, past, or future ages of individuals based on given relationships and time intervals.

BASIC CONCEPT

Age increases by 1 year every year

If a person is:

- Present age = x
- After 5 years = $x + 5$
- 3 years ago= $x - 3$

Example Problems

1. If Rohith is 50 years old and his son is 10 years old, find the simplest ratio of their ages.

Soln:

Rohith: Son→ 50: 10

Divide both numbers by 10:

5: 1

Ans: 5: 1

2. Amaran is 6 times as old as his son Kumaran. After 4 years, he will be 4 times as old as his son. Find their present ages.

Soln:

Step 1: Assume Present Ages

Let Kumaran's present age = x

Then Amaran's present age = 6x

Step 2: After 4 Years

Kumaran's age = x + 4

Amaran's age = 6x + 4

Given condition: $6x + 4 = 4(x + 4)$

$2x = 12 \Rightarrow x = 6$

Kumaran = 6 years

Amaran = 6 × 6 = 36 years

Ans: Kumaran = 6 years

Amaran = 36 years

3. The sum of the present ages of a father and his son is 60 years. Six years ago, the father's age was 5 times the age of the son. Find the son's age after 6 years.

Soln:

Step 1: Assume Present Ages

Let son's present age = **x**

Then father's present age = **60 – x**

Step 2: Six Years Ago

Son's age = x – 6

Father's age = 60 – x – 6 = 54 – x

Given condition: $54 - x = 5(x - 6)$

$54 - x = 5x - 30$

$54 + 30 = 5x + x$

$84 = 6x$

$x = 14$

Son's Age After 6 Years

Present age = 14

After 6 years: $14 + 6 = 20$

Ans: 20 years

4. The ages of Vivek and Sumit are in the ratio 2:3 after 12 years their ages will be in the ratio 11:15. What is the present age of Sumit?

Given:

Present age ratio of Vivek: Sumit = 2: 3

Let their present ages be:

- Vivek = 2x
- Sumit = 3x

After 12 years:

- Vivek = 2x + 12
- Sumit = 3x + 12

New ratio is 11: 15

$\frac{2x+12}{3x+12} = \frac{11}{15}$

$15(2x + 12) = 11(3x + 12)$

$30x + 180 = 33x + 132$

$180 - 132 = 33x - 30x$

$48 = 3x$

$x = 16$

Sumit's age: $3x = 3 \times 16 = 48$

Sumit's present age = 48 years

5. The ratio of a father's age to his son's age is 4: 1 . The product of their ages is 196. What is the ratio of their ages after 5 years.

Given:

Father: Son = 4: 1

Let their present ages be:

- Father = 4x
- Son = x

Given product of their ages:

$4x \times x = 196$

$4x^2 = 196$

$x^2 = 49$

$x = 7$

Present ages:

- Father = 4 × 7 = 28 years
- Son = 7 years

After 5 years:

- Father = 28 + 5 = 33
- Son = 7 + 5 = 12

New ratio: 33: 12

11: 4

Ans: 11: 4

6. The Present age of Arun and Suresh are 24 years and 36 years respectively, what was the ratio between the ages of Suresh and Arun 8 years ago? .

Given:

Present ages:

- Arun = 24 years
- Suresh = 36 years

8 years ago:

- Arun's age = 24 – 8 = 16 years

- Suresh's age = 36 – 8 = 28 years

Required ratio (Suresh: Arun) → 28: 16
Divide both by 4: → 7: 4
Ans: 7 : 4

7. The sum of the ages of the father and son is 72 years. Six years ago, the father's age was 2 times the age of the son. What was son's age six years ago?

Soln:

Let present age of son = x
Then present age of father = 72 – x
(Because their total age is 72)
Six years ago:
- Son's age = x – 6
- Father's age = 72 – x – 6 = 66 – x

Given: Father's age was 2 times son's age.
$66 - x = 2(x - 6)$
$66 - x = 2x - 12$
$66 + 12 = 2x + x$
$78 = 3x$
$x = 26$
Son's age 6 years ago →$26 - 6 = 20$
Ans: Son's age six years ago was 20 years.

8. Latha is one year older than Sunita. Sunita is two years older than Bindu. Rajan is one year older than Bindu. Who is the youngest?

Soln:

Let Bindu's age = x
- Sunita is 2 years older than Bindu

→ Sunita = x + 2
- Lata is 1 year older than Sunita

→ Lata = (x + 2) + 1 = x + 3
- Rajan is 1 year older than Bindu

→ Rajan = x + 1

Now compare all ages:
- Bindu = x
- Rajan = x + 1
- Sunita = x + 2
- Lata = x + 3

The smallest age is x
Therefore, **Bindu is the youngest.**

9. A boy is now twice as old as his sister, four years ago, he was thrice as old as her what are their ages now?

Soln:

Let the sister's present age be x years.
Then the boy's present age = 2x (since he is twice as old).
4 years ago:
- Sister's age = x – 4
- Boy's age = 2x – 4

Four years ago, he was three times as old as her.
$2x - 4 = 3(x - 4)$
$2x - 4 = 3x - 12$
$2x - 3x = -12 + 4$
$-x = -8$
$x = 8$
Therefore:
- Sister's present age = 8 years
- Boy's present age = 2 × 8 = 16 years

Ans: The boy is 16 years old and the sister is 8 years old.

10. A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half, of the age of his mother. How old is the mother at present?

Soln:

Let the person's present age = x
Let the mother's present age = M
Given:
1. $x = \frac{2}{5}M$
2. After 8 years:

Person's age = x + 8
Mother's age = M + 8
According to the question: $x + 8 = \frac{1}{2}(M + 8)$
Substitute $x = \frac{2}{5}M$
$\frac{2}{5}M + 8 = \frac{1}{2}(M + 8)$
Remove fractions (LCM of 5 and 2 is 10)
Multiply whole equation by 10:
$10\left(\frac{2}{5}M+8\right) = 10\left(\frac{1}{2}(M + 8)\right)$
$4M + 80 = 5(M + 8)$
$4M + 80 = 5M + 40$
$80 - 40 = 5M - 4M$
$40 = M$
Ans: The mother's present age is 40 years.

11. A father is twice as old as his son. 20 years ago, the age of the father was 12 times the age of the son. What is the present age of the father?

Soln:

Let the son's present age = **x** years
Then father's present age = **2x** (since he is twice as old)
20 years ago:
Son's age = x – 20
Father's age = **2x – 20**
According to the question: $2x - 20 = 12(x - 20)$
$2x - 20 = 12x - 240$
$-20 + 240 = 12x - 2x$
$220 = 10x$
$x = 22$
Present ages: Son's age = 22 years
Father's age = 2 × 22 = 44 years
Ans: The father's present age is 44 years.

12. The ratio of the ages of the father and the son at present is 19:5. After 4 years, the ratio will be 3:1. What is the sum of the present ages of the father and the son?

Soln:

Let the present ages of father and son be in the ratio 19: 5.
Father's age = 19x
Son's age = 5x
After 4 years:
Father's age = 19x + 4
Son's age = 5x + 4
Given that the new ratio is 3: 1
$\frac{19x+4}{5x+4} = \frac{3}{1}$
$19x + 4 = 3(5x + 4)$
$19x + 4 = 15x + 12$
$19x - 15x = 12 - 4$
$4x = 8$
$x = 2$
Present ages:

Father = 19 × 2 = 38 years
Son = 5 × 2 = 10 years
Sum of present ages: $38 + 10 = 48$
Ans: 48 years

13. A mother is 5 times as old as her son. After 5 years, the sum of their ages will be 70 years.
Find the mother's present age.

Soln:
Let son's present age = **x**
Mother's present age = **5x**
After 5 years→ Son's age = x + 5
→Mother's age = 5x + 5
According to the question: $(x + 5) + (5x + 5) = 70$
$x + 5 + 5x + 5 = 70$
$6x + 10 = 70$
$6x = 60$
$x = 10$
Mother's age = 5x
= 5 × 10
= 50 years
Ans: Mother's present age is 50 years.

14. Raman's age is three times the sum of the ages of his two sons. After 5 years his age will be twice the sum of the ages of his two sons. Find the age of Raman.

Soln:
Let the present sum of the ages of the two sons = x
Raman's present age = 3x
After 5 years:
Sum of sons' ages = x + 10
(Each son grows 5 years → total increase = 10)
Raman's age = 3x + 5
According to the question:$3x + 5 = 2(x + 10)$
$3x + 5 = 2x + 20$
$3x - 2x = 20 - 5$
$x = 15$
Raman's present age → $3x = 3 \times 15 = 45$
Ans: Raman's present age is 45 years.

15. A father's age is four times as much as the sum of the ages of his three children but 6 years hence his age will be only double the sum of their ages. Then find the age of Father.

Soln:
A father's age is four times as much as the sum of the ages of his three children but 6 years hence his age will be only double the sum of their ages. Then find the age of Father.

Soln:
Let the present sum of the ages of the three children = x
Father's present age = 4x
After 6 years:
Each child grows 6 years.
Increase in total age of three children = 6 × 3 = 18
Sum of children's ages after 6 years = x + 18
Father's age after 6 years = 4x + 6
According to the question: →
$4x + 6 = 2(x + 18)$
$4x + 6 = 2x + 36$
$4x - 2x = 36 - 6$
$2x = 30$
$x = 15$
Father's present age**:** →$4x = 4 \times 15 = 60$
Ans: Father's present age is 60 years.

Practice Problems:

1. A mother is currently 5 times as old as her daughter. After 10 years, the mother's age will be 3 times the age of her daughter. What is the daughter's current age?
(a) 6 years (b) 8 years
(c) 10 years (d) 12 years

2. The age of a person is four times the sum of the ages of his two sons. After 10 years his age will 2 times of the sum of their ages. Find the present age of the man.
(a) 56 years (b) 45 years
(c) 64 years (d) 60 years

3. A is younger than B. Seven times the difference between their ages is equal to the sum of their ages. Ratio of B's age after 12 years and A's present age is 5: 3. What is A's present age?
(a) 24 years (b) 30 years
(c) 36 years (d) 42 years

4. The sum of the ages of a father and his son is 72 years. After 2 years, the father will be 4 years less than 3 times the age of his son. Find their present ages.
(a) 54 years and 18 years (b) 48 years and 24 years
(c) 50 years and 22 years (d) 60 years and 12 years

5. If A is older than B, C is older than B but younger than A.D is younger than E and B.B Is older than E. identify who is youngest?
(a) A (b) B
(c) C (d) D

6. Now Sharma age is quarter as old as his father. six years ago the father age was seven times as old as Sharma. Find their present ages
(a) 10 years and 40 years
(b) 12 years and 48 years
(c) 14 years and 56 years
(d) 16 years and 64 years

7. A father said to his son, "I was as old as you are at the present at the time of your birth". If the father's age is 38 years now, what was the son's age five years back?
(a) 14 years (b) 15 years
(c) 16 years (d) 17 years

8. The ages of A and B are in the ratio of 4:5. Five years hence the ratio their ages will become 9:11. What is the present ages of A and B?
(a) 16 years and 20 years (b) 40 years and 50 years
(c) 24 years and 30 years (d) 28 years and 35 years

9. Ten yrs ago, the ages of X and y are in the ratio 3:1 the ratio of the present age is 2:1 . Find their present ages.
(a) 40 years and 20 years (b) 30 years and 15 years
(c) 20 years and 10 years (d) 50 years and 25 years

10. The product of Kumaran's age (in years) two years ago and his age four years from now is one more than twice his present age. What is his present age?
(a) 2 years (b) 4 years
(c) 3 years (d) 5 years

Answers	
1. c	6. b
2. d	7. a

3. c	8. b
4. a	9. a
5. d	10. c

Solution:

1. Soln:
Let the daughter's present age be x years.
Then the mother's present age = 5x years.
After 10 years:
- Daughter's age = x + 10
- Mother's age = 5x + 10

According to the question: $5x + 10 = 3(x + 10)$
$5x + 10 = 3x + 30$
$5x - 3x = 30 - 10$
$2x = 20$
$x = 10$
Ans: Daughter's present age = 10 years

2. Soln:
Let the present age of the man = x years
Let the present sum of the ages of his two sons = y years
Given: $x = 4y$
After 10 years:
- Man's age = x + 10
- Sum of sons' ages = y + 20 (each son increases by 10 years)

According to the question:
$x + 10 = 2(y + 20)$
Substitute $x = 4y$:
$4y + 10 = 2y + 40$
$4y - 2y = 40 - 10$
$2y = 30$
$y = 15$
$x = 4y = 4 \times 15 = 60$
Ans: Present age of the man = 60 years

3. Soln:
Let A's present age = x
Let B's present age = y
Condition 1: Seven times their age difference equals the sum of their ages:
$7(y - x) = x + y$
$7y - 7x = x + y$
$6y = 8x$
$3y = 4x$
$y = \frac{4x}{3}$
Condition 2: → $\frac{y+12}{x} = \frac{5}{3}$
Substitute $y = \frac{4x}{3}$
$\frac{\frac{4x}{3}+12}{x} = \frac{5}{3}$
$\frac{4x+36}{x} = 5$
$4x + 36 = 5x$
$x = 36$
Ans: A's present age = 36 years

4. Soln:
Let the present age of the father = **F**
Let the present age of the son = **S**
Given: $F + S = 72$ →eqn1
After 2 years:
- Father's age = **F + 2**
- Son's age = **S + 2**

According to the question: $F + 2 = 3(S + 2) - 4$
$F + 2 = 3S + 6 - 4$
$F + 2 = 3S + 2$
$F = 3S$
Now substitute in eqn 1:
$3S + S = 72$
$4S = 72$
$S = 18$
$F = 3 \times 18 = 54$
Present ages:
- Father = 54 years
- Son = 18 years

5. Soln:
Given:
- A is older than B → **A > B**
- C is older than B but younger than A → **A > C > B**
- D is younger than E and B → **E > D** and **B > D**
- B is older than E → **B > E**

Now arrange all together:
A > C > B > E > D
Ans: Youngest person is D.

6. Soln:
Let Sharma's present age = **x years**
Father's present age = **4x years**
(Because Sharma is one-fourth of his father's age.)
Six years ago:
Sharma's age = x − 6
Father's age = 4x − 6
According to the question:
$4x - 6 = 7(x - 6)$
$4x - 6 = 7x - 42$
$42 - 6 = 7x - 4x$
$36 = 3x$
$x = 12$
Ans: Present Ages:
- **Sharma = 12 years**
- **Father = 48 years**

7. Soln:
Let the son's present age be x years.
Father's present age = 38 years.
At the time of son's birth (x years ago),
Father's age = 38 − x
According to the statement: $38 - x = x$
$38 = 2x$
$x = 19$
So, son's present age = **19 years**
Five years back: $19 - 5 = 14$
Ans: Son's age five years back = 14 years

8. Soln:
Let present ages of A and B be: $A = 4x, B = 5x$
After 5 years:
$\frac{4x+5}{5x+5} = \frac{9}{11}$
$11(4x + 5) = 9(5x + 5)$

$44x + 55 = 45x + 45$
$44x - 45x = 45 - 55$
$-x = -10$
$x = 10$
Present ages: $A = 4x = 40$ years
$B = 5x = 50$ years
Ans: Present ages are 40 years and 50 years

9. Soln:
Let present ages of X and Y be: $X = 2x, Y = x$
(Since present ratio is 2: 1)
Ten years ago:
$X - 10 = 2x - 10$
$Y - 10 = x - 10$
Given ratio ten years ago:
$\frac{2x-10}{x-10} = \frac{3}{1}$
$2x - 10 = 3(x - 10)$
$2x - 10 = 3x - 30$
$30 - 10 = 3x - 2x$
$20 = x$
Present ages:
$X = 2x = 40$ years
$Y = x = 20$ years
Ans: Present ages are 40 years and 20 years

10. Soln:
Let Kumaran's present age be **x years**.
Two years ago = **x – 2**
Four years from now = **x + 4**
According to the question: $(x - 2)(x + 4) = 2x + 1$
$x^2 + 4x - 2x - 8 = 2x + 1$
$x^2 + 2x - 8 = 2x + 1$
$x^2 + 2x - 8 - 2x - 1 = 0$
$x^2 - 9 = 0$
$x^2 = 9$
$x = 3$
Ans: Kumaran's present age = 3 years

19 Probability

Probability is the branch of mathematics that deals with how likely an event is to happen.

Random Experiment

A random experiment is an experiment in which:

1. The set of all possible outcomes is known.
2. The exact outcome cannot be predicted.

Examples:

- Tossing a coin
- Rolling a die

Sample Space (S)

- The set of all possible outcomes of a random experiment is called the sample space.
- It is denoted by S.

Example:

- When rolling a die, possible outcomes are
  $S = \{1,2,3,4,5,6\}$
  Sample Point
- Each element of the sample space is called a sample point.

Example:

- In the sample space {1, 2, 3, 4, 5, 6},
  - 1 is a sample point
  - 2 is a sample point … etc.

Event

- In a random experiment, each possible outcome is called an event.
- An event is a subset of the sample space.

Example:

- Getting two heads when tossing two coins is an event.

Trial

- Performing an experiment once is called a trial.

Example:

- When tossing a coin three times, Each toss is a trial.

Probability of an Event

Probability of an Event Formula

If S is the sample space and E is an event, then probability of event E is:

$P(E) = \frac{n(E)}{n(S)}$

Where:

- n(E) = Number of favourable outcomes
- n(S) = Total number of possible outcomes

Important Point

- This formula is used only when the sample space is finite.

Special Cases

Sure event: $P(S) = 1$

Impossible event: $P(\emptyset) = 0$

Range of Probability

$0 \le P(E) \le 1$

Probability always lies between 0 and 1.

Complement of an Event

Complement event of E is $\bar{E}$ (not E).

$P(E) + P(\bar{E}) = 1 P(\bar{E}) = 1 - P(E)$

EXAMPLES:

1. Which of the following values cannot be a probability of an event?

(a) –0.0001 (b) 0.5

(c) 1.001 (d) 1

(e) 20% f) 0.253 g) $\frac{1-\sqrt{5}}{2}$

Soln:

Valid probabilities

- (b) 0.5
- (d) 1
- (e) 20% = 0.2
- (f) 0.253

Cannot be probability

- (a) –0.0001 (negative)
- (c) 1.001 (greater than 1)
- (g) $\frac{1-\sqrt{5}}{2} = \frac{1-2.236}{2} = -0.618$

2. A bag contains 5 blue balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) blue (ii) not blue.

Soln:

Total number of balls = 5 blue + 4 green = 9 balls

(i) Probability of drawing a blue ball = Number of blue balls / Total balls $= \frac{5}{9}$

(ii) Probability of drawing a not blue ball = Number of green balls / Total balls $= \frac{4}{9}$

Ans: Final answers: (i) $\frac{5}{9}$ (ii) $\frac{4}{9}$

3. Two dice are rolled. Find the probability that the sum of outcomes is (i) equal to 4 (ii) greater than 10 (iii) less than 13

Soln:

When two dice are rolled, the sample space consists of 36 ordered outcomes:

(1,1), (1,2), (1,3), (1,4), (1,5), (1,6)
(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)
(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)
(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)
(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)

total possible outcomes = $6 \times 6 = 36$.

(i) Sum = 4

Favourable outcomes:

(1,3), (2,2), (3,1)→ 3 outcomes

$P(\text{sum} = 4) = \frac{3}{36} = \frac{1}{12}$

(ii) Sum > 10
Possible sums are 11 and 12.
Sum = 11 → (5,6), (6,5)→ 2 outcomes
Sum = 12 → (6, 6)→ 1 outcome
Total favourable outcomes = 3
$P(\text{sum} > 10) = \frac{3}{36} = \frac{1}{12}$

(iii) Sum < 13
The maximum possible sum of two dice is 12, so all 36 outcomes are favourable.
$P(\text{sum} < 13) = \frac{36}{36} = 1$
Ans: (i) $\frac{1}{12}$ (ii) $\frac{1}{12}$ (iii) 1

4. Two coins are tossed together. What is the probability of getting different faces on the coins?

Soln:

Two coins are tossed together.

$\text{P(E)}=\frac{Total\ number\ of\ outcomes}{Number\ of\ favourable\ outcomes}$

Total outcomes = 4 → $\{HH, HT, TH, TT\}$
Favourable outcomes (different faces) = 2 → HT, TH
$P(\text{different faces}) = \frac{2}{4} = \frac{1}{2}$ **Ans:** $\mathbf{\frac{1}{2}}$

5. What is the probability that a leap year selected at random will contain 53 saturdays.

Soln:

A leap year has 366 days.
Since, $366 = 52$ weeks $+ 2$ days
So, in a leap year:
There are 52 Saturdays for sure.
The remaining 2 extra days decide which days occur 53 times.
Step 1: Possible extra day combinations
The 2 extra days can be:
1. Sunday & Monday
2. Monday & Tuesday
3. Tuesday & Wednesday
4. Wednesday & Thursday
5. Thursday & Friday
6. Friday & Saturday
7. Saturday & Sunday

Total possible cases = 7

Step 2: When do we get 53 Saturdays?
A leap year will have 53 Saturdays if:
- One of the extra days is Saturday.

From the list above, Saturday appears in:
- Friday & Saturday
- Saturday & Sunday

So, favorable cases = 2

Step 3: Probability
$\text{Probability} = \frac{\text{Favourable cases}}{\text{Total cases}} = \frac{2}{7}$

Ans: $\boxed{\frac{2}{7}}$

6. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.

Soln:

When a die is rolled and a coin is tossed together, we find probability using:
$\text{Probability} = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$

Step 1: Total outcomes
A die has 6 outcomes → {1,2,3,4,5,6}
A coin has 2 outcomes → {H, T}
Total outcomes:
$6 \times 2 = 12(1, H), (1, T), (2, H), (2, T), (3, H),$
$12(1, H), (1, T), (2, H), (2, T), (3, H),$
$(3, T), (4, H), (4, T), (5, H), (5, T), (6, H), (6, T)$

Step 2: Favourable outcomes
Die shows an odd number → {1, 3, 5}
Coin shows Head (H)
Favourable outcomes: $(1, H), (3, H), (5, H)$
Number of favourable outcomes = 3

Step 3: Probability
$P = \frac{3}{12} = \frac{1}{4}$
Ans: $\boxed{\frac{1}{4}}$

7. A bag contains 6 green balls, some black and red balls. Number of black balls is as twice as the number of red balls. Probability of getting a green ball is thrice the probability of getting a red ball. Find (i) number of black balls (ii) total number of balls

Soln:

Let number of red balls = x
Then number of black balls = 2x
(Number of black balls is twice red balls)
Number of green balls = 6

Step 1: Total number of balls
Total $= 6 + x + 2x = 6 + 3x$

Step 2: Use given probability condition
$P(\text{Green}) = 3 \times P(\text{Red})$
Now,
$P(\text{Green}) = \frac{6}{6+3x}$
$P(\text{Red}) = \frac{x}{6+3x}$
According to question:
$\frac{6}{6+3x} = 3 \times \frac{x}{6+3x}$

Step 3: Solve
Denominators are same, so cancel:
$6 = 3xx = 2$

Step 4: Find required answers
Number of red balls = 2
Number of black balls = 2x = 4
Total number of balls: $6 + 2 + 4 = 12$
Ans: (i) Number of black balls = 4

(ii) Total number of balls = 12

8. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, ...12. What is the probability that it will point to (i) 7 (ii) a prime number (iii) a composite number

Soln:

The spinner has numbers 1 to 12.
Total possible outcomes = 12
$\text{Probability} = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$
(i) Probability that it points to 7
Only one favourable outcome → {7}
$P(7) = \frac{1}{12}$

(ii) Probability that it points to a prime number
Prime numbers between 1 and 12 are: 2,3,5,7,11
(Number 1 is not prime)
Total prime numbers = 5
$P(\text{Prime}) = \frac{5}{12}$

(iii) Probability that it points to a composite number
Composite numbers between 1 and 12 are: 4,6,8,9,10,12
Total composite numbers = 6
$P(\text{Composite}) = \frac{6}{12} = \frac{1}{2}$

Ans:(i) $\frac{1}{12}$ (ii) $\frac{5}{12}$ (iii) $\frac{1}{2}$

Practice problems:

1. If A is an event of a random experiment such that P(A):P(A′) = 17:15 and n(S) = 640 then find (i) P(A) (ii) n(A).
(a) $\frac{15}{32}, 340$ (b) $\frac{17}{32}, 340$
(c) $\frac{15}{32}, 320$ (d) $\frac{17}{32}, 320$

2. A coin is tossed thrice. What is the probability of getting two consecutive tails?
(a) $\frac{1}{8}$ (b) $\frac{1}{4}$
(c) $\frac{3}{8}$ (d) $\frac{1}{2}$

3. A bag contains 12 blue balls and x red balls. If one ball is drawn at random (i) what is the probability that it will be a red ball? (ii) If 8 more red balls are put in the bag, and if the probability of drawing a red ball will be twice that of the probability in (i), then find x.
(a) $\frac{x}{12+x}, x = 4$ (b) $\frac{12}{12+x}, x = 8$
(c) $\frac{x}{20+x}, x = 6$ (d) $\frac{x}{12+x}, x = 8$

4. Two unbiased dice are rolled once. Find the probability of getting (i) a doublet (equal numbers on both dice) (ii) the product as a prime number (iii) the sum as a prime number (iv) the sum as 1 give options only
(a) $\frac{1}{6}, \frac{1}{12}, \frac{5}{12}, 0$ (b) $\frac{1}{12}, \frac{1}{6}, \frac{1}{3}, \frac{1}{36}$
(c) $\frac{1}{6}, \frac{1}{6}, \frac{1}{2}, 0$ (d) $\frac{1}{36}, \frac{1}{12}, \frac{5}{18}, 0$

5. Three fair coins are tossed together. Find the probability of getting (i) all heads (ii) atleast one tail (iii) atmost one head (iv) atmost two tails
(a) $\frac{1}{8}, \frac{7}{8}, \frac{1}{2}, \frac{7}{8}$ (b) $\frac{1}{8}, \frac{3}{4}, \frac{1}{4}, \frac{1}{2}$
(c) $\frac{1}{4}, \frac{7}{8}, \frac{1}{2}, \frac{3}{4}$ (d) $\frac{1}{8}, \frac{1}{2}, \frac{3}{4}, \frac{7}{8}$

6. A bag contains 5 red balls, 6 white balls, 7 green balls, 8 black balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is (i) white (ii) black or red (iii) not white (iv) neither white nor black.
(a) $\frac{3}{13}, \frac{1}{2}, \frac{10}{13}, \frac{6}{13}$ (b) $\frac{1}{4}, \frac{7}{13}, \frac{9}{13}, \frac{5}{13}$
(c) $\frac{2}{13}, \frac{7}{13}, \frac{11}{13}, \frac{6}{13}$ (d) $\frac{3}{13}, \frac{7}{13}, \frac{10}{13}, \frac{5}{13}$

7. In a box there are 20 non-defective and some defective bulbs. If the probability that a bulb selected at random from the box found to be defective is 3 8 then, find the number of defective bulbs
(a) 10 (b) 12
(c) 15 (d) 18

8. Two customers Priya and Amuthan are visiting a particular shop in the same week (Monday to Saturday). Each is equally likely to visit the shop on any one day as on another day. What is the probability that both will visit the shop on (i) the same day (ii) different days (iii) consecutive days?
(a) $\frac{1}{6}, \frac{5}{6}, \frac{5}{18}$ (b) $\frac{1}{36}, \frac{35}{36}, \frac{5}{18}$
(c) $\frac{1}{6}, \frac{1}{3}, \frac{5}{12}$ (d) $\frac{1}{12}, \frac{11}{12}, \frac{1}{6}$

9. A card is drawn at random from a well-shuffled deck of 52 cards. Find the probability that the card drawn is
(i) a Red card
(ii) a King
(iii) a Black Face card
(iv) an Ace or a Queen
(a) $\frac{1}{2}, \frac{1}{13}, \frac{1}{13}, \frac{2}{13}$ (b) $\frac{1}{4}, \frac{1}{13}, \frac{1}{26}, \frac{2}{13}$
(c) $\frac{1}{2}, \frac{4}{52}, \frac{2}{52}, \frac{8}{52}$ (d) $\frac{1}{2}, \frac{1}{4}, \frac{1}{13}, \frac{1}{13}$

Answers		
1. b	4. a	7. b
2. b	5. a	8. a
3. d	6. d	9. a

Solution:

1. Given:
$P(A): P(A') = 17:15$
Let $P(A) = 17k, P(A') = 15k$
Since $P(A) + P(A') = 1$
$17k + 15k = 1, \quad 32k = 1, \quad k = \frac{1}{32}$
$P(A) = 17 \quad k = \frac{17}{32} \qquad n(A) = P(A) \times n(S)$
$= \frac{17}{32} \times 640 = 17 \times 20 = 340$
Ans: 17/32, 340

2. Soln:
When a coin is tossed 3 times:
Total outcomes = $2^3 = 8$
Sample space: HHH, HHT, HTH, HTT, THH, THT, TTH, TTT
Two consecutive tails
Outcomes having at least one TT together:
HTT, TTH, TTT
Number of favourable outcomes = 3
$P(\text{two consecutive tails}) = \frac{3}{8}$
Ans: $\boxed{\frac{3}{8}}$

3. Soln:
Total balls initially = $12 + x$
(i) Probability of drawing a red ball
$P(\text{red}) = \frac{x}{12+x}$
(ii) After adding 8 more red balls
New red balls = $x + 8$
New total balls = $12 + x + 8 = 20 + x$
New probability: $P'(\text{red}) = \frac{x+8}{20+x}$
Given:
$P'(\text{red}) = 2 \times P(\text{red})$
$\frac{x+8}{20+x} = 2\left(\frac{x}{12+x}\right)$
$\frac{x+8}{20+x} = \frac{2x}{12+x}$

$(x+8)(12+x) = 2x(20+x)$
$x^2 + 20x + 96 = 40x + 2x^2$
$x^2 + 20x - 96 = 0$
$(x+24)(x-4) = 0$
$x = 4(\text{reject } -24)$
Ans: (i) $\frac{x}{12+x}$ (ii) $\boxed{x=4}$

4. Soln:
when two unbiased dice are rolled:
Total outcomes = $6 \times 6 = 36$
(i) Doublet (equal numbers)
Possible: (1,1), (2,2), (3,3), (4,4), (5,5), (6,6)
Total = 6
$P = \frac{6}{36} = \frac{1}{6}$
(ii) Product is a prime number
Prime numbers: 2, 3, 5, 7, 11, ...
Product will be prime only if one number is 1 and the other is prime.
Possible outcomes:
(1,2), (2,1) → product 2
(1,3), (3,1) → product 3
(1,5), (5,1) → product 5
Total = 6
$P = \frac{6}{36} = \frac{1}{6}$
(iii) Sum is a prime number
Prime sums possible: 2, 3, 5, 7, 11
Sum = 2 → (1,1) → 1
Sum = 3 → (1,2), (2,1) → 2
Sum = 5 → 4 outcomes
Sum = 7 → 6 outcomes
Sum = 11 → 2 outcomes
Total = 1 + 2 + 4 + 6 + 2 = 15
$P = \frac{15}{36} = \frac{5}{12}$
(iv) Sum = 1
Minimum possible sum = 2
So, $P = 0$
Ans: (i) $\frac{1}{6}$ (ii) $\frac{1}{6}$ (iii) $\frac{5}{12}$ (iv) 0

5. Soln:
When 3 fair coins are tossed:
Total possible outcomes = $2^3 = 8$
Sample space:
$\{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$
Each outcome has probability = $\frac{1}{8}$
(i) All Heads
Only one outcome: $HHHP(\text{all heads}) = \frac{1}{8}$
(ii) At least one Tail
Use complement rule.
At least one tail = 1 – P(no tail)
No tail means all heads.
$P(\text{at least one tail}) = 1 - \frac{1}{8} = \frac{7}{8}$
(iii) At most one Head
At most one head means:
- 0 heads → TTT
- 1 head → HTT, THT, TTH

Total favourable outcomes = 4
$P(\text{at most one head}) = \frac{4}{8} = \frac{1}{2}$
(iv) At most two Tails
At most two tails means:
- 0 tails → HHH
- 1 tail → HHT, HTH, THH
- 2 tails → HTT, THT, TTH

Total favourable outcomes = 7
$P(\text{at most two tails}) = \frac{7}{8}$
Ans: (i) $\frac{1}{8}$ (ii) $\frac{7}{8}$ (iii) $\frac{1}{2}$ (iv) $\frac{7}{8}$

6. **Soln:**
Total number of balls = $5 + 6 + 7 + 8 = 26$
Probability formula: $P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$
(i) Probability of getting a white ball
Number of white balls = 6
$P(\text{white}) = \frac{6}{26} = \frac{3}{13}$
(ii) Probability of getting black or red
Black balls = 8, Red balls = 5
Favourable outcomes = $8 + 5 = 13$
$P(\text{black or red}) = \frac{13}{26} = \frac{1}{2}$
(iii) Probability of getting not white
Not white = red + green + black
$5 + 7 + 8 = 20$
$P(\text{not white}) = \frac{20}{26} = \frac{10}{13}$
(iv) Probability of getting neither white nor black
Neither white nor black = red + green
$5 + 7 = 12P(\text{neither white nor black}) = \frac{12}{26} = \frac{6}{13}$
Ans: (i) $\frac{3}{13}$ (ii) $\frac{1}{2}$ (iii) $\frac{10}{13}$ (iv) $\frac{6}{13}$

7. Soln:
Let the number of defective bulbs be x.
Total bulbs in the box = $20 + x$
Given: $P(\text{defective}) = \frac{3}{8}$
Using probability formula:
$\frac{x}{20+x} = \frac{3}{8}$
$8x = 3(20 + x)$
$8x = 60 + 3x$
$8x - 3x = 60$
$5x = 60x = 12$
Ans: Number of defective bulbs = 12

8. Soln:
Number of days in a week = 6
Total possible outcomes = $6 \times 6 = 36$
(i) Probability that both visit on the same day
Favourable outcomes =(Mon, Mon), (Tue, Tue), ... (Sat, Sat) = 6
$P(\text{same day}) = \frac{6}{36} = \frac{1}{6}$
(ii) Probability that both visit on different days
$P(\text{different days}) = \frac{36-6}{36} = \frac{30}{36} = \frac{5}{6}$
(iii) Probability that both visit on consecutive days
Consecutive day pairs are:

(Mon, Tue), (Tue, Mon),
(Tue, Wed), (Wed, Tue),
(Wed, Thu), (Thu, Wed),
(Thu, Fri), (Fri, Thu),
(Fri, Sat), (Sat, Fri)
Total favourable outcomes = 10
$P(\text{consecutive days}) = \frac{10}{36} = \frac{5}{18}$
Ans: (i) $\frac{1}{6}$ (ii) $\frac{5}{6}$ (iii) $\frac{5}{18}$

9. Soln:
Total number of cards = 52
(i) Red card
Number of red cards = 26
$P(\text{Red card}) = \frac{26}{52} = \frac{1}{2}$

(ii) King
Number of kings = 4
$P(\text{King}) = \frac{4}{52} = \frac{1}{13}$

(iii) Black face card
Face cards = Jack, Queen, King
Black face cards = 3 face cards × 2 black suits = 6
$P(\text{Black face card}) = \frac{6}{52} = \frac{3}{26}$

(iv) Ace or Queen
Number of aces = 4
Number of queens = 4
(They are different cards, so no overlap)
Favourable outcomes = 4 + 4 = 8
$P(\text{Ace or Queen}) = \frac{8}{52} = \frac{2}{13}$
Ans: (i) $\frac{1}{2}$ (ii) $\frac{1}{13}$ (iii) $\frac{3}{26}$ (iv) $\frac{2}{13}$
Addition Theorem of Probability

(i) For Two Events
If $A$and $B$are any two events, then:
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

(ii) For Three Events
If A, $B$and $C$are any three events, then:
$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$

EXAMPLES:

1. A flower is selected at random from a basket containing 80 yellow, 70 red and 50 white flowers. Find the probability of selecting a yellow or red flower. using addition theorem
Given: Number of yellow flowers = 80
Number of red flowers = 70
Number of white flowers = 50
Total flowers = 80 + 70 + 50 = 200
Let A = Event of selecting a yellow flower
B = Event of selecting a red flower
We need to find: $P(A \cup B)$
Addition Theorem of Probability
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Since one flower cannot be both yellow and red at the same time,
$P(A \cap B) = 0$

Step 1: Find individual probabilities
$P(A) = \frac{80}{200}, P(B) = \frac{70}{200}$

Step 2: Apply Addition Theorem
$P(A \cup B) = \frac{80}{200} + \frac{70}{200} - 0$
$= \frac{150}{200} = \frac{3}{4}$
Ans: $\boxed{\frac{3}{4}}$
Probability of selecting a yellow or red flower = 3/4

2. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

Soln:
When two dice are rolled:
Total possible outcomes = 6 × 6 = 36
Let
A = Event of getting a doublet
B = Event of getting sum = 4
We use Addition Theorem:
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Step 1: Find Event A (Doublets)
Doublets are: (1,1), (2,2), (3,3), (4,4), (5,5), (6,6)
Number of outcomes = 6
$P(A) = \frac{6}{36}$

Step 2: Find Event B (Sum = 4)
Sum 4 outcomes: (1,3), (2,2), (3,1)
Number of outcomes = 3
$P(B) = \frac{3}{36}$

Step 3: Find A ∩ B (Common outcomes)
Common outcome: (2,2)
Number of outcomes = 1
$P(A \cap B) = \frac{1}{36}$

Step 4: Apply Addition Theorem
$P(A \cup B) = \frac{6}{36} + \frac{3}{36} - \frac{1}{36} = \frac{8}{36} = \frac{2}{9}$
Ans: $\boxed{\frac{2}{9}}$
Probability of getting a doublet or sum 4 = 2/9

3. If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$, and $P(A \cap B) = \frac{1}{8}$, find:
(i) $P(A$ or $B)$
(ii) P(not A and not B)

Soln:
i) Using Addition Theorem:
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ Substitute values:
$= \frac{1}{4} + \frac{1}{2} - \frac{1}{8}$
Take LCM = 8
$= \frac{2}{8} + \frac{4}{8} - \frac{1}{8} = \frac{5}{8}$
Ans: $\boxed{\frac{5}{8}}$
(ii) P(not A and not B)
We know: $P(\text{not A and not B}) = P((A \cup B)^c)$
Using complement rule:
$P((A \cup B)^c) = 1 - P(A \cup B) = 1 - \frac{5}{8} = \frac{3}{8}$
Ans:(i) $\boxed{\frac{5}{8}}$ (ii) $\boxed{\frac{3}{8}}$

4. In an apartment, in selecting a house from door numbers 1 to 100 randomly, find the probability of getting the door number of the house to be an even number or a perfect square number or a perfect cube number.

Soln:

Total door numbers = 1 to 100

Total outcomes $= 100$

Let

A = Event of getting an even number

B = Event of getting a perfect square

C = Event of getting a perfect cube

We use Addition Theorem for three events:

$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$

Step 1: Count each event

Even numbers (A)

Even numbers from 1 to 100:

2, 4, 6, …, 100

Number of even numbers = 50

Perfect Squares (B)

Squares ≤ 100:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Number of squares = 10

Perfect Cubes (C)

Cubes ≤ 100:

1, 8, 27, 64

Number of cubes = 4

Step 2: Find intersections

A ∩ B (Even perfect squares)

4, 16, 36, 64, 100

Count = 5

B ∩ C (Perfect square and cube)

Common numbers: 1, 64

Count = 2

A ∩ C (Even perfect cubes)

8, 64

Count = 2

A ∩ B ∩ C (Even square and cube)

Only 64

Count = 1

Step 3: Apply Addition Theorem

$n(A \cup B \cup C) = 50 + 10 + 4 - 5 - 2 - 2 + 1 = 56$

Step 4: Find Probability

$P(A \cup B \cup C) = \frac{56}{100} = \frac{14}{25}$

Ans: $\boxed{\frac{14}{25}}$

Probability of getting an even number or perfect square or perfect cube = 14/25

5. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that

(i) The student opted for NCC but not NSS.

(ii) The student opted for NSS but not NCC.

(iii) The student opted for exactly one of them.

Soln:

Total students = 50

Let A = Students who opted NCC → n(A) = 28

B = Students who opted NSS → n(B) = 30

n(A ∩ B) = 18

Step 1: Find students in only one group

NCC but not NSS

$n(A \text{ only}) = n(A) - n(A \cap B)$

$= 28 - 18 = 10$

$P(\text{NCC only}) = \frac{10}{50} = \frac{1}{5}$

NSS but not NCC

$n(B \text{ only}) = n(B) - n(A \cap B)$

$= 30 - 18 = 12$

$P(\text{NSS only}) = \frac{12}{50} = \frac{6}{25}$

Step 2: Exactly one of them

Exactly one means:

$n(\text{exactly one}) = 10 + 12 = 22 P(\text{exactly one}) = \frac{22}{50} = \frac{11}{25}$

Ans:

(i) $\boxed{\frac{1}{5}}$ **(ii)** $\boxed{\frac{6}{25}}$ **(iii)** $\boxed{\frac{11}{25}}$

Practice Problems:

1. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

(a) $\frac{1}{2}$ (b) $\frac{4}{9}$

(c) $\frac{5}{9}$ (d) $\frac{2}{3}$

2. If A and B are two mutually exclusive events of a random experiment and P (not(A) = 0.45, P (A ∪(B) = 0.65

(a) 0.10 (b) 0.20

(c) 0.30 (d) 0.45

3. A box contains cards numbered 3, 5, 7, 9, … 35, 37. A card is drawn at random from the box. Find the probability that the drawn card have either multiples of 7 or a prime number.

(a) $\frac{11}{18}$ (b) $\frac{13}{18}$

(c) $\frac{7}{18}$ (d) $\frac{5}{9}$

4. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads

(a) $\frac{1}{2}$ (b) $\frac{3}{4}$

(c) $\frac{7}{8}$ (d) $\frac{5}{8}$

5. In a town of 8000 people, 1300 are over 50 years and 3000 are females. It is known that 30% of the females are over 50 years. What is the probability that a chosen individual from the town is either a female or over 50 years?

(a) $\frac{13}{40}$ (b) $\frac{3}{8}$

(c) $\frac{17}{40}$ (d) $\frac{1}{2}$

6. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or two consecutive heads.

(a) $\frac{7}{8}$ (b) $\frac{3}{4}$

(c) $\frac{1}{2}$ (d) 1

7. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$, then find the value of x.

(a) 2 (b) 1

(c) 3 (d) 1.5

8. Which of the following is incorrect?

(a) $P(A) > 1$ (b) $0 \leq P(A) \leq 1$

(c) $P(\emptyset) = 0$ (d) $P(A) + P(A') = 1$

9. The probability of selecting a red marble at random from a jar containing p red, q blue and r green marbles is:

(a) $\frac{q}{p+q+r}$ (b) $\frac{p}{p+q+r}$

(c) $\frac{pq}{p+q+r}$ (d) $\frac{pr}{p+q+r}$

10. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is $\frac{1}{9}$, then the number of tickets bought by Kamalam is:

(a) 9 (b) 12

(c) 18 (d) 15

Answers	
1. c	6. d
2. a	7. b
3. b	8. a
4. c	9. b
5. c	10. d

Solution:

1. Soln:

Let A = event that the first die shows an even number = {2, 4, 6}

$P(A) = \frac{3}{6} = \frac{1}{2}$

B = event that the total face sum is 8

Favorable outcomes for sum 8 are:

(2,6), (3,5), (4,4), (5,3), (6,2) → 5 outcomes

$P(B) = \frac{5}{36}$

Intersection $A \cap B$

First die is even and sum is 8:

Possible outcomes are

(2,6), (4,4), (6,2) → 3 outcomes

$P(A \cap B) = \frac{3}{36} = \frac{1}{12}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{5}{36} - \frac{1}{12} = \frac{18}{36} + \frac{5}{36} - \frac{3}{36} = \frac{20}{36} = \frac{5}{9}$

Ans: $\boxed{\frac{5}{9}}$

2. Soln:

Given: $P(\text{not } A) = 0.45$

Since $P(A) + P(\text{not } A) = 1 P(A) = 1 - 0.45 = 0.55$

Since A and B are mutually exclusive,

$P(A \cap B) = 0 P(A \cup B) = P(A) + P(B) 0.65 = 0.55 +$

$P(B) P(B) = 0.65 - 0.55 = 0.10$

Ans: $P(B) = \boxed{0.10}$

3. Soln:

The box contains odd numbers from 3 to 37.

Sample space:

$S = \{3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37\}$

Total cards = 18

Let A = multiples of 7 → {7, 21, 35} → 3 numbers

B = prime numbers → {3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37} → 11 numbers

Intersection $A \cap B$= {7} → 1 number

$P(A \cup B) = \frac{n(A)+n(B)-n(A \cap B)}{n(S)} = \frac{3+11-1}{18} = \frac{13}{18}$

Ans: $\boxed{\frac{13}{18}}$

4. Soln:

Total outcomes when 3 unbiased coins are tossed = 2^3

$= 8$

Let A = at most 2 tails → (0, 1, or 2 tails)

Favourable outcomes = 7

$P(A) = \frac{7}{8}$

B = at least 2 heads → (2 or 3 heads)

Favourable outcomes = 4

$P(B) = \frac{4}{8} = \frac{1}{2}$

Intersection $A \cap B$= outcomes satisfying both conditions = at least 2 heads → 4 outcomes

$P(A \cap B) = \frac{4}{8} = \frac{1}{2}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{7}{8} + \frac{1}{2} - \frac{1}{2} = \frac{7}{8}$

Ans: $\boxed{\frac{7}{8}}$

5. Soln:

Total people = 8000

Number of females = 3000

Number of people over 50 = 1300

30% of females are over 50 years:

$P(\text{female and over 50}) = 0.3 \times 3000 = 900$

$P(\text{female or over 50}) = \frac{3000+1300-900}{8000} = \frac{3400}{8000} = \frac{17}{40}$

Ans: $\boxed{\frac{17}{40}}$

6. Soln:

Sample space when a coin is tossed thrice = $2^3 = 8$ Let

A = exactly two heads → {HHT, HTH, THH} → 3 outcomes

B = at least one tail → complement of {HHH} → 7 outcomes

C = two consecutive heads → {HHH, HHT, THH} → 3 outcomes

Union of events: $A \cup B \cup C$ From B we already have {HHT, HTH, THH, HTT, THT, TTH, TTT}

Adding HHH from C gives all 8 outcomes.

So, $P(A \cup B \cup C) = \frac{8}{8} = 1$

Ans: $\boxed{1}$

7. Soln:

Given:
Probability of getting the job = $\frac{x}{3}$
Probability of not getting the job = $\frac{2}{3}$
Using the relation:
P(getting job")+P(not getting job)
$= 1\frac{x}{3} + \frac{2}{3} = 1\frac{x+2}{3} = 1x + 2 = 3$
x =1
Ans: $\boxed{1}$

8. Soln:
The incorrect statement is (a) $P(A) > 1$, because probability of any event always lies between 0 and 1.
Correct probability properties are:
- $0 \leq P(A) \leq 1$
- $P(\emptyset) = 0$
- $P(A) + P(A') = 1$

Ans: (a) $\boldsymbol{P(A) > 1}$

9. Soln:
Total number of marbles = $p + q + r$
Number of red marbles = p
Probability of selecting a red marble = $\frac{p}{p+q+r}$
Ans: $\boldsymbol{\frac{p}{p+q+r}}$

10. Soln:
Let the number of tickets bought by Kamalam be x.
Using probability formula:
$\frac{x}{135} = \frac{1}{9}$, $x = \frac{135}{9} = 15$
Ans: 15

TNPSC 2025 Aptitude
Previous Year Questions (PYQ's)

1. Divide Rs. 2,602 between A and B, so that the amount of A at the end of 6 years is equal to the amount of B at the end of 8 years, compound interest being at 4% per annum.
(a) Rs. 1,300, Rs. 1,232 (b) Rs. 1,452, Rs. 1,150
(c) Rs. 1,302, Rs. 1,300 (d) Rs. 1,352, Rs. 1,250
(e) Answer not known
ரூ. 2,602-ஐ A மற்றும் B ஆகிய இருவருக்குப் பிரித்துக் கொடுக்க வேண்டும். 4% கூட்டு வட்டி விகிதத்தில், 6 ஆண்டுகளுக்குப் பிறகு A பெறும் தொகையும், 8 ஆண்டுகளுக்குப் பிறகு B பெறும் தொகையும் சமம் எனில், அவர்கள் ஒவ்வொருவருக்கும் கிடைக்கும் பங்கு எவ்வளவு?
(a) ரூ. 1,300, ரூ. 1,232 (b) ரூ. 1,452, ரூ. 1,150
(c) ரூ. 1,302, ரூ. 1,300 (d) ரூ. 1,352, ரூ. 1,250
(e) Answer not known

2. Find the simple interest on Rs. 68,000 at 16 2/3% per annum for 9 months.
(a) Rs. 8,500 (b) Rs. 8,000
(c) Rs. 9,400 (d) Rs. 9,100
(e) Answer not known
அசல் ரூ. 68,000-க்கு 16 2/3% ஆண்டு வட்டி விகிதத்தில் 9 மாதங்களுக்குக் கிடைக்கும் தனிவட்டியைக் காண்க.
(a) ரூ. 8,500 (b) ரூ. 8,000
(c) ரூ. 9,400 (d) ரூ. 9,100
(e) Answer not known

3. P and Q can do a piece of work in 20 days and 30 days respectively. They started the work together and Q left after some days of work and P finished the remaining work in 5 days. After how many days from the start did Q leave?
(a) 6 days (b) 9 days
(c) 12 days (d) 15 days
(e) Answer not known
P மற்றும் Q ஆகிய இருவரும் ஒரு வேலையை முறையே 20 நாட்கள் மற்றும் 30 நாட்களில் முடிப்பார்கள். அவர்கள் இருவரும் சேர்ந்து வேலையைத் தொடங்குகின்றனர். சில நாட்கள் வேலை செய்த பிறகு Q விலகுகிறார். மீதமுள்ள வேலையை P மட்டும் 5 நாட்களில் முடித்தார் எனில், வேலை தொடங்கிய எத்தனை நாட்களுக்குப் பிறகு Q விலகினார்?
(a) 6 நாட்கள் (b) 9 நாட்கள்
(c) 12 நாட்கள் (d) 15 நாட்கள்
(e) Answer not known

4. If a : b = 3 : 7 and b : c = 7 : 6, Find the ratio between c and a
(a) 3 : 6 (b) 1 : 2
(c) 2 : 1 (d) 7 : 3
(e) Answer not known
a : b = 3 : 7 மற்றும் b : c = 7 : 6 எனில், c மற்றும் a-க்கு இடையேயான விகிதத்தைக் காண்க.
(a) 3 : 6 (b) 1 : 2
(c) 2 : 1 (d) 7 : 3
(e) Answer not known

5. The ratio of two numbers is 3 : 4 and H.C.F is 4. Their L.C.M. is
(a) 48 (b) 58
(c) 38 (d) 68
(e) Answer not known
இரு எண்களின் விகிதம் 3 : 4 மற்றும் அவற்றின் மீ.பொ.வ (H.C.F) 4 எனில், அவ்வெண்களின் மீ.சி.ம (L.C.M) காண்க.
(a) 48 (b) 58
(c) 38 (d) 68
(e) Answer not known

6. A number x is divisible by 13 when this number is divided by 16, 24, 32 it leaves a remainder 6 in each case. The least value of x is
(a) 390 (b) 420
(c) 294 (d) 486
(e) Answer not known
ஒரு எண் x-ஐ 13-ஆல் வகுக்க முடியும். அதே எண் x-ஐ 16, 24 மற்றும் 32 ஆகிய எண்களால் வகுக்கும்போது ஒவ்வொரு முறையும் மீதி 6 கிடைக்கிறது எனில், x-ன் மிகச்சிறிய மதிப்பு யாது?
(a) 390 (b) 420
(c) 294 (d) 486
(e) Answer not known

7. There are 80 students in a class. If 25% are absent on a particular day, how many students are present in the class?
(a) 20 (b) 40
(c) 60 (d) 75
(e) Answer not known
ஒரு வகுப்பில் 80 மாணவர்கள் உள்ளனர். ஒரு குறிப்பிட்ட நாளில் 25% மாணவர்கள் வருகை தரவில்லை எனில், அன்றைய தினம் வகுப்பிற்கு வருகை தந்த மாணவர்களின் எண்ணிக்கையைக் காண்க.
(a) 20 (b) 40
(c) 60 (d) 75
(e) Answer not known

8. The ratio of boys and girls in a class is 5:3. If 16% of boys and 8% of girls failed in an examination, then find the percentage of passed students.
(a) 87% (b) 13%
(c) 84% (d) 92%
(e) Answer not known
ஒரு வகுப்பிலுள்ள மாணவர்கள் மற்றும் மாணவிகளின் விகிதம் 5:3 ஆகும். ஒரு தேர்வில் 16% மாணவர்கள் மற்றும் 8% மாணவிகள் தோல்வி அடைந்தனர் எனில், தேர்ச்சி பெற்ற மொத்த மாணவர்களின் சதவீதத்தைக் காண்க.
(a) 87% (b) 13%
(c) 84% (d) 92%
(e) Answer not known

9. A person distributes his pens among four friends A, B, C, D in the ratio $\frac{1}{3} : \frac{1}{4} : \frac{1}{5} : \frac{1}{6}$. What is the minimum number of pens that the person should have?
(a) 65 (b) 57
(c) 75 (d) 45
(e) Answer not known
ஒருவர் தம்மிடமுள்ள பேனாக்களை A, B, C, D ஆகிய நான்கு நண்பர்களுக்கு $\frac{1}{3} : \frac{1}{4} : \frac{1}{5} : \frac{1}{6}$ என்ற விகிதத்தில் வழங்குகிறார் எனில், அவரிடமிருக்க வேண்டிய குறைந்தபட்ச பேனாக்களின் எண்ணிக்கை எவ்வளவு?
(a) 65 (b) 57
(c) 75 (d) 45
(e) Answer not known

10. If the ratios formed using the numbers 2, 5, x, 20 in the same order are in proportion, then 'x' is
(a) 50 (b) 4
(c) 10 (d) 8
(e) Answer not known
2, 5, x, 20 ஆகிய எண்களை அதே வரிசையில் பயன்படுத்தி அமையும் விகிதங்கள் ஒரு விகித சமத்தில் இருந்தால், 'x'-ன் மதிப்பு _____ ஆகும்.
(a) 50 (b) 4
(c) 10 (d) 8
(e) Answer not known

11. If the HCF of 108 and 234 is expressible in the form 23x - 51, then what is the value of x?
(a) 1 (b) 2
(c) 3 (d) 4
(e) Answer not known
108 மற்றும் 234 ஆகியவற்றின் மீ.பொ.வ (HCF) ஐ 23x - 51 என்ற வடிவில் எழுதினால், x-ன் மதிப்பு என்ன?
(a) 1 (b) 2
(c) 3 (d) 4
(e) Answer not known

12. Simplify : $(4^{-1} + 4^{-2} + 4^{-3})^0 \times (4^{-1} + 4^{-2} + 4^{-3})^1$
(a) $\frac{21}{64}$ (b) $\frac{64}{21}$ (c) 1 (d) 0
(e) Answer not known
சுருக்குக: $(4^{-1} + 4^{-2} + 4^{-3})^0 \times (4^{-1} + 4^{-2} + 4^{-3})^1$
(a) $\frac{21}{64}$ (b) $\frac{64}{21}$
(c) 1 (d) 0
(e) Answer not known

13. The average mark of 25 students was found to be 78.4. Later on, it was found that score of 96 was misread as 69. Find the correct mean of the marks.
(a) 75.64 (b) 79.48
(c) 80.12 (d) 82.46
(e) Answer not known
25 மாணவர்களின் சராசரி மதிப்பெண் 78.4 எனக் கண்டறியப்பட்டது. பின்னர், 96 என்ற மதிப்பெண் தவறுதலாக 69 எனப் படிக்கப்பட்டது தெரியவந்தது எனில், சரியான சராசரி மதிப்பெண்ணைக் காண்க.
(a) 75.64 (b) 79.48
(c) 80.12 (d) 82.46
(e) Answer not known

14. 3 men or 4 women or 12 boys can complete a work in one day. In how many days a man, a woman and 5 boys together can complete that work?
(a) 1 day (b) 2 days
(c) 3 days (d) 4 days
(e) Answer not known
3 ஆண்கள் அல்லது 4 பெண்கள் அல்லது 12 சிறுவர்கள் ஒரு வேலையை ஒரு நாளில் முடிப்பார்கள் எனில், ஒரு ஆண், ஒரு பெண் மற்றும் 5 சிறுவர்கள் சேர்ந்து அதே வேலையை எத்தனை நாட்களில் முடிப்பார்கள்?
(a) 1 day (b) 2 days
(c) 3 days (d) 4 days
(e) Answer not known

15. The diameter of a sphere is 8 cm. It is melted and drawn into a wire of diameter 3 mm. The length of the wire is _____.
(a) 36.9 m (b) 37.9 m
(c) 38.9 m (d) 39.9 m
(e) Answer not known
ஒரு கோளத்தின் விட்டம் 8 செ.மீ. அது உருக்கப்பட்டு 3 மி.மீ விட்டமுள்ள ஒரு கம்பியாக நீட்டப்படுகிறது எனில், அக்கம்பியின் நீளம் _____ ஆகும்.
(a) 36.9 m (b) 37.9 m
(c) 38.9 m (d) 39.9 m
(e) Answer not known

16. A sum of money becomes Rs 13380 after 3 years and Rs 20070 after 6 years on compound interest. Find the sum.
(a) Rs 8,820 (b) Rs 8,920
(c) Rs 9,020 (d) Rs 9,920
(e) Answer not known
கூட்டு வட்டி வீதத்தில் ஒரு குறிப்பிட்ட அசலானது 3 ஆண்டுகளில் ₹ 13,380 ஆகவும், 6

ஆண்டுகளில் ₹ 20,070 ஆகவும் மாறுகிறது எனில், அதன் அசலைக் காண்க.

(a) Rs 8,820 (b) Rs 8,920
(c) Rs 9,020 (d) Rs 9,920
(e) Answer not known

17. Seats for Mathematics, Physics and Biology in a school are in the ratio of 5:7: 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

(a) 2:3:4 (b) 6:7:8
(c) 6:8:9 (d) 1:3:4
(e) Answer not known

ஒரு பள்ளியில் கணிதம், இயற்பியல் மற்றும் உயிரியல் பாடங்களுக்கான இடங்களின் விகிதம் **5 : 7 : 8** ஆகும். அந்த இடங்களை முறையே **40%**, **50%** மற்றும் **75%** அதிகரிக்கத் திட்டமிடப்பட்டுள்ளது எனில், அதிகரிக்கப்பட்ட புதிய இடங்களின் விகிதம் என்னவாக இருக்கும்?

(a) 2:3:4 (b) 6:7:8
(c) 6:8:9 (d) 1:3:4
(e) Answer not known

18. A,B and C start at the same time in the same direction to run around a circular stadium . A completes a round in 252 seconds, B in 308 seconds and C in 198 seconds, all starting at the same point. After what time will they meet again at the starting point?

(a) 26 min 18 sec (b) 42 min 36 sec
(c) 45 min (d) 46 min 12 sec
(e) Answer not known

A, B மற்றும் C ஆகிய மூவரும் ஒரே நேரத்தில், ஒரே புள்ளியிலிருந்து, ஒரே திசையில் ஒரு வட்ட வடிவ மைதானத்தைச் சுற்றி ஓடத் தொடங்குகின்றனர். A ஒரு சுற்றை 252 விநாடிகளிலும், B 308 விநாடிகளிலும் மற்றும் C 198 விநாடிகளிலும் முடிப்பார்கள் எனில், அவர்கள் மூவரும் மீண்டும் எப்போது தொடக்கப் புள்ளியில் சந்திப்பார்கள்?

(a) 26 min 18 sec (b) 42 min 36 sec
(c) 45 min (d) 46 min 12 sec
(e) Answer not known

19. The cost of 15 kg of sugar is Rs 255, the cost of 17 kg of tea is RS 1615 and the cost of 22 kg of rice is Rs 572. What is the total cost of 18 kg of sugar, 21 kg of tea and 27 kg of rice?

(a) Rs. 2,442 (b) Rs. 3,923
(c) Rs. 3,003 (d) Rs. 2,932
(e) Answer not known

15 கி.கி சர்க்கரையின் விலை ₹255, 17 கி.கி தேயிலையின் விலை ₹1615 மற்றும் 22 கி.கி அரிசியின் விலை ₹572 எனில், 18 கி.கி சர்க்கரை, 21 கி.கி தேயிலை மற்றும் 27 கி.கி அரிசி ஆகியவற்றின் மொத்த விலை என்ன?

(a) Rs. 2,442 (b) Rs. 3,923
(c) Rs. 3,003 (d) Rs. 2,932
(e) Answer not known

20. The income of a person first increased by 10% and then it is decreased by 10%. What is the change in his income?

(a) 1% Increase (b) 1% Decrease
(c) No Change (d) 2% Decrease
(e) Answer not known

ஒரு நபரின் வருமானம் முதலில் 10% அதிகரிக்கப்பட்டு, பின்னர் 10% குறைக்கப்படுகிறது எனில், அவருடைய வருமானத்தில் ஏற்படும் மாற்றம் என்ன?

(a) 1% அதிகரிப்பு (b) 1% குறைவு
(c) மாற்றமில்லை (d) 2% குறைவு
(e) Answer not known

21. A, B, and C can separately do a work in 12, 15, and 20 days respectively. They started to work together, but C left after 2 days. Then A and B will finish the remaining work in how many days?

(a) 5 days (b) 4 days
(c) 6 days (d) 3 days
(e) Answer not known

A, B மற்றும் C ஆகிய மூவர் ஒரு வேலையைத் தனித்தனியே முறையே 12, 15 மற்றும் 20 நாட்களில் முடிப்பார்கள். அவர்கள் மூவரும் சேர்ந்து வேலையைத் தொடங்குகின்றனர், ஆனால் வேலை தொடங்கிய 2 நாட்களில் C விலகி விடுகிறார் எனில், மீதமுள்ள வேலையை A மற்றும் B இருவரும் சேர்ந்து எத்தனை நாட்களில் முடிப்பார்கள்?

(a) 5 நாட்கள் (b) 4 நாட்கள்
(c) 6 நாட்கள் (d) 3 நாட்கள்
(e) Answer not known

22. A square park is surrounded by a path of uniform width of 2 meters all around. The area of the path is 288 square meters. Find the perimeter of the park.

(a) 124 meters (b) 144 meters
(c) 136 meters (d) 152 meters
(e) Answer not known

ஒரு சதுர வடிவப் பூங்காவைச் சுற்றி 2 மீட்டர் சீரான அகலமுள்ள பாதை அமைந்துள்ளது. அந்தப் பாதையின் பரப்பு 288 சதுர மீட்டர் எனில், அந்தப் பூங்காவின் சுற்றளவைக் காண்க.

(a) 124 மீட்டர் (b) 144 மீட்டர்
(c) 136 மீட்டர் (d) 152 மீட்டர்
(e) Answer not known

23. A borrows ₹16,000 at 12% p.a. simple interest and B borrows ₹12,000 at 18% p.a. simple interest. In how many years will their total debt (Principal + Interest) be equal?

(a) $15\frac{1}{3}$ years (b) $16\frac{2}{3}$ years
(c) 18 years (d) 12 years
(e) Answer not known

A என்பவர் ₹16,000-ஐ ஆண்டுக்கு 12% தனிவட்டி வீதத்திலும், B என்பவர் ₹12,000-ஐ ஆண்டுக்கு 18% தனிவட்டி வீதத்திலும் கடனாகப் பெறுகிறார்கள். எத்தனை ஆண்டுகளுக்குப் பிறகு இருவரது கடன் தொகையும் (அசல் + வட்டி) சமமாகும்?

(a) $15\frac{1}{3}$ ஆண்டுகள் (b) $16\frac{2}{3}$ ஆண்டுகள்
(c) 18 ஆண்டுகள் (d) 12 ஆண்டுகள்
(e) Answer not known

24. A man spends ₹500 in buying 12 tables and chairs. The cost of one table is ₹50 and that of one chair is ₹40. What is the ratio of the number of chairs to the number of tables purchased?

(a) 1 : 5 (b) 2 : 3
(c) 5 : 1 (d) 3 : 4
(e) Answer not known

ஒருவர் ₹500 செலவில் 12 மேசைகள் மற்றும் நாற்காலிகளை வாங்குகிறார். ஒரு மேசையின் விலை ₹50 மற்றும் ஒரு நாற்காலியின் விலை ₹40 எனில், அவர் வாங்கிய நாற்காலிகள் மற்றும் மேசைகளின் எண்ணிக்கைக்கு இடையிலான விகிதம் என்ன?

(a) 1 : 5 (b) 2 : 3
(c) 5 : 1 (d) 3 : 4
(e) Answer not known

25. If LCM of 'a' and 'a + 2' is 1300. Find the LCM of 'a' and a + 1.

(a) 24,000 (b) 2,550
(c) 1,275 (d) 2,600
(e) Answer not known

'a' மற்றும் 'a + 2' ஆகியவற்றின் மீ.சி.ம (LCM) 1300 எனில், 'a' மற்றும் 'a + 1' ஆகியவற்றின் மீ.சி.ம-ஐக் காண்க.

(a) 24,000 (b) 2,550
(c) 1,275 (d) 2,600
(e) Answer not known

26. Two numbers are in the ratio of 15:11. If their HCF is 13, then what are the numbers?

(a) 105, 77 (b) 150, 110
(c) 195, 143 (d) 185, 133
(e) Answer not known

இரண்டு எண்கள் 15:11 என்ற விகிதத்தில் உள்ளன. அவற்றின் மீ.பொ.வ (HCF) 13 எனில், அந்த எண்கள் யாவை?

(a) 105, 77 (b) 150, 110
(c) 195, 143 (d) 185, 133
(e) Answer not known

27. Find the least number of square tiles required to pave the ceiling of a room 15 m 17 cm long and 9 m 2 cm broad.

(a) 656 (b) 738
(c) 814 (d) 902
(e) Answer not known

15 மீ 17 செ.மீ நீளமும், 9 மீ 2 செ.மீ அகலமும் கொண்ட ஓர் அறையின் மேற்கூரையில் பதிக்கத் தேவைப்படும் மிகக் குறைந்த எண்ணிக்கையிலான சதுர வடிவ வில்லைகளின் (Tiles) எண்ணிக்கையைக் காண்க.

(a) 656 (b) 738
(c) 814 (d) 902
(e) Answer not known

28. The number 311 311 311 311 311 311 311 is:

(a) neither divisible by 3 nor by 11
(b) divisible by 11 but not by 3
(c) divisible by 3 but not by -11
(d) divisible by both 3 and 11
(e) Answer not known

311 311 311 311 311 311 311 என்ற எண்:

(a) 3 மற்றும் 11 ஆகிய இரண்டாலும் வகுபடாது
(b) 11-ஆல் வகுபடும், ஆனால் 3-ஆல் வகுபடாது
(c) 3-ஆல் வகுபடும், ஆனால் 11-ஆல் வகுபடாது
(d) 3 மற்றும் 11 ஆகிய இரண்டாலும் வகுபடும்
(e) Answer not known

29. If 3 men or 9 boys can finish a piece of work in 21 days, in how many days can 5 men and 6 boys together do the same piece of work?

(a) 12 days (b) 9 days
(c) 15 days (d) 8 days
(e) Answer not known

3 ஆண்கள் அல்லது 9 சிறுவர்கள் ஒரு வேலையை 21 நாட்களில் முடிக்க முடியும் என்றால், 5 ஆண்கள் மற்றும் 6 சிறுவர்கள் சேர்ந்து அதே வேலையை எத்தனை நாட்களில் முடிப்பார்கள்?

(a) 12 நாட்கள் (b) 9 நாட்கள்
(c) 15நாட்கள் (d) 8 நாட்கள்
(e) Answer not known

30. Find the area of a trapezium where the height (h) is 5.9 cm and the parallel sides are a = 7 cm and b = 6cm.

(a) 35.40 cm^2 (b) 38.35 cm^2
(c) 42.15 cm^2 (d) 76.70 cm^2
(e) Answer not known

ஒரு சரிவகத்தின் இணை பக்கங்கள் a = 7 செ.மீ, b = 6 செ.மீ மற்றும் உயரம் h = 5.9 செ.மீ எனில், அதன் பரப்பளவைக் காண்க.

(a) 35.40 செ.மீ^{2} (b) 38.35 செ.மீ^{2}
(c) 42.15 செ.மீ^{2} (d) 76.70 செ.மீ^{2}
(e) Answer not known

31. In how many years will Rs 6600 becomes Rs 6930 at 10% p.a. if the interest compounded half yearly?

(a) 3 months (b) 6 months
(c) 9 months (d) 1 year
(e) Answer not known

அசல் ₹6,600 ஆனது 10% ஆண்டு வட்டி விகிதத்தில், அரை ஆண்டுக்கு ஒருமுறை வட்டி கணக்கிடப்படும் முறையில், எத்தனை ஆண்டுகளில் ₹6,930 ஆக மாறும்?

(a) 3 மாதங்கள் (b) 6 மாதங்கள்
(c) 9 மாதங்கள் (d) 1 ஆண்டு
(e) Answer not known

32. Find the Simple Interest on Rs. 45000 at 10% per annum for 5 years.

(a) Rs. 20,500 (b) Rs. 22,500
(c) Rs. 24,500 (d) Rs. 25,500
(e) Answer not known

அசல் ₹45,000-க்கு 10% ஆண்டு வட்டி விகிதத்தில் 5 ஆண்டுகளுக்குக் கிடைக்கும் தனிவட்டியைக் காண்க.

(a) ₹20,500 (b) ₹22,500
(c) ₹24,500 (d) ₹25,500
(e) Answer not known

33. The Ratio 20:15 is equivalent to

(a) 4:3 (b) 3:4
(c) 5:4 (d) 4:5
(e) Answer not known

20:15 என்ற விகிதம் இதற்குச் சமமானது

(a) 4:3 (b) 3:4
(c) 5:4 (d) 4:5
(e) Answer not known

34. Find the ratio of HCF and LCM of the numbers 18 and 30

(a) 1:5 (b) 1:15
(c) 5:1 (d) 15:1
(e) Answer not known

18 மற்றும் 30 ஆகிய எண்களின் மீ.பொ.வ (HCF) மற்றும் மீ.சி.ம (LCM) ஆகியவற்றிற்கு இடையேயான விகிதத்தைக் காண்க.

(a) 1:5 (b) 1:15
(c) 5:1 (d) 15:1
(e) Answer not known

35. Two numbers are in the ratio of 2:3. If their HCF is 15 find the numbers.

(a) 30, 45 (b) 20, 30
(c) 15, 30 (d) 45, 60
(e) Answer not known

இரு எண்களின் விகிதம் 2:3. அவ்வெண்களின் மீ.பொ.வ 15 எனில், அந்த எண்களைக் காண்க.

(a) 30, 45 (b) 20, 30
(c) 15, 30 (d) 45, 60
(e) Answer not known

36. If the difference between 80% of a number and 60% of the same number is 1200, then find 25% of that number.

(a) 1200 (b) 1500
(c) 1800 (d) 2000
(e) Answer not known

ஓர் எண்ணின் 80% மற்றும் அதே எண்ணின் 60% ஆகியவற்றிற்கு இடையேயான வித்தியாசம் 1200 எனில், அந்த எண்ணின் 25%-ஐக் காண்க.

(a) 1200 (b) 1500
(c) 1800 (d) 2000
(e) Answer not known

37. A,B and C completes a piece of work costing Rs. 1800. A worked for 6 days, B for 4 days and C for 9 days. If their daily wages are in the ratio 5:6:4, how much amount will be received by A.

(a) Rs. 800 (b) Rs. 600
(c) Rs. 900 (d) Rs. 400
(e) Answer not known

A, B மற்றும் C ஆகிய மூவரும் சேர்ந்து ஒரு வேலையை ₹ 1,800 மதிப்பீட்டில் முடித்தனர். A என்பவர் 6 நாட்களும், B என்பவர் 4 நாட்களும் மற்றும் C என்பவர் 9 நாட்களும் வேலை செய்தனர். அவர்களது தினசரி ஊதிய விகிதம் 5:6:4 எனில், A பெரும் தொகை எவ்வளவு?

(a) Rs. 800 (b) Rs. 600
(c) Rs. 900 (d) Rs. 400
(e) Answer not known

38. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

(a) 21 cm (b) 18 cm
(c) 24 cm (d) 27 cm
(e) Answer not known

ஒரு திண்ம நேர்வட்டக் கூம்பின் கனஅளவு 11088 செ.மீ^{3} ஆகும். அதன் உயரம் 24 செ.மீ எனில், அக்கூம்பின் ஆரத்தைக் காண்க.

(a) 21 செ.மீ (b) 18 செ.மீ
(c) 24 செ.மீ (d) 27 செ.மீ
(e) Answer not known

39. Find the principal if the difference between Compound Interest (C.I) and Simple Interest (S.I) on it at 8% per annum for 2 years is Rs. 240.

(a) Rs. 37,500 (b) Rs. 38,000
(c) Rs. 35,000 (d) Rs. 40,000
(e) Answer not known

ஆண்டுக்கு 8% வட்டி வீதத்தில் 2 ஆண்டுகளுக்கு ஒரு தொகைக்கு கிடைக்கும் கூட்டு வட்டிக்கும் (C.I) தனி வட்டிக்கும் (S.I) இடையேயான வித்தியாசம் ரூ. 240 எனில், அசல் தொகையைக் காண்க.

(a) Rs. 37,500 (b) Rs. 38,000
(c) Rs. 35,000 (d) Rs. 40,000
(e) Answer not known

40. Which of the following is the correct time period for Rs. 17,000 to amount to Rs. 18,200 at an interest rate of 7% per annum?

(a) $1\frac{1}{119}$ years (b) $1\frac{2}{119}$ years
(c) $1\frac{3}{119}$ years (d) $1\frac{10}{119}$ years
(e) Answer not known

ரூ. 17,000 அசல் தொகையானது 7% வட்டி வீதத்தில், எத்தனை ஆண்டுகளில் ரூ. 18,200 ஆக உயரும்?

(a) $1\frac{1}{119}$ ஆண்டுகள் (b) $1\frac{2}{119}$ ஆண்டுகள்
(c) $1\frac{3}{119}$ ஆண்டுகள் (d) $1\frac{10}{119}$ ஆண்டுகள்
(e) Answer not known

41. What is the greatest possible volume of a vessel that can be used to measure exactly the volume of milk in cans (in full capacity) of 80 litres, 100 litres and 120 litres?

(a) 10 litres (b) 20 litres
(c) 30 litres (d) 40 litres
(e) Answer not known

80 லிட்டர், 100 லிட்டர் மற்றும் 120 லிட்டர் கொள்ளளவு கொண்ட கலன்களில் உள்ள பாலை முழுமையாக அளக்கப் பயன்படும் மிகப்பெரிய அளவையின் கொள்ளளவு என்ன?

(a) 10 லிட்டர் (b) 20 லிட்டர்
(c) 30 லிட்டர் (d) 40 லிட்டர்
(e) Answer not known

42. A man, a boy, and a woman can finish a work in 10 days, 15 days, and 30 days, respectively. In how many days can the work be finished by a man, a woman, and a boy when all of them work together?

(a) 5 days (b) 6 days
(c) 8 days (d) 10 days
(e) Answer not known

ஒரு ஆண், ஒரு சிறுவன் மற்றும் ஒரு பெண் ஒரு வேலையை முறையே 10 நாட்கள், 15 நாட்கள் மற்றும் 30 நாட்களில் முடிப்பார்கள். அவர்கள் அனைவரும் ஒன்றாகச் சேர்ந்து வேலை செய்தால், அந்த வேலையை எத்தனை நாட்களில் முடிப்பார்கள்?

(a) 5 நாட்கள் (b) 6 நாட்கள்
(c) 8 நாட்கள் (d) 10 நாட்கள்
(e) Answer not known

43. A and B together complete a piece of work in 40 days, B and C completed the same work in 48 days, C and A complete the same work in 60 days. In how many days can all the three complete the same work while working together?

(a) 27 days (b) 30 days
(c) 32 days (d) 25 days
(e) Answer not known

A மற்றும் B ஆனது ஒரு வேலையை 40 நாட்களில் முடிப்பர் அதே வேலையை B மற்றும் C 48 நாட்களில் முடிப்பர், அதே போல் C மற்றும் A ஆனவர்கள் 60 நாட்களில் முடிப்பர் எனில் A, B, C இணைந்து அதே வேலையை எத்தனை நாட்களில் முடிப்பர்?

(a) 27 நாட்கள் (b) 30 நாட்கள்
(c) 32 நாட்கள் (d) 25 நாட்கள்
(e) Answer not known

44. A conical tent is required to accommodate 9 persons and each person needs 12 m^2 of space on ground and 160 cubic meters of air to breathe. The vertical height of the tent is

(a) 40 m (b) 30 m
(c) 50 m (d) 10 m
(e) Answer not known

ஒரு கூம்பு வடிவ கூடாரமானது 9 நபரை வைத்துக் கொள்ள இயலும். ஒரு நபருக்கு 12 மீ ^{2}அளவு தரையளவும், 160 கன மீட்டர் காற்று சுவாசிப்பதற்கும் தேவைப்படுகிறது எனில் கூடாரத்தின் உயரம் என்பது

(a) 40 மீ (b) 30 மீ
(c) 50 மீ (d) 10 மீ
(e) Answer not known

45. Three identical cubes of side 3 cm are joined end to end. Then the total surface area is

(a) 576 cm^2 (b) 126 cm^2
(c) 224 cm^2 (d) 228 cm^2
(e) Answer not known

3 செ.மீ. அளவுள்ள மூன்று ஒரே மாதிரியான கனங்கள் ஒன்றன் பின் ஒன்றாக இணைக்கப்பட்டுள்ளன. அப்போது மொத்த மேற்பரப்பு பரப்பளவு என்ன?

(a) 576 செ.மீ^{2} (b) 126 செ.மீ^{2}
(c) 224 செ.மீ^{2} (d) 228 செ.மீ^{2}
(e) Answer not known

46. Deepika has paid Simple Interest on a certain sum for 12 years at 5% per annum is Rs. 3,600. Find the sum.

(a) Rs. 6,000 (b) Rs. 3,000
(c) Rs. 5,000 (d) Rs. 4,000
(e) Answer not known

தீபிகா ஒரு குறிப்பிட்ட தொகைக்கு 5% வட்டி வீதம் 12 ஆண்டுகள் கழித்து ரூ. 3,600-ஐத் தனி வட்டியாகச் செலுத்தினால், அதன் அசலைக் காண்க.

(a) ரூ. 6,000 (b) ரூ. 3,000
(c) ரூ. 5,000 (d) ரூ. 4,000
(e) Answer not known

47. Product of two co-prime numbers is 119. Find the LCM.

(a) 1 (b) 119
(c) 19 (d) Equal to their H.C.F
(e) Answer not known

இரு பகா எண்களின் பெருக்கற்பலன் 119. எனில் அதன் மீ.பொ.ம வைக் காண்க.

(a) 1 (b) 119
(c) 19 (d) மீ.பொ.வ வுக்கு சமம்
(e) Answer not known

48. The Greatest Number that exactly divides 425, 4131 and 255 is

(a) 13 (b) 7
(c) 17 (d) 21
(e) Answer not known

425, 4131 மற்றும் 255 ஆகிய எண்களை மீதியின்றி வகுக்கக்கூடிய மிகப்பெரிய எண் எது?
(a) 13 (b) 7
(c) 17 (d) 21
(e) Answer not known

49. The HCF of 408,1190,1734 and 2890 is
(a) 34 (b) 2
(c) 17 (d) 51
(e) Answer not known
408, 1190, 1734 மற்றும் 2890 ஆகியவற்றின் மீ.பொ.வ (H.C.F) என்ன?
(a) 34 (b) 2
(c) 17 (d) 51
(e) Answer not known

50. One man, 3 women and 4 boys can do a piece of work in 96 hours. 2 men and 8 boys can do it in 80 hours. 2 men and 3 women can do it in 120 hours. Then 5 men and 12 boys can do it in:
(a) $39\frac{1}{11}$hours (b) $42\frac{7}{11}$hours
(c) $43\frac{7}{11}$hours (d) 44 hours
(e) Answer not known
ஒரு ஆண், 3 பெண்கள் மற்றும் 4 சிறுவர்கள் ஒரு வேலைப்பாட்டை 96 மணிநேரங்களில் முடிக்க முடியும். 2 ஆண்கள் மற்றும் 8 சிறுவர்கள் அதை 80 மணிநேரங்களில் முடிக்க முடியும். 2 ஆண்கள் மற்றும் 3 பெண்கள் அதை 120 மணிநேரங்களில் முடிக்க முடியும். அப்படியானால் 5 ஆண்கள் மற்றும் 12 சிறுவர்கள் அதை எத்தனை நேரத்தில் முடிப்பார்கள்?
(a) $39\frac{1}{11}$மணி (b) $42\frac{7}{11}$மணி
(c) $43\frac{7}{11}$மணி (d) 44 மணி
(e) Answer not known

51. If a diagonal of a rectangle is thrice its smaller side, then the ratio of its length to breadth is:
(a) 3 : 1 (b) $\sqrt{8}$: 1
(c) $2\sqrt{2}$: 1 (d) $\sqrt{5}$: 1
(e) Answer not known
ஒரு செவ்வகத்தின் கோணம் (diagonal) அதன் சிறிய பக்கத்தின் மூன்று மடங்கு எனில், அதன் நீளம் மற்றும் அகலம் எந்த விகிதத்தில் இருக்கும்?
(a) 3 : 1 (b) $\sqrt{8}$: 1
(c) $2\sqrt{2}$: 1 (d) $\sqrt{5}$: 1
(e) Answer not known

52. If x: 7.5 = 8: y = 7: 17.5, find x: y
(a) 3 : 22 (b) 1 : 7
(c) 3 : 20 (d) 3 : 23
(e) Answer not known
x: 7.5 = 8: y = 7: 17.5 எனில், x: yஐ காண்க.
(a) 3 : 22 (b) 1 : 7
(c) 3 : 20 (d) 3 : 23
(e) Answer not known

53. If Rs. 1,600 is divided among P and Q in the ratio 5 : 3, then Q's share is:
(a) 900 (b) 600
(c) 1000 (d) 1200
(e) Answer not known
ரூ. 1,600 ஐ P மற்றும் Q ஆகியோருக்கு 5 : 3 என்ற விகிதத்தில் பகுத்தால், Q-வின் பங்கு எவ்வளவு?
(a) 900 (b) 600
(c) 1000 (d) 1200
(e) Answer not known

54. L.C.M. of $(2x^2-3xy)^2$, $(4x-6y)^3$and $(8x^3-27y^3)$is _____?
(a) $2x(2x-3y)^3(4x^2+6xy+9y^2)$
(b) $2^3x^2(2x-3y)^3(4x^2+6xy+9y^2)$
(c) $2^2x^2(2x-3y)^2(4x^2+6xy+9y^2)$
(d) $2^2x^2(2x-3y)^2(4x+6xy+9y)$
(e) Answer not known
$(2x^2-3xy)^2$, $(4x-6y)^3$மற்றும் $(8x^3-27y^3)$இன் L.C.M. என்ன?
(a) $2x(2x-3y)^3(4x^2+6xy+9y^2)$
(b) $2^3x^2(2x-3y)^3(4x^2+6xy+9y^2)$
(c) $2^2x^2(2x-3y)^2(4x^2+6xy+9y^2)$
(d) $2^2x^2(2x-3y)^2(4x+6xy+9y)$
(e) Answer not known

55. Peter got 30% of the maximum marks in an examination and failed by 10 marks. However, Paul who took the same examination got 40% o the total marks and got 15 marks more than the passing marks. What were the passing marks in the examination?
(a) 35 (b) 65
(c) 85 (d) 70
(e) Answer not known
பீட்டர் ஒரு தேர்வில் அதிகபட்ச மதிப்பெண்களின் 30% பெற்றார் மற்றும் 10 மதிப்பெண்களால் தோல்வியடைந்தார். ஆனால் அதே தேர்வில் கலந்து கொண்ட பால், மொத்த மதிப்பெண்களின் 40% பெற்றார் மற்றும் தேர்ச்சி மதிப்பெண்களை விட 15 மதிப்பெண்கள் அதிகமாக பெற்றார். அந்த தேர்வின் தேர்ச்சி மதிப்பெண்கள் என்ன?
(a) 35 (b) 65
(c) 85 (d) 70
(e) Answer not known

56. Akila scored 80% of marks in an examination. If her score was 576 marks, then find the maximum marks of the examination.
(a) 640 (b) 700
(c) 720 (d) 800
(e) Answer not known
அகிலா ஒரு தேர்வில் **80%** மதிப்பெண்கள் பெற்றார். அவர் பெற்ற மதிப்பெண் **576** எனில், அந்தத் தேர்வின் மொத்த மதிப்பெண்களைக் காண்க.
(a) 640 (b) 700
(c) 720 (d) 800
(e) Answer not known

57. Eight men working for 9 hours a day complete a piece of work in 20 days. In how many days can 12 men working for 10 hours a day complete the same piece of work?
(a) 10 days (b) 12 days
(c) 15 days (d) 18 days
(e) Answer not known

8 மனிதர்கள் ஒரு நாளைக்கு 9 மணிநேரம் வேலை செய்து ஒரு வேலையை 20 நாட்களில் முடிக்கிறார்கள். அதே வேலையை 12 மனிதர்கள் ஒரு நாளைக்கு 10 மணிநேரம் வேலை செய்தால் எத்தனை நாட்களில் முடிப்பார்கள்?
(a) 10 நாட்கள் (b) 12 நாட்கள்
(c) 15 நாட்கள் (d) 18 நாட்கள்
(e) Answer not known

58. Three circles of radius 3.5 cm each are placed in such a way that each touches the other two. The area of the portion enclosed by the circles is
(a) 1.25 cm^2 (b) 1.96 cm^2
(c) 2.75 cm^2 (d) 3.50 cm^2
(e) Answer not known

ஒவ்வொன்றும் 3.5 செ.மீ ஆரம் கொண்ட மூன்று வட்டங்கள், ஒவ்வொன்றும் மற்ற இரண்டு வட்டங்களைத் தொடுமாறு வைக்கப்பட்டுள்ளன. அந்த வட்டங்களால் சூழப்பட்ட இடைப்பட்டப் பகுதியின் பரப்பளவு என்ன?
(a) 1.25 செ.மீ^{2} (b) 1.96 செ.மீ^{2}
(c) 2.75 செ.மீ^{2} (d) 3.50 செ.மீ^{2}
(e) Answer not known

59. The difference of SI and CI on a sum at 5% per annum for 3 years is Rs. 122. Find the sum.
(a) Rs. 12,000 (b) Rs. 14,000
(c) Rs. 16,000 (d) Rs. 18,000
(e) Answer not known

ஒரு தொகைக்கு ஆண்டுக்கு 5% வட்டி விகிதத்தில் 3 ஆண்டுகளுக்கு எளிய வட்டி (SI) மற்றும் கூட்டு வட்டி (CI) இடையேயான வித்தியாசம் ரூ. 122 ஆகும். அந்த தொகையை காண்க.
(a) Rs. 12,000 (b) Rs. 14,000
(c) Rs. 16,000 (d) Rs. 18,000
(e) Answer not known

60. Ramesh deposited Rs 15600 in a fixed deposit at the rate of 10% per annum simple, interest. After every second year, he adds his interest earnings to the principal. The interesst added to end of Fourth year is
(a) Rs. 3,276 (b) Rs. 3,432
(c) Rs. 3,588 (d) Rs. 3,744
(e) Answer not known

ரமேஷ் ரூ. 15,600 ஐ ஆண்டு 10% எளிய வட்டி விகிதத்தில் நிலையான வைப்பு (Fixed Deposit) திட்டத்தில் முதலீடு செய்தார். ஒவ்வொரு இரண்டாவது ஆண்டின் முடிவில், அவர் பெற்ற வட்டியை முதல்தொகையுடன் சேர்த்தார். நான்காவது ஆண்டின் முடிவில் சேர்க்கப்பட்ட வட்டி எவ்வளவு?
(a) Rs. 3,276 (b) Rs. 3,432
(c) Rs. 3,588 (d) Rs. 3,744
(e) Answer not known

61. The combined salary of A, B, and C amounts to ₹33,300. If A, B, and C spend 80%, 85%, and 75% of their respective incomes, and their savings are in the ratio 7:6:9, find the salary of B.
(a) ₹10,800 (b) ₹11,100
(c) ₹12,000 (d) ₹12,600
(e) Answer not known

A, B மற்றும் C ஆகியோரின் மொத்த சம்பளம் ₹33,300 ஆகும். A, B மற்றும் C தங்களது வருமானத்தின் முறையே 80%, 85% மற்றும் 75% செலவழிக்கிறார்கள். அவர்களின் சேமிப்புகள் 7 : 6 : 9 என்ற விகிதத்தில் உள்ளன எனில், B-யின் சம்பளம் எவ்வளவு?
(a) ₹10,800 (b) ₹11,100
(c) ₹12,000 (d) ₹12,600
(e) Answer not known

62. Three numbers are in the ratio of 3: 4: 5 and their L.C.M. is 2400. Their H.C.F. is
(a) 20 (b) 30
(c) 40 (d) 60
(e) Answer not known

மூன்று எண்கள் 3:4:5 என்ற விகிதத்தில் உள்ளன. அவற்றின் மீ.பொ.ம (L.C.M.) 2400 எனில், அவற்றின் மீ.பொ.வ (H.C.F.) காண்க.
(a) 20 (b) 30
(c) 40 (d) 60
(e) Answer not known

63. If a, b are two digit numbers such that HCF(a, b) = 15. Then how many pairs are available?
(a) 11 (b) 12
(c) 14 (d) 15
(e) Answer not known

(a, b) ன் மீப்பெரு பொது வகுத்தி 15 மற்றும் a, b ஆகியவை ஈரிலக்க எண்கள் எனில் இவ்வாறு எத்தனை இணை எண்கள் காணப்படுகின்றன?
(a) 11 (b) 12
(c) 14 (d) 15
(e) Answer not known

64. When a dice is rolled, find the probability to get the number, which is greater than 4?
(a) $\frac{1}{3}$ (b) $\frac{1}{2}$
(c) $\frac{2}{3}$ (d) $\frac{1}{6}$
(e) Answer not known

ஒரு பகடை உருட்டப்படும்போது 4ஐ விடப் பெரிய எண் கிடைப்பதற்கான நிகழ்தகவு என்ன?

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$
(c) $\frac{2}{3}$ (d) $\frac{1}{6}$
(e) Answer not known

65. A, B and C can do a piece of work in 5, 6 and 12 days respectively. If A, B and C work together to complete, then find their separate shares if they will be paid Rs. 27,000 for completing the work.

(a) 10000, 5000, 12000 (b) 5000, 12000, 10000
(c) 10000, 12000, 5000 (d) 12000, 10000, 5000
(e) Answer not known

A, B மற்றும் C ஆகியோர் ஒரு வேலையை முறையே 5, 6 மற்றும் 12 நாட்களில் முடிப்பார்கள். A, B மற்றும் C ஆகிய மூவரும் ஒன்று சேர்ந்து அந்த வேலையை முடித்தால் அவர்களுக்கு ரூ. 27,000 வழங்கப்படும் எனில் அவர்கள் தனித்தனியே பெறும் பங்குகளைக் காண்க.

(a) 10000, 5000, 12000 (b) 5000, 12000, 10000
(c) 10000, 12000, 5000 (d) 12000, 10000, 5000
(e) Answer not known

66. If the radius of a cone is doubled, the new volume will be _____ times the original volume.

(a) 2 times (b) 4 times
(c) 6 times (d) 8 times
(e) Answer not known

ஒரு கூம்பின் ஆரம் (radius) இரட்டிப்பாக மாற்றப்பட்டால், புதிய கனஅளவு (volume) முதன்மை கனஅளவின் _____ மடங்காக இருக்கும்.

(a) 2 மடங்கு (b) 4 மடங்கு
(c) 6 மடங்கு (d) 8 மடங்கு
(e) Answer not known

67. Find the difference in C.I. and S.I. for P = Rs. 12000, r = 8%, n = 3 years

(a) Rs. 235.544 (b) Rs. 236.544
(c) Rs. 237.544 (d) Rs. 238.544
(e) Answer not known

கூட்டு வட்டிக்கும், தனிவட்டிக்கும் இடையேயுள்ள வித்தியாசத்தைக் காண்க.P = ரூ. 12000, r = 8%, n = 3 ஆண்டுகள்

(a) ரூ. 235.544 (b) ரூ. 236.544
(c) ரூ. 237.544 (d) ரூ. 238.544
(e) Answer not known

68. In what time will Rs. 17,800 amount to Rs. 19,936 at 6% simple interest per annum?

(a) 4 years (b) 3 years
(c) 2½ years (d) 2 years
(e) Answer not known

ரூ. 17,800 என்பது ஆண்டு 6% எளிய வட்டியில் ரூ. 19,936 ஆக மாற எவ்வளவு நேரம் ஆகும்?

(a) 4 ஆண்டுகள் (b) 3 ஆண்டுகள்
(c) 2 ½ ஆண்டுகள் (d) 2 ஆண்டுகள்
(e) Answer not known

69. Selvan has Rs. 900 and wants to divide it between Manimozhi and Bharathi in the ratio 3 : 2, then How much amount Bharathi can get?

(a) 540 (b) 360
(c) 340 (d) 560
(e) Answer not known

செல்வனிடம் ரூ. 900 உள்ளது. அதனை மணிமொழி மற்றும் பாரதிக்கு இடையில் 3 : 2 என்ற விகிதத்தில் பகிர்ந்து அளிக்கிறார் எனில், பாரதிக்கு கிடைக்கும் தொகை எவ்வளவு?

(a) 540 (b) 360
(c) 340 (d) 560
(e) Answer not known

70. Find the LCM of 12, 14, 19, 25 and 36

(a) 1197 (b) 1197000
(c) 11970 (d) 119700
(e) Answer not known

12, 14, 19, 25 மற்றும் 36 ஆகியயவற்றிற்கு மீ.பொ.ம காண்க.

(a) 1197 (b) 1197000
(c) 11970 (d) 119700
(e) Answer not known

71. The population of a town is increasing at the rate of 5% p.a. It was 1200 in the year 2020. Find the population in the year 2023 approximately.

(a) 1389 (b) 1379
(c) 1399 (d) 1369
(e) Answer not known

ஒரு நகரத்தின் மக்கள்தொகை ஆண்டுக்கு 5% வீதம் அதிகரிக்கிறது. 2020ஆம் ஆண்டு மக்கள் தொகை 1200 ஆக இருந்தது. 2023 ஆம் ஆண்டில் மக்கள் தொகையைத் தோராயமாகக் காண்க.

(a) 1389 (b) 1379
(c) 1399 (d) 1369
(e) Answer not known

72. Babu can weave a saree in 24 days. Ramesh is twice as good a weaver as Babu. If both of them weave together, then in how many days can they complete weaving the saree?

(a) 10 (b) 12
(c) 8 (d) 24
(e) Answer not known

பாபு ஒரு சேலையை 24 நாட்களில் நெய்வார். ரமேஷ் பாபுவை விட நெய்வதில் இரு மடங்கு திறமைசாலி. இருவரும் இணைந்து நெய்தால், அந்த சேலையை எத்தனை நாட்களில் நெய்து முடிப்பார்கள்?

(a) 10 (b) 12
(c) 8 (d) 24
(e) Answer not known

73. If an aluminium sphere of radius 24 cm is melted to make a cylinder of radius 6 cm, then the height of the cylinder is
(a) 512 cm (b) 128 cm
(c) 256 cm (d) 64 cm
(e) Answer not known

24 செ.மீ ஆரமுள்ள ஒரு அலுமினியக் கோளம் உருக்கப்பட்டு 6 செ.மீ ஆரமுள்ள ஒரு உருளையாக மாற்றப்படுகிறது, எனில் உருளையின் உயரம் _____ ஆகும்.
(a) 512 செ.மீ (b) 128 செ.மீ
(c) 256 செ.மீ (d) 64 செ.மீ
(e) Answer not known

74. Find the compound interest for the given data:
Principal = Rs. 8000, r = 4%p.a., $n = 1\frac{1}{2}$years, interest compounded annually.
(a) Rs. 486.40 (b) Rs. 468.40
(c) Rs. 466.40 (d) Rs. 484.40
(e) Answer not known

கொடுக்கப்பட்ட விவரங்களுக்கு கூட்டு வட்டியை கண்டுபிடிக்கவும்:
முதல்தொகை = ரூ. 8000, r = 4%ஆண்டு, $n = 1\frac{1}{2}$ஆண்டுகள், ஆண்டு ஒன்றுக்கு ஒருமுறை கூட்டு வட்டி.
(a) ரூ. 486.40 (b) ரூ. 468.40
(c) ரூ. 466.40 (d) ரூ. 484.40
(e) Answer not known

75. Find the simple interest on a principal of Rs. 35,500 at 10% per annum for $3\frac{1}{2}$years.
(a) Rs. 12,400 (b) Rs. 12,425
(c) Rs. 12,450 (d) Rs. 12,500
(e) Answer not known

கொடுக்கப்பட்ட முதல்தொகைக்கு எளிய வட்டியை காண்க:
முதல்தொகை = ரூ. 35,500, ஆண்டு 10% வட்டி விகிதத்தில், $3\frac{1}{2}$ஆண்டுகளுக்கு.
(a) ரூ. 12,400 (b) ரூ. 12,425
(c) ரூ. 12,450 (d) ரூ. 12,500
(e) Answer not known

76. What is the smallest 5 digit number that is exactly divisible by 144 and 216?
(a) 10268 (b) 10368
(c) 10468 (d) 10168
(e) Answer not known

144 மற்றும் 216 ஆகிய எண்களால் சரியாக வகுபடக் கூடிய மிகச் சிறிய 5 இலக்க எண் என்ன?
(a) 10268 (b) 10368
(c) 10468 (d) 10168
(e) Answer not known

77. The ratio of 1 hour to 9 seconds is
(a) 400 : 1 (b) 1 : 400
(c) 40 : 1 (d) 1 : 40
(e) Answer not known

1 மணிநேரத்திற்கும் 9 வினாடிகளுக்கும் உள்ள விகிதம்:
(a) 400 : 1 (b) 1 : 400
(c) 40 : 1 (d) 1 : 40
(e) Answer not known

78. If A's salary is 25% less than B's salary, by how much percent is B's salary more than A's?
(a) $33\frac{1}{3}$% (b) 25%
(c) $25\frac{1}{3}$% (d) 33%
(e) Answer not known

A-ன் வருமானம் B-ன் வருமானத்தை விட 25% குறைவு எனில், B-ன் வருமானம் A-ன் வருமானத்தை விட எத்தனை சதவீதம் அதிகம்?
(a) $33\frac{1}{3}$% (b) 25%
(c) $25\frac{1}{3}$% (d) 33%
(e) Answer not known

79. A sum of money at simple interest amounts to Rs. 815 in the 3rd year and Rs. 854 in the 4th year. Find the sum.
(a) Rs. 650 (b) Rs. 690
(c) Rs. 698 (d) Rs. 700
(e) Answer not known

ஒரு தொகை எளிய வட்டியில் 3ஆம் ஆண்டில் ரூ. 815 ஆகவும், 4ஆம் ஆண்டில் ரூ. 854 ஆகவும் ஆகிறது. அந்த முதல்தொகையை கண்டுபிடிக்கவும்.
(a) ரூ. 650 (b) ரூ. 690
(c) ரூ. 698 (d) ரூ. 700
(e) Answer not known

80. Find the rate of interest if the difference between C.I and S.I on Rs. 16,000 compounded annually for 2 years is Rs. 40.
(a) 4.5% (b) 5%
(c) 5.5% (d) 6%
(e) Answer not known

ரூ. 16,000க்கு 2 ஆண்டுகள் ஆண்டுதோறும் கூட்டுத் தொகை வட்டி (C.I) மற்றும் எளிய வட்டி (S.I) ஆகியவற்றின் வித்தியாசம் ரூ. 40 ஆக இருந்தால், வட்டி விகிதத்தை கண்டுபிடிக்கவும்.
(a) 4.5% (b) 5%
(c) 5.5% (d) 6%
(e) Answer not known

81. The population of a town is increasing at the rate of 8% p.a. It was 801900 in the year 2021. Find the population in the year 2019.
(a) 687500 (b) 687600
(c) 687700 (d) 687800
(e) Answer not known

ஒரு நகரத்தின் மக்கள் தொகை ஆண்டுக்கு 8% வீதத்தில் அதிகரிக்கிறது. 2021 ஆம் ஆண்டில் அது 801900 ஆக இருந்தது. 2019 ஆம் ஆண்டின் மக்கள் தொகையை கண்டுபிடிக்கவும்.

(a) 687500 (b) 687600
(c) 687700 (d) 687800
(e) Answer not known

82. The ratio of the volumes of two cones is 8 : 9. Find the ratio of their radii if the height of the second cone is four times the height of the first cone.

(a) 1 : 1 (b) 2 : 3
(c) 3 : 2 (d) $4\sqrt{2} : 3$
(e) Answer not known

இரண்டு கூம்பு வடிவங்களின் கன அளவுகளின் விகிதம் 8 : 9 ஆகும். இரண்டாவது கூம்பின் உயரம், முதல் கூம்பின் உயரத்தின் 4 மடங்கு என்றால், அவற்றின் அரை விட்டங்களின் விகிதத்தை கண்டுபிடிக்கவும்.

(a) 1 : 1 (b) 2 : 3
(c) 3 : 2 (d) $4\sqrt{2} : 3$
(e) Answer not known

83. The length, breadth and height of a cuboid are in the ratio 5 : 3 : 2. Its volume is 1920 cm^3. Find the length of the cuboid.

(a) 18 cm (b) 19 cm
(c) 20 cm (d) 21 cm
(e) Answer not known

ஒரு செவ்வக கட்டத்தின் (Cuboid) நீளம், அகலம் மற்றும் உயரம் ஆகியவை 5 : 3 : 2 என்ற விகிதத்தில் உள்ளன. அதன் கன அளவு 1920 செ.மீ^{3}. அந்த செவ்வக கட்டத்தின் நீளத்தை கண்டுபிடிக்கவும்.

(a) 18 செ.மீ (b) 19 செ.மீ
(c) 20 செ.மீ (d) 21 செ.மீ
(e) Answer not known

84. If the biggest circle is cut from a square of side 14 units, then the remaining area in the square is approximately:

(a) 40 sq. units (b) 41 sq. units
(c) 42 sq. units (d) 43 sq. units
(e) Answer not known

14 அலகு பக்க அளவு கொண்ட ஒரு சதுரத்தில் இருந்து மிகப்பெரிய வட்டம் வெட்டப்பட்டால், சதுரத்தில் மீதமுள்ள பரப்பளவு சுமார் எவ்வளவு?

(a) 40 சதுர அலகுகள் (b) 41 சதுர அலகுகள்
(c) 42 சதுர அலகுகள் (d) 43 சதுர அலகுகள்
(e) Answer not known

85. P and Q can do a piece of work in 40 days and 60 days respectively. They started the work together and Q left after some days of work and P finished the remaining work in 5 days. After how many days from the start did Q leave?

(a) 21 days (b) 20 days
(c) 22 days (d) 23 days
(e) Answer not known

P மற்றும் Q ஒரு வேலையை முறையே 40 நாட்களிலும் 60 நாட்களிலும் முடிக்க முடியும். அவர்கள் இருவரும் சேர்ந்து வேலை தொடங்கினர். சில நாட்கள் கழித்து Q வேலை விட்டு வெளியேறினார்; அதன் பிறகு P மீதமுள்ள வேலையை 5 நாட்களில் முடித்தார். ஆரம்பித்தது முதல் எத்தனை நாட்களுக்கு பிறகு Q வெளியேறினார்?

(a) 21 நாட்கள் (b) 20 நாட்கள்
(c) 22 நாட்கள் (d) 23 நாட்கள்
(e) Answer not known

86. X, Y and Z can do a piece of work in 8, 12 and 16 days respectively. If X, Y and Z work together to complete the job, then find Y's share if they will be paid Rs. 26,000 for completing the job.

(a) Rs. 10,000 (b) Rs. 8,000
(c) Rs. 6,500 (d) Rs. 12,000
(e) Answer not known

X, Y மற்றும் Z ஆகியோர் ஒரு வேலையை முறையே 8, 12 மற்றும் 16 நாட்களில் முடிக்க முடியும். அவர்கள் மூவரும் சேர்ந்து வேலை செய்தால், அந்த வேலையை முடித்ததற்காக ரூ. 26,000 வழங்கப்பட்டால், அதில் Y-க்கு கிடைக்கும் பங்கை கண்டுபிடிக்கவும்.

(a) ரூ. 10,000 (b) ரூ. 8,000
(c) ரூ. 6,500 (d) ரூ. 12,000
(e) Answer not known

87. When two dice are rolled, the probability of getting same faces on the dice is _____.

(a) 5/6 (b) 31/36
(c) 6/216 (d) 1/6
(e) Answer not known

இரண்டு காய்கள் (dice) ஒன்றாக உருட்டப்பட்டால், இரண்டிலும் ஒரே எண் வருவதற்கான நிகழ்தகவு _____.

(a) 5/6 (b) 31/36
(c) 6/216 (d) 1/6
(e) Answer not known

88. The ratio of boys and girls in a class is 5 : 3. If 16% of boys and 8% of girls failed in an examination, then find the percentage of students who passed.

(a) 87% (b) 88%
(c) 90% (d) 84%
(e) Answer not known

ஒரு வகுப்பில் ஆண்கள் மற்றும் பெண்களின் விகிதம் 5 : 3 ஆகும். தேர்வில் 16% ஆண்களும் மற்றும் 8% பெண்களும் தோல்வியடைந்தனர். தேர்வில் தேர்ச்சி பெற்ற மாணவர்களின் சதவீதத்தை கண்டுபிடிக்கவும்.

(a) 87% (b) 88%
(c) 90% (d) 84%
(e) Answer not known

89. Find the sum of the series: 1 + 3 + 5 + ⋯ + 55
(a) 700 (b) 784
(c) 555 (d) 550
(e) Answer not known
தொடரின் கூடுதல் காண்க: 1 + 3 + 5 + ⋯ + 55
(a) 700 (b) 784
(c) 555 (d) 550
(e) Answer not known

90. If the numerator of a fraction is increased by 50% and the denominator is decreased by 20%, then the fraction becomes $\frac{3}{5}$. Find the original fraction.
(a) $\frac{2}{3}$ (b) $\frac{3}{4}$
(c) $\frac{8}{25}$ (d) $\frac{1}{2}$
(e) Answer not known
ஒரு பகுதியின் (fraction) மேலெண் 50% அதிகரிக்கப்படுகிறது மற்றும் கீழெண் 20% குறைக்கப்படுகிறது. அதன் பிறகு அந்த பகுதி $\frac{3}{5}$ஆகிறது. ஆரம்ப பகுதியை கண்டுபிடிக்கவும்.
(a) $\frac{2}{3}$ (b) $\frac{3}{4}$
(c) $\frac{8}{25}$ (d) $\frac{1}{2}$
(e) Answer not known

Answer Key

1.	(d)	**2.**	(a)	**3.**	(b)	**4.**	(c)	**5.**	(a)	**6.**	(a)	**7.**	(c)	**8.**	(a)	**9.**	(b)	**10.**	(d)
11.	(c)	**12.**	(a)	**13.**	(b)	**14.**	(a)	**15.**	(b)	**16.**	(b)	**17.**	(a)	**18.**	(d)	**19.**	(c)	**20.**	(b)
21.	(b)	**22.**	(c)	**23.**	(b)	**24.**	(c)	**25.**	(b)	**26.**	(c)	**27.**	(c)	**28.**	(a)	**29.**	(b)	**30.**	(b)
31.	(b)	**32.**	(b)	**33.**	(a)	**34.**	(b)	**35.**	(a)	**36.**	(b)	**37.**	(b)	**38.**	(a)	**39.**	(a)	**40.**	(a)
41.	(b)	**42.**	(a)	**43.**	(c)	**44.**	(a)	**45.**	(b)	**46.**	(a)	**47.**	(b)	**48.**	(c)	**49.**	(c)	**50.**	(c)
51.	(c)	**52.**	(c)	**53.**	(b)	**54.**	(b)	**55.**	(c)	**56.**	(c)	**57.**	(b)	**58.**	(b)	**59.**	(c)	**60.**	(d)
61.	(c)	**62.**	(c)	**63.**	(b)	**64.**	(a)	**65.**	(d)	**66.**	(b)	**67.**	(b)	**68.**	(d)	**69.**	(b)	**70.**	(b)
71.	(a)	**72.**	(c)	**73.**	(a)	**74.**	(a)	**75.**	(b)	**76.**	(b)	**77.**	(a)	**78.**	(d)	**79.**	(c)	**80.**	(b)
81.	(a)	**82.**	(d)	**83.**	(c)	**84.**	(c)	**85.**	(a)	**86.**	(b)	**87.**	(d)	**88.**	(a)	**89.**	(b)	**90.**	(c)

Logical Reasoning

01 Alpha Numeric Series

Alpha Numeric Series is a type of reasoning question where letters (alphabets), numbers, or a combination of both are arranged in a specific pattern or order. The questions test your ability to identify the rule or pattern used in the sequence.

Types of Alpha Numeric Series

1. Alphabet Series
A sequence made only with letters following a specific alphabetical pattern.

Example:
A, D, G, J, ___
Pattern: +3 letters
A → D → G → J → M

2. Number Series
A sequence made only with numbers following a mathematical rule.
Example:
2, 4, 8, 16, ___
Pattern: ×2
Next number = 32

3. Alpha-Numeric Mixed Series
A sequence containing both letters and numbers.
Example:
A1, C3, E5, G7, ___
Pattern:
Letter +2 → A, C, E, G → I
Number +2 → 1, 3, 5, 7 → 9
Answer = I9

4. Alternating Series
Two different patterns alternate in the sequence.
Example:
2, A, 4, C, 6, E, ___
Pattern:
Numbers → 2, 4, 6 → 8
Letters → A, C, E → G
Next term = 8

5. Letter Position Series
Uses the alphabet position values.
A=1, B=2, C=3 … Z=26
Example:
B, E, H, K, ___
Positions:
2, 5, 8, 11 (+3 pattern)
Next = N (14)

6. Coding-Based Series
Letters are arranged using coding or shifting patterns.
Example:
AZ, BY, CX, DW, ___
Pattern:
First letter → A, B, C, D → E
Second letter → Z, Y, X, W → V
Answer = EV

Example Problems (PYQ)

1. In a certain code language, ACEG is written as 16 and DFGH is written as 25. Using the same coding pattern, how will HIKM be written?

Soln:
Step 1: Use alphabet positions
A = 1, B = 2, C = 3.... M = 13
Step 2: Check first example
ACEG
A = 1, C = 3, E = 5, G = 7
Add them:
1 + 3 + 5 + 7 = 16
Matches the given value.
Step 3: Check second example
DFGH
D = 4, F = 6, G = 7, H = 8
Add them:
4 + 6 + 7 + 8 = 25
Rule confirmeD.
Rule: Add the alphabet position numbers.
Step 4: Apply to HIKM
H = 8, I = 9, K = 11, M = 13
Add: 8 + 9 + 11 + 13 = 41
Ans:41

2. If FISH = GJTI, then BIRD =?

Soln:
Step 1: Find the pattern
Look at the change from FISH → GJTI.
Each letter is shifted +1 forward in the alphabet.

Original	+1 Shift
F	G
I	J
S	T
H	I

So, the rule is: each letter moves one step forward in the alphabet.
Step 2: Apply the same rule to BIRD

Letter	+1 Shift
B	C
I	J
R	S
D	E

So, BIRD → CJSE
Ans: CJSE

3. If TNPC = 5791 and CUP = 169, find the value of CPU.

Soln:
Step 1: Find the value of each letter
From TNPC = 5791
T = 5
N = 7
P = 9
C = 1

Step 2: Use the second condition
CUP = 169
We already know:
C = 1
P = 9
So, 1 _ 9 = 169
Therefore, U = 6
Step 3: Find CPU
C = 1
P = 9
U = 6
So, CPU = 196
Ans: 196

4. If B = 2 and BALL = 27, then BOOK = ?

Soln:

Given
B = 2 → confirms we are using alphabet values.
Check with BALL
B = 2
A = 1
L = 12
L = 12
BALL = 2 + 1 + 12 + 12 = 27(matches the question)
Now find BOOK
B = 2
O = 15
O = 15
K = 11
BOOK = 2 + 15 + 15 + 11
BOOK = 43
Ans: 43

5. Find the missing term in the series: ZA, YB, XC, WD, ?

Soln:

Step 1: Observe the first letters
Z → Y → X → W
Each step decreases by 1 letter.
So, the next letter after W is V.
Step 2: Observe the second letters
A → B → C → D
Each step increases by 1 letter.
So the next letter after D is E.
Step 3: Combine both patterns
First letter = V
Second letter = E
Therefore, the missing term is:VE
Ans: VE

6. Find the missing term: B2, D6, F18, H54, ?

Soln:

Letters: B, D, F, H → +2 letters → J
Numbers:
2 × 3 = 6
6 × 3 = 18
18 × 3 = 54
54 × 3 = 162
Ans: J162

7. Find the correct letter in the series:
C, E, I, K, O, Q, ?

Soln:

Step 1: Write the alphabet positions
C = 3
E = 5
I = 9
K = 11
O = 15
Q = 17
Step 2: Find the differences
3 → 5 = +2
5 → 9 = +4
9 → 11 = +2
11 → 15 = +4
15 → 17 = +2
Step 3: Identify the pattern
The pattern is +2, +4, +2, +4, +2 … (alternating pattern)
Step 4: Next term
17 + 4 = 21
21st letter = U
Pattern: +2, +4 (alternating)
Next letter: U

8. Find the missing letter: C, F, I, L, ?

Soln:

C(3) → F(6) → I(9) → L(12)
Pattern: +3
12 + 3 = 15 → O
Ans:O

9. Study the arrangement:
D 4 F @ H 7 K % M 3 P # T
If all the symbols are removed, which element will be 3rd to the right of H?

Soln:

Step 1: Remove all symbols
Symbols: @ , % , #
Remaining sequence:
D 4 F H 7 K M 3 P T
Step 2: Move 3 places to the right of H
H position = 4
4 + 3 = 7
Position 7 = M
Ans: M

10. Study the arrangement:
B 6 E % G 1 J @ L 9 P # R
If all the numbers are removed, which element will be 5th to the left of R?

Soln:

Step 1: Remove all numbers
Numbers: 6, 1, 9
Remaining sequence:
B E % G J @ L P # R
Step 2: Move 5 places to the left of R
R position = 10
10 – 5 = 5
Position 5 = J
Ans: J

Practice Problems:

1. In a certain code language, BDFH is written as 20 and CEGI is written as 24. Using the same pattern, how will DFHJ be written?

(a) 22 (b) 24
(c) 26 (d) 28

2. If WATER = ZDWHU, then MILK =?
(a) PLOM (b) PLOK
(c) PLON (d) OLNK

3. If CAT = 3120 and DOG = 4157, find the value of TAC.
(a) 0312 (b) 2013
(c) 3120 (d) 2130

4. Find the missing term in the series: ZA, WC, UE, SG, ?
(a) QI (b) PJ
(c) QH (d) RI

5. Find the missing term in the series: D5, F15, H45, J135, ?
(a) L270 (b) L315
(c) M405 (d) L405

6. Find the missing letter in the series: B, D, H, J, N, P, ?
(a) R (b) S
(c) T (d) U

7. Study the arrangement:
D 3 F @ H 8 K % M 2 P $ R
If the arrangement is written in reverse order, which element will be 5th from the left?
(a) P (b) M
(c) 2 (d) %

8. Study the arrangement:
B 3 D $ F 9 H % K 6 M @ P
If all the numbers are removed, which element will be 2nd to the left of K?
(a) H (b) F
(c) D (d) B

9. Study the arrangement:
C 7 E & G 4 J # L 9 N % P
How many numbers are immediately preceded by a letter?
(a) 2 (b) 3
(c) 4 (d) 5

10. Study the arrangement:
B 5 D $ F 8 H @ K 3 M % Q
How many letters are immediately followed by a number?
(a) 3 (b) 2
(c) 4 (d) 5

Answers:	
1. d	6. c
2. c	7. b
3. b	8. a
4. a	9. b
5. d	10. a

Solution:

1. Assign alphabetical positions:
A = 1, B = 2, C = 3, …, Z = 26
Check the pattern
BDFH
B = 2, D = 4, F = 6, H = 8
Sum = 2 + 4 + 6 + 8 = 20 ✓
CEGI
C = 3, E = 5, G = 7, I = 9
Sum = 3 + 5 + 7 + 9 = 24 ✓
Now find for DFHJ
D = 4, F = 6, H = 8, J = 10
Sum = 4 + 6 + 8 + 10 = 28
Ans: 28

2. Soln:
Observe the pattern:
WATER → ZDWHU
Check each letter shift:
W → Z (+3)
A → D (+3)
T → W (+3)
E → H (+3)
R → U (+3)
So the rule is each letter is shifted +3 forward in the alphabet.
Now apply the same to MILK:
M → P
I → L
L → O
K → N
MILK → PLON
Ans: PLON

3. Soln:
Step 1: Assign positions
A = 1, B = 2, … Z = 26
CAT → C = 3, A = 1, T = 20
DOG → D = 4, O = 15, G = 7
Step 2: Check the given codes
- CAT → 3120 → looks like simply writing the positions together: 3 1 20
- DOG → 4157 → positions: 4 15 7 → 4157

So, the pattern is: replace each letter with its alphabet position and write them together.
Step 3: Find TAC
T = 20, A = 1, C = 3
Write together → 2013
Ans: 2013

4. Soln:
Step 1: Separate letters in the pairs
1. ZA → Z and A
2. WC → W and C
3. UE → U and E
4. SG → S and G
5. ? → ?

Step 2: Look at the first letters
Z, W, U, S, …
- Z → 26
- W → 23 (-3)
- U → 21 (-2)
- S → 19 (-2)

So, first letters are decreasing: Z, W, U, S, Q (next is Q).
Step 3: Look at the second letters
A, C, E, G, …
- A → 1
- C → 3 (+2)
- E → 5 (+2)
- G → 7 (+2)

So, the next letter = 9 → I
Step 4: Combine
Q + I = QI
Ans: QI

5. Soln:
Step 1: Separate letters and numbers
- D5 → Letter: D, Number: 5
- F15 → Letter: F, Number: 15
- H45 → Letter: H, Number: 45
- J135 → Letter: J, Number: 135

Step 2: Look at the letters
D, F, H, J, …
- Alphabet positions: D = 4, F = 6, H = 8, J = 10
- Pattern: +2 each time
- Next letter: L (12th letter)

Step 3: Look at the numbers
5, 15, 45, 135, …
- Pattern: Each number is multiplied by 3:
  - 5 × 3 = 15
  - 15 × 3 = 45
  - 45 × 3 = 135
- Next number: 135 × 3 = 405

Step 4: Combine
Next term = L405
Ans: L405

6. Soln:
Step 1: Assign alphabetical positions
- B = 2
- D = 4
- H = 8
- J = 10
- N = 14
- P = 16

Step 2: Look at the pattern in positions
Positions: 2, 4, 8, 10, 14, 16, …
- Differences:

4 − 2 = 2
8 − 4 = 4
10 − 8 = 2
14 − 10 = 4
16 − 14 = 2
So, the pattern alternates: +2, +4, +2, +4, +2, …
- Next difference = +4 → 16 + 4 = 20

Step 3: Convert back to a letter
- 20 → T

Ans: T

7. Soln:
Step 1: Write the arrangement in reverse order
Original: D 3 F @ H 8 K % M 2 P $ R
Reversed: R $ P 2 M % K 8 H @ F 3 D
Step 2: Find the 5th element from the left
Reversed arrangement:
1. R
2. $
3. P
4. 2
5. M

Ans: M

8. Soln:
Step 1: Remove all the numbers
Numbers are: 3, 9, 6
Arrangement without numbers: B D $ F H % K M @ P
Step 2: Find the 2nd element to the left of K
- Locate K in the new arrangement:

B D $ F H % K M @ P
K is at position 7 (B=1)
- 2nd to the left → 7 − 2 = position 5 → H

Ans: H

9. Soln:
Step 1: Identify the numbers in the arrangement
Numbers: 7, 4, 9
Step 2: Check which numbers are immediately preceded by a letter
- 7 → preceded by C
- 4 → preceded by G
- 9 → preceded by L

All 3 numbers are immediately preceded by letters.
Ans: 3

10. Soln:
Step 1: Identify the letters
Letters: B, D, F, H, K, M, Q
Step 2: Check which letters are immediately followed by a number
- B → followed by 5
- D → followed by $
- F → followed by 8
- H → followed by @
- K → followed by 3
- M → followed by %
- Q → followed by nothing

letters immediately followed by numbers = B, F, K
Ans: 3

04 Ranking

Ranking is the process of arranging people, objects, or things in order based on some criteria, like marks, height, speed, or weight.

Formula:

1. Total persons = Left rank + Right rank − 1
2. Rank from bottom = Total − Rank from top + 1
3. Rank from top = Total − Rank from bottom + 1

Example Problems

1. In a class of 45 students, Ravi ranks 12th from the top. What is his rank from the bottom?

Soln:

Rank from bottom = Total students − Rank from top + 1
= 45 − 12 + 1
= 34

Ans: 34

2. In a row of students, Anitha is 18th from the left and 20th from the right. How many students are there in the row?

Soln:

Total students = Left rank + Right rank − 1
= 18 + 20 − 1
= 37

Ans: 37

3. Ramesh is 15th from the left and Suresh is 20th from the left. How many students are between them?

Soln:

= Students between them
= 20 − 15 − 1
= 4

Ans: 4 students

4. In a row of 90 people, Ravi is 20th from the left end. If he moves 10 places towards the right end, what will be his new position from the left end?

Soln:

Ravi's initial position from the left end = 20th.
He moves 10 places towards the right, so his position number from the left increases by 10.
New position from left = 20 + 10
New position = 30th from the left end

Ans: Ravi will be 30th from the left end

5. In a row of students, Ravi is 12th from the left and Mohan is 18th from the right. If there are 5 students between them, find the total number of students.

Soln:

Total students = Left rank + Right rank + Students between
Total = 12 + 18 + 5
Total = 35

Ans: 35 students

6. In a row of students, Ravi is 14th from the left end and Suresh is 18th from the right end. There are 7 students between them. Anil is sitting immediately to the right of Ravi.

Questions

(A) How many students are there in the row?

Total = Left + Right + Between
= 14 + 18 + 7
= 39

Ans: (B) 39

(B) What is the position of Ravi from the right end?

Right rank = Total − Left rank + 1
= 39 − 14 + 1
= 26

Ans: 26

(C) What is the position of Suresh from the left end?

Left rank = Total − Right rank + 1
= 39 − 18 + 1
= 22

Ans: 22

(D) What is the position of Anil from the left end?

Ravi = 14th
Anil is immediately to the right of Ravi
So, Anil = 15th from the left

Ans: 15

(E) How many students are to the right of Suresh?

Suresh = 18th from right
Students to his right = 17

Ans: 17

Practice Problems:

1. In a class of 50 students, Anil ranks 15th from the top. What is his rank from the bottom?
(a) 34 (b) 35
(c) 36 (d) 37

2. In a row of students, Kavya is 16th from the left and 25th from the right. How many students are there in the row?
(a) 39 (b) 40
(c) 41 (d) 42

3. Ravi is 12th from the left and Mohan is 21st from the left. How many students are between them?
(a) 8 (b) 7
(c) 9 (d) 10

4. In a row of 80 people, Meena is 18th from the left enD. If she moves 7 places towards the right, what will be her new position from the left end?
(a) 24 (b) 27
(c) 26 (d) 25

5. In a row of students, Kiran is 16th from the left and Arun is 19th from the right. If 7 students are between them, how many students are there in the row?
(a) 40 (b) 41
(c) 42 (d) 43

6. In a row of students, Arun is 12th from the left end and Bala is 17th from the right end. There are 8 students between Arun and BalA. Kiran is sitting immediately to the left of BalA. The total number of students in the row is unknown.

Questions

i) How many students are there in the row?
(a) 37 (b) 36
(c) 35 (d) 38

ii) What is the position of Bala from the left end?
(a) 20 (b) 21
(c) 22 (d) 23

iii) What is the position of Kiran from the left end?
(a) 19 (b) 22
(c) 21 (d) 20

iv) How many students are to the right of Arun?
(a) 24 (b) 25
(c) 26 (d) 27

v) How many students are between Arun and Bala?
(a) 7 (b) 9
(c) 8 (d) 10ANSWERS:

Answers	
1. c	6. i) a
2. b	ii) b
3. a	iii) d
4. d	iv) b
5. c	v) c

Solution:

1. Soln:
Total students = 50
Rank from top = 15
Rank from bottom = 50 − 15 + 1
Rank from bottom = 36
Ans: Anil is 36th from the bottom.

2. Soln:
Total students = 16 + 25 − 1
Total students = 40
Ans: There are 40 students in the row.

3. Soln:
When both positions are from the same side, use:
Students between = Larger rank − Smaller rank − 1
Students between = 21 − 12 − 1
Students between = 8
Ans: 8 students are between them.

4. Soln:
When a person moves towards the right, the position from the left increases.
New position from left = Old position + Places moved
New position = 18 + 7 = 25
Ans: Meena will be 25th from the left end.

5. Soln:
Total students = 16 + 19 + 7
Total students = 42

6. Soln:
i) Total = 12 + 17 + 8
Total = 37
Ans: 37

ii) Left position = Total − Right position + 1
= 37 − 17 + 1
= 21
Ans: 21

iii) Kiran is immediately left of Bala
Bala = 21st
Kiran = 20th
Ans: 20

iv) Arun = 12th from left
Students to the right = 37 − 12
= 25
Ans: 25

v) Arun = 12
Bala = 21
Students between = 21 − 12 − 1
= 8
Ans: 8

08 Puzzles

A puzzle in reasoning is a problem where you are given a set of conditions/clues, and you must arrange people, objects, or data logically to find the correct answer.
It tests:

- Logical thinking
- Analytical ability
- Attention to detail
- Speed & accuracy

Types of puzzles

1. Floor Puzzle
People live on different floors of a building.
Includes:
- Top/bottom floors
- Above/below relations
- Even/odd floors

2. Flat + Floor Puzzle (Mixed)
Combination of **floors + flats (left/right)**

3. Box / Stack Puzzle
Boxes or objects arranged vertically (top to bottom)

4. Day / Month / Date Puzzle
People linked with days, months, or dates

5. Ranking / Order Puzzle
Based on positions or ranks

6. Scheduling Puzzle
Time slots, meetings, or arrangements

7. Data Arrangement Puzzle
Multiple variables combined (name + place + job etc.)

8. Uncertain Number Puzzle (Advanced)
Number of persons/floors not fixed

Type 1: Floor Puzzle:

Six persons — Asha, Bala, Charan, Divya, Eshan, Farah — live on 6 different floors (1–6).
(1 = bottom, 6 = top)

1. Asha lives above Bala
2. Charan lives on an even-numbered floor
3. Divya lives immediately below Asha
4. Eshan lives on the top floor
5. Farah does not live on the 1st floor

Questions

1. Who lives on the 3rd floor?
2. Who lives immediately below Farah?
3. Which of the following is the correct pair (Top to Bottom)?
4. Who lives on an even-numbered floor (other than Charan)?
5. Which lives immediately below Bala ?

Solutions

Step 1: Fix definite position
Eshan = Floor 6

Step 2: Use Asha–Divya condition
Divya is immediately below Asha → (Divya, Asha) pair
Possible pairs: (1,2), (2,3), (3,4), (4,5), (5,6)
But: floor 6 already has Eshan → (5,6) not possible
So possible: (1,2), (2,3), (3,4), (4,5)

Step 3: Use "Asha above Bala"
Try valid placement:
If Asha = 2, Divya = 1
Then Bala must be below Asha → impossible (no floor below 1)
If Asha = 3, Divya = 2
Bala can be on Floor 1 (possible)
Continue checking consistency...

Step 4: Fill remaining
Now we have:
Floor 3 → Asha
Floor 2 → Divya
Floor 1 → Bala
Remaining floors: 4, 5, 6
Floor 6 → Eshan
Left: Charan, Farah → floors 4, 5

Step 5: Apply remaining conditions
Charan → even floor → can be 2, 4, 6
(2 & 6 already filled) → **Charan = 4**
Farah → not on Floor 1 → remaining → **Floor 5**

Final Arrangement

Floor	Person
6	Eshan
5	Farah
4	Charan
3	Asha
2	Divya
1	Bala

ANSWERS:

1. 3rd floor → **Asha**
2. Below Farah → **Charan**
3. Top to Bottom → **Eshan – Farah – Charan – Asha – Divya – Bala**
4. Even floor (≠ Charan) → **Divya , Eshan**
5. None

TYPE 2: Flat + Floor Puzzle (Mixed):

A building has 3 floors (1–3) and 2 flats on each floor (Left & Right).
Six persons — A, B, C, D, E, F — live in the building.

Conditions:

1. A lives on the top floor
2. B lives on the same floor as A
3. C lives immediately below A
4. D lives in the left flat of floor 1
5. E lives on a floor above D
6. F does not live on the top floor

Questions:

1. Who lives on the top floor?
2. Who lives immediately below A?
3. Who lives on the 1st floor left flat?
4. Who lives on the 2nd floor?
5. Who lives on a floor above D?

Sol.

Step 1: Draw basic structure

Floor 3 → [_ | _]
Floor 2 → [_ | _]
Floor 1 → [_ | _]
L R

Step 2: Apply direct clues

A lives on top floor
→ Floor 3
B same floor as A
→ Floor 3
So: Floor 3 → [A / B]

Step 3: Place C

C lives immediately below A
So C is on **Floor 2 (same flat as A column)**

Step 4: Place D

D lives in **Left flat of Floor 1**
Floor 1 → [D | _]

Step 5: Place E

E lives above D
So, E can be Floor 2 or 3

Step 6: Place F

F not on top → Floor 1 or 2

Step 7: Final arrangement (filling logically)

One valid arrangement:
Floor 3 → [A | B]
Floor 2 → [C | E]
Floor 1 → [D | F]

Final Answer

Floor	Left	Right
3	A	B
2	C	E
1	D	F

ANSWERS:

1. Top floor → **A, B**
2. Below A → **C**
3. 1st floor left → **D**
4. 2nd floor → **C, E**
5. Above D → **A, B, C, E**

TYPE 3: Box / Stack Puzzle:

Seven books — Maths, English, Tamil, Physics, Chemistry, Biology, History — are kept one above the other.

Conditions:

1. History is at the top
2. Biology is at the bottom
3. Tamil is immediately above Chemistry
4. Physics is immediately below History
5. Maths is below Physics but above Tamil
6. Chemistry is above English
7. English is immediately above Biology

Questions

1. Which book is second from the top?
2. Which book is just above English?
3. Which book is in the middle (4th position)?
4. Which book is just below Maths?
5. Which book is third from the bottom?

Sol. Step 1: Fix definite positions

History is at the top
Position 1 = **History**
Biology is at the bottom
Position 7 = **Biology**

Step 2: Direct pair condition

English is immediately above Biology
Position 6 = **English**

Step 3: Another fixed relation

Physics is immediately below History
Position 2 = **Physics**

Step 4: Place Tamil & Chemistry

Tamil is immediately above Chemistry
(Tamil – Chemistry) pair

Step 5: Use remaining condition

Maths is below Physics but above Tamil
So: Physics (2) > Maths > Tamil
Available positions: 3, 4, 5
So, we place:
Maths = 3
Tamil = 4
Chemistry = 5 (since Tamil is just above Chemistry)

Step 6: Final check

All conditions satisfied

Final Arrangement (Top → Bottom)

1. History 2. Physics 3. Maths
4. Tamil 5. Chemistry 6. English
7. Biology

ANSWERS:

1. Second from top → **Physics**
2. Just above English → **Chemistry**
3. Middle (4th) → **Tamil**
4. Just below Maths → **Tamil**
5. Third from bottom → **Chemistry**

TYPE 4: Day / Month / Date Puzzle:

Five friends — Arun, Bhanu, Chitra, Divya, and Esha — have their birthdays on different months in the year: January, March, May, July, and September. Use the clues to find out each person's birthday month.

Clues:

1. Arun's birthday is not in the first half of the year.
2. Bhanu's birthday is earlier than Divya's but later than Chitra's.
3. Esha's birthday is in a month with 31 days.
4. Chitra's birthday is in an odd-numbered month.
5. Divya's birthday is not in May.

Questions:

1. **True or False:** Arun is the only person in the group whose birthday month has fewer than 31 days.
2. **Fill in the Blank:** If Chitra is in January and Bhanu is in March, the person whose birthday falls in May must be _____.
3. **Identify the Friend:** Which friend has a birthday earlier than Divya but later than Chitra?
4. **True or False:** Based on Clue 1, it is possible for Arun to have a birthday in March.
5. **Chronological Order:** List the five friends in order from the earliest birthday in the year to the latest.

Solution

Clues Recap:

1. Arun's birthday is not in the first half → July or September
2. Bhanu's birthday is earlier than Divya's but later than Chitra's
3. Esha's birthday is in a month with 31 days → January, March, May, July, September (all months here have 31, so clue doesn't eliminate)
4. Chitra's birthday is in an odd-numbered month → January (1), March (3), May (5), July (7), September (9) → all months are odd, no elimination
5. Divya's birthday is not in May

Step-by-Step Reasoning:

1. Arun → July or September (clue 1)
2. Chitra → must be **before Bhanu**, because Bhanu is after Chitra
3. Bhanu → **between Chitra and Divya**
4. Divya → not May → remaining options: January, March, July, September
5. Esha → any month with 31 days → all months fit

Try arranging logically:

- Let's start from first to last in year: January → March → May → July → September
  We need **Chitra < Bhanu < Divya**
- Chitra → earliest possible → January
- Bhanu → next → March or May
- Divya → after Bhanu → cannot be May → July or September
- Arun → July or September → must not conflict with Divya → So if Divya is July → Arun = September; if Divya = September → Arun = July
- Esha → remaining month → May

Final Arrangement:

Friend	Month
Chitra	January
Bhanu	March
Divya	July
Arun	September
Esha	May

ANSWERS:

1. **True** (September has 30; all others have 31).
2. **Esha**.
3. **Bhanu**.
4. **False** (March is in the first half of the year).
5. **Chitra, Bhanu, Esha, Divya, Arun**.

TYPE 5: Ranking / Order Puzzle:

Seven students—Pavi, Qadir, Ravi, Sam, Tara, Uma, and Vidya—received their ranks in a competitive exam (Rank 1 is the highest/best, Rank 7 is the lowest). No two students have the same rank.

The Clues

1. Sam has a better rank than Pavi but a lower rank than Uma.
2. Ravi is exactly in the middle of the ranking (Rank 4).
3. Vidya's rank is above Sam's rank and immediatly below Uma's rank.
4. Qadir has the best rank (Rank 1).
5. Tara's rank is lower than Pavi's.

Questions:

1. Which three students occupy the top three ranks (1, 2, and 3)?
2. Who has the rank immediately below **Ravi**?
3. Which student received the lowest rank (Rank 7)?
4. How many positions are there between **Uma** and **Pavi**?
5. Who is exactly two ranks above Pavi?

Solution

1. **Direct Clues:**
   Qadir is Rank 1 (Clue 4).
   Ravi is Rank 4 (Clue 2).
   Current Status*:* 1: Qadir, 4: Ravi.
2. **The Chain of Command:**
   From Clues 1, 3, and 5, we can build a relative sequence:
   Sam is higher than **Pavi** (Clue 1).
   Pavi is higher than **Tara** (Clue 5).
   The Full Chain: Uma → Vidya → Sam → Pavi → Tara.
   The Final Ranking Table

Rank	Student
1	**Qadir**
2	**Uma**
3	**Vidya**
4	**Ravi**
5	**Sam**
6	**Pavi**
7	**Tara**

ANSWERS:

1. Top 3 Ranks?
   Ans: Qadir (1), Uma (2), Vidya (3).
2. Rank below Ravi?
   Ans: Sam (Rank 5).
3. Lowest Rank (7)?
   Ans: Tara.
4. Positions between Uma and Pavi?
   Ans: Three (Vidya, Ravi, and Sam).
5. Who is exactly two ranks above Pavi?
   Ans: Ravi (Rank 4).

TYPE 6: Scheduling Puzzle:

Five consultants—**A, B, C, D, and E**—have meetings at **9:00 AM, 10:00 AM, 11:00 AM, 12:00 PM, and 1:00 PM**.

The Clues:

1. **A's** meeting is exactly two hours after **C's**.
2. **E** has the last meeting (1:00 PM).
3. **B's** meeting is earlier than **D's**.
4. **D** does not have the 10:00 AM meeting.

Questions:

1. Who has the first meeting of the day?
2. At what time is A's meeting scheduled?
3. Which consultant meets the CEO immediately after B?
4. How many people have their meetings before D?
5. Who is scheduled for the 12:00 PM slot?

Solution

Step 1: Place the Fixed Anchor

Clue 2 states **E** has the last meeting at **1:00 PM**.
Current Schedule*:* 1:00 PM = E

Step 2: Test the "Two-Hour Gap" (Clue 1)

Clue 1 says **A** is exactly 2 hours after **C**.
The possible pairs for (C, A) are:
Option 1: C at 9:00 AM and A at 11:00 AM.
Option 2: C at 10:00 AM and A at 12:00 PM.

Step 3: Apply the B < D Rule (Clue 3 & 4)

Clue 3 says **B** is earlier than **D**.
Clue 4 says **D** cannot be at 10:00 AM.
Step 4: Evaluate Option 2 (C=10:00, A=12:00)
If C is 10:00 and A is 12:00, the remaining slots are 9:00 and 11:00.
Since B must be earlier than D, B would be 9:00 and **D would be 11:00**.
This seems to work, but let's check Option 1 to see if it's more definitive.

Step 5: Evaluate Option 1 (C=9:00, A=11:00)

If C is 9:00 and A is 11:00, the remaining slots are 10:00 and 12:00.
Since B must be earlier than D, **B must be 10:00** and **D must be 12:00**.
This perfectly follows **Clue 4** (D is not 10:00).

Final Schedule

Time	Consultant
9:00 AM	**C**
10:00 AM	**B**
11:00 AM	**A**
12:00 PM	**D**
1:00 PM	**E**

TYPE 7: Data Arrangement:

Five friends — Amit, Binita, Charan, Deepa, Ekta — each like a different fruit: Apple, Mango, Banana, Orange, Grapes, and each has a favorite color: Red, Blue, Green, Yellow, Pink.

Clues:

1. Amit likes Mango but does not like Red or Blue.
2. Binita's favorite color is alphabetically after Deepa's.
3. Charan likes Apple and his favorite color is Green.
4. Deepa likes a fruit alphabetically before Binita's.
5. Ekta's favorite color is Pink and .
6. Binita does not like Banana.

Questions

1. What is Amit's favorite color?
2. Which fruit does Ekta like?
3. Who has Red as their favorite color?
4. Which fruit is liked by the person whose favorite color is Blue?
5. True or False: Charan's fruit comes alphabetically before Amit's.

Soluton

1. The "Easy" Anchors:
   Charan: Likes Apple and Green (Direct clue).
   Amit: Likes Mango (Direct clue).
   Ekta: Favorite color is Pink (Direct clue).
2. Solving the Colors (Amit, Binita, Deepa):
   Amit: Does not like Red or Blue. Since Green and Pink are taken, Amit must like Yellow.
   Deepa & Binita: The remaining colors are Red and Blue. Clue says Binita's color is alphabetically after Deepa's. Since Red comes after Blue:
   - Deepa = Blue
   - Binita = Red
3. Solving the Fruits (Binita, Deepa, Ekta):
   The remaining fruits are Banana, Orange, Grapes.
   Deepa's fruit is alphabetically before Binita's.
   Binita does not like Banana.
   - If Binita likes Grapes, Deepa must like Banana (B before G). But then Ekta gets Orange.
   - If Binita likes Orange, Deepa must like Grapes (G before O). But then Ekta gets Banana.
   - The Chain: Deepa (Banana) < Binita (Grapes) or Deepa (Grapes) < Binita (Orange).
   - Since Binita cannot have Banana, and the "alphabetical" rule must apply to the remaining set, let's look at the remaining options: Banana, Grapes, Orange.
     - Deepa = Banana
     - Binita = Grapes
     - Ekta = Orange

Final Data Arrangement Table

Name	Fruit	Color
Amit	Mango	Yellow
Binita	Grapes	Red
Charan	Apple	Green
Deepa	Banana	Blue
Ekta	Orange	Pink

ANSWERS:

1. Amit's Color? **Ans: Yellow.**
2. Ekta's Fruit? **Ans: Orange.**
3. Who likes Red? **Ans: Binita.**
4. Blue Color's Fruit? **Ans: Banana.**
5. Charan's Fruit < Amit's? **Ans: True.**

TYPE 8: Uncertain Number Puzzle (Advanced)

A certain number of people are sitting in a straight row facing North. You do not know the total number of people yet.

The Clues:

1. **A** sits exactly in the middle of the row.
2. **B** sits third to the right of **A**.
3. **C** sits at the extreme right end of the row.
4. There is only **one person** between **B** and **C**.

Questions

1. Total number of people?
2. What is the position of A from the left end?
3. How many people sit between A and C?

Soluton

To find the total number of people, follow these steps:

1. **Start with the gap between B and C:**
   - Since **C** is at the end and there is **one person** between B and C, the row looks like this:
   - B _ C (End)
2. **Add the clue about A:**
   - **B** is third to the right of **A**. This means there are **two people** between A and B.
   - A _ _ B _ C (End)
3. **Find the Middle:**
   - Now count the people to the **right** of **A**.
   - From **A** to the right end (**C**), there are **5 positions** (including C).
   - Since **A** is exactly in the **middle**, there must also be **5 positions** to the **left** of A.

The Final Map

(End) _ _ _ _ _ **A** _ _ B _ C (End)

Answers:

1. Total people? **Ans: 11.**
2. A's position from left? **Ans: 6th.**
3. People between A and C? **Ans: 4.**

PRACTICE PROBLEMS:

1. Seven people—**Giri, Hari, Indu, Jayan, Kiran, Lalit, and Mani**—live on seven different floors of a building. The lowermost floor is 1, and the topmost floor is 7.

   The Clues:

   1. **Lalit** lives on floor number 4.
   2. Only **two people** live between Lalit and **Mani**.
   3. **Giri** lives immediately above **Mani**.
   4. **Indu** lives on an odd-numbered floor but not on floor number 1.
   5. Only **one person** lives between Indu and **Kiran**.
   6. **Hari** lives on a floor above **Jayan**.

   Questions

   1. Who lives on the topmost floor?
   2. How many people live between Giri and Lalit?
   3. On which floor does Jayan live?
   4. Who lives immediately below Indu?

2. Five boxes—**Red, Blue, Green, Yellow, and White**—are stacked one above the other. The bottom box is Position 1 and the top is Position 5.

   The Clues:

   1. The **White** box is at the very bottom (Position 1).
   2. The **Red** box is kept immediately above the **White** box.
   3. The **Yellow** box is at the very top (Position 5).
   4. The **Blue** box is kept exactly between the **Red** and **Yellow** boxes.

   Questions

   1. Which color box is at Position 4?
   2. Which box is kept at Position 3?
   3. How many boxes are between the White box and the Blue box?
   4. What is the position of the Green box?

3. Seven friends—**Adi, Bhanu, Chandu, Divya, Eshwar, Fiza, and Gita**—attend a class on different days of the same week, starting from **Monday** and ending on **Sunday**.

   The Clues:

   1. **Chandu** attends the class on **Wednesday**.
   2. Only **two people** attend between Chandu and **Fiza**.
   3. **Bhanu** attends the class immediately before **Fiza**.
   4. **Adi** attends the class on one of the days **after** Fiza.
   5. Only **three people** attend between Adi and **Gita**.
   6. **Eshwar** attends the class on a day immediately **before** Divya.

   Questions

   1. Who attends the class on Sunday?
   2. On which day does Gita attend the class?
   3. How many people attend the class between Bhanu and Eshwar?
   4. Who attends the class immediately after Chandu?

SOLUTION:

1. Based on the clues provided, here is the step-by-step arrangement:
   1. Lalit is fixed on Floor 4.
   2. Mani is 2 floors away from Lalit. If we go up, he'd be on 7. if we go down, he'd be on Floor 1.
   3. Giri is immediately above Mani. Since Floor 8 doesn't exist, Mani must be on Floor 1 and Giri on Floor 2.
   4. Indu is on an odd floor (3, 5, or 7) but not 1.
   5. Kiran is one floor away from Indu. Through testing the remaining spots, Indu fits on Floor 5 and Kiran fits on Floor 7 (with Floor 6 between them).
   6. Hari is above Jayan, leaving Hari on Floor 6 and Jayan on Floor 3.

   Final Floor Map

Floor	Person
7	Kiran
6	Hari
5	Indu
4	Lalit
3	Jayan
2	Giri
1	Mani

   Answers:

1. Topmost floor? → Hari
2. People between Giri & Lalit? → 1 person
3. Jayan lives on? → 6th floor
4. Immediately below Indu? → Lalit

2. Step 1: Fixed positions
- Position 1 → **White**
- Position 2 → **Red** (immediately above White)
- Position 5 → **Yellow**

Step 2: Blue position
"Blue is exactly between Red (2) and Yellow (5)"
→ Middle of 2 and 5 = **Position 3**
So, Position 3 → **Blue**
Step 3: Remaining box
Only **Green** is left → Position 4
Final Stack:

Position	Box
5 (Top)	Yellow
4	Green
3	Blue
2	Red
1 (Bottom)	White

Answers:
1. Position 4? → Green
2. Position 3? → Blue
3. Between White & Blue? → 1 box
4. Green position? → 4th

3. Step 1: Fixed day
Wednesday → **Chandu**
Step 2: Chandu & Fiza
"2 people between Chandu and Fiza"
Possible:
Chandu (Wed = Day 3) → Fiza = Day **6 (Saturday)**
So, **Fiza = Saturday**
Step 3: Bhanu position
"Bhanu immediately before Fiza"
→ Fiza (Sat) → Bhanu = **Friday**
Step 4: Adi position
"Adi is after Fiza"
→ After Saturday → **Sunday**
So, Adi = **Sunday**
Step 5: Adi & Gita
"3 people between Adi and Gita"
- Adi = Sunday (7)
- → Gita = **Wednesday (3)** (already Chandu)

So adjust!
Try other valid placement:
Keep:
- Chandu = Wednesday
- Fiza = **Monday** (2 people between: Tue, Wed)

Check:
- Bhanu before Fiza (no day before Monday)

Not possible
Chandu = Wednesday (3)
Fiza = **Saturday (6)**
Bhanu = Friday (5)
Adi = Sunday (7)
Now check Gita:
"3 between Adi (7) & Gita"
→ Gita = **Tuesday (2)**
Step 6: Eshwar & Divya
"Eshwar immediately before Divya"
Remaining days: Monday, Thursday
→ Eshwar = Monday
→ Divya = Thursday
Final Arrangement:

Day	Person
Monday	Eshwar
Tuesday	Gita
Wednesday	Chandu
Thursday	Divya
Friday	Bhanu
Saturday	Fiza
Sunday	Adi

Answers:
1.Sunday? → Adi
2.Gita day? → Tuesday
3.Between Bhanu & Eshwar? → 3 people
4. After Chandu? → Divya

TNPSC 2025 Reasoning
Previous Year Questions (PYQ's)

1. Find the next number in the sequence:
0, 2, 24, 252, ___
(a) 2600 (b) 2420 (c) 3036
(d) 3120 (e) Answer not known
பின்வரும் வரிசையில் அடுத்த எண்ணைக் கண்டறிக: **0, 2, 24, 252, ____**
(a) 2600 (b) 2420 (c) 3036
(d) 3120 (e) விடை தெரியவில்லை

2. In the series, 6 4 1 2 2 8 7 4 2 1 5 3 8
How many pairs of alternate numbers have a difference of 2?
(a) 2 (b) 3 (c) 4
(d) 5 (e) Answer not known
வரிசை: **6, 4, 1, 2, 2, 8, 7, 4, 2, 1, 5, 3, 8** இந்த வரிசையில், தொடர்ச்சியான எண் ஜோடிகளில் (**successive numbers**) வேறுபாடு **2** ஆக உள்ள ஜோடிகள் எத்தனை?
(a) 2 (b) 3 (c) 4
(d) 5 (e) விடை தெரியவில்லை

3. Find the missing term in the sequence: 7, 12, 19, 24, 43, __, 91.
(a) 48 (b) 52 (c) 56
(d) 60 (e) Answer not known
விடுபட்ட எண்ணைக் கண்டறிதல். கொடுக்கப்பட்ட எண்தொடர்: **7, 12, 19, 24, 43, __, 91.**
(a) 48 (b) 52 (c) 56
(d) 60 (e) விடை தெரியவில்லை

4. D, F, G, H, I and M are sitting in a row. I and M are in the centre, and F and D are at the beginning and at the end. G is sitting on the left of D. Then who is sitting on the right of F?
(a) G (b) H (c) I
(d) M (e) Answer not known
D, F, G, H, I மற்றும் M ஆகியோர் ஒரு வரிசையில் அமர்ந்துள்ளனர். I மற்றும் M நடுப்பகுதியில் உள்ளனர். F மற்றும் D முறையே தொடக்கத்திலும் முடிவிலும் உள்ளனர். G, D-ன் இடப்பக்கத்தில் அமர்ந்துள்ளார். அப்படியானால், F-ன் வலப்பக்கத்தில் அமர்ந்திருப்பவர் யார்?
(a) G (b) H (c) I
(d) M (e) விடை தெரியவில்லை

5. If 'A' = 26 , SUN = 27 then CAT = ?
(a) 45 (b) 52 (c) 57
(d) 63 (e) Answer not known
'A' = 26, SUN = 27 எனில், CAT = ?
(a) 45 (b) 52 (c) 57
(d) 63 (e) விடை தெரியவில்லை

6. If **a** ≠ b ≠ c is given, which one of the following is correct?
(a) b ≠ a ≠ c (b) a, b, c are distinct (c) a = b = c
(d) a ≠c or a = c (e) Answer not known
a≠b≠c எனக் கொடுக்கப்பட்டால், பின்வருவனவற்றுள் எது சரியானது?
(a) b ≠ a ≠ c
(b) a,b,c ஆகியவை வெவ்வேறானவை (distinct)
(c) a = b = c
(d) a≠ c or a = c
(e) விடை தெரியவில்லை

7. The missing term in the given alpha-numeric series is
2 X 2, 7 T 4, 14 P 12, 23 L 48, _____
(a) 34 H 240 (b) 32 I 240 (c) 34 I 192
(d) 32 J 192 (e) Answer not known
கொடுக்கப்பட்டுள்ள எண்ணெழுத்துத் தொடரில் விடுபட்ட உறுப்பைக் காண்க:
2 X 2, 7 T 4, 14 P 12, 23 L 48, _____
(a) 34 H 240 (b) 32 I 240 (c) 34 I 192
(d) 32 J 192 (e) விடை தெரியவில்லை

8. Find the next term.
64, 32, 48, 120, 420, _____
(a) 1680 (b) 1890 (c) 1920
(d) 2100 (e) Answer not known
கொடுக்கப்பட்டுள்ள தொடரின் அடுத்த உறுப்பைக் காண்க: **64, 32, 48, 120, 420, _____**
(a) 1680 (b) 1890 (c) 1920
(d) 2100 (e) விடை தெரியவில்லை

9. Ravi ranks 9th in a class of 45 students. There are 18 students below Raj Rankwise. How many students are there between Ravi and Raj rankwise?
(a) 16 (b) 17 (c) 18
(d) 19 (e) Answer not known
45 மாணவர்கள் கொண்ட ஒரு வகுப்பில் ரவி மேலிருந்து 9-வது இடத்தைப் பிடிக்கிறான். ராஜிற்கு பின் வரிசையில் 18 மாணவர்கள் உள்ளனர் எனில், ரவிக்கும் ராஜிற்கும் இடையில் எத்தனை மாணவர்கள் உள்ளனர்?
(a) 16 (b) 17 (c) 18
(d) 19 (e) விடை தெரியவில்லை

10. If DANGER is coded as 10-7-20-13-11-24, then the code of 'MACHINE' in the same code is
(a) 13-7-20-9-11-25-15 (b) 13-7-20-10-11-25-15
(c) 19-7-9-15-14-11-20 (d) 19-7-9-14-15-20-11
(e) Answer not known

DANGER என்பது 10-7-20-13-11-24 என குறியீடு செய்யப்பட்டால், அதே குறியீட்டு முறையில் 'MACHINE' என்பதற்கான குறியீடு என்ன?
(a) 13-7-20-9-11-25-15 (b) 13-7-20-10-11-25-15
(c) 19-7-9-15-14-11-20 (d) 19-7-9-14-15-20-11
(e) விடை தெரியவில்லை

11. Replace the letters with symbols as follows: A → (+), B → (−), C → (×), D → (÷) Find the value of:
4 B 3 C 5 A 30 D 2
(a) 4 (b) 17 (c) 9
(d) 23 (e) Answer not known
எழுத்துகளை கீழ்க்கண்ட குறியீடுகளால் மாற்றுக:
A → (+), B → (−), C → (×), D → (÷)
பின்வரும் வெளிப்பாட்டின் மதிப்பை காண்க:
4 B 3 C 5 A 30 D 2
(a) 4 (b) 17 (c) 9
(d) 23 (e) விடை தெரியவில்லை

12. Which letter will be midway between the 6th letter from the left and the 14th letter from the left in the English alphabet?
(a) I (b) J (c) K
(d) L (e) Answer not known
ஆங்கில எழுத்துக்களில் இடது பக்கத்திலிருந்து 6வது எழுத்துக்கும், இடது பக்கத்திலிருந்து 14வது எழுத்துக்கும் நடுவில் உள்ள எழுத்து எது?
(a) I (b) J (c) K
(d) L (e) விடை தெரியவில்லை

13. In a dice if 1 is opposite to 4 and 2 is opposite to 5, then:
(a) 3 is adjacent to 4 and 6 (b) 3 is adjacent to 5 and 6
(c) 2 is adjacent to 3 and 6 (d) 1 is adjacent to 4 and 6
(e) Answer not known
ஒரு பகடையில் (Dice), 1 என்பது 4-க்கு எதிரில் உள்ளது மற்றும் 2 என்பது 5-க்கு எதிரில் உள்ளது எனில்:
(a) 3 என்பது 4 மற்றும் 6-க்கு அடுத்ததாக உள்ளது
(b) 3 என்பது 5 மற்றும் 6-க்கு அடுத்ததாக உள்ளது
(c) 2 என்பது 3 மற்றும் 6-க்கு அடுத்ததாக உள்ளது
(d) 1 என்பது 4 மற்றும் 6-க்கு அடுத்ததாக உள்ளது
(e) விடை தெரியவில்லை

14. P is elder than Q. R is elder than Qbut younger than P. S is elder than P but younger than T. Who is the youngest?
(a) P (b) Q (c) R
(d) S (e) Answer not known
P என்பது Q-வை விட வயதில் பெரியவர். R என்பது Q-வை விட பெரியவர் ஆனால் P-வை விட சிறியவர். S என்பது P-வை விட பெரியவர் ஆனால் T-வை விட சிறியவர். அவர்களில் வயதில் மிகவும் சிறியவர் யார்?
(a) P (b) Q (c) R
(d) S (e) விடை தெரியவில்லை

15. Find the missing term in the given series.
8,24, 12, ?, 18, 54
(a) 30 (b) 36 (c) 27
(d) 48 (e) Answer not known
கொடுக்கப்பட்டுள்ள தொடரில் விடுபட்ட எண்ணைக் கண்டறியவும். 8, 24, 12, ?, 18, 54
(a) 30 (b) 36 (c) 27
(d) 48 (e) விடை தெரியவில்லை

16. Find the missing number in the series:
5, 24, 99, 378, ?
(a) 1380 (b) 1387 (c) 1384
(d) 1377 (e) Answer not known
கொடுக்கப்பட்டுள்ள தொடரில் விடுபட்ட எண்ணைக் கண்டறியவும்.
(a) 1380 (b) 1387 (c) 1384
(d) 1377 (e) விடை தெரியவில்லை

17. Find the missing letters in the series:
KJI, MLK, ONM, ? , SRQ, UTS
(a) QPO (b) PON (c) RQP
(d) OQP (e) Answer not known
கொடுக்கப்பட்டுள்ள தொடரில் விடுபட்ட எழுத்துக்களைக் கண்டறியவும்:
(a) QPO (b) PON (c) RQP
(d) OQP (e) விடை தெரியவில்லை

18. How many days in a week start with the word "T"?
(a) 1 (b) 2 (c) 3
(d) 4 (e) Answer not known
ஒரு வாரத்தில் "T" என்ற எழுத்தால் தொடங்கும் நாட்கள் எத்தனை?
(a) 1 (b) 2 (c) 3
(d) 4 (e) விடை தெரியவில்லை

19. Find the odd one out: audio, arise, awake, video
(a) audio (b) arise (c) awake
(d) video (e) Answer not known
பின்வருவனவற்றில் வேறுபட்டதை (Odd one) கண்டறியவும்:
audio, arise, awake, video
(a) audio (b) arise (c) awake
(d) video (e) விடை தெரியவில்லை

20. Find the missing element in the series:
ACE, ?, MOQ, SUW
(a) GIK (b) HJL (c) IKM
(d) GJM (e) Answer not known
கொடுக்கப்பட்டுள்ள தொடரில் விடுபட்ட எழுத்துக்களைக் கண்டறியவும்:
(a) GIK (b) HJL (c) IKM
(d) GJM (e) விடை தெரியவில்லை

21. If Z = 52 and ACT = 48, then what will be the value of BAT?
(a) 39 (b) 41 (c) 44
(d) 46 (e) Answer not known

Z = 52 மற்றும் ACT = 48 எனில், BAT இன் மதிப்பு என்ன?
(a) 39 (b) 41 (c) 44
(d) 46 (e) விடை தெரியவில்லை

22. How many independent words can 'HEARTIESS' be divided into without changing the order of the letters and unit each letter only once?
(a) 2 (b) 3 (c) 4
(d) 5 (e) Answer not known
HEARTIESS என்ற சொல்லிலிருந்து, எழுத்துகளின் வரிசையை மாற்றாமல், ஒவ்வொரு எழுத்தையும் ஒரே முறை மட்டும் பயன்படுத்தி, தனித்தனியாக பொருள் தரும் ஆங்கிலச் சொற்களாக எத்தனைப் பகுதிகளாகப் பிரிக்கலாம்?
(a) 2 (b) 3 (c) 4
(d) 5 (e) விடை தெரியவில்லை

23. Find the 13th number in the Fibonacci series.
(a) 144 (b) 233 (c) 377
(d) 610 (e) Answer not known
பிபோனாச்சி தொடரில் (Fibonacci series) 13வது எண்ணை கண்டறிக.
(a) 144 (b) 233 (c) 377
(d) 610 (e) விடை தெரியவில்லை

24. If MAT = 260 , HAT = 160 which number is denoted by SUN?
(a) 247 (b) 266 (c) 380
(d) 294 (e) Answer not known
MAT = 260, HAT = 160 எனில், SUN என்ற சொல்லிற்கு எந்த எண் குறிக்கப்படுகிறது?
(a) 247 (b) 266 (c) 380
(d) 294 (e) விடை தெரியவில்லை

25. Find out the missing one
SCD, TEF , UGH , ? , WKL
(a) VIJ (b) VIK (c) VKI
(d) VJI (e) Answer not known
விடுபட்ட எழுத்தை / சொல்லை நிரப்புக:
(a) VIJ (b) VIK (c) VKI
(d) VJI (e) விடை தெரியவில்லை

26. Find the missing term 2A11, 4D13, 12G17, ?
(a) 24J21 (b) 36J23 (c) 48J23
(d) 48K23 (e) Answer not known
கொடுக்கப்பட்ட தொடரில் விடுபட்ட உறுப்பை கண்டறிக.
2A11, 4D13, 12G17, ?
(a) 24J21 (b) 36J23 (c) 48J23
(d) 48K23 (e) விடை தெரியவில்லை

27. Which word does not belong to the others?
(a) Index (b) Glossary (c) Chapter
(d) Book (e) Answer not known
பின்வரும் சொற்களில் மற்றவற்றுடன் சேராதது எது?
(a) குறியீட்டு அட்டவணை
(b) சொற்களஞ்சியம்
(c) அதிகாரம்
(d) புத்தகம்
(e) விடை தெரியவில்லை

28. Find the next term. 0.5, 0.6, 1.5, 4, 8.9, ?
(a) 16 (b) 17 (c) 18.1
(d) 15.9 (e) Answer not known
பின்வரும் தொடரில் அடுத்த உறுப்பை கண்டறிக:
0.5, 0.6, 1.5, 4, 8.9, ?
(a) 16 (b) 17 (c) 18.1
(d) 15.9 (e) விடை தெரியவில்லை

29. In a dice, if 2 is adjacent to 3, 5 and 6 then which of the following is necessarily true?
(a) 3 is adjacent to 6 (b) 1 is adjacent to 4
(c) 2 is adjacent to 4 (d) 2 is adjacent to 1
(e) Answer not known
ஒரு பகடையில், 2 என்ற எண் 3, 5 மற்றும் 6 ஆகிய எண்களுக்கு அடுத்துள்ள பக்கமாக இருந்தால், பின்வருவனவற்றில் எது நிச்சயமாக உண்மையாக இருக்கும்?
(a) 3-க்கு அடுத்துள்ள பக்கம் 6
(b) 1-க்கு அடுத்துள்ள பக்கம் 4
(c) 2-க்கு அடுத்துள்ள பக்கம் 4
(d) 2-க்கு அடுத்துள்ள பக்கம் 1
(e) விடை தெரியவில்லை

30. Pick the odd one from: CGKO : BFJN : AEIM : FDKN
(a) CGKO (b) BFJN (c) AEIM
(d) FDKN (e) Answer not known
கொடுக்கப்பட்டவற்றுள் தொடர்பில்லாத எழுத்தைத் கண்டறியவும்?
(a) CGKO (b) BFJN (c) AEIM
(d) FDKN (e) விடை தெரியவில்லை

31. Five girls are sitting in a row. Rosy is not adjacent to Sivanandhini and Abi. Anuradha is not adjacent to Sivanandhini. Rosy is adjacent to Monika. Monika is at the middle in the row. Then, Anuradha is adjacent to whom out of the following?
(a) Rosy (b) Sivanandhini
(c) Monika
(d) Cannot be determined (e) Answer not known
ஐந்து பெண்கள் ஒரு வரிசையில் அமர்ந்திருக்கிறார்கள். ரோஸி என்பவர் சிவனந்தினி மற்றும் அபிக்கு அருகில் இல்லை. அனுராதா சிவனந்தினிக்கு அருகில் இல்லை. ரோஸி மோனிகாவிற்கு அருகில் இருக்கிறார்.

மோனிகா வரிசையில் நடுவில் இருக்கிறார். பின்னர், அனுராதா பின்வருவனவற்றில் யாருக்கு அருகில் இருக்கிறார்?

(a) ரோஸி
(b) சிவனந்தினி
(c) மோனிகா
(d) தீர்மானிக்க முடியாது
(e) விடை தெரியவில்லை

32. ABCAABBCCAAABBBCCC..... What will be the 25th letter in the pattern?
(a) B (b) C (c) D
(d) A (e) Answer not known

ABCAABBCCAAABBBCCC..... என்ற அமைப்பில் 25-வது எழுத்து என்ன
(a) B (b) C (c) D
(d) A (e) விடை தெரியவில்லை

33. Series: * E 7 O & 6 ^ 4 Z 5 * 3 9 T ! D # 2 $ U
If all the digits are dropped, which of the following is third to the right of the eleventh from the right end?
(a) ^ (b) 8 (c) Z
(d) T (e) Answer not known

வரிசை: * **E 7 O & 6 ^ 4 Z 5 * 3 9 T ! D # 2 $ U**
வினா: மேலே உள்ளவற்றில் அனைத்து இலக்கங்களையும் (digits) நீக்கிய பின், பின்வருவனவற்றில் எது வலது முனையிலிருந்து பதினொன்றாவது உறுப்பின் வலது புறத்தில் மூன்றாவதாக உள்ளது?
(a) ^ (b) 8 (c) Z
(d) T (e) விடை தெரியவில்லை

34. Series: R E 5 D A P $ 3 T I Q7 9 B # 2 K % U 1 M W 4 * J 8 N
Which of the following is exactly in the middle between 3 and 1, in the above arrangement?
(a) B (b) K (c) 9
(d) # (e) Answer not known

வரிசை: R E 5 D A P $ 3 T I Q7 9 B # 2 K % U 1 M W 4*J 8 N
வினா: மேலே கொடுக்கப்பட்ட உறுப்புகளில் 3-க்கும் 1-க்கும் இடைப்பட்ட சரியாக நடுவில் உள்ள உறுப்பு எது?
(a) B (b) K (c) 9
(d) # (e) விடை தெரியவில்லை

35. If $A \rightarrow 1, B \rightarrow 2, C \rightarrow 3 \ldots Z \rightarrow 26$, then
$A^B + B^C + C$ will not be equal to which of the following?
(a) $\sqrt{FX}$ (b) $S - G$ (c) $(B)(E)$
(d) L (e) Answer not known

A→1,B→2,C→3...Z→26 எனக் கொண்டால், $A^B + B^C + C^A$ என்பது பின்வருவனவற்றில் எதற்குச் சமமாக இருக்காது?

(a) $\sqrt{FX}$ (b) $S - G$ (c) $(B)(E)$
(d) L (e) விடை தெரியவில்லை

36. If
→ stands for 'addition',
← stands for 'subtraction',
↑ stands for 'division',
↓ stands for 'multiplication', ↗ stands for 'equal to', then which of the following alternatives is correct?
(a) 7 ← 43 ↑ 6 ↓ 1 ↗ 4 (b) 3 ↓ 6 ↑ 2 → 3 ← 6 ↗ 5
(c) 5 → 7 ← 3 ↑ 2 ↗ 4 (d) 2 ↓ 5 ← 6 → 2 ↗ 6
(e) Answer not known

→ என்பது 'கூட்டல்' என்பதை குறிக்கிறது,
← என்பது 'கழித்தல்' என்பதை குறிக்கிறது,
↑ என்பது 'வகுத்தல்' என்பதை குறிக்கிறது,
↓ என்பது 'பெருக்கல்' என்பதை குறிக்கிறது,
↗ என்பது 'சமம்' என்பதை குறிக்கிறது.
அப்படியானால், பின்வரும் மாற்றுகளில் எது சரியானது?
(a) 7 ← 43 ↑ 6 ↓ 1 ↗ 4 (b) 3 ↓ 6 ↑ 2 → 3 ← 6 ↗ 5
(c) 5 → 7 ← 3 ↑ 2 ↗ 4 (d) 2 ↓ 5 ← 6 → 2 ↗ 6
(e) விடை தெரியவில்லை

37. There are 9 color boxes: Red, Black, White, Green, Yellow, Blue, Orange, Violet, and Pink, but not necessarily in the same order.
Only 5 boxes are placed between Red and White.
Yellow is placed immediately above White.
Only three boxes are placed between Yellow and Green.
As many boxes are placed between Red and Green as between Black and Yellow.
Blue is placed below Black but not at the bottom.
More than 4 boxes are placed between Yellow and Blue.
One box is placed between Blue and Orange.
Pink box is placed above Violet.
Which boxes are placed immediately above and immediately below Black?
(a) Pink and Green (b) Pink and Violet
(c) Green and Blue (d) Pink and Orange
(e) Answer not known

சிவப்பு, கருப்பு, வெள்ளை, பச்சை, மஞ்சள், நீலம், ஆரஞ்சு, ஊதா மற்றும் இளஞ்சிவப்பு என 9 வண்ணப் பெட்டிகள் உள்ளன (அதே வரிசையில் இருக்க வேண்டிய அவசியமில்லை).

1. சிவப்பு மற்றும் வெள்ளை பெட்டிகளுக்கு இடையில் 5 பெட்டிகள் மட்டுமே உள்ளன.
2. வெள்ளை பெட்டிக்கு உடனடியாக மேலே மஞ்சள் பெட்டி உள்ளது.
3. மஞ்சள் மற்றும் பச்சை பெட்டிகளுக்கு இடையில் மூன்று பெட்டிகள் மட்டுமே உள்ளன.
4. சிவப்பு மற்றும் பச்சை பெட்டிகளுக்கு இடையில் உள்ள பெட்டிகளின் எண்ணிக்கை, கருப்பு மற்றும் மஞ்சள் பெட்டிகளுக்கு இடையில் உள்ள பெட்டிகளின் எண்ணிக்கைக்கு சமம்.
5. கருப்பு பெட்டிக்கு கீழே நீலப் பெட்டி உள்ளது, ஆனால் அது கடைசியில் இல்லை.

6. மஞ்சள் மற்றும் நீலப் பெட்டிகளுக்கு இடையில் 4-க்கும் மேற்பட்ட பெட்டிகள் உள்ளன.

7. நீலம் மற்றும் ஆரஞ்சு பெட்டிகளுக்கு இடையில் ஒரு பெட்டி உள்ளது.

8. ஊதா பெட்டிக்கு மேலே இளஞ்சிவப்பு (Pink) பெட்டி உள்ளது.

கருப்பு பெட்டிக்கு உடனடியாக மேலேயும் கீழேயும் உள்ள பெட்டிகள் எவை?

(a) இளஞ்சிவப்பு மற்றும் பச்சை

(b) இளஞ்சிவப்பு மற்றும் ஊதா

(c) பச்சை மற்றும் நீலம்

(d) இளஞ்சிவப்பு மற்றும் ஆரஞ்சு

(e) விடை தெரியவில்லை

38. In a row of 100 people, John is 36th from the left end. What is his position from the right end?
(a) 63 (b) 64 (c) 65
(d) 66 (e) Answer not known

100 பேர் கொண்ட ஒரு வரிசையில், ஜான் இடது முனையிலிருந்து 36-வது இடத்தில் உள்ளார். வலது முனையிலிருந்து அவரது இடம் என்ன?
(a) 63 (b) 64 (c) 65
(d) 66 (e) விடை தெரியவில்லை

39. Find the missing term in the following series:
13, 14, 23, 48, 97, 178, ?
(a) 305 (b) 312 (c) 287
(d) 299 (e) Answer not known

பின்வருவனவற்றில் விடுபட்ட எண்ணைக் காண்க.

13, 14, 23, 48, 97, 178, ?
(a) 305 (b) 312 (c) 287
(d) 299 (e) விடை தெரியவில்லை

40. Three dice are rolled at the same time. In one dice, the outcome shows 5. How?
(a) 75 (b) 65 (c) 70
(d) 80 (e) Answer not known

மூன்று பகடைகள் ஒரே நேரத்தில் உருட்டப்படுகின்றன. அவற்றில் ஒரு பகடையில் 5 வருவதற்கான வாய்ப்பு என்ன?
(a) 75 (b) 65 (c) 70
(d) 80 (e) விடை தெரியவில்லை

41. Two dice are rolled simultaneously. The number of possible outcomes that the number on the first dice is smaller than the number on the second dice. Why?
(a) 30 (b) 15 (c) 18
(d) 17 (e) Answer not known

இரண்டு பகடைகள் ஒரே நேரத்தில் உருட்டப்படுகின்றன. முதல் பகடையில் வரும் எண், இரண்டாவது பகடையில் வரும் எண்ணைவிட குறைவாக இருக்கும் சாத்தியமான முடிவுகளின் எண்ணிக்கை என்ன?
(a) 30 (b) 15 (c) 18
(d) 17 (e) விடை தெரியவில்லை

42. Read the information carefully and answer the questions given below
(i) A, B, C, D, E, F and G are sitting around a circle and are facing the centre
(ii) G is second to the left of C, who is to the immediate left of F.
(iii) A is third to the left of E.
(iv) B is between D and E.
Then, which of the following is the position of F?
(a) Fourth to the right of D
(b) To the immediate left of G
(c) Third to the right of B
(d) To the immediate right of C
(e) Answer not known

பின்வரும் விவரங்களை கவனமாகப் படித்து கேட்கப்பட்ட வினாவிற்கு பதிலளிக்கவும்.

(i) A, B, C, D, E, F மற்றும் G ஆகியோர் வட்ட மையத்தை நோக்கி, ஒரு வட்ட வடிவில் உட்கார்ந்துள்ளனர்.

(ii) C யிலிருந்து இடது பக்கத்தில் இரண்டாவதாக G உட்கார்ந்து உள்ளார். மேலும் C, F-க்கு இடது பக்கத்தில் அடுத்ததாக உள்ளார்.

(iii) E-க்கு இடது பக்கத்தில் மூன்றாவதாக A உட்கார்ந்து உள்ளார்.

(iv) D மற்றும் E-க்கு இடையில் B உள்ளார்.

(எனில் F என்பவர் எந்த இடத்தில் உட்கார்ந்து உள்ளார்?)

(a) D-க்கு வலது பக்கத்தில் நான்காவதாக

(b) G-க்கு உடனடியாக இடது பக்கத்தில்

(c) B-க்கு வலது பக்கத்தில் மூன்றாவதாக.

(d) C-க்கு உடனடியாக வலது பக்கத்தில்

43. Arun is older than Maran. Gopal is older than Maran but younger than Arun. Kapil is younger than Ram and Maran. Maran is older than Ram. Whose age is exactly in the middle of all the five?
(a) Maran (b) Ram (c) Arun
(d) Gopal (e) Answer not known

அருண் மாறனைவிடப் பெரியவர். கோபால் மாறனைவிடப் பெரியவர் ஆனால் அருணை விடச் சிறியவர். கோபால், மாறன் மற்றும் ராமை விடச் சிறியவர். மாறன், ராமை விடப் பெரியவர் எனில் மேற்கண்டவர்களில் வயதில் நடுவில் இருப்பவர் யார்?
(a) மாறன் (b) ராம் (c) அருண்
(d) கோபால் (e) விடை தெரியவில்லை

44. All children are students.
All students are players.
Conclusions:
I. All cricketers are students.
II. All children are players.
(a) I and II both are false (b) I only true
(c) II only true (d) Both I and II are true
(e) Answer not known

கூறுகள்:

எல்லா குழந்தைகளும் மாணவர்கள்.

எல்லா மாணவர்களும் விளையாட்டாளர்கள்.

முடிவுகள்:

I. எல்லா கிரிக்கெட் வீரர்களும் மாணவர்கள்.

II. எல்லா குழந்தைகளும் விளையாட்டாளர்கள்.

(a) I மற்றும் II இரண்டும் தவறு
(b) I மட்டும் சரி
(c) II மட்டும் சரி
(d) I மற்றும் II இரண்டும் சரி
(e) விடை தெரியவில்லை

45. A six sided dice is marked '1' on two of its faces, '2' on other two of its faces and '3' on remaining two faces. The number of possible outcomes of getting a sum 4 from two throws of a dice?
(a) 10 (b) 12 (c) 3
(d) 8 (e) Answer not known

ஒரு ஆறுபக்க பகடையின் இரு பக்கங்களில் '**1**' எனவும் மற்ற இரு பக்கங்களில் '**2**' எனவும் மீதமுள்ள இரு பக்கங்களில் '**3**' எனவும் குறிக்கப்பட்டுள்ளது. பகடை இருமுறை வீசப்படும்போது கூடுதல் **4** கிடைப்பதற்கு சாத்தியமான விளைவுகளின் எண்ணிக்கை எது?
(a) 10 (b) 12 (c) 3
(d) 8 (e) விடை தெரியவில்லை

46. Find the next term in the below series:
2L, 2 E, 4 K, 4 F, 8 J, 8 G, ?
(a) 16 I (b) 16 H (c) 16 J
(d) 16 K (e) Answer not known

கீழ்க்கண்ட தொடரில் அடுத்த உறுப்பைக் காண்க.
2L, 2 E, 4 K, 4 F, 8 J, 8 G, ?
(a) 16 I (b) 16 H (c) 16 J
(d) 16 K (e) விடை தெரியவில்லை

47. A ate grapes and pineapple; B ate grapes and oranges; C ate oranges, pineapple and apple; D ate grapes, apple and pineapple. After taking fruits, B and C fell sick. In the light of the above facts, it can be said that the cause of sickness was... Find out the fruit which made them sick?
(a) Apple (b) Pineapple (c) Grapes
(d) Oranges (e) Answer not known

A என்பவர் திராட்சை மற்றும் அன்னாசி பழங்கள் சாப்பிட்டார். B என்பவர் திராட்சை மற்றும் ஆரஞ்சு பழங்கள் சாப்பிட்டார். C என்பவர் ஆரஞ்சு, அன்னாசி மற்றும் ஆப்பிள் பழங்கள் சாப்பிட்டார். D என்பவர் திராட்சை, ஆப்பிள் மற்றும் அன்னாசி பழங்கள் சாப்பிட்டார். மேற்கண்ட பழங்களை சாப்பிட்ட பிறகு B மற்றும் C நோய்வாய்ப்பட்டனர். மேற்கண்ட விவரங்கள் (காரணங்கள்) படி, அவர்கள் எந்தப் பழத்தைச் சாப்பிட்டதால் நோய்வாய்ப்பட காரணமாக இருந்திருக்கும்?
(a) ஆப்பிள் (b) அன்னாசி (c) திராட்சை
(d) ஆரஞ்சு (e) விடை தெரியவில்லை

47. Find the odd man out:
331, 482, 551, 263, 373, 242, 111
(a) 263 (b) 373 (c) 242
(d) 111 (e) Answer not known

பின்வரும் வரிசையில் மாறுபட்ட எண் எது?
331, 482, 551, 263, 373, 242, 111
(a) 263 (b) 373 (c) 242
(d) 111 (e) விடை தெரியவில்லை

48. Find the missing term:
$\frac{1}{6}, \frac{4}{9}, \frac{1}{2}, ?$
(a) $\frac{2}{3}$ (b) $\frac{5}{9}$ (c) $\frac{4}{11}$
(d) $\frac{5}{12}$ (e) Answer not known

விடுபட்ட உறுப்பைக் காண்க:
$\frac{1}{6}, \frac{4}{9}, \frac{1}{2}, ?$
(a) $\frac{2}{3}$ (b) $\frac{5}{9}$ (c) $\frac{4}{11}$
(d) $\frac{5}{12}$ (e) விடை தெரியவில்லை

49. If in a certain code language, 'EAT' is written as '318' and 'CHAIR' is written as '24156'. Then how will 'TEACHER' be written in that code language?
(a) 8313426 (b) 8312436 (c) 8321436
(d) 8321346 (e) Answer not known

ஒரு குறிப்பிட்ட சங்கேத மொழியில் '**EAT**' என்பது '**318**' மற்றும் '**CHAIR**' என்பது '**24156**' என குறிக்கப்படுகிறது எனில் '**TEACHER**' என்பது அந்த சங்கேத மொழியில் எவ்வாறு குறிக்கப்படும்?
(a) 8313426 (b) 8312436 (c) 8321436
(d) 8321346 (e) விடை தெரியவில்லை

50. Two dice are thrown simultaneously. What is the probability that the sum of outcomes is less than or equal to 12?
(a) 1/3 (b) 1 (c) 0
(d) 1/12 (e) Answer not known

இரண்டு பகடைகள் ஒரே நேரத்தில் உருட்டப்படுகின்றன. அவற்றின் கூடுதல் **12** அல்லது அதற்கு குறைவாக இருப்பதற்கான நிகழ்தகவு என்ன?
(a) 1/3 (b) 1 (c) 0
(d) 1/12 (e) விடை தெரியவில்லை

Answer Key

1.	(d)	**2.**	(b)	**3.**	(a)	**4.**	(c)	**6.**	(d)	**7.**	(a)	**8.**	(b)	**9.**	(b)	**10.**	(a)	**11.**	(a)
12.	(b)	**13.**	(c)	**14.**	(b)	**15.**	(b)	**16.**	(d)	**17.**	(a)	**18.**	(b)	**19.**	(c)	**20.**	(a)	**21.**	(d)
22.	(d)	**23.**	(b)	**24.**	(c)	**25.**	(a)	**26.**	(c)	**27.**	(d)	**28.**	(b)	**29.**	(b)	**30.**	(d)	**31.**	(a)
32.	(a)	**33.**	(c)	**34.**	(a)	**35.**	(c)	**36.**	(d)	**37.**	(a)	**38.**	(c)	**39.**	(d)	**40.**	(a)	**41.**	(b)
42.	(a)	**43.**	(a)	**44.**	(c)	**45.**	(b)	**46.**	(a)	**47.**	(d)	**47.**	(b)	**48.**	(b)	**49.**	(b)	**50.**	(b)