

Numerical Ability

# TCS Digital Test Preparation Series

## About me

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

# Pattern

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

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

# Topics !!

**Elementary  
Statistics.**

**Data  
Interpretation.**

**Simplifications  
&  
Approximations.**

**Number System**

**Mensuration**

**Ages**

**Allegations and  
Mixtures**

**Averages**

**Clocks  
and Calendars**

Equations

Percentages

Permutations  
and Combinations

Probability

Profit and Loss

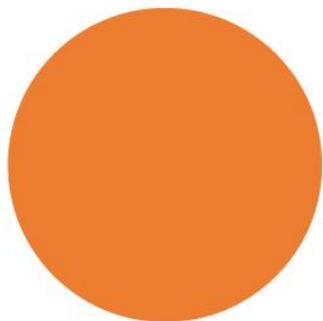
Ratios  
and Proportion

Series  
and Progressions

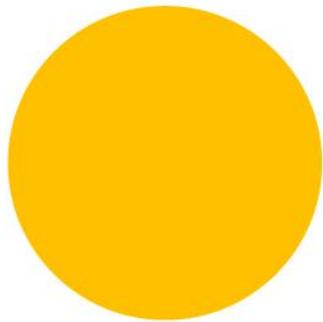
Time, Speed  
and Distance

Time and Work

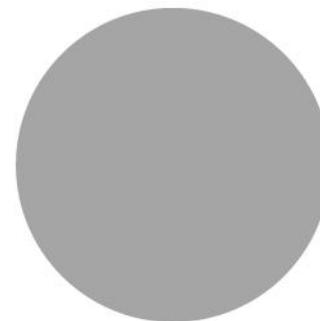
# Approach



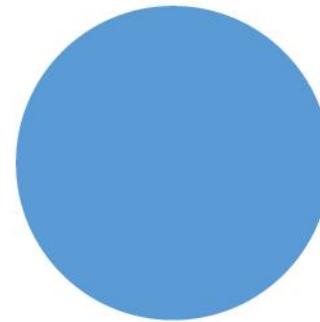
Complete understanding of questions covered during the Session.



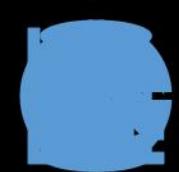
Go through the link provided in the resource slide and try to solve them.



Try to attempt practice assignment questions.



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



# Data Interpretation

Data Table   Pie Chart

Bar Chart   Line Graph

# Concepts and Formulas

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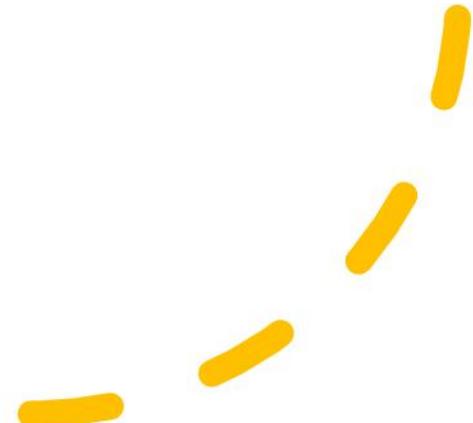
**Table Chart**-Table Chart are the most common and versatile method to solve data interpretation problems.Table are fundamental method to represent the data. In table data is represent in row and columns.

**Pie Chart**-Pie Chart is pictorial representations of data as part of circle.

**Bar Chart**-Bar Chart is the way of representing data on X-axis and Y-axis.Bar Chart is most convenient way to present the data. It is very easy to understand.

# Formulas

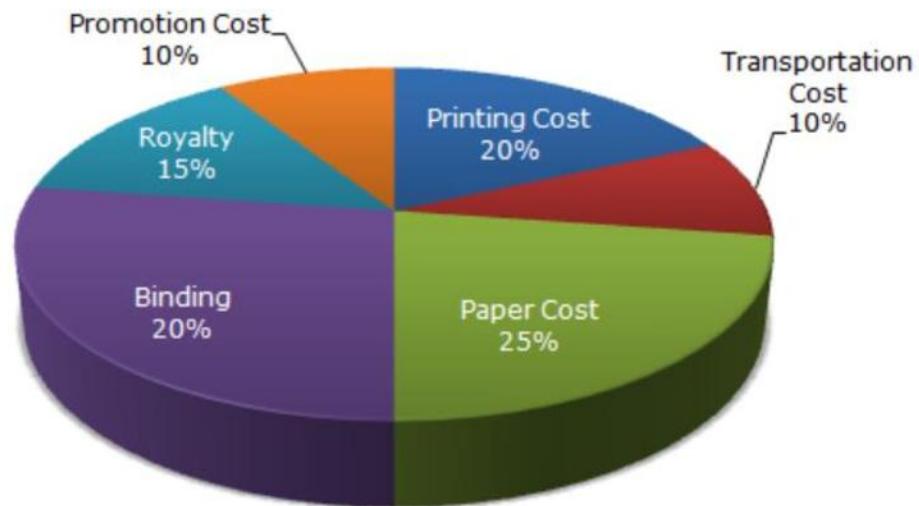
- Increase/Decrease in Quantity=(Change in Quantity/Initial Quantity).
- Average=(A<sub>1</sub>+A<sub>2</sub>+...+A<sub>n</sub>)/n.
- Percentage Increase/Decrease in Quantity=(Change in Quantity/Initial Quantity)x 100.
- Total Angle sum in a Pie Chart is 360 Degrees.
- Percentage of A in a composition of A and B is  $(A/(A+B))*100$



# Sample Question 1

The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book. Study the pie-chart and answer the questions based on it.

Various Expenditures (in percentage) Incurred in Publishing a Book



- . If for a certain quantity of books, the publisher has to pay Rs. 30,600 as printing cost, then what will be amount of royalty to be paid for these books?
  - A. Rs. 19,450
  - B. Rs. 21,200
  - C. Rs. 22,950
  - D. Rs. 26,150

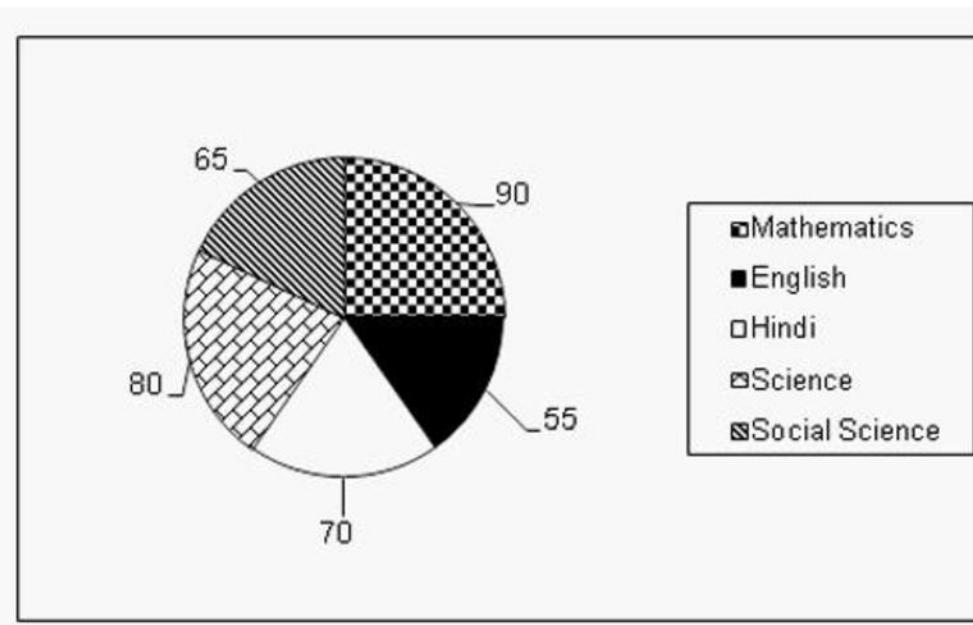
## Sample Question Solution 1

### Explanation:

Let the amount of Royalty to be paid for these books be Rs.  $r$ .

$$\text{Then, } 20 : 15 = 30600 : r \Rightarrow r = \text{Rs.} \left( \frac{30600 \times 15}{20} \right) = \text{Rs.} 22,950.$$

## Sample Question 2



## Sample Question Solution 2

The Marks scored in English and Mathematics is less than the marks scored in Science and Hindi by

1. 5%
2. 4.33%
3. 3.33%
4. 6%

## Sample Question Solution 2

**Answer Option: 3**

Marks scored in English and Mathematics =  $(55 + 90) / 360 \times 900 = 362.5$  Marks scored in Hindi and Science =  $(70 + 80) / 360 \times 900 = 375$  Percent decrease =  $12.5 / 375 \times 100 = 3.33$

## Sample Question 3

The following table shows the number of Men and Women and the percentage of Children in five different societies.

Societies	Men(males)	Women	Children
P	120	80	20%
Q	180	60	40%
R	150	50	50%
S	80	200	30%
T	100	170	10%

**Question:**

Number of males in society Q is how much percent less than the number of children in society R?

- 20%
- 5%
- 33.33%
- 10%
- 25%

## Sample Question Solution 3

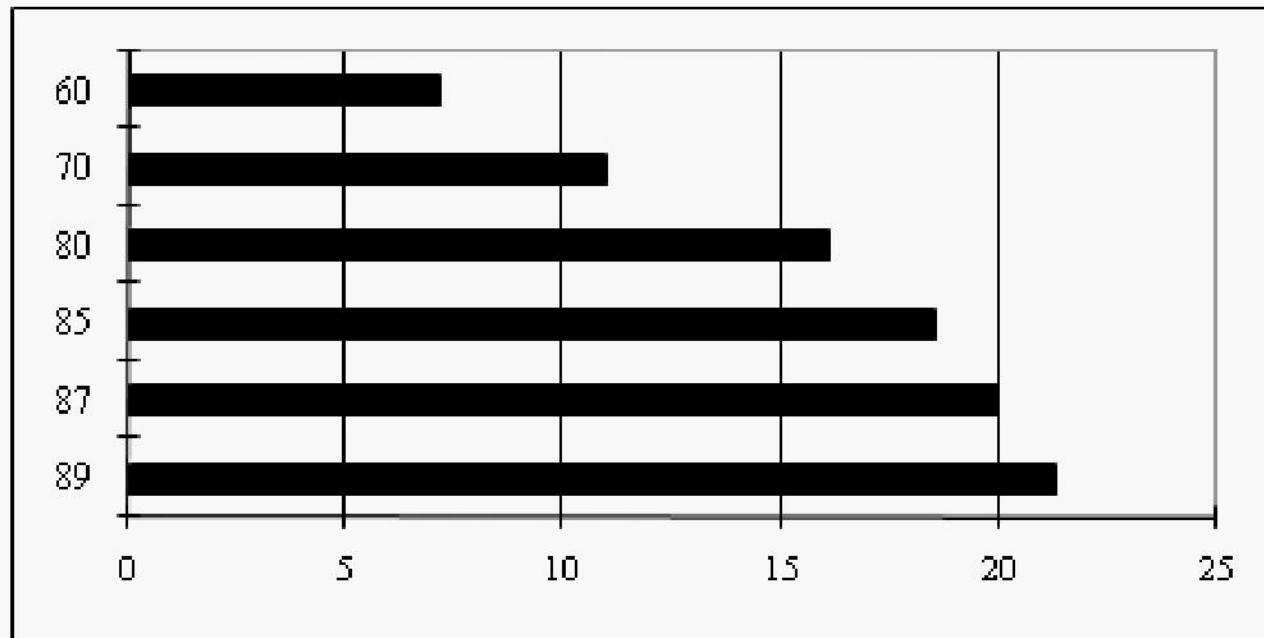
Number of males in society Q = 180

Number of children in society R = 50% of  $[(150 + 50) \times 100/50]$  = 200

$\therefore$  Required Percentage =  $[(200 - 180)/200] \times 100 = 10\%$

## Sample Question 4

Refer to the following graph related to the percentage of persons over 25 years of age and with more than 4 years college education living in country X.



## Sample Question Solution 4

What was the average percentage increase per year from 1970 to 1980?

- A. 0.5%
- B. 5%
- C. 0.7%
- D. 2%

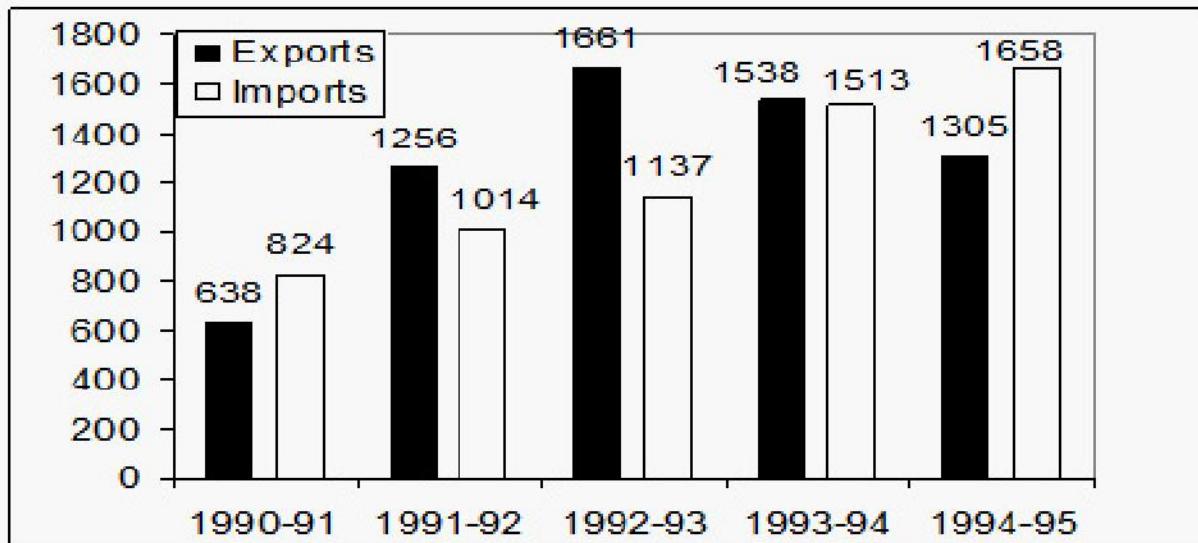
## Sample Question Solution 4

Answer: B

%age in year 1980 = 16.5. %age in year 1970 = 11%. Percentage increase =  $(16.5 - 11) / 11 = 50\%$

Average % age increase over 10 years =  $50/10 = 5\%$

## Sample Question 5



- . In which of the following years was the gap in the exports and imports the maximum?
- A. 1994-95      B. 1992-93      C. 1993-94      D. 1990-91

## Sample Question Solution 5

**Answer: B**

Difference for 1994-1995 = 1658-1305 = 353

Difference for 1992-1993 = 1661-1137 = 524

Difference for 1993-1994 = 1538-1513 = 25

Difference for 1990-1991 = 824-638 = 186

In this case we can observe that 1992-1993, the gap in the exports and imports is maximum.

Hence, answer is option B

# Statistics

Mean

Median

Mode

Standard Deviation

Variance

# What is Statistics

- Statistics is associated with collecting, classifying, arranging and presenting numerical data.
- It allows us to interpret various results from it and forecast many possibilities.
- Statistics deals with facts, observations and information which are in the form of numeric data only.

## Mean

Mean is the most commonly used measure of central tendency. It actually represents the average of the given collection of data. It is applicable for both continuous and discrete data.

It is equal to the sum of all the values in the collection of data divided by the total number of values.

Suppose we have  $n$  values in a set of data namely as  $x_1, x_2, x_3, \dots, x_n$  then the mean of data is given by:

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

It can also be denoted as:

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\text{Mean } \bar{x} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}$$

Here,

$\sum f_i$  = Sum of all frequencies

# Median

Median: Given that the data collection is arranged in ascending or descending order, the following method is applied:

- If number of values or observations in the given data is odd, then the median is given by  $\left(\frac{n+1}{2}\right)^{th}$  observation.
- If in the given data set, the number of values or observations is even then the median is given by the average of  $\left(\frac{n}{2}\right)^{th}$  and  $\left(\frac{n}{2} + 1\right)^{th}$  observation.

Median for grouped data can be calculated using the formula,

$$\text{Median} = l + \left( \frac{\frac{N}{2} - cf}{f} \right) \times h$$

## ***Formula for Calculating Median:***

$$\text{Median, } M_e = l + \{h \times (N/2 - cf)/f\}$$

***where,***

***l = lower limit of median class.***

***h=width of median class.***

***f = frequency of median class,***

***cf = cumulative frequency of the class preceding the median class.***

$$N = \sum f_i$$

## Example of Median

**Example: Calculate the median for the following frequency distribution.**

Class Interval	0-8	8-16	16-24	24-32	32-40	40-48
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Frequency	8	10	16	24	15	7
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*Class   Frequency   Cumulative Frequency*

<i>Class</i>	<i>Frequency</i>	<i>Cumulative Frequency</i>
0-8	8	8
8-16	10	18
16-24	16	34
24-32	24	58
32-40	15	73
40-48	7	80
$N = \sum f_i = 80$		

*Now,  $N = 80 = (N/2) = 40$ .*

*The cumulative frequency just greater than 40 is 58 and the corresponding class is 24-32.*

*Thus, the median class is 24-32.*

*$l = 24, h = 8, f = 24, cf = c.f. \text{ of preceding class} = 34, \text{ and } (N/2) = 40$ .*

*Median,  $M_e = l + h \{(N/2 - cf)/f\}$*

$$= 24 + 8 \{(40 - 34)/24\}$$

$$= 26$$

*Hence, median = 26.*

# Mode

Consider the following data set which represents the marks obtained by different students in a subject.

Name	Anmol	Kushagra	Garima	Ashwini	Geetika	Shakshi
Marks Obtained (out of 100)	73	80	73	70	73	65

The maximum frequency observation is 73 ( as three students scored 73 marks), so the mode of the given data collection is 73.

We can calculate the mode for grouped data using the below formula:

$$Mode = l + \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

## ***Formula for Calculating Mode:***

$$M_o = x_k + h \{ (f_k - f_{k-1}) / (2f_k - f_{k-1} - f_{k+1}) \}$$

*where,*

*$x_k$  = lower limit of the modal class interval.*

*$f_k$  = frequency of the modal class.*

*$f_{k-1}$  = frequency of the class preceding the modal class.*

*$f_{k+1}$  = frequency of the class succeeding the modal class.*

*$h$  = width of the class interval.*

## Example of Mode

**Example 1: Calculate the mode for the following frequency distribution.**

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
-------	------	-------	-------	-------	-------	-------	-------	-------

Frequency	5	8	7	12	28	20	10	10
-----------	---	---	---	----	----	----	----	----

*Class 40-50 has the maximum frequency, so it is called the modal class.*

$$x_k = 40, h = 10, f_k = 28, f_{k-1} = 12, f_{k+1} = 20$$

$$\text{Mode, } M_o = x_k + h \{(f_k - f_{k-1}) / (2f_k - f_{k-1} - f_{k+1})\}$$

$$= 40 + 10 \{(28 - 12) / (2 * 28 - 12 - 20)\}$$

$$= 46.67$$

*Hence, mode = 46.67*

# Properties of Table

- Class Interval (width of the class) is the difference between the upper limit and lower limit, denoted by the letter h.
- Class interval = Upper-class limit- lower-class limit.
- Class Mark is defined as the mid-value (or middle value) of each class interval.
- Class Mark =  $(\text{Upper limit} + \text{Lower limit})/2$
- The upper limit of the class is the maximum value or the value above which there exists no item in that class.
- The lower limit of the class is the least value or the value below which there exists no item in that class
- *Class Size h = Upper limit – Lower Limit.*

# Standard Deviation and Variance

- **Standard Deviation** is a measure which shows how much variation (such as spread, dispersion, spread,) from the mean exists.
- It is a popular measure of variability because it returns to the original units of measure of the data set.
- **Variance** is the measure of how notably a collection of data is spread out. If all the data values are identical, then it indicates the variance is zero.
- A variance is used to measure how far the data values are dispersed from the mean, and the standard deviation is the used to calculate the amount of dispersion of the given data set values.



$$\text{Variance} = (\text{Standard deviation})^2 = \sigma^2$$

The corresponding formulas are hence,

$$\text{Population standard deviation } \sigma = \sqrt{\frac{\sum(X-\mu)^2}{N}} \text{ and}$$

$$\text{Sample standard deviation } s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$$

Where X (or x) = Value of Observations

$\mu$  = Population mean of all Values

n = Number of observations in the sample set

$\bar{x}$  = Sample mean

N = Total number of values in the population

# Some Important Rules

- As a general rule, the median, mean, and quartiles will be changed by adding a constant to each value.
- However, the range, interquartile range, standard deviation and variance will remain the same.
- Multiplying every value by a constant, however, will multiply the mean, median, quartiles, range, interquartile range, and standard deviation by that constant, and multiply the variance (which is simply the square of the standard deviation) by the square of that constant.

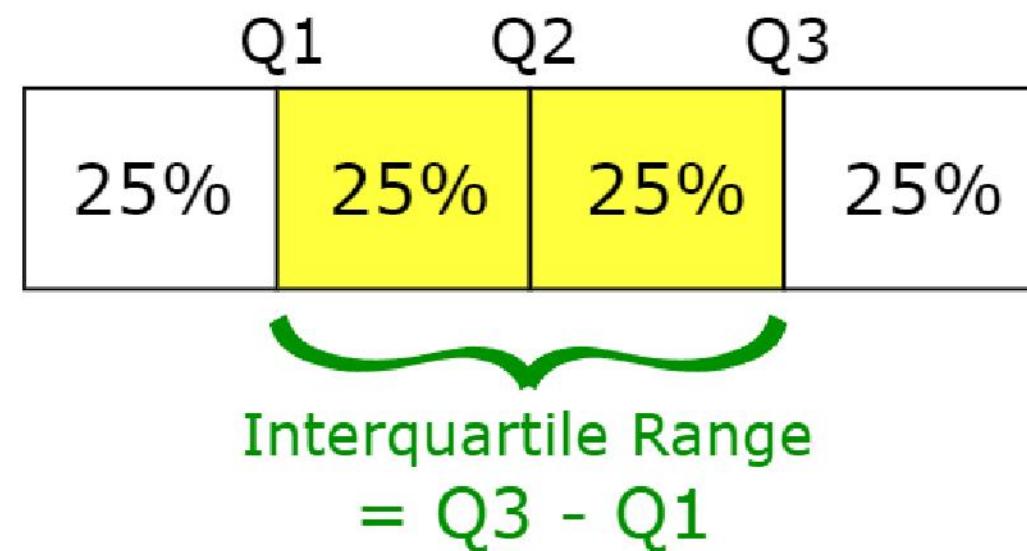


# Properties

- $\text{Var}(X + C) = \text{Var}(X)$ , where C is a constant.
- $\text{Var}(CX) = C^2.\text{Var}(X)$ , where C is a constant.
- $\text{Var}(aX + b) = a^2.\text{Var}(X)$ , where a and b are constants.
- $\text{SD}(X + C) = \text{SD}(X)$ , where C is a constant.
- $\text{SD}(CX) = C.\text{SD}(X)$ , where C is a constant.
- $\text{Mean}(X+C)=\text{Mean}(X)+C$ , where C is a constant.
- $\text{Mean}(X.C)=\text{Mean}(X).C$ , where C is a constant.
- $\text{Median}(X+C)=\text{Median}(X)+C$ , where C is a constant.
- $\text{Median}(X.C)=\text{Median}(X).C$ , where C is a constant.
- $\text{Mode}(X+C)=\text{Mode}(X)+C$ , where C is a constant.
- $\text{Mode}(X.C)=\text{Mode}(X).C$ , where C is a constant.

# Quartile

- A quartile divides the set of observation into 4 equal parts.
- The middle term, between the median and first term is known as the first or Lower Quartile and is written as  $Q_1$ .
- Similarly, the value of mid term that lies between the last term and the median is known as the third or upper quartile and is denoted as  $Q_3$ .
- Second Quartile is the median and is written as  $Q_2$ .



When the set of observation is arranged in an ascending order, then the 25th percentile is given as:

$$Q_1 = \left( \frac{n+1}{4} \right)^{th} \text{Term}$$

The second quartile or the 50th percentile or the Median is given as:

$$Q_2 = \left( \frac{n+1}{2} \right)^{th} \text{Term}$$

The third Quartile or the 75th Percentile (Q3) is given as:

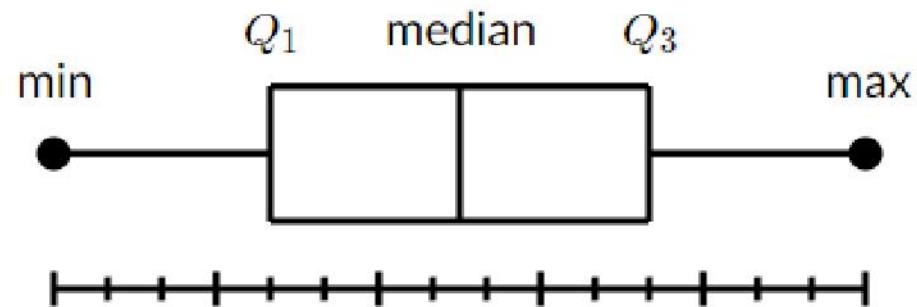
$$Q_3 = \left( \frac{3(n+1)}{4} \right)^{th} \text{Term}$$

# Inter Quartile Range

The Upper quartile is given by rounding to the nearest whole integer if the solution is coming in decimal number. The major use of the lower and upper quartile helps is that it helps us measure the dispersion in the set of the data given. The dispersion is also called “inter quartile range”, denoted as IQR, inter quartile range is the difference between lower and upper quartile.

$$IQR = \text{Upper Quartile} - \text{Lower Quartile}$$

# An example of Box Plot

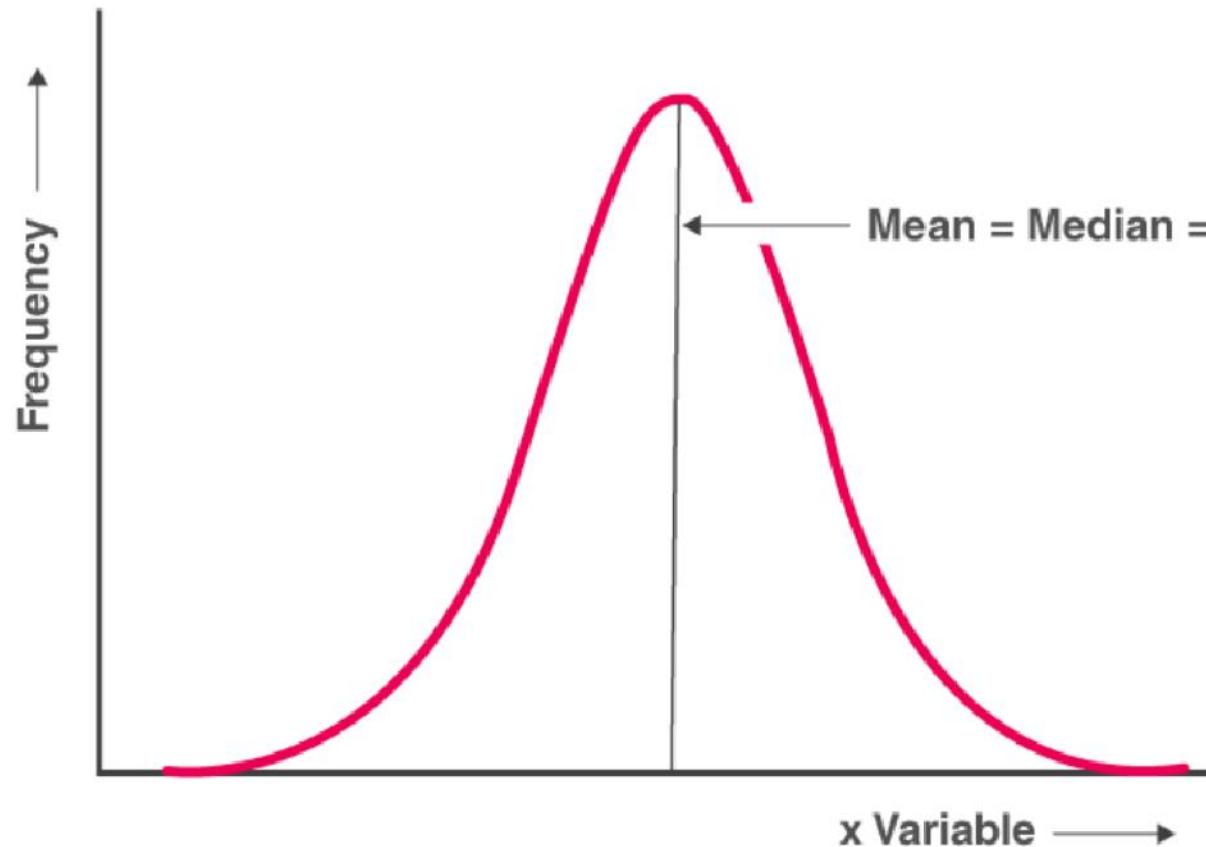


# Relation Between Mean Median and Mode

- Mean is the average of the data set which is calculated by adding all the data values together and dividing it by the total number of data sets.
- Median is the middle value among the observed set of values and is calculated by arranging the values in ascending order or in descending order and then choosing the middle value.
- Mode is the number from a data set which has the highest frequency and is calculated by counting the number of times each data value occurs.
- Empirical Relationship between Mean, Median and Mode
- In case of a moderately skewed distribution, the difference between mean and mode is almost equal to three times the difference between the mean and median. Thus, the empirical mean median mode relation is given as:
- **Mode = 3 Median – 2 Mean**

- Frequency Distribution with Symmetrical Frequency Curve

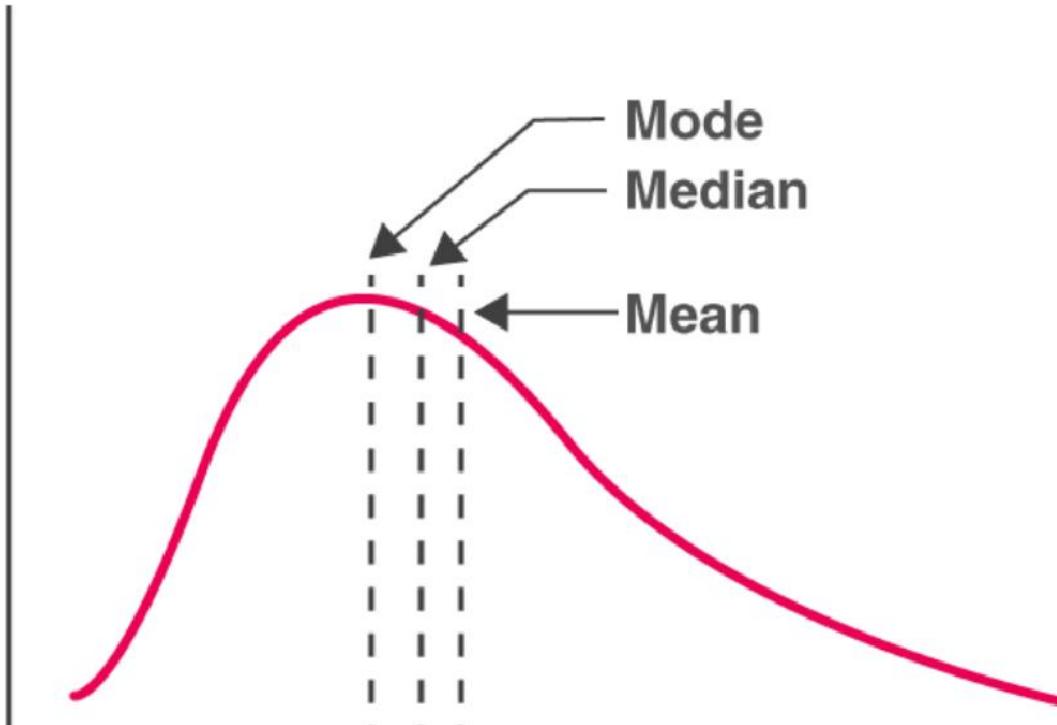
If a frequency distribution graph has a symmetrical frequency curve, then mean, median and mode :



Mean = Median = Mode

- For Positively Skewed Frequency Distribution

In case of a positively skewed frequency distribution, the mean is always greater than median and always greater than the mode.

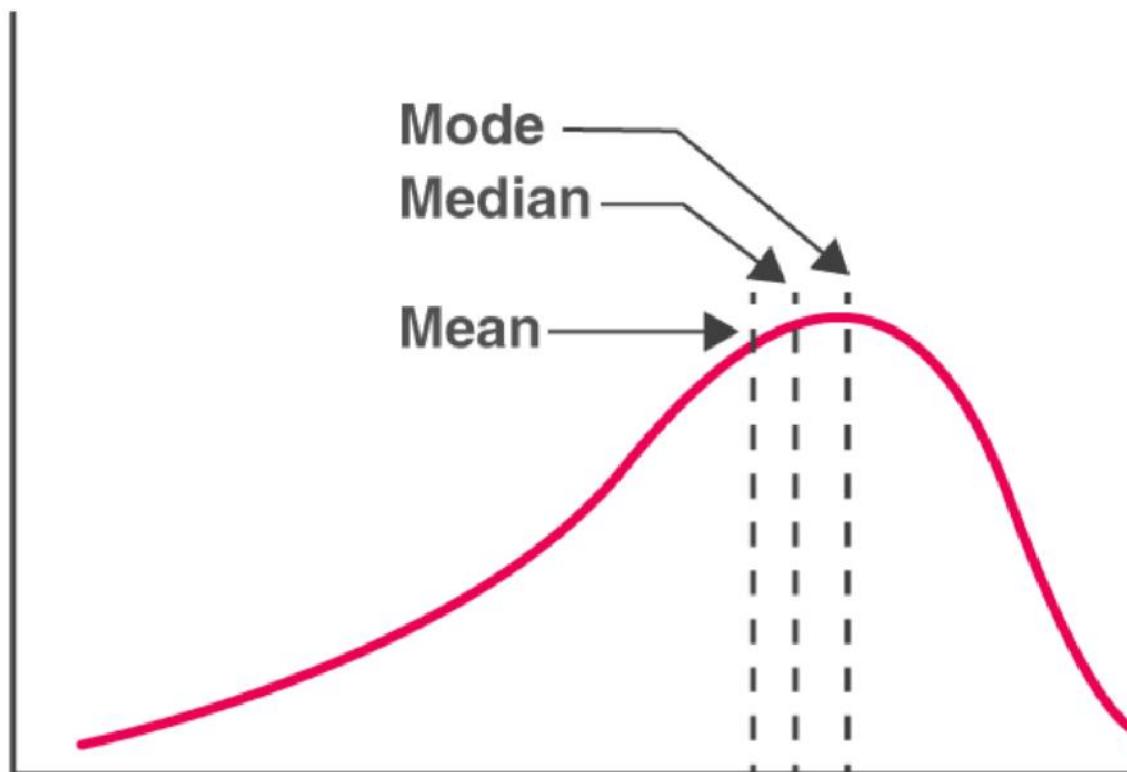


Positively skewed frequency distribution

Mean > Median > Mode

- For Negatively Skewed Frequency Distribution

In case of a negatively skewed frequency distribution, the mean is always lesser than median and the median is always lesser than the mode.



Negatively skewed frequency distribution

Mean < Median < Mode

## Sample Question 6

**What is the mean deviation of the data 2, 9, 9, 3, 6, 9, 4 ?**

1. 2.23

2. 2.57

3. 3.23

4. 3.57

## Sample Question Solution 6

Given data is 2, 9, 9, 3, 6, 9, 4

$$\Rightarrow n = 7$$

$$\text{Mean } \bar{x} = \frac{2 + 9 + 9 + 3 + 6 + 9 + 4}{7}$$

$$\Rightarrow \bar{x} = 6$$

$$\text{Mean deviation} = \frac{1}{n} \sum |x - \bar{x}|$$

$\Rightarrow$  Mean deviation

$$= \frac{1}{7}$$

$$(|2 - 6| + |9 - 6| + |9 - 6| + |3 - 6| + |6 - 6| + |9 - 6| + |4 - 6|)$$

$$\Rightarrow \text{Mean deviation} = 2.57$$

Hence, the mean deviation of the data 2, 9, 9, 3, 6, 9, 4 is 2.57

## Sample Question 7

Standard deviation for the following distribution is:

Size of Item	6	7	8	9	1	1	1
	0	1	1	2			
Frequency	3	6	9	1 3	8	5	4

1. 1.6
2. 9.0
3. 5.0
4. 1.88

# Sample Question Solution 7

Total number of items in the distribution =  $\sum f_i = 3 + 6 + 9 + 13 + 8 + 5 + 4 = 48$ .

The Mean ( $\bar{x}$ ) of the given set =  $\frac{\sum f_i x_i}{\sum f_i}$ .

$$\Rightarrow \bar{x} = \frac{6 \times 3 + 7 \times 6 + 8 \times 9 + 9 \times 13 + 10 \times 8 + 11 \times 5 + 12 \times 4}{48} = \frac{432}{48}$$
$$= 9.$$

Let's calculate the variance using the formula:  $\sigma^2 = \frac{\sum x_i^2}{n} - \bar{x}^2$ .

$$\frac{\sum x_i^2}{n} =$$
$$\frac{6^2 \times 3 + 7^2 \times 6 + 8^2 \times 9 + 9^2 \times 13 + 10^2 \times 8 + 11^2 \times 5 + 12^2 \times 4}{48} =$$
$$\frac{4012}{48}$$
$$= 83.58.$$

$$\therefore \sigma^2 = 83.58 - 9^2 = 83.58 - 81 = 2.58.$$

And, Standard Deviation ( $\sigma$ ) =  $\sqrt{\sigma^2} = \sqrt{\text{Variance}} = \sqrt{2.58} \approx 1.607$ .

## Sample Question 8

**The mean and the variance of 10 observations are given to be 4 and 2 respectively. If every observation is multiplied by 2, the mean and the variance of the new series will be respectively.**

1. 8 and 20
2. 8 and 4
3. 8 and 8
4. 80 and 40

# Sample Question Solution 8

## Concept:

If every observation is multiplied by a number, then the mean is also multiplied by the same number

$$\text{Variance} = \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$$

If every observation is multiplied by a number, new variance = (number)<sup>2</sup> × old variance

## Calculation:

Here, mean ( $\bar{x}$ ) = 4 and variance ( $\sigma^2$ ) = 2

Number of observation (n) = 10

New mean = 2 × (mean)

$$= 2 \times 4$$

$$\Rightarrow 8$$

New var = (number)<sup>2</sup> × old variance

$$\Rightarrow 2^2 \times 2$$

$$\Rightarrow 8$$

Hence, option (3) is correct.

## Sample Question 9

**Question:** In a moderately skewed distribution, the median is 20 and the mean is 22.5. Using these values, find the approximate value of the mode.

## Sample Question Solution 9

Given,

$$\text{Mean} = 22.5$$

$$\text{Median} = 20$$

$$\text{Mode} = x$$

Now, using the relationship between mean mode and median we get,

$$(\text{Mean} - \text{Mode}) = 3 (\text{Mean} - \text{Median})$$

So,

$$22.5 - x = 3 (22.5 - 20)$$

$$22.5 - x = 7.5$$

$$\therefore x = 15$$

**So, Mode = 15.**

## Sample Question 10

Find the median, lower quartile, upper quartile and inter-quartile range of the following data set of scores: 19, 21, 23, 20, 23, 27, 25, 24, 31 ?

# Sample Question Solution 10

First, let's arrange of the values in an ascending order: 19, 20, 21, 23, 23, 24, 25, 27, 31

Now let's calculate the Median,

$$Q_2 = \left( \frac{n+1}{2} \right)^{th} \text{Term} \quad Q_2 = \left( \frac{9+1}{2} \right)^{th} \text{Term} = 5^{th} \text{Term} = 23$$

Lower Quartile:

$$Q_1 = \left( \frac{n+1}{4} \right)^{th} \text{Term} = \left( \frac{9+1}{4} \right)^{th} \text{Term} = 2.5^{th} \text{Term}$$

Upper Quartile:

$$Q_3 = \left( \frac{3(n+1)}{4} \right)^{th} \text{Term} \quad Q_3 = \left( \frac{3(9+1)}{4} \right)^{th} \text{Term} = \frac{30}{4} = 7.5^{th} \text{Term}$$

Average of 2nd and 3rd terms

$$= (20 + 21)/2 = 20.5 = \text{Lower Quartile}$$

Average of 7th and 8th terms

$$= (25 + 27)/2 = 26 = \text{Upper Quartile}$$

$$\text{IQR} = \text{Upper quartile} - \text{Lower quartile}$$

$$= 26 - 20.5$$

$$= 5.5$$

## Sample Question 11

**Question:** Calculate the mean, variance and standard deviation for the following data:

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	27	10	7	5	4	2

# Sample Question Solution 11

Class Interval	Frequency (f)	Mid Value ( $x_i$ )	$fx_i$	$fx_i^2$
0 – 10	27	5	135	675
10 – 20	10	15	150	2250
20 – 30	7	25	175	4375
30 – 40	5	35	175	6125
40 – 50	4	45	180	8100
50 – 60	2	55	110	6050
	$\sum f = 55$		$\sum fx_i = 925$	$\sum fx_i^2 = 27575$

$$N = \sum f = 55$$

$$\text{Mean} = (\sum fx_i)/N = 925/55 = 16.818$$

$$\text{Variance} = 1/(N - 1) [\sum fx_i^2 - 1/N(\sum fx_i)^2]$$

$$= 1/(55 - 1) [27575 - (1/55)(925)^2]$$

$$= (1/54) [27575 - 15556.8182]$$

$$= 222.559$$

$$\text{Standard deviation} = \sqrt{\text{variance}} = \sqrt{222.559} = 14.918$$

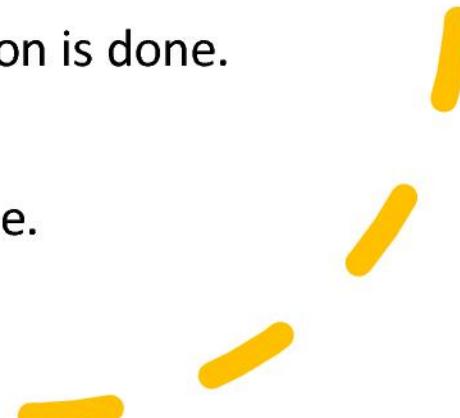
# Simplifications & Approximations



# VBODMAS rule?

This rule states that the expression needs to be solved in a proper sequence and it is decided by the precedence of mathematical operators to simplify the equation:

- **V**- Vinculum or bar ('Bar bracket') '---'
- **B (Brackets)**- Brackets are to be solved in the following sequence-
  - Small brackets ('Circular bracket') '()'
  - Middle brackets ('Curly bracket') '{}'
  - Square bracket ('Big bracket') '[]'
- **O (of)** - Operation of 'of' is simplified.
- **D (Division)** - Operation of division is done.
- **M (Multiplication)** - Operation of multiplication is done.
- **A (Addition)** - Addition operation is done.
- **S (Subtraction)** - Subtraction operation is done.



# Formulas

- $a^2 - b^2 = (a - b)(a + b)$
- $(a + b)^2 = a^2 + 2ab + b^2$
- $a^2 + b^2 = (a - b)^2 + 2ab$
- $(a - b)^2 = a^2 - 2ab + b^2$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$
- $(a + b + c)^3 = a^3 + b^3 + c^3 + 3(a + b)(b + c)(c + a)$
- $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - ac - bc)$
- $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab - 2ac + 2bc$
- $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 ; (a + b)^3 = a^3 + b^3 + 3ab(a + b)$
- $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

# Approximation

## **Conversion of decimal numbers to the nearest number**

To solve such questions, first, convert the decimal to the nearest value. Then simplify the given equation using the new values that you have obtained.



## Sample Question 12

If  $a - b = 3$  and  $a^2 + b^2 = 29$ , find the value of  $ab$ .

- A. 10
- B. 12
- C. 15
- D. 18

## Sample Question Solution 12

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

$$= 29 - 9 = 20$$

$$\Rightarrow ab = 10.$$

## Sample Question 13

A sum of Rs. 1360 has been divided among A, B and C such that A gets  $\frac{2}{3}$  of what B gets and B gets  $\frac{1}{4}$  of what C gets. B's share is:

- A.** Rs. 120
- B.** Rs. 160
- C.** Rs. 240
- D.** Rs. 300

## Sample Question Solution 13

Let C's share = Rs.  $x$

Then, B's share = Rs.  $\frac{x}{4}$ , A's share = Rs.  $\left(\frac{2}{3} \times \frac{x}{4}\right)$  = Rs.  $\frac{x}{6}$

$$\therefore \frac{x}{6} + \frac{x}{4} + x = 1360$$

$$\Rightarrow \frac{17x}{12} = 1360$$

$$\Rightarrow x = \frac{1360 \times 12}{17} = \text{Rs. } 960$$

Hence, B's share = Rs.  $\left(\frac{960}{4}\right)$  = Rs. 240.

## Sample Question 14

What approximate value should come in place of question mark (?) in the following question? (You are not expected to calculate the exact value)

$$28.13\% \text{ of } 150 + \sqrt{(63.15 \times 6.92)} + (7.89)^2 = ?$$

- 127
  - 115
  - 132
  - 140
  - 150
-

## Sample Question Solution 14

Given expression is,

$$28.13\% \text{ of } 150 + \sqrt{(63.15 \times 6.92)} + (7.89)^2 = ?$$

We can write the given values as:

$$28.13 \approx 28, 63.15 \approx 63, 6.92 \approx 7 \text{ and } 7.89 \approx 8$$

Approximating values in the given expression:

$$\Rightarrow ? = 28\% \text{ of } 150 + \sqrt{(63 \times 7)} + 8^2$$

$$\Rightarrow ? = 28\% \text{ of } 150 + \sqrt{(63 \times 7)} + 8^2$$

$$\Rightarrow ? = 28 \times 150/100 + \sqrt{(9 \times 7 \times 7)} + 8^2$$

$$\Rightarrow ? = 42 + 21 + 64$$

$$\therefore ? = 127$$

## Sample Question 15

What approximate value should come in place of the question mark '?' in the following question? [You are not expected to calculate the exact value.]

$$(91.104 \times ? + 45.004 \times 2.895 = 75.001 \times 8.888)$$

2

3

4

10

## Sample Question Solution 15

Approximating the terms as,

$$\Rightarrow 91.104 \cong 91$$

$$\Rightarrow 45.004 \cong 45$$

$$\Rightarrow 2.895 \cong 3$$

$$\Rightarrow 75.001 \cong 75$$

$$\Rightarrow 8.888 \cong 9$$

Hence, the expression approximately becomes,

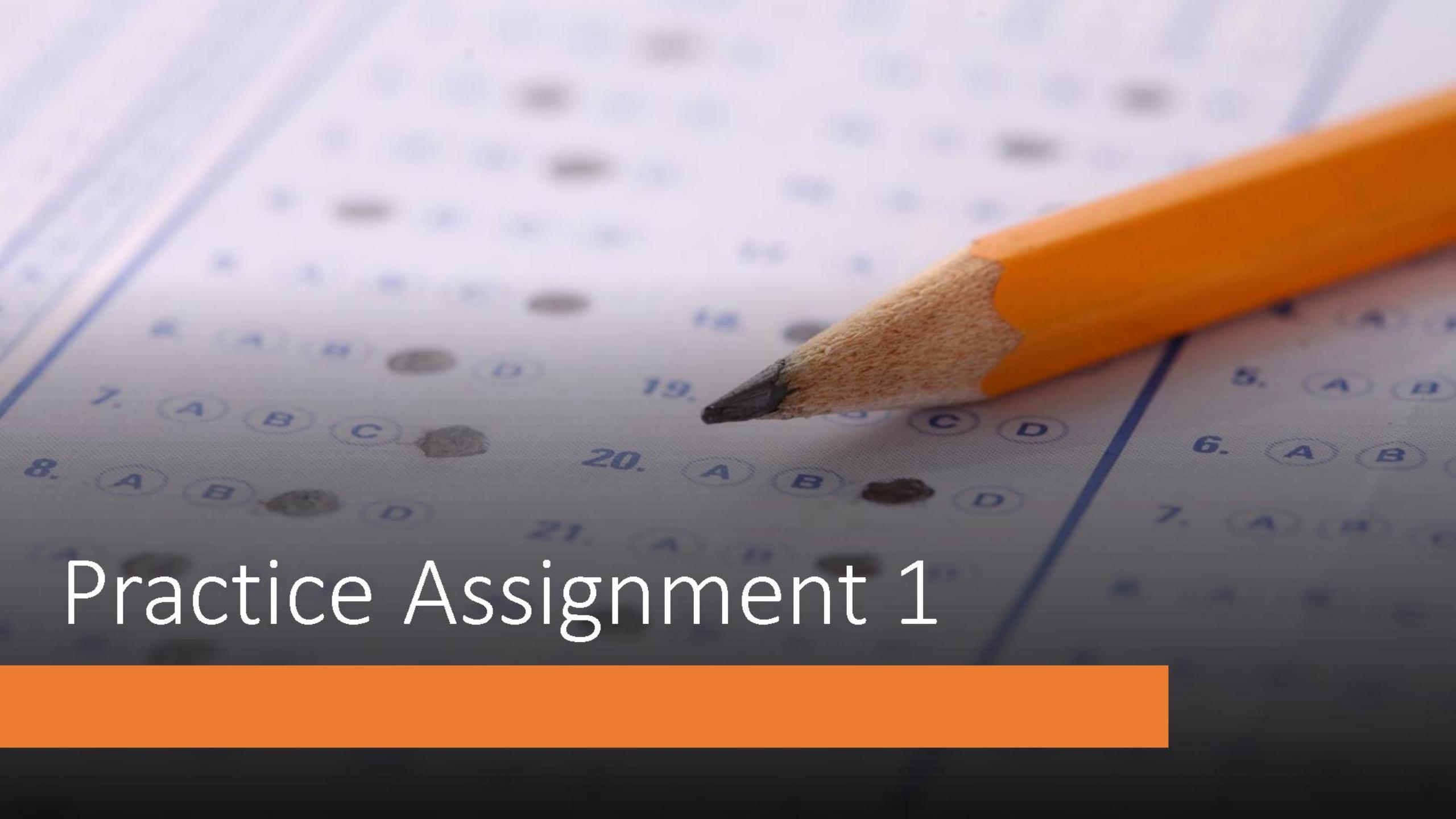
$$\Rightarrow 91 \times ? + 45 \times 3 = 75 \times 9$$

$$\Rightarrow 91 \times ? = 675 - 135$$

$$\Rightarrow ? = 540/91$$

$$\therefore ? = 6$$

# Practice Assignment 1



## Practice Question 1.1

The mean of a set of data is 5. What will be the mean if ten is subtracted from each data ?



5



10



-10



-5

## Practice Question Solution 1.1

let the number of data be  $n$

so sum of data = *mean*  $\times$  *number of data*

$$= 5n$$

now 10 is subtracted to each data

so now sum becomes =  $5n - 10n = -5n$

*mean* = sum of data / no. of data

$$= \frac{-5n}{n} = -5$$

so new mean becomes -5

## Practice Question 1.2

The median of the following data is:

Class	0-10	10-20	20-30	30-40	40-50
Frequency	10	15	12	15	8

24.166

12.56

23.545

21.66

# Sample Question Solution 1.2

Class	Frequency	Commulative Frequency
0-10	10	10
10-20	15	25
20-30	12	37
30-40	15	52
40-50	8	60

$$\text{Median} = L + \left( \frac{\frac{n}{2} - C_f}{f} \right) \times h$$

Where,

L=lower limit of median class

n=number of observations

$C_f$ = Commulative frequency of class

h=class size

f=frequency

$$\text{Median} = 20 + \left( \frac{\frac{60}{2} - 25}{12} \right) \times 10$$

$$\text{Median} = 20 + \frac{50}{12}$$

$$\text{Median}=20+4.166$$

$$\text{Median}=24.166$$

## Practice Question 1.3

If mean of 29 observations is 33 and on adding one more observation the new mean becomes 34. What is the value of 30th observation?

68

55

63

54

## Practice Question Solution 1.3

For, 29 observations mean is 33

$$\text{sum} = 33 \times 29 = 957$$

and for 30 observations, mean is 34

$$\text{sum} = 34 \times 30 = 1020$$

$$\text{Difference} = 1020 - 957$$

$$= 63 \text{ (30th number)}$$

## Practice Question 1.4

The sum of deviations of  $n$  number of observations measured from 2.5 is 50. The sum of deviations of the same set of observations measured from 3.5 is -50. What is the value of  $n$ ?

1. 50
2. 60
3. 80
4. 100

## Practice Question Solution 1.4

Let, data value be  $a_1, a_2, a_3, \dots, a_n$

$$(a_1 - 2.5) + (a_2 - 2.5) + (a_3 - 2.5) + \dots + (a_n - 2.5) = 50$$

$$(a_1 + a_2 + a_3 + \dots + a_n) - 2.5(n) = 50$$

$$(a_1 + a_2 + a_3 + \dots + a_n) = 50 + 2.5n \text{ and}$$

$$(a_1 - 3.5) + (a_2 - 3.5) + \dots + (a_n - 3.5) = -50$$

$$(a_1 + a_2 + a_3 + \dots + a_n) - 3.5(n) = -50$$

$$(a_1 + a_2 + a_3 + \dots + a_n) = -50 + 3.5n$$

$$\text{Now, } -50 + 3.5n = 50 + 2.5n$$

$$\Rightarrow n = 100$$

$$\Rightarrow n = 100$$

Hence, option (4) is correct.

## Practice Question 1.5

**Find the mean deviation for the given data is  $p, 6, 6, 7, 8, 11, 15, 16$ , if value of mean of the data is 3 times of the ' $p$ '.**

1. 2.25
2. 3.75
3. 4.4
4. 2.5

# Practice Question Solution 1.5

## **CONCEPT:**

Mean Deviation for ungrouped data:

For 'n' observation  $x_1, x_2, \dots, x_n$ , the mean deviation about their mean  $\bar{x}$  is given by

$$M.D = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{N}, \text{ where } N \text{ is the number of observations}$$

## **CALCULATIONS:**

Given data of numbers are p, 6, 6, 7, 8, 11, 15, and 16.

$$\text{Mean } \bar{x} = \frac{\text{Sum of all the observations}}{\text{Total number of observations}} = \frac{p+6+6+7+8+11+15+16}{8} = 3p$$

$$\therefore 23p = 69 \quad \Rightarrow p = 3$$

So given data is 3, 6, 6, 7, 8, 11, 15, 16 and mean is 3p, i.e. 9.

$$\therefore \text{Mean deviation} = \frac{|3-9| + |6-9| + |6-9| + |7-9| + |8-9| + |11-9| + |15-9| + |16-9|}{8}$$

$$\text{Mean deviation} = \frac{|x_i - \bar{x}|}{n} = \frac{30}{8} = 3.75$$

## Practice Question 1.6

**Which of the following is related to the measure of variability?**

1. Mean
2. Mode
3. (Both (1) and (2))
4. Standard deviation

## Practice Question Solution 1.6

- **Standard deviation:** average distance from the mean.
- **Variance:** average of squared distances from the mean.

Standard Deviation is the most stable measure of variability. It is the most important and commonly used measure of dispersion. It measures the absolute dispersion or variability of a distribution. Standard Deviation is the positive square root of the mean of the squared deviation of observation from their mean.

Hence, it can be concluded that **standard deviation is related to the measure of variability.**

## Practice Question 1.7

**The mean of a distribution is 21 and the standard deviation is 7. What is the value of the coefficient variation?**

1. 16.66%
2. 66.66%
3. 33.33%
4. 100%

# Practice Question Solution 1.7

## Concept:

The coefficient of variation is given by:  $\frac{\sigma}{\bar{x}} \times 100$  where  $\sigma$  is the standard deviation and  $\bar{x}$  is the mean.

## Calculation:

Given: Mean of distribution is 21 and the standard deviation is 7.

Here,  $\sigma = 7$  and  $\bar{x} = 21$

As we know that coefficient of variation is given by:  $\frac{\sigma}{\bar{x}} \times 100$  where  $\sigma$  is the standard deviation and  $\bar{x}$  is the mean.

$$\Rightarrow \frac{7}{21} \times 100 = 33.33\%$$

## Practice Question 1.8

Let  $x$  be the median of data : 33, 42, 28, 49, 32, 37, 52, 57, 35, 41. If 32 is replaced by 36 and 41 by 63, then the median of the data, so obtained, is  $y$ . what is the value of  $(x + y)$ ?

1. 79.5
2. 79
3. 78
4. 78.5

# Practice Question Solution 1.8

Arrange the data in ascending order 28, 32, 33, 35, 37, 41, 42, 49, 52, 57

If  $n = 10$  (even)

$$\text{Median} = [((n/2)^{\text{th}} + (n/2 + 1)^{\text{th}})/2]$$

$$\text{Median} = [(10/2)^{\text{th}} + (10/2 + 1)^{\text{th}}/2] = (5^{\text{th}} + 6^{\text{th}})/2 = (37 + 41)/2 = 39$$

$$\Rightarrow x = 39$$

If 32 is replaced by 36 and 41 by 63, then

The new data is 33, 42, 28, 49, 36, 37, 52, 57, 35, 63

Arrange the data in ascending order 28, 33, 35, 36, 37, 42, 49, 52, 57, 63

If  $n = 10$  (even)

$$\text{Median} = [((n/2)^{\text{th}} + (n/2 + 1)^{\text{th}})/2]$$

$$\text{Median} = [(10/2)^{\text{th}} + (10/2 + 1)^{\text{th}}/2] = (5^{\text{th}} + 6^{\text{th}})/2 = (37 + 42)/2 = 39.5$$

$$\Rightarrow y = 39.5$$

$$\Rightarrow x + y$$

$$\Rightarrow 39 + 39.5$$

$$\Rightarrow 78.5$$

## Practice Question 1.9

If the standard deviation of 0, 1, 2, 3 \_\_\_\_ 9 is K, then the standard deviation of 10, 11, 12, 13 \_\_\_\_ 19 will be:

1.  $K + 1$
2.  $K$
3.  $K + 4$
4.  $K + 8$

# Practice Question Solution 1.9

## Formula Used:

- $\sigma^2 = \sum(x_i - \bar{x})^2/n$
- Standard deviation is same when each element is increased by the same constant

## **Calculation:**

Since each data increases by 10,

There will be no change in standard deviation because  $(x_i - \bar{x})$  remains same.

**∴ The standard deviation of 10, 11, 12, 13 \_\_\_\_ 19 will be K.**

## Practice Question 1.10

The data given below shows the number of sixes and the number of batsmen who have hit them.

Number of sixes	Number of batsmen
1	2
2	3
3	1
4	3
5	2

What is the median of number of sixes?

1. 5
2. 3
3. 4
4. 4.5

## Practice Question Solution 1.10

$$\text{Median} = [(n + 1)/2]^{\text{th}} \text{ term}$$

$n \rightarrow$  odd term

$$\Rightarrow \text{Median} = [(5 + 1)/2]^{\text{th}} \text{ term}$$

$$\Rightarrow \text{Median} = 3^{\text{th}} \text{ term}$$

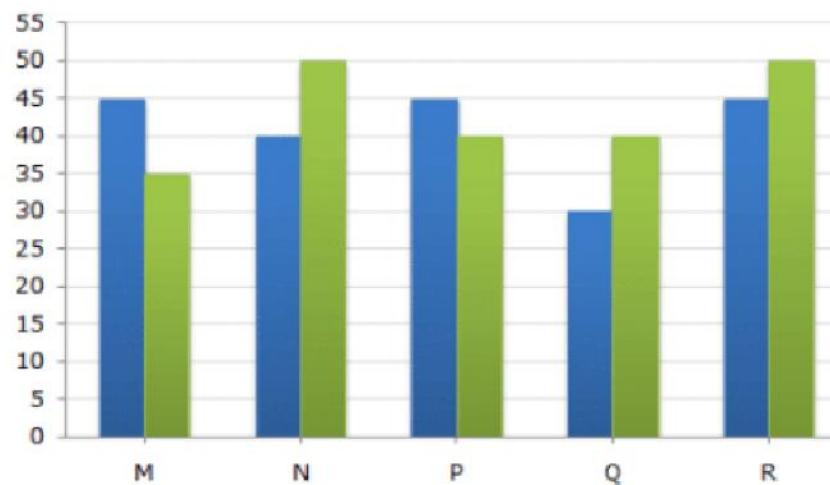
$\therefore$  Median of 1, 2, 3, 4 and 5 is 3.

## Practice Question 1.11

The following bar graph shows the Income and Expenditures (in million US \$) of five companies in the year 2001. The percent profit or loss of a company is given by

$$\% \text{ Profit/Loss} = \frac{\text{Income} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

Income and Expenditure (in million US \$) of five companies in the year 2001.



In 2001, what was the approximate percentage of profit/loss of all the five Companies taken together?

5% profit

6.5% profit

4% loss

7% loss

## Practice Question Solution 1.11

**Explanation:** Total income of all five companies

$$= (35 + 50 + 40 + 40 + 50) \text{ million US \$}$$

$$= 215 \text{ million US \$}.$$

Total expenditure of all five companies

$$= (45 + 40 + 45 + 30 + 45) \text{ million US \$}$$

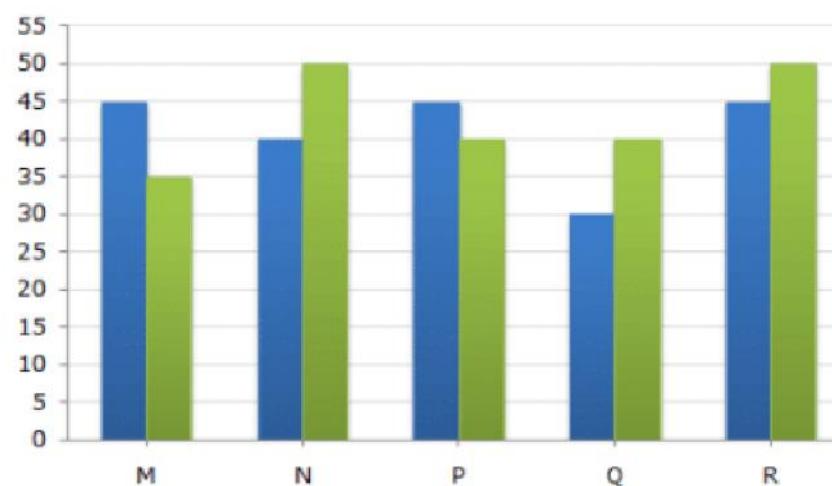
$$= 205 \text{ million US \$}. \text{ Therefore \% Profit} = ((215-205)/205) \times 100\% = 4.88\% \approx 5\%.$$

## Practice Question 1.12

The following bar graph shows the Income and Expenditures (in million US \$) of five companies. The percent profit or loss of a company is given by

$$\% \text{ Profit/Loss} = \frac{\text{Income} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

Income and Expenditure (in million US \$) of five companies in the year 2001.



For Company R, if the expenditure had increased by 20% in year 2001 from year 2000 and the company had earned profit of 10% in 2000, what was the Company's income in 2000 (in million US \$)?

35.75

37.25

38.5

41.25

## Practice Question Solution 1.12

Explanation: Let the expenditure of Company R in 2000 be  $x$  million US \$.

Then, expenditure of Company R in 2001 =  $(120/100x)$  million US \$.

Therefore  $120x/100 = 45 \Rightarrow x = 37.5$ .

i.e., expenditure of Company R in 2000 = 37.5 million US \$.

Let the income of Company R in 2000 be  $I$  million US \$. Then,  $10 = ((I-37.5)/37.5) \times 100$  [ Ref %Profit in 2000 = 10%]

$$\Rightarrow I - 37.5 = 3.75$$

$$\Rightarrow I = 41.25$$

i.e., Income of Company R in 2000 = 41.25 million US \$.

## Practice Question 1.13

The bar graph given below shows the foreign exchange reserves of a country (in million US \$) from 1991 - 1992 to 1998 - 1999.

Foreign Exchange Reserves Of a Country. (in million US \$)



The ratio of the number of years, in which the foreign exchange reserves are above the average reserves, to those in which the reserves are below the average reserves is?

2:6

3:4

3:5

4:4

## Practice Question Solution 1.13

Explanation: Average foreign exchange reserves over the given period = 3480 million US \$. The country had reserves above 3480 million US \$ during the years 1992-93, 1996-97 and 1997-98, i.e., for 3 years and below 3480 million US \$ during the years 1991-92, 1993-94, 1994-95, 1995-56 and 1998-99 i.e., for 5 years. Hence, required ratio = 3 : 5.

## Practice Question 1.14

The bar graph given below shows the foreign exchange reserves of a country (in million US \$) from 1991 - 1992 to 1998 - 1999.

Foreign Exchange Reserves Of a Country. (in million US \$)



The foreign exchange reserves in 1997-98 was how many times that in 1994-95?

0.7

1.2

1.4

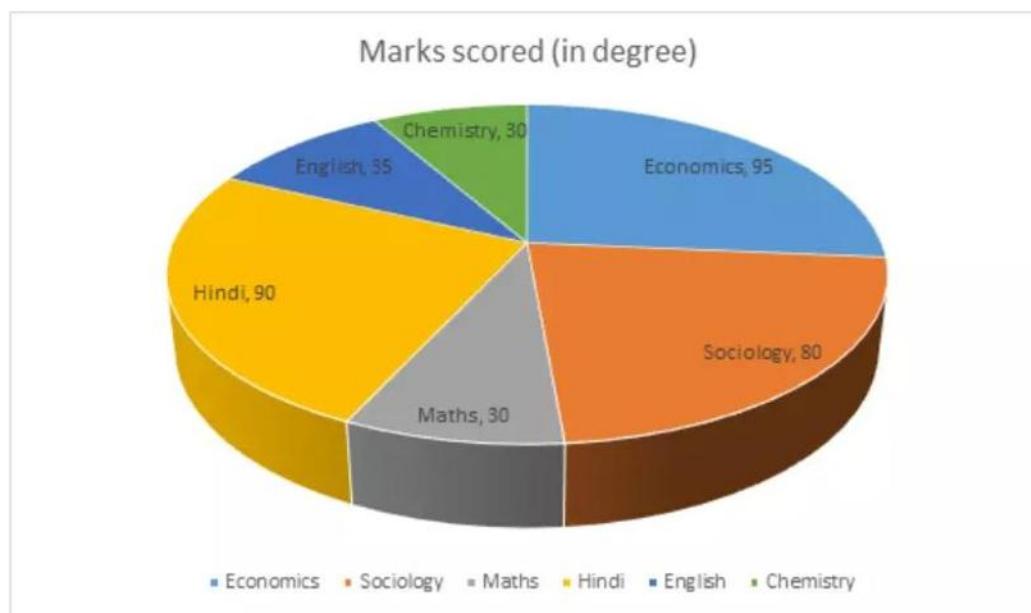
1.5

## Practice Question Solution 1.14

**Explanation:** Required ratio =  $5040/3360 = 1.5$ .

# Practice Question 1.15

The pie-chart below displays the marks scored by a boy in six different subjects. The total marks scored by him is 1800. Study the pie-chart below carefully and then answer the questions accordingly.



- If the total marks scored is 2000, then how much marks were scored by the boy in Sociology?

444.4

350

321.5

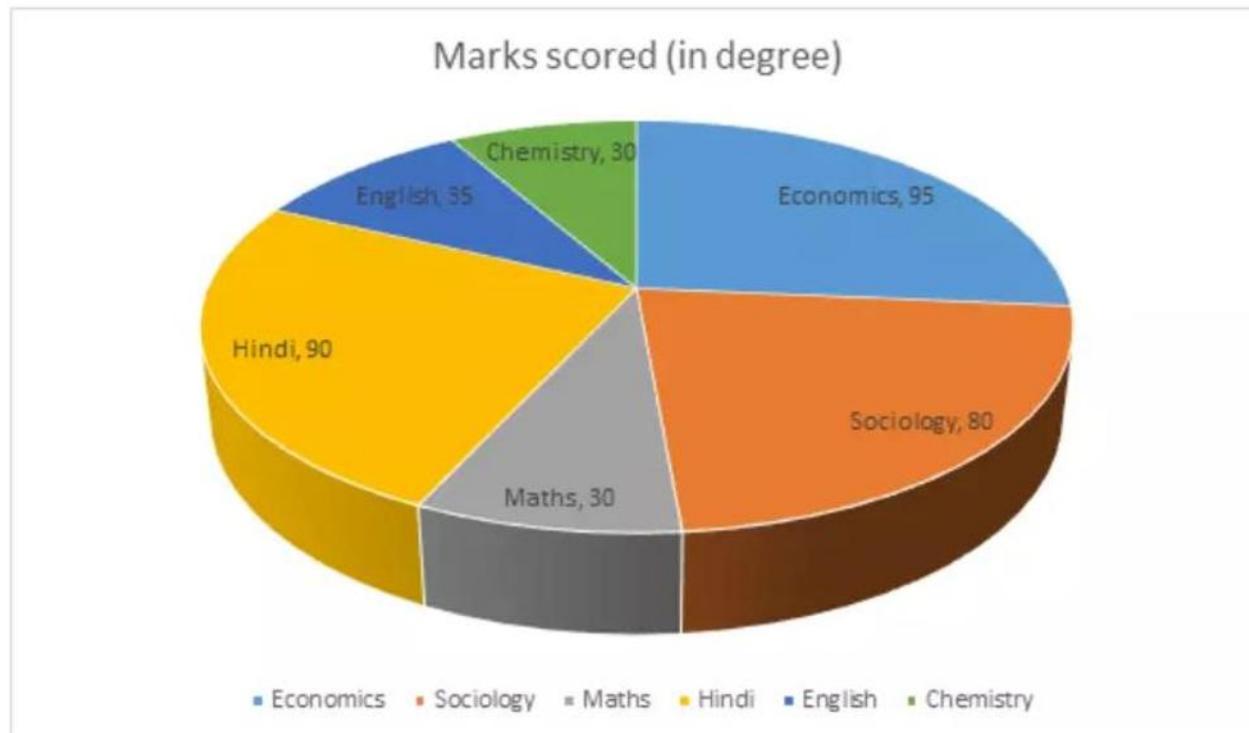
360

## Practice Question Solution 1.15

Marks scored in Sociology =  $80/360 * 2000 = 444.4$

Therefore, the marks scored in biology were 444.4

## Practice Question 1.16



Find by how much percent marks scored in English and Maths is less than the marks scored in Chemistry and Hindi?

41.5%

42.2%

40.6%

45.8%

## Practice Question Solution 1.16

Marks scored in English and Maths =  $(35 + 30)/360 * 1800$

$$= 65/360 * 1800 = 325$$

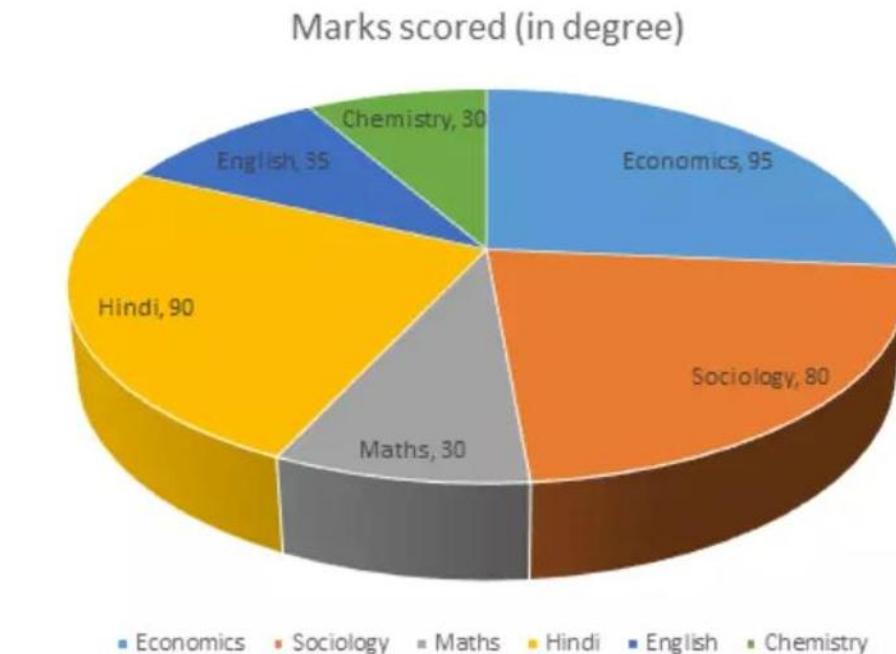
Marks scored in chemistry and Hindi =  $(30 + 90)/360 * 1800$

$$= 120/360 * 1800 = 600$$

Therefore, the difference =  $600 - 325 = 275$

Thus, the percent difference =  $275/600 * 100 = 45.8\%$

## Practice Question 1.17



According to the given chart if the boy scored 450 marks, then which subject it was?

English

Sociology

Hindi

Economics

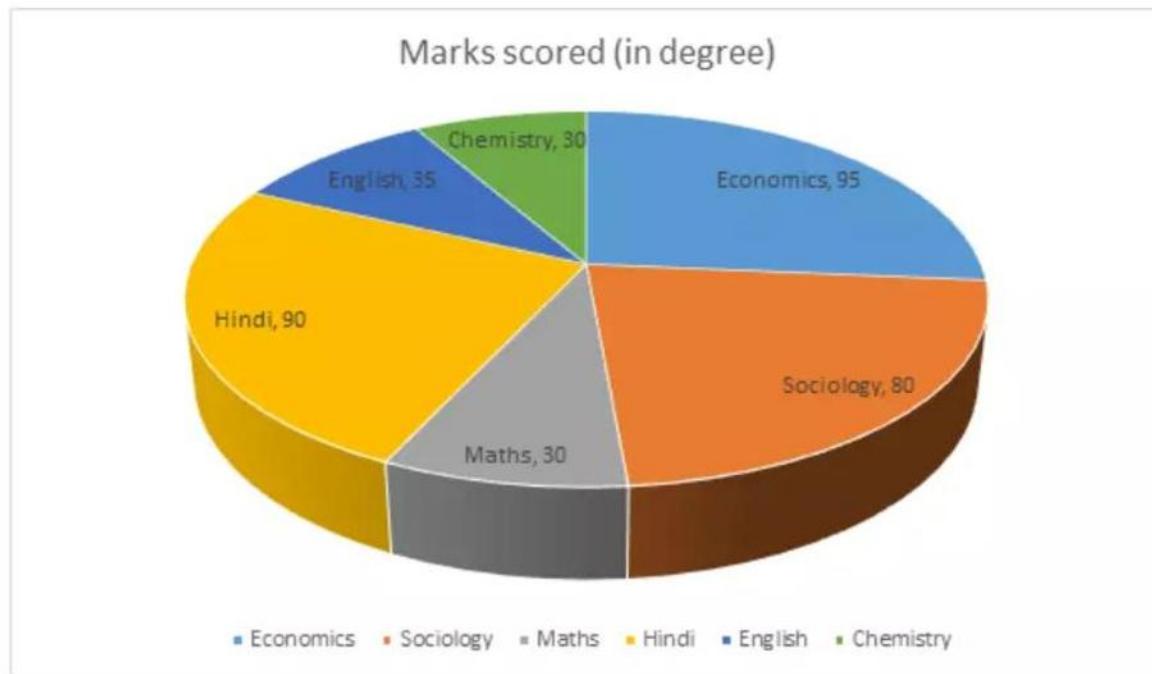
## Practice Question Solution 1.17

On the basis of the options given, the degree of marks in Hindi is 90

Therefore, marks =  $90/360 * 1800 = 450$

Thus, marks scored in Hindi is 450.

## Practice Question 1.18



Find the total marks scored in economics and chemistry?

750

680

650

625

## Practice Question Solution 1.18

The marks scored in economics =  $95/360 * 1800$

= **475**

The marks scored in chemistry =  $30/360 * 1800$

= **150**

Therefore, total marks scored in economics and chemistry =  $475 + 150 = 625$

# Practice Question 1.19

The following table shows a number of people from different age groups who respond to survey about their favorite food style.

Food/Age	Number of People		
	15-20 Yrs	21-30 Yrs	31-40 Yrs
American	6	4	17
Italian	7	5	5
South Indian	6	12	14
North Indian	1	4	1
Coastal	2	3	15
Arabian	9	3	4
European	2	2	2

# Practice Question Solution 1.19

- What percentage of people indicates that their favorite style of food is Indian.

22

34

30.64

32.58

Total no. Of people - 124

No of Indians in (15-20yrs) - 7

No. Of Indians in (21-30)yrs - 16

No. Of Indians in (31+)yrs - 15

Percentage of people who love Indian food=  $38/124 * 100 = 30.64\%$

Hence Option C is the correct one.

## Practice Question 1.20

Approximately what percentage of the total people were aged 15 – 20 (Calculate to the nearest whole Percentage)

31

27

28

14

## Practice Question Solution 1.20

Total number of people = people from age (15-20) + people from age (21-30) + people from age 31+) =  $33 + 31 + 58 = 122$

Percentage of total sample aged between (15-20) =  $= 27.0491$

The nearest whole percentage will be= 28

Hence Option C is the correct one.

## Practice Question 1.21

**Simplify:**  $10 - \left\{ 5 \frac{1}{2} - \left( 7 \frac{1}{2} + 2.8 \div x \right) \right\} \times 4.25 \div (0.2)^2 = 306$

- a. 1.963
- b. 2.847
- c. 3.562
- d. 4.963

# Practice Question Solution 1.21

**Step 1:**

$$10 - \left\{ 5 \frac{\frac{1}{2}}{2} - \left( \frac{\frac{15}{2}}{2} + 2.8 \div x \right) \right\} \times 4.25 \div (0.2)^2 = 306$$

$$10 - \frac{\{5.5x - 7.5x - 2.8\}}{x} \times \frac{425}{4} =$$

**Step 2:**

$$10 - \frac{\{-2x - 2.8\}}{x} \times 106.25 = 306$$

$$10 - \left\{ \frac{\{-212.5x - 297.5x\}}{x} \right\} = 306$$

**Step 3:**

$$\frac{10x + 212.5x + 297.5}{x} = 306$$

$$(306 - 222.5)x = 297.5$$

$$x = \frac{297.5}{(306 - 222.5)} = 3.562$$

## Practice Question 1.22

. If  $\frac{x}{y} = \frac{3}{4}$  and  $8x + 5y = 22$ , then find the value of x.

- a. 3.2
  - b. 2.1
  - c. 2.3
  - d. 1.5
-

## Practice Question Solution 1.22

Correct Option: (d)

$$y = \frac{4}{3}x$$

Substitute this value in  $8x+5y=22$

$$8x + 5 \cdot \frac{4}{3}x = 22$$

$$44x=66$$

$$x=1.5$$

## Practice Question 1.23

If  $2x + 3y = 34$  and  $\frac{x+y}{y} = \frac{13}{8}$ , then find the value of  $6x + 4y$ .

- a. 62
- b. 58
- c. 108
- d. 122

## Practice Question Solution 1.23

**Step 1:** Find the value of x and y

$$\frac{x+y}{y} = \frac{13}{8}$$

$$8x+8y=13y$$

$$8x-5y=0 \text{-----(1)}$$

Multiply  $2x+3y=34$  by 4

$$8x+12y=136 \text{-----(2)}$$

Adding (1) and (2) we get,

$$-17y=-136$$

$$y=8$$

Substitute value of  $y = 8$ , in (1)

$$2x+3 \times 8=34$$

$$x=5$$

**Step 2:** Find the value of  $6x + 4y$

$$\text{The value of } 6x+4y=(6 \times 5)+(4 \times 8)=62$$

---

## Practice Question 1.24

The population of a city A which is 68000 decreases at the rate of 1200/year. Population of city B which is 42000, increases at the rate of 800 per year. Find in how many years, the population of cities A and B are equal?

- a. 9 years
- b. 10 years
- c. 13 years
- d. 15 years

# Practice Question Solution 1.24

Correct Option: (c)

We have to find the population of cities A and B after x years.

**Step 1:** Population of city A = 68000, **decreases** at the rate of 1200/year

$$68000 - 1200x$$

**Step 2:** Population of city B = 42000, **increases** at the rate of 800/year

$$42000 + 800x$$

**Step 3:** Find after how many **population of cities A and B are equal**.

**Population of city A = Population of city B**

$$68000 - 1200x = 42000 + 800x$$

$$68000 - 42000 = 1200x + 800x$$

$$26000 = 2000x$$

$$x = 13$$

---

# Practice Question 1.25

What approximate value should come in place of question mark (?) in the following question?

$$33.5\% \text{ of } 1924.2 + ? \% \text{ of } 5324.4 = 6827.5862$$

(1) 136

(2) 282

(3) 90

(4) 116

(5) 199

# Practice Question Solution 1.25

In this type of question, we are expected to calculate **Approximate** value (not exact value), so we can replace the given numbers by their nearest perfect places which makes the calculation easy.

We can write the given values as:

$$1924.2 \approx 1924$$

$$5324.4 \approx 5324$$

$$6827.5862 \approx 6828$$

Now, the given expression:

$$33.5\% \text{ of } 1924.2 + ? \% \text{ of } 5324.4 = 6827.5862$$

$$\Rightarrow \frac{33.5}{100} \times 1924 + \frac{?}{100} \times 5324 = 6828$$

$$\Rightarrow \frac{33.5}{100} \times 1924 + \frac{?}{100} \times 5324 = 6828$$

$$\Rightarrow 644.54 + ? \times 53.24 = 6828$$

$$\Rightarrow ? = \frac{6828 - 644.54}{53.24}$$

$$\Rightarrow ? \approx 116$$

# Practice Question 1.26

What will come in place of question mark in the following question?

$$(1 - \frac{1}{2}) (1 - \frac{1}{3}) (1 - \frac{1}{4}) (1 - \frac{1}{5}) \dots \dots (1 - \frac{1}{x}) = ?$$

1  $(x + 1)$

2  $(x - 1)$

3  $(1/x)$

4  $x$

5 None of these

## Practice Question Solution 1.26

Given expression:

$$(1 - \frac{1}{2}) (1 - \frac{1}{3}) (1 - \frac{1}{4}) (1 - \frac{1}{5}) \dots \dots (1 - \frac{1}{x}) = ?$$

$$\Rightarrow ? = (1 - \frac{1}{2}) (1 - \frac{1}{3}) (1 - \frac{1}{4}) (1 - \frac{1}{5}) \dots \dots \left(1 - \frac{1}{x-1}\right) (1 - \frac{1}{x})$$

$$\Rightarrow ? = \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \dots \times \left(\frac{x-2}{x-1}\right) \left(\frac{x-1}{x}\right)$$

$$\Rightarrow ? = 1/x$$

Hence, the required answer is (1/x)

## Practice Question 1.27

Simplify:  $0.6 + 0.6 - 0.6$  of  $0.6 \div 0.6 + (0.6 \times 0.6)$

① 0.33

② 0.81

③ 0.90

④ 0.34

⑤ None of these

## Practice Question Solution 1.27

**Calculation:**

$$0.6 + 0.6 - 0.6 \text{ of } 0.6 \div 0.6 + (0.6 \times 0.6)$$

$$\Rightarrow 0.6 + 0.6 - (0.6 \times 0.6) \div 0.6 + 0.36$$

$$\Rightarrow 0.6 + 0.6 - 0.36 \div 0.6 + 0.36$$

$$\Rightarrow 0.6 + 0.6 - 0.6 + 0.36$$

$$\Rightarrow 0.96$$

**∴ The required answer is 0.96**

## Practice Question 1.28

What will come in place of question mark in the following question?

$$30\% \text{ of } [(320\% \text{ of } 20) - 14] \% \text{ of } 340 = 200\% \text{ of } ?$$

① 17.5

② 25.5

③ 27

④ 51.5

⑤ None of these

# Practice Question Solution 1.28

Step-1- Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket, the BODMAS rule must be followed,

$$\Rightarrow 30\% \text{ of } [((320\% \text{ of } 20) - 14)\% \text{ of } 340] = 200\% \text{ of } ?$$

$$\Rightarrow 30\% \text{ of } [((320 \times 20/100) - 14)\% \text{ of } 340] = 200\% \text{ of } ?$$

$$\Rightarrow 30\% \text{ of } [(64 - 14)\% \text{ of } 340] = 200\% \text{ of } ?$$

$$\Rightarrow 30\% \text{ of } (50\% \text{ of } 340) = 200\% \text{ of } ?$$

Step-2- Any mathematical 'Of' or 'Exponent' must be solved next,

$$\Rightarrow 30\% \text{ of } 170 = ? \times 200/100$$

$$\Rightarrow 51 = 2 \times ?$$

$$\Rightarrow ? = 25.5$$

Hence the required answer is 25.5

# Practice Question 1.29

What should come in place of the question mark '?' in the following question?

$$\{(7.29 \times 2.7) \div 1000\} = (?)^3 \times 10^{-6}$$

① 3

② 27

③ 81

④ 54

⑤ 9

# Practice Question Solution 1.29

Follow BODMAS rule to solve this question, as per the order given below,

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

Given expression is,

$$\Rightarrow \{(7.29 \times 2.7) \div 1000\} = (?)^3 \times 10^{-6}$$

$$\Rightarrow (?)^3 \times 10^{-6} = 729 \times 27 \div 1000000$$

$$\Rightarrow (?)^3 \times 10^{-6} = 729 \times 27 \times 10^{-6}$$

$$\Rightarrow (?)^3 = 9^3 \times 3^3$$

$$\Rightarrow (?)^3 = (27)^3$$

$$\Rightarrow ? = 27$$

## Practice Question 1.30

The value of  $\sqrt{\frac{(\sqrt{12}-\sqrt{8})(\sqrt{3}+\sqrt{2})}{5+\sqrt{24}}}$  is

①  $\sqrt{2} - \sqrt{6}$

②  $\sqrt{6} + \sqrt{2}$

③  $2 + \sqrt{2}$

④  $\sqrt{6} - 2$

⑤ None of these

## Practice Question Solution 1.30

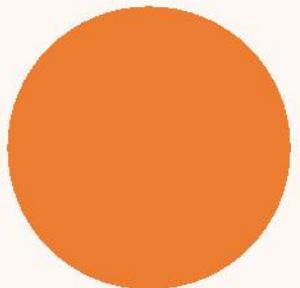
$$\begin{aligned}\text{Numerator} &= \sqrt{(\sqrt{12} - \sqrt{8})(\sqrt{3} + \sqrt{2})} \\&= \sqrt{2 \times (\sqrt{3} - \sqrt{2}) \times (\sqrt{3} + \sqrt{2})} \\&= \sqrt{2 \times [(\sqrt{3})^2 - (\sqrt{2})^2]} \\&= \sqrt{2 \times (3 - 2)} \\&= \sqrt{2 \times 1} \\&= \sqrt{2}\end{aligned}$$

So, we have  $\frac{\sqrt{2}}{\sqrt{5+\sqrt{24}}} = \sqrt{2} \frac{\sqrt{5-\sqrt{24}}}{\sqrt{25-24}}$  (Rationalizing the denominator)

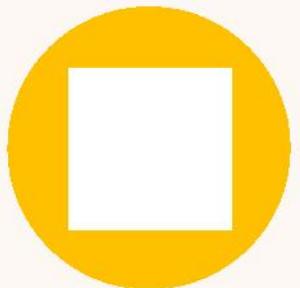
$$\begin{aligned}&= \sqrt{10 - 4\sqrt{6}} \\&= \sqrt{4 + 6 - 2 \times 2 \times \sqrt{6}} \\&= \sqrt{(\sqrt{6} - 2)^2} \\&= (\sqrt{6} - 2)\end{aligned}$$



# Resources and Books



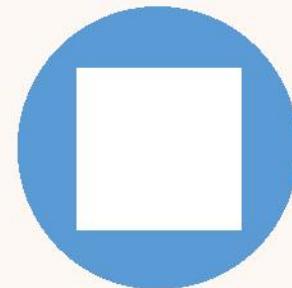
Fast Track Objective Arithmetic by Rajesh Verma –  
Arihant Publication.



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



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



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Thank you

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