TCS NQT - Numerical Ability

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LCM and HCF Formulas

Basic Formulas of LCM and HCF with Definition

On this page we have discussed LCM and HCF formulas, definition with examples.

LCM stands for Least Common Factor

LCM or least common factor of two numbers 4, 6 is denoted as LCM(4, 6). And the LCM is the smallest positive integer that is divisible by both 4 and 6, which is 12.

HCF stands for Highest Common Factor

Greated Common Divisor or gcd of two or more positive integers is defined as the largest positive integer that divides the numbers without leaving the remainder.

LCM and HCF Formulas

HCF and LCM Formula Product of Two numbers = (HCF of the two numbers) x (LCM of the two numbers)

How to find HCF H.C.F. of Two numbers = Product of Two numbers/L.C.M of two numbers

How to find LCM L.C.M of two numbers = Product of Two numbers/H.C.F. of Two numbers

HCF by Prime Factorization Method

Take an example of finding the highest common factor of 100, 125 and 180.

Now let us write the prime factors of 100, 125 and 180.

$100 = 2 \times 2 \times 5 \times 5$

$125 = 5 \times 5 \times 5$

$180 = 3 \times 3 \times 2 \times 2 \times 5$

The common factors of 100, 125 and 180 are 5

Therefore, HCF (100, 125, 180) = 5

HCF by Division Method

Steps to find the HCF of any given numbers:

1. Larger number/ Smaller Number
2. The divisor of the above step / Remainder
3. The divisor of step 2 / remainder. Keep doing this step till R = 0(Zero).
4. The last step's divisor will be HCF.

Example:

Let's take two number 120 and 180

```
120) 180 (1
     120
  ---------
     60) 120 (2
         120
      ---------
         000
```

LCM by Prime Factorization Method

A technique to find the Least Common Multiple (LCM) of a set of numbers by breaking down each number into its prime factors and then multiplying the highest powers of each prime factor.

Lets take two numbers i.e., 25 and 35, now to calculate the LCM:

- List the **prime factors** of each number first.
  25 = 5 × 5
  35 = 7 × 5
- Then multiply each factor the **most number of times** it occurs in any number.

If the same multiple occurs more than once in both the given numbers, then multiply the factor by the most number of times it occurs.

The occurrence of Numbers in the above example:

5: two times

7: one time

LCM = 7 × 5 × 5 = 175

LCM by Division Method

Let us see with the same example, which we used to find the LCM using prime factorization.

Solve LCM of (25,35) by division method.

5 | 25, 35

----

5 | 5, 7

----

7 | 1, 7

| 1, 1

Therefore, LCM of 25 and 35 = 5 x 5 × 7 = 175

Questions and Answers of HCF and LCM

<u>Question:</u>

Calculate the highest number that will divide 43, 91 and 183 and leaves the same remainder in each case

Options

A. 4
B. 7
C. 9
D. 13

Solution:

Here the trick is :

1. Find the Differences between numbers
2. Get the HCF (that differences)

We have here 43, 91 and 183

So differences are

183 – 91 = 92,

183 – 43 = 140,

91 – 43 = 48.

Now, HCF (48, 92 and 140)

- 48 = 2 × 2 × 2 × 2 × 3
- 92 = 2 × 2 × 23
- 140 = 2 × 2 × 5 × 7
- HCF = 2 × 2 = 4

And 4 is the required number.

Correct Answer : A

Question:

Which of the following is greatest number of four digits which is divisible by 15, 25, 40 and 75 is:

Options

A. 9700
B. 9600
C. 9800
D. 9650

Solution: Greatest number of 4-digits is 9999.

Now , find the L.C.M. of 15, 25, 40 and 75 i.e. 600.

On dividing 9999 by 600, the remainder is 399.

Hence, Required number (9999 – 399) = 9600.

Alternatively,

9999/600

= **16**.66500

Ignore the decimal points, required number would be 16 * 600 = 9600

Correct Answer : B

Question:

The greatest possible length which can be used to measure exactly the lengths 7 m, 3 m 85 cm, 12 m 95 cm is:

Options

A. 25 cm
B. 15 cm
C. 35 cm
D. 55 cm

Solution: Required length = H.C.F. of 700 cm, 385 cm and 1295 cm = 35 cm.

Correct Answer : C

How To Solve LCM and HCF Questions Quickly

Solve HCF and LCM Problems Quickly

As we know that HCF and LCM is the most underrated topic in mathematics. But it is important to know that the topic consists multiple level of Questions. Let us review thoroughly How To Solve LCM and HCF Quickly.

HCFThe highest Common Factor is also known as Greatest Common divisor i.e. the largest positive integer that divides more than one integer is called as the greatest common divisor.
LCMLeast Common Multiple is also known as Smallest Common Multiple i.e. the smallest positive integer that is divisible by more than one integer.

How to Solve HCF as well as LCM Questions Quickly

- **HCF –** It is important to note that HCF of the given numbers cannot be greater than any one of them.
- **LCM –** It is important to note that LCM of the given numbers cannot be smaller than any one of them.
- If 1 is the HCF of 2 numbers, then their LCM will be their product.
- For two co prime numbers, the HCF is always 1.
- The most common methods to solve HCF and LCM easily is

Type 1: Find the greatest or smallest number.

Question 1. The greatest possible length which can be used to measure exactly the lengths 5 m, 4 m, 12 m 55 cm is

Options

A. 2

B. 10

C. 25

D. 5

Solution: H.C.F. of (500 cm, 400 cm, 1255 cm) = 5 cm

The factors of 400 are: 1, 2, 4, **5**, 8, 10, 16, 20, 25, 40, 50, 80, 100, 200, 400

The factors of 500 are: 1, 2, 4, **5**, 10, 20, 25, 50, 100, 125, 250, 500

The factors of 1255 are: 1, **5**, 251, 1255

Then the highest common factor is 5. (Since, only 5 is common in all three

Correct option: D

Question 2. The H.C.F. and L.C.M. of two numbers are 10 and 560 respectively. If one of the numbers is 70, find the other number?

Options

A. 80

B. 300

C. 308

D. 280

Solution: We know that, Product of two numbers = H.C.F x L.C.M

70 x a = 10 x 560

Therefore, a = (10 × 560)/175 = 5600/70 = 80

So, the other number = 80

Correct option: A

Question 3. Find the greatest number which on dividing 1484 and 2045 leaves remainders 4 and 5 respectively?

Options

A. 20

B. 30

C. 10

D. 40

Solution: Required number = H.C.F. of (1484 – 4) and (2045 – 5)

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H.C.F. of 1480 and 2040

1480 = 2 x 2 x 2 × 5 × 37

2040 = 2 x 2 x 2 × 3 × 5 × 17

H.C.F 1480 & 2040 = 2 x 2 x 2 x 5=40

Correct option: D

Type 2: Find HCF

Question 1. Three numbers are in the ratio of 4: 3: 6 and their L.C.M. are 3600. Find their H.C.F:

Options

A. 350

B. 280

C. 250

D. 300

Solution: Let the numbers be 4x, 3x and 6x

Then, their L.C.M. = (4x * 3x *6x) = 12x

So, 12x = 3600 or x = 300

Therefore, numbers are (4 x 300), (3 x 300) and (6 x 300) = 1200, 900, 1800

Let us do the prime factorization to find HCF

1200 = 2^{4} * 3 * 5^{2}

900 = 2^{2} * 3^{2} * 5^{2}

1800 = 2^{3} * 3^{2} * 5^{2}

Hence, required H.C.F.

= 2^{2} * 3 * 5 ^{2} = 300

Correct option: D

Question 2. Find the HCF of 34, 48, 56, and 74

Options

A. 2

B. 4

C. 34

D. 8

Solution: The factors of 34 are: 1, 2, 17, 34

The factors of 48 are: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

The factors of 56 are: 1, 2, 4, 7, 8, 14, 28, 56

The factors of 74 are: 1, 2, 37, 74

Therefore, the highest common factor is 2.

Correct option:A

Question 3. Find the HCF of 2/11, 4/17, 6/5.

Options

A. 1/935

B. 2/935

C. 2/93

D. 2/35

Solution: We know that

HCF = **HCF of numerator/LCM of Denominator**

HCF = **HCF (2,4,6)/LCM(11,17,5)**

HCF = 2/935

Correct option:B

Type 3: How to Solve when sum of two numbers is given , LCM and HCF is given to find the sum of reciprocals.

Question: Sum of two numbers is 55 and the H.C.F. and L.C.M. of these numbers are 5 and 120 respectively, then the sum of the reciprocals of the numbers is equals to:

Options

A. 11/120

B. 11/220

C. 21/120

D. 11/320

Solution : Let the numbers be a and b.

Now , given a+b = 55

a × b = HCF × LCM = 5 × 120
HCF × LCM = 600

Now, as we know that 1/a + 1/b = a+b / a*b

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$1/a + 1/b = 55/600$

11/120

Correct Option : A

Type 4: How to Solve HCF, LCM Problems related to finding the biggest container to measure quantities

Question : Suppose there are three different containers contain different quantities of a mixture of milk and water whose measurements are 403 litres, 434 litres and 465 litres What biggest measure must be there to measure all the different quantities exactly?

Options :

A. 31 litres

B. 21 litres

C. 41 litres

D. 30 litres

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Solution : Prime factorization of 403,434 and 465 is

$403=13\times31$

$434=2\times7\times31$

$465=3\times5\times31$

H.C.F of 403, 434 and 465=31

Correct Option : A

Type 5 : How to Solve HCF, LCM Problems related to Bell ring.

Question: Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together ?

Options :

A. 8

B. 16

C. 9

D. 10

Solution : L.C.M. of 2, 4, 6, 8, 10, 12 is 120.

Hence, the bells will toll together after every 120 seconds(2 minutes).

Therefore, in 30 minutes ,number of times bells toll together is 30/2 + 1 = 16 (We added 1 because in starting i.e. 0 mins all the bells would ring once together)

Correct Option B

Type 6 : How to Solve HCF, LCM Problems related to Circle Based Runner Problem.

Question: Two people P and Q start running towards a circular track of length 400 m in opposite directions with initial speeds of 10 m/s and 40 m/s respectively. Whenever they meet, P's speed doubles and Q's speed halves. After what time from the start will they meet for the third time?

Options

A. 30 seconds

B. 26 seconds

C. 10 seconds

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D. 20 seconds

Solution : Time taken to meet for the 1st time= 400/ (40+10)=8 sec.

Now P's speed = 20m/s and Q's speed=20 m/s.

Time taken to meet for the 2nd time= 400/ (20+20) = 10 sec.

Now P's speed =40 m/sec and Q's speed = 10 m/sec.

Time taken to meet for the 3rd time= 400/(10+40)=8 sec.

Therefore, Total time= (8+10+8) = 26 seconds.

Correct Option B

HCF and LCM Shortcut, tricks, and tips

HCF and LCM tricks, shortcuts, and tips

HCF and LCM shortcuts, tips, and tricks are not easy to find at the time of examination. So we came up with a dedicated page to help students at the crucial moment.

HCF and LCM tricksHCF is the greatest common divisor of more than one integer. Hence, the largest positive integer that divides more than one integer is known as the Highest common factor. LCM is the least common multiple of two or more integers. Let us move forward and look up some of the Tips and Tricks Of HCF and LCM.

Here, are some easy tips and tricks for you to solve HCF and LCM questions quickly, easily , and efficiently in competitive exams.

HCF and LCM Tips and Tricks and Shortcuts

- The H.C.F of two or more numbers is smaller than or equal to the smallest number of given numbers
- The smallest number which is exactly divisible by a, b and c is L.C.M of a, b, c.
- The L.C.M of two or more numbers is greater than or equal to the greatest number of given numbers.
- The smallest number which when divided by a, b and c leaves a remainder R in each case. **Required number = (L.C.M of a, b, c) + R**
- The greatest number which divides a, b and c to leave the remainder R is **H.C.F of (a – R)**, **(b – R)** and **(c – R)**
- The greatest number which divide x, y, z to leave remainders a, b, c is **H.C.F of (x – a), (y – b)** and **(z – c)**
- The smallest number which when divided by x, y and z leaves remainder of a, b, c (x – a), (y – b), (z – c) are multiples of M
  Required number = (L.C.M of x, y and z) – M

Type 1: Tips and Tricks and Shortcuts to find the greatest or smallest number

Question 1. Find the greatest 5 digit number divisible by 5, 15, 20, and 25

Options

A. 99900

B. 99000

C. 99990

D. 90990

Solution: LCM of 5, 15, 20, and 25 is **300**

The greatest 5 digit number is 99999

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99999/300 = **333**.33

Therefore, the highest 5 digit number divisible by 300 would be **333** * **300** = 99900

Correct option: A

Type 2: Find the numbers, sum of numbers, product of numbers if

- **Their ratio and H.C.F. are given.**
- **Product of H.C.F. and L.C.M are given**

Question 2. The product of two numbers is 3888. If the H.C.F. of these numbers is 36, then the greater number is:

Options

A. 110

B. 108

C. 36

D. 120

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Solution: Let the two numbers be 36x and 36y

Now, 36x * 36y = 3888

xy = 3888 / 36 × 36

xy = 3

Now, co-primes with product 3 are (1, 3).

Therefore, the required numbers are 36 * 1 = 36

36 * 3 = 108

Therefore the greatest number is 108

Correct option: B

Type 4: How to Solve HCF, LCM Problems related to finding the biggest container to measure quantities

Question : Suppose there are three different containers contain different quantities of a mixture of Sugar and rice whose measurements are 403 grams, 434 grams and 465 grams What biggest measure must be there to measure all the different quantities exactly?

Options :

A. 31 grams

B. 21 grams

C. 41 grams

D. 30 litres

Solution : Prime factorization of 403, 434 and 465 is

$403=13\times31$

$434=2\times7\times31$

$465=3\times5\times31$

H.C.F of 403, 434 and 465=31

Correct Option : A

Type 5 :Tips , tricks and Shortcuts of HCF, LCM Problems related to Bell ring.

Question: Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together ?

Options :

A. 8

B. 16

C. 9

D. 10

Solution : L.C.M. of 2, 4, 6, 8, 10, 12 is 120.

Hence, the bells will toll together after every 120 seconds(2 minutes).

Therefore, in 30 minutes ,number of times bells toll together is 30/2 + 1 = 16

Correct Option B

Question. 3 Find HCF of 12 and 16.

Options

(A) 5

(B) 4

(C) 12

(D) 16

Solution Find the difference between 12 and 16. The difference is 4. Now, check whether the numbers are divisible by the difference. 12 is divisible by 4 and 16 is divisible by 4.Hence, the HCF is 4.

Correct Option B

Question. 4 Find HCF of 18 and 22.

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Options

(A) 2

(B) 4

(C) 18

(D) 36

Solution Find the difference between 18 and 22. The difference is 4. Now, check whether the numbers are divisible by the difference. Both 18 and 22 are not divisible by 4. So take the factors of the difference. The factors of 4 are 2*2*1. Now, check whether the numbers are divisible by the factors. 18 and 22 are divisible by factor 2.

Hence, the HCF is 2.

Note: If there are more than two numbers, take the least difference.

Correct Option(A)

Tips and Tricks and Shortcuts to find LCM easily

Question 5 Find LCM of 2,4,8,16.

Options

(A) 16

(B) 18

(C) 12

(D) 2

Solution Factorize of above numbe

2 =2

$8 = 2^3$

$16 = 2^4$

Choose the largest number. In this example, the largest number is 16. Check whether 16 is divisible by all other remaining numbers. 16 is divisible by 2, 4, 8. Hence, the LCM is 16.

Correct Option (A)

Question 6 Find the LCM of 2,3,7,21.

Options

(A) 21

(B) 44

(C) 36

(D) 42

Solution Choose the largest number. The largest number is 21. Check whether 21 is divisible by all other remaining numbers. 21 is divisible by 3 and 7 but not by 2. So multiply 21 and 2. The result is 42. Now, check whether 42 is divisible by 2, 3, 7. Yes, 42 is divisible. Hence, the LCM is 42.

Correct Option (D)

Number System Formulas

Number System Definition Number system is a writing system for presenting number on the number line. A number system is a system of writing or expressing numbers.

Formulas of Number System:

1. $1 + 2 + 3 + 4 + 5 + \ldots + n = n(n + 1)/2$

2. $(1^2 + 2^2 + 3^2 + \ldots.. + n^2) = n (n + 1) (2n + 1)/6$

3. $(1^3 + 2^3 + 3^3 + \ldots.. + n^3) = (n(n + 1)/2)^2$

4. Entirety of first n odd numbers = n^2

5. Entirety of first n even numbers = $n(n + 1)$

Mathematical Formulas to solve questions

1. $(a + b)(a - b) = (a^2 - b^2)$

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

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

4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

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

6. $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

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

8. when $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

Types of Number System:

- **Natural Numbers**
    - All positive integers are called natural numbers. All counting numbers from 1 to infinity are natural numbers. **N = {1, 2, 3, 4, 5, 6……….∞}**

- **Whole Numbers**

- The set of numbers that includes all natural numbers and the number zero are called whole numbers. They are also called as Non-negative integers. **W = { 0,1,2,3,4,5,6,7,8,…………..∞}**

- **Integers**
  - All numbers that do not have the decimal places in them are called integers. **Z = {∞…….-3, -2, -1, 0, 1, 2,** 3………∞}
  - a. Positive Integers: 1, 2, 3, 4….. is the set of all positive integers.
  - b. Negative Integers: −1, −2, −3….. is the set of all negative integers.
  - c. Non-Positive and Non-Negative Integers: 0 is neither positive nor negative.

- **Real Numbers**
  - All numbers that can be represented on the number line are called real numbers.

- **Rational Numbers**
  - A rational number is defined as a number of the form a/b where 'a' and 'b' are integers and b ≠ 0. The rational numbers that are not integers will have decimal values. These values can be of two types
  - a. Terminating decimal fractions: For example: \frac{1}{5} = 0.5,\frac{125}{4} = 31.25
  -
  - b. Non-Terminating decimal fractions: For example:\frac{19}{6} = 3.1666666, \frac{21}{9} = 2.33333

- **Irrational Numbers**
  - It is a number that cannot be written as a ratio \frac{x}{y} form (or fraction). An Irrational numbers are non-terminating and non-periodic fractions. For example: \sqrt{2} = 1.414

- **Complex Numbers**
  - The complex numbers are the set {a+bi}, where, a and b are real numbers and 'i' is the imaginary unit.

- **Imaginary Numbers**
    - A number does not exist on the number line is called imaginary number. For example square root of negative numbers are imaginary numbers. It is denoted by ‘i’ or ‘j.

- **Even Numbers**
    - A number divisible by 2 is called an even number.
    - For example: 2, 6, 8, 14, 18, 246, etc.

- **Odd Numbers**
    - A number not divisible by 2 is called an odd number.
    - For example: 3, 7, 9, 15, 17, 373, etc.

- **Prime numbers**
    - A number greater than 1 is called a prime number, if it has exactly two factors, namely 1 and the number itself.
    - For example: 2, 3, 5, 7, 11, 13, 17, etc.

- **Composite numbers**
    - Numbers greater than 1 which are not prime, are known as composite numbers. For example: 4, 6, 8, 10, etc.

Formulas for finding the Squares of a number.

Squares of numbers between 91-100:

- 97^2

Step 1: 97 can be written as (100-3)

Step 2: (100-3)^2, using the formula of (a-b)^2

(100-3)^2 = 100^2 + 3^2 – 2*100*3

= 10000 + 9 – 6000

= 10009 -600 = 9409

- 91^2

Step 1: 91 can be written as (100-9)

Step 2: (100-9)^2, using the formula (a-b)^2

(100-9)^2 = 100^2 + 9^2 – 2*100*9

10000 + 81 – 1800 = 8281

Final Result: From step 2 and step 3 => 91^2 = 8281

<u>Squares of numbers between 100-109:</u>

- 102^2

Step 1: 102 can be written as (100+2)

Step 2: (100+2)^2, using the formula (a+b)^2

[/latex](100+2)^2 = 100^2 + 2^2 + 2*100*2[/latex]

10000 + 4 + 400 = 10404

- 107^2

Step 1: 107 can be written as (100+7)

Step 2: (100+7)^2, using the formula (a+b)^2

(100+7)^2 = 100^2 + 7^2 + 2*100*7

10000 + 49 + 1400 = 11449

<u>Squares of numbers between 51-60</u>

- 53^2

Step 1: 53-50 = 3

Step 2: 25+3 = 28

Step 3: 3^2 = 09

Final result: From step 2 and step 3 => 53^2 = 2809.

- 42^2

Step 1: 50-42 = 8

Step 2: 25-8 = 17

Step 3: 8^2 = 1764

Final Result From step 2 and step 3 => 42^2 = 1764

How To Solve Number System Questions Quickly

How to solve number system easily

Number System is one of the most common and important topics in Quantitative Aptitude. Here we are providing you an idea about How to Solve Number System Questions Quickly.

Number system Number system is a technique to represent number and present number in discrete manner. Whole Number, Rational Number, Natural Number, Odd Number, Even Number, Irrational Number etc are general type of Number System.

Important Formulas to solve Number System quickly

1. $(a + b)(a - b) = (a^2 - b^2)$

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

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

4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

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

6. $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

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

8. when $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

How To Solve Number System Questions Quickly Type – 1

Question 1.

34567 x 9999 =?

Options.

A. 345635432
B. 345634533
C. 345635433
D. 345635343

Solution:

34567 x 9999 = 34567 x (10000 – 1)
34567 x 9999 = 34567 x (10000) – 34567 x 1
34567 x 9999 = 345670000 – 34567
34567 x 9999 = 345635433

Correct option C

How to Solve Number System Questions Quickly Type – 2

Question 2.

The smallest 3 digit prime number is:

Options

A. 100
B. 103
C. 105
D. 101

Solution:

The smallest three digit number is 100 but it is not a prime number. The next number is 101 and it is a prime number because it is divisible by 1 and itself only. Therefore, 101 is the smallest 3 digit prime number.

Correct option: D

Question 3.

Choose the terminating decimal

Options

A. 99.5555
B. 3.777
C. 0.6
D. 0.454545454545

Solution:

A terminating decimal is a decimal that ends after few repetitions after decimal point.
Correct option: C

Question 4.

Which of the following is not the Natural number?

Options

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A. 1

B. 3

C. 0

D. 5

Solution:

All counting numbers from 1 to infinity are natural numbers.

Correct option: C

Question 5.

Choose the non- terminating decimal?

Options

A. $\frac{4}{45}$

B. $\frac{5}{8}$

C. $\frac{1}{4}$

D. $\frac{9}{1280}$

Solution:

$\frac{4}{45}$ = 0.08888...

$\frac{5}{8}$ = 0.625

$\frac{1}{4}$= 0.25

$\frac{9}{1280}$= 0.00703125

Correct option: A

How to Solve Number System Questions Quickly Type – 3

Question 6

6596 – ? = 6459 – 3357

Options

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A. 3949

B. 3494

C. 3102

D. 3499

Solution:

6596 – x = 3102

-x = 3102 – 6596

– x = – 3494

x = 3494

Correct option: B

Question 7

Which one of the following cannot be the square of natural number?

Options

A. 7225

B. 3136

C. 8100

D. 3457

Solution:

$7225 = (85)^2$

$3136 = (56)^2$

$8100 = (90)^2$

3457 is not the square of any natural number as square of any natural number never ends with 7.

Correct option: D

Question 8

What is the unit digit in the product (3^{65} x 6^{59} x 7^{71})?

Options

A. 1

B. 2

C. 3

D. 4

Solution:

Unit digit in 3^4 = 1

So, Unit digit in $(3^4)^{16}$ = 1

Unit digit in 365 = 3^{65} = $(3^4)^{16}$ x 3^1 = (1 x 3) = 3

Unit digit in 6^{59} = 6

Unit digit in 7^4 = 1

So, Unit digit in$(7^4)^{17}$ is 1

Unit digit in 7^{71} = $(7^4)^{17}$ x 7^3 = (1 x 3) = 3

Required digit = Unit digit in (3 x 6 x 3) = 4

Correct option: D

Question 9

117 * 117 + 83 * 83 = ?

Options

A. 40578

B. 20578

C. 31090

D. 34567

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Solution:

$(117)^2 + (83)^2 = (100 + 17)^2 + (100 - 17)^2$

$= 2 *[(100)^2 + (17)^2]$

$= 2 * (10000 + 289)$

$= 2 * 10289$

$= 20578$

Correct option: B

Number System Tips, Tricks and Shortcuts

Shortcuts and tricks for Number System a basic section and one of the main sections in the aptitude.

Number System The number system refers to a set of mathematical principles, symbols, and rules used to represent and manipulate numbers. It provides a structured framework for counting, measuring, calculating, and representing quantities.

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Number System Tips and Tricks

Number System	Examples
Whole Number	0, 1, 2, 3, 4, 5…
Natural Number	1, 2, 3, 4, 5, 6…
Integers	…-3, -2, -1, 0, 1, 2, 3, 4, 5,…
Prime Number	3, 5, 7, 11, 13, 17…..
Co-Prime Number	HCF = 1
Composite Number	4, 6, 8, 9, 12, 14, 15…..
Even Number	2, 4, 6, 7, 8, 10…
Odd Number	1, 3, 5, 7, 9….
Rational Number	In ‘p/q’ form wherein p & q are integers and q is not equal to 0

Tips and Tricks to solve Number System Quickly

Trick to find the square of a Number :

25^{2}

we can write 25 as (20+5)

so, $(20+5)^{2}$

we will use the formula $(a+b)^{2}$

$20^{2} + 5^{2} + 2*20*5$

400 + 25 + 200 = 625

56^{2}

square the first and second number = 5^{2}= 25 6^{2} =36 = 2536

Then, multiply the given digit 5*6 = 30 and add 0 at then end = 300,

then multiply it by 2 = 300 * 2 = 600

add both the number = 2536 + 600 = 3136

Trick to solve the Square root of any number

$\sqrt{3136}$

We have to see the unit digit of the number that is 6 and 6 is the unit digit of either the square of 4 or 6

Now see the first two digits, 31 which comes between the square of 4 or 6, so we will take the number 5

Now multiply the number 5 by 4 = 20, it is not possible because it is way less than 31

5*6 = 30, it is near 31

so 56 is the answer.

Tricks to find the factorial of any number

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n Factorial Formula

The formulas for n factorial are:

1. n! = n(n-1)(n-2)……………………(3)(2)(1)
2. n! = n × (n − 1)!

7! = 7 * 6 * 5 * 4 * 3 * 2 = 5040

Trick to find the multiple square of a number

$\sqrt{5\sqrt{5}\sqrt{5}\sqrt{5}}$

we will use the formula, $x^{\frac{2^{n}-1}{2^{n}}}$

n = number of digits in the square

we have four digits so, n = 4

$5^{\frac{2^{4}-1}{2^{4}}}$

$5^{\frac{15}{16}}$

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Divisibility Rule

Divisibility Rule	**Definition**
Divisibility rule of 2	Any number whose last digit is an even number (0, 2, 4, 6, 8) is divisible by 2
Divisibility rule of 3	A number is divisible by 3 if the sum of its digits is divisible by 3.
Divisibility rule of 4	A number is divisible by 4, if the number formed by the last two digits is divisible by 4.
Divisibility rule of 5	A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place.
Divisibility rule of 6	A number is exactly divisible by 6 if that number is divisible by 2 and 3 both. It is because 2 and 3 are prime factors of 6.
Divisibility rule of 7	Double the last digit and subtract it from the remaining leading truncated number to check if the result is divisible by 7 until no further division is possible
Divisibility rule of 8	If the last three digits of a number are divisible by 8, then the number is completely divisible by 8.
Divisibility rule of 9	It is the same as of divisibility of 3. Sum of digits in the given number must be divisible by 9.

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Divisibility Rule	Definition
Divisibility rule of 11	If the difference of the sum of alternative digits of a number is divisible by 11, then that number is divisible by 11.

Tips and Tricks to solve Number System questions

Question 1 : Simplify the equation, (1/?) × 425 ÷ 5^{−2} = 4 × 156.25

Options

A. 19

B. 34

C. 17

D. 19

Solution:

(1/?) × 425 ÷ 5^{−2} = 4 × 156.25

625 = (1/?) × 425 × 25

? = (425/25) = 17

Correct option: A

Question 2: How many prime numbers are there from 1 to 50?

Options

A. 20

B. 15

C. 21

D. 25

Solution: Prime numbers less than 50 are:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

Correct option: B

Question 3: 1198 * 1198 = ?

Options

A. 1435204

B. 1432504

C. 1453204

D. 1435024

Solution: $(1198)^2$

$(1200 - 2)^2$

We can use the identity: $(a-b)^2 = a^2 + b^2 - 2ab$

$(1200)^2 + 2^2 - 2 * 1200 * 2$

$1440000 + 4 - 4800$

1435204

Correct option: A

Question 4: The sum of first five prime numbers is:

Options

A. 20

B. 28

C. 30

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D. 25

Solution: Sum of first five prime numbers is = 2+3+5+7+11 = 28

Correct option: B

Question 5: If x and y are odd numbers, then which of the following is always an even numbers?

Options

A. x + y

B. xy

C. x/y

D. xy + 2

Solution: The sum of two odd number is always even. So, x + y is even.

Correct option: A

Numbers Decimal And Fraction Formulas

Formulas and Concepts for Numbers, Decimal And Fraction

On this page we have discussed Number, Decimal and Fraction formulas to solve the questions quickly. A fraction in which the denominator (the bottom number) is a power of ten (such as 10, 100, 1000, etc). You can write decimal fractions with a decimal point (and no denominator), which make it easier to do calculations like addition and multiplication on fractions.

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Formulas for Decimal and Fraction Fractions in which denominators are powers of 10 are known as Decimal Fractions. For Ex- $\frac{1}{10}$, $\frac{99}{100}$.

Prime Course Trailer

Number, Decimal and Fraction Formulas

1. $(a + b)(a - b) = (a^2 - b^2)$

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

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

4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

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

6. $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

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

8. when $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

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Conversion of a Decimal into Vulgar Fraction:

Put 1 in the denominator under the decimal point and annex with it as many zeros as in the number of digits after the decimal point.

- Now, remove the decimal point and reduce the fraction to its lowest terms.

For Ex- 0.45 = $\frac{45}{100}$ = $\frac{9}{25}$

Annexing Zeros and Removing Decimal Signs:

Applying zeros to the extreme right of a decimal fraction does not change its value. Thus, 0.5 = 0.50 = 0.500, etc.

- If numerator and denominator of a fraction contain the same number of decimal places, then we remove the decimal sign.

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For Ex- \frac{5.879}{4.856} \ = \frac{5879}{4856} \ .

Operations Formulas For Number, Decimals and Fractions

i. *Addition and Subtraction of Decimal Fractions:* The given numbers are placed under each other that the decimal points lies in one column. The numbers are so arranged that can now be added or subtracted in the usual way.

ii. *Multiplication of a Decimal Fraction By a Power of 10:* Shift the decimal point to the right by as many places as is the power of 10.

Thus, 5.9632 x 100 = 596.32; 0.073 x 10000 = 730.

iii. *Multiplication of Decimal Fractions:* Multiply the given numbers considering them without decimal point. Now, in the product, the decimal point is marked off to obtain as many places of decimal as is the sum of the number of decimal places in the given numbers.

Suppose we have to find the product (.2 x 0.02 x .002).

Now, 2 x 2 x 2 = 8. Sum of decimal places = (1 + 2 + 3) = 6.

.2 x .02 x .002 = .000008

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iv. *Dividing a Decimal Fraction By a Counting Number:* Divide the given number without considering the decimal point, by the given counting number. Now, in the quotient, put the decimal point to give as many places of decimal as there are in the dividend.

Suppose we have to find the quotient (0.0204 ÷ 17). Now, 204 ÷ 17 = 12.

Dividend contains 4 places of decimal. So, 0.0204 ÷ 17 = 0.0012

v. *Dividing a Decimal Fraction By a Decimal Fraction:* Multiply both the dividend and the divisor by a suitable power of 10 to make divisor a whole number.

For Ex- \frac{0.0066}{0.12} \ x \frac{0.0066 * 100}{0.12 * 100}
\ = \frac{0.0066}{0.12} \ = \frac{0.66}{12}\

Number, Decimal and Fraction Formulas

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Suppose some fractions are to be arranged in ascending or descending order of magnitude, then convert each one of the given fractions in the decimal form, and arrange them accordingly.

For Ex- Arrange the fractions, in descending order.
$\frac{3}{7} \ , \frac{5}{21} \ , \frac{9}{7} \$

Now, $\frac{3}{7} \ = 0.42$, $\frac{5}{21} \ = 0.23$, $\frac{9}{7} \ = 1.28$

Since, 1.28 is greater. So, 1.28>0.42>0.23.
Therefore, $\frac{3}{7} \ > \frac{5}{21} \ > \frac{9}{7} \ .$

Recurring Decimal:

If in a decimal fraction, a figure or a set of figures is repeated continuously, then such a number is called a *recurring decimal*.

In a recurring decimal, if a single figure is repeated, then it is expressed by putting a dot on it. If a set of figures is repeated, it is expressed by putting a bar on the set.

$\frac{1}{3}=0.\overline{33}$, $\frac{22}{7} \ = 3.142857142857$........
= $\frac{}{}3.\overline{142857}$

Pure Recurring Decimal

A decimal fraction, in which all the figures after the decimal point are repeated, is called a pure recurring decimal.

Converting a Pure Recurring Decimal into Vulgar Fraction

Write the repeated figures only once in the numerator and take as many nines in the denominator as is the number of repeating figures.

For Ex- 0.5 = $\frac{5}{9}$= $0.\overline{53}$; $\frac{53}{99} \ .$

Mixed Recurring Decimal

A decimal fraction in which some figures do not repeat and some of them are repeated, is called a mixed recurring decimal.
For Ex- 0.175555 = \frac{}{} 0.17\overline{3}

Number, Decimal and Fraction Formulas to solve Questions.

Decimal Fractions:

Fractions in which denominators are powers of 10 are known as decimal fractions.

Thus, 1/10 = 1 tenth = .1; 1/100 = 1 hundredth = .01;
99 = 99/100 hundredths = .99; 7/1000 = 7 thousandths = .007.

Conversion of a Decimal into Vulgar Fraction:

Put 1 in the denominator under the decimal point and annex with it as many zeros as is the number of digits after the decimal point. Now, remove the decimal point and reduce the fraction to its lowest terms.

Thus, 0.25 = 25/100 = 1/4 ; 2.008 = 2008/1000 = 251/125.

Multiplication and Division of Decimal and Fraction:

Suppose we have to find the product (.3 x 0.03 x .003).

Now, 3 x 3 x 3 = 27. Sum of decimal places = (1 + 2 + 3) = 6.

.3 x .03 x .003 = .000027

Dividing a Decimal Fraction By a Decimal Fraction:

= 0.00066/0.11
= 0.00066 x 100 /0.11 x 100
= 0.066/11
= .006

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Question and Answers

Question 1 : 4100 + 13.952 – ? = 3764.002

A. 747.095

B. 247.752

C. 347.932

D. 349.95

Answer: Option D

Explanation:

Let 4100 + 13.952 – x = 3764.002.

Then x = (4100 + 13.952) – 3764.002

= 4113.952 – 3764.002 = 349.95.

Question 2 : What is the sum of the decimal fractions 25/100 and 30/100?

A. 55/100

B. 65/100

C. 75/100

D. 85/100

Solution:

Given decimal fractions: 25/100 and 30/100.

As the denominators are the same in both decimal fractions, we can directly add the numerators.

Thus,

(25/100) + (30/100) = (25 + 30)/100

(25/100) + (30/100) = 55/100.

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Hence, the sum of the decimal fractions 25/100 and 30/100 is 55/100.

Question 3 : 25% of 30% of 850 + 5 × 76 = ?

A. 441.75
B. 443.75
C. 441.57
D. 443.57

Correct Option: B

25% of 30% of 850 + 5 × 76

= 25/100 * 30/100 * 850 + 5 * 76

= 443.75

Question 4 : (32/100) × 750 – ? = (14/100) × 540

A. 152.6
B. 132.6
C. 146.6
D. 164.4

Correct Option: D
(32/100) × 750 – ? = (14/100) × 540

240 – x = 75.6

x = 240 – 75.6

x = 164.4

Question 5 : √196 × √144 × 20% of 700 = ? + 1265

A. 22255
B. 22266

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C. 22588

D. 25874

Correct Option: A

$\sqrt{196} \times \sqrt{144} \times 20\%$ of $700 = ? + 1265$

$14 \times 12 \times 140 = ? + 1265$

$168 \times 140 = ? + 1265$

$23520 = ? + 1265$

$? = 23520 - 1265$

$? = 22255$

How To Solve Numbers, Decimal And Fractions Questions Quickly

Solving Numbers, Decimal and Fractions Quickly

A fraction where the denominator (the bottom number) is a power of ten (such as 10, 100, 1000, etc). We can write decimal fractions with a decimal point (and no denominator), which make it easier to do calculations like addition and multiplication on fractions. To find some methods How To Solve Numbers And Fractions Questions, go through this page thoroughly.

Examples \frac{7}{10} \ is a decimal fraction and it can be shown as 0.7 \frac{43}{100} \ is a decimal fraction and it can be shown as 0.43 \frac{88}{1000} \ is a decimal fraction and it can be shown as 0.088

How To Solve Quickly Number, Decimal and Fraction

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It represents a part of a whole or more generally, any number of equal parts. If a unit is divided into any number of equal parts, then one or more of these parts is termed as a fraction of the unit.

The numerator in a fraction represents a number of equal parts and denominator (≠0) represents how many of those parts make up a unit or a whole.

The value of fraction (x/y) = 1, if numerator = denominator
The value of fraction is zero,if numerator=0 and denominator ≠0
The value of fraction is infinity,if the denominator=0
The value of fraction remains unchanged,even if the numerator and denominator are multiplied or divided by same number

Pure recurring decimal: In a decimal fraction, if all the numbers after decimal point repeat, then it is called as pure recurring decimal.
Mixed recurring decimal: In a decimal fraction, if some numbers are repetitive and some are not, then it is called as mixed recurring decimal.

Basic Concept To Solve Number, Decimals and Fractions Questions Quickly

(Must Remember)

1) $(a - b)^{2} = (a^{2} + b^{2} - 2ab)$
2) $(a + b)^{2} = (a^{2} + b^{2} + 2ab)$
3) $(a + b)(a - b) = (a^{2} - b^{2})$
4) $(a^{3} + b^{3}) = (a + b)(a^{2} - ab + b^{2})$
5) $(a^{3} - b^{3}) = (a - b)(a^{2} - ab + b^{2})$
6) $(a + b + c)^{2} = a^{2} + b^{2} + c^{2} + 2(ab + bc + ca)$
7) $(a^{3} + b^{3} + c^{3} - 3abc) = (a + b + c)(a^{2} + b^{2} + c^{2} - ab - bc - ac)$

Now let us solve some of the questions to find some methods How To Solve Numbers And Fractions Question.

How To Solve Number, Decimals and Fractions Questions Quickly

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Question 1 : Convert 0.737373… into vulgar fraction?

Options

(a) \frac{73}{99} \

(b) \frac{77}{99} \

(c) \frac{73}{90} \

(d) \frac{73}{900} \

Correct Answer: Option A

Explanation:

In a decimal fraction, if there are n numbers of repeated numbers after a decimal point, then just write one repeated number in the numerator and in denominator take n number of nines equal to repeated numbers you observe after the decimal point. 0.737373… is written as \frac{}{}0.\overline{73} .

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Question 2 : Find the number of zeros in 2145 x 5234

Options

(a) 145
(b) 234
(c) 10
(d) None of these.

Correct Options: A

Explanations

we have to look for the pairs of 2x 5, so the maximum pairs we can form are 145 because we have the maximum power of 2 is 145 , so the number of zeros in this case are 145.

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Questions 3 : Find the number of zeros at end of 5 x 10 x 15 x 20 x 25 x 30 x 35…………………………………… x 240 x 245 x 250?

Options

(a) 30
(b) 47
(c) 50
(d) 48

Correct Options: B

Explanations

We can take 5 as common out of this expression and write it as
5(1 x 2 x 3 x 4…………………………………… x 49 x 50)
5(50!)
To find number of zeros we first find
Maximum power of 2 in 50!
[\frac{50}{2} \ ] + [\frac{50}{2^2} \ ] + [\frac{50}{2^3} \ ] + [\frac{50}{2^4} \ ] + [\frac{50}{2^5} \ ] + ……….
= 25 + 12 + 6 + 3 +1= 47
Maximum power of 5 in 50!

\frac{50}{5} \ + [\frac{50}{5^2} \ ] + [\frac{50}{5^3} \ ]
= 10 + 2= 12

Thus maximum power of 5 present in given expression is 62 and maximum power of 2 present in given expression is 47. Hence number of zeros will be 47.

Question 4 : Find the value of \frac{5.45 + 6.23 * 9.7}{3.42 + 5.23 * 8.6}

A. 65.188 / 48.389
B. 65.881 / 48.398
C. 54.65 / 56.32
D. 55.654 / 65.456

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Answer: A

Sol:

\frac{5.45 + 6.23 * 9.7}{3.42 + 5.23 * 8.6}

\frac{5.45 + 60.431}{3.42 + 44.978}

\frac{5.45 + 60.431}{3.42 + 44.978}

65.881 / 48.398

Question 5 : 30% of 40% of 980 + 6.35 × (72/8) = ?

A. 53.5

B. 57.39

C. 57.75

D. 45.25

Correct Option: B

30% of 40% of 980 + 6.35 × (72/8) = ?

\frac{30}{100}\times \frac{40}{100}* 980 +6.35\times9 = x

0.3 * 0.4 * 980 + 6.35 * 9= x

117.6 + 57.15 = x

x = 174.75

Numbers, Decimals And Fractions Tips, Tricks And Shortcuts

Shortcuts for Number, Decimals, and Fractions

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Here are some Tips, tricks and shortcuts For Numbers Decimals Fractions which will directly help in different competitive and recruitment exams.

As we know that numbers, decimals and fractions is a very basic topic and there are multiple methods to solve them.

Note : Before starting to solve the question it is important to remember some of the identities. Let us look at some of them given below.

Tips and Tricks for Decimal and Fraction

Tips For Numbers Decimals Fractions

1) $(a - b)^{2} = (a^{2} + b^{2} - 2ab)$
2) $(a + b)^{2} = (a^{2} + b^{2} + 2ab)$
3) $(a + b)(a - b) = (a^{2} - b^{2})$
4) $(a^{3} + b^{3}) = (a + b)(a^{2} - ab + b^{2})$
5) $(a^{3} - b^{3}) = (a - b)(a^{2} - ab + b^{2})$
6) $(a + b + c)^{2} = a^{2} + b^{2} + c^{2} + 2(ab + bc + ca)$
7) $(a^{3} + b^{3} + c^{3} - 3abc) = (a + b + c)(a^{2} + b^{2} + c^{2} - ab - bc - ac)$

Tricks and shortcuts for Decimal and fraction

1. Decimal Fractions:

Fractions in which denominators are powers of 10 are known as decimal fractions.
Thus, 1/10 = 1 tenth = .1; 1/100 = 1 hundredth = .01;
88/100 = 88 hundredths = .88; 6/1000 = 6 thousandths = .006, etc.;

2. Conversion of a Decimal into Vulgar Fraction:

Put 1 in the denominator under the decimal point and annex with it as many zeros as is the number of digits after the decimal point. Now, remove the decimal point and reduce the fraction to its lowest terms.
Thus, 0.25 = 25/100 = 1/4 ; 2.008 = 2008/1000 = 251/125.

3. Annexing Zeros and Removing Decimal Signs:

Annexing zeros to the extreme right of a decimal fraction does not change its value.
Thus, 0.8 = 0.80 = 0.800, etc.

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If numerator and denominator of a fraction contain the same number of decimal places, then we remove the decimal sign.

Thus, 1.84/2.99 = 184/299 = 8/13.

4. Operations on Decimal Fractions:

i. Addition and Subtraction of Decimal Fractions: The given numbers are so placed under each other that the decimal points lie in one column. The numbers so arranged can now be added or subtracted in the usual way.

ii. Multiplication of a Decimal Fraction By a Power of 10: Shift the decimal point to the right by as many places as is the power of 10.
Thus, 5.9632 x 100 = 596.32; 0.073 x 10000 = 730.

iii. Multiplication of Decimal Fractions: Multiply the given numbers considering them without decimal point. Now, in the product, the decimal point is marked off to obtain as many places of decimal as is the sum of the number of decimal places in the given numbers.
Suppose we have to find the product (.2 x 0.02 x .002).
Now, 2 x 2 x 2 = 8. Sum of decimal places = (1 + 2 + 3) = 6.
.2 x .02 x .002 = .000008

iv. Dividing a Decimal Fraction By a Counting Number: Divide the given number without considering the decimal point, by the given counting number. Now, in the quotient, put the decimal point to give as many places of decimal as there are in the dividend.

Suppose we have to find the quotient (0.0204 Ã· 17). Now, 204 Ã· 17 = 12.

Dividend contains 4 places of decimal. So, 0.0204 Ã· 17 = 0.0012

v. Dividing a Decimal Fraction By a Decimal Fraction: Multiply both the dividend and the divisor by a suitable power of 10 to make divisor a whole number.

Now, proceed as above.

Thus, 0.00066/0.11 = 0.00066 x 100/0.11 x 100 = 0.066/11 = .006

5. Comparison of Fractions:

Suppose some fractions are to be arranged in ascending or descending order of magnitude, then convert each one of the given fractions in the decimal form, and arrange them accordingly.

Let us to arrange the fractions 3/5, 6/7 and 7/9 in descending order.

Now, 3/5 = 0.6, 6/7 = 0.857, 7/9 = 0.777...

Since, 0.857 > 0.777... > 0.6. So, 6/7 > 7/9 > 3/5 .

6. Recurring Decimal:

If in a decimal fraction, a figure or a set of figures is repeated continuously, then such a number is called a recurring decimal.

If a single figure is repeated, then it is expressed by putting a dot on it. If a set of figures is repeated, it is expressed by putting a bar on the set.

Thus, 1/3 = 0.333... = 0.3; 22/7 = 3.142857142857.... = 3.142857.

Pure Recurring Decimal: A decimal fraction, in which all the figures after the decimal point are repeated, is called a pure recurring decimal.

Converting a Pure Recurring Decimal into Vulgar Fraction: Write the repeated figures only once in the numerator and take as many nines in the denominator as is the number of repeating figures.

Thus, 0.5 = 5/9; 0.53 = 53/99; 0.067 = 67/999, etc.

Mixed Recurring Decimal: A decimal fraction in which some figures do not repeat and some of them are repeated, is called a mixed recurring decimal.

Eg. 0.1733333.. = 0.173.

Now let us look at some of the Tips For Numbers Decimals Fractions through the given examples.

Questions and Answers

Question 1: Evaluate \frac{(3.8^2-1.2^2)}{(3.8 -{1.2})}

(a) 5.2
(b) 4.8
(c) 4
(d) 5

Answer : D

Explanation :

\frac{(3.8^{2}-1.2^{2})}{(3.8 -{1.2})}\
\frac {(3.8 + 1.2)(3.8 – 1.2)} {(3.8 – 1.2)}

= 3.8+1.2 =5

Question 2: If 1.5x = 0.04y, then the value of \frac { (y – x)}{ (y+x) } is :

(a) 73/77
(b) 7.3/77
(c) 730/77
(d) 7300/77

Answer: A

Explanation:

\frac{ (x)}{ (y) }

= \frac{ (0.04)}{ (1.5) }

= \frac{ (4)}{ (150) }

= \frac{ (2)}{ (75) }

= > \frac{ (y – x)}{ (y+x) }

= \frac{(1 – \frac{x}{y})} {(1 + \frac{x}{y})}

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= \frac {1 – \frac{2}{75}}{1 – \frac{2}{75}}

= 73/77

Question 3: If 47. 2506 = 4*A + 7/B + 2*C + 5/D + 6*E, then the value of 5*A + 3*B + 6*C + D + 3*E is :

(a) 53.6003
(b) 53.603
(c) 153.6003
(d) 213.003

Answer: C

Explanation:

4*A + 7/B + 2*C + 5/D + 6*E =47.2506
=> 4 * A + 7/B + 2 *C + 5/D + 6*E = 40 + 7 + 0.2 + 0.05 + 0.0006
Comparing the terms on both sides, we get :
4*A =40, 7/B = 7, 2*C = 0.2, 5/D = 0.05, 6*E = 0.0006
A = 10,
B = 1,
C = 0.1,
D = 100,
E = 0.0001.
5*A + 3*B + 6*C + D + 3*E =(5*10) + (3*1) + (6*0.1) +100 +(3*0.0001)
=50 + 3 + 0.6 + 100 + 0.003 = 153.6003.

Question 4 : A recipe requires 3/4 cup of sugar to make 12 cookies. How much sugar would be needed to make 36 cookies?

A. 2.25
B. 2.5
C. 3.5
D. 4.5

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Solution and Explanation:

To find the amount of sugar needed to make 36 cookies, we can set up a proportion based on the given information:

Sugar needed / Number of cookies = 3/4 cup / 12 cookies

Let's solve for the unknown, which is the amount of sugar needed for 36 cookies:

Sugar needed / 36 = (3/4) cup / 12

Cross-multiplying gives us:

Sugar needed * 12 = 36 * (3/4)

Sugar needed * 12 = 108/4

Simplifying the right side:

Sugar needed * 12 = 27

Dividing both sides by 12:

Sugar needed = 27 / 12

Sugar needed = 2.25 cups

Therefore, to make 36 cookies, you would need 2.25 cups of sugar

Question 5: Evaluate 1082 using (a + b)2 formula.

A. 11645
B. 12547
C. 11664
D. 12745

Solution:

Let's write 108 as: 108 = 100 + 8

$108^{2} = (100 + 8)^{2}$

Using the formula $(a + b)^{2} = a^{2} + 2ab + b^{2}$

$108^{2} = (100)^{2} + 2(100)(8) + (8)^{2}$

$= 10000 + 1600 + 64$

$= 11664$

Formulas for Divisibility

Formulas for Divisibility in Aptitude

In this page we have provided the definition and formulas for Divisibility along with the rules of divisibility of all the important digits asked in the exam.

DefinitionA divisibility is a rule for finding whether the number is divisible by another number or not. We can say that when number a is divided by another number b and remainder becomes zero . Hence the number a is divisible by b.

Formulas of Divisibility

Formulas for Divisibility & Definitions:

- A divisibility rule is a shorthand method of determining whether a given number is divisible by a fixed divisor without carrying out the division, usually by examining its digits.
- One whole number is divisible by another if, after dividing, the remainder is zero.
- If the whole number is divisible by another number than the second number is factor of 1st number.
- When we set up a division problem in an equation using our division algorithm, and $r = 0$, we have the following equation: a = bq

- When this is the case, we say that *a* is divisible by *b*. If this is a little too much technical jargon for you, don't worry! It's actually fairly simple. If a number *b* divides into a number *a* evenly, then we say that *a* is divisible by *b*.
- For example, 8 is divisible by 2, because \frac{8}{2} = 4. However, 8 is not divisible by 3, because of \frac{8}{3} = 2 with a remainder of 2. We see that we can check to see if a number, *a* , is divisible by another number, *b* , by simply performing the division and checking to see if b divides into an evenly.

Rules of Divisibility

Divisibility rule of 2	Any number whose last digit is an even number (0, 2, 4, 6, 8) is divisible by 2
Divisibility rule of 3	A number is divisible by 3 if the sum of its digits is divisible by 3.
Divisibility rule of 4	A number is divisible by 4, if the number formed by the last two digits is divisible by 4.
Divisibility rule of 5	A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place.
Divisibility rule of 6	A number is exactly divisible by 6 if that number is divisible by 2 and 3 both. It is because 2 and 3 are prime factors of 6.
Divisibility rule of 7	Double the last digit and subtract it from the remaining leading truncated number to check if the result is divisible by 7 until no further division is possible
Divisibility rule of 8	If the last three digits of a number are divisible by 8, then the number is completely divisible by 8.
Divisibility rule of 9	It is the same as of divisibility of 3. Sum of digits in the given number must be divisible by 9.
Divisibility rule of 11	If the difference of the sum of alternative digits of a number is divisible by 11, then that number is divisible by 11.
Divisibility rule of 12	A number is exactly divisible by 12 if that number is divisible by 3 and 4 both.
Divisibility rule of 13	Multiply the last digit with 4 and add it to remaining number in a given number, the result must be divisible by 13.
Divisibility rule of 15	If the number divisible by both 3 and 5, it is divisible by 15.
Divisibility rule of 17	Multiply the last digit with 5 and subtract it from remaining number in a given number, the result must be divisible by 17
Divisibility rule of 19	Multiply the last digit with 2 and add it to remaining number in a given number, the result must be divisible by 19.

Question and Answers

Question 1 :Calculate how many numbers between 1 and 100, including both are divisible by 9 or 4.

A. 35
B. 33
C. 34
D. 30

Answer : 34
Explanation :
11 numbers are divisible between 1 and 100 by 9.
25 numbers are divisible by 4 between 1 and 100.
Therefore, total numbers = 36.
Also, there are numbers which are divisible by both 4 and 9 and are counted twice.
= 11 + 25 – 2 = 34

Question 2 : Which of the following is exactly divisible by 11?

A. 817425
B. 4832817
C. 817259
D. 5533935

Answer : 5533935
Explanation :
A given number is divisible by 11 only if the difference between the sum of the digits in the odd places and the sum of the digits in the even places is divisible by 11.
5+3+9+5= 22; 5+3+3= 11 (22-11= 11)

Question 3 : What will be the sum of remainders when 684 will be divided by 3 , 7 and 5?

A. 10
B. 9

C. 11

D. 6

Answer : 9

Explanation :

684 when divided by 3 leaves a remainder of 0.

684 when divided by 7 leaves a remainder of 5.

684 when divided by 5 leaves a remainder of 4.

Thus sum of remainders = 0 + 5 + 4 = 9.

Question 4 : Find the number from the given numbers which is not divisible by 7:

A. 84

B. 126

C. 89

D. 161

Answer : 89

Explanation :

All three numbers when divided by 7 leaves a remainder of 0 except for the number 89 which leaves a remainder of 5.

Question 5 : Find the second-smallest 3 digit number divisible by 2 and 7

A. 114

B. 128

C. 142

D. 107

Answer : 128

Explanation :

114 is the smallest 3 digit number divisible by 2 and 7.

142 is the third smallest 3 digit number divisible by 2 and 7.

107 is only divisible by 7.

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128 is the second smallest 3 digit number divisible by 2 and 7.

Thus, 128 is the answer.

How To Solve Divisibility Questions Quickly

How to Solve Divisibility Questions

In this Page we have discussed on How to Solve Divisibility Questions Quickly and easily, Along with different types of questions as well. This will help you in different Examinations.

ExampleFor example : 981 is divisible by 3 since the sum of the digits is 18 which is divisible by 3. Then the given number is divisible by 3

How To Solve Divisibility Questions Quickly & its Rules

- The capacity of a dividend to be exactly divided by a given number is termed as divisibility.
- One whole number is divisible by another if, after dividing, the remainder is zero.
- If a whole number is divisible by another number then the second number is factor of 1st number.

Type 1: Find the largest or smallest number

Question 1. What smallest number should be added to 1056 so that the number is completely divisible by 23?

Options

A. 2

B. 0

C. 1

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D. 3

Solution On dividing 1056 by 23 we get remainder as 21

Required number = 23 – 21 = 2

1056 + 2 = 1058

1058 is completely divisible by 23 leaving reminder as 0.

Correct option: A

Question 2. In the given numbers, if first digit of each number is replaced by second digit, second digit is replaced by third digit, and third digit is replaced by first digit. Find out the second lowest number?
456 137 564 238 625

Options

A. 238

B. 625

C. 456

D. 137

Solution 456 137 564 238 625

On replacing the position as per the instructions given in the question, the number become

564 371 645 382 256

Therefore, the second lowest number is 137

Correct option: D

Question 3. Find the largest 4 digit number which is exactly divisible by 88?

Options

A. 9955

B. 9988

C. 9944

D. 9088

Solution Largest 4 digit number is 9999

On dividing 9999 by 88, remainder = 55

Required number = 9999 – 55 = 9944

Correct option:C

Type 2: Which of the following numbers is/or not divisible by given number.

Question 1. Which of these numbers is not divisible by 5?

Options

A. 345675

B. 234565

C. 230050

D. 345601

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Solution A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place. Therefore, only option D is not divisible.

Correct option: D

Question 2. Which of these numbers is not divisible by 7?

Options

A. 875

B. 4143

C. 1470

D. 5488

Solution For 4143

Remove 3 from the number and double it = 6

Remaining number is 414, now subtract 414 from 6 = 414 – 6 = 408.

Repeat the process, We have last digit as 8, double = 16

Remaining number is 40, now subtract 40 from 16 = 40 – 16 = 24.

As 24 is not divisible by 7, hence the number 414 is not divisible by 7.

Correct option:B

Question 3. How many numbers between 300 and 900 are divisible by 4, 5 and 6?

Options

A. 10

B. 13

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C. 14

D. 15

Solution First find the LCM of 4, 5, and 6 = 60

Now, on dividing 900 by 60 we get quotient as 15

On dividing 300 by 60 we get quotient as 5

Therefore the required number is 15 – 5 = 10

Correct option:A

Type 3: How To Solve Divisibility Questions Quickly. Find the remainder

Question 1. On dividing a number by 60, we get 159 as quotient and 0 as remainder. On dividing the same number by 50, what will be the remainder?

Options

A. 40

B. 10

C. 20

D. 30

Solution Number = 159 x 60 + 0 = 9540

On dividing 9540 by 50 we get remainder as 40

Correct option:A

Question 2. What is the remainder when (2p + 2)^{2} is divided by 4 and 'p' is an integer?

Options

A. 1

B. 2

C. 3

D. None of the above

Solution On expanding $(2p + 2)^2 = 4p^2 + 8p + 4$

Now, take 4 common, then we get $4(p^2 + 2p + 1)$

Let the value of p be 1

$4 (1^{2} + 2 \times 1 + 1) = 16$

Hence, 16 is divisible by 4 and the remainder will be 0

Correct option:D

Question 3. Find the remainder when 4^{875} is divided by 17.

Options

A. 19

B. 12

C. 21

D. 13

Solution Rem $\frac{4^{875}}{17}$

Rem $\frac{4 \times 4^{874}}{17}$

Rem $\frac{4 \times 16^{437}}{17}$

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as when 4 x $(17-1)^{437}$ is divided by 17, it will give remainder of 4 x (-1)

Rem [4 x \frac{(-1)}{ 17}]

Rem \frac{-4}{ 17}

= 13

Correct option : D

Divisibility Tips, Tricks and Shortcuts

Tips and Tricks for Divisibility

In this Page we have discussed about the Tips and Tricks for Divisibility. Divisibility is a mathematical concept that deals with the relationship between numbers and how one number can be evenly divided by another. When we say that one number is divisible by another, it means that the division operation results in a whole number or an integer without any remainder.

Properties of Divisibility

- If a number "a" is divisible by both "b" and "c," then it is also divisible by their product, "b × c."
- If a number "a" is divisible by "b," and "b" is divisible by "c," then "a" is also divisible by "c."
- If a number "a" is divisible by "b" and "c," then it is divisible by their greatest common divisor

Tips, Tricks and Divisibility Rules

- **Divisibility rule for 1**
  - Every number is divisible by 1.
    Example: 5 is divisible by 1
- **Divisibility rule for 2**

- Any even number or number whose last digit is an even number (0, 2, 4, 6, 8) is divisible by
  Example: 220 is divisible by 2.

- **Divisibility rule for 3**
  - A number is divisible by 3 if the sum of its digits is divisible by 3. Example: 315 is divisible by 3.
    Here, 3 + 1 + 5 = 9

    9 is divisible by 3. It means 315 is also divisible by 3.

- **Divisibility rule for 4**
  - A number is divisible by 4, if the number formed by the last two digits is divisible by 4.
    Example: 7568 is divisible by 4
    Here, 68 is divisible by 4 (68÷4 = 17)

Therefore, 7568 is divisible by 4

- **Divisibility rule for 5**
  - A number is exactly divisible by 5 if it has the digits 0 or 5 at one's place. Example: 5900, 57895, 4400, 1010 are divisible by 5.

- **Divisibility rule for 6**
  - A number is exactly divisible by 6 if that number is divisible by 2 and 3 both. It is because 2 and 3 are prime factors of 6.
    Example: 63894 is divisible by 6, the last digit is 4, so divisible by 2, and sum 6+3+8+9+4 = 30 is divisible by 3.

- **Divisibility rule for 7**
  - Double the last digit and subtract it from the remaining leading truncated number to check if the result is divisible by 7 until no further division is possible
    Example: 1093 is divisible by 7

Remove 3 from the number and double it = 6

Remaining number is 109, now subtract 6 from 109 = 109 – 6 = 103.

Repeat the process, We have last digit as 3, double = 6

Remaining number is 10, now subtract 6 from 10 = 10 – 6 = 4.

As 4 is not divisible by 7, hence the number 1093 is not divisible by 7.

- **Divisibility rule for 8**
  - If the last three digits of a number are divisible by 8, then the number is completely divisible by 8.

Example: 215632 is divisible by 8, as last three digits 632 is divisible by 8.

- **Divisibility rule for 9**
  - It is the same as of divisibility of 3. Sum of digits in the given number must be divisible by 9.
    Example: 312768 is divisible by 9, Sum of digits = 3+1+2+7+6+8 = 27 is divisible by 9.

- **Divisibility rule for 10**
  - Any number whose last digit is 0, is divisible by 10.
    Example: 10, 60, 370, 1000, etc.

- **Divisibility rule for 11**
  - If the difference of the sum of alternative digits of a number is divisible by 11, then that number is divisible by 11.
    Example: 737 is divisible by 11 as 7 + 7 = 14 and 14 – 3 = 11, 11 is divisible by 11.
    416042 is divisible by 11 as 4 + 6 + 4 = 14 and 1 + 0+ 2 = 3, 14 – 3 = 11, 11 is divisible by 11.

- **Divisibility rule for 12**

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- A number is exactly divisible by 12 if that number is divisible by 3 and 4 both. Example: 108 is divisible by 12. Sum of digit = 1 + 8 = 9, 9 is divisible by 3. And last two
  digits 08 is divisible by 4. Therefore, 108 is divisible by 12.

- **Divisibility rule for 13**
  - Multiply the last digit with 4 and add it to remaining number in a given number, the result must be divisible by 13. Example: 208 is divisible by 13, 20 + (4 x 8) = 20 + 32 = 52, 52 is divisible by 13.

- **Divisibility rule for 14**
  - A number is exactly divisible by 14 if that number is divisible by 2 and 7 both. It is because 2 and 7 are prime factors of 14. Example: 1246 is divisible by 14, as the last digit is even, so divisible by 2. Now check for 7,

Remove 6 from the number and double it = 12

Remaining number is 124, now subtract 124 from 12 = 112.

Repeat the process, We have the last digit as 2, double = 4

The remaining number is, now subtract 11 from 4 = 7

As 7 is divisible by 7, hence the number 1246 is divisible by 7.

- **Divisibility rule for 15**
  - If the number divisible by both 3 and 5, it is divisible by 15.
  - Example: 23505 is divisible by 15.
  - Check for 3: 2 + 3 + 5 + 0 +5 = 15, 15 is divisible by 3. Check for 5: It has the 5 at one's place, therefore, divisible by 5.

- **Divisibility rule for 16**

- The number formed by last four digits in the given number must be divisible by 16. Example: 152448 is divisible by 16 as last four digits (2448) are divisible by 16.

- **Divisibility rule for 17**
    - Multiply the last digit with 5 and subtract it from remaining number in a given number, the result must be divisible by 17. Example: 136 is divisible by 17. 13 – (5 x 6) = 13 – 30 = 17, 17 is divisible by 17.

- **Divisibility rule for 18**
    - If the number is divisible by both 2 and 9, it is divisible by 18. Example: 92754 is divisible by 18. Check for 2: the last digit is even, therefore, it is divisible by 2. Check for 9: 9 + 2 + 7 + 5 + 4 = 27, 27 is divisible by 9.

- **Divisibility rule for 19**
    - Multiply the last digit with 2 and add it to remaining number in a given number, the result must be divisible by 19. Example: 285 is divisible by 19, 28 + (2 x 5) = 28 + 10 = 38, 38 is divisible by 19.

- **Divisibility rule for 20**
    - The number formed by last two digits in the given number must be divisible by 20. Example: 245680 is divisible by 20, because the last two digits 80 is divisible by 20.

Type 1: Find the largest or smallest number

Question 1. Find the smallest 4 digit number which is exactly divisible by 41?

Options.

A. 1000

B. 1023

C. 1025

D. 1012

Solution Smallest 4 digit number is 1000

On dividing 1000 by 41, remainder = 16

Required number = 1000 + (41 – 16) = 1025

Correct option: C

Question 2. Find the Largest 3 digit number which is exactly divisible by 25?

Options.

A. 975

B. 905

C. 980

D. 950

Solution Largest Three digit numbers is 999

On dividing 999 by 25, remainder = 24

Required number = 999 – 24 = 975

Correct option: A

Type 2: Which of the following numbers is/or not divisible by given number.

Question 1. Which of these numbers is divisible by 3?

Options.

A. 1003

B. 253

C. 1031

D. 1221

Solution 1003 = 1 + 0 + 0 + 3 = 4, 4 is not divisible by 3

253 = 2 + 5 + 3 = 10, 10 is not divisible by 3

1031 = 1 + 0 + 3 + 1 = 5, 5 is not divisible by 3

1221 = 1 + 2 + 2 + 1= 6, 6 is divisible by 3

Correct option: D

Question 2. Which of these numbers is not divisible by 10?

Options.

A. 1250

B. 1253

C. 1930

D. 1220

Solution Last digit of 1253 is not 0 so it is not divisible by 10

Correct option: B

Type 3: Tips and Tricks to Solve Divisibility Questions.
Find the remainder

Question 1. Find out the remainder of \frac{2^{12}}{5}

Options.

A. 1

B. 2

C. 0

D. 3

Solution Convert 2^{12} in multiple of 16 = 16 x 16 x 16 =2^{4}\times 2^{4}\times 2^{4}

Now divide each number by 5

On dividing 16 by 5 we get remainder as 1

Now, multiply all the remainders 1 x 1 x 1 = 1

Correct option: A

Question 2. Find out the remainder when 7^{4} is divided by 5.

Options.

A. 0

B. 4

C. 1

D. 2

Solution Divide 7 by 5 Remainder will 2

2\times 2\times 2\times 2 = 16

Now divide 16 by 5

On dividing 16 by 5 we get remainder as 1

Correct option: C

Formulas For Ages

Formulas For Problem on Ages

Here on this page you will get to know about the Formulas For Ages. These type of Formulas are widely used in the Problem on Ages questions and are beneficial for solving the question in exams Quickly and Efficiently.

Types of age-related problems

- Age of an individual
- Age ratio problem
- Age difference problem

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Important Formulas on Ages

1. If the present age is *x*, then *n* times the age is ***nx***.
2. If the present age is *x*, then age *n* years later/hence = ***x + n***.
3. If the present age is *x*, then age *n* years ago = ***x − n***.
4. The ages in a ratio *a* : *b* will be ***ax*** and ***bx***.
5. If the present age is x, then $\frac{1}{n} \ $ of age is $\frac{x}{n} \ $

Important Concepts on Problems on Ages

Concept 1

x years ago the age of A was n1 times the age of B, and at present A’s age is n2 times that of B, then;
A’s current =$\frac{\left (n_{1} -1\right)n_{2}x}{n_{1}-n_{2}}$ years.
and, B’s current age = $\frac{\left (n_{1} -1\right)x}{(n_{1}-n_{2})}$years.

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Concept 2

The present age of A is n1 times the present age of B. After x years, age of A becomes n2 times the age of B, then;

A's current = $\frac{\left (n_{2} -1\right)n_{2}x}{(n_{1}-n_{2})}$ years.

and, B's current age = $\frac{\left (n_{2} -1\right)x}{(n_{1}-n_{2})}$ years.

Concept 3

t1 years ago, the age of A was X times the age of B and after t2 years age of A becomes Y times the age of B, then;

A's present age = $\frac{\left (x)(t_{1}+ t_{2}\right)(y - 1)}{(x-y)} + t_{1}$ years

And B's present age = $\frac{t_{2}(y - 1)+t_{1}(x - 1)}{x - y}$ years

Concept 4

The sum of present ages of A and B is X years, t years after, the age of A becomes Y times the age of B, then;

A's present age = $\frac{xy + t(y-1)}{y +1}$ years

And B's present age= $\frac{x- t(y-1)}{y+1}$ years

Concept 5

The ratio of the present ages of A and B is p: q and after t years, it becomes r: s, then;

A's present age = $\frac{pt(r-s)}{ps-qr}$ years.

And, B's present age = $\frac{qt(r-s)}{ps-qr}$ years

Concept 6

The sum of present ages of A and B is X years, t years ago, the age of A was Y times the age of B, then;

Present age of A = $\frac{xy + t(y-1)}{y+1}$ years

And, the present age of B = $\frac{x + t(y-1)}{y+1}$ years

Question and Answer

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Question 1: Saina Nehwal is 8 years older than her cousin. Her cousin is 24 years younger than his mother. If the ratio between the ages of Saina and her cousin's mother is 7 : 11. What will be the age of Saina's cousin after 3 years?

A. 21 years
B. 20 years
C. 26 years
D. 23 years

Answer: 23 years
Let the age of Saina = x, her cousin's age = x – 8, Cousin's mother age = x – 8 + 24
Ratio between the ages of Saina and her cousin's mother is 7 : 11
$x : x + 16 = 7 : 11$
$11 \times x = (x + 16) \times 7$
$11x = 7x + 112$
$4x = 112$
$x = 28$
Saina's cousin age = 28 – 8 = 20
After 3 years Saina's cousin age = 20 + 3 = 23 years

Question 2 : Tiger's present age is acquired, if we subtract 9 years from Arav's present age and divide the remainder by 14. If Mohan's age is 8 years and he is 3 years elder to Arav, then find Tiger's present age.

A. 42
B. 79
C. 77
D. 85

Answer : 79 years
Explanation:
Let Tiger's present age be x
Given, Mohan's present age 8 years

Then, Arav's present age = 8-3 = 5 years

Given, if we subtract 9 years from Arav's present age and divide the remainder by 14 we will get Tiger's present age

= x-9/14 = 5

x-9 = 70

x = 79 years

Tiger's present is 79 years

Question 3 : Erika was five times older than Gigi ten years ago. The age of an Erika will be twice that of a Gigi in five years. How old were Erika's compared to Gigi five years ago?

A. 5:1
B. 3:1
C. 2:1
D. 4:1

Answer : 3:1

Explanation :

Erika was 5 times older than Gigi 10 years ago.

Let the age of Gigi 10 years ago be x years.

∴ The age of Erika 10 years ago = 5x years

5 years from now, Erika will be twice older than Gigi.

∴ We can write now,

(5x + 10 + 5) = 2 × (x + 10 + 5)

⇒ 5x + 15 = 2x + 30

⇒ 3x = 15

⇒ x = 5

∴ Age of Gigi 10 years ago = 5 years

And, the age of Erika 10 years ago = 5x = 5 × 5 = 25 years

∴ The reqd. ratio = \frac{25 + 5}{5+5} = \frac{30}{10} = 3:1

Question 4 : Sum of the ages of Tendulkar and Dravid 16 years hence will be equal to 3 times their present age. If at present Tendulkar is 10 years elder to Dravid, then what are their present ages?

A. 22, 8
B. 29, 12
C. 13, 3
D. 13, 6

Answer: 13, 3
Let the present ages of Tendulkar and Dravid be x years and y years respectively.
As per the question,
$(x + 16) + (y + 16) = 3(x + y)$
$x + y + 32 = 3x + 3y$
$x + y = 16$ …..(i)
Also,
$y + 10 = x$
$x – y = 10$ …..(ii)
Solving eqns (i) and (ii), we get
$x = 13$ and $y = 3$
Therefore, Present ages of Tendulkar and Dravid is 13 years and 3 years respectively.

Question 5 : Amitabh said to his friend "If you subtract 18 from my age the two digits of my age will reverse their positions. Also my age is six, less than 8 times the sum of digits of my age". Find Amitabh's age.

A. 46 years
B. 37 years
C. 56 years
D. 42 years

Answer:
Let Mayank's age be $(10x + y)$ years

Age by reversing the digits = (10y + x) yrs

Now, 10x + y – 18= 10y + x

9x – 9y = 18

x – y = 2………………(1)

Also,

10x+y = 8(x+y) – 6

2x – 7y = –6………… (2)

Solving equations (1) and (2),

x = 4 , y = 2

Therefore, Mayank's age = 10x + y

= 10(4) + 2

= 42 years

How To Solve Problem on Ages Questions Quickly

How To Solve Ages Questions Quickly

Here on this page we will discuss on How To Solve Ages Questions Quickly and easily is given below:

- Decide which age – either it is present or past or future.
- After deciding the age, Consider it as X.
- In most cases, we take the present age as 'X', i.e., the base year works just fine.
- Past will express as (x-5) years.
- The future can be expressed as (x+5).
- But sometimes, 'present age' is not directly given in words. Then, *take 'x' to be the age you are going to find*.

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- Sometimes when nothing works then just look at the options and solve it through back calculations! It also works fine.

Important Formulas to Know about Ages

- If you are assuming the current age to be x, then the age after n years will be (x+n) years.
- If you are assuming the current age to be x, then the age before n years will be (x-n) years.
- If the age is given in the form of a ratio, for example, p:q, then the age shall be considered as qx and px
- If you are assuming the current age to be x, then n times the current age will be (x×n) years
- If you are assuming the current age to be x, then 1/n of the age shall be equal to (x/n) years

Problem On Ages Tips, Tricks And Shortcuts

Tips and Tricks to solve Problem on Ages

On this page you will get to know about all the tips, tricks and shortcuts on Problems on Ages and How to solve them easily using tricks and shortcuts.

Tips and Tricks

- Classify the key phrases and arrange the information by assigning variables
- Select only one variable to solve the problem.
- If the information in the question comprises ages at different points of time, assume present age as 'x'
- Read the question very carefully. The phrase 'n time more than' needs to be understood correctly.

Important Formulas to Solve Ages Question

- If you are assuming the current age to be x, then the age after n years will be (x+n) years.
- If you are assuming the current age to be x, then the age before n years will be (x-n) years.
- If the age is given in the form of a ratio, for example, p:q, then the age shall be considered as qx and px
- If you are assuming the current age to be x, then n times the current age will be (x×n) years
- If you are assuming the current age to be x, then 1/n of the age shall be equal to (x/n) years

Tricks to Solve Ages Question

- The most important thing is to read the question carefully and gradually form the equation which shall help you answer the question.
- Basic things like addition, subtraction, multiplication and division will help a candidate reach the answer and no complicated calculations are required to answer such questions.
- Arrange the values given by placing them correctly in an equation by giving variables to the unknown values
- Once the equation has been formed, solve the equation to find the answer.
- The final step is to recheck the answer obtained by placing it in the equation formed to ensure that no error has been made while calculating.

Type 1:

Tips and Tricks to solve Problems on Ages Based on Present Age

Question 1.

In the next 6 years, C will be double the age of D 6 years back. If at present C is 5 years elder to D, then find D's present age.

A.) 32
B.) 25
C.) 23
D.) 20

Correct answer C

Explanation :

Let D’s present age be x

Given, (x + 5) = C’s age

Given, (x + 5) + 6 = 2(x – 6)

= x + 11 = 2x – 12

x = 23

Type 2:

Tips and Tricks to solve Problems Based on Age Before K Years

Question 2.

Vikram said to his daughter, “I was as old as you are today when you were born.” If Vikram’s age is 45 today, then his daughter’s age 3 years ago was?

A.) 22
B.) 19.5
C.) 23.5
D.) 21.5

Correct answer B

Explanation :

let vikram's daughter age = z.
Given , 45- z = z .
So, 2z = 45 , z = 22.5.
So, 3 yrs ago, daughter age will be 22.5 – 3 = 19.5.

Type 3:

Tips and Tricks to solve Problem Based on Age After K Years

Question 3.

Lalita is four times the age of Om. If after 3 years, she would be three times of Om, then additional after 3 years, how many time would be her age of Om?

A.) 2.5
B.) 3.5
C.) 2
D.) 3

Correct answer A

Explanation :

Let us assume Om's age as s and Lalita's age as 4s

Given, 4s + 3 = 3(s + 3)

= 4s + 3 = 3s + 9

s = 6

So, Om's age is 6 and Lalita's age is 24.

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Therefore, after 6 years Lalita's will be 30 and Om will be 12. Lalita will be 2.5 times elder.

Question 4 :

Present ages of Shikhar and Hardik's are in the ratio of 3:4. The ratio of Bhuvan's age after 5 years to Hardik's age 1 year ago is 4 : 3 and four times the difference in ages of Hardik and Shikhar is one more than the age of Bhuvan. Find the average of the present ages of Shikhar and Hardik.

A. 20 years
B. 10 years
C. 14 years
D. 15 years

Answer:
Correct Option: C
Let Shikhar's age = A, Bhuvan's age = B, and Hardik's age = C
Then, according to the question,
⇒ A/C = 3/4 …………….(i)
⇒ B + 5/ C-1 = 4/3 …………….(iI)
⇒ 4 × (C – A) = B + 1 ———————(iii)
After solving these equations,
⇒ A = 12
⇒ C = 16
Average of ages of Shikhar and Hardik = 12 + 16 / 2 = 14

Question 5 :

Vidyut Jamwal was three times Tiger's age ten years ago, but he will be only twice as old in ten years. What is Vidyut's present age?

A. 60 years
B. 70 years

C. 80 years

D. 90 years

Answer : 70 years

Explanation :

Let Vidyut's present age be "x" years and Tiger's present age be "y" years.

Then, according to the first condition,

X−10 = 3(y−10) => x−3y = −20…………(1)

Now, Vidyut's age after 10 years = (x+10)(x+10) years.

Tiger's age after 10 years = (y+10)(y+10) years.

(x+10) = 2(y+10) => x−2y = 10……(2)

Solving (1) and (2),

we get x = 70 and y = 30

Vidyut's present age = 70 years and Tiger's present age = 30 years.

Speed Time and Distance Formulas

Basic Formulas of Speed, Distance and Time with Definition

On this page we have discussed about Speed Time and Distance formulas with Examples.

SpeedSpeed can be defined as the rate at which an object covers distance in a specific direction within a given timeframe.

DistanceDistance can be defined as a scalar quantity that represents the numerical measure of the extent between two points in space.

TimeTime can be defined as the continuous and irreversible progression of events and existence and is typically measured in units like seconds(s), minutes(mins) and hours(hr).

Formulas of Train for Speed, Distance and Time

Train problems are very common problems which are asked in quantitative aptitude exams of companies, apart from basic speed distance and time questions hence students must focus on trains problems.

Here we have discussed some basic formulas required for train problems that are asked in exams

- **Speed of the Train = \frac{Total Distance}{Total Time Taken}**
- If length of two trains is given, say t1 and t2, and the trains are moving in **opposite directions** with speeds of x1 and y1 respectively, then the **time taken by trains to cross each other =\frac{T1 + T2}{X1 + Y1}**
- If the length of two trains is given, say t1 and t2, and they are moving in the **same direction**, with speeds x1 and y1 respectively, then the **time is taken to cross each other = {(t1+t2) / (x1-y1)}**
- When the **start time of two trains is the same from position a and b towards each other** and after crossing each other, they took t1 and t2 time in reaching a and b respectively, then the **ratio between the speed of trains is = \frac{\sqrt{T2}}{\sqrt{T1}}**
- If two trains leave station a and b at time t1 and t2 respectively and travel with speed X and Y respectively, then distanced from x, where two trains meet is = \frac{(T2-T1)\times (X\times Y)}{(X1-Y1)}
- The average speed of a train without any stoppage is x1, and with the stoppage, it covers the same distance at an average speed of y1, then **Rest Time per hour = (Difference in average speed) / (Speed without stoppage)**

Question and Answers on Speed Distance and Time

Q1. Arnold bane travels from one place to another at 60 km/hr and returns at 240 km/hr. If the total time taken is 5 hours, then find the Distance.

Options: A)120km
B)360km
C)280km
D)240km

Answer :
Here the Distance is constant, so the Time taken will be inversely proportional to the Speed. Ratio of Speed is given as 60:240, i.e. 1:4

So the ratio of Time taken will be 4:1.

Total Time taken = 5 hours; Time taken while going is 4 hours and returning is 1 hour.

Hence, Distance = 60x 4 = 240 km

Option D is correct

Q2.Anthony Milan by bus takes double the Time taken by train to travel from Bangalore to Chennai. What is
the Speed of the train if the Speed of the bus is 95 km/hr.

Options: A)60km

B)50km

C)180km

D)190km

Answer:

Let's denote the speed of the train as "x" km/hr, Tb time taken by bus, Tt time taken by train, Sb speed of bus

The time taken by the bus to travel from Bangalore to Chennai is given by:

Tb = Distance / Sb

Since the speed of the bus is 40 km/hr, we can rewrite the equation as:

Tb = Distance / 95

According to the given information, the time taken by the bus is double the time taken by the train:

Tb = 2 * Tt

Substituting the expressions for Tb and Tt, we get:

Distance / 95 = 2 * Distance / x

To solve for the speed of the train (x), we can cross-multiply and solve for x:

Distance * x = 95 * 2 * Distance

x = 190 km/hr

Option D is correct.

Q3. Train X can travel 50% faster than a car Y. Both start from New Delhi at the same time and reach Meerut which is 75 kms away from New Delhi at the same

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time. However, the train lost about 12.5 minutes while stopping at the stations. The speed of the car Y is:

Options: A)120km
B)300km
C)160km
D)240km

Answer: Let the speed of car be x km

Then the speed of Train = $\frac{150}{100}x$
$=\frac{3}{2}x$
$\frac{75}{x}-\frac{75}{\frac{3}{2}}x = \frac{125}{10 \times 60}$
$\frac{75}{x}-\frac{50}{x} =\frac{5}{24}$
$x = \left (\frac{25\times 24}{5} \right)$
120 km/hr
Option A is correct.

Q4.A train travels from Station A to Station B at a constant speed of 80 km/h. On its return journey from Station B to Station A, the train encounters some technical issues, and its speed reduces to 60 km/h. The total time taken for the whole trip is 9 hours. Find the distance between Station A and Station B.

Options: A)308.57 km
B)156.4 km
C)200 km
D)123.7 km

Answer:

Let the distance between Station A and Station B be D kilometers. Time taken for the journey from A to B: D / 80 hours Time taken for the journey from B to A: D / 60 hours
According to the problem, the total time taken for the round trip is 9 hours. So we can set up the equation: D / 80 + D / 60 = 9

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To solve for D, we can find the least common multiple (LCM) of 80 and 60, which is 240. Then, we get: (3D + 4D) / 240 = 9 7D = 9 * 240 D = 9 * 240 / 7 D ≈ 308.57 km

Therefore, the distance between Station A and Station B is approximately 308.57 kilometers

Option A is correct.

Q5. A high-speed train departs from City P to City Q at 8:00 AM. At the same time, another train leaves City Q and travels towards City P at a speed of 120 km/h. The distance between the two cities is 480 kilometers. If the high-speed train travels at a constant speed of 180 km/h, at what time will the two trains pass each other?

Options: A)9:30 am
B)4:30 am
C)12:40 pm
D)8:00 am

Answer:

Let the time at which the two trains pass each other be T hours after 8:00 AM.

Distance covered by the high-speed train = 180 km/h * T hours Distance covered by the other train = 120 km/h * T hours

According to the problem, the total distance between the cities is 480 kilometers.

So, we can set up the equation: 180T + 120T = 480

300T = 480 T = 480 / 300 T = 1.6 hours

The two trains will pass each other 1.6 hours after 8:00 AM.

Option D is correct.

How to Solve Speed Distance and Time Questions Quickly

Solve Speed, Distance and Time Question Quickly

Speed Distance and Time is a part of our study since beginning but students generally fail to focus on this topic . This page will provide you with the most simple approach to Solve Speed Distance and Time questions quickly along with the help of some Examples

SpeedSpeed can be defined as the rate at which an object covers distance or the rate of change of its position with respect to time.
Distance"Distance" refers to the spatial separation or physical gap between two objects, locations, or points in a given space. It is a scalar quantity that signifies the extent of how far apart these objects or points are from each other.
TimeTime is defined as an interval separating two events. Units of time are hour , minutes and second.

How to Solve Speed Distance and Time Questions Quickly:-

Before solving the question, we need to know about the Formulas of Speed Time and Distance.

Basic Formulas

- Distance (D1) = Speed × Time
- Time = Distance/Speed
- Speed = Distance / Time
- To Convert Km/h to M/s =Km/h * 5/18 = Values in m/s or m/sec *18/5 = Values in km/h
- Calculate Average Speed = 2ab/a + b
- X and Y may walk in same direction or in opposite direction.

Speed Distance and Time Shortcut and Tricks

Shortcuts for Speed Time and Distance

To solve speed distance and time as quickly as possible and reach to the best solution and a precise solution we must know some tips and tricks to solve it. On this page we have discussed about Shortcuts to solve speed distance and time.

SpeedSpeed refers to how fast or how slow and object covers a specified distance
DistanceDistance is the Space between two particular Points or places.
TimeTime can be defined as the period taken by a person to cover a certain distance.

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 The concept of Speed Time and Distance revolves around these basic formulas:

To find the solution to speed, distance, and time problems, you can use the following shortcuts:

1. To find speed: Speed = \frac{Distance}{Time}. Divide the distance traveled by the time taken to get the speed.
2. To find distance: Distance = Speed × Time

   Multiply speed by the time taken to cover the distance

3. To find time: Time = \frac{Distance}{Speed}

   Divide distance by speed to get the time taken.

These formulas are useful in solving various problems related to speed, distance, and time. But keep in mind to use proper units.

Type: 1 Shortcut to find Average speed when time is same

Average Speed =\frac{Speed1 + Speed2}{2}

Example:

Musk travels 600 km at 50kmph. He then travels another 700km at 50kmph. What is the average speed?

Solution:

Time taken for 600km = 600/50 = 12 hours

Time taken for 700km = 700/50 = 14 hours

Since the time is same in both cases, use the above formula to find out the average speed.

S1 = 50

S2 = 50

Sa = (50+50)/2 = 50kmph

Type: 2 Shortcut to find Average speed when distances are same

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$S_a= \frac{2S1 \times S2}{S1 + S2}$

Example:

Suraj Ranjhas travels from his house to park at a speed of 70kmph. He suddenly returns home at a speed of 80 kmph. What is his average speed?

Solution:

S1 = 70

S2 = 80

Sa = 2(70×80)/(70+80)

= 11200/150

= 74.67 kmph

Type: 3 Shortcut to find time when two trains will meet

The distance between two cities Kanpur and Allahabad is 560 Km. A train starts from Kanpur at 8 a.m. and travel towards Allahabad at 120 km/hr. Another train starts from Allahabad at 9 a.m and travels towards Kanpur at 100 Km/hr. At what time do they meet?

Solution:

A started at 8 a.m. and he covered 120 km by the time B started its journey.

Remaining distance = 560-120 = 440 km

Relative speed = 120 + 100 = 220 km/h (We added both speed as they were running in same direction.

Now they will meet after 440/220 = 2 hours

now they will meet at 9 a.m. + 2 hours = 11 a.m

Type:4 Shortcut to find Least time to meet in a circular race

T1, T2, T3 are the Individual times taken by racers to complete one circle respectively .

Example:

Three persons participate in a race which was on a circular track of length 600m. Ram, Rahul and Rajat participated They can run at a speed of 2mps, 4mps and 5mps respectively. How long will they take to meet in the starting point for the first time?

Solution:

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Time taken by each person to complete one circle

Ram = 600/2 = 300 seconds = T1

Rahul = 600/4 = 150 seconds = T2

Rajat = 600/5 = 120 seconds = T3

LCM(T1, T2, T3) = 600 seconds

Time taken by them to meet at starting point for the first time = 600 seconds.

Formulas For Time and Work

Time and Work Formulas

Go through the entire page to know easy Formulas For Time and Work that will help you to solve problems quickly.

Time Formula Time Taken = 1 / Rate of Work
Work Formula Rate of Work = 1 / Time Taken

Formula's For Time and Work

Work from Days:

If A can do a piece of work in n days, then A's one day work = \frac{1}{n}

Days from work:

If A's one day work = \frac{1}{n}, then A can finish the work in n days

Work Done by A and B

A and B can do a piece of work in 'a' days and 'b' days respectively.

When working together they will take \frac{ab}{a+b} days to finish the work

In one day, they will finish \frac{a+b}{ab} part of work.

Ratio:

If A is thrice as good a workman as B, then:

Ratio of work done by A and B = 3: 1.

Ratio of times taken by A and B to finish a work = 1: 3

Efficiency:

Efficiency is inversely proportional to the

Time taken when the amount of work done is constant.

Efficiency $\alpha = \frac{1}{\text{Time Taken}}$

Rules for Time and Work

Rule 1: If A completes a piece of work in x days. And B can completes same piece of work in y days .

Then,

One day work of A = $\frac{1}{x}$ One day work of B = $\frac{1}{y}$

Work done by A + B = $\frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy}$

Total time = $\frac{xy}{x + y}$

Rule 2: If A completes a piece of work in x days. B completes same piece of work in y days .C completes same piece of work in z days

Then,

One day work of A = $\frac{1}{x}$

One day work of B = $\frac{1}{y}$

One day work of C = $\frac{1}{z}$

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Work done by A + B + C = $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{yz+xz+xy}{xyz}$

Total time = $\frac{xyz}{xy + yz + zx}$.

Rule 3: If M_1 men can complete a work W_1 in D_1 days and M_2 men can complete a work W_2 in D_2 days then, $\frac{M_{1}D_{1}}{W_{1}} = \frac{M_{2}D_{2}}{W_{2}}$.

If Time required by Both M_1 and M_2 is T_1 and T_2 respectively, then relation is $\frac{M_{1}D_{1}T_{1}}{W_{1}} = \frac{M_{2}D_{2}T_{2}}{W_{2}}$

Rule 4: If A alone can complete a certain work in ‘x’ days and A and B together can do the same amount of work in ‘y’ days,

Work done by b $=\frac{1}{y} – \frac{1}{x} = \frac{x-y}{xy}$

Then B alone can do the same work in $\frac{xy}{(x-y)}$ days

Rule 5: If A and B can do work in ‘x’ days.

If B and C can do work in ‘y’ days.

If C and A can do work in ‘z’ days.

Work done by A,B and C = $\left (\frac{1}{2}\right)\left (\frac{1}{x}+\frac{1}{y}+\frac{1}{z} \right)$

Total time taken when A, B, and C work together $\frac{2xyz}{ (xy+yz+zx)}$

Rule 6: Work of one day = $\frac{Total\ \ work}{Total\ \ number\ \ of\ \ working\ \ days}$

Total work = one day work × Total number of working days

Remaining work = 1 – work done

Work done by A = A’s one day work × Total number of working days of A

Rule 7: If A can finish $\frac{m}{n}$ part of the work in D days.

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Then total time taken to finish the work by A = $\frac{D}{\frac{m}{n}} = \frac{n}{m} \times D$ days

Rule 8:

If A can do a work in ‘x’ days

B can do the same work in ‘y’ days

When they started working together, B left the work ‘m’ days before completion then total time taken to complete the work = (y+m)x/(x+y)

Rule 9: A and B finish work in a days.

They work together for ‘b days and then A or B left the work.

B or A finished the rest of the work in ‘d’ days.

Total time taken by A or B alone to complete the work = $\frac{ad}{a-b}$ or $\frac{bd}{a-b}$

Questions based on above formulas:

Question 1: ***A construction crew of 8 workers can build a house in 24 days. How many days will it take for 12 workers to build the same house?***

Answer: Let the amount of work required to build the house be represented as “1 house.”
8 workers can build the house in = 24 days
Day taken by 12 workers to build the house = $\frac{8 \times 24}{12}$

= ${8 \times 2}$

= 16 days

Question 2: ***A bakery can bake 180 cakes in 6 days. How many cakes can it bake in 10 days?***

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Answer: Let the rate of work for the bakery be the number of cakes baked per day.
The bakery's rate of work = 180 cakes / 6 days = 30 cakes/day.
Number of cakes baked in 10 days = 30 cakes/day * 10 days = 300 cakes.

Question 3: ***If 15 painters can paint a house in 9 days, how many days will it take for 9 painters to paint the same house?***

Answer: Let the amount of work required to paint the house be represented as "1 house."

Time taken by 15 painters to paint a house = 9 days

Time taken by 9 painters to paint the same house =

$\frac{15 \times 9}{9}$

$= {15 \times 1}$

= 15 days

Question 4: ***A machine can produce 240 widgets in 5 days. How long will it take for the machine to produce 600 widgets?***

Answer: Let the rate of work for the machine be the number of widgets produced per day.
The machine's rate of work = 240 widgets / 5 days = 48 widgets/day.
Time taken to produce 600 widgets = 600 widgets / 48 widgets/day = 12.5 days.

Question 5 : ***If a team of 6 workers can complete a project in 18 days, how many workers are needed to complete the project in 9 days?***

Answer: Let the amount of work required for the project be represented as "1 project."
Time taken by 6 workers to complete the work in = 18 days

Let there be X workers to complete the same work in 9 days
$X = \frac{6 \times 18}{9}$
$X = 6 \times 2$
X = 12 workers

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How To Solve Time and Work Problems Quickly

How to Solve Time and Work Problems Quickly

Go through the entire page to know How To Solve Time and Work Questions Quickly in easy way.

TimeTime is defined as the duration taken to complete a particular task or set of tasks. Time taken = 1/ Rate of work
WorkThe number of units of work done in unit time can be defined as work. Work done= Time Taken x Rate of work

Types of problem that can be asked in placement exam related to time and work

Type 1: Calculate time taken or work completed by one, two or more workers

Question 1. Rohan and Mohan can paint a wall in 12 days together, Mohan and Sohan can paint the same wall in 15 days together and Rohan and Soham can paint that wall in 20 days together. In how many days Rohan alone can paint the wall?

Options

A. 20

B. 30

C. 40

D. 25

Solution: Rohan + Mohan + Soham one day work

= \frac{1}{2} (\frac{1}{12} + \frac{1}{15} + \frac{1}{20})

Rohan + Mohan + Soham one day work = $\frac{1}{10}$

Now, Rohan’s one day work = $\frac{1}{10} – \frac{1}{15} = \frac{1}{30}$

Therefore, Rohan alone will paint the wall in 30 days.

Correct option: B

Question 2.Mamta can alone complete a part of assignment in 8 days. Work done by Sunil alone in one day is half of the work done by Mamta alone in one day. In how many days can the assignment be completed, if Mamta and Sunil work together?

Options:

A. 5.33 days

B. 16 days

C. 24 days

D. 4 days

Solution: Mamata can finish part of assignment in one day = $\frac{1}{8}$

Sunil can finish part of assignment in one day = $\frac{1}{16}$

Mamata + Sunil together finish part of assignment in one day
= $\frac{1}{8} + \frac{1}{16} = \frac{3}{16}$

Therefore, together they will take $\frac{16}{3}$ days = 5.33 days.

Correct option: A

Question 3. Husband H and wife W can do a work in 24 days together. Husband can do the same job in 60 days alone. Then at what time wife can complete the same work alone?

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Options:

A. 10

B. 20

C. 30

D. 40

Solution: Wife’s one day work = $\frac{1}{24} - \frac{1}{60} = \frac{1}{40}$

Therefore, she will take 40 days.

Correct option: D

Type 2:How To Solve Quickly Work and Time Questions when efficiency is given in percentage

Question 1. Jaya is twice as efficient as Maya. Jaya takes 30 days less than Maya to finish the work. Calculate the time required to finish the work together.

Options:

A.40 days

B. 30 days

C. 20 days

D. 35 days

Solution: Time required to complete the job together is given by

$T = m \times \frac{D}{m^2 - 1}$

$T = 2 \times \frac{30}{2^2 - 1}$

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T = \frac{60}{3}

T= 20 days.

Correct option: C

Question 2. 6 students and 3 professionals can complete a task in 12 days by working 8 hours every day. In how much time will 12 professionals complete the same task by working 6 hours every day, if the efficiency of each student is twice that of a professionals?

Options:

A. 20 days

B. 10 days

C. 25 days

D. 15 days

Solution: 1 student= 2 professionals (as given in question, efficiency of each student is twice that of a professionals)

6 students = 12 professionals

As given

(6 students + 3 professionals) * 8 * 12 = 12 professionals * 6 * D

15 professionals * 8 * 12 = 12 professionals * 6 * D

D = (15 x 8)/6 = 20

Correct option: A

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Question 3. Rajat takes 6 days to complete the assignment whereas Jannat completes the same assignment in 12 days. In how much time they will complete the assignment together?

Options:

A. 2 days

B. 3 days

C. 4 days

D. 1 days

Solution: Rajat can do the work in = 6 days

Jannat can do the work in = 12 days

Together they can do the work in
= $\frac{1}{6}+ \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$ = 4 days

Correct option: B

Type 3: Calculate time/work when workers leave in between

Question 1. Three friends Anmol, Balbir and Chinu can do a work together in 12, 18, and 24 days respectively. After working 4 days Anmol and Chinu leaves the work. Find in how many days Balbir alone can complete the remaining work ?

Options:

A. 4 days

B. 5 days

C. 10 days

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D. $\frac{18}{5}$ days

Solution: (Anmol + Balbir + Chinu)'s one day work

= $\frac{1}{12} + \frac{1}{18} + \frac{1}{24} = \frac{13}{72}$

4's day work = $4 \times \frac{13}{72} = \frac{13}{18}$

Therefore, remaining work = $1 - \frac{13}{18} = \frac{5}{18}$

Now, time taken by Balbir to complete the work = $\frac{5}{18} \times 18 = 5$

Correct option: B

Question 2. Madhur can complete a part of task in 25 days. Her friend Divya can finish it in 20 days. They work together for 5 days and then Madhur left the work. In how many days will Divya finish the remaining work?

Options:

A. 24 days

B. 25 days

C. 20 days

D. 11 days

Solution: Time taken by Madhur to finish the task = 25 days

Hence, Madhur's one day work = $\frac{1}{25}$

Divya takes time to finish the work = 20 days

So, Divya's one day's work = $\frac{1}{20}$

Madhur + Divya's 1 day's work = $\frac{1}{25} + \frac{1}{20} = \frac{9}{100}$

Madhur + Divya's 5 day's work = $5 \times \frac{9}{100} = \frac{9}{20}$

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Therefore, remaining work $(1 - \frac{9}{20}) = \frac{11}{20}$

Now, $(\frac{11}{20})^{th}$ part of work is done by Divya in one day

Therefore, $\frac{11}{20}$ work will be done by Divya in $20 \times \frac{11}{20} = 11$

Correct option: D

Question 3. Zubair can finish his assignment in 18 days. His brother Muneer can do the same assignment in 15 days. Muneer worked for 10 days and left the assignment. In how many days, Zubair alone can finish the remaining assignment?

Options:

A. 4 days

B. 5 days

C. 6 days

D. 8 days

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Solution: Muneer's one day work on assignment $= \frac{1}{15} \times 10 = \frac{2}{3}$

Remaining work $= 1 - \frac{2}{3} = \frac{1}{3}$

According to the question, A's one day work $= \frac{1}{18}$

Therefore $\frac{1}{3}$ work is done by Zubair in $\frac{1}{3} \times 18 = 6$ days

Correct option: C

Type 4: Share of salary based on work

Question 1. Raj and Ram undertook a work for Rs. 4000. Raj alone can do a part of work in 6 days. Ram alone can do a part of work in 8 days. Their friend Tony joined them and they completed the work in 3 days. What is the share of Tony ?

Options:

A. Rs. 500

B. Rs. 800

C. Rs. 300

D. Rs. 120

Solution: Tony's one day work = $\frac{1}{3} – (\frac{1}{6} + \frac{1}{8})$
= $\frac{1}{24}$

Their ratio of one day work = $\frac{1}{6}: \frac{1}{8}: \frac{1}{24}$

Tony worked for 3 days

Therefore, his share = $3 \times \frac{1}{24} \times 4000 = 500$.

Correct option: A

Question 2. Kulfi can do a work in 10 days. Another girl joined and they complete the same work in 6 days. If they get Rs. 100 for the work, what is the share of another girl ?

Options:

A. Rs. 70

B. Rs. 60

C. Rs. 50

D. Rs. 10

Solution: Kulfi can do the work in = 10 days

Both can do the work in = 6 days

Another girl can do the work = $\frac{1}{6} – \frac{1}{10}= \frac{1}{15}$ = 15 days

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Kulfi and another girl’s share = 15: 10 = 3: 2

Therefore, another girl’s share = $\frac{3}{5} \times 100$ = Rs. 60

Correct option: B

Question 3. Arti, Ankit, and Nidhi contracted a work for Rs. 9999. Together, Arti and Ankit completed $\frac{7}{11}$ of the work. How much does Nidhi get ?

Options:

A. Rs. 3245

B. Rs. 3663

C. Rs. 6363

D. Rs. 3636

Solution: Arti + Ankit did = $\frac{7}{11}$

Nidhi completed = $1 - \frac{7}{11} = \frac{4}{11}$

Arti + Ankit’ share : Nidhi’s share = 7 : 4

Nidhi’s share = $\frac{4}{11} \times 9999$ = 3636.

Correct option: D

Tips And Tricks And Shortcut For Work And Time

Tricks and Shortcuts of Time and Work.

On this page we will discuss about Shortcut Tips and Tricks about Time and work.

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WorkIn time and work problems, "work" refers to the task or project that needs to be completed. It is often measured in units or parts, and the goal is to determine how much work is involved.
Time"Time" in time and work problems represents the duration or period taken to complete a given amount of work. It is usually measured in days, hours, or any other appropriate unit of time.

Work and Time-Tips and Tricks and Shortcuts

- Here, are quick and easy tips and tricks for you to solve Work and Time questions quickly, easily, and efficiently in competitive exams.

Tips and tricks of the Work and Time questions to Understand the relation between Man, work, and Time.

1. More men can do more work. Similarly, less men will do less work
2. More work takes more time. Similarly, less work takes less time
3. More man can do work in less time, Similarly, less men can do work in more time

Type 1: Calculate time taken or work completed by one, two or more workers

Question 1. Soumya can do a piece of work in 50 days. How much part of the work she can do in 20 days?

Options:

A. $\frac{1}{5}$

B. $\frac{3}{8}$

C. $\frac{2}{5}$

D. $\frac{1}{4}$

Solution: 1 day work of Somya = $\frac{1}{50}$

Therefore, in 20 days she can do 20 $\times \frac{1}{50} = \frac{20}{50} = (\frac{2}{5})^{th}$ part of the work.

Correct option: C

Type 2: Tips and Tricks and Shortcuts for Work and Time to Calculate time/work when efficiency is given in percentage

Question 1. Positive efficiency of a Neha is 5%. Negative efficiency of Shreya is 2.5%. Find out the net efficiency.

Options:

A. 2.5 %

B. -2 %

C. 1.2 %

D. 2.5 %

Solution: Positive efficiency = 5%

Negative efficiency = 2.5%

Therefore the Net efficiency = (5 – 2.5) = 2.5%

Correct option: A

Type 3: Calculate time/work when workers leave in between

Question 1. Karan can do a piece of work in 50 days. He works for 15 days and then leaves. Tarun comes and finishes the remaining work in 35 days. In how many days Tarun alone can finish the work?

Options:

A. 50 days

B. 10 days

C. 60 days

D. 45 days

Solution: Karan’s 1 day work = $\frac{1}{50}$.

Work done by Karan in 15 days = 15 × $\frac{1}{50}$ = $\frac{3}{10}$

Therefore, remaining work = 1 – $\frac{3}{10}$ = $\frac{7}{10}$

Tarun finishes this remaining $\frac{7}{10}$ work in 35 days.

Therefore, Tarun can finish the work in $\frac{35}{\frac{7}{10}}$ = 50

Correct option: A

Type 4: Work and Time Tips and Tricks and Shortcuts- Share of salary based on work

Question 1. Hetal’s one day work is $\frac{1}{20}$ and Avnika’s one day work is $\frac{1}{30}$ but with the help of Yasha they finished the work in 10 days. For that work they got total of Rs. 5000. Find the share of Yasha?

Options:

A. Rs. 833.33

B. Rs. 800

C. Rs.235

D. Rs. 338.3

Solution: Hetal’s total work done = $\frac{10}{20}$ = $\frac{1}{2}$

Avnika’s total work = $\frac{10}{30}$ = $\frac{1}{3}$

The work together completed in $\frac{1}{2}$ + $\frac{1}{3}$ = $\frac{5}{6}$

Remaining work = 1 – $\frac{5}{6}$ = $\frac{1}{6}$

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Therefore, Yasha's share = $5000 \times \frac{1}{6} = \frac{5000}{6}$ = Rs 833.33

Correct option: A

Averages Formulas

Averages Formulas Used In Aptitude

Averages formulas is widely used in statistics also to reduce the calculation in finding the average where the data is huge. Here We will demonstrate the application of the assumed mean to solve some aptitude questions based on averages and weighted averages.

NoteAverage is the sum of observations divided by the total number of observations. The Average is also known as mean.

In this Page Averages Formulas are given which is useful to solve many problems

- **An average is defined as the sum of n different units divided by n numbers of the units.**

Example:- What will be the average weight of three boy, respective weight are 46,54,53?

Solution: $\frac{\text{sum of numbers}}{\text{total numbers}}$

$=\frac{(46+54+53)}{3}$

$=\frac{153}{3}$

$=51$

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Example:- A school trip by St Marry's Academy, Meerut was organized to Appu Ghar Delhi. The total number of Girls on the trip were 160, total number of boys on the trip were 40 and total number of teachers present on the trip were 100. If they want to ride a roller coaster and all of them can not board the ride at one time. Find the average no. people boarding the ride.

Solution: $\frac{\text{sum of numbers}}{\text{total numbers}}$

$= \frac{(160+40+100)}{3}$

$= 100$

Basic Averages Formulas:

- Mathematically, it is defined as the ratio of summation of all the numbers to the number of units present in the list.

Average = $\mathbf{\frac{X_{1}+X_{2}+X_{3}+X_{4}+.....X_{n}}{n}}$

OR

Average = $\frac{\text{Sum of Observations}}{\text{Total Number of Observations}}$

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Average Speed and Velocity Formula:

- **Average Speed :** It can be defined as total distance Travelled by a body in definite interval of time. Average speed is calculated using the below formula

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

CASE 1:

When one travels at speed 'a' for half the time and speed 'b' for other half of the time. Then, average speed is the arithmetic mean of the two speeds.

Average Speed= $\mathbf{\frac{a+b}{2}}$

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CASE 2 :

When one travels at speed 'a' for half of the distance and speed 'b' for other half of the distance.Then, average speed is the harmonic mean of the two speeds.

Average Speed= $\mathbf {\frac{2ab}{a+b} }$

CASE 3:

When one travels at speed a for one-third of the distance, at speed b for another one-third of the distance and speed c for rest of the one-third of the distance
or:

Average Speed = $\mathbf{\frac{3abc}{ab+bc+ca}}$

Average Velocity : It can be defined as total displacement divided by total time. We calculate Average Velocity using the below formula

Average Velocity = $\mathbf{\frac{Displacement}{Total Time}}$

Formula of Averages Related to Numbers:

- Average of 'n' consecutive Natural Numbers = $\mathbf{\frac{n+1}{2}}$
- Average of the square of consecutive n natural numbers = $\mathbf{\frac{(n+1)(2n+1)}{6}}$
- Average of cubes of consecutive n natural numbers = $\mathbf{\frac{n\times (n+1)^{2}}{4}}$
- Average of n consecutive even numbers **= (n+1)**
- Average of consecutive even numbers till n = $\mathbf{\frac{n}{2}+1}$
- Average of n consecutive odd numbers **= n**
- Average of consecutive odd numbers till n = $\mathbf{\frac{n+1}{2}}$
- Sum of 1st n even consecutive natural numbers is = **n(n + 1)**

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- Sum of 1st n odd consecutive natural numbers is = \mathbf{n^{2}}

Question 1 :

The average of 10 numbers is 23. If each number is increased by 4, what will the new average be?

Solution :

Average of 10 numbers = 23

Sum/Total numbers = 23

Sum/10 = 23

Sum of the 10 numbers = 230

If each number is increased by 4, the total increase = 4 x 10 = 40

New sum = 230 + 40 = 270

Therefore, the new average = 270/10 = 27

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Question 2 :

The average weight of a group of seven boys is 56 kg. The individual weights (in kg) of six of them are 52, 57, 55, 60, 59 and 55. Find the weight of the seventh boy.

Solution :

Average weight of 7 boys = 56 kg.

Total weight of 7 boys = (56 × 7) kg = 392 kg.

Total weight of 6 boys = (52 + 57 + 55 + 60 + 59 + 55) kg

= 338 kg.

Weight of the 7th boy = (total weight of 7 boys) – (total weight of 6 boys)

= (392 – 338) kg

= 54 kg.

Therefore, the weight of the seventh boy is 54 kg.

Question 3:

The mean of 25 numbers is 36. If the mean of the first numbers is 32 and that of the last 13 numbers is 39, find the 13th number.

Solution :

Mean of the first 13 numbers = 32

Sum of the first 13 numbers = (32 × 13) = 416

Mean of the last 13 numbers = 39

Sum of the last 13 numbers = (39 × 13) = 507

Mean of 25 numbers = 36

Sum of all the 25 numbers = (36 × 25) = 900

Therefore, the 13th observation = (416 + 507 – 900) = 23

Hence, the 13th observation is 23

Question 4 :

The average of 7 consecutive numbers is 20. What is the largest of these numbers?

Solution :

Let the 7 consecutive numbers be x, x + 1, x + 2, x + 3, x + 4, x + 5 and x + 6,

As per the given condition;

[x + (x + 1) + (x + 2) + (x + 3) + (x + 4) + (x + 5) + (x + 6)] / 7 = 20

⇒ 7x + 21 = 140

⇒ 7x = 119

⇒ x =17

The largest number = x + 6 = 23.

Question 5 :

A batsman makes a score of 87 runs in the 17th inning and thus increases his average by 3. Find his average after 17th inning?

Solution :

Let the average after 7th inning = x

Then average after 16th inning = x − 3

16(x-3)+87 = 17x

x = 87 − 48 = 39

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How To Solve Averages Questions Quickly

How To Solve Averages Questions Quickly

An Averages is the concept for the Aptitude and other competitive exams. Most of us have a fair understanding of the average or mean but we have not knowledge regarding How to Solve Problems on Averages Quickly. However, the questions from Average which appear in competitive exams are tricky and often calculation intensive if we apply the standard approach.

NoteIn this page we will Learn How to Solve Problems on Averages Quickly with Different Types of Problems .So that we can Solve Averages Problems in Less Time.

How To Solve Problems On Averages:-

Mathematically, it is defined as the ratio of summation of all the data to the number of units present in the list.

Average = $\mathbf{\frac{X_{1}+X_{2}+X_{3}+X_{4}+.....X_{n}}{n}}$

OR

Average = $\frac{\text{Sum of Observations}}{\text{Total Number of Observations}}$

How to Solve Average Speed and Velocity Problems

- **Average Speed :** Average speed is calculated using the below formula

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

Also , Formula to calculate Average speed when X travels at speed 'a' and 'b' for the same amount of time is $\mathbf{\frac{a+b}{2}}$

- **Average Velocity :** We calculate Average Velocity using the below formula : $\mathbf{\frac{Displacement}{Total Time}}$

Type 1: How to Solve Problems on Averages Weights and Ages

Question 1 : The average age of 39 boys and a girl is are 11 years. If the age of the girl is excluded the average age of the group is reduced by 1. What is the age of the girl ?

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Solution : The average of 39 boys + 1 girl = 11

Sum of ages of 39 boys + 1 girl = 11x (39+1)= 440 ……………… Eqn (i)

When the girl is excluded from the average age the new average = 11- 1= 10

The sum of the ages of 39 boys= 39x 10= 390 ………………Eqn(ii)

Girl's age= (i)- (ii)= 440- 390= 50

Alternatively,

Alternatively : When the girl leaves the group, she takes with her 1 year (i.e the change in the new average) from each of the 39 students along with the 11 years of her average age.

So the age of the girl will (39 x 1)+ 11 that is 50 years.

Question 2 : The average weight of 10 a group of persons increases by 10 kg when a new person replaces one of the persons from the group who weighs 60kg. Calculate the weight of the new person.

Solution : Total increase in weight = 10 x 10 = 100 kg

Weight of new person = 60+100 =160 kg

Question 3 : The age of Yogesh at the time of his wedding was 27 years, while the age of his wife at that time was 25 years. Four years after their marriage the average age of Yogesh, his wife, and his son is 21 years. Find Age of Yogesh's son.

Solution : Let the current age son be x

Ages of Yogesh and his wife after 4 years of their marriage = 27+4 = 31 and 25+4 =29 years respectively.

Average age of the family =21

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=>$\frac{(31+29+x)}{3} = 21$

x + 60 = 63

x = 63-60

x = 3 year's

Therefore, the current age Yogesh's son is 3 years.

Type 2: How to Solve Problems on Average marks and scores

Question 1 : The batting average of Sachin in 15 innings is 55. The difference between the runs of his best and worst innings is 65. Excluding the best and the worst innings the average of 13 innings played by Sachin is 50. Calculate Sachin's best score.

Solution : Total score of Sachin in 15 innings = 55 x 15 = 825

Total score of Sachin in 13 innings (excluding his best and worst inning's scores) = 13 x 50 = 650

Sum of Sachin's score in his best and worst innings = 825-650 = 175

The difference of Sachin's score in his best and worst innings = 65

B+W = 175...(1)

B-W = 65...(2)

adding equation 1 and 2; (1)+(2)

2B = 240

B = 120

Therefore, Sachin's score in his best innings was 120 runs.

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Question 2 : The average marks of a class gets increased by 5 when Shikha's marks are wrongly entered as 75 instead of 55. Find the number of students in the class.

Solution : Let the total strength of class be n.

Let sum of scores of rest of students is x

Let the average when marks of Shikha are 75 = A1= $\frac{75+x}{n}$

The average of class when shikha marks is 55 = A2 = $\frac{(57+x)}{n}$

A1-A2 = 5

$\frac{(75+x)}{n} - \frac{(55+x)}{n} = 5$

20 = 5n

n = 4

Therefore, the total number of students in the class is 4.

Question 3 : A team of 5 players participated in a competition. The best player of the team scored 50 points. Had he scored 80 points, the average score of the team would have been 75. Calculate the total points scored by the team.

Solution : Let the sum of of points scored by 4 players of the team other then the best player be x.

Actual average = $\frac{(x+50)}{5}$

Required average = 75 = $\frac{(x+80)}{5}$

x = $(75\times 5)-80$

x = 375-80

x = 295

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Total points scored by the team = 295 + 50 = 345

Type 3: How to solve Problems on Average speed distance time

Question 1 : Tushar travels from his home to office at the speed of 20 Kmph. While returning from office to home his speed increases by 20%. Calculate Tushar's average speed.

Solution : Tushar's speed while returning home = $120\times \frac{20}{100}$ = 24Kmph
Average speed = $\frac{(2ab)}{a+b}$

That is, $\frac{(2\times 20\times 24)}{(20+24)}$ = $\frac{960}{44}$ = 21.81Kmph
Therefore, the average speed of Tushar will be 21.81 Kmph.

Question 2 : Shyam travels at speed 40 km/hr for half the time and speed 30 km/hr for other half of the time. Then,what will be average speed of Shyam?

Solutions : Average speed of Shyam = $\frac{a+b}{2}$ = $\frac{40+30}{2}$ = 35

Question 3 : Ravi traveled a distance of 500 km partially on a motorbike and partially in car. The speed of the motorbike was 50 Kmph and distance covered was 200 Km. The total time taken in the journey was 6 hours. Find the average speed for the entire journey.

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

Average speed = $\frac{500}{6}$

= 83.33 Kmph

Type 4: How to solve Average Problems on Numbers

Question 1: The average of 5 numbers is 50. The average of the first and the second number is 40. Similarly, the average of the fourth and the fifth number is 25. Find the third term of the series.

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Solution: Let the third term be x

Average of 5 numbers =50

Therefore, the sum total of all 5 numbers = 50 x 5 = 250

Sum of first two numbers = 40 x 2 = 80

Sum of fourth and fifth term = 25 x 2 = 50

80+x+50 = 250

x = 250-130

x = 120

Question 2 : The average of 5 consecutive numbers is 50. Find the numbers.

Solution: Let the numbers be (n-2), (n-1), (n), (n+1), (n+2)

Sum of all numbers = n-2+n-1+n+n+1+n+2 = 50 x 5

5n = 250

n = 50

Numbers = 48, 49 , 50, 51, 52

Question 3 : Calculate the average of 5 consecutive odd numbers greater than 15.

Solution: Odd numbers greater than 15 = 17, 19, 21, 23, 25

Average = \frac{(17+19+21+23+25)}{5} = 21

Alternatively:

There are 5 terms which are at equal interval so, 21 will be Average

Tips And Tricks And Shortcuts for Averages

Tips, Tricks and Shortcuts for Averages in Aptitude

Here, We are discussing the best approach to understand the questions from averages and also using Tips and Tricks for Averages we can avoid unwanted calculation.

In this Page we will learn Tips,Tricks for Averages as well as Shortcuts on Averages. That will help in Solving Question of Averages in less Time.

Tips and Tricks to Calculate Averages | Shortcuts in Averages:-

- Find below , the best Tips and Tricks and Shortcuts on Averages apart from the basic method of solving
- Basic Tips and Tricks for Averages:

  Average = \mathbf{\frac{X_{1}+X_{2}+X_{3}+X_{4}+.....X_{n}}{n}}

  OR

Average = \frac{\text{Sum of Observations}}{\text{Total Number of Observations}}

Trick 1 : If the value of each unit in a class is increased by some value x, then the average of the class also increases by x.

For example, if the marks obtained by of Raj and Rohit increases by 20 marks each, the average of the total marks of both also increases by 20.

Trick 2 : If the value of each unit in a class decreases by some value x, then the average of the class also decreases by x.

For example, if the score of Raj and Rohit in a match is decreased by 20 individually, the average score of both also decreases by 20.

Trick 3 : The average of any number series or group is always between its smallest and the largest value.

For example- If the average test score of four children are 6, 9, 10, 11 than the average of all four name respectively is 9

Trick 4 : When a person leaves the group, and replacement is made of that person then:

If the average age increases,

Age of new person = Age of separated person + (increase in the average × total number of persons).

If the average age decreases,

Age of new person = Age of separated person – (decrease in the average × total number of persons)

Trick 5 :

When a person joins the group,

When the average age is increased

Age of new person = Previous average + (increase in average × total members including new member).

When the average age is decreased

Age of new person = Previous average – (decrease in average × total members including new member).

Tips and Tricks and Shortcuts to Calculate average of a Series:

- Average of 'n' consecutive Natural Numbers =

  $\mathbf{\frac{n+1}{2}}$
- Average of the square of consecutive n natural numbers =

  $\mathbf{\frac{(n+1)(2n+1)}{6}}$
- Average of cubes of consecutive n natural numbers =

  $\mathbf{\frac{n\times (n+1)^{2}}{4}}$
- Average of n consecutive even numbers **= (n+1)**
- Average of consecutive even numbers till n =

  $\mathbf{\frac{n}{2}+1}$
- Average of n consecutive odd numbers **= n**
- Average of consecutive odd numbers till n =

  $\mathbf{\frac{n+1}{2}}$
- Sum of 1st n even consecutive natural numbers is = **n(n + 1)**
- Sum of 1st n odd consecutive natural numbers is = $\mathbf{n^{2}}$

Type 1: Tips to Solve Problems on Weights and Ages Average

Question 1: When a new man joins a group of 5 people after Replacing a man, their average age increases by 2 kg. If he replaces a man weighing 40 kg, how much does he weigh?

Solution : Increased weight = (5 x 2) = 10

Weight of the new man = (40 +10) = 50 kg

Question 2: The average age of 4 monkeys is 20 years. The youngest monkey is eight years old. When he was born, the average age of the remaining monkeys was N years. Calculate the average age of the monkeys excluding the youngest monkey?

Solution: The average age of monkey = 20 years.

Sum of all their ages = 20 × 4 = 80 year's

Sum of their ages excluding the youngest monkey = 80 – 8 = 72 year's

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The average age of the remaining monkey = $\frac{72}{3}$ = 24 years

Type 2: Tips to Solve Problems on Average Marks and Scores

Question 1 : If the Marks of Each student is 70 and it is increased by 20, then the average of the class will be

Solution: Average of the class = 70+20 = 90

Question 2: The average marks of 80 students of 10th standard is 40. The average marks of students of section A is 35, and that of Section B is 60. Find the number of students in section A.

Solution: Let the number of students in Section A and Section B be x and y.

Total number of students including Section A and Section B = 80

=> x+y = 80…(1)

Total marks obtained by entire 10th Standard = 80 x 40 =3200

= 35x+60y =3200

=> 7x+12y=640…(2)

Multiplying (1) by 12 and subtracting from (2)

we get,

x=64

Type 3: Tips to Solve Problems on Speed Distance Time Averages

Question 1 : A bus Travels from Place A to Place B.During this it covers 150 km in 3 hours and 350 km in 2 hours.find the average speed of the bus.

Solution : Average speed = $\frac{\text{Total distance Travelled}}{\text{Total Time Taken}}$ = $\frac{150+350}{3+2}$ = 100 km/hr

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Question 2 : The average speed of a train without stopping at any stoppages is 48 km/h, and average speed when the train stops at different stoppages is 40 km/h. How many minutes in an hour does the train stop on an average?

Solution: The average speed of a train without stoppages = 48 km/h

With stoppages, the average speed reduces by (48-40) = 8 kms

Therefore, the time per hour the train stops on an average

= \frac{8}{48}\times 60 minutes

= 10 minutes

Type 4: Tips and Tricks to Solve Average Problems on Numbers

Question 1 : The average of N consecutive natural numbers is 7. Find out the value of n.

Solution: Average of n consecutive natural numbers is = \frac{(n+1)}{2}

7 = \frac{(n+1)}{2}

n+1= 14

n = 13

Question 2: The average of the square of N consecutive natural numbers is 20. Find out the value of n.

Solution: Average of square of n consecutive natural numbers is
= \frac{(n+1)(2n+1)}{6}

20 = \frac{(n+1)(2n+1)}{6}

120 = 8 x 15

120 = (7+1)(2×7+1)

n =7

Alligations and Mixture Formulas

Formulas For Alligation And Mixture

A mixture, as the name suggests is mixing two or more things together and alligation enables us to find the ratio in which the ingredients/ things have been mixed to form the mixutre.

The most fundamental point to remember while solving mixtures and alligations is that alligation is a way to find the mean value of mixture when the ratio and amount of the ingredients mixed are different and also to find the proportion in which the elements are mixed.

NoteThe Alligation and Mixture Formulas can be applied to any topic like mixtures, profit and loss, simple interest, time and distance, percentage, etc.

Formulas to Solve Alligations and Mixtures question :-

<u>What is an Alligation?</u>

When two ingredients X and Y of price p and q respectively are mixed together, such that the price of the resultant mixture is M (mean price), then the ratio (R) in which ingredients are mixed is given by, **the rule of the alligation.**

(Cheaper quantity) : (Dearer quantity) = (d – m) : (m – c)

<u>What is a Mixture?</u>

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In a **mixture,** two or more ingredients are mixed together to get a desired quantity. The quantity can be expressed as ratio or percentage.

For example: When two varieties of sugar are mixed to form a new variety of sugar then it is called as a mixture.

What is a Mean Price?

The cost of a unit quantity of the mixture is called the mean price.

Formulas to Solve Mixture and Alligations

Alligation and Mixture Formulas 1

When two commodities are mixed then ,

Alligation and Mixture Formulas 2

Consider a container contain x unit of liquid A from which y units are taken out and replaced by water. This operation is repeated n number of times, then the quantity of pure liquid will be given by the formula:

Quantity = \left[x – (1 – \left(\frac{Y}{X}\right)^n \right] units

Therefore, (Cheaper Commodity) : (Dearer Commodity) = (d – m) : (m-c)

Alligation and Mixture Formulas 3

Calculate quantity of pure Liquid after ‘n’ successive operations,

If a container contains ‘x’ units of pure liquid , and we replace the liquid with ‘y’ units of water ,

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Then after ‘n’ successive operations, the units of pure liquid left is ,

After n operations, the quantity of pure liquid $= x\left(1 - \frac{y}{x}\right)^n$ units.

Criss-Cross Method

Some aspirants use the above method in different format, which we call criss-cross method. Below is the format:

The working is, we take the positive difference of mean price and cheaper price and write the difference in the place of Quantity of dearer price. Similarly, take the positive difference of mean price and dearer price and write the difference in the place of Quantity of cheaper price.

Rule of Constant

There are another types of questions on mixtures and alligation where the quantity of one element in the mixture does not change while adding another element to the first mixture. For such questions, I recommend an alternate method of using the rule of constant to get to the answer. The concept uses the simple understanding of percentages. Let us learn it with the help of an example.

Method 1: School textbook approach

We assume that the quantity of water added to be x litres. The quantity of milk in the existing solution is 30% of 40 = 12 litres, with the addition of water, the quantity of new solution becomes (40 + x) litres. As per the problem, the percentage of milk in new solution should be 15 %. we will get x = 40.

Method 2: Rule of Alligation.

We assume that the two solutions of milk and water are added to get the new solution and apply the approach we used in Example 3.

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Taking milk as the common element in both the solutions, we have 30% milk in first and 0% milk in the second solution (i.e. pure water). On mixing them, we got 15% milk in the final solution. Therefore,

Or the ratio of the quantity of first and second solution should be 15:15 = 1:1

Hence, 40 litres of pure water should be mixed to get the desired new solution.

Method 3: Rule of Constant

In this rule, we target the element in the mixture whose amount does not change but its percentage changes because of the change in the total amount of the mixture.

As we calculated above, the quantity of milk in the first solution is 12 litres, and it will remain same in the new solution as well. That is,

12 liters = 30% of the first solution =15% of the new solution

Question 1 :

A and B are two alloys of iron and silver prepared by mixing metals in the ratio 4 : 5 and 7 : 5 respectively. If equal quantities of alloys are melted to form a third alloy C, the ratio of iron to silver in C is

Solution :

In alloy A, the ratio of iron to Silver=4:5, 5+4=9

In alloy B, the ratio of iron to Silver=7:5, 7+5=12, as the amount to be mixed.

So take the LCM of 9 and 12. hence, we mix 36 gm of A and 36 gm of B.

(the reason for choosing LCM as the amount is to simplify calculations.)

For a: amount of iron=\frac{4}{9}\times36=16 and amount of silver \frac{5}{9}\times36=20

For B: amount of iron=$\frac{7}{12}\times36=21$ and amount of silver=$\frac{5}{12}\times36=15$

Hence, Total amount of iron=16+21=37

Total amount of silver=20+15=35

Hence, Final ratio of iron to Silver in the mix of two alloys= 37:35

Question 2 :

Mixture of alcohol and water contains 35% of alcohol by volume. Then, 40 ml of water is added to such a mixture of 100 ml. The percentage of alcohol in the new mixture is?

Solution :

Here percentage alcohol in the mixture is to be found out. So, the quantity of alcoholis kept as numerator

$\frac{Alcohol}{Mixture}=\frac{q}{q_{a}+{q_{w}}}=\frac{0.35\times100}{100+40}=\frac{35}{140}$

(since 40 ml water is added

Quantity of mixture=100+40).

% alcohol = $\frac{35}{140}\times100=25\%$

the mixture contains 20% alcohol.

Question 3 :

Two containers of equal volume contains milk and water in the ratio 3: 5 and 5: 3, respectively. If the contents of both containers are emptied into a third one, what would be the ratio of milk to water in that container?

Solution :

Let the volume of both the container b x units each. Thus, the first container would contain $\frac{3}{8}x$ units of milk and $\frac{5}{8}x$ units of water, whereas the second container would contain $\frac{5}{8}x$units of milk and $\frac{3}{8}x$ units of water. When the content of both are empty into a third one it would have,

Milk $\left(\frac{3}{8}x \right)+\left(\frac{5}{8}x \right)$ ...(1)

And water $\left(\frac{5}{8}x \right)+\left(\frac{3}{8}x \right)$ ....(2)

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Thus, the required ratio. x:x = 1 : 1

Question 4 :

From two ornament Weighing 18 gram and 24 gram containing gold and silver in the ratio of 2: 1 and 5: 1 respectively, a new ornament is made. What is the amount of gold in the new ornament?

Solution :

from the first ornament, gold = (2/3)*18 = 12

From the second ornament gold= (5/6)*24 = 20

Thus, total gold=32 gm.

Question 5 :

A sum of money is sufficient to pay Sachin's salary of 45 days and kale's salary for 60 days. For how many days can the sum pay the salary of both?

Solution:

Sachin's salary for one day = 1/45th of the sum of money.

For kale's salary for one day = 1/60 of the sum of money.

=> (Sachin + kale)'s salary for one day= 1/45+1/60=7/180th of the sum.

Hence, when they both work together, the sun will last for 180/7 days.

How To Solve Alligation And Mixtures Questions Quickly

How to solve Alligation and Mixtures Questions Quickly

How To Solve Alligation And Mixtures Questions Quickly via latest methods, formulae is discussed on this page along with few variety of questions.

What is Alligation?The rule of alligation help to find the ratio in which two or more variety of ingredients of a given price must be mixed to produce a mixture of desired price.It is a rule for the solution of problems concerning the compounding or mixing of ingredients

What is Mixture?A mixture contains two or more commodities of certain quantity mixed together to get the desired quantity.

What is called Mean Price?The cost of a unit quantity of the mixture is called the mean price.

Type 1 : How to Solve Alligation and Mixtures Questions Quickly (When two quantities are mixed then)

$$\left(\frac{ \text{ Quantity of Cheaper }}{\text{ Quantity of dearer }} \right) = \left(\frac{ \text{ C.P of Dearer (d) – Mean price (m)}}{ \text{ Mean price(m) – C.P. of cheaper(c) }} \right)$$

Therefore, (Cheaper Quantity) : (Dearer Quantity) = (d – m) : (m-c)

How to solve Alligation and Mixtures Questions quickly Ques 1

Calculate the average price of the resulting mixture when two variety of sugar at ₹12 per Kg and ₹15 per Kg are mixed in the ratio of 2:3.

Solution:

Let average price be Aw

$$\frac{2}{3} = \frac{(15-Aw)}{(Aw-12)}$$

2Aw-24 = 45-3Aw

5Aw = 69

Aw = 69/5 = ₹13.8 per Kg

How to solve Alligation and Mixtures Questions quickly Ques 1

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Two varieties of rice are in the ratio of 3:2 such that the average price of the resulting mixture is ₹15 per Kg. The price of one of the varieties is ₹10 per Kg. Find the price of the other variety of rice.

Solution:

Let Price of another variety is A_{2}

$\frac{3}{2}= \frac{(A2-15)}{(15-10)}$

$15 = 2A_{2}-30$

$\frac{45}{2} = A_{2}$

A2 = ₹22.5 per Kg

How to solve Alligation and Mixtures Questions quickly Ques 1

Two varieties of tea are mixed in some ratio. The cost of the first variety is ₹20 per Kg and that of second variety is ₹30 per Kg. If the average cost of the resulting mixture is ₹25 per Kg, find the ratio.

Solution:

$\frac{x}{y}= \frac{(30-25)}{(25-20)}$

$\frac{x}{y} = \frac{5}{5} = 1:1$

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Type 2 : How to Solve Alligation and Mixtures Questions Quickly (when there is process of replacement)

If a container has x unit of liquid A from which y units are taken out and replaced by water. This process is repeated n number of time, then the quantity of pure liquid will be given by:

After n operations, the quantity of pure liquid = $\left(x \left(1 - \frac{y}{x} \right)n \right)$

Question 1

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A 420L of the mixture contains pure milk and water in the ratio of 2:5. Now 80 L of water is added to the mixture. Calculate the ratio of milk and water in the resulting mixture.

Solution:

The quantity of milk in initial mixture =

$\frac{2}{7} \times 420 = 120 \text{ L}$

Quantity of water = 420-120 = 300L

Water added = 80L

Concentration of water in the resulting mixture = 300 + 80 = 380L

The ratio of the resulting mixture 120/380 = 6:19.

Question 2

A milkman mixes 30L of water in 90L of milk. He then sells 1/4th of this mixture. Now he adds water to replenish the quantity of milk sold. Find the current proportion of milk and water.

Solution:

The initial ratio of milk and water = 90:30 = 3:1

Now, 1/4th of the mixture is sold, that is the total volume of the mixture is reduced by 25%.

In other words, both water and milk are reduced by 25%.

So, the volume of milk and water is 67.5L and 22.5 respectively.

Now, 30L (25% of the total mixture volume) of water is added to the mixture.

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The volume of milk = 67.5L

Volume of water = 22.5+30= 52.5L

Current ratio = 67.5/52.5 = 9:7

Question 3

A 20 litres mixture of milk and water contains milk and water in the ratio 3 : 2. 10 litres of the mixture is removed and replaced with pure milk and the operation is repeated once more. At the end of the two removal and replacement, what is the ratio of milk and water in the resultant mixture?

Solution:

In 20 liters of mixture

Milk =

\frac{3}{5} \times 20 = 12 \text{ L}

Water = 8 litres

In 10 liters of mixture.

Milk = 6 liters

Water = 4 litres

On adding 10 liters of milk,

Milk = 12 – 6 + 10 = 16 L

Water = 8 – 4 = 4 L

Again. in 10 liters of mixture,

Milk = 4/5 * 10 = 8 L

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Water = 2 litres

On adding 10 litres of milk,

Milk =16 – 8 + 10 = 18 litres

Water = 2 litres

Therefore, Required ratio = 18 : 2 = 9 : 1

Question 4

Cost of two types of pulses is Rs.15 and Rs, 20 per kg, respectively. If both the pulses are mixed together in the ratio 2:3, then what should be the price of mixed variety of pulses per kg?

Solution:

Let the cost of mixed variety of pulse be Rs. x

As per the alligation rule,

2:3 = (20-x) : (x-15)

⇒ 2x+3x = 60+30

⇒ 5x = 90

⇒ x = 18

Question 5

A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

Solution:

Amount of milk left after 3 operations = $\left[40\left(1-\frac{4}{40} \right)^3 \right]$ litres

$\left(40\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10} \right)$ = 29.16 litres

Tips And Tricks And Shortcuts For Alligation And Mixtures

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Tips And Tricks For Alligation And Mixtures

Tips and Tricks for Alligation and Mixtures will be discussed on this page for solution of problems regarding the mixing of ingredients in a shortcut way.

MixtureIt is the process of mixing two or more elements/ingredients together.
AlligationIt is a process or a rule that tells us how to mix two or more ingredients/mixtures to get the desired mixture of a certain price & concentration.

Tips and Tricks and Shortcuts Alligations and Mixtures:-

Type 1. Tips and Tricks for Alligation and Mixtures

In most of these questions , you are supposed to find the ratio , or any one of the values either M(mean price) , or C(C.P of cheaper) or D(C.P of dearer) where the other two values and the ratio is given.

To find that , we have the best trick for you.

When two commodities are mixed then,

\left (\frac{ \text{ Quantity of Cheaper }}{\text{ Quantity of dearer }} \right) = \left (\frac{ \text{ C.P of Dearer (d) – Mean price (m)}}{ \text{ Mean price(m) – C.P. of cheaper(c) }} \right)

This equation can also be developed using the pictorial diagram.

Question 1:

Two varieties of wheat are mixed in the ratio of 4:5. The price of the mixture is ₹15 per Kg. The price of the variety having lesser weight is ₹12 per Kg. Calculate the price of the other variety.

Solution:

First of all we will identify and substitute the values in the diagram

Now substituting this in the formula

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\left (\frac{ \text{ Quantity of Cheaper }}{\text{ Quantity of dearer }} \right) = \left (\frac{ \text{ C.P of Dearer (d) – Mean price (m)}}{ \text{ Mean price(m) – C.P. of cheaper(c) }} \right)

\frac{4}{5} = \frac{(N – 15)}{(15 – 12)}
\frac{4}{5} = \frac{N – 15}{3}

So , 5N – 75 = 12

N = Rs. 17.4 per Kg

Type 2: Shortcuts, Tips and Tricks for Alligation and Mixtures

Calculate quantity of pure Liquid after ‘n’ successive operations:

If a Container contains ‘x’ units of pure liquid , and we replace the liquid with ‘y’ units of water :

Then after ‘n’ successive operations, the units of pure liquid left is

\left (x \left(1 – \frac{y}{x} \right)n \right)

Below is an example to explain this concept.

Question 2:

A vessel contains 60L of milk, out of which 15L litres of milk is taken out and replaced by water. This process is repeated two times. Find the amount of milk left in the container.

Solution:

From the question we have ,

Total Milk (x) = 60L

Milk taken out in one round (y) = 15L

No. of rounds (N) = 2

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So , Using the above formula ,

Amount of milk left in the container

=\left (x \left(1 – \frac{y}{x} \right)n \right)

=\left (60 \left(1 – \frac{15}{60} \right)2 \right)

=\left (60 \left(\frac{3}{4} \right)2 \right)

Solving this we get the answer as 33.75L

Question 3:

A dealer has 1000 kg sugar and he sells a part of it at 8% profit and the rest of it at 18% profit. The overall profit he earns is 14%. What is the quantity which is sold at 18% profit?

Solution :

As per the rule of alligation,

Quantity of Dearer: Quantity of Cheaper = (18-14) : (14-8) = 4:6 = 2:3

Quantity of sugar sold at 18% profit = 3/5 × 1000 = 600kg

Question 4 :

How much coffee of variety A, costing Rs. 5 a kg should be added to 20 kg of Type B coffee at Rs. 12 a kg so that the cost of the two coffee variety mixture be worth Rs. 7 a kg?

Solution :

As per the rule of alligation,

Quantity of Dearer: Quantity of Cheaper = (12-7) : (7-5) = 5:2

Quantity of Variety A coffee that needs to be mixed ⇒ 5:2 = x:20

⇒ x =50 kg

Question 5 :

A mixture of 20 kg of water and spirit contains 10% water. How much water must be added to this mixture to raise the percentage of water to 25%?

Solution :

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Water = $\left(\frac{10}{100} \right)\times100=2$ and spirit = 18kg.

In the second mixture:

75 kg spirit is contained in a mixture of 100 kg

18 kg spirit is contained in a mixture of $\left(\frac{100}{75} \right)\times18=24$kg

So, water to be added=24-20=4 kg

Formulas for Ratio and Proportions

Basic Formulas of Ratio and Proportion

On this page we have discussed Ratio and Proportion formulas, definition with examples.

Ratio and Proportion are explained majorly based on fractions. When a fraction is represented in the form of a:b, then it is a ratio whereas a proportion states that two ratios are equal. Here, a and b are any two integers.

What is Ratio and Proportion in Maths? The rate of speed (distance/time) or price (rupees/meter) of a material, etc, where the concept of the ratio is highlighted. Proportion is an equation that defines that the two given ratios are equivalent to each other.

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Proportion: –

The equality of two ratios is known as proportion. It is used to find out the quantity of one class over the total. In other words, the proportion is a part that describes the comparative relation with the overall part.

Subsequently, 2 : 3 equals to 4 : 6, we will write 2 : 3 :: 4 : 6 and we can say that 2, 3, 4, and 6 are in proportion. Consequently, 2, 3, 4, and 6 are called 1^{st}, 2^{nd}, 3^{rd}, and 4^{th} proportional respectively. The first and the fourth proportional are called the extreme terms while the second and the third proportional are called mean terms.

The product of the means equals the product of the extremes.

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Formulas for Ratio and Proportions are as follows: –

Fourth Proportional	If x : y = z: a, then a is called the fourth proportional to x, y, z.
Third Proportional	If x: y = y: z, then z is called the third proportional to x and y.
Mean Proportional	Mean proportional between x and y is $\sqrt{xy}$
Comparison of Ratios	We say that (x: y) > (z: a), then (x/y) > (z /a).
Compounded Ratio	The compounded ratio of the ratios (x: y), (z: a), (b : c) is (xzb: yac)

Formulas & Properties of Ratio

- The ratio of two people a and b is denoted as a : b.
- a : b = ma : mb, where m is a constant.
- x : y : z = X : Y : Z is equivalent to x/X=y/Y=z/Z
- If x/y = z/a then, x+y/x-y = z+a/z-a

Property of Proportion

- x/y=z/a , this means x : y ::z:a

Question 1 : Sales manager of pepperfry.com was checking the inventory and concluded that the cost price of 2 tables and 3 chairs is Rs. 2200 and the cost price of 2 chairs and 4 tables is Rs. 2400. The question is what will be the ratio between the cost price of the chairs and the table ?

Options :

1. 8 : 9
2. 6 : 5
3. 9 : 5
4. 10 : 7

Answer: d.

Solution : Let the cost price of one table = x Rs., the cost price of one chairs = y Rs.

According to the question,

2x + 3y = 2200 ….1

2y + 4x = 2400

2x + y = 1200 ….2

After solving these 2 equation,

x = 350 Rs. , y = 500 Rs.

Ratio = 500 : 350 = 10 : 7

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Question 2 : When Kate and Jennifer received their income statement last week, their accountant noted that their income for 2017 was divided by five to four. Kate's income in 2018 compared to that of 2017 is 3:5, while Jennifer's income in 2018 compared to that of 2017 is 3:2. Find Jennifer's salary for the year 2017 if the combined income of Kate and Jennifer in 2018 was Rs. 10242.

Options :

1. **2450 Rs**
2. **4552 Rs**
3. **1150 Rs**
4. **4598 Rs**

Answer: b.

Solution : Let the income of Kate in 2018 and 2017 be 3x and 5x respectively.

Let the income of Jennifer in 2018 and 2017 be 3y and 2y respectively

Since, the ratio of their income in the year 2017 was 5 : 4

5x : 2y = 5 : 4

2x = y

The sum of their incomes in 2018 is Rs. 10242

3x + 3y = 10, 242

9x = 10, 242

x = 1,138 and y = 2276

Jennifer's income for the year 2017 = 2y = Rs. 4552

Question 3 : Rick Grimes has 2 vessels A and B of equal volume containing Petrol and Diesel in the ratio 3 : 2 and 2 : 1 to their brim respectively. He then poured two litres of the solution from vessel A and three litres of the solution from vessel B into a big empty vessel C. If the solution in C occupied 40% of the capacity of C, what proportion would he achieve of the volume of vessel C which should be the volume of Diesel that shall be added so that the ratio of Petrol and Diesel in vessel C becomes 1 : 1?

Options :

1. **21 : 152**
2. **22 : 120**
3. **14 : 125**

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4. **14 : 150**

Answer: c.

Solution : Amount of Petrol poured into C from vessel A and B,

$=2\times \frac{3}{5}+3\times \frac{2}{3}=\frac{16}{5}$litres

Also, amount of Diesel poured into C from vessels A and B,

$=5-\frac{16}{5}=\frac{9}{5}$litres

Given, 5 litres rePresent 40% of the capacity of vessel C, vessel C has a capacity of,

$=5\times \frac{5}{2} = 12.5$ litres

To make the quantities of Diesel and Petrol same in the vessel C, quantity of Diesel to be added,

$=\frac{16}{5}-\frac{9}{5}= \frac{7}{5}$ litres

Therefore, the required ratio is,

$=\frac{\frac{7}{5}}{12.5}= \frac{14}{125}$litres

Question 4: Vin Diesel distributed some chocolates among his four children and kept some with him. The eldest three children got chocolates in the ratio 3 : 11 : 7. The total number of chocolates with Vin and youngest child is three times the total chocolates with the three eldest children. The ratio of chocolates with Vin and that with all the children is 3 : 4. Find the total number of chocolates if the youngest child has 81 chocolates with him?

Options :

1. **252**
2. **263**
3. **274**
4. **285**

Answer: a.

Solutions : Let the children be P, Q, R and S and Mr Flynn be F

Chocolates with P : Q : R = 3 : 7 : 11

Let the number of chocolates be 3X, 7X and 11X

Total chocolates with three eldest children = 21X

Chocolate with F and S = 3 × 21X = 63X

Total chocolates = (21X + 63X) = 84X

Chocolate with F : (P + Q + R + S) = 3 : 4

Total 7 units of chocolate = 84 X

1 unit = 12X

Chocolate with F = 3 × 12X = 36X

Chocolate with S = (63X – 36X) = 27X

27 X = 81 $\rightarrow$ X=3

Total number of chocolates = 84X = 84 × 3 = 252

Question 5 : Tyris Gibson has scored the marks which are in the ratio of 7 : 10 in theory exams. Total marks which can be obtained in practicals were 20% of the total marks of theory. If Tyris got full marks in practical then find the ratio of total marks obtained by Tyris to the total marks which can be obtained in the subject.
Options :

1. **4 : 5**
2. **3 : 5**
3. **2 : 4**
4. **3 : 4**

Answer: d.
Solution : Let, marks obtained by Tyris Gibson in theory and total marks of theory be '7x' and '10x' respectively

So, total marks (theory + practical) = 10x + 2x = 12x

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Marks obtained by Tyris Gibson (theory + practical) = 7x + 2x = 9 x

Required Ratio = \frac{9x}{12x}=\frac{3}{4}

How To Solve Ratio And Proportion Questions Quickly

Solve Ratio and Proportion Questions Quickly

In some situations, the comparison by a division process makes good sense when compared to performing their difference. On this page you'll learn How to **Solve Ratio And Proportion Question Quickly.**

NoteRatio and Proportions are said to be faces of the same coin. When two ratios are equal in value, then they are said to be in proportion. In simple words, it compares two ratios. Proportions are denoted by the symbol '::' or '='.

How to Solve Ratio And Proportion Quickly – Compound Ratio Based On Individual Ratios

Question 1.

Find the compound ratio of (9 : 10), (11 : 13), (15 : 19).

A. 156:157

B. 297:494

C. 221:431

D. 1:5

Correct answer B

Solution:

If we compound two or more ratio, then, a : b and c : d will become ac:bd.

Therefore, (9 : 10), (11 : 13), (15 : 19) = 9/10 * 11/13 * 15/19 = 1485/2470

= 297/494

Question 2.

Find the composite ratio of 2 : 3, 3 : 5, 5 : 7.

A. 11 : 24
B. 2 : 7
C. 14 : 23
D. 24 : 97

Correct answer B

Solution:

The composite ratio is intended by 2/3 * 3/5 * 5/7 = 30/105

= 2/7

Question 3.

Find the compounded ratio of (3 : 7), (9:5), and (11:21)

A. 99:245
B. 13:17
C. 114:221
D. 305:711

Correct answer A

Solution:

If we compound two or more ratio, then, a : b and c : d will become ac:bd.

Therefore, (3 : 7), (9:5), and (11:21)= 3/7 * 9/5 * 11/21 = 297/735 = 99/245

Distributing Any Quantity Based On Ratios

Question 4.

Rs. 27440 is divided among 5 females, 3 men, and 1 child. The ratio of each woman, man, and kid, are 9 : 3 : 2. What is the child's share?

A. 550
B. 760
C. 980
D. 952

Correct answer C

Solution:

Given, the ratio of females, males, and toddlers = 9 : 3 : 2

No. of females, men, and child are 5, 3, 1
Thus actual ratio of females, men, and child = 9 * 5 : 3 * 3 : 2 * 1 = 45 : 9 : 2
Therefore, part of child = (2/56) * 27440 = Rs. 980

Question 5.

An amount of Rs. 58666 is divided among three employees in the ratio of 1/17, 1/19, and 1/21. Find the smallest share.

A. 17561.7
B. 17200.49
C. 17000
D. 11760.50

Correct answer A

Solution:

Given, three shares = 1/17, 1/19, 1/21.

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Therefore, the ratio will be 399/6783, 357/6783, 323/6783

Thus, the ratio is 399 : 357 : 323

The smallest share = 58666*323/1079

= 17561.7

Coins Based Ratio Problems

Question 6.

Sahil got old currencies from his cupboard worth Rs. 450 in the denomination of 2 paisa, 5 paisa, and 50 paisa in ratio 5 : 4 : 3. How many 2 paisa coins he got.

A. 1200
B. 1250
C. 1100
D. 1220

Correct answer B

Solution:

Let the number of 2 paisa coins be 5x

Let the number of 5 paisa coins be 4x

Let the number of 50 paisa coins be 3x

Then, 2*5x/100 + 5*4x/100 + 50*3x/100 = 180x/100

Given, 180x/100 = 450

Therefore, 450*100/180 = x

x = 250

Hence, 2paisa coins = 5 * 250 = 1250

Question 7.

A person has 180 rupees in the denomination of 5paisa, 10paisa, and 25paisa in ratio 5 : 3 : 1. Calculate how many 25 paisa coins he has.

A. 225
B. 200
C. 350
D. 300

Correct answer A

Solution:

Let the number of 5 paisa coins be 5x

Let the number of 10 paisa coins be 3x

Let the number of 25 paisa coins be x

Then, 5*5x/100 + 10*3x/100 + 25x/100 = 80x/100

Given, 80x/100 = 180

Therefore, 180*100/80 = x

x = 225

Hence, 25 paisa coins = 1*225 = 225 coins

Question 8.

Harish has 1500 rupees in the denomination of 5 paisa, 25 paisa, and 50 paisa in ratio 5 : 3 : 2. Calculate how many 25 paisa coins he has.

A.2800

B.2000

C.2500

D.2250

Correct answer D

Solution:

Let the number of 5 paisa coins be 5x

Let the number of 25 paisa coins be 3x

Let the number of 1 rupee coins be 2x

Then, 5*5x/100 + 25*3x/100 + 50 * 2x/100 = 200x/100

Given, 200x/100 = 1500

Therefore, 1500*100/200 = x

x = 750

Hence, 25 paisa coins = 3*750 = 2250

How to Solve Ratio And Proportion Quickly – Mixtures & Addition Based Ratio Problems

Question 9.

Chetan and Shaheen's salaries are in the ratio 5 : 9. If both of their salaries are raised by Rs. 4200, then the proportion changes to 22 : 27. Find Shaheen's salary.

A. 9250.95

B. 8058.32

C. 7199.97

D. 13580.45

Correct answer C

Solution:

Let Chetan and Shaheen’s salaries be 5x and 9x

Given, 5x + 4200 / 9x + 4200 = 22/27

135x + 113400 = 198x + 92400

63x = 21000

x = 333.33

Therefore, Shaheen’s salary = 333.33 * 9 + 4200 = 7199.97

Question 10.

Salaries of Preeti and Bina are in the ratio 14 : 15. If both get an increment of Rs. 5300, the new ratio becomes 33 : 35. What is Preeti’s salary?

A. 24000
B. 34980
C. 30100
D. 10200

Correct answer B

Solution:

Let Preeti’s salary be 14x, and Bina’s salary be 15x

Given, 14x + 5300 = 33

Given, 15x + 5300 = 35

= 14x + 5300/15x + 5300 = 33/35

= 490x + 185500 = 495x + 174900

5x = 10600

x = 2120

Therefore, Preeti’s salary = 14 * 2120 + 5300 = 34980

<u>Question 11.</u>

400 g of 25% sugar syrup was added to 600 g of 40% sugar syrup. Find the percentage of the syrup in the mixture.

A. 22%
B. 34%
C. 31%
D. 38%

<u>Correct answer B</u>

<u>Solution:</u>

Amount of sugar syrup in mixture 1 = 25/100*400= 100

Amount of sugar syrup in mixture 2 = 40/100*600 = 240

The total amount of sugar syrup = 340

Percentage of sugar syrup in the mixture = 340 * 100/ 1000 = 34%

Tips And Tricks and Shortcuts on Ratio And Proportion

Ratio and Proportion Tips and Tricks and Shortcuts

The problems on Ratio and Proportion can be easily solved by using some simple tips and tricks. Some of the Tips And Tricks and Shortcuts on Ratio And Proportion are mentioned below.

Key Points to Remember1.The ratio between two quantities should exist with the same kind. 2.While comparing two ratios, their units must be similar. 3.Significant order of terms must be there. 4. If the ratios are equal like a fraction, then only comparison of 2 ratios can be performed.

Ratio and Proportion Tips and Tricks and Shortcuts

1. If x : y and z : a, then it can be solved as (x*z)/(y*a).
2. If x/y=z/a=b/c, then each of these ratios is equal to (x+z+e) ⁄(y+a+f)
3. If x/y=z/a, then y/x=a/z (Invertenao)
4. If x/y=z/a, then x/z=y/a (Alterenao)
5. If x/y=z/a, then (x+y)/y=(z+a)/a (Componendo)
6. If x/y=z/a, then (x-y)/y=(z-a)/a (Dividenao)
7. If x/y=z/a, then (x+y)/(x-y)=(z+a)/(z-a) (Componendo and Dividendo)
8. Four numbers x, y, z ana a are said to be in proportion if x : y = z : a. If on the other hand, x : y = y : z = z : a, then the four numbers are said to be in continued proportion.
9. Let us consider the ratios, x : y = y : z. Here y is called the mean proportional and is equal to the square root of the product of x and z i.e. y2 = x *z ⇒ y = √xz
10. If the three ratios, x : y, y : z, z : a is known, we can find x : a by the multiplying these three ratios x/a = x/y * y/z * z/a
11. If x, y, z, and a are four terms and the ratios x : y, y : z, z : a are known, then one can find the ratio x : y : z : a.

Note – There are four types of Ratio and Proportion problems that are as follows :-

Type 1: Ratio and Proportions Tricks
Compound Ratio Based On Individual Ratios
Question 1.

Find the combined ratio of (5 : 6), (7 : 9), (10 : 11).

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A. 56/157

B. 65/99

C. 21/31

D. 1/5

Correct answer – 65/99

Solution:

If we compound two or more ratio, then, **a : b and c : d will become ac : bd**.

Therefore, (5 : 6), (7 : 9), (10 : 11) = 5/6 * 7/9 * 10/11 = 350/594

= 65/99

Type 2: Tricks and Shortcuts
Distributing Any Quantity Based On Ratios
Question 2.

Rupees 812.5 is divided among Suhas, Ragini, and Gautam in such a way that 3-times Suhas's share, 2-times Ragini's share and 4 times Gautam's share is equal. Calculate their individual share.

A. 246, 369, 184.5

B. 224, 350, 180.5

C. 375,250, 187.5

D. 285, 384, 195.5

Correct answer – 375, 250, 187.5

Solution:

Let the Ragini, Suhas, and Gautam share be x, y, and z

Given, 2x = 3y = 4z.

Given, x + y + z = 812.5

Here, we will assign values of x and z in terms of y.

Therefore, y + 3y/2 + 3y/4 = 812.5

13y = 812.5*4

13y = 3250

y= 250

x = 375

z = 187.5

Therefore, individual shares are Suhas -375, Ragini – 250, Gautam – 187.5

Type 3: Ratio and Proportions Tips and Tricks
Coins Based Ratio Problems
Question3.

Geeta has 1800 rupees in the denomination of 5 paisa, 25 paisa, and 75 paisa in ratio 6 : 3 : 1. Calculate how many 25 paisa coins he has.

A. 2800

B. 2000

C. 3500

D. 3000

Correct answer – 3000

Solution:

Let the number of 5 paisa coins be 6x

Let the number of 25 paisa coins be 3x

Let the number of 75 paisa coins be x

Then, 5*6x/100 + 25*3x/100 + 75x/100 = 1800

=> 180x/100 = 1800

Therefore, x = 1800*100/180

x = 1000

Hence, 25 paisa coins = 3*1000 = 3000

Type 4: Tips and Tricks
Mixtures & Addition Based Ratio Problems
Question 4.

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A mixture of sugar and water is in the ratio 3 : 2. A man adds 9 liters of water, and the mixture comes in the ratio of 3 : 5. Find the quantity of sugar in the new mixture.

A. 9
B. 15
C. 12
D. 10

Correct answer – 9

Solution:

Let water be 2x, and sugar is 3x.

Given, 3x/2x+9 = 3/5

5x = 2x + 9

3x = 9

x = 3

Therefore, quantity of sugar = 3 * 3 = 9 liters

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Formulas for Simple Interest And Compound Interest

Formulas To Find Averages In Aptitude

On this page we have discussed Simple Interest and Compound Interest formulas, definition with examples.

Interest formulas mainly refer to the formulas of simple and compound interests.
NoteWhen interest is calculated on the principal, or original amount. Then, it is known as Simple Interest.
NoteWhen interest is calculated on the principal amount and also on the interest of previous time periods. Then, it is known as Compound Interest .Compound Interest also known as Interest on interest.

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Definition of Simple Interest

- The interest calculated on the amount initially invested or loaned. It is a method for calculating the interest earned or paid on a certain balance in a specific period.
- Simple interest is a quick and easy method of calculating the interest on a sum of Amount. It is determined by **multiplying the daily interest rate by the principal amount and the number of days .**

Definition Of Compound Interest

- Compound interest is the addition of interest to the principal sum of a loan or deposit. Compound interest is calculated based on the principal, interest rate, and the time period involved.
- **It is the addition of interest to the sum of Amount or Principal Amount i.e. interest on interest**. It is the result of reinvesting interest.So that interest in the next period is then earned on the principal amount and previously accumulated interest.

Formula for Compound Interest

- Interest Compounded Annually
    - **Amount =** $\mathbf{P\left (1+\frac{R}{100n} \right)^{nT}}$
    - Compound Interest = Total amount – Principal
    - Rate of interest (R)(in %) = $n[(\frac{A}{P})^{\frac{1}{nT}} - 1]$

Interest Compounded Half-Yearly

- When interest is compounded Half yearly Then, we must consider n=2, Hence, Formula for Amount = $\mathbf{P\left (1+\frac{R}{100\times 2} \right)^{2T}}$
- Compound Interest = Total amount – Principal
- Rate of interest (R) (in %)= $2(P^{\frac{1}{2T}} - 1)$

Interest Compounded Quarterly

- We have to consider n=4. So, Amount = $\mathbf{P\left (1+\frac{R}{100\times 4} \right)^{4T}}$
- Compound Interest = Total amount – Principal

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- Rate of interest (R) (in %)= 4(P^{\frac{1}{4T}} – 1)

Interest is Compound Monthly

- When the interest is compounded montly then, n=12. So, formula for Amount = \mathbf{P\left (1+\frac{R}{100\times 12} \right)^{12T}}

Interest is Compounded Annually but Time is in Fraction, say 2(3/2) years

- When the Interest is Compounded Annually but Time is in Fraction. Then, the formula Amount = P $(1+r/100)^2$* (1+(3/2)r/100)\mathbf{(1+ \frac{r}{100})^{2}}\mathbf{(1+ \frac{\frac{3r}{2}}{100})}

CI when Rates are Different for Different Years

- When rates are different for different years . Then, Amount = P (1+ \frac{r_{1}}{100})(1+ \frac{r_{2}}{100})(1+ \frac{r_{3}}{100})

Formula for Simple Interest

- Simple Interest

SI = \mathbf{\frac{P * R * T}{100}}

Where,

P = money borrowed or lent out for a certain period

r = rate of interest

t = time period for which the amount is lent

Principal = \frac{100 × SI}{R × T }

Rate = \frac{100 × SI}{P × T }

Time = \frac{100 × SI}{R × P }

Total Amount of Money

- Amount = Principal + Interest
- A = P + I

Question 1 : Vanraj shah borrowed a sum of Rs. 10,000 at 8% per annum compounded annually. If the amount is to be paid in three equal installments, the annual installment will be

Solution : Let each installment be x,

$$10000=\frac{x}{(1+\frac{8}{100})} + \frac{x}{(1+\frac{8}{100})}^{2}+ \frac{x}{(1+\frac{8}{100})}^{3}$$

$$10000=x{\frac{25}{27} + (\frac{25}{27}) ^{2}+ (\frac{25}{27}) ^{3}}$$

$$=x*\frac{25}{27}(1 + \frac{25}{27} + \frac{625}{729})$$

$$=\frac{25x}{27} *(\frac{2029}{729})$$

x =3880.335

Question 2 : A financier lends money at simple interest, but he includes the interest every six months for calculating the principal. If he is changing an interest of 20%, the effective rate of interest becomes?

Solution : Let the sum be Rs. 100. Then,

S.I. for first 6 months = $\frac{100 * 20 * \frac{1}{2})}{100}$ = Rs.10

Next 6 months 20% of 110

S.I. for last 6 months =Rs.$\frac{110 * 20 * \frac{1}{2})}{100}$ = Rs.11

So, amount at the end of 1 year = Rs. (100 + 10 + 11) = Rs. 121 R
= (121 – 100) = 21%

Question 3 : Raghav singh purchases a coat for Rs.2400 cash or for Rs.1000 cash down payments and two monthly installments of Rs.800 each. Find the rate of interest.

Solution : Amount as a principal for 2 month = 2400 – 1000 = 1400
At the rate of r% per annum after 2 months,

Rs.1400 will amount to Rs 1400 + (\frac{1400*r*2}{100*12})

Total amount for 2 installments at the end of second month
Rs800+(800+(\frac{800*r*1}{100*12)}))

Then 1400 + \frac{2800*r}{1200}=1600+ \frac{800*r}{1200}
R=120%

Question 4: Mohsin khan invested Rs. 20,000 in a scheme at simple interest @ 15% per annum. After three years he withdrew the principal amount plus interest and invested the entire amount in another scheme for two years, which earned him compound interest @ 12% per annum. What would be the total interest earned by Mosses at the end of 5 years?

Solution: SI= 20,000*15*3/100=9000

Amount=20,000+9000=29,000

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Now CI= 29,000*(1+12/100)^{2}
= 29,000 * 28/25 * 28/25 = 36,377.6

A-P=36, 377.6-29000=7377.6

After 5yrs 7377.6+9000=16,377.6

Question 5 : Bobby deol invested his money for a certain time. It amounts to Rs. 600 at 10% per annum. But when invested at 5% per annum, it amounts to Rs. 400. Find the time.

Solution : 600-P=P*10*\frac{t}{100} —>1
===>6000-10P=Pt

400-P=P*5*\frac{t}{100}—->2
===>8000-20P=Pt

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Equate 1 and 2

$6000-10P=8000-20P$

$\Longrightarrow P=200$

Substitute P in 1 then

$400=200*10*\frac{t}{100}$

$\Longrightarrow$20yrs.

How To Solve Compound And Simple Interest Problems Quickly

How To solve Compound Interest And Simple Interest Problems Quickly

The Basic Difference Between Simple Interest (SI) and Compound Interest(CI) is that the Simple Interest is the interest calculated on the Principal or sum of amount while Compound Interest is calculated on the principal amount and the previous earned interest also i.e.

NoteSI = ${\frac{P \times R \times T}{100}}$ and CI =${P (1+ \frac{R}{100\times n})^{nT} - P}$

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Definition of Simple and Compound Interest

- Compound Interest is the interest charged on the original principal and on the accumulated past interest of a deposit is known as Compound interest.

The Formula For Compound Interest Amount =$\mathbf{P \times (1 + \frac{r}{100\times n})^{nT}}$

- Simple Interest is the interest When some money is borrowed by someone, then borrower is required to pay an additional amount of money other than the original sum. This additional amount of money is called interest.

The Formula for Simple InterestSI = $\mathbf{\frac{P * R * T}{100}}$

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Type 2: Solve Simple Interest and Compound Interest Quickly. Find the amount/time/rate of interest when CI or SI or their difference is given

Question 1. The difference between the CI and SI on a certain amount is at 10% p.a. for 3 years is Rs. 31. Find the principal?

Options

A. 1000

B. 3100

C. 310

D. 100

Solution The difference between compound interest and simple interest for three years is 31.

Difference = $\frac{P \times (R)^2}{(100)^2} \times \frac{(300 + R)}{100}$

$31 = \frac{P \times (10)^2}{(100)^2} \times \frac{(300 + 10)}{100}$

$31 = P \times \frac{31}{1000}$

On solving further, we get

P = 1000

Correct option: A

Question 2. If the SI on a sum of money for 2 years at 5% p.a. is Rs. 500, what is the CI on the same sum at the same rate and for the same time?

Options

A. Rs. 512.5

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B. Rs 521.5

C. Rs 515.2

D. Rs 215.5

Solution Sum = $\frac{500 \times 100}{2 \times 5}$

Sum = $\frac{50000}{10}$

Sum = 5000

Amount = $5000 (1+ \frac{5}{100})^{2}$

$5000 \times 1.05 \times 1.05 = 5512.5$

CI = 5512.5 – 5000

CI = Rs. 512.5

Correct option: A

Question 3. The difference between CI and SI on a principal of Rs. 15,000 for two years is Rs. 24. What is the annual rate of interest?

Options

A. 16%

B. 4%

C. 8%

D. 6%

Solution CI – SI = $\frac{P \times (R)^2}{(100)^2}$

On solving further we get,

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$24 \times (100)^{2} = 15000 \times R^2$

$R^2 = 16$

$R = 4\%$

Correct option: B

Question 4. The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:

A. 2

B.1/2

C. 3

D.4

Solution- Amount = Rs. (30000 + 4347) = Rs. 34347.

Let the time be n years.

then, $30000 \left(1+\frac{7}{100} \right)^n = 34347$

$\left(\frac{107}{100} \right)^n = \frac{34347}{30000}$

$\left(\frac{107}{100} \right)^2$

Correct option: A

Question 5. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?

A.Rs. 2160

B.Rs. 3120

C.Rs. 3972

D.Rs. 6240

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Solution

Let P = Rs. 100. Then, S.I. Rs. 60 and T = 6 years.

R= $\left (\frac{100\times60}{10\times6} \right)$= 10% p.a.

Now, P = Rs. 12000. T = 3 years and R = 10% p.a

C.I = Rs $\left [12000\times\left \{ \left (1+\frac{10}{100} \right)^3-1 \right \} \right]$

=Rs$\left (12000\times\frac{331}{1000} \right)$

=3972

Tips , Tricks And Shortcuts on Compound Interest and Simple Interest

Shortcuts, tips, and tricks on Compound Interest and Simple interest are not easy to find at the time of examination. So we came up with a dedicated page to help students at the crucial moment.

Simple interest is based on the principal amount of a sum of money. While the compound interest is based on the principal amount and the previous accumulated interest.

Compound and Simple Interest tricks If the interest on a sum borrowed for a certain period is reckoned uniformly, then it is called simple interest or the flat rate. In the case of compound interest, the interest is added to the principal at the end of each period to arrive at the new principal for the next period.

Formulas for Simple Interest Problems

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Formulas to Solve Simple interest Problems in Aptitude

Simple interest is a easy method of calculating the interest charge on a loan. First, it is important to recall the concept of interest and ways to calculate it. This Page from here on contains Formulas and definition of Simple Interest.

Simple Interest Definition Simple interest is calculated by multiplying the daily interest rate by the principal by the number of days that elapse between payments i.e. \frac{P * R * T}{100}

Simple Interest Formulas

- Simple Interest is the rate at which we lend or borrow money. In simple terms, when a lender lends money to a borrower, the borrower has to pay an extra amount of money to the lender. This extra amount of money is called interest. The interest on a sum borrowed for a certain period is called simple interest.

Basic Formula\frac{P * R * T}{100}

- After the calculation for S.I. is done, the principal has to be added to it to get the total amount that the borrower has to give or the lender will collect. This is called total amount and its formula is given as:

Total AmountA = P + S.I.

Notations in S.I. Formula:

S.I	Simple Interest
P	Principal Amount
A	Total Amount
R	Rate of Interest
T	Time (in Years)

Using the above notations, the formula for S.I. becomes,

S.I.=\frac{P * R * T}{100}

This formula can be used to find the missing parameters while calculating the interest or total amount. Thus, the reduced forms of this formula are:

To calculate the Interest, the formula becomes:

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- I = PTR/100

To calculate the Principal Amount, the formula is:

- P = (I × 100) / RT

To find the rate of interest, the formula will be:

- R = (I × 100)/ PT
- R (in decimal) = I/PT

Thus, the rate of interest in percent is given by:

- R = R * 100

To get the time, formula is:

- T = (I × 100) / PR

Formulas based Questions on Simple Interest

Example 1. Find the simple interest on Rs. 65,000 at 6(2/3)% per annum for a period of 9 months?

Options

(A) 3520

(B) 3250

(C) 2350

(D) 5320

Solution Principle = 65,000

Rate = 6 \frac{2}{3} \

Time = 9 months

Principle = 65,000

Rate = \frac{20}{3} \

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Time = \frac{3}{4} \

S.I = \frac{P*R*T}{100} \

= Rs. [65000×(20/3)×(3/4)×(1/100)]

= 3250

Correct Option(B)

Example 2. What sum of money will amount to Rs. 520 in 5 years and Rs. 568 in 7 years at simple interest?

Options
(A) 350
(B) 400
(C) 550
(D) 500

Solution Amount in 5 years = Rs 520

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Amount in 7 years = Rs 568

2 years S.I = 568-520 = 48

Simple Interest for 1 years = \frac{48}{2} \ = 24

5 years amount = Rs 520

For 1 years = 5*24 = 120

P = A – S.I = 520-120

P = 400

Correct Option(B)

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Example 3 : At what rate, percent per annum will a sum of money triple in 13 years approximately.

Options

(A) 2.25%

(B) 8.98%

(C) 15.38%

(D) None

Solution : Let principal = P, Then, S.I.= 2P and Time = 13 years

We know that S.I. = $\frac{PTR}{100}$

Rate = $\frac{100*2P}{P*13}$% = 15.38% per annum.

Correct option : 15.38%

Example 4 : A sum was put at simple interest at a certain rate for 9 years. Had it been put at a 5% higher rate, it would have fetched Rs 540 more. Find the sum.

Options

(A) 5278 rs

(B) 1200 rs

(C) 627 rs

(D) 3200 rs

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Solution: Let sum = P and original rate = R. Then

$[\frac{(P \times (R+5) \times 9)}{100}] – [\frac{(P \times R \times 9)}{100}] = 540$

$9P \times (R+5) – 9PR = 54000$

9PR + 45P – 9PR = 54000

45P = 54000

P = 1200

Correct Option : 3200 Rs

Example 5 : A sum of money at simple interest amounts to Rs. 873 in 6 years and to Rs. 923 in 9 years. The sum is:

Options

(A) 624 rs

(B) 573 rs

(C) 362 rs

(D) none

Solution: S.I. for 1 year = Rs. (923 – 873) = Rs. 50.

S.I. for 6 years = Rs.(50 * 6) = Rs. 300.

Principal = Rs. (873 – 300) = Rs. 573

Correct Option: 573 Rs

How To Solve Quickly Simple Interest Questions

How to Solve Simple Interest Questions Quickly in Aptitude

As we know that Simple Interest is the most important topic in mathematics. But it is important to know that the topic consists multiple level of Questions. Let us review thoroughly How To Solve Simple Interest Questions Quickly.

What is considered Simple Interest? Simple interest is when interest is calculated only on the initial money put in (the principal). In addition, the interest is not continually added to this total.

Definition of Simple Interest

- If the interest on a sum borrowed for certain period is calculated uniformly, then it is called simple interest.
- It is simply obtained by multiplying principal amount with rate and with given time interval.

- Formula of Simple Interest = $\mathbf{\frac{P * R * T}{100}}$

Example – What is simple interest of Rs 5000/- for 5 years at 5% interest per annum.

Solution – SI= $\mathbf{\frac{P * R * T}{100}}$

$=\frac{5000 *5 *5}{100}$

=Rs 1250.

How to Solve for Interest Rate?

The above equation can be used to solve for any of the variables: interest, principal, rate, or time. To solve the equation the known information needs to be plugged in and then solve for the unknown variable. The equation can be rearranged so each variable is set to equal the known variables:

- Solve for interest earned (initial equation): $I = P\times R \times T$
- Solve for principal: $P = \frac{I}{R \times T}$
- Solve for interest rate: $R = \frac{I}{P \times T}$
- Solve for time: $T = \frac{I}{P \times R}$

Type 1: How to Solve Problems On Simple Interest (SI)

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Question 1. Find the simple interest on Rs. 60,000 at 13/5 % p.a. for a period of 9 months?

Options:

A. 1170

B. 1710

C. 11700

D. 1017

Solution: We know that, **SI =** $\mathbf{\frac{P * R * T}{100}}$

P = 60000

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R = **\frac{13}{5}**%

T = 9 months = **\frac{ 3}{4}**th year

SI =**\frac{60000 * 13 * 3}{5 * 4 * 100}**

SI = **\frac{117000}{100}**

SI = 1170

Correct option: A

Question 2. What will be the ratio of simple interest earned on a certain amount at the same rate of interest for 6 years and that for 24 years?

Options:

A. 1:2

B. 3:5

C. 1:3

D. 1:4

Solution: Required Ratio = Simple Interest for 6 years/Simple Interest for 24 years

=**\frac{T_{1}}{T_{2}}**

=**\frac{6}{24}**

=**\frac{1}{4}**

=1:4

Correct option: D

Question 3.Find the simple interest on Rs.500 for 10 months at 5 paisa per month?

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Options:

A. Rs. 2500

B. Rs. 250

C. Rs. 25

D. Rs. 25.5

Solution: SI = **\mathbf{\frac{P * R * T}{100}}**

SI = \frac{500 * 5 * 10}{100}

= Rs. 250

Correct option: B

Type 2: Problems On Simple Interest (SI) When Rates are different for different years

Question 1. Nisha borrowed some money at the rate of 5% p.a. for the first two years. She again borrowed at the rate of 10% p.a. for the next three years. Later at the rate of 15% p.a. for the rest of the years. Total interest paid by her was Rs. 15000 at the end of 9 years. Calculate the amount of money she borrowed?

Options:

A. Rs. 15005
B. Rs. 20000
C. Rs. 15000
D. Rs. 10000

Solution: According to the question,

r_1 = 5% , T_1 = 2 years

r_2 = 10% , T_2 = 3 years

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r_3 = 15% , T_3 = 4 years

(since, beyond 5 years rate is 15%)

Simple interest = 15000

Therefore, P = \frac{15000 * 100}{5*2 +10*3 +15*4 }

=\frac{1500000}{10 + 30 + 60 }

= \frac{1500000}{100}

= Rs. 15000

Correct option: C

Question 2. Rahul invests some amount of money in three different schemes for 5 years, 10 years and 15 years at 10%, 12% and 15% Simple Interest respectively. At the completion of each scheme, he gets the same interest. Find out the ratio of his investment?

Options:

A. 3: 9: 15
B. 10: 24: 45
C. 10: 24: 40
D. 9: 24: 45

Solution: If a certain sum of money is lent out in n parts in such a manner that equal sum of money is obtained at simple interest on each part where interest rates are 10 %, 12 %,15% respectively and time periods are 5 years , 10 years , 15 years respectively.

Let the three amounts be Rs. x, Rs. y and Rs. z,
Then , According to question

$\frac{x \times 10 \times 5}{100} = \frac{y \times 12 \times 10}{100} = \frac{z \times 15 \times 15}{100}$

50 x = 120 y = 225 z = k(say)

10 x = 24 y = 45 z = k
$\frac{k}{10} : \frac{k}{24} : \frac{k}{45}$

Hence, the ratio of his investment will be
$\frac{k}{10} : \frac{k}{24} : \frac{k}{45}$

10 : 24 : 45
Correct option: B

Question 3. Ram tool a loan for Rs.10000 from bank for a period of 3 years. The bank charged the interest rates as 5% for first year, 7% for second year and 9% for the third year. Find the amount he has to pay back to the bank after three years?

Options:

A. Rs. 18500

B. Rs. 145000

C. Rs. 15100

D. Rs 12100.

Solution: Simple Interest = 5% + 7% + 9% = 21%.

Amount = Principal + Rate of Interest.

Principal is 100% of the amount.

Therefore, Amount = 100% + 21%.= 121%

According to the question, total amount to be paid

A =$\frac{121 * 10000}{100}$

A = 12100

Therefore, the amount that Ram has to pay back to the bank after three years Rs 12100.

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Correct option: D

Type 3: How to Solve Problems On Simple Interest (SI) to find the Rate of Interest, Time period and Principal

Question 1. A sum of money becomes six times in 30 years. Calculate the rate of interest.

Options:

A. 16.66%

B. 4.5%

C. 15.45%

D. 15%

Solution: We know that, if sum of money becomes x times in n years at some rate of interest, then rate of interest is calculated as,

$R = 100 \left(\frac{x-1}{n}\right) \%$

$R = 100 \left(\frac{6-1}{30}\right)$

$R = 100 \left(\frac{5}{30}\right)$

$R = \frac{500}{30}$

$R = 16.66\%$

Correct option: A

Question 2. How much time will it take for an amount of Rs. 630 to yield Rs. 72 as interest at 5.4 % p.a. of simple interest?

Options:

A. 2 years and 10 months

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B. 1 years and 11 months

C. 2 years and 11 months

D. 1 years and 11 months

Solution: We know that, Time = \frac{100 * SI }{R * P }

T =\frac{100 * 72}{630 * 5.4}

T = 7200/3402 = \frac{7200}{3402}

T = 2 years and 11 months

Correct option: C

Question 3. Mr. Tata invested Rs. 13,900 in two different schemes I and II. The rate of interest for both the schemes were 14% and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme II?

Options:

A. Rs. 2400

B. Rs. 6200

C. Rs. 6400

D. Rs. 4600

Solution: Let the amount invested in schemes I = x

Therefore, in schemes II = (13900 – x)

SI (scheme I) = \frac{P * R * T}{100}

Then For scheme I,

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SI = $\frac{x * 14 * 2}{100}$

Then For scheme II,

SI (scheme II) = $\frac{(13900-x) * 11 * 2}{100}$

SI (scheme I) + SI (scheme II) = 3508

$\frac{(x * 14 * 2)}{100}+\frac{((13900-x) * 11 * 2)}{100}= 3508$

$\frac{28x}{100}+\frac{(13900 – x) * 22}{100} = 3508$

6x = 45000

x = 45000/6

x = 7500

Hence, the sum invested in Scheme II = 13900 – 7500 = Rs. 6400

Correct option: C

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Tips And Tricks And Shortcuts For Simple Interest Problems

Tips, Tricks & Shortcuts To Solve Simple Interest in Aptitude

To know the latest Tips and tricks and shortcuts of Simple Interest problems, go through the page entirely.

Easy Tips & Tricks, Shortcuts of Simple Interest are given below:

DefinitionSimple interest is the interest calculated on the principal portion of a loan or the original amount. Simple interest does not compound, meaning that lender will only gain interest on the principal amount , and a borrower will never have to pay interest on interest already accrued. Simple Interest = $\mathbf{\frac{P * R * T}{100}}$.

General Formula and Shortcuts for Simple Interest

- Simple Interest= **\mathbf{\frac{P * R * T}{100}}**
- Simple interest is calculated by multiplying the interest rate and principal and number of days.
- Here, are quick and easy tips and tricks on Simple Interest problems learn easily tricks and tips on SI and efficiently in competitive exams and recruitment drive process.
- There are mainly 2 types of questions asked in exams. However, these questions can be twisted to check the students' understanding level of the topic.

Simple Interest Shortcut formulas.

- If the interest on a sum of money is **\frac{1}{x}**of the principal, and the number of years is equal to the rate of interest then rate can be calculated using the formula: **\mathbf{\sqrt{\frac{100}{x}}}**

- The rate of interest for t_1 years is r_1%, t_2 years is r_1%, t_3 years is r_3 %. If a man gets interest of Rs x for (t_1+ t_2 + t_3 = n) years, then principal is given by: \mathbf{\frac{x*100}{r_{1}t_{1}}} **+ $r_2t_2 + r_3t_3$**

- If sum of money becomes x times in t years at simple interest, then the rate is calculated as **R =** \mathbf{\frac{100(x-1)}{t}} **%**

- If a sum of money becomes x times in t years at simple rate of interest, then the time is calculated as t = \mathbf{\frac{100(x-1)}{R}}

- If an amount P_1 is lent out at simple interest of R_1% p.a. and another amount of P_2 at simple interest of R_2% p.a, then the rate of interest of the whole sum is given by: **R** = \mathbf{\frac{P_{1}R_{1}+P_{2}R_{2}}{P_{1}+P_{2}}}

Some Tricks to Solve easily

Trick 1:-

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- If a sum of money becomes “n” times in “T years” at simple interest, then the rate of interest per annum can be given be

$$R=\left (\frac{100\left (n-1 \right)}{T} \right)$$

Trick 2:-

- If an amount **P1** is lent out at simple interest of **R1**% per annum and another amount **P2** at simple interest rate of **R2**% per annum, then the rate of interest for the whole sum can be given by

$$R=\frac{P1R1 + P2R2}{P1 + P2}$$

Trick 3:-

- A sum of money at simple interest n1 itself in t1 year. It will become n2 times of itself in (If Rate is constant)

$$\frac{T1}{T2}=\frac{n1-1}{n2-1}\frac{T1}{T2}=\frac{n1-1}{n2-1}$$

Type 1: To find Simple Interest

Question 1. Find the simple interest of Rs 1000 for 10 years at 6% p.a.?

Options:

A. Rs. 60

B. Rs. 6000

C. Rs. 600

D. Rs. 6

Solution: We know that,

SI = p*r*t/100

SI = 1000*6*10/100

SI = 60000/100

SI = Rs. 600

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Correct option: C

Type 2: Simple Interest problem – When Rate of Interest is different for Different Years

Question 1. If a sum of Rs.25000 is given as loan for a period of 4 years with the interest rates 2%, 4%, 5%, and 6% for the 1st, 2nd, 3rd, and 4th year respectively. What is the total amount that has to be paid at the end of 4 years?

Options:

A. Rs. 29250

B. Rs. 29520

C. Rs. 25920

D. Rs. 25290

Solution: As this is a case of Simple Interest we add 2% + 4% + 5% and 6% = 17%.

Amount = Principal + Rate of Interest.

Principal is 100% of the amount.

Therefore,

Amount = 100% + 17%.

Therefore Amount = 117%

Amount = (117*25000)/100

=29250

Correct option: A

Type 3: Simple Interest problems To find the (Rate of Interest, Time period, Principal)

Question 1. A sum of money becomes 5 times in 20 years. Calculate the rate of interest.

Options:

A. 20%

B. 13%

C. 15%

D. 25%

Solution: We know that, If sum of money becomes x times in t years at simple interest, then the rate is calculated as

R = 100 (x-1)/t %

R = 100 (5-1)/20

R = 100 (4)/20

R = 400/20

R = 20%

Correct option: A

Question 2 : In an investment at 10% per annum simple interest after 2 years the interest received by Ryan is Rs. 580. What will be the principal amount that Ryan invests ?

Options

(A) 3000 Rs

(B) 2000 Rs

(C) 2900 Rs

(D) 2500 Rs

Solution: S.I = $\frac{P\times R\times T}{100}$

$580 = \frac{(P\times 10\times 2)}{100}$

$P = \frac{580\times 100}{10\times 2}$

P = 2900 Rs

Compound Interest Formulas

Compound Interest Formulas in Aptitude

On this page we have discussed Compound Interest formulas, definition with examples.

Compound Interest in Maths

Compound interest is a concept in mathematics and finance that refers to the interest earned or paid on an initial amount of money, called the principal, as well as any accumulated interest from previous periods. Unlike simple interest, where interest is only calculated based on the initial principal, compound interest takes into account both the initial amount and the interest earned over time.

Compound Interest Formula $P\left(1+ \mathbf{\frac{r}{100n}}\right)^{nT} - P$

Compound Interest Formula

- Compound interest is the interest calculated on the original principal and on the accumulated past interest of a deposit or loan. Compound interest is calculated based on the principal, interest rate (APR or annual percentage rate), and the time involved.

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Formula of Compund Interest (CI) = $P (1+ \mathbf{\frac{r}{100n}})^{nT} - P$

Formula of Amount = CI +P

$= P (1+ \mathbf{\frac{r}{100n}})^{nT} - P + P$

Here, P = Principal

r = rate of interest

T = the number of years the amount is deposited or borrowed for.

n= the number of times that interest is compounded per unit ‘t’.

Times(in years)	Amount	Interest
1	$P\left (1-\frac{R}{100} \right)$	$\frac{PR}{100}$
2	$P\left (1-\frac{R}{100} \right)^2$	$P\left (1-\frac{R}{100} \right)^2-P$
3	$P\left (1-\frac{R}{100} \right)^3$	$P\left (1-\frac{R}{100} \right)^3-P$
4	$P\left (1-\frac{R}{100} \right)^4$	$P\left (1-\frac{R}{100} \right)^4-P$
n	$P\left (1-\frac{R}{100} \right)^n$	$P\left (1-\frac{R}{100} \right)^n-P$

Important Compound Interest formulas

- **Formulas for Compound Interest (When Interest is Compound Annually)**
  - Amount = $P\mathbf{(1+ \frac{r}{100})^{T}}$
  - Compound Interest =Total amount – Principal
  - Rate of interest (R) = $[\mathbf{(\frac{A}{P})^{\frac{1}{T}}}- 1]$%
- **Formulas of Compound Interest (When Interest is Compound Half Yearly)**
  - Amount = $P (1+ \mathbf{\frac{{\frac{r}{2}}}{100})^{2T}}$
  - Compound Interest = Total amount – Principal
- **Compound Interest Formulas (When Interest is Compound Quarterly)**
  - Amount = $P (1+ \mathbf{\frac{{\frac{r}{4}}}{100})^{4T}}$

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- Compound Interest = Total amount – Principal

- **Formulas of Compound Interest (When Interest is Compound Monthly)**
  - Amount = **P** $(1+ \mathbf{\frac{\frac{r}{12}}{100}})^{12T}$

- **Compound Interest Formulas (When Interest is Compounded Annually but time is in fraction, say $2(\mathbf{\frac{3}{2}})$ years)**
  - Amount = **P** $(1+ \mathbf{\frac{r}{100}})^{2}(1+ \mathbf{\frac{\frac{3}{2}r}{100}})$

- **Formulas of Compound Interest (When rates are different for different years)**
  - Amount = P $(1+\frac{r_{1}}{100}) (1+\frac{r_{2}}{100}) (1+\frac{r_{3}}{100})$

- **Formulas for Compound Interest (Present worth of Rs. x due n years)**
  - Present worth = $\frac{x}{(1+\frac{r}{100})}$

Problems Based on Formulas Of Compound interest with solutions

Question 1 . Find the amount on Rs 16000 for 3 year at 5% per annum compounded annually n.

[A] Rs. 18562

[B] Rs. 18550

[C] Rs. 18952

[D] Rs. 18552

Solution : According to the formula of Compound Interest

Amount = **P** $(1+ \mathbf{\frac{r}{100}})^{n}$

Amount = $16000 (1+ \mathbf{\frac{5}{100}})^{3}$

Amount = $16000 (1+ \mathbf{\frac{1}{20}})^{3}$

Amount = $16000 (\mathbf{\frac{21}{20}})^{3}$

Amount =18552

Correct Option: D

Question 2 . Find the compound interest on Rs. 10,000 at 20% per annum for 5 years 4 months, compounded annually is :

[A] Rs. 16600

[B] Rs. 16544

[C] Rs. 15644

[D] Rs. 16500

Solution : According to the Formula of Compound Interest ,

CI = **P** (1+ \mathbf{\frac{r}{100}})^{n} **– P**

CI = **10,000** (1+ \mathbf{\frac{20}{100}})^{5\frac{1}{3}} **– 10,000**

CI = **10,000** (1+ \mathbf{\frac{1}{5}})^{5\frac{1}{3}} **– 10,000**

CI = **10,000** (1+ \mathbf{\frac{1}{5}})^{5}(1+ \mathbf{\frac{1}{3*5}}) **– 10,000**

CI = **10,000** (1+ \mathbf{\frac{1}{5}})^{5}(1+ \mathbf{\frac{1}{3*5}}) **– 10,000**

CI = **10,000** (1+ \mathbf{\frac{1}{5}})^{5}(1+ \mathbf{\frac{1}{15}}) **– 10,000**

CI = **10,000** (\mathbf{\frac{6}{5}})^{5}(\mathbf{\frac{16}{15}}) **– 10,000**

On Solving ,

CI = 26544 – 10,000

CI = 16544

Correct Option: B

Question 3. Dobi borrowed a sum of Rs 78,000 at 10% p.a compound interest for 2 years. He repaid some amount at the end of 1st year. If Dobi cleared the debt by repaying Rs 35200 at the end of the 2nd year. How much did he repay at the end of 1st year?

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[A] 72460

[B] 53800

[C] 18330

[D] 83787

Solution: Using CI formula,
Total amount on compound interest
P = 78000
R= 10%
A = P(1+R/100)n
78000(1 + \frac{10}{100}) = 85800
Let us assume he repaid y Rs at the end of 1st year
(85800 – y) *(1 + \frac{10}{100}) = 35200
85800 – y = 32000

y = 53800

Correct Option: 53800

Question 4 . If the compound interest on a sum of Rs 72000 at 10% p.a for t years is Rs 23832, what is the value of t?

[A] 9

[B] 1

[C] 2

[D] 3

Solution: As C.I for the 1st year = S.I

Interest for 1st year = 73000*\frac{10}{100}

= 7200 Rs

As interest on interest is C.I

Interest for the 2nd year = 7200 + 7200*\frac{10}{100}

= 7200 + 720 = 7920

Interest for the 3rd year = 7920 + 7920\frac{10}{100}

= 7920 + 792 = 8712

Total interest at the end of 3 years = 7200 + 7920 + 8712

= 23832

Therefore t = 3

Correct Option= 3

Question 5 . The Compound Interest on a certain amount at a certain rate of interest, for the 7th and 8th year, was Rs 2180 and Rs 2659.6 respectively. Find the rate of interest per annum.

[A] 3

[B] 12

[C] 22

[D] 28

Solution: Using interest on interest is C.I

Let r be rate of interest

2180 + 21.8r = 2659.6

21.8r = 2659.6 – 2180

r = 22

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How To Solve Compound Interest Questions Quickly

Solve Compound Interest Problems Quickly

Go through the page completely to know How To Solve Compound Interest Quickly.

Compound Interest Compound interest is the multiplication of the initial principal amount and one plus the annual interest rate raised to the number of compound periods minus one i.e Compound Interest
Compound Interest Formula$CI = P\left(\left(1+ \mathbf{\frac{r}{100n}}\right)^{nT} - 1 \right)$

Definition of Compound Interest

- Compound interest is the interest calculated on the original principal and on the accumulated past interest of a deposit or loan.
- Compound interest calculated by multiplying the original principal amount one plus the annual interest rate raised to the number of compound periods minus one.
- Basic Formula for the Compound Interest ,

$A = P\left(1 + \mathbf{\frac{r}{n}}\right)^{nt}$

Here, A = Amount

P = Principal

r = Interest rate(decimal)

n = number of times interest is compounded per unit ‘t’

t = total time

Type 1: Problems on Compound Interest (Yearly, Quarterly, and Half-yearly)

Question 1 . If a sum of Rs.100 is invested for 10% p.a at CI then the sum of the amount will be Rs.121 in

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Options:

A. 2 years

B.1 year

C.1.5 years

D. 3 years

Solution: We know that, **Amount =P**(1+ \mathbf{\frac{r}{100}})^{t}

121 = 100 (1 + \frac{10}{100})^t

(\frac{121}{100}) = (\frac{11}{10})^t

(\frac{11}{10})^2= (\frac{11}{10})^t

t = 2 years

Correct option: A

Question 2. Find the CI on Rs. 10,000 in 2 years at 2 % per annum, the interest being compounded half-yearly.

Options:

A. 408

B. 406.04

C. 409.03

D. 405.50

Solution: According to the question

P =10000, r = 2%, t = 2

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We know that,

Amount = **P** $\mathbf{(1+ \frac{{\frac{r}{2}}}{100})^{2t}}$

A = 10000 $\mathbf{(1+ \frac{{\frac{2}{2}}}{100})^{2*2}}$

A = 10000 $\mathbf{(1+ \frac{1}{100})^{4}}$

A = 10000 $(1+ 0.01)^4$

A = 10000 $(1.01)^4$

A = 10000 (1.04)

A = 10406.04

Now, CI = A – P

CI = 10406.04 – 10000

CI = 406.04

Correct option: B

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Question 3. Find the CI on Rs. 2000 in 9 months at 12% p.a. if the interest is calculated quarterly.

Options:

A. 251.01

B. 251

C. 304

D.185.45

Solution: According to the question,

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P = 2000, r = 6%, t = 9 months (3 quarter)

We know that,

Amount = $P \left(1+ \frac{{\frac{r}{4}}}{100}\right)^{4t}$

A = $2000 \left(1+ \frac{{\frac{12}{4}}}{100}\right)^{4*\frac{9}{12}}$

A = $2000 \left(1+ \frac{{\frac{12}{4}}}{100}\right)^{4*\frac{3}{4}}$

A = $2000 \left(1+ \frac{3}{100}\right)^{3}$

A = $2000 (1+0.03)^3$

A = $2000 (1.03)^3$

A = 2000 (1.09)

A = 2185.45

Now, CI = A – P

CI = 2185.45– 2000 = 185.45

Correct option: D

Type 2: When Rate of Interest, Time period, Principal are given

Question 1. The CI on Rs. 20,000 at 6% per annum is Rs. 2472. Find the period (in years):

Options:

A. 2

B. 4

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C. 5

D. 3

Solution: Amount = 20000 + 2472 = Rs. 22472

Let the time = n years

So, $20000 (1+ \frac{6}{100})^{n} = 22472$

$(\frac{106}{100})^{n} = (\frac{22472}{20000}) = (\frac{11296}{10000}) = (\frac{106}{100})^{2}$

Therefore, n = 2 years

Correct option: A

Question 2. The principal amount is put on CI for two years at 40%. It gets 964 more if the interest is payable half yearly. Calculate the sum.

Options:

A. Rs 8485
B. Rs 8485.91
C. Rs 8480
D. Rs 8455.91

Solution: Let us assume the Principal as Rs. 100

When compounded annually

$A = 100 (1+ \frac{40}{100})^{2}$

A= 196

When compounded half yearly

$A = 100 (1+ \frac{\frac{40}{2}}{100})^{4}$

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$A = 100 (1+ \frac{20}{100})^{4}$

A = 207.36

Difference, 207.36 – 196 = 11.36

If difference is 11.36, then Principal = Rs 100

If difference is 964, then Principal = $(\frac{100}{11.36}) \times 964$

P = Rs 8485.91

Correct option: B

Question 3. In what time the CI on Rs 800 at 30% pa will amount to Rs.1352 if calculated annually?

Options:

A. 3 years
B. 1.6 years
C. 2 years
D. 5 years

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Solution: We know that,

Amount = $P (1+ \frac{r}{100})^{t}$

$1352 = 800 (1+ \frac{30}{100})^{t}$

$(\frac{1352}{800}) = (1.3)^{t}$

$1.69 = (1.3)^{t}$

$1.69 = (1.3)^{2}$

Therefore, t = 2 years

Correct option: C

Type 3: When difference of compound and simple interest is given

Question 1. If the difference between compound interest and simple interest on a certain principal amount is Rs 500 at 10% p.a. for 2 years. Then calculate the sum.

Options:

A. 45000
B. 50000
C. 55000
D. 5000

Solution: Given the difference between SI and CI = 500

Time = 2 years

When the difference between SI and CI is of **two years** then,

Difference = P \mathbf{ \frac{(R)^{2}}{(100)^{2}}}

Where P = principal amount, R = rate of interest

According to the question:

500 = P \frac{(10)^{2}}{(100)^{2}}

P = 50,000

Correct option: B

Question 2. The difference between CI and SI on an amount of Rs. 15,000 for 2 years is Rs. 96. Find the rate of interest?

Options:

A. 8%
B. 5%
C. 4%
D. 3%

Solution: **Difference = P ×** \mathbf{ \frac{(R)^{2}}{(100)^{2}}}

96 =15000 **×** \frac{(R)^{2}}{10000}

\frac{96 ×10000 }{15000} =R^{2}

R^{2} = 64

R = 8%

Correct option: A

Question 3. The difference between CI and SI calculated annually on a certain amount of money for two years at 4% pa is Re. 1. Find the sum:

Options:

A. 600
B. 700
C. 650
D. 625

Solution: When the difference between SI and CI is of two years then,

Difference =P × \mathbf{ \frac{(R)^{2}}{(100)^2}}

Where P = principal amount, R = rate of interest

1 = P **×** \frac{(4)^{2}}{(100)^2}

P = 625

Correct option: D

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Type 4: Problem related to sum of money becomes x time in ‘a’ years and y times in ‘b’ years.

Question 1. A sum of money borrowed under CI gets double in 5 years. When will it become eight times of itself if the rate of interest remains same?

Options:

A. 15 years
B. 20 years
C. 10 years
D. 5 years

Solution: We know that,

$(x)^{\frac{1}{a}} =(y)^{\frac{1}{b}}$

$(2)^{\frac{1}{5}} =(8)^{\frac{1}{b}}$

$(2)^{\frac{1}{5}} =(2)^{\frac{3}{x}}$

$\frac{1}{5} =\frac{3}{x}$

x = 15 years

Correct option: A

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Question 2. If a certain amount of sum becomes 9 times in 2 years at compound interest, then find out the rate of interest?

Options:

A. 250%
B. 100%
C. 200%
D. 20%

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Solution: We know that,

$r = 100 ((\frac{A}{P})^{\frac{1}{t}} - 1)$

Therefore,

$r = 100((\frac{9P}{P})^{\frac{1}{2}} - 1)$

$r = 100 (9^{\frac{1}{2}} - 1)$

$r = 100 (3-1) = 100*2$

$r = 200\%$

Correct option: C

Question 3. At what rate percentage will certain amount of money become 8 times in three years?

Options:

A. 113. 79%
B. 100%
C. 110. 79%
D. 130%

Solution: We know that

$r = 100 ((\frac{A}{P})^{\frac{1}{t}} - 1)$

$r = 100 ((8)^{\frac{1}{3}} - 1)$

$r = 100 * (2-1)$

$r = 100\%$

Correct option: B

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Type 5: How To Solve Compound Interest Quickly (When rates are different for different years)

Question 1. Ravi took an amount of Rs.20000 as loan at CI charging 5%, 10% and 20% for the 1st year, 2nd year, and 3rd year respectively. Find out the total interest to be paid by Ravi at the end of the 3rd year?

Options:

A. Rs. 7270

B. Rs. 2270

C. Rs. 7720

D. Rs. 7027

Solution: According to the question,

P = 20000

R = 5%, 10%, and 20%

T= 1, 2, and 3 years

Amount = 20000 (1+\frac{5}{100}) (1+\frac{10}{100})(1+\frac{20}{100})

Amount = 20000 (\frac{105}{100}) (\frac{110}{100})(\frac{120}{100})

Amount = (20000) (1.05) (1.1) (1.2)

Amount = 27720

We know that, CI = A – P

CI = 27720 – 20000

CI = Rs. 7720

Correct option: C

Question 2. If the rate of CI for the 1st year is 8%, 2nd year is 10%, and for 3rd year is 15% then find the amount and the CI on Rs 10000 in three years.

Options:

A. 3626

B. 6236

C. 3666

D. 3662

Solution: We know that, Amount = P $(1 + \frac{r_{1}}{100})$ $(1 + \frac{r_{2}}{100})$ $(1 + \frac{r_{3}}{100})$

Amount = 10000 $(1+\frac{8}{100})$ $(1+\frac{10}{100})$ $(1+\frac{15}{100})$

Amount = 10000 (1.08) (1.1) (1.15)

Amount = 13662

Now, CI = amount −principal

CI = 13662 – 10000

CI = 3662

Correct option: D

Question 3. Karan bought a bike of Rs. 60000 by paying cash. He borrowed the cash from his friend at rate of interest 5% for the 1st year and 15% for the 2nd year. Find out the total amount he has to pay after 2 years to his friend.

Options:

A. Rs. 72450

B. Rs. 74250

C. Rs. 72540

D. Rs. 75420

Solution We know that, Amount = $P (1+\frac{r_{1}}{100})(1+\frac{r_{2}}{100})$

Amount after two years = $60000 (1+\frac{5}{100}(1+\frac{15}{100}$

Amount after two years = (60000)(1.05)(1.15)

Amount after two years = Rs. 72450

Correct Option: A

Tips Tricks And Shortcuts Of Compound Interest

Compound Interest Tips Tricks And Shortcuts

Compound Interest shortcuts, tips, and tricks are not easy to find at the time of examination. So we came up with a dedicated page to help students at the crucial moment.
Compound Interest can be calculated $CI = P (1+ \mathbf{\frac{r}{100n}})^{nt} - P$
Total Amount $A = P (1+ \mathbf{\frac{r}{100n}})^{nt}$

Important Tips on Compound Interest

- Here, are quick and easy tips and tricks on Compound Interest. Learn the tricks and concept of compound interest.

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- There are mainly 5 types of questions asked in exams. However, these questions can be twisted to check the students understanding level of the topic but it can be solved using tips and tricks.

Important formulae on Compound Interest

- A sum of money placed at compound interest becomes x time in 'a' years and y times in 'b' years. These two sums can be related by the following formula:
  $\mathbf{x^{\frac{1}{a}}=y^{\frac{1}{b}}}$
- If an amount of money grows up to Rs x in t years and up to Rs y in (t+1) years on compound interest, then
  r% = $\mathbf{\frac{y-x}{x}* 100}$
- A sum at a rate of interest compounded yearly becomes Rs. A_1 in t years and Rs. A_2 in (t + 1) years, then
  P = A_1 $(\mathbf{\frac{A_{1}}{A_{2}}})$

Type 1: For different time period (Yearly, Quarterly, and Half-yearly)

Question 1. Find the amount if Rs 50000 is invested at 10% p.a. for 4 years

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Options:

A. 73205

B. 7320.5

C. 73250

D. 73502

Solution: We know that,

Amount = $P (1+ \frac{r}{100})^{n}$

$A =50,000(1+ \frac{10}{100})^{4}$

$A = 50000 (1.1)^4$

A = 73205

Correct option: A

Type 2: To find the Rate of Interest, Time period, Principal

Question 1. The Compound Interest on a sum of Rs 576 is Rs 100 in two years. Find the rate of interest.

Options:

A. 7.33%
B. 4.33%
C. 8.33%
D. 5.33%

Solution: We know that,

Amount = Compound Interest + Principal

A = 576 + 100 = 676

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

$676 = 576\left(1+\frac{r}{100}\right)^{2}$

$\frac{676}{576} = \left(1+\frac{r}{100}\right)^{2}$

$\left(\frac{26}{24}\right)^{2} = \left(1+\frac{r}{100}\right)^{2}$

$\frac{26}{24} = \left(1+\frac{r}{100}\right)$

$\left(\frac{26}{24} - 1\right) = \frac{r}{100}$

$1.0833 - 1 = \frac{r}{100}$

$0.0833 = \frac{r}{100}$

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r = 8.33%

Correct option: C

Type 3: Find sum or rate of interest when compound interest and S.I are given

Question 1. The difference between the CI and SI on a certain amount at 14% p.a. for 2 years is Rs. 100. What will be the value of the amount at the end of three years if compounded annually?

Options:

A. 7558.89
B. 7500.45
C. 7558
D. 7554.56

Solution: We know that, Difference between CI and SI for 2 years ,

Difference $= \frac{P(R)^{2}}{(100)^{2}}$

$100 = \frac{P(14)^{2}}{(100)^{2}}$

$P =\frac{100(100)^{2}}{(14)^{2}}$

$P =\frac{1000000}{196}$

P = 5102.04

Now calculate the CI on Rs. 5102.04

$A = 5102.04 (1+ \frac{14}{100})^{3}$

$A =5102.04 (\frac{114}{100})^{3}$

A = 5102.04 * 1.48

A= 7558.89

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Correct option: A

Type 4: (When sum of money becomes x time in ‘a’ years and y times in ‘b’ years.)

Question 1. A sum of money placed at compound interest doubles itself in 8 years. In how many years will it amount to 32 times itself?

Options:

A. 40 years
B. 50 years
C. 32 years
D. 35 years

Solution: We know that,

$x^{\frac{1}{a}} = y^{\frac{1}{b}}$

$2^{\frac{1}{8}} = 32^{\frac{1}{x}}$

$2^{\frac{1}{8}} = 2^{\frac{5}{x}}$

$\frac{1}{8} = \frac{5}{x}$

x = 40 years

Correct option: A

Type 5: When C.I. Rates are different for different years

Question 1. Find the compound interest on a sum of money of Rs.10000 after 2 years, if the rate of interest is 2% for the first year and 4% for the next year?

Options:

A. Rs. 304
B. Rs. 608

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C. Rs. 1000

D. Rs. 710

Solution: We know that,

Amount = $P (1+\frac{r_{1}}{100}) (1+\frac{r_{2}}{100}) (1+\frac{r_{3}}{100})$

Here, r_1 = 2% r_2 = 4% and p = Rs.10000,

CI = A – P

CI = $10000 (1 + \frac{2}{100}) (1 + \frac{4}{100}) - 10000$

CI = $10000 * (\frac{102}{100})(\frac{104}{100}) - 10000$

CI = $10000 * (51 * \frac{52}{2500}) - 10000$

CI = $10000 * (\frac{2652}{2500}) - 10000$

CI = 10000 * (1.06) – 10000

CI = 10608 – 10000

CI = 608

Hence, the required compound interest is Rs. 608.

Correct option: B

Percentages Formulas

Percentages Formulas and Application

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The word “Percentage” was coined from the Latin word “Percentum” which means “by hundred”, therefore, it is said that percentages are the fractions with 100 in the denominator. This Page from here on contains Percentages formulas and definition.

Percentage Formula To determine the percentage, we have to divide the value by the total value and then multiply the resultant by 100. \left (\frac{Value}{Total.Value} \right)\times100

Formulas for Percentages & Definitions

- In mathematics, a percentage is a number or ratio expressed as a fraction whose denominator (bottom) is 100.

  Thus, x percent means x hundredths, written as x%.

  We express x% as a fraction as \frac{x}{100}
- For example 10% = \frac{10}{100} = \frac{1}{10}

Percentages Difference Formula

- If we are given with two values and we need to find the percentage difference between these two values, then it can be done using the formula:
- Percentage.Difference =\left \| \frac{N1+N2}{\left [\frac{N1+N2}{2} \right]} \right \|\times100

Formulas & Basic Concept of Percentages

- To calculate a % of b = \mathbf{\frac{a}{100} × b }
- To find what percentage of a is b = \mathbf{\frac{b}{a} × 100}
- To calculate percentage change in value

  Percentage change = \mathbf{\frac{Change}{Initial Value }× 100 }
- Percentage Increase or Decrease
  - Percentage increase = \mathbf{\frac{R}{100 + R } × 100 } %

  -

  - Percentage decrease = \mathbf{\frac{R}{100 − R } × 100 } %

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- Successive Percentage Change

  If there are successive percentage increases of a % and b%, the effective percentage increase is: $\mathbf{ a + b + \frac{ab}{100} }$ %

- Succesive Discount :

If there are successive discount of a % and b%, the effective discount is: $\mathbf{ a + b - \frac{ab}{100} }$ %

- Results on population

  Let the population of a town be P now and suppose it increases at the rate of R% per annum, then:

  - Population after n years = $\mathbf{P (1 +\frac{R}{100})^n}$
  - Population n years ago = $\mathbf{\frac{P}{(1 +\frac{R}{100})^n}}$

- Results on Depreciation:

  Let the present value of a machine be P. Suppose it depreciates at the rate of R% per annum. Then:

  - Value of the machine after n years = $\mathbf{P (1 - \frac{R}{100})^n}$
  - Value of the machine n years ago = $\mathbf{\frac{P}{(1 -\frac{R}{100})^n}}$
  - If A is R% more than B, then B is less than A by $\mathbf{\frac{R}{100 + R } \times 100 }$ %
  - If A is R% less than B, then B is more than A by $\mathbf{\frac{R}{100 - R } \times 100 }$ %

- Increase N by S% : N (1 + $\frac{S}{100}$).

- Decrease N by S% : $N\left(1 - \frac{S}{100}\right)$

Question 1 : Peaches are now 50% more expensive at Reliance Smart Point. What percentage reduction in consumption is required to maintain peach expenditure constant?

1. **35 %**
2. **35.50 %**
3. **33.33 %**
4. **32.50 %**

Answer: 3.

Explanation:

If the price of a commodity increases by r%, then the reduction in consumption so as not to increase the expenditure is –

$\left(\frac{r}{100+r}\times 100\right)\%$

Therefore r is the increased price(i.e 50)

By using the formula:

$\left(\frac{50}{100+50}\times 100\right)\%=\frac{50}{150}\times100=33.33\ \%$

Question2 : Jason Statham could set aside 10% of his earnings. However, when his income increased by 20% two years later, he could only save the same amount as before. How much has his spending increased by percentage?

1. **$22\frac{2}{9}\%$**
2. **$21\frac{5}{7}\%$**
3. **$22\frac{2}{8}\%$**
4. **$23\frac{1}{9}\%$**

Answer: 1.

Explanation:

Let earlier income be 100 Rs

∴ Savings = 10% of 100 = 10 Rs

∴ Expenditure = 90 Rs

New Income = 120 Rs

Savings (same as before) = 10 Rs

∴ Expenditure = 120 – 10 = 110 Rs

∴ Increase in Expenditure = 110 – 90 = 20

Percentage Increase= $\frac{20}{90}\times 100\%=22\frac{2}{9}\%$

Question 3 : To pass the NDA Recruitment Test, candidates must receive 290 of the aggregate marks to pass. What is the highest total of marks an applicant can receive if they receive 203 and are considered unsuccessful by 12% of their total scores?

1. **750**
2. **725**
3. **700**
4. **675**

Answer: 2.

Explanation:

Let's maximum aggregate marks = x

203 + 12% of x = 290

12% of x = 290 – 203

$x=\frac{87\times100}{12}=725.$

Question 4: 12. Robert Pattinson is an IT professional who spends 12% of his monthly income on power, 25% of his income on food, 20% of his income on his children's education, 30% of his income on rent, and the rest 1040 on everything else. What is the person's monthly salary?

1. **7500 Rs**
2. **7700 Rs**
3. **7900 Rs**
4. **8000 Rs**

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Answer:4.

Explanation:

Let the monthly salary of the Robert be x. then,

Total spends of Robert = (30 + 25 + 20 + 12) = 87%

Remaining % = 100 – 87 = 13%

So, 13% ≡ 1040

100% ≡ x

Using the cross multiplication method,

$x=\frac{1040\times100}{13}=80\times 100= 8000$ Rs

Question 5 : If Yasir's income is 20% less than Xavier's, by what percentage does Yasir's salary fall short of Xavier's?

1. **16.66 %**
2. **15.50 %**
3. **14.45 %**
4. **13.45 %**

Answer: 1.

Explanation:

Let the salary of Yasir be 100. then,

Salary of Xavier will be 120.

Yasir less than Xavier in %,

$=\frac{120-100}{120}\times 100=\frac{20}{120}\times 100=16.33$ %

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How To Solve Percentage Questions Quickly

How to solve Percentages Problems Quickly

Here you will find easy tricks on How To Solve Percentage Problems quickly.

Percentage Definition In Aptitude , Percentage is the number expressed as a fraction of 100 Or we can say that a fraction with denominator 100 is called a per cent.
Formula\text{Percentage} = \left(\frac{{\text{Percentage Value}}}{{100}}\right) \times \text{Number}

Percentage Questions & Definition

- A percentage is a ratio expressed as a fraction whose denominator (bottom) is 100.Thus, x percent means x hundredths, written as x%.
- A percentage is a fraction of an amount expressed as a particular number of hundredths of that amount.

What is P percent of X?

- Written as an equation: Y = P% × X.
- The 'what' is Y that we want to solve for
- Remember to first convert percentage to decimal, dividing by 100
- Solution: Solve for Y using the percentage formula **Y = P% × X.**

How to calculate the percentage of a number?

- To calculate the percentage of a number, we need to use a different formula such as:
- P% of Number = X
  where X is the required percentage.
- If we remove the % sign, then we need to express the above formulas as;
- P/100 * Number = X

Type 1: Percentage Problems- based on Mixtures and Allegation

Question 1. A general store shopkeeper sells black pepper at some cost price but he mixes it with papaya's seed and thereby gains 25%. Find the percentage of papaya's seed mixed with black pepper?

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Options:

A. 25%

B. 30%

C. 20%

D. 10%

Solution: Let the CP of 1 kg black pepper = Re. 1

The SP of I Kg mixture = Re

1

Gain = 25%

Therefore, CP of 1 Kg

mixture = $\frac{100}{125} \times 1 = \frac{4}{5}$

Ratio of black pepper: papaya seed = $\frac{4}{5}$: $\frac{1}{5}$

Hence, percentage of papaya seed in the mixture = $\frac{1}{5} \times 100 = 20\%$

Correct option: C

Question 2. A bar tender served a jar full of vodka containing 50% alcohol to a customer. After few minutes, the customer asked the bar tender to replace the vodka by another drink containing 19% alcohol and now the percentage of alcohol was found to be 25%. Find out the quantity of vodka replaced?

Options:

A. $\frac{25}{31}$

B. $\frac{20}{31}$

C. $\frac{1}{2}$

D. $\frac{31}{20}$

Solution: By the rule of alligation, we have:

Ratio of 1st and 2nd quantities = 6: 25

By the rule of ratio, if x:y is the ratio, to get the quantity of x, the formula is $\frac{x}{x+y}$,and to get the quantity of y, the formula is $\frac{y}{x+y}$

Therefore, required quantity replaced = $\frac{25}{25 + 6}$ = $\frac{25}{31}$

Correct option: A

Question 3. There is one liquid A which contains 25% of water, the liquid B contains 30% of water. A vessel is filled with 6 parts of the liquid A and 4 parts of the liquid B. Find out the percentage of water in the mixture?

Options:

A. 27%

B. 25%

C. 20%

D. 30%

Solution: Let the capacity of the vessel be 10

So, water from liquid A = 6 × $\frac{25}{100}$ = 1.5

And, water from liquid B = 4 × $\frac{30}{100}$ = 1.2

Total water = 1.5 + 1.2 = 2.7

In terms of percentage = $\frac{2.7}{10}$ ×100 = 27%

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Correct option: A

Type 2: Problems based on Ratios and Fractions

Question 1.If 40% of a number is equal to 2/3rd of another number, what is the ratio of first number to the second number?

Options:

A. 1: 2

B. 2: 3

C. 3: 5

D. 5: 3

Solution: Let the two numbers be x and y

40% of x = $\frac{2}{3}y$

Then, $\frac{40x}{100} = \frac{2}{3}y$

$\frac{2}{5} x = \frac{2}{3}y$

$\frac{x}{y} = \frac{2}{3} \times \frac{5}{2} = \frac{5}{3}$

Therefore the ratio = 5: 3

Correct option: D

Question 2: In a box of 8 donuts ,2 donuts have Choco chip sprinkle on them. Find out how many percent of the donuts in the box has Choco chip sprinkle?

Options:

A. 20%

B. 40%

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C. 25%

D. 10%

Solution: $\frac{2}{8}= \frac{x}{100}$

$8x = 200$

$x = \frac{200}{8}$

$x = 25\%$

Correct option: C

Question 3: Two numbers are respectively 40% and 80% more than a third number. The ratio of the two numbers is:

Options:

A. 6: 5

B. 7: 9

C. 2:5

D. 1:2

Solution: Let the third number x

First number = 40 % more than x = $\frac{140}{100}$ x = $\frac{7}{5}$ x

Second number = 80% more than x = $\frac{180}{100}$ x = $\frac{9}{5}$ x

Therefore their ratio = $\frac{7}{5}$ x : $\frac{9}{5}$ x = 7: 9

Correct option: B

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Tips And Tricks And Shortcuts of Percentage

Tips ,Tricks and Shortcuts of Percentages

Percentages problems can be found in various fields, including mathematics, finance, and everyday situations. Whether you're calculating discounts, tips, or interest rates, here are some tips and tricks and shortcuts of percentages to help you tackle percentage problems:

PercentagesTo determine the percentage, we have to divide the value by the total value and then multiply the resultant by 100.\left(\frac{\text{Part}}{\text{Whole}}\right) \times 100

Tips and tricks and shortcuts on Percentage

- Here, are quick and easy tips and tricks on PrepInsta page for Percentage problems swiftly, easily, and efficiently in competitive exams and other recruitment exams.
- If the value of an item goes up or down by x%, the percentage reduction or increment to be now made to bring it back to the original point is \mathbf{\frac{x}{100 + x } × 100 } %
- If A is x% more or less than B, then B is \mathbf{\frac{x}{100 + x } × 100 } % less or more than A.
- If the price of an item goes up/down by x %, then the quantity consumed should be reduced by \mathbf{\frac{x}{100 + x } × 100 } % so that the total expenditure remains the same.
- Percentage – Ratio Equivalence table

Fraction Percentage

\frac{1}{3} × 100 = 33.33%	\frac{1}{10} × 100 = 10%
\frac{1}{4} × 100 = 25%	\frac{1}{11} × 100 = 9.09%
\frac{1}{5} × 100 = 20%	\frac{1}{12} × 100 = 8.33%
\frac{1}{6} × 100 = 16.66%	\frac{1}{13} × 100 = 7.69%

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$\frac{1}{7} \times 100 = 14.28\%$	$\frac{1}{14} \times 100 = 7.14\%$
$\frac{1}{8} \times 100 = 12.5\%$	$\frac{1}{15} \times 100 = 6.66\%$
$\frac{1}{9} \times 100 = 11.11\%$	$\frac{1}{16} \times 100 = 6.25\%$

Convert Percentages to Decimals or Fractions:

- Sometimes it's easier to work with decimals or fractions rather than percentages. To convert a percentage to a decimal, divide by 100. To convert a percentage to a fraction, simply write it over 100 and simplify if possible.

Practice Decimal Equivalents of Common Fractions:

- Knowing common decimal equivalents of fractions (e.g., 1/4 = 0.25, 1/2 = 0.5, 3/4 = 0.75) can speed up your calculations.

Solving Percentage Increase/Decrease:

- To find the percentage increase or decrease between two values, use the formula: Percentage Change = [(New Value – Old Value) / |Old Value|] * 100

Calculate Reverse Percentages:

- If you have the final amount and the percentage increase/decrease and need to find the original amount, you can use this formula:
  Original Value = Final Value / (1 ± Percentage/100)

Type 1: Percentage Tips and Tricks and Shortcuts- Based on Mixtures and Alligation

Question 1. A small container has 60l of milk and water mixture. It was made by mixing milk and water in which 80% is milk. Rohan came and added some water in the mixture. Now, find out how much water was added to the mixture that the percentage of milk became 60%?

Options:

A. 20 litre

B. 25 litre

C. 2 litre

D. 10 litre

Solution: Given, percentage of milk = 80%

It means, the percentage of water = 20%

In 60L of mixture, water = $\frac{60 \times 20}{100} = \frac{1200}{100}$ = 12 litre

Let the water added = x

Now, $\frac{12 + x}{60 + x} \times 100 = 40$ (it is because in the new mixture milk is 60%, 100 – 60 = 40% water)

1200 + 100x = 2400 + 40x

100x – 40x = 2400 – 1200

60x = 1200

x= 20 litre

Correct option: A

Type 2: Percentage Tips and Tricks – Problems based on Ratios and Fractions

Question 1. If the numerator of a fraction is increased by 50% and the denominator is decreased by 10%, the value of the new fraction becomes $\frac{4}{5}$. Find the original fraction?

Options:

A. $\frac{12}{21}$

B. $\frac{13}{20}$

C. $\frac{12}{25}$

D. $\frac{25}{12}$

Solution: Let original numerator be x

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Let original denominator be y

Let original fraction be $\frac{x}{y}$

According to the question,

Numerator of a fraction is increased by 50% = $\frac{150}{100x}$

Denominator is decreased by 10% = $\frac{90}{100}$

Now, $\frac{\frac{150}{100} x }{ \frac{90}{100} y}= \frac{4}{5}$

$\frac{150x}{90y} =\frac{4}{5}$

$\frac{x}{y}= \frac{4}{5} \times \frac{90}{150}= \frac{12}{25}$

Correct option: C

Type 3: Tips and Tricks and Shortcuts for Percentages- Income, Salary, Expenditure

Question 1. Ajay spends 40% of his salary and saves Rs. 480 per month. Find his monthly salary.

Options:

A. 1000

B. 800

C. 600

D. 850

Solution: Let the salary of Ajay be x

He spends 40% which means he saves 60% of the salary.

60% of x = 480

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$\frac{60}{100}x = 480$

$x = 480 \times \frac{100}{60}$

$x = \frac{48000}{60}$

$x = 800$

Therefore, his monthly salary = 800

Correct option: B

Type 4: Percentage Tips and Tricks and Shortcuts- Problems based on Population

Question 1. Delhi has the population of 3000. In the first year, the population decreases by 4%, and in the second year, it increases by 5%. Find the population at the end of two years?

Options:

A. 3024

B. Remains same

C. 3120

D. 2880

Solution: In the first year, the population decreases by 4% = $3000 \times \frac{96}{100} = 2880$

In the second year it increases by 5% = $2880 \times \frac{105}{100} = 3024$

Correct option: A

Type 5: Problems based on profit and loss

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Question 1. The cost price of 20 chairs is the same as the selling price of x tables. If the profit is 25%, then find the value of x?

Options:

A. 15

B. 20

C. 16

D. 18

Solution: Let the CP of each chair = 1

Therefore CP of x table = x

20 CP = X SP

Profit % = SP/CP

1.25=20/X

X=16

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Correct option: C

Type 6: Percentage Tips and Tricks and Shortcuts

Question 1. If 20% of a = b, then b% of 20 is the same as:

Options:

A. 4% of a

B. 5% of a

C. 10% of a

D. 2% of a

Solution: 20% of a = b

$\frac{20}{100} a = b$

b% of 20 $=\frac{b}{100} \times 20 = \frac{20}{100} \times \frac{20}{100} \times a$

= 4% of a

Correct option: A

Formulas For Profit And Loss

Formulas for Profit and Loss Questions

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Important Formulas for Profit and Loss are given here on this page.

Profit (P) – The amount gained by selling a product for more than its cost price.

Loss (L) – The amount the seller incurs after selling the product less than its cost price is mentioned as a loss.

Profit and Loss Formulas Profit or Gain = Selling price – Cost Price & Loss = Cost Price – Selling Price

Formulas for Profit and Loss

- **Cost Price –** It is basically the price at which a commodity or object is bought at. **e.g.** Shopkeeper buying Sugar from Farmer to sell in his grocery store. In its short form it is denoted as **C.P.**
- **Selling Price –** The price at which the commodity is sold at. e.g. Shopkeeper selling sugar to his customer. In its short form is denoted as S.P.
- **Gain or Profit –** If Cost Price is lesser than Selling Price, gain is made.

- **Loss –** If Cost price is greater than the Selling price, Loss is incurred.

1. C.P in case of gain:

$$\left (\frac{100}{100 + Gain} \right)\times S.P$$

2. C.P in case of Loss:

$$\left (\frac{100}{100 - Loss} \right)\times S.P$$

3. S.P in case of Gain:

$$\left (\frac{100 + Gain}{100} \right)\times C.P$$

4. S.P in case of Loss:

$$\left (\frac{100 - Loss}{100} \right)\times C.P$$

Other Important Formulas for Profit and Loss

Profit	Loss
CP<SP	CP>SP
Profit% = $\frac{profit}{\text{ Cost Price}}\times100$	Loss% = $\frac{Loss}{\text{ Cost Price}}\times100$
Cost Price = $\frac{Profit}{\text{Profit Percentage}}\times 100$	Loss = $\frac{\text{ Loss Percentage}}{100}\times$ Cost Price
Profit = $\frac{\text{ Profit Percentage}}{100}\times$ Cost Price	Cost Price= $\frac{Loss}{\text{Loss Percentage}}\times 100$

Some Important Formulas for Profit and Loss

- Profit = Selling Price – Cost Price
- Loss = Cost Price – Selling Price
- Profit % = (Profit / Cost Price) × 100%
- Loss% = (Loss / Cost Price) × 100%
- Selling Price = [(100 + Profit%)/100] × Cost Price
- Cost Price = [100/(100 + Profit%)] × Selling Price
- Selling Price = [(100 – Loss%)/100] × Cost Price
- Cost Price = [100/(100 – Loss%)] × Selling Price
- Discount = Marked Price – Selling Price

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Other Important Formulas

1. If you sell two items at same selling price "s" first at x% profit and 2nd one at x% loss. Then a loss is incurred always, which is given by

$(\frac{x}{10})^2$

2. Discount Percentage :

$\left(\frac{Discount}{Marked \: Price} \right)\times 100$

3. Successive discounts:

If d1% , d2% d3%are successive discounts on marked price,
Selling price=marked price $\left(\frac{100-d_{1}}{100}\right)\times \left(\frac{100-d_{2}}{100}\right)\times \left(\frac{100-d_{3}}{100}\right)$

Note:
(a) If there is no discount, the marked price is equal to the selling price
(b) Discount is always calculated on marked price unless otherwise stated.

Question 1:

The small vegetable vendor bought some quantities of carrots and potatoes. If the cost price of 24 carrots is the same as the selling price number of a particular number of potatoes, then find the number of potatoes. (Given that the profit% is 50%)

1. **12**
2. **16**
3. **20**
4. **24**

Answer: 16

Solution:

Let's say the required number of potatoes is p.

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It is given that CP of 24 potatoes is same as the SP of p number of potatoes

So, 24(CP) = p(SP)

$\Rightarrow \frac{SP}{CP} = \frac{24}{p}$

Now, given profit% = 50%.

So, $\Rightarrow \frac{\text{(SP-CP)}}{CP} = \frac{50}{100} = \frac{1}{2}$

$\Rightarrow \frac{24-p}{p} = \frac{1}{2}$

$\Rightarrow p = 2 \times (24-p) = 48 - 2p$

$\Rightarrow 3p = 48$

$\Rightarrow p = 16$

Question 2

If the selling price triples, the new profit becomes six times the initial profit. Find the profit percentage.

1. **66%**
2. **55.55%**
3. **66.66%**
4. **24%**

Answer: 66.66%

Solution:

Let the CP be Rs. x and SP be Rs. y.

According to the question, when selling price triples, the new profit becomes six times the initial profit.

Initial profit = y – x New profit = 6(y – x)

Therefore $\Rightarrow 6(y - x) = (3y - x)$

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$\Rightarrow 6y - 6x = 3y - x$

$\Rightarrow 3y = 5x$

$\Rightarrow y = \frac{5x}{3}$

Soo, profit = $y - x = \frac{5x}{3} - x = \frac{2x}{3}$

Profit % = $\frac{\text{Profit}}{CP} \times 100$

$= \frac{\frac{2x}{3}}{x} \times 100$

= 66.66%

Question 3

A shopkeeper mixes 10kg of pulses at Rs 5 per kg with 30 kg of pulses of another variety at Rs. 15 per kg. He then sells the mixed pulses at Rs. 20 per kg. How much is the profit or loss percentage?

1. 60% Profit
2. 60% Loss
3. 50% Profit
4. No profit no loss

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Answer: 60% Profit

Solution:

Total amount of pulses = 10 kg + 30 kg = 40 kg.

CP of 40kg pulses = (10 *5) + (15 * 30) = Rs. 500

Rate at which he sells pulses = Rs. 20 per kg.

SP of 40kg pulses = 20 * 40 = Rs. 800

Therefore, the profit he makes = Rs. (800 – 500) = Rs. 300

Profit % = $\frac{300}{500} \times 100$ = 60% profit

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Question 4

During the end of the season sale, the owner of an apparel store decided to increase the price of clothes by 30%, and then introduced two successive discounts of 10% and 15%. What is the profit or loss percentage?

1. **5% loss**
2. **6.33% loss**
3. **5.3% profit**
4. **No profit no loss**

Answer: 5.3% profit

Solution:

Let the CP of one product be Rs. 100

A 30% increase in price means the selling price of that product = Rs. 130

10% discount on Rs. 130 = \frac{130 \times 10}{100} = Rs. 13

So, the first selling price = (130 – 13) = Rs. 117

Now, 15% discount is applied to this new SP, = \frac{117 \times 10}{100} = Rs. 11.7

So, the final SP = 117 – 11.7 = Rs. 105.3

The CP of the apparel was Rs. 100 and the final SP was Rs. 105.3. So, profit = Rs. 5.3

Therefore, the Profit% = \frac{5.3}{100} \times 100 = 5.3% profit

Question 5

Assume you want to gift your friend his favorite novel for his birthday. The selling price of the novel at a bookstore is Rs. 600, including the taxes. The rate of tax is 10%. If the bookseller made a profit of 20%, then what is the cost price of the book?

1. **200**
2. **400**
3. **500**
4. **None of the above**

Answer: 500

Solution:

As 10% is tax for the selling price of the book, we can say that 110% of SP = 600

So, SP = $\frac{600 \times 100}{110}$

Therefore, CP = $\frac{110 \times \frac{600 \times 100}{110}}{120}$

= Rs. 500.

How To Solve Profit And Loss Question Quickly

How to solve Profit and Loss Questions Quickly

Profit and Loss is the most important topic in quantitative section of all the job entrance exams. This page here on contains information about how to solve Profit and Loss questions Quickly.

Gain or Profit If Cost Price is lesser than Selling Price, gain is made.
LossIf Cost price is greater than the Selling price, Loss is incurred

Basic Concepts on Profit and Loss

Concepts to solve Profit and loss questions:

- **Cost Price –** Cost Price is the price at which an article is purchased by the buyer. It is abbreviated as C. P.
- **Selling Price –** Selling Price is the price at which any material or commodity is sold to known. **For ex**– Rahul is selling sugar. Here selling refers to SELLING PRICE .
- **Gain or Profit –** If SP is greater than CP then the seller is said to have profit or gain.

Profit and Loss Formula

Basic Concepts of Profit and Loss

- **Use Unitary Method**: If the profit or loss is given on a single item, you can use the unitary method to find the profit or loss on multiple items quickly. For example, if the profit on one item is $5, the profit on 6 items would be 6 times $5.
- **Shortcut for 10%**: To calculate 10% of any amount, simply move the decimal point one place to the left. For example, 10% of $50 is $5.
- **Shortcut for 5%**: To calculate 5% of any amount, first find 10% using the above shortcut and then halve it. For example, 5% of $60 is (10% of $60)/2 = $6/2 = $3.
- **Discounts and Markups**: If the question involves discounts or markups, understand that a discount is a reduction from the selling price, and a markup is an increase over the cost price.
- **Reversal Method**: If the cost price and the profit percentage are given, but the selling price needs to be found, you can use the reversal method. Divide the profit percentage by 100, add 1, and then multiply it by the cost price to find the selling price. For example, if the cost price is $80 and the profit percentage is 25%, the selling price would be (1 + 0.25) x $80 = $100.

Basic Formulas of Profit and Loss

- **Profit (P):**

  Profit = Selling Price (SP) – Cost Price (CP)
- **Loss (L):**

  Loss = Cost Price (CP) – Selling Price (SP)
- **Profit Percentage (Profit %):**

  $Profit\%=\frac{Profit}{Cost.Price}\times100$
- **Loss Percentage (Loss %):**

  $Loss\% = \frac{Loss}{\text{ Cost Price }}\times100$
- **Marked Price (MP) and Discount Percentage (Discount %):**

  $Discount = \frac{\text{ Discount Precentage}}{100}\times {\text{Marked Price}}$
- **Discount Percentage (Discount %):**

  $Discount\%=\frac{Discount}{\text{ Marked Price}}\times100$

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How to Solve Profit and Loss Questions Quickly

Question 1. A man sold an article at a loss of 20%. If he has sold that article for Rs. 12 more he would have gained 10%. Find the cost price of that article :

Options:

A. Rs. 60

B. Rs. 40

C. Rs. 30

D. Rs. 22

Solution:

Assume the cost of article is x

the person sold at 20% loss

Loss = $\frac{CP - SP}{CP}$

= $(x-S.P)/x$

= $20/100$

∴ S.P = $0.8x$

If he had sold it for Rs. 12 more, then he would have gained 10%.

Gain % = $\frac{SP - CP}{CP}$

= $\frac{0.8x + 12 - x}{x}$

= $\frac{10}{100}$

∴ $12-0.2x=0.1x$

$\therefore 12=0.3x$

$\therefore x=40$Ans.

Correct option: B

Question 2. If on an item a company gives 25% discount, they earn 25% profit. If they now give 10% discount then what is the profit percentage.

Options:

A. 40%

B. 55%

C. 35%

D. 30%

Solution: Let the cost be Rs x.

After giving 25% discount it becomes 0.75x

Selling price = 0.75x which gives 25% profit… (1)

Thus, after giving 10% discount it becomes 0.90x

Selling price = 0.90x …… (2)

From (1) and (2),

0.90x will gives $\frac{25 \times 0.90x}{0.75x}$ = 30 % profit.

Correct option: D

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Question 3.Shopkeeper bought a product for Rs1000 per kg and is selling that at the same price. However he uses, a weighing scale that gives scale of 1kg for every 800gms. What is his profit?

Options:

A. 56% profit

B. 55% loss

C. 25% profit

D. None of these

Solution: $Gain\% = \frac{True\: weight – False\: weight}{False\: weight}\times 100$

$= \frac{1000 – 800}{800}\times 100$

$= \frac{2}{8}\times 100$

= 25% profit

Correct option: C

How To Solve Questions based on given Percentage

Question 4. A shopkeeper bought a watch for Rs.400 and sold it for Rs.500.What is his profit percentage?

Options:

A. 35%

B. 25%

C. 30%

D. 20%

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Solution: Cost price=400

Selling price=500

profit%= $\frac{Total \: Profit}{Cost\: Price} \times 100$

profit=500-400=rs.100

profit%= $\frac{100}{400} \times 100$

= $\frac{100}{4}$

=25%

Correct option: B

Question 5. A person bought an article and sold it at a loss of 10%. If he had bought it for 20% less and sold it for Rs.55 more he would have had a profit of 40%. The cost price of the article is.

Options:

A. 125

B. 150.5

C. 112.5

D. None

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Solution: Now x is CP , sold it at a loss of 10%= $\frac{90x}{100}$= $\frac{9x}{10}$

Bought it for 20% less= $\frac{80x}{100}$= $\frac{4x}{5}$

profit 40%of $\frac{4x}{5}$= $\frac{140}{100}$× $\frac{4x}{5}$= $\frac{56x}{50}$

$\frac{56x}{50}$– $\frac{9x}{10}$=55rs

$\frac{560x-450x}{500}$ =55rs

$\frac{110x-}{500}$=55rs

x= $\frac{500*55}{110}$

x= $\frac{27500}{110}$=250

X-250

Correct option: D

Question 6. If on an item a company gives 25% discount, they earn 25% profit. If they now give 10% discount then what is the profit percentage.

Options:

A. 40%

B. 55%

C. 45%

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D. 30%

Solution: Let the cost be Rs x.

After giving 25% discount it becomes 0.75x

Selling price = 0.75x which gives 25% profit...(1)

Thus, after giving 10% discount it becomes 0.90x

Selling price = 0.90x ......(ii)

From (1) and (2),

0.90x will gives = \frac{25 * 0.90x}{0.75x}
= 30 % profit.

Correct option: D

Question 7. A cow and a horse are bought for Rs 200000. The cow is sold at profit of 20% and the horse at a loss of 10%.the overall gain is Rs 4000. The cost price of cow is?

Options:

A. 36000

B. 80000

C. 54000

D. 45000

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Solutions: Let, the cost price of cow be c and that of horse be h.

Then,

c+h=200000

Selling price of Cow & Horse = $\frac{6c }{5} + \frac{9h}{10}$
= $\frac{12c + 9h}{10}$

now, $\frac{12c + 9h}{10}$=204000

12c+9h =2040000 .....(eq 1)

12c+12h=2400000 .....(eq 2)

3h = 360000

=> h= Rs.120000

c=200000-120000
=80000

Cost of cow = Rs. 80000

Cost of Horse=Rs. 36000

Correct Option B

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Question 8. A merchant buys 20 kg of wheat of Rs.30 per kg and 40 kg wheat at Rs.25 per kg. He mixed them and sells one third of the mixture at Rs.26 per kg. The price at which the merchant should sell the remaining mixture, So that he may earn a profit of 25 % in his whole outlay is?

Options:

A. Rs 30

B. Rs 36

C. Rs 37

D. Rs 40

Solution: Cost price of all the wheat=(20*30)+(40*25)=1600

if he makes 25% profit then total selling

price=1600 × \frac{5}{4}=2000

total mixture of wheat is 60kg. one third of which is 20kg.

Now selling price of 20kg of wheat=20*26=520

so 40 kg of wheat = \frac{2000-520}{40}=37.

Correct Option C

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Tips and Tricks and Shortcuts for Profit and Loss

Tips,Tricks and Shortcuts for Profit and Loss

Profit and Loss is the most important topic in quantitative section of all the job entrance exams. This page here on contains Tips, Tricks and Shortcuts for Profit and Loss questions.

Cost Price The price at which product or commodity have been bought known as Cost Price.
Selling Price The price at which a product or service is sold to the known as Selling Price.

Some Important Points:

- The profit and loss concept play and important and fundamental role in realm of accounting.
- Here in tips and tricks and shortcuts of profit and loss will definitely help in the solving the questions very efficiently.
- First learn the the formulas and how to find Profit and Loss on this page here.
- 8 out of 10 Questions in any exam will be one of the following formats –

Prime Course Trailer

Shortcuts to solve questions of Profit & Loss

Type 1 Problem- Seller has two Articles for same price, but first article is sold at x% profit and other at x% loss. Total Profit/Loss incurred by him is not 0%

Way to solve this question is –

Apply direct formula Loss = (\frac{x}{10})²%

Proof with example -> Let us assume the articles were sold at Rs1200, and 20% profit in case 1 is made and 20% loss in case 2 is made.

SP in case 1(Profit) – 1200

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Thus CP = $\left(\frac{100}{100 + Gain} \right) \times SP = \left(\frac{100}{120} \right) \times 1200 = \left(\frac{5}{6} \right) \times 1200 = 1000$

SP in case 2(Loss) – 1200

Thus CP = $\left(\frac{100}{100 - Loss} \right) \times SP = \left(\frac{100}{80} \right) \times 1200 = \left(\frac{5}{4} \right) \times 1200 = 1500$

Total SP = 1200 + 1200 = 2400

Total CP = 1000 + 1500 = 2500

Loss = $\left(\frac{CP - SP}{CP} \right) \times 100 = \left(\frac{100}{2500} \right) \times 100 = \frac{100}{25} = 4\%$

Also from direct formula above = $\left(\frac{20}{10} \right)^2$

In such cases always, loss is incurred.

Type 2 Problem- Where no CP or SP is given. But whole concept is about Percentages.

Way to Solve Type 2 Questions

Assume the CP to be 100 and then solve the whole problem.

Example. In a transaction, the profit percentage is 80% of the cost. If the cost further increases by 20% but the selling price remains the same, how much is the decrease in profit percentage?

Let us assume CP = Rs. 100.

Then Profit = Rs. 80 and selling price = Rs. 180.

The cost increases by 20% → New CP = Rs. 120, SP = Rs. 180.

Profit % = $\frac{60}{120} * 100 = 50\%$.

Therefore, Profit decreases by 30%.

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Type 3 Problem- There are two Articles and you have to calculate total loss or profit.

Way to solve type 3 Problem

Now these problems are generally easy. But the whole point of solving is not to even use a pen and solve in 20 seconds.

Example. A man bought some toys at the rate of 10 for Rs. 40 and sold them at 12 for Rs. 60. Find his gain or loss percent

Cost price of 10 toys = Rs. 40 → CP of 1 toy = Rs. 4.

Selling price of 12 toys = Rs. 60 → SP of 1 toy = Rs. $\frac{160}{12}$ = 5

Therefore, Gain = 5 – 4 = 1.

Gain percent = $\frac{1}{4}\times 100$ = 25%

Now in your mind you must do value 4 and 5 and $\frac{1}{4}$ = 25%.

Type 4 Problem- CP of y items is same as SP of x items and Profit or Loss of some percentage is made.

Way to solve type 4 Question

The cost price of 10 pens is the same as the selling price of n pens. If there is a loss of 40%, approximately what is the value of n?

Solution:

Let the price of each pen be Re. 1.

Then the cost price of n pens is Rs. n and

the selling price of n pens is Rs. 10.

Loss = n-10.

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Loss of 40% → $\left(\frac{loss}{CP}\right) \times 100 = 40$

Therefore, $\frac{n - 10}{n} \times 100 = 40 \rightarrow n = 17$ (approx)

Type 5 Problem-

If the price of an item increases by r% , then the reduction in consumption so that expenditure remains the same is

or

If the price of a commodity decreases by r% then increase in consumption , so as not to decrease expenditure on this item is

Way to solve type 5 Questions

Just apply the following two formulas

Case 1

$\left(\frac{r}{100 + r} \right)\times 100\%$

Case 2

$\left(\frac{r}{100 - r} \right)\times 100\%$

Type 6 Problem(IMP)- A dishonest dealer claims to sell his goods at cost price ,but he uses a weight of lesser weight .Find his gain%.

Way to solve type 6 Problem

Apply the following formula directly

Gain % = $\frac{True \: Weight - False\: Weight}{False \: Weight} \times 100$

Example. Shopkeeper bought a product for Rs1000 per kg and is selling that at the same price. However he uses, a weighing scale that gives scale of 1kg for every 800gms. What is his profit?

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Answer will be $(\frac{1000 - 800}{800})\times 100 = (\frac{2}{8}) \times 100 = 25\%$ profit.

Type 7 Problem(IMP)-

These questions will not be there for exams like AMCAT and Cocubes etc but for eLitmus.

A shopkeeper sells an item at a profit of x % and uses a weight which is y % less .find his total profit

Use Formula: Gain% =

$$\left (\frac{\%Profit +\%{ \text{ Less } \: in \: weight}}{100 - \% { \text{ Less } \: in \: weight}} \right)\times 100$$

When dealer sells goods at loss on cost price but uses less weight .

Profit% or Loss% = $\left (\frac{\%Less\: weight -\% Loss}{100 - \% Less\: in \: weight} \right)\times 100$

A dishonest dealer sells goods at x % loss on cost price but uses a gms instead of b gms to measure as standard, his profit or loss percent :-

Use Formula: Profit% or Loss% = $\left (100 - Loss\% \right)\left (\frac{Original\: Weight}{Altered\: Weight} \right)- 100$

Note :- profit or loss will be decided according to sign .if +ive it is profit ,if –ve it is loss .

Case-1: **When dealer sells product at profit but alters weight**

Profit% or loss% = $[100+gain\%][\frac{1000}{Altered \: Weight}] - 100$

Case-2: **When dealer reduces weight in terms of percentage and earns profit**

Example: A shopkeeper sells an item at a profit of 20 % and uses a weight which is 20% less. Find his total profit.

Applying the first formula

$\left(\frac{20+20}{100-20}\right) \times 100 = 50\%$

Case-3: When dealer sells goods at loss on cost price but uses less weight.

Note :- profit or loss will be decided according to sign . If +ive it is profit ,if –ve it is loss.

Example: A dishonest dealer sells goods at 10% loss on cost price but uses 20% less weight. Calculate profit or loss percent.

Solution:

Apply formula: Case 2 Formula

$\left(\frac{20-10}{100-20} \right) \times 100$

$= \frac{25}{2}\%$

Here sign is positive so there is a profit of 12.5%

Case 4

Example: A dishonest dealer sells products at 10% loss on cost price but uses 2 gm instead of 4 gm . what is his profit or loss percent?

Solution:

Apply formula :

$[100-10] \frac{4}{2}-100 = 80\%$

Case 4

Note :- Profit or loss will be decided according to sign. If +ive it is profit ,if –ve it is loss .

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Example: A shopkeeper uses 940 gm in place of one kg. He sells it at 4% profit. What will be the overall profit or loss?

Solve this on your own, answer is 10.6%

Arithmetic, Geometric And Harmonic Progressions Formulas

Basic Formulas for AP, GP and HP with definition

In this Page you will Find Formulas for AP and GP and HP as well as definition also. These are Standard Formulas to Solve any Types of Problems of AP and GP and HP.

AP stands for Arithmetic progression

A series of number is termed to be in Arithmetic progression when the difference between two consecutive numbers remain the same.This constant difference is called the common difference.

GP stands for Geometric progression

A geometric progression is a sequence of numbers in which each term is obtained by multiplying the previous term by a constant ratio. This constant ratio is called the common ratio.

HP stands for Harmonic progression

A harmonic progression is a sequence of numbers in which each term is the reciprocal of an arithmetic progression.

AP, GP & HPGP^2 = AP x HP

Formulas of Arithmetic Progression (A.P)

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In A.P. the next number can be obtained by adding or subtracting the constant number to the previous in the sequence. Therefore, this constant number is known as the common difference(d).

Suppose, if ‘a’ is the first term and ‘d’ be the common difference, then

- nth term of an AP: (a + (n-1)d)
- Arithmetic Mean: Sum of all terms in the AP divided by the number of terms in the AP.
- Sum of ‘n’ terms of an AP: (0.5n*(first term + last term) = 0.5n*[2a + (n-1)d])

Formulas of Geometric Progression (G.P)

Suppose, if ‘a’ is the first term and ‘r’ be the common ratio, then

- Formula for nth term of GP = $a r^{n-1}$
- Geometric mean = nth root of the product of ‘n’ terms in the GP.
- Formula to find the geometric mean between two quantities a and b = $\sqrt{ab}$
- Formula to find the sum of the number of terms in a GP

Let ‘a’ be the first term, ‘r’ be the common ratio and ‘n’ be the number of terms

1.
    1. if r>1 , then , $s_{n} = a \times \frac{r^{n} -1}{r-1}$
    2. if r<1 , then , $s_{n} = a \times \frac{1-r^{n}}{1-r}$

Sum of infinite terms in a GP(r<1) $\frac{a}{1-r}$

Definition of Harmonic Progression (H.P)

Harmonic progression is the series when the reciprocal of the terms are in AP.

For example, $\frac{1}{a}$, $\frac{1}{ (a + d)}$, $\frac{1}{(a + 2d)}$…… are termed as a harmonic progression as a, a + d, a + 2d are in Arithmetic progression.

- First term of a HP is $\frac{1}{a}$

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- There are many Application of Harmonic Progressions.

Formulas of Harmonic Progression (H.P)

- The nth term in HP is identified by, $a_{n} = \frac{1}{a+(n-1)d}$
- To solve any problem in harmonic progression, a series of AP should be formed first, and then the problem can be solved.

For two terms ‘a’ and ‘b’,
Harmonic Mean = $\frac{(2ab)}{(a + b)}$

Relationship Between Arithmetic Mean, Harmonic Mean, and Geometric Mean of Two Numbers

If GM, AM and HM are the Geometric Mean, Arithmetic Mean and Harmonic Mean of two positive numbers respectively, then

$GM^2 = AM \times HM$

Using Formulas of A.P, G.P and H.P in Questions

Question 1: The sum of the first 5 terms of a geometric progression is 124. If the common ratio is 2, what is the first term of the progression?

a) 2
b) 4
c) 8
d) 16

Solution:
The sum of the first n terms of a geometric progression is given by $S = \frac{a(r^{n}-1)}{r-1}$, where S is the sum, a is the first term, r is the common ratio, and n is the number of terms.
Given S = 124, r = 2, and n = 5, we can substitute these values into the formula and solve for a:
$124 = \frac{a(2^{5}-1)}{(2-1)}$
$124 = \frac{a(32-1)}{1}$
$124 = a(31)$
$= \frac{124}{31} = 4$
Therefore, the first term of the progression is 4.

Correct answer: b

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Question 2: The 5th term of an arithmetic progression is 17 and the 10th term is 32. What is the common difference?

a) 3
b) 4
c) 5
d) 6

Solution:
The nth term of an arithmetic progression is given by a + (n-1)d, where a is the first term, d is the common difference, and n is the term number. Given the 5th term = 17 and the 10th term = 32, we can set up two equations:
17 = a + (5-1)d
32 = a + (10-1)d

Solving these equations simultaneously, we get:
17 = a + 4d
32 = a + 9d

Subtracting the first equation from the second equation, we get:
32 – 17 = (a + 9d) – (a + 4d) 15 = 5d
d = 3
Therefore, the common difference is 3.

Correct option :a

Question 3: Find t10 and S10 for the following series: 2, 9,16

a) 65,535
b) 55,330
c) 45,440
d) 35,445

Solution:
To find the 10th term (t10) and the sum of the first 10 terms (S10) for the given series, we need to determine the pattern of the series.

Looking at the series, we can observe that each term is obtained by adding 7 to the previous term. Therefore, the common difference (d) is 7.

To find t10, we can use the formula for the nth term of an arithmetic progression (AP): tn = a + (n-1)d
Here, a is the first term, which is 2, n is the term number, which is 10, and d is the common difference, which is 7.

t10 = 2 + (10-1) * 7
t10 = 2 + 9 * 7
t10 = 2 + 63
t10 = 65

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So, the 10th term (t10) of the series is 65.

To find S10, we can use the formula for the sum of the first n terms of an arithmetic progression:

Sn = (n/2) * (2a + (n-1)d)
Here, a is the first term, which is 2, n is the number of terms, which is 10, and d is the common difference, which is 7.
S10 = (10/2) * (2 * 2 + (10-1) * 7)
S10 = 5 * (4 + 9 * 7)
S10 = 5 * (4 + 63)
S10 = 5 * 67 S10 = 335
So, the sum of the first 10 terms (S10) of the series is 335.

Correct answer : a

Question 4: A number 39 is divided into three parts which are in A.P. and the sum of their squares is 515. Find the largest number.

(a) 17
(b) 15
(c) 13
(d) 11

Solution:
Let the three numbers be (a-d), a, and (a+d), where a is the middle term and d is the common difference.

According to the given information, we have:
(a-d) + a + (a+d) = 39 (Sum of the three numbers is 39)
((a-d)^2) + (a^2) + ((a+d)^2) = 515 (Sum of their squares is 515)

Expanding the second equation, we get:
a^2 – 2ad + d^2 + a^2 + a^2 + 2ad + d^2 = 515
3a^2 + 2d^2 = 515

Simplifying the equation, we have:
3a^2 + 2d^2 = 515 —-(1)
From the first equation, we have:
3a = 39
a = 13

Substituting the value of a in equation (1), we get: 3(13^2) + 2d^2 = 515
507 + 2d^2 = 515
2d^2 = 8 d^2 = 4
d = 2

Now, we can find the three numbers:
(a-d) = 13-2 = 11

a = 13
(a+d) = 13+2 = 15
Therefore, the largest number is 15.

Correct answer: 15.

Question 5: The sum of the first and the third term of a geometric progression is 15 and the sum of its first three terms is 21. Find the progression.

(a) 3,6,12…
(b) 12, 6, 3…
(c) Both of these
(d) None of these

Solution:

Let's assume the first term of the geometric progression is "a" and the common ratio is "r".

According to the given information, the sum of the first and third terms is 15, which can be expressed as:

a + ar^2 = 15 —-(1)

The sum of the first three terms is 21, which can be expressed as:

a + ar + ar^2 = 21 —-(2)

To solve these equations, we can subtract equation (1) from equation (2) to eliminate "a":

(a + ar + ar^2) – (a + ar^2) = 21 – 15

ar = 6

Now, we can substitute this value of "ar" into equation (1):

a + (6/r) = 15

Multiplying both sides by "r" to eliminate the fraction:

ar + 6 = 15r

Rearranging the equation:

15r – ar = 6

r(15 – a) = 6

Since “r” cannot be zero, we can divide both sides by (15 – a):

r = 6 / (15 – a)

Now, let’s analyze the answer choices:

(a) 3, 6, 12…

If we substitute “a = 3” into the equation for “r”, we get:

r = 6 / (15 – 3) = 6/12 = 1/2

However, this value of “r” does not satisfy the given conditions, as the sum of the first and third terms is not 15.

(b) 12, 6, 3…

If we substitute “a = 12” into the equation for “r”, we get:

r = 6 / (15 – 12) = 6/3 = 2

This value of “r” satisfies the given conditions, as the sum of the first and third terms is indeed 15.

Therefore, the correct answer is 12, 6, 3…

Correct answer: b

How To Solve Arthmetic, Geometric and Harmonic Progression Quickly

Solve AP, GP and HP Questions Quickly

In this Page you will learn How to Solve AP and GP and HP Questions Quickly through different types of Questions. This topic is very important from examination point of view. That’s why this will helps in different examinations.

APAn Arithmetic progression is a sequence of numbers in which each term is derived from the preceding term by adding or subtracting a fixed number called the common difference "d".

GPA Geometric progression is a sequence in which each term is derived by multiplying or dividing the preceding term by a fixed number called the common ratio.

HPA series of terms is known as a HP series when their reciprocals are in arithmetic progression.

Quick methods to solve AP, GP and HP

How to solve AP, GP and HP Questions quickly

Arithmetic Progression (AP)

1. Identify the first term (a) and the common difference (d) of the sequence.
2. Use the formula for the nth term of an AP: a + (n-1)d.
3. Use the formula for the sum of the first n terms of an AP: n/2[2a + (n-1)d].

Geometric Progression (GP)

1. Identify the first term (a) and the common ratio (r) of the sequence.
2. Use the formula for the nth term of a GP: ar^(n-1).
3. Use the formula for the sum of the first n terms of a GP: a(1-r^n)/(1-r).

Harmonic Progression (HP)

1. Identify the first term (a) and the common difference (d) of the sequence.
2. Use the formula for the nth term of an HP: 1/(a+(n-1)d).
3. Use the formula for the sum of the first n terms of an HP: n/[2a+(n-1)d].

Type 1: AP questions

Question 1.

Find the first term of the AP series in which 10^{th} term is 6 and 18^{th} term is 70.

Options:

1. 76
2. – 76
3. 66
4. – 66

Solution:

10^{th} term = (a + 9d) = 6….(1)

18^{th} term = (a + 17d) = 70 ……. (2)

On solving equation 1 and 2

We get, d = 8

Put the value of d in equation 1

(a + 9d) = 6

a + 9 x 8 = 6

a + 72 = 6

a = -66

Correct option: 4

Question 2.

Find the n^{th} term of the series 3, 8, 13, 18,...,

Options:

1. 2(2n+ 1)
2. 5n + 2
3. 5n – 2
4. 2(2n – 1)

Solution:

The given series is in the form of AP.

first term a = 3

common difference d = 5

We know that, n^{th} term = t_n = a + (n-1)d

Therefore, t_n = 3 + (n-1) 5

= 3 + 5n – 5

= 5n – 2

Correct option: 3

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Question 3.

The series 28, 25,……. -29 has 20 terms. Find out the sum of all 20 terms?

Options:

1. -10
2. -12
3. 10
4. 12

Solution:

a =28, d= -3 (25 – 28), l = -29, n = 20

Sum of all n-terms = $S_n = \frac{n}{2}(a+l)$

$S_{20} = \frac{20}{2} (28 + (-29))$

$S_{20} = -10$

Correct option: 1

Type 2: GP questions

Question 1.

Find the sum of the following infinite G. P. $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$…….

Options:

1. $\frac{1}{3}$
2. $\frac{2}{3}$
3. $\frac{1}{5}$
4. $\frac{1}{2}$

Solution:

a = $\frac{1}{3}$, r = $\frac{\frac{1}{9}}{\frac{1}{3}} = \frac{1}{3}$

Required sum = $\frac{a}{(1-r)}$

$= \frac{\frac{1}{3}}{(1-\frac{1}{3})}$

$= \frac{\frac{1}{3}}{\frac{2}{3}}$

$= \frac{1}{2}$

Correct option: 4

Question 2.

Find the G. M. between $\frac{4}{25}$ and $\frac{196}{125}$

Options:

1. $\frac{28}{5}$
2. $\frac{28}{25}$
3. $\frac{8}{25}$
4. $\frac{14}{5}$

Solution:

Geometric mean $\sqrt{ab}$

GM = $\sqrt{\frac{4}{25}\times \frac{196}{25}}$

GM = $\frac{28}{25}$

Correct option: 2

Question 3.

Find the number of terms in the series 1, 3, 9 , ….19683

Options:

1. 10
2. 8
3. 6
4. 7

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Solution:

In the given series,

$a_1 = 1$, $r = \frac{3}{1} = 3$, $a_n = 19683$

=> $19683 = 1 \times (3^{n-1})$

=> $19683 = 3^{n-1}$

=> $3^9 = 3^{n-1}$

=> $9 = n-1$

$n = 10$

Correct option: 1

Type 3: HP questions

Question 1:

If the 6th term of H.P. is 10 and the 11th term is 18. Find the 16th term.

Options:

1. 90
2. 110
3. 85
4. 100

Solution:

6th term = $a + 5d = \frac{1}{10}$……(1)

11th term = $a + 10d = \frac{1}{18}$……(2)

On solving equation 1 and 2 we get, $d = \frac{-2}{225}$

Put value of d in equation 1

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$a + 5d = \frac{1}{10}$

$a + 5 \times \frac{-2}{225} = \frac{1}{10}$

$a = \frac{13}{90}$

Now, 16^{th} term = $a + 15d = \frac{13}{90} + 15 \times \frac{- 2}{225}$

$= \frac{13}{90} - \frac{30}{225}$

$= \frac{1}{90}$

Therefore 16^{th} term = 90

Correct option: 1

Question 2.

Find the Harmonic mean of 6, 12, 18

Options:

1. 10.12
2. 9.62
3. 9.81
4. 8.10

Solution:

We know that,

$HM = \frac{n}{s}$

where , $s = (\frac{1}{a})+(\frac{1}{b})+(\frac{1}{c})$

$s=(\frac{1}{6})+(\frac{1}{12})+(\frac{1}{18})$

$=(\frac{11}{36})$

$HM = \frac{n}{s}=\frac{3}{(\frac{11}{36})}$

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$HM = 3\times \frac{36}{11}$

$HM = \frac{108}{11}$

$HM = 9.81$

Correct option: 3

Question 3.

What is the relation between AM, GM, and HM?

Options:

1. $AM \times HM = GM^2$
2. $AM / HM = GM$
3. $AM + HM = GM^2$
4. $AM - HM = GM^2$

Solution:

$AM = \frac{a+b}{2}$

$GM = \sqrt{ab}$

$HM = \frac{2ab}{a+b}$

Therefore $AM \times HM = GM^2$

$\frac{a+b}{2} \times \frac{2ab}{a+b} = ab$

Correct option: 1

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AP, GP and HP Shortcut, tricks, and tips

AP, GP and HP tricks, shortcuts, and tips

Here, are quick and easy Tips and Tricks for AP and GP and HP for you to help in AP, GP, and HP questions quickly, easily, and efficiently in competitive exams.

There are many Applications of AP and GP and HP as well as they are Very Important Topics from Examination Point of View.

AP, GP and HP tricks Observe the relationship between terms to identify patterns in the progression and note any common differences, ratios, or reciprocals that can simplify calculations.

Here, are some easy tips and tricks for you to solve AP, GP and HP questions quickly, easily, and efficiently in competitive exams.

Tips and Tricks for AP

1. nth term of an AP = $t_n = a + (n - 1)d$
2. Number of terms of an AP (n) = $\left[\frac{(l-a)}{d}\right] + 1$
3. Sum of first n terms in an AP = $S_n = \frac{n}{2}[2a + (n - 1)d]$ OR $\frac{n}{2}(a+l)$
4. While Solving three unknown Term in an A.P whose sum or product is given should be assumed as a-d, a, a+d.
5. While Solving Four terms in an A.P. whose sum or product is given should be assumed as a-3d, a-d, a+d, a+3d.

Tips and Tricks for GP

1. nth term of an GP = $a_n = ar^{n-1}$
2. Sum of first n terms in an GP = S_n = = $a \times \frac{r^{n}-1}{r-1}$ if r>1
3. Sum of first n terms in an GP = S_n = = $a \times \frac{1-r^{n}}{1-r}$ if r<1
4. Infinite term GP $\frac{a}{1-r}$
5. While Solving three unknown Term in an G.P whose sum or product is given should be assumed as $(\frac{a}{r})$, a, ar

Tips and Tricks for HP

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1. nth term of an HP = $a_{n} = \mathbf{\frac{1}{(a + (n - 1)d)}}$
2. Harmonic Mean of two numbers a and b is $\mathbf{\frac{2ab}{a+b}}$
3. While Solving HP Questions we convert given Problem in an AP.

Type 1: AP questions

Question 1.

Find 10^{th} term in the series 2, 5, 8, 11, 14……

Options:

1. 26
2. 29
3. 32
4. 27

Solution:

We know that,

$t_n = a + (n - 1)d$

In the given series,

a = 2

d = 3 …. (5 – 2, 8 – 5…..)

Therefore, 10^{th} term = $t_{10} = a + (n-1)\ d$

$t_{10} = 2 + (10 - 1)\ 3$

$t_{10} = 2 + 9 \times 3$

$t_{10} = 29$

Correct option: 2

Question 2.

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The sum of 3 numbers in arithmetic progression is 36 and product of their extreme is 80. Find the numbers.

Options:

1. 20 , 8 , 16
2. 4 , 12, 20
3. 12 , 20 , 28
4. None of these

Solution:

We know that,

$t_n = a + (n - 1)d$

Assume the numbers as:

a-d, a, a+d

or a-d+a+a+d=36

or 3a=36

a=12

now (a-d) (a+d)=80

$a^2-d^2=80$

$144-d^2=80$

$d^2=64$

d=8

thus the numbers will be: 4, 12 and 20

Correct option: 2

Type 2: GP question

Question 1.

Find the number of terms in the series 5, 10, 20, ...320?

Options:

1. 5
2. 4
3. 6
4. 7

Solution:

We know that,

$a_n = ar^{n-1}$

a = 5

r = 2

$a_n = 320$

$320 = 5 \times 2^{n-1}$

$64 = 2^{n-1}$

$2^{6} = 2^{n-1}$

n-1 = 6

n = 7

Correct Option. 4

Question 2.

The sum of three numbers is 14 and their product is 64. All the three numbers are in GP. Find all the three numbers when value of r is a whole number?

Options:

1. 3, 6, 4
2. 2, 4, 8
3. 2, 4, 6
4. 4, 4, 4

Solution: The three numbers can be written as $\left(\frac{a}{r}\right)$, a, ar

Sum of the three numbers = $\left(\frac{a}{r}\right) + a + ar = 14$

Product of the three numbers = $\left(\frac{a}{r}\right) \times a \times ar = 64$

i.e. $a^3 = 64$

Therefore, $a = 4$

Put the value of a in $\frac{a}{r} + a + ar = 14$

$a\left(\frac{1}{r} + 1 + r\right) = 14$

$4\left(\frac{1}{r} + 1 + r\right) = 14$

$2(1 + r + r^2) = 7r$

$2r^2 - 5r + 2 = 0$

$r = 2$ or $\frac{1}{2}$

If $r = 2$, then numbers are 2, 4, 8.

If $r = \frac{1}{2}$ then numbers are 8, 4, 2

Correct Option. 2

Type 3: HP questions

Question 1.

Find the 15th term in the series $\frac{1}{3}, \frac{1}{6}, \frac{1}{9}, \frac{1}{12}$…….

Options:

1. 45
2. $\frac{1}{70}$
3. $\frac{1}{45}$
4. 70

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Solution:

We know that,

$a_{n} = \frac{1}{a+(n-1)d}$

Convert the HP series in AP

We get 3, 6, 9, 12……
In the given series,

$a = 3$

$d = 3.....(6 – 3)$

Therefore, 15th term = $a_{15} = a + (n-1) d$

$a_{15} = 3 + (15 – 1) 3$

$a_{15} = 3 + 14 \times 3$

$a_{15} = 3 + 42$

$a_{15} = 45$

HP $a_{15} = \frac{1}{45}$

Correct option: 3

Probability Formulas

Formulas For Probability

In Aptitude, Probability is a very Important Topic for the Competitive Exam make sure that you will get all the related Probability Formulas with a clear understanding.

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On this Page, the Probability Formulas is given for your convenience, so that you can solve the Probability-based Question without any problem.

FORMULA OF PROBABILITY: Probability is the ratio of wanted outcomes to the total number of possible outcomes.
i.e. P(A) = \mathbf{ \frac{\text{The Number of wanted outcomes }}{\text{The total number of Possible Outcomes}}}

Formula & Definition for Probability

- **Probability** is a number that reflects the chance or possibility of a particular event will occur.
- **Probability** refers to the extent of occurrence of events. When an event occurs like throwing a ball, picking a card from deck, etc ., then the must be some probability associated with that event.
- In terms of mathematics, probability refers to the ratio of wanted outcomes to the total number of possible outcomes. There are three approaches to the theory of probability, namely: Classical Approach , Relative Frequency Approach , Subjective Approach.

P(A) = \mathbf{ \frac{The Number of wanted outcomes }{The total number of Possible Outcomes}}

Basic Definition and Formula

- **Random Event:** If the repetition of an experiment occurs several times under similar conditions if it does not produce the same outcome every time but the outcome in a trial is one of the several possible outcomes, then such an experiment is called a Random event or a Probabilistic event.
- **Elementary Event –** The Elementary event refers to the outcome of each random event performed. Whenever the random event is performed, each associated outcome is known as an elementary event.
- **Sample Space –** Sample Space refers to the set of all possible outcomes of a random event. For example, when a coin is tossed, the possible outcomes are head and tail.

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- **Event –** An event refers to the subset of the sample space associated with a random event.
- **Occurrence of an Event –** An event associated with a random event is said to occur if any one of the elementary events belonging to it is an outcome.

Basic Probability Formulas

- **Probability Range –** $0 \le P(A) \le 1$
- **Rule of Complementary Events –** $P(A^c) + P(A) = 1$
- **Rule of Addition –** $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- **Disjoint Events –** Events A and B are disjoint if $P(A \cap B) = 0$
- **Conditional Probability –** P(A | B) = \frac{P(A∩B)}{P(B)}
- **Bayes Formula –** P(A | B) = \frac{P(B|A). P(A)}{P(B)}
- **Independent Events –** Events A and B are independent if. $P(A \cap B) = P(A) \cdot P(B)$.

Sample Probability Based Questions

Question 1:

In a bag, there are 7 red marbles, 5 blue marbles, and 4 green marbles. Two marbles are randomly selected from the bag without replacement. What is the probability that both of them are blue?

Solution:

For the first draw, Probability of selecting a blue marble is 5/16 (5 blue marbles out of 16 total marbles).

After the first marble is drawn, there are 4 blue marbles left out of 15 total marbles.

For the second draw, the probability of selecting a blue marble is 4/15.

To calculate the probability of both marbles being blue => Probability = \frac{5}{16}\times \frac{4}{15}

Probability = \frac{20}{24} = \frac{1}{12}

Question 2:

In a drawer, there are 4 black pens, 3 blue pens, and 5 red pens. A pen is drawn at random from the drawer. What is the probability that it is either black or blue?

Solution:

We have calculate the probability of drawing a black or blue pen from the drawer

The total no. of pens in the drawer is 4 black + 3 blue + 5 red = 12 pens

Probability of drawing a black pen is 4/12

Probability of drawing a blue pen is 3/12 = 1/4

Hence, The probability of drawing either a black or blue pen, we add the individual probabilities:

Probability = \frac{4}{12} + \frac{3}{12}
Probability = \frac{7}{12}

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Question 3:

In a bag, there are 3 green bulbs, 4 orange bulbs, and 5 white bulbs. A bulb is randomly picked from the bag. What is the probability of selecting either a green bulb or a white bulb?

Solution:

Total number of bulbs in the bag is 3 green + 4 orange + 5 white = 12 bulbs

Number of green bulbs is 3, and the number of white bulbs is 5

Probability of selecting either a green or a white bulb, we add the number of green bulbs and the number of white bulbs, and then divide it by the total number of bulbs.

Probability = (Number of green bulbs + Number of white bulbs) / Total number of bulbs

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Probability = $\frac{3 + 5}{12}$

Probability = $\frac{8}{12}$

Probability = $\frac{2}{3}$

Question 4:

Sylvester Stallone brought a box of balloons for a group of students. The box contains 3 balloons of Shape A, 4 balloons of Shape B, and 5 balloons of Shape C. If three balloons are randomly drawn from the box, what is the probability that all three balloons are of different shapes?

Solution:

Total No. of Balloons = 3 Balloons of Shape A +4 Balloons of Shape B + 5 Balloons of Shape C = 12

n(s)= $^{12}C_{3}=220$

n(e)= $^{3}C_{1} * {}^{4}C_{1} * {}^{5}C_{1} = 60$

P= $\frac{60}{220}=\frac{3}{11}$

Question 5:

Joey Tribbiani organized a rack race with two participants. The probability of the first participant winning is 2/7, and the probability of the second participant winning is 3/5. What is the probability that one of them will win?

Answers:

Let's denote:
P(A) = Probability of the first participant winning = 2/7
P(B) = Probability of the second participant winning = 3/5

The probability of both participants winning simultaneously (a tie) is zero since there can only be one winner. Therefore, the probability that one of them will win is:

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P(one of them wins) = P(A) + P(B) – P(A and B)

P(one of them wins) = P(A) + P(B) – 0 (since P(A and B) = 0)

P(one of them wins) = P(A) + P(B)

Substituting the given probabilities:

P(one of them wins) = $\frac{2}{7}+\frac{3}{5}$

P(one of them wins) =$\frac{10}{35}+\frac{21}{35}$

P(one of them wins) = $\frac{31}{35}$

How To Solve Probability Questions Quickly

How to Solve Probability Questions Quickly

Here , In this Page you learn how to Solve Probability Questions Quickly. Go through this page to get sample Probability questions to get the clear understanding of method to solve the questions based on probability.

Therefore, probability of the occurrence of event is the number between 0 and 1..

Formula for Probability:P(A) = $\mathbf{ \frac{The Number of wanted outcomes }{The total number of Possible Outcomes}}$

How to Solve Quickly Probability Questions

- You can solve many simple probability problems just by knowing two simple rules:
- The probability of any sample point can range from 0 to 1.
- The sum of probabilities of all sample points in a sample space is equal to 1.
- The probability of event A is denoted by P(A).

Formula of Probability and their related concepts:

1. **Probability of an event (A):** P(A) = \frac{Number.of.favorable.outcomes}{Number.of.possible.outcomes}

   This formula calculates the probability of an event A occurring. You count the number of outcomes that satisfy event A and divide it by the total number of possible outcomes.

2. **Addition rule:** P(A or B) = P(A) + P(B) – P(A and B)

   This formula calculates the probability of event A or event B occurring. You sum the probabilities of each event individually, but subtract the probability of both events occurring simultaneously to avoid double-counting.

3. **Multiplication rule** (**for independent events**): P(A and B) = P(A) * P(B)

   This formula calculates the probability of event A and event B occurring simultaneously, assuming that the events are independent. You multiply the probabilities of each event individually.

4. **Multiplication rule** (**for dependent events**): P(A and B) = P(A) * P(B | A)

   This formula calculates the probability of event A and event B occurring simultaneously, assuming that the events are dependent. P(B|A) denotes the probability of event B occurring given that event A has already occurred.

5. **Conditional probability:** P(A | B) = \frac{P(A.and.B)}{P(B)}

   This formula calculates the probability of event A occurring given that event B has already occurred. P(A and B) denotes the probability of both events A and B occurring simultaneously, and P(B) represents the probability of event B occurring.

6. **Complementary probability:** P(A’) = 1 – P(A)

   This formula calculates the probability of the complement of event A, denoted as A’. It subtracts the probability of event A occurring from 1, yielding the probability of event A not occurring.

7. **Bayes’ theorem:** P(A|B) = P(B|A)\times\frac{P(A)}{P(B)}

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Bayes' theorem allows you to calculate the probability of event A occurring given event B, by utilizing conditional probabilities. P(A|B) represents the probability of event A given event B, P(B|A) is the probability of event B given event A, P(A) is the prior probability of event A, and P(B) is the prior probability of event B.

Types 1- How to Solve Probability Questions Quickly of Random ticket or ball drawn

Question 1. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

Options

(a) $\frac{1}{2}$

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

(c) $\frac{8}{15}$

(d) $\frac{9}{20}$

Solution: Here, S = {1, 2, 3, 4, ..., 19, 20}.

Let E = event of getting a multiple of 3 or 5 = {3, 6 , 9, 12, 15, 18, 5, 10, 20}.

$P(E) = \frac{n(E)}{n(S)} = \frac{9}{20}$

Correct Options (D).

Question 2 A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

Options

(a) $\frac{10}{21}$

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(b) $\frac{11}{21}$

(c) $\frac{2}{27}$

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

Solution: Total number of balls = (2 + 3 + 2) = 7.

Let S be the sample space.

Then, n(S) = Number of ways of drawing 2 balls out of 7.

$= {}^{7}C_{2}$

$= \frac{7 \times 6}{2 \times 1}$

= 21.

Let E = Event of drawing 2 balls, none of which is blue.

n(E) = Number of ways of drawing 2 balls out of (2 + 3) balls.

$= {}^{5}C_{2}$

$= \frac{5 \times 4}{2 \times 1}$

= 10 .

$P(E) = \frac{n(E)}{n(S)} = \frac{10}{21}$.

Correct Options (A)

Questions 3 A bag contains 1100 tickets numbered 1, 2, 3, … 1100. If a ticket is drawn out of it at random, what is the probability that the ticket drawn has the digit 2 appearing on it?

(a) $\frac{291}{1100}$

(b) $\frac{292}{1100}$

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(c) $\frac{290}{1100}$

(d) $\frac{301}{1100}$

Solution: Ticket has a maximum of 4 digits on it as Thousands, Hundreds Tens ,Units or TH H T U.

Number of Tickets with 2 in TH place = 0.

Number of Tickets with 2 in H place = From 200 upto 299 = 100.

Number of Tickets with 2 in T place but not in H place = 20 to 29 in T and U places and 00 to 10 except 02 in TH and H places = 10×10 = 100.

Number of Tickets with 2 ONLY in U place but not in TH H or T place

= H or T place both have (0 to 9 excluding 2) + (TH=1 & H=0 & U

= 2 & (T= 0 to 9 excluding 2))

= (9×9) + 9 = 90.

Total Tickets with at least one 2 = 290

Probability = $\frac{290}{1100}$ is answer.

Correct Options (c)

Type 2- How to Solve Probability Questions Quickly of boys and girls

Question 1. In a class there are 60% of girls of which 25% poor. What is the probability that a poor girl is selected is leader?

Options

(a) 20%

(b) 15%

(c) 10%

(d) 25%

Solutions: Assume total students in the class = 100

Then Girls = 60% (100) = 60

Poor girls = 25% (60) = 15

So probability that a poor girls is selected leader = \frac{Poor girls}{
Total students} = \frac{15}{100} = 15%

Correct Options (b)

Questions 2. What is the probability that the total of two dice will be greater than 9, given that the first die is a 5?

Options

(a) \frac{1}{3}

(b) \frac{1}{6}

(c) \frac{1}{9}

(d) None of these

Solution : Let A= first die is 5

Let *B* = total of two dice is greater than 9

P(*A*) = Possible outcomes for *A* and *B*: (5, 5), (5, 6)

P(A and B) = \frac{2}{36} = \frac{1}{18}

$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{1}{18} \div \frac{1}{6} = \frac{1}{3}$.

Correct Options (A)

Questions 3. If six cards are selected at random (without replacement) from a standard deck of 52 cards, what is the probability there will be no pairs? (two cards of the same denomination)

Solution: Let E_i be the event that the first i cards have no pair among them. Then we want to compute $P(E_6)$.

Which is actually the same as $P(E_1 \cap E_2 \cap \cdots \cap E_6)$, since $E_6 \subset E_5 \subset \cdots \subset E_1$, implying that $E_1 \cap E_2 \cap \cdots \cap E_6 = E_6$.

We get $P(E_1 \cap E_2 \cap \cdots \cap E_6) = P(E_1)P(E_2|E_1) \cdot \cdot$

$\cdot = \frac{52}{52} \frac{48}{51} \frac{44}{50} \frac{40}{49} \frac{36}{48} \frac{32}{47}$

Alternatively, one can solve the problem directly using counting techniques.

Define the sample space to be (equally likely)ordered sequences of 6 cards; then, $|S| = 52 \cdot 51 \cdot 50 \cdots 47$, and the event E6 has $52 \cdot 48 \cdot 44 \cdots 32$ elements

Questions 4. A group of 5 friends-Archie, Betty, Jerry, Moose, and Veronica-arrived at the movie theater to see a movie. Because they arrived late, their only seating option consists of 3 middle seats in the front row, an aisle seat in the front row, and an adjoining seat in the third row. If Archie, Jerry, or Moose must sit in the aisle seat while Betty and Veronica refuse to sit next to each other, how many possible seating arrangements are there?

Options

(a) 32

(b) 36

(c) 48

(d) 72

(e) 120

Solution: Good = Total – Bad.

Total = arrangements with Archie, Jerry or Moose in the aisle seat.

Number of options for the aisle seat = 3. (Archie, Jughead, or Moose)

Number of ways to arrange the 4 other people = 4 x 3 x 2 x 1.

To combine these options, we multiply: 3 x 4 x 3 x 2 = 72.

Bad = arrangements with Archie, Jerry or Moose in the aisle seat BUT with Betty next to Veronica.

Number of options for the aisle seat = 3. (Archie, Jughead, Moose).

Number of options for the third row seat = 2. (Anyone but Betty and Veronica, since in a bad arrangement they sit next to each other.)

Number of options for the middle of the 3 remaining seats = 2. (Must be Betty or Veronica so that they sit next to each other).

Number of ways to arrange the 2 remaining people = 2 x 1.

To combine these options, we multiply: 3 x 2 x 2 x 2 = 24.

Good arrangements = 72 – 24 = 48.

Correct Option C.

Tips And Tricks And Shortcuts For Probability Questions

Tips and Tricks and Shortcuts for Probability

The Event which is likely to occur, measured by the ratio of the Favourable cases to the whole number of cases possible , known as Probability. In this Page Tips and Tricks for Probability is given.

Values of Probability:

- Value of Probability lies between 0 and 1.
- Value of Probability 0 will be for Impossible Event.
- Value of Probability 1 will be for Sure Event.

Tips for Probability

Probability is a measure of the likelihood of an event occurring, which is determined by the ratio of favorable outcomes to the total number of possible outcomes.

The formula for calculating probability is:

P(E) = \frac{Number of Favorable Outcomes}{Total Number of Possible Outcomes}

- In mathematical terms,

  Probability represents the ratio of desired outcomes to the total number of possible outcomes.
- When solving probability questions, if it is easier to find the probability of an event not happening, you can calculate that probability and subtract it from 1.
- When encountering the term **"or"** in a question,

  Use **addition (+)** when applying the Fundamental Principle of Counting to solve the problem.

When encountering the term **"and"** in a question,
Use **multiplication (x)** when applying the Fundamental Principle of Counting to solve the problem

Tips and Tricks for Probability Questions and their solution

Question 1. A die is rolled, find the probability that an even number is obtained ?

Options

(a) $\frac{3}{4}$

(b) $\frac{1}{2}$

(c) $\frac{1}{4}$

(d) None of these

Solutions Let us first write the sample space, S of the experiment.

$S=\{1,2,3,4,5,6\}$

Let E be the event "an even number is obtained" and write down.

$E= \{2,4,6\}$

We can use the formula of the classical probability.

$P(E)= \frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$.

Correct Options (b)

Question 2. Two coins are tossed, find the probability that two heads are obtained. Note: Each coin has two possible outcomes H (heads) and T (Tails).

Options

(a) $\frac{1}{4}$

(b) $\frac{1}{2}$

(c) $\frac{3}{2}$

(d) None of these

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Solutions The sample space S is given by.

S = {(H,T),(H,H),(T,H),(T,T)}

Let E be the event "two heads are obtained". E = {(H,H)}

We use the formula of the classical probability.

P(E) = \frac{n(E)}{n(S)} = \frac{1}{4}

Correct Options (a)

Question 3. Two dice are rolled, find the probability that the sum is

a) equal to 1

b) equal to 4

c) less than 13

Solution The sample space S of two dice is shown below.

S = {(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)}

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a) Let E be the event “sum equal to 1”. There are no outcomes which correspond to a sum equal to 1, hence

$P(E) = \frac{n(E)}{n(S)} = \frac{0}{36} = 0$

Quickest Way : Sum is always greater than or equal to 1 . So it is Impossible Event means Probability will be 0.

b) Three possible outcomes give a sum equal to 4: E = {(1,3),(2,2),(3,1)}, hence.

$P(E) = \frac{n(E)}{n(S)} = \frac{3}{36} = \frac{1}{12}$

c) All possible outcomes, E = S, give a sum less than 13, hence.

$P(E) = \frac{n(E)}{n(S)} = \frac{36}{36} = 1$

Quickest Way : Sum is always less than 13 . So it is sure Event means Probability will be 1.

Question 4. A Speak truth truth in 20 % of cases and B in 40 % of cases. In what Percentages of cases are they likely to Contradict to each other in

Narrating the Same Event?

Options

(a) 40 %

(b) 44 %

(c) 42 %

(d) None of these

Solutions They contradict each other if one of them Speaks and the other one lies. and vice – versa.

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Required Percentages = 0.20 x (1 – 0.40) + (1- 0.20) x 0.40 = 0.44 = 44 %

Correct Option (b)

Permutation and Combination Formulas

Permutation and Combination Formulas

Permutation and Combination Formulas has been discussed on this page to help student remember all important formulas in last min before exam.

Permutation: The different arrangements of a given number of things by taking some or all at a time, are called permutations. This is denoted by $^n P_r$. Permutations are studied in almost every branch of mathematics, and in many other fields of science. In computer science, they are used for analyzing sorting algorithms.

Combination: Each of the different groups or selections which can be formed by taking some or all of a number of objects is called a combination. This is denoted by $^n C_r$

Permutation and Combination Formulas

- Number of all **permutations** of n things, taken r at a time, is given by

  $^n P_r = \frac{n!}{(n-r)!}$
- Number of all **combinations** of n things, taken r at a time, is given by

  $^n C_r = \frac{n!}{(r)! (n-r)!}$

Points to remember

- Factorial of any negative quantity is not valid.
- If a particular thing can be done in m ways and another thing can be done in n ways, then
  - Either one of the two can be done in $m + n$ ways and
  - Both of them can be done in $m \times n$ ways
- 0! = 1

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- $1! = 1$
- If from the total set of n objects and 'p_1' are of one kind and 'p_2' and 'p_3' and so on …. till p_r are others respectively then

  $^n P_r = \frac{n!}{p_1 ! \times q_2 ! \times \ldots\ldots p_r !}$
- $^nP_n = n!$
- $^nC_n = 1$
- $^nC_0 = 1$
- $^nC_r = {}^nC_{(n-r)}$

$^nC_0+{}^nC_1+{}^nC_2+{}^nC_3+\ldots{}^nC_n = 2^n$

Permutation and Combination Formulas- Factorial

n ! = n(n-1)(n-2) …… 1 Eg. – 5! = 5(5-1)(5-2)(5-3)(5-4) = 5(4)(3)(2)(1)

Standard Truths

- 0! = 1
- n! only exists of n >= 0 and doesn't exist for n < 0

n	n!
0	1
1	1
2	2
3	6
4	24
5	120
6	720
7	5 040
8	40,320
9	362 880
10	3 628 800

Permutations Formulas

Number of ways in which Permutations out of n things r things can be SELECTED & ARRANGED (denoted by ^nP_r).

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^nP_r = number of permutations (arrangements) of n things taken r at a time.

$^n P_r = \frac{n!}{(n-r)!}$ n ≥ r

Eg.

- Arrangement of Letters/Alphabets to form words with meaning or without meaning.
- Arrangements of balls on a table.

Formulas for Combinations

The number of ways in which r things at a time can be SELECTED from from n things is Combinations (represented by ^nC_r).. ^nC_r = Number of combinations (selections) of n things taken r at a time.

- **$^n P_r = \frac{n!}{(r)! (n-r)!}$; where n ≥ r (n is greater than or equal to r).**

Eg.

- Selections for people from total numbers who want to go out on a picnic.
- Filling posts with people
- Selection for a sports team out of available players
- Selection of balls from a bag

Important Properties:

Property 1

Number of permutations (or arrangements) of n different things taken all at a time = n!

Property 2

For Objects in which P1 are alike and are of one type, P2 are alike or other different type and P3 are alike or another different type and the rest must be all different, Number of permutations = **$\frac{n!}{(p1)! (p2)! (p3)!}$**

Property 3

When repetition is allowed number of permutations of n different things taken r at a time = n × n× n ×… (r times) = n^r

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Property 4

Here, we are counting the number of ways in which ***k balls*** can be distributed into ***n boxes*** under various conditions. The conditions which are generally asked are

1. The balls are either distinct or identical.
2. No box can contain more than one ball or any box may contain more than one ball.
3. No box can be empty or any box can be empty.

Distribution of		**How many balls boxes will contain**		
k balls	**into n Boxes**	**No Restrictions**	**≤ 1 (At most one)**	**≥ 1 (At least one)**
Distinct	Distinct	n^k (formula 1)	^nP_k (formula 2)	**S(k,n) × n!** (formula 3) **Imp)**
Identical	Distinct	$^{(k+n-1)}C_{(n-1)}$ (formula 5)	^nC_k (formula 6)	$^{(k-1)}C_{(n-1)}$ (formula 7)

Other Properties

- $^nP_r = r! \times {^nC_r}$
- $^nC_r + {^nC_{r-1}} = {^{n+1}C_r}$
- $^nC_x = {^nC_y}$ when $x = y$ or $x + y = n$
- $^nC_r = {^nP_{n-r}}$
- $r \cdot {^nC_r} = n \, {^{n-1}C_{r-1}}$
- $\frac{^nC_r}{r+1} = \frac{^{n+1}C_{r+1}}{n+1}$
- For ^nC_r to be greatest,
    - (a) if n is even, $r = \frac{n}{2}$

(b) if n is odd, $r = \frac{n+1}{2}$ or $\frac{n-1}{2}$

How To Solve Quickly Permutation Combination

How to Solve Permutation and Combination Questions Quickly

How to solve Permutation and Combination Questions Quickly has been discussed on this page along with basic concepts.

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What is Permutation?Permutation is basically called as a arrangement where order does matters.Here we need to arrange the digits , numbers , alphabets, colors and letters taking some or all at a time.It is represented as,$\mathbf{^nP_r = \frac{n!}{(n-r)! }}$

What is Combination?Combination is basically called as a selection where order does not matters.Here we need to arrange the digits , numbers , alphabets, colors and letters taking some or all at a time. It is represented as$\mathbf{^nC_r = \frac{n!}{(n-r)! r! }}$

Basic concept of Permutation and Combination

Related Pages

How to Solve Permutation and Combination Questions Quickly.

- **Permutation** is an arrangement of objects in a definite order.
- Number of all permutations of n things, taken r at a time, is given by

  $^nP_r = \mathbf{\frac{n!}{(n-r)!}}$
- **Combination** is selection of objects where order does not matter.
- Number of all **combinations** of n things, taken r at a time, is given by

  $^nC_r = \frac{n!}{(n-r)! r! }$
- Here we can easily understand how to solve permutation and combination easy.

Type 1: How to Solve Quickly Permutation and Combination Different ways to arrange (with repetition)

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Question 1.How many 3 letter words with or without meaning can be formed out of the letters of the word MONDAY when repetition of words is allowed?

Options:

A. 125

B. 216

C. 120

D. 320

Solution: $6 * 6 * 6 = 216$

OR

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We can solve directly by formula $n^r = 6^3 = 216$

Correct option: B

Question 2. In how many ways the letters in the word TOOTH can be arranged?

Options:

A. 120

B. 40

C. 20

D. 30

Solution: $\frac{5!}{2! \times 2!}$

$= \frac{5 \times 4 \times 3 \times 2 \times 1}{2 \times 1 \times 2 \times 1}$

$= \frac{120}{4}$

$= 30$

Correct option: D

Question 3.How many three digit numbers can be formed using digits 2, 3, 4, 7, 9 so that the digits can be repeated.

Options:

A. 125

B. 360

C. 24

D. 6

Solution: Each place can be filled by any one of 5 digits

Total numbers = 5 * 5 *5 =125

OR

We can solve directly by formula $n^r = 5^3 = 125$

Correct option: A

Type 2: Different ways to arrange (without repetition)

Question 1. How many five letter words with or without meaning, can be formed from the word 'COMPLEXIFY', if repetition of letters is not allowed?

Options:

A. 43200

B. 30240

C. 12032

D. 36000

Solution: ${}^{10}P_5 = \frac{10!}{(10 - 5)!} = 10 * 9 * 8 * 7 * 6 = 30240$

Correct option: B

Question 2.In how many different ways can the letters of the word 'LOGARITHMS' be arranged so that the vowels always come together?

Options:

A. 6720

B. 241920

C. 40320

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D. 360344

Solution: In such questions we treat vowels as one letter.

So the word becomes LGRTHMS (OAI)

It means there are total 8 letters. Therefore, number of ways of arranging these letters = 8! = 40320

Now, there are three vowels (OAI), number of ways of these letters can be arranged = 3! = 6

Required number of words = 40320 * 6 = 241920

Correct option: B

Question 3.How many three digit numbers can be formed from the digits 3, 4, 5, 7, 8, and 9. Also, the number formed should be divisible by 5 and no repetition is allowed?

Options:

A. 20

B. 24

C. 25

D. 10

Solution: The number which is divisible by 5 has 5 or 0 at one's place. In this case we must have 5 at the unit place as 0 is not in the list.

There are total 6 digit out of which last digit is fixed by 5. Therefore, we are left with 5 digits (3, 4, 7, 8, 9) at the tens place.

Similarly, the hundred place can be filled by 4 digits.

So, required number = 4 * 5 * 1 = 20

Correct option: A

Type 3: How To Solve Permutation and Combination Question- (with repetition)

Question 1.An ice cream seller sells 5 different ice-creams. John wants to buy 15 ice creams for his friends. In how many ways can he buy the ice-cream?

Options:

A. 1450

B. 3768

C. 3876

D. 1540

Solution: ${}^{r+n-1}C_r = {}^{15+5-1}C_{15} = {}^{19}C_{15}$

We know that, ${}^{n}C_r = \frac{n!}{(n-r)!\, r!}$

${}^{19}C_{15} = \frac{19!}{(19-15)!\, 15!} = 3876$

Correct option: C

Question 2.There are 5 types of soda flavor available in a shop. In how many ways can 10 soda flavors be selected?

Options:

A. 1454

B. 1001

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C. 1211

D. 1540

Solution: ${}^{r+n-1}C_r = {}^{10+5-1}C_{10} = {}^{14}C_{10}$

We know that, \frac{n!}{(n-r)! r! }

${}^{14}C_{10}$ = \frac{14!}{(14-10)! 10! } = 1001

Correct option: B

Question 3. In how many ways can 16 identical toys be divide in 4 children?

Options:

A. 966

B. 696

C. 969

D. 996

Solution: ${}^{r+n-1}C_r = {}^{16+4-1}C_{16} = {}^{19}C_{16}$

We know that, ${}^{n}C_r$ = \frac{n!}{(n-r)! r! }

${}^{19}C_{16}$ = \frac{19!}{(19-16)! 16! } = 969

Correct option: C

Type 4: Permutation and Combination Solve Question Quickly. (without repetition)

Question 1. A wooden box contains 2 grey balls, 3 pink balls and 4 green balls. Fins out in how many ways 3 balls can be drawn from the wooden box. Make sure that at least one pink ball is included in the draw?

Options:

A. 64

B. 46

C. 56

D. 65

Solution: According to the question, we have, (one pink and two non-pink balls) or (two pink and one non-pink balls) or (3 pink)

Therefore, required number of ways are $({}^{3}C_{1} * {}^{6}C_{2}) + ({}^{3}C_{2} * {}^{6}C_{1}) + ({}^{3}C_{3}) = 45 + 18 + 1 = 64$

Correct option: A

Question 2.There are 5 boys and 10 girls in a classroom. In how many ways teacher can select 2 boys and 3 girls to make a dance group?

Options:

A. 720

B. 1200

C. 240

D. 840

Solution: Required numbers of ways = ${}^{5}C_{2} * {}^{10}C_{3} = 10 * 120 = 1200$

Correct option: B

Question 3.There are 10 consonants and 5 vowels. Out of which how many words of 5 consonants and 2 vowels can be made?

Options:

A. 1270080

B. 120052

C. 210789

D. 720432

Solution: Number of ways of selecting (5 consonants out of 10) and (2 vowels out of 4) = $^{10}C_5$ * $^5C_2$ = 252

Number of ways of arranging 7 letters among themselves = 7!

=7 x 6 x 5 x 4 x3 x2 x 1

=5040

Required number of ways = (252 x 5040) = 12,70,080

Correct option: A

Tips And Tricks And Shortcuts For Permutation And Combination

Tips and Tricks, and Shortcuts for Permutation and Combination

Tips and Tricks for Permutation and Combination has been discussed on this page to help student practice shortcuts while solving questions.

Here, are rapid and easy tips and tricks and shortcuts on Permutation and Combination questions swiftly, easily, and efficiently in competitive exams and recruitment exams.

Permutation: Permutation: The different arrangements of a given number of things by taking some or all at a time, are called permutations. This is denoted by nPr.
Combination: Combination: Each of the different groups or selections which can be formed by taking some or all of a number of objects is called a combination. This is denoted by nCr.

Tips and Tricks and Shortcuts for Permutation and Combination

-
    - Use permutations if a problem calls for the number of arrangements of objects and different orders are to be counted.
    - Use combinations if a problem calls for the number of ways of selecting objects and the order of selection is not to be counted.
    - Summary of formula to use.

Order	Repetition	Formula
Permutation	Yes	n^r
Permutation	No	np_r
Combination	Yes	$r + n - 1_{Cr}$
Combination	No	n_{Cr}

Types of Tips and Tricks and Shortcuts for Permutation and Combination

Tips and Tricks for Type 1 Problems
Tips and Tricks for Type 2 Problems
Tips and Tricks for Type 3 Problems
Tips and Tricks for Type 4 Problems
Tips and Tricks for Type 5 Problems

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Questions on Types of Tips and Tricks and Shortcuts for Permutation and Combination

Type 1: Different ways to arrange (with repetition)

Question 1 In how many ways can the letters of the word 'LEADER' be arranged?

Options:

1.
    1.
        1. 720
        2. 360
        3. 200
        4. 120

Solution Letter ‘E’ appears twice and all other letters 1L, 1A, 1D and 1R appears once in the word.

Required number of ways = \frac{6!}{2!} = \frac{ 6 × 5 × 4 × 3 × 2 × 1}{2 × 1} = \frac{720}{2} = 360

Correct option: 2

Type 2: Different ways to arrange (without repetition)

Question 1 How many different ways are there to arrange your first three classes if they are Math, English, and Hindi?

Options:

1. 4
2. 6
3. 120
4. 36

Solution We know that,

$P_r = n!$

$P_3 = 3!$

$P_3 = 6$

Correct option: 2

Type 3: Different ways to select (with repetition)

Question 1 In a shop there are 4 types of sweets. In how many ways can Shekhar buy 19 sweets?

Options:

1. 480

2. 540
3. 720
4. 1540

Solution $^{r+n-1}C_{r} = {}^{19+4-1}C_{19} = {}^{22}C_{19}$

We know that, $^{n}C_{r}$ = \frac{n!}{(n-r)! r! }

$^{22}C_{19}$ =\frac{22!}{(22-19)! 19! } = 1540

Type 4: Different ways to select (without repetition)

Question 1 How many different 4 digit numbers can be formed using the digits 2,3,4,5,6,7,8 no digit being repeated in any number

Options:

1. 720
2. 120
3. 24
4. 840

Solution: The thousand place can be filled in 7 ways, the hundredth place can be filled in 6 ways, the tens place can be filled in 5 ways, and the ones place can be filled in 5 ways.

Total ways = 7*6*5*4 = 840

Correct option: 4

Geometry Formulas

Geometry Basic Formulas – Area, Volume and Perimeter

On this page we will discuss about the formulas that are Required to solve Geometry Questions. With Certain Examples which will clear your concept about the topic very well

Definition for Geometry: Geometry is all about shapes and their properties.Geometry can be divided into:- Plane Geometry is about flat shapes like lines, circles and triangles, shapes that can be drawn on a piece of paper. Solid Geometry is the geometry of three-dimensional space, the kind of space we live in.

Perimeter For your knowledge a perimeter is the path that surrounds or encompasses a two-dimensional shape.

Basic Geometry Formulas-Area, Volume and Perimeter.

Largest Possible Sphere :

In this type you will be given a cube of "a" cm and will be asked the volume of largest possible sphere which can be chiseled out from it.

Diagonal of the Sphere: $\frac{a}{2} = \text{ Radius }$

Remaining Empty Space of the Cube: $a^3 = \frac{\pi a^3}{6}$

Largest possible cube:

In this type you will be given a sphere of radius "A" cm and will be asked the volume of largest cube which can be chiseled out from it.

Here **OA= radius of the sphere.** So, diameter of the sphere = 2a

Diagonal of the cube = $\sqrt{3}x$

(If side of the Square is x)

$\Rightarrow \sqrt{3x} = 2a = \Rightarrow x = \frac{2a}{\sqrt3}$

The largest square that can be inscribed in a right angled triangle:

In this type you will be given a Square BDEF when one of its vertices coincide with the vertex of the right angle of the triangle ABC

Side of the Square: $\left (\frac{ab}{a+b}\right)$

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Area of the Square: $\left(\frac{ab}{a+b}\right)^2$

The largest square that can be inscribed in a semi circle:

In this type you will be asked the area of the largest Square which can be inscribed in a **Semicircle of radius "r"**

Area of the Square: $\frac{3}{5}r^2$

The largest square that can be inscribed in a Quadrant:

In this type you can be asked the area or Side of the largest Square which can be inscribed in a **Quadrant of Radius "r"**

Side of the Square: $\frac{r}{\sqrt2}$

Area of Square: $\frac{r^2}{2}$

The largest square that can be inscribed in a right angled triangle:

In this type you will be given a Square DEGF when one of its vertices coincide with the hypotenuse of the right angle of the triangle ABC and you can be asked for the side of the square.

Side of the Square: $\frac{abc}{a^2 + b^2 + ab}$

The largest cube that can be chiseled out from a cone:

In this question you will be asked about the side of the largest cube which will be chiseled out of a cone of height 'h' cm and radius 'r' cm

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Side of Cube: $\frac{\sqrt2rh}{h + \sqrt2r}$

The maximum volume of cylinder:

In this you will be asked about the volume of the largest cylinder which can be chiseled out from a right circular cone.

Maximum Volume of the Cylinder: $\pi \times \frac{2r^2}{3}\times \frac{h}{3}$

Some Examples Using above Formulas:

Question 1: Ratan had a hard wooden board out of which he made an equilateral triangle with a side length of 10 cm. Find it's area?

Answer: The formula to find the area of an equilateral triangle is given by A $=\frac{\sqrt{3}}{4}{a}^2$

$=\frac{\sqrt{3}}{4}{10}^2$

$=43.30cm^{2}$

Question 2: Raj bought a mirror for his room with a length of 12 meters and a diagonal of 15 meters, find the width of the rectangle.

Answer: The width of the rectangle is 9 meters.

In a rectangle, the diagonal divides the rectangle into two congruent right-angled triangles. We can use the Pythagorean Theorem to find the width ('b') of the rectangle using the length ('a') and the diagonal ('c'):

$b^{2} =c^{2} – a^{2}$
$b^{2} = 15^{2} – 12^{2}$
$b^{2}=225-144$
$b^{2}= 81$

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$b=\sqrt{81}$

$b = 9$ m

Question 3: Sam made a circle out of clay find it's area in terms of pi given the diameter of circle is 18cm?

Answer: Given Diameter = 18 cm

Radius = 9 cm

Area of circle = πr^{2}

Area = $\pi 9^{2}$

Area= $81\pi cm^{2}$

Question 4: Find Volume of a ice-cream cone whose radius is 6 cm and height 7 cm?

Answer: We know Volume of cone = $\frac{1}{3}\pi r^{2}h$

Hence, $\frac{1}{3}\pi r^{2}h = \frac{1}{3}\pi 6^{2}7$

$=84\pi cm^{3}$

Question 5: The supplement of $90^{\cdot}$ is?

Answer: Supplementary angles means those angles whose sum is 180.

According to question:

$90^{\cdot} + x = 180$

$= 180 - 90 = x$

$= 90^{\cdot}$

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How To Solve Geometry Questions Quickly

How To Solve Practical Geometry Problems

From the information provided on this page we will be learning about **How to solve Geometry Questions Quickly** of various types and how to apply problem solving techniques. Having knowledge about this will help you in solving more numbers of problems in less time.

DefinitionFor your knowledge, Geometry is all about the shapes and properties for the Plane Geometry and Solid Geometry.

Steps to Analyze and Solve Problems Quickly.

- **Determine what the problem is asking about and then try to solve the problem.**
- **In geometry problems it is very much necessary to draw sketch of the problem solution as it helps you to reach to your solution quickly.**
- **Pay attention to units make sure that the units used are converted accordingly and all Numbers have same units.**
- **Solve the math you may use pythagoras theorem or other theorem's to solve it**
- **Analyze your results and make sure they are correct.**

Type 1: How to Solve Geometry Questions Quickly related to Lines and Angles

Ques. 1

In the figure above, AB = BC = CD = DE = EF = FG = GA. Then ∠DAE is approximately

Options

(a) 15°

(b) 20°

(c) 25°

(d) 30°

Explanation

Let us assume, DAE = x

Triangle ABC is isosceles as AB = BC –> BCA = CAB = x

Hence, CBD = CAB + BCA = x + x = 2x …………. [External angle of triangle ABC]

Triangle BCD is isosceles as BC = CD –> CBD = CDB = 2x

Hence, DCE = DAE + CDA = x + 2x = 3x …………. [External angle of triangle ACD]

Triangle CDE is isosceles as CD = DE –> DCE = DEC = AED = 3x

Similarly, ADE = EFD = AEF + DAE = EGF + DAE = (DAE + GFA) + DAE = DAE + DAE + DAE = 3x

Hence, in triangle ADE, ADE + DAE + AED = 3x + x + 3x = 7x

Hence, 7x = 180 —> x = 180/7 = 25.7.. ≈ 25

Correct Option (C)

Ques. 2

In triangle DEF shown below, points A, B and C are taken on DE, DF and EF respectively such that EC = AC and CF = BC. If ∠D=40^{0}, then ∠ACB =

Options:

(a) 140

(b) 70

(c) 100

(d) None of these

Explanation

Let the angle E be x in triangle (AEC),

then angle AEB= 180-2*x. Then in triangle DEF, angle F=180-(40+x).

Now in triangle BCF, angle BCF=2*x-100.

Now, angle ACB= 180-(180-2*x+2*x-100)=100

Ques. 3

In the above figure, ACB is a right-angled triangle. CD is the altitude. Circles are inscribed within the ΔACD and ΔBCD. P and Q are the centres of the circles. The distance PQ is

Options

(a) 5

(b) √50

(c) 7

(d) 8

Explanation

By the pythagoras theorem we get BC= 25. Let BD = x,
Triangle ABD is similar to triangle CBA ⇒
\frac{AD}{15} \ = \frac{x}{15} \
and also triangle ADC is similar to triangle ACB ⇒
\frac{AD}{20} \ = \frac{25-x}{15} \ .
From the 2 equations, we get x= 9 and DC= 16.
We know that **area=** (semi perimeter) * inradius
For triangle ABD, Area = \frac{1}{2}\times BD\times AD = \frac{1}{2} \times 12\times 9 =54
semi perimeter =\frac{15+9+12}{2} = 18.
On using the above equations we get inradius, r = 3.
PQ = R+r = 7cm.

Type 2: How to solve Geometry Questions of various shapes.

Ques. 4

The lateral area is twice as big as the base area of a cone. If the height of the cone is 9, what is the entire surface area (base area plus lateral area)?

Options

(a) 81π

(b) 90π

(c) 54π

(d) 9π

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Explanation:

Lateral Area = LA = π(r)(l) where r = radius of the base and l = slant heightLA = 2B

$\pi(r)(l) = 2\pi(r^2)$

$rl = 2r^2$

$l = 2r$

From the diagram, we can see that $r^2 + h^2 = l^2$. Since h = 9 and l = 2r, some substitution yields

$r^2 + 9^2 = (2r)^2$

$r^2 + 81 = 4r^2$

$81 = 3r^2$

$27 = r^2$

$B = \pi(r^2) = 27\pi$

$LA = 2B = 2(27\pi) = 54\pi$

$SA = B + LA = 81\pi$

Correct Options (A)

Ques. 5

You are given a right circular cone with height 5 cm. The radius is twice the length of the height. What is the volume?

Options

(a) 100πcm³

(b) 500πcm³

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(c) 500/3 πcm³
(d) 50πcm³

Explanation:

You are given a right circular cone with height 5. The radius is twice the length of the height.
Height =5cm. The radius is twice of the height.

You are given a right circular cone with height 5. The radius is twice the height.
Radius = 2* Height
so the radius is 10 cm
Volume = $\pi r^2 \frac{h}{3} = \pi(10)^2 \frac{5}{3} = \frac{500}{3} \pi r^3$

Tips Tricks And Shortcuts For Geometry

Geometry Tips and Tricks and Shortcuts

To solve questions effectively and accurately in placement exams you need to have a stronghold on the tips, tricks and shortcuts of that chapter. This page will provide you with all possible **Tips Tricks and Shortcuts of Geometry** questions types which are frequently asked in the exams.

The **Tips Tricks of Coordinate Geometry** and **Shortcuts** are listed below with the sample questions.

From a given perimeter how many triangles with integral sides are possible?

We can solve this manually. But with the help of a tips and tricks and shortcut that is discussed in this page of PrepInsta

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- We can solve this question within seconds. Generally there are two cases for these type of questions.

<u>Scenario 1:</u>

When Perimeter is odd

<u>Scenario 2:</u>

When perimeter is even

<u>Scenario 1 – Details</u>

- **How many triangles with integral sides are possible for perimeter P where P is even**

Solution – In this case, total number of triangles will be the nearest integer to $\frac{P^2}{48}$ \

<u>Scenario 2 – Details</u>

- **How many triangles with integral sides are possible for perimeter P where P is odd**

Solution – In this case, total number of triangles will be the nearest integer to $\frac{(P+3)^2}{48}$ \

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Tips and Tricks on Geometry

<u>Question 1:</u>

ABCD is a square. AD is tangent to circle with radius r and OE = ED. Then what is the ratio of the area of circle to the area of square?

Options

a) $\frac{\Pi}{3}$ \

b) $\frac{\Pi r^2}{3}$ \

c) $\frac{\Pi r^2}{4}$ \

d) $\frac{2\Pi r}{4r}$

Explanations

$OD^2 = OA^2 + AD^2$

$(2r)^2 = r^2 + AD^2$

Thus PQ, which is also the side of square, is equal to r√3. The area of square becomes: $3r^2$

Hence the ratio of the area of circle to square is:

$\frac{area\ \ of\ circle}{area\ \ of\ square} = \frac{\pi r^2}{3r^2} = \frac{\pi}{3}$

<u>**Correct Option (A)**</u>

Geometry Shortcuts Tips and Tricks and Shortcuts

<u>**Question 2**</u>

If in a triangle ABC, $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos c}{c}$, then what can be said about the triangle ?

Options

A) Right angled triangle

B) Isosceles triangle

C) Equilateral triangle

D) Nothing can be inferred

Explanations

From the sine rule of triangle we know, $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = k$

Therefore, a = k(sin A), b = k(Sin B) and c = k(Sin C)

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Hence, we can rewrite, \frac{cos A}{a} \ = \frac{cos B}{b} \ = \frac{cos C}{c}
\ as \frac{cos A}{k Sin A} \ = \frac{cos A}{k Sin B} \ = \frac{cos C}{k Sin C} \

or Cot A= Cot B= Cot C
A = B = C, Hence the triangle is equal.

Correct Option (C)

Formulas For Perimeter Area Volume

Perimeter, Area and Volume formulas

In this page we are going to learn about various **Formulas for Perimeter Area and Volume** of various geometrical shapes and figures. For your knowledge a perimeter is the path that surrounds or encompasses a two-dimensional shape.

ConceptWhile Volume is the quantity of a three-dimensional space enclosed by a closed surface. And Area is the quantity that expresses the extent of a two-dimensional figure or shape..

Perimeter, Area and Volume formulas for various shapes:-

- **Geometry** is a branch of mathematics that deals with different shapes and sizes. It can be divided into two different types: Plane Geometry and Solid Geometry
- **Plane Geometry** deals with shapes such as circles, triangles, rectangles, square.
- **Solid Geometry** is concerned in calculating the length, perimeter, area and volume of various geometric figures and shapes. Here are some basic formulas which can be used to calculate the length, area, volume, and perimeter of various shapes and figures.

Formulas For Perimeter Area Volume:-

- **Formulas for Square**

Here, s = side

-
  - Perimeter: 4 * s

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- Area: S^2
- Diagonal: $s\sqrt{2}$
- Area of square when diagonal is given = $\frac{1}{2}\times d^{2}$

- **Formulas for Rectangle**

Here , l = length, b = breadth.

- Perimeter: 2 (l + b) (l = length, b = breadth)
- Area: l × b
- Diameter: $\sqrt{l^2 + b^2}$
- Area of 4 walls of a room = 2 (Length + Breadth) × Height

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- **Formulas of Circle**
  - Area of circle = πr^2
  - Area of semi-circle= $\frac{\pi r^2}{2}$
  - Circumference of a circle = $2\pi r$
  - Circumference of a semi-circle = πr
  - Length of arc = $\frac{2\pi r\theta}{360}$

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- Area of sector = 1/2 (arc*R) = $\pi r^2 \theta/360$

- **Parallelogram formulas**
  - Perimeter: $2(a + b)$
  - Area: $b \times h$
  - Height of parallelogram = $\frac{A}{b}$

- **Rhombus formulas**
  - Perimeter: $4 \times a$
  - Area: $\frac{p\times q}{2}$
  - Diagonals

    $p = p = \sqrt{4a^{2} - q^{2}}$

    $q = p = \sqrt{4a^{2} - q^{2}}$

- **Trapezium formulas**
  - Perimeter: $a + b + c + d$
  - Area: $\frac{1}{2}$ × (sum of parallel sides) × distance between them
  - To find thee distance between parallel sides you will have to convert trapezium to rectangle and then use **PYTHAGORAS THEOREM.**

- **Cube formulas**
  - Volume: $(\text{side})^3$
  - Surface area = $6s^2$
  - Partial Surface area = $4s^2$
  - Diagonal = $\sqrt{3}s$

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- **Cuboid formulas**
    - Volume: $l * b * h$
    - Surface area = $2 (lb + bh + hl)$
    - Curved Surface area = $2h(l+b)$
    - Diagonal = $\sqrt{l^2 + b^2 + h^2}$

- **Sphere formulas**
- Formulas for Sphere
    - Volume: $\frac{4}{3}\pi r^3$
    - Surface area = $4\pi r^2$

- **Hemisphere formulas**
    - Volume: $\frac{2}{3}\pi r^3$
    - Curved Surface area = $2\pi r^2$
    - Total Surface area = $3\pi r^2$

- **Cylinder formulas**
    - Volume: $\pi r^2 h$
    - Curved Surface area = $2\pi rh$
    - Total Surface area = $2\pi r (h + r)$

- **Cone formulas**
    - Volume: $\frac{1}{3}\pi r^2 h$
    - Slant height = $l = \sqrt{h^2 + r^2}$
    - Curved Surface area = πrl
    - Total Surface area = $\pi rl + \pi r$

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Some Examples Based On Above Formulas

*Question **1: Rohan Bought a House, which had a garden outside it, with sides measuring 12 meters and 8 meters, Find the perimeter of the garden ?***

Answer: The formula to find Perimeter is , P= 2(L+W)

= 2(12+8)

=2(20)

=40m Ans.

Question 2:To protect his house from Robbers, Mohan wrapped a wire around his square plot. If the wire's length is 80 meters, what is the perimeter of the square?

Answer: Perimeter of Square Plot = 4a(Where a = length of side)

= 4 x 80

= 320m Ans.

Question 3: Two kids planned to make an equilateral traingle of a cardboard , The length of one side of the traingle being 8 centimeters. Calculate the perimeter of the triangle.

Answer: Perimeter of Equilateral Traingle = 3 x Side length

= 3 x 8

= 24m Ans

Question 4: Rahul Came up with an idea to make figure made up of two adjacent rectangles, one measuring 8 meters by 5 meters and the other 6 meters by 4 meters. Find the total area of the figure.

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Answer: Total area of the figure = Area of the first rectangle + Area of the second rectangle

= (8 meters × 5 meters) + (6 meters × 4 meters)

= 40 square meters + 24 square meters

= 64 square meters.

Question 5: The base of a triangle measures 12 centimeters, and its height is 8 centimeters. Find the area of the triangle.

Answer: Area of the triangle = (Base × Height) / 2

= (12 centimeters × 8 centimeters) / 2

= 48 square centimeters.

Tips And Tricks And Shortcuts on Perimeter Area Volume Questions

Tips, Tricks and Shortcuts on Perimeter Area and Volume

The area is the space occupied by a shape of an object. The area of a figure is the number of unit squares that cover the surface of a closed figure, and Volume is calculated by the quantity of three-dimensional space enclosed by a closed surface.

Tips And Tricks And Shortcuts on Perimeter Area Volume:-

- Here, are quick and easy tips and tricks for you on Perimeter, Area, and Volume. Learn, the tricks and concept on Perimeter, area and volume.

Type 1: Find the area, perimeter, length, breadth and some other sides of the shapes

Question 1: The ratio between the length and the breadth of a rectangular plot is 7:3. Rahul was cycling along the boundary of the plot at a speed of 10 km/hr. He completes one round of the plot in 6 minutes. Find the area of the plot?

Options:

A. 52000 m²

B. 51500 m²

C. 53500 m²

D. 52500 m²

Solution: Distance covered by Rahul in 6 minutes = $\frac{10000}{60} \times 6 = 1000$ m

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Therefore, perimeter = 1000m

Length = 7x and breadth = 3x

Then 2 (l +b) = 1000

2 (7x + 3x) = 1000

2 (10x) = 1000

20x = 1000

x = 50

Length = 7x = 7 * 50 = 350

Breadth = 3x = 3 * 50 = 150

Therefore, Area = l * b = 350 * 150 = 52500 m^2

Correct option: D

Type 2: Perimeter, Area and Volume Tips and Tricks and Shortcuts by finding the volume & surface area

Question 1 What is the total surface area of a right circular cone of height 10 cm and base radius 7 cm?

Options:

A. 422.4 m^2

B. 422.4 cm^2

C. 422.4 cm^3

D. 422.4 cm

Solution: h = 10 cm, r = 7 cm

Slant height = l = \sqrt{h^2 + r^2 }

l = \sqrt{100 + 49 } = \sqrt{149 }= 12.2

Total surface area of cone = $\pi rl + \pi r^2$

(\frac{22}{7} × 7 × 12.2)+ (\frac{22}{7} × 7 × 7)

268.4 + 154

422.4 cm^2

Correct option: B

Type 3:Tips and Tricks and Shortcuts for Perimeter, Area and Volume by finding Percentage increase or decrease

Question 1:If length of the rectangle is increased by 50% and breadth is decreased by 20%. Then what is the percentage change in the area?

Options:

A. 70% decrease

B. 30 % increase

C. 20% increase

D. 20% decrease

Solution: Original area = $l * b$

New length = 50% increase = $\frac{150}{100}l$

= $\frac{3}{2}l$

New breadth = 20% decrease = $\frac{80}{100}b = \frac{4}{5}b$

Therefore, new area = $\frac{3}{2}l * \frac{4}{5}b$

New area = $\frac{6}{5} l b$

Change in Area = New Area – Original Area

Change in Area = $\frac{6}{5}lb - lb$

Change in Area = $\frac{1}{5}lb$

Percentage change in area = $\frac{\frac{1}{5}lb}{lb} * 100$

Percentage change in area = $\frac{1}{5} * 100 = \frac{100}{5} = 20\%$

Since, the answer is positive, it means there is increase in the area.

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Correct option: C

Type 4: How to solve cost related problems

Question 1 A wall of trapezium shape has height 8 m. The parallel sides of trapezium are 4 m and 6 m. If the rate of painting per square meter is Rs.50 than find the cost painting the complete wall?

Options:

A. Rs. 400

B. Rs. 420

C. Rs. 540

D. Rs. 450

Solution: Area of trapezium =\frac{1}{2} * (sum of parallel sides) * distance between them

Area of trapezium = \frac{1}{2} * (4 + 6) + 8

Area of trapezium = \frac{1}{2} * (18)

Area of trapezium = 9 square meter

Rate of painting per square meter is Rs.50

Therefore, to paint 9 square meter, total cost of painting = 9 * 50 = Rs. 450

Formulas for Coordinate Geometry

Coordinate Geometry Formulas

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Co-ordinate geometry is considered as one of the most easiest chapters from Quantitative Aptitude Section which can be asked in an Exam. This page here will give you all the required **Formulas for Coordinate Geometry.**

So that you can ace the questions asked from this chapter in any of the exams you wish to appear.

What is Coordinate Geometry?

- Coordinate geometry is a branch of geometry where the position of the points on the plane is defined with the help of an ordered pair of numbers also known as coordinates.

Coordinate Geometry Formulas and Basic Concept

- The point of intersection of the x and the y-axis is known as the origin. At this point, both x and y are 0.
- The values on the right-hand side of the x-axis are positive and the values on the left-hand side of the x-axis are negative.
- Similarly, on the y-axis, the values located above the origin are positive and the values located below the origin are negative.

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Formulas Required for Solving Coordinate Geometry Questions.

- Distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$

  $AB = \sqrt{(x_{2}- x_{1})^2 + (y_{2}- y_{1})^2}$

- Slope of line when two points are given (x_1, y_1) and (x_2, y_2)

  $m = \frac{(y_{1}- y_{2})}{(x_{1}- x_{2})}$

- Slope of line when linear equation is given $ax + by = c \Rightarrow -\frac{a}{b}$

- Midpoint $= \frac{x_{1} + x_{2}}{2}, \frac{y_{1} + y_{2}}{2}$

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- The co-ordinates of a point R(x,y) that divides a line segment joining two points A(x1, y1) and B(x2, y2) internally in the ratio m:n is given by

  $x = \frac{ m x_{2} + nx_{1}}{m + n}$

$y = \frac{my_{2} + ny_{1} }{m + n}$

- The co-ordinates of a point R(x,y) that divides a line segment joining two points A(x1, y1) and B(x2, y2) externally in the ratio m:n is given by

  $x =\frac{ m x_{2} - nx_{1}}{m - n}$

$y = \frac{my_{2} - ny_{1} }{m - n}$

- Centroid of a triangle with its vertices (x_1,y_1), (x_2,y_2), (x_3,y_3)

  $C = \frac{x_{1}+ x_{2} + x_{3}}{3}, \frac{y_{1}+ y_{2} + y_{3}}{3}$

- Area of a Triangle with its vertices $A(x_1,y_1)$, $B(x_2,y_2)$, $C(x_3,y_3)$

  $A =\frac{1}{2} \times[(x_{1}(y_{2}-y_{3}) + (x_{2}(y_{3}-y_{1})) + (x_{3}(y_{1}-y_{2}))]$

- Division of a line segment by a point

  If a point p(x, y) divides the join of $A(x_1, y_1)$ and $B(x_2, y_2)$, in the ratio m: n, then

  $x= \frac{ m x_{2} + nx_{1}}{m + n}$ and $y= \frac{my_{2} + ny_{1} }{m + n}$

- The equation of a line in slope intercept form is Y= mx+ c, where m is its slope.

  The equation of a line which has gradient m and which passes through the point (x_1, y_1) is =

  $y - y_1 = m(x - x_1)$.

Some Examples Using Above Formulas:

Question 1: Given two points A(2, 5) and B(6, 9), find the Distance between points A(2, 5) and B(6, 9)

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Answer: Distance between points A(2, 5) and B(6, 9):

Distance = \sqrt{6-2}^{2}+\sqrt{9-5}^{2}

=\sqrt{4^{2}+4^{2}} =

\sqrt{32} =

5.66 Ans

Question 2:If the slope of a line is -2/3 and it passes through the point (2, 5), find the equation of the line in point-slope form.

Answer: Equation of the line passing through points P(3, 8) and Q(5, -2):

Slope (m) =\frac{change in y}{change in x} =\frac{-2-8}{5-3}=\frac{-10}{2}=-5

Using the point-slope form: $y - y1 = m(x - x1)$

$y - 8 = -5(x - 3)$

$y - 8 = -5x + 15$

$y = -5x + 23$

Question 3: A rectangle has vertices at points A(1, 1), B(5, 1), C(5, 3), and D(1, 3). Determine its area and perimeter.

Answer:Rectangle with vertices at points A(1, 1), B(5, 1), C(5, 3), and D(1, 3):
Area = Length * Width Length =
Distance between points B and C:
Length = √((5 – 5)^2 + (3 – 1)^2) = √(0 + 4) = √4 = 2
Width = Distance between points A and B:
Width = √((5 – 1)^2 + (1 – 1)^2) = √(16 + 0) = √16 = 4 Area = 2 * 4 = 8 square units

Question 4: Determine the equation of the circle with center C(2, -1) and a radius of 5.

Answer:Equation of the circle with center C(2, -1) and radius 5:
The equation of a circle with center (h, k) and radius r is (x-h)^{2} + (y-k)^{2} = r^{2}
For this circle: = (x-h)^{2} + (y-(-1)^{2} = r^{2}=5^2 (x – 2)^2 + (y + 1)^2 = 25

Question 5: Given the points A(3, 6), B(8, 6), and C(5, 2), find the area of the triangle ABC.

Answer: Area of triangle ABC with vertices A(3, 6), B(8, 6), and C(5, 2):

Area = ½ |x1(y2 – y3) + x2(y3 – y1) + x3(y1 – y2)|

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Area = ½ |3(6 – 2) + 8(2 – 6) + 5(6 – 6)|

Area = ½ |12 – 24 + 0|

Area = ½ |-12|

Area = 6 square units

How To Solve Coordinate Geometry Quickly

Ways to solve Coordinate Geometry Problems Quickly

In This page we will be discussing about the ways how we can solve Coordinate Geometry Questions Quickly using basic Formulas, Tips and Tricks.

DefinitionIn coordinate geometry , points are placed on the coordinate plane . There are two scales, one is running across the plane called the x-axis and another scale is a right angles to it called the y - axis

Solve Coordinate Geometry Questions Quickly

- A coordinate geometry is a branch of geometry where the position of the points on the plane is defined with the help of an ordered pair of numbers also known as coordinates.

How To Solve Coordinate Geometry Questions Quickly:

Type 1: How To Solve Quickly Coordinate Geometry -Distance and Equation of Straight Line

Question 1: Find the distance between points A(–2,-5) and B(6,1)?

Options:

A. 100

B. 10

C. 20

D. 5

Solution: $AB = \sqrt{(x_{2}- x_{1})^2 + (y_{2}- y_{1})^2}$

$AB =\sqrt{(6- (-2))^2 + (1- (-5))^2}$

$AB = \sqrt{(6+2)^2 + (1+5)^2}$

$AB = \sqrt{(8)^2 + (6)^2}$

$AB = \sqrt{64 + 36}$

$AB =\sqrt{100}$

$AB = 10$

Correct option: B

Question 2: Find the equation of line whose end points are (4, 5) and (2, 8).

Options:

A. $3x - 2y -2 = 0$

B. $3x + 2y -2 = 0$

C. $3x + 2y + 2 = 0$

D. $3x - 2y + 2 = 0$

Solution: We know that,

$y - y_1 = m(x - x_1)$

$m = \frac{(y_{1}- y_{2})}{(x_{1}- x_{2})}$

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Therefore, $y - y_1 = \frac{(y_{1}- y_{2})}{(x_{1}- x_{2})} \times (x - x_1)$

$y - 5 = \frac{(8- 5)}{(4 - 2)} \times x - 4$

$y - 5 =\frac{3}{2} \times(x - 4)$

$2y - 10 = 3x - 12$

$3x - 2y -2 = 0$

Correct option: A

Question 3: Two points $(a + 3, b + k)$ and (a, b) are on the line $x - 2y + 9 = 0$. Find the value of k.

Options:

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C.$\frac{3}{4}$

D.$\frac{3}{2}$

Solution: $x - 2y + 9 = 0$

$y = \frac{x}{2}+ \frac{9}{2}$

Slope of the line = $\frac{1}{2}$

Slope of the line using two points = $b + k - \frac{b}{a} + 3 -a$
$= \frac{k}{3}$

$\frac{k}{3} = \frac{1}{2}$

$k = \frac{3}{2}$

Correct option: D

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Type 2: How To Solve Coordinate Geometry Quickly. In which quadrant does the point lie?

Question 1: In which quadrant does the point (-7, 3) lie?

Options:

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Solution: The point is negative in the x axis and positive for the y axis, thus the point must lie in the 2nd quadrant.

Correct option: B

Question 2: In which quadrant does the point (2, 3) lie?

Options:

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Solution: Both points are positive. Therefore they will lie in 1st quadrant

Correct option: A

Question 3: In which quadrant does the point (-10, -3) lie?

Options:

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Solution: Both points are negative. Therefore they will lie in 3th quadrant.

Correct option: C

Type 3: Solve Quickly Coordinate Geometry Questions.
Find the Coordinates

Question 1: Find the co-ordinates of the centroid of a triangle whose vertices are (0, 4), (6, 10) and (9, 4).

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Options:

A. 6, 5

B. 7, 5

C. 5, 6

D. 5, 7

Solution: We know that, Centroid of a triangle with its vertices (x_1,y_1), (x_2,y_2), (x_3,y_3)

$C = \frac{x_{1}+ x_{2} + x_{3}}{3}, \frac{y_{1}+ y_{2} + y_{3}}{3}$

$C = \frac{0+ 6 + 9}{3}, \frac{4+ 10 + 4}{3}$

$C = \frac{15}{3}, \frac{18}{3}$

C = 5, 6

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Correct option: C

Question 2: If the distance between two points A(a, −3) and B(3, a) is 6 unit, then a = ?

Options:

A. ± 3

B. − 5

C. 4

D. 0

Solution: We know that, Distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$

$AB = \sqrt{(x_{2}- x_{1})^2 + (y_{2}- y_{1})^2}$

$AB = \sqrt{(3- a)^2 + (a+ 3)^2}$

$AB = \sqrt{2a^2 + 18}$

According to question,

$\sqrt{2}a^2+18 = 6$

$2a^2 + 18 = 36$

$a^2 = 9$

$a = \pm 3$

Correct option: A

Question 3: The line passing through (4,3) and (y,0) is parallel to the line passing through (−1,−2) and (3,0). Find the value of y?

Options:

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A. 2

B. -2

C. -1

D. 1

Solution: Slope of line passing through (4,3) (y,0)

$m = \frac{(y_{1}- y_{2})}{(x_{1}- x_{2})}$

$m_{1}= \frac{(3- 0)}{(4- y)}$

Slope of line passing through (−1,−2) (3,0)

$m_{2}= \frac{(-2 - 0)}{(-1- 3)}$

If two lines are parallel then, there slopes are equal

$m_{1}= m_{2}$

$\frac{3}{4- y } = \frac{-2}{-4}$

$\frac{3}{4- y } = \frac{2}{4}$

$8 - 2y = 12$

$- 2y = 12 - 8$

$- 2y = 4$

$y = \frac{4}{-2}$

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y = – 2

Correct option: B

Type 4: Coordinate Geometry Solve Questions Quickly.
Find the area

Question 1: A(a,b), B(c,d) and C(e,f) are the vertices of a triangle. Given that:

Option 1: AB + BC > AC

Option 2: Area of the triangle = \frac{1}{2} ×[(a(c-e) + (c(f-b)) + (e(b-d))]

Which of the following are true?

Options:

A. Option I is true

B. Option II is true

C. Both are true

D. None of the above

Solution: The formula given in option II is wrong.

The correct formula is

A = **\frac{1}{2} ×[(a(d-f) + (c(f-b)) + (e(b-d))]**

Correct option: A

Question 2: Find the area of the triangle formed by the vertices (31, 25), (23, 30) and (33, 28)

Options:

A. 25

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B. 15

C. 19

D. 17

Solution: Area of triangle = $\frac{1}{2} \times [(x_{1}(y_{2}-y_{3}) + (x_{2}(y_{3}-y_{1})) + (x_{3}(y_{1}-y_{2}))]$

$A=\frac{1}{2} \times [(31(30-28) + (23(28-25)) + (33(25-30))]$

A = 17

Correct option: D

Question 3: Find the area of the triangle formed by the vertices (-8, 19), (-7, 31) and (13, 25)

Options:

A. 125

B. 135

C. 119

D. 123

Solution: Area of triangle = $\frac{1}{2} \times [(x_{1}(y_{2}-y_{3}) + (x_{2}(y_{3}-y_{1})) + (x_{3}(y_{1}-y_{2}))]$

$A= \frac{1}{2} \times [(- 8 (31-25) + (7(25 - 19)) + (13(19-31))]$

A = 123

Correct option: D

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Tips Tricks And Shortcuts on Coordinate Geometry

Shortcuts, Tips and Tricks for the Questions of Coordinate Geometry

To solve questions effectively and accurately in placement exams you need to have a stronghold on the tips, tricks and shortcuts of that chapter. This page will provide you with all possible **Tips Tricks of Coordinate Geometry** and will provide you with various shortcuts as well.

Introduction to Tips Tricks and Shortcuts for Coordinate Geometry

- Here, are Coordinate Geometry tips and tricks and shortcuts. Co-ordinate Geometry are most asked in recruitment exams. Learn, the tricks on Coordinate Geometry easily, and efficiently.
- Here are the types of problems given for solving the coordinate geometry questions based on areas , length of segment and distance time graphs

Type 1: Coordinate Geometry Questions Tips and Tricks and Shortcuts for .

Question 1. Find the equation of straight line passing through (2, 3) and perpendicular to the line 3x + 2y + 4 = 0

Options:

A. 2x – 3y + 5 = 0

B. 2x + 3y + 5 = 0

C. 2x – 3y – 5 = 0

D. 2x + 3y – 5 = 0

Solution : $x_1 = 2; y_1 = 3$

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The given line is $3x + 2y + 4 = 0$

Line perpendicular to it will have slope $m = \frac{2}{3}$

Thus equation of line through (2, 3) and slope $\frac{2}{3} = y - y1 = m(x - x1)$

$(y - 3) = \frac{2}{3} (x - 2)$

$y - 3 = 2x - \frac{4}{3}$

$3y - 9 = 2x - 4$

$2x - 3y + 5 = 0$

Correct option: A

Type 2: Tips Tricks and Shortcuts for In which quadrant does the point lie?

Question 1. In which quadrant does the point (-2, 3) lie?

Options:

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Solution: The point is negative in the x axis and positive for the y axis, thus the point must lie in the 2nd quadrant.

Correct option: 2

Type 3: Tips and Tricks for Find length of the segment or coordinates

Question 1. Find the coordinate of the point which will divide the line joining the point (2, 3) and (3, 5) internally in the ratio 2:3?

Options:

A. 2, 1

B. 2, 5

C. $\frac{12}{5}, \frac{19}{5}$

D. $12, \frac{15}{19}$

Solution: We know that, $x= \frac{ m x_{2} + nx_{1}}{m + n}$ and $y= \frac{my_{2} + ny_{1} }{m + n}$

$x = 2 \times 3 + 3 \times \frac{2}{2}+ 3$

$x = \frac{12}{5}$

$y = 2 \times 5 + 3 \times \frac{3}{2} + 3$

$y = \frac{19}{5}$

Therefore, $(x, y) = \frac{12}{5}, \frac{19}{5}$

Correct option: 3

Type 4: Tips Tricks and Shortcuts for Area of the Triangle in Coordinate Geometry

Question 1. Find the area of the triangle formed by the vertices (1, 2), (3,5) and (-2, 3)

Options:

A. 2.5

B. 3.5

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C. 5.5

D. 6

Solution : Area of triangle = $A = \frac{1}{2} \times [(x_{1}(y_{2}-y_{3}) + (x_{2}(y_{3}-y_{1})) + (x_{3}(y_{1}-y_{2}))]$

$A =\frac{1}{2} \times [(1(5-3) + (3(3-2)) + (2(2-5))]$

$A =\frac{1}{2} \times [(1(2) + (3(1)) + (2(-3))]$

$A = \frac{1}{2} \times [2 + 3 + 6]$

$A = \frac{1}{2} \times [11]$

$A = 5.5$

Correct option: C

Formulas for Linear Equation Problems

Introduction to Formulas of Linear Equations

A linear equation is also known as an algebraic equation in which each term has an exponent of one. The graph representation of the equation shows a straight line. Standard form of linear equation is $y = m x + b$. Where, x is the variable and y, m, and b are the constants. On this page you will find complete Formulas for Linear Equation that will help you to solve questions of all levels.

Formulas & Definitions for Linear Equations

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- A linear equation is an algebraic equation in which each term has an exponent of one and the graphing of the equation results in a straight line.
- Standard form of linear equation is y = **mx + b.** Where, x is the variable and y, m, and b are the constants.

Forms of Linear Equations

There are mainly 3 forms of Linear Equation :

1. Standard Form
2. Slope-Intercept Form
3. Point-Slope Form

1. Standard Form

The standard form of a linear equation is typically written as:

Ax + By = C

Where:

- �A and �B are coefficients (constants) representing the coefficients of �x and �y terms, respectively.
- �C is a constant term.

The standard form requires that �A and �B are both integers and that �A is non-negative. Also, �A and �B should not have any common factors other than 1. This form is commonly used in algebraic manipulation and solving systems of linear equations.

2. Slope-Intercept Form

The slope-intercept form of a linear equation is written as:

y=mx+b

Where:

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- �m is the slope of the line, representing the rate of change between �y and �x.
- �b is the y-intercept, which is the value of �y when �x is equal to 0. It represents the point where the line intersects the y-axis.

This form is particularly useful for graphing linear equations and quickly identifying the slope and y-intercept of the line.

3. Point-Slope Form

The point-slope form of a linear equation is given by:

$$y-y_1=m(x-x_1)$$

Where:

- �m is the slope of the line, as explained in the slope-intercept form.
- (�1,�1)(x_1,y_1) represents the coordinates of a point on the line.

This form is useful when you know a specific point on the line and its slope, allowing you to write the equation directly without having to calculate the y-intercept.

Linear equations in one variable

- A Linear Equation in one variable is defined as **ax + b = 0**
- Where, a and b are constant, **a ≠ 0**, and x is an unknown variable
- The solution of the equation ax + b = 0 is x = – \frac{b}{a} . We can also say that – \frac{b}{a} is the root of the linear equation ax + b = 0.

Linear equations in two variable

- A Linear Equation in two variables is defined as **ax + by + c = 0**
- Where a, b, and c are constants and also, both a and b ≠ 0

Linear equations in three variable

- A Linear Equation in three variables is defined as **ax + by + cz = d**
- Where a, b, c, and d are constants and also, a, b and c ≠ 0

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Formulas and Methods to solve Linear equations

- **Substitution Method**

Step 1: Solve one of the equations either for x or y.

Step 2: Substitute the solution from step 1 into the other equation.

Step 3: Now solve this equation for the second variable.

- **Elimination Method**

Step 1: Multiply both the equations with such numbers to make the coefficients of one of the two unknowns numerically same.

Step 2: Subtract the second equation from the first equation.

Step 3: In either of the two equations, substitute the value of the unknown variable. So, by solving the equation, the value of the other unknown variable is obtained.

- **Cross-Multiplication Method**

Suppose there are two equation,

$p_{1}x + q_{1}y = r_{1}$ ....(1)

$p_{2}x + q_{2}y = r_{2}$ ....(2)

Multiply Equation (1) with p_2

Multiply Equation (2) with p_1

$p_{1}p_{2}x + q_{1}p_{2}y = r_{1}p_{2}$

$p_{1}p_{2}x + p_{1}q_{2}y = p_{1}r_{2}$

Subtracting,

$q_{1}p_{2}y - p_{1}q_{2}y = r_{1}p_{2} - p_{1}r_{2}$

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or, $y(q_1 p_2 - q_2 p_1) = r_2 p_1 - r_1 p_2$

Therefore, $y = \frac{r_{2}p_{1} - r_{1}p_{2}}{q_{1}p_{2} - q_{2}p_{1}}$

$= \frac{r_{1}p_{2} - r_{2}p_{1}}{q_{2}p_{1} - q_{1}p_{2}}$

where $(p_1 q_2 - p_2 q_1) \neq 0$

Therefore, $\frac{y}{r_{1}p_{2} - r_{2}p_{1}} = \frac{1}{q_{2}p_{1} - q_{1}p_{2}}$ ...(3)

Multiply Equation (1) with q_2

Multiply Equation (2) with q_1

$p_{1}q_{2}x + q_{1}q_{2}y = r_{1}q_{2}$

$q_{1}p_{2}x + q_{1}q_{2}y = q_{1}r_{2}$

Subtracting,

$p_{1}q_{2}x - p_{2}q_{1}x = r_{1}q_{2} - q_{1}r_{2}$

or, $x(p_1 q_2 - p_2 q_1) = (q_1 r_2 - q_2 r_1)$

or, $x = \frac{q_{1}r_{2} - r_{1}q_{2}}{p_{1}q_{2} - p_{2}q_{1}}$

Therefore, $\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{1}{p_{1}q_{2} - p_{2}q_{1}}$ ... (4)

where $(p_1 q_2 - p_2 q_1) \neq 0$

From equations (3) and (4), we get,

$\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{y}{r_{1}p_{2} - p_{1}r_{2}} = \frac{1}{p_{1}q_{2} - p_{2}q_{1}}$

where $(p_1 q_2 - p_2 q_1) \neq 0$

Note: Shortcut to solve this equation will be written as

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$\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{y}{r_{1}p_{2} - r_{2}p_{1}} = \frac{1}{q_{2}p_{1} - q_{1}p_{2}}$

which means,

$x = \frac{q_{1}r_{2} - r_{1}q_{2}}{q_{2}p_{1} - q_{1}p_{2}}$

$y = \frac{r_{1}p_{2} - r_{2}p_{1}}{q_{2}p_{1} - q_{1}p_{2}}$

Important Formulas of Linear Equation & key points to Remember

- Suppose, there are two linear equations: $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$

Then,

(A) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}}$, then there will be one solution, and the graphs will have intersecting lines.

(B) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}} = \frac{c_{1}}{c_{2}}$, then there will be numerous solutions, and the graphs will have coincident lines.

(C) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}} \neq \frac{c_{1}}{c_{2}}$ then there will be no solution, and the graphs will have parallel lines.

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Questions on Formulas of Linear Equation:

Question 1:

What is the slope-intercept form of the equation of a line?

a) $y=mx+b$

b) $y=mx-b$

c) $y=bx+m$

d) $y=bx-m$

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Answer : (a)

Explanation:

The correct answer is (a). The slope-intercept form of a linear equation is $y=mx+b$, where m represents the slope and b represents the y-intercept.

Question 2:

Which form of a linear equation is useful when you know a specific point on the line and its slope?

a) Point-Slope Form

b) Slope-Intercept Form

c) Standard Form

d) None of the above

Answer: (a)

Explanation: The correct answer is (a). The point-slope form of a linear equation is written as $y-y_1=m(x-x_1)$, where $(1,1)(x_1,y_1)$ represents the coordinates of a point on the line, and m is the slope.

Question 3:

What does the standard form of a linear equation look like? a) $y=mx+b$

b) $y=bx+m$

c) $Ax+By=C$

d) $Ax+By=D$

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Explanation: The correct answer is (c). The standard form of a linear equation is $Ax+By=C$, where A and B are coefficients representing the coefficients of x and y, respectively, and C is a constant term.

Question 4:

Which of the following is the correct representation of the point-slope form of a linear equation?

a) $y=mx+b$

b) $y-y_1=m(x-x_1)$

c) $y=Ax+By$

d) $y=m1x+b$

Explanation: The correct answer is (b). The point-slope form of a linear equation is represented as $y-y_1=m(x-x_1)$, where (x_1,y_1) represents the coordinates of a point on the line, and m is the slope of the line. This form is useful when you know a specific point on the line and its slope.

Question 5:

How can you eliminate fractions from a linear equation?

a) Multiply both sides of the equation by a common denominator

b) Divide both sides of the equation by a common denominator

c) Add both sides of the equation by a common denominator

d) Subtract both sides of the equation by a common denominator

Explanation: The correct answer is (a). To eliminate fractions from a linear equation, multiply both sides of the equation by a common denominator. This process will clear the fractions and make the equation easier to solve.

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How To Solve Linear Equation Questions Quickly

Tips for solving Linear Equations Quickly

When it comes to solving linear equations quickly, mastering the right techniques can make all the difference. Begin by identifying the form of the equation, whether it's in standard form, slope-intercept form, or point-slope form. Next, apply the appropriate method, such as the graphical method for visualization, elimination or substitution method for simultaneous equations, cross-multiplication for dealing with fractions, or leveraging matrices and determinants for complex systems.

How to Solve Linear Equation Questions & Definition

- A linear equation is an equation where variable quantities are in the first power only and whose graph is a straight line.
- The above line represent as, y= mx + c

Methods to solve Linear Equation :

There are mainly 6 methods to solve Linear Equation :

1. Graphical Method
2. Elimination Method
3. Substitution Method
4. Cross Multiplication Method
5. Matrix Method
6. Determinants Method

Let's explain each method in terms of solving linear equations:

1. **Graphical Method**: The graphical method involves graphing both sides of a linear equation on the same coordinate plane and finding the point(s) where the graphs intersect. The solution to the equation is the x-coordinate (and corresponding y-

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coordinate) of the point(s) of intersection. In this method, the graphical representation of the equation visually illustrates the solution(s) to the equation.

2. **Elimination Method**: In the elimination method, you aim to eliminate one variable by adding or subtracting multiple equations to make one variable's coefficient cancel out. This process leads to an equation with only one variable, which can be easily solved. After finding the value of one variable, you can substitute it back into one of the original equations to find the value of the other variable.
3. **Substitution Method**: The substitution method involves solving one variable in terms of the other from one of the equations and then substituting this expression into the other equation. By doing so, you reduce the system of equations to a single equation with one variable, which can then be solved easily.
4. **Cross Multiplication Method**: The cross multiplication method is used to solve equations with fractions. When you have an equation with fractions, you cross-multiply by multiplying the numerator of one fraction with the denominator of the other and vice versa. This process eliminates the fractions and simplifies the equation, making it easier to solve.
5. **Matrix Method**: In the matrix method, you represent a system of linear equations using matrices and use matrix operations to solve for the variables. This method is particularly useful when dealing with large systems of equations, as it simplifies the process of solving using matrices and their properties.
6. **Determinants Method**: The determinants method involves using the concept of determinants from linear algebra to solve a system of linear equations. You form a matrix with the coefficients of the variables, a matrix with the constants on the right-hand side, and then find the determinants of these matrices. By using Cramer's rule or other determinant-based methods, you can solve for the variables.

Type 1: Solve Linear Equations Questions Quickly, Find the value of x or y.

Question 1. If 3a + 7b = 75 and 5a – 5b = 25, what is the value of a + b?

Options:

A. 11

B. 6

C. 5

D. 17

Solution: $3a + 7b = 75$ ……(1)

$5a - 5b = 25$ (divide the equation by 5)

we get, $a - b = 5$ …….(2)

Now multiplying eq. (2) by 7

and add to eq. (1), we get

$3a + 7b = 75$

$7a - 7b = 35$

On solving

$10a = 110$

$a = \frac{110}{10}$

$a = 11$

Now put the value of a in eq (2)

$11 - b = 5$

$b = 11 - 5$

$b = 6$

Therefore, $a = 11$ and $b = 6$

The value of $a + b = 6 + 11 = 17$

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Correct option: D

Question 2. If $2^{x+y} = 16$ and $16^{x-y} = 2$, then find the value of x?

Options:

A. $\frac{1}{4}$

B. $\frac{17}{4}$

C. $\frac{17}{8}$

D. 4

Solution: Given, $2^{x+y} = 16$

$2^{x+y} = 2^4$

$x + y = 4$....(1)

Now, $16^{x-y} = 2$

$(2^4)^{x-y} = 2^1$

$x - y = \frac{1}{4}$ ....(2)

On solving equation 1 and 2

We get,

$2x = \frac{17}{4}$

$x = \frac{17}{4 \times 2} = \frac{17}{8}$

Correct option: C

Question 3. The system of equations 3a + 5b = 6 and 6a + 10y = 6 has

Options:

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A. No solution

B. One solution

C. Two solution

D. Infinite solution

Solution: $\frac{a_{1}}{a_{2}} = 3/6 = 1/2$

$\frac{b_{1}}{b_{2}} = 5/10 = 1/2$

$\frac{c_{1}}{c_{2}} = \frac{6}{6} = 1$

$\frac{a_{1}}{a_{2}} = \frac{b_{1}}{b_{2}} \neq \frac{c_{1}}{c_{2}}$

Therefore, there is no solution

Correct option: A

Type 2: Solve Quickly Linear Equations Questions, Based on Word problems

Question 1. The difference between the two numbers is 45. The ratio of the two numbers is 8:3. Find the two numbers?

Options:

A. 72 and 27

B. 90 and 45

C. 81 and 36

D. 60 and 15

Solution: Let the first number be 8x

Let the second number be 3x

Now, the difference between the two numbers is 45

Therefore, $8x - 3x = 45$

$5x = 45$

$x = \frac{45}{5}$

$x = 9$

Now, put the value of x in

$8x = 8 \times 9 = 72$

$3x = 3 \times 9 = 27$

Correct option: A

Question 2. The breadth of a rectangle is twice its length. If the perimeter of the rectangle is 84m. Then, calculate the length and breadth of the rectangle?

Options:

A. L=12 and B= 24

B. L = 14 and B = 28

C. L = 28 and B = 14

D. L = 24 and B = 12

Solution: Perimeter of rectangle = 2 (l+b)

Length of the rectangle = x

Breadth of the rectangle = 2x

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Perimeter of the rectangle = 84

2 (x + 2x) = 84

2 (3x) = 84

6x = 84

x = \frac{84}{6}

x = 14

Therefore, the Length of the rectangle = 14m

And Breadth of the rectangle = 14 × 2 = 28m

Correct option: B

Question 3. Ajay bought 5 tickets for two concerts A and B and 10 tickets for concert A and C. He paid Rs. 350. Now the total of a ticket for concert A and B and ticket of A and C is Rs. 42, then what is the ticket price for concert A and B?

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Options:

A. Rs. 10

B. Rs. 42

C. Rs. 14

D. Rs. 28

Solution: Let the ticket price of concert A and B = a

Let the ticket price of concert A and C = b

According to the question, a + b = 42…… (1)

Ticket bought by Ajay = 5a + 10b = 350

= a + 2b = 70……(2)

Now solve equation 1 and 2

a + b = 42

a + 2b = 70

b = 70 – 42

b = 28

Now put the value of b in equation 1

a+ 28 = 42

a = 42 – 28

a = 14

Hence, the ticket price for concert A and B = Rs. 14

Correct option: C

Tips And Tricks And Shortcuts on Linear Equation Problems

Tips And Tricks And Shortcuts On Linear Equations

Mastering linear equations is essential for excelling in mathematics, and having the right tips and tricks up your sleeve can make problem-solving a breeze. First, identify the form of the equation, whether it's in standard form, slope-intercept form, or point-slope form. Simplify the equation by combining like terms and eliminating fractions if present. Use the graphical method to visualize the solution and find the point of intersection.

Definition of Linear EquationA linear equation is a mathematical equation that represents a straight line in a two-dimensional Cartesian coordinate system. It is an algebraic expression of the form y=mx+b, where x and y are variables, m is the slope of the line, and b is the y-intercept

Linear Equation Tips and Tricks and Shortcuts

Tips and Tricks :

• Here, we have provided quick and easy tips and tricks for you on Linear Equation questions which and efficiently in competitive exams as well as other recruitment exams that must help to find a better place.

• It can be easily solved by eliminating the wrong options. It means put the given values in equation and check which one is satisfying the equation.

• Standard form of linear equations is y= mx+b. There are 2 types of questions asked in exams explain below.

Shortcuts for solving Linear Equation:

There are several shortcuts and techniques to solve linear equations quickly and efficiently. Here are some useful shortcuts:

1. **Combine Like Terms**: Before solving, combine similar terms on both sides of the equation to simplify the equation.
2. **Isolate the Variable**: Aim to get the variable (usually x) on one side of the equation by applying inverse operations (addition, subtraction, multiplication, division) to move all other terms to the other side.
3. **Use Fractional Form**: When the equation contains fractions, it's often easier to work with the equation in fractional form to avoid dealing with large numbers.
4. **Cancellation**: If you have terms with the same factor on both sides of the equation, you can cancel them out to simplify the equation.
5. **Multiply to Eliminate Fractions**: To eliminate fractions, multiply the entire equation by the least common multiple (LCM) of the denominators.

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6. **Cross-Multiplication**: For equations with proportions or fractions, use cross-multiplication to simplify and solve for the variable.

💡Using these shortcuts and techniques can save you time and improve your problem-solving skills for linear equations. However, it's essential to remember the principles behind each shortcut to ensure accuracy in your solutions.

Type 1: Linear Equations Shortcuts. To Find the value of x or y.

Question 1. If 3a + 6 = 4a – 2, then find the value of a?

Options:

A. 3

B. 8

C. 6

D. 7

Solution: We can use the trick of eliminating the option

Option 1, put a = 3

3 * 3 + 6 = 15

4 * 3 -2 = 10

This means option 1 is incorrect.

Now, check for option 2, put a = 8

3 * 8 + 6 = 30

4 * 8 – 2 = 30

This means option 2 satisfies the equation. Therefore, it is the correct option.

Correct option: B

Question 2. Which of the following is the correct equation of the line passing through the points (2, 5) and (4, 11)?

Options

A) y = 3x + 1

B) y = 2x + 1

C) y = 2x + 3

D) y = 3x + 5

Solution: To find the equation of a line passing through two given points, we first calculate the slope (m) using the formula:

m = \frac{(y2-y1)}{(x2-x1)}

For the points (2, 5) and (4, 11), the slope is \frac{(11-5)}{(4-2)}= \frac{6}{2}=3.

Next, we use the point-slope form of the linear equation:

y – y1 = m(x – x1)

Plugging in the values (2, 5) and m = 3, we get the equation y – 5 = 3(x – 2). Solving for y, we find y = 3x + 1.

Correct Option : A

Type 2: Tips And Tricks for Linear Questions Word problems

Question 3. The cost of 5 blankets and 6 bedsheets is Rs.1500. The cost of 6 blankets and 5 bedsheets is Rs.1300. Find out the total cost of one blanket and one bedsheet.

Options:

A. Rs. 255

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B. Rs. 250

C. Rs. 81.81

D. Rs. 254.545

Solution: Let the cost of blankets be x and the cost of bedsheets be y.

According to the question:

$5x + 6y = 1500$…(1)

$6x + 5y = 1300$…(2)

Multiply Eq 1 by 5 and Eq 2 by 6,

we get.

$25x+30y = 7500$…(3)

$36x+30y = 7800$…(4)

Subtract equation (3) from equation (4)

$11x = 300$

$x = \frac{300}{11}$

$5 \times \frac{300}{11} + 6y = 1500$

$6y = 1500 - \frac{1500}{11}$

$6y = 1500(1 - \frac{1}{11})$

$6y = 1500 \times \frac{10}{11}$

$y = \frac{2500}{11}$

Total cost = x+y

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=> $\frac{300}{11}+\frac{2500}{11}$

= $\frac{2800}{11}$ = 254.545

Correct option: D

Question 4: What is the x-intercept of the line represented by the equation 2x + 3y = 12?

Options

A) 4

B) 6

C) 8

D) 12

Solution: To find the x-intercept, we set y = 0 and solve for x.

Substituting y = 0 into the equation 2x + 3y = 12, we get 2x + 3(0) = 12. Simplifying, we find 2x = 12, and then x = 6.

Correct Option: B

Question 5: If the line 3x – y = 5 is parallel to the line 2x + ky = 8, what is the value of k?

Options

A) -3

B) -2

C) 2

D) 3

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Solution: Two lines are parallel if their slopes are equal.

The slope of the line $3x - y = 5$ can be found by rearranging the equation in slope-intercept form ($y = mx + b$), where m is the slope.

So, $3x - y = 5$ becomes $y = 3x - 5$, and the slope is 3.

The line $2x + ky = 8$ can also be rearranged as $y = -(2/k)x + 8/k$, where the slope is $-2/k$. To make both slopes equal (3 and $-2/k$), we need $-2/k = 3$. Solving for k, we find $k = -2/3$.

Correct Option: B

Formulas for Linear Equation Problems

Introduction to Formulas of Linear Equations

A linear equation is also known as an algebraic equation in which each term has an exponent of one. The graph representation of the equation shows a straight line. Standard form of linear equation is $y = m x + b$. Where, x is the variable and y, m, and b are the constants. On this page you will find complete Formulas for Linear Equation that will help you to solve questions of all levels.

Formulas & Definitions for Linear Equations

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Forms of Linear Equations

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There are mainly 3 forms of Linear Equation :

4. Standard Form
5. Slope-Intercept Form
6. Point-Slope Form

1. Standard Form

The standard form of a linear equation is typically written as:

Ax + By = C

Where:

- �A and �B are coefficients (constants) representing the coefficients of �x and �y terms, respectively.
- �C is a constant term.

The standard form requires that �A and �B are both integers and that �A is non-negative. Also, �A and �B should not have any common factors other than 1. This form is commonly used in algebraic manipulation and solving systems of linear equations.

2. Slope-Intercept Form

The slope-intercept form of a linear equation is written as:

y=mx+b

Where:

- �m is the slope of the line, representing the rate of change between �y and �x.
- �b is the y-intercept, which is the value of �y when �x is equal to 0. It represents the point where the line intersects the y-axis.

This form is particularly useful for graphing linear equations and quickly identifying the slope and y-intercept of the line.

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3. Point-Slope Form

The point-slope form of a linear equation is given by:

$$y - y_1 = m(x - x_1)$$

Where:

- �m is the slope of the line, as explained in the slope-intercept form.
- (�1,�1)(x_1, y_1) represents the coordinates of a point on the line.

This form is useful when you know a specific point on the line and its slope, allowing you to write the equation directly without having to calculate the y-intercept.

Linear equations in one variable

- A Linear Equation in one variable is defined as **ax + b = 0**
- Where, a and b are constant, **a ≠ 0**, and x is an unknown variable
- The solution of the equation ax + b = 0 is x = – \frac{b}{a} . We can also say that – \frac{b}{a} is the root of the linear equation ax + b = 0.

Linear equations in two variable

- A Linear Equation in two variables is defined as **ax + by + c = 0**
- Where a, b, and c are constants and also, both a and b ≠ 0

Linear equations in three variable

- A Linear Equation in three variables is defined as **ax + by + cz = d**
- Where a, b, c, and d are constants and also, a, b and c ≠ 0

Formulas and Methods to solve Linear equations

- **Substitution Method**

Step 1: Solve one of the equations either for x or y.

Step 2: Substitute the solution from step 1 into the other equation.

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Step 3: Now solve this equation for the second variable.

- **Elimination Method**

Step 1: Multiply both the equations with such numbers to make the coefficients of one of the two unknowns numerically same.

Step 2: Subtract the second equation from the first equation.

Step 3: In either of the two equations, substitute the value of the unknown variable. So, by solving the equation, the value of the other unknown variable is obtained.

- **Cross-Multiplication Method**

Suppose there are two equation,

$p_{1}x + q_{1}y = r_{1}$ ....(1)

$p_{2}x + q_{2}y = r_{2}$ ....(2)

Multiply Equation (1) with p_2

Multiply Equation (2) with p_1

$p_{1}p_{2}x + q_{1}p_{2}y = r_{1}p_{2}$

$p_{1}p_{2}x + p_{1}q_{2}y = p_{1}r_{2}$

Subtracting,

$q_{1}p_{2}y - p_{1}q_{2}y = r_{1}p_{2} - p_{1}r_{2}$

or, $y (q_1 p_2 - q_2p_1) = r_2p_1 - r_1p_2$

Therefore, $y = \frac{r_{2}p_{1} - r_{1}p_{2}}{q_{1}p_{2} - q_{2}p_{1}}$

$= \frac{r_{1}p_{2} - r_{2}p_{1}}{q_{2}p_{1} - q_{1}p_{2}}$

where $(p_1q_2 - p_2q_1) \neq 0$

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Therefore, $\frac{y}{r_{1}p_{2} - r_{2}p_{1}} = \frac{1}{q_{2}p_{1} - q_{1}p_{2}}$ ...(3)

Multiply Equation (1) with q_2

Multiply Equation (2) with q_1

$p_{1}q_{2}x + q_{1}q_{2}y = r_{1}q_{2}$

$q_{1}p_{2}x + q_{1}q_{2}y = q_{1}r_{2}$

Subtracting,

$p_{1}q_{2}x - p_{2}q_{1}x = r_{1}q_{2} - q_{1}r_{2}$

or , $x(p_1q_2 - p_2q_1) = (q_1r_2 - q_2r_1)$

or, $x = \frac{q_{1}r_{2} - r_{1}q_{2}}{p_{1}q_{2} - p_{2}q_{1}}$

Therefore, $\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{1}{p_{1}q_{2} - p_{2}q_{1}}$ ... (4)

where $(p_1q_2 - p_2q_1) \neq 0$

From equations (3) and (4), we get,

$\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{y}{r_{1}p_{2} - p_{1}r_{2}} = \frac{1}{p_{1}q_{2} - p_{2}q_{1}}$

where $(p_1q_2 - p_2q_1) \neq 0$

Note: Shortcut to solve this equation will be written as

$\frac{x}{q_{1}r_{2} - r_{1}q_{2}} = \frac{y}{r_{1}p_{2} - r_{2}p_{1}} = \frac{1}{q_{2}p_{1} - q_{1}p_{2}}$

which means,

$x = \frac{q_{1}r_{2} - r_{1}q_{2}}{q_{2}p_{1} - q_{1}p_{2}}$

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$y = \frac{r_{1}p_{2} - r_{2}p_{1}}{q_{2}p_{1} - q_{1}p_{2}}$

Important Formulas of Linear Equation & key points to Remember

- Suppose, there are two linear equations: $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$

Then,

(A) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}}$, then there will be one solution, and the graphs will have intersecting lines.

(B) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}} = \frac{c_{1}}{c_{2}}$, then there will be numerous solutions, and the graphs will have coincident lines.

(C) If $\frac{a_{1}}{a_{2}}=\frac{b_{1}}{b_{2}} \neq \frac{c_{1}}{c_{2}}$ then there will be no solution, and the graphs will have parallel lines.

Questions on Formulas of Linear Equation:

Question 1:

What is the slope-intercept form of the equation of a line?

a) $y=mx+b$

b) $y=mx-b$

c) $y=bx+m$

d) $y=bx-m$

Answer : (a)

Explanation:

The correct answer is (a). The slope-intercept form of a linear equation is $y=mx+b$, where m represents the slope and b represents the y-intercept.

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Question 2:

Which form of a linear equation is useful when you know a specific point on the line and its slope?

a) Point-Slope Form

b) Slope-Intercept Form

c) Standard Form

d) None of the above

Answer: (a)

Explanation: The correct answer is (a). The point-slope form of a linear equation is written as $y-y_1=m(x-x_1)$, where $(1,1)(x_1,y_1)$ represents the coordinates of a point on the line, and m is the slope.

Question 3:

What does the standard form of a linear equation look like? a) $y=mx+b$

b) $y=bx+m$

c) $Ax+By=C$

d) $Ax+By=D$

Explanation: The correct answer is (c). The standard form of a linear equation is $Ax+By=C$, where A and B are coefficients representing the coefficients of x and y, respectively, and C is a constant term.

Question 4:

Which of the following is the correct representation of the point-slope form of a linear equation?

a) �=��+� $y=mx+b$

b) �−�1=�(�−�1) $y-y_1=m(x-x_1)$

c) �=��+�� $y=Ax+By$

d) $y=m1x+b$

Explanation: The correct answer is (b). The point-slope form of a linear equation is represented as �−�1=�(�−�1) $y-y_1=m(x-x_1)$, where (�1,�1) (x_1,y_1) represents the coordinates of a point on the line, and � m is the slope of the line. This form is useful when you know a specific point on the line and its slope.

Question 5:

How can you eliminate fractions from a linear equation?

a) Multiply both sides of the equation by a common denominator

b) Divide both sides of the equation by a common denominator

c) Add both sides of the equation by a common denominator

d) Subtract both sides of the equation by a common denominator

Explanation: The correct answer is (a). To eliminate fractions from a linear equation, multiply both sides of the equation by a common denominator. This process will clear the fractions and make the equation easier to solve.

How To Solve Linear Equation Questions Quickly

Tips for solving Linear Equations Quickly

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When it comes to solving linear equations quickly, mastering the right techniques can make all the difference. Begin by identifying the form of the equation, whether it's in standard form, slope-intercept form, or point-slope form. Next, apply the appropriate method, such as the graphical method for visualization, elimination or substitution method for simultaneous equations, cross-multiplication for dealing with fractions, or leveraging matrices and determinants for complex systems.

How to Solve Linear Equation Questions & Definition

- A linear equation is an equation where variable quantities are in the first power only and whose graph is a straight line.
- The above line represent as, $y = mx + c$

Methods to solve Linear Equation :

There are mainly 6 methods to solve Linear Equation :

7. Graphical Method
8. Elimination Method
9. Substitution Method
10. Cross Multiplication Method
11. Matrix Method
12. Determinants Method

Let's explain each method in terms of solving linear equations:

7. **Graphical Method**: The graphical method involves graphing both sides of a linear equation on the same coordinate plane and finding the point(s) where the graphs intersect. The solution to the equation is the x-coordinate (and corresponding y-coordinate) of the point(s) of intersection. In this method, the graphical representation of the equation visually illustrates the solution(s) to the equation.
8. **Elimination Method**: In the elimination method, you aim to eliminate one variable by adding or subtracting multiple equations to make one variable's coefficient cancel out. This process leads to an equation with only one variable, which can be easily solved. After finding the value of one variable, you can substitute it back into one of the original equations to find the value of the other variable.
9. **Substitution Method**: The substitution method involves solving one variable in terms of the other from one of the equations and then substituting this expression into the other

equation. By doing so, you reduce the system of equations to a single equation with one variable, which can then be solved easily.

10. **Cross Multiplication Method**: The cross multiplication method is used to solve equations with fractions. When you have an equation with fractions, you cross-multiply by multiplying the numerator of one fraction with the denominator of the other and vice versa. This process eliminates the fractions and simplifies the equation, making it easier to solve.
11. **Matrix Method**: In the matrix method, you represent a system of linear equations using matrices and use matrix operations to solve for the variables. This method is particularly useful when dealing with large systems of equations, as it simplifies the process of solving using matrices and their properties.
12. **Determinants Method**: The determinants method involves using the concept of determinants from linear algebra to solve a system of linear equations. You form a matrix with the coefficients of the variables, a matrix with the constants on the right-hand side, and then find the determinants of these matrices. By using Cramer's rule or other determinant-based methods, you can solve for the variables.

Type 1: Solve Linear Equations Questions Quickly, Find the value of x or y.

Question 1. If 3a + 7b = 75 and 5a – 5b = 25, what is the value of a + b?

Options:

A. 11

B. 6

C. 5

D. 17

Solution: 3a + 7b = 75 ……(1)

5a – 5b = 25 (divide the equation by 5)

we get, a – b = 5 …….(2)

Now multiplying eq. (2) by 7

and add to eq. (1), we get

3a + 7b = 75

7a – 7b = 35

On solving

10a = 110

a = \frac{110}{10}

a = 11

Now put the value of a in eq (2)

11 – b = 5

b = 11 – 5

b = 6

Therefore, a = 11 and b = 6

The value of a + b = 6 + 11 = 17

Correct option: D

Question 2. If 2^{x+y} = 16 and 16^{x-y} = 2, then find the value of x?

Options:

A. \frac{1}{4}

B. \frac{17}{4}

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C. $\frac{17}{8}$

D. 4

Solution: Given, $2^{x+y} = 16$

$2^{x+y} = 2^4$

$x + y = 4$....(1)

Now, $16^{x-y} = 2$

$(2^4)^{x-y} = 2^1$

$x - y = \frac{1}{4}$ ....(2)

On solving equation 1 and 2

We get,

$2x = \frac{17}{4}$

$x = \frac{17}{4 \times 2} = \frac{17}{8}$

Correct option: C

Question 3. The system of equations 3a + 5b = 6 and 6a + 10y = 6 has

Options:

A. No solution

B. One solution

C. Two solution

D. Infinite solution

Solution: $\frac{a_{1}}{a_{2}} = 3/6 = 1/2$

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$\frac{b_{1}}{b_{2}} = 5/10 = 1/2$

$\frac{c_{1}}{c_{2}} = \frac{6}{6} = 1$

$\frac{a_{1}}{a_{2}} = \frac{b_{1}}{b_{2}} \neq \frac{c_{1}}{c_{2}}$

Therefore, there is no solution

Correct option: A

Type 2: Solve Quickly Linear Equations Questions, Based on Word problems

Question 1. The difference between the two numbers is 45. The ratio of the two numbers is 8:3. Find the two numbers?

Options:

A. 72 and 27

B. 90 and 45

C. 81 and 36

D. 60 and 15

Solution: Let the first number be 8x

Let the second number be 3x

Now, the difference between the two numbers is 45

Therefore, $8x - 3x = 45$

$5x = 45$

$x = \frac{45}{5}$

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x = 9

Now, put the value of x in

$8x = 8 \times 9 = 72$

$3x = 3 \times 9 = 27$

Correct option: A

Question 2. The breadth of a rectangle is twice its length. If the perimeter of the rectangle is 84m. Then, calculate the length and breadth of the rectangle?

Options:

A. L=12 and B= 24

B. L = 14 and B = 28

C. L = 28 and B = 14

D. L = 24 and B = 12

Solution: Perimeter of rectangle = 2 (l+b)

Length of the rectangle = x

Breadth of the rectangle = 2x

Perimeter of the rectangle = 84

2 (x + 2x) = 84

2 (3x) = 84

6x = 84

x = \frac{84}{6}

$x = 14$

Therefore, the Length of the rectangle = 14m

And Breadth of the rectangle = $14 \times 2 = 28$m

Correct option: B

Question 3. Ajay bought 5 tickets for two concerts A and B and 10 tickets for concert A and C. He paid Rs. 350. Now the total of a ticket for concert A and B and ticket of A and C is Rs. 42, then what is the ticket price for concert A and B?

Options:

A. Rs. 10

B. Rs. 42

C. Rs. 14

D. Rs. 28

Solution: Let the ticket price of concert A and B = a

Let the ticket price of concert A and C = b

According to the question, $a + b = 42$…… (1)

Ticket bought by Ajay = $5a + 10b = 350$

$= a + 2b = 70$……(2)

Now solve equation 1 and 2

$a + b = 42$

$a + 2b = 70$

$b = 70 - 42$

b = 28

Now put the value of b in equation 1

a+ 28 = 42

a = 42 – 28

a = 14

Hence, the ticket price for concert A and B = Rs. 14

Correct option: C

Tips And Tricks And Shortcuts on Linear Equation Problems

Tips And Tricks And Shortcuts On Linear Equations

Mastering linear equations is essential for excelling in mathematics, and having the right tips and tricks up your sleeve can make problem-solving a breeze. First, identify the form of the equation, whether it's in standard form, slope-intercept form, or point-slope form. Simplify the equation by combining like terms and eliminating fractions if present. Use the graphical method to visualize the solution and find the point of intersection.

Definition of Linear EquationA linear equation is a mathematical equation that represents a straight line in a two-dimensional Cartesian coordinate system. It is an algebraic expression of the form y=mx+b, where x and y are variables, m is the slope of the line, and b is the y-intercept

Linear Equation Tips and Tricks and Shortcuts

Tips and Tricks :

• Here, we have provided quick and easy tips and tricks for you on Linear Equation questions which and efficiently in competitive exams as well as other recruitment exams that must help to find a better place.

• It can be easily solved by eliminating the wrong options. It means put the given values in equation and check which one is satisfying the equation.

• Standard form of linear equations is y= mx+b. There are 2 types of questions asked in exams explain below.

Shortcuts for solving Linear Equation:

There are several shortcuts and techniques to solve linear equations quickly and efficiently. Here are some useful shortcuts:

7. **Combine Like Terms**: Before solving, combine similar terms on both sides of the equation to simplify the equation.
8. **Isolate the Variable**: Aim to get the variable (usually x) on one side of the equation by applying inverse operations (addition, subtraction, multiplication, division) to move all other terms to the other side.
9. **Use Fractional Form**: When the equation contains fractions, it's often easier to work with the equation in fractional form to avoid dealing with large numbers.
10. **Cancellation**: If you have terms with the same factor on both sides of the equation, you can cancel them out to simplify the equation.
11. **Multiply to Eliminate Fractions**: To eliminate fractions, multiply the entire equation by the least common multiple (LCM) of the denominators.
12. **Cross-Multiplication**: For equations with proportions or fractions, use cross-multiplication to simplify and solve for the variable.

💡Using these shortcuts and techniques can save you time and improve your problem-solving skills for linear equations. However, it's essential to remember the principles behind each shortcut to ensure accuracy in your solutions.

Type 1: Linear Equations Shortcuts. To Find the value of x or y.

Question 1. If 3a + 6 = 4a – 2, then find the value of a?

Options:

A. 3

B. 8

C. 6

D. 7

Solution: We can use the trick of eliminating the option

Option 1, put a = 3

3 * 3 + 6 = 15

4 * 3 -2 = 10

This means option 1 is incorrect.

Now, check for option 2, put a = 8

3 * 8 + 6 = 30

4 * 8 – 2 = 30

This means option 2 satisfies the equation. Therefore, it is the correct option.

Correct option: B

Question 2. Which of the following is the correct equation of the line passing through the points (2, 5) and (4, 11)?

Options

A) y = 3x + 1

B) y = 2x + 1

C) y = 2x + 3

D) y = 3x + 5

Solution: To find the equation of a line passing through two given points, we first calculate the slope (m) using the formula:

$m = \frac{(y2-y1)}{(x2-x1)}$

For the points (2, 5) and (4, 11), the slope is $\frac{(11-5)}{(4-2)}= \frac{6}{2}=3$.

Next, we use the point-slope form of the linear equation:

y – y1 = m(x – x1)

Plugging in the values (2, 5) and m = 3, we get the equation y – 5 = 3(x – 2). Solving for y, we find y = 3x + 1.

Correct Option : A

Type 2: Tips And Tricks for Linear Questions Word problems

Question 3. The cost of 5 blankets and 6 bedsheets is Rs.1500. The cost of 6 blankets and 5 bedsheets is Rs.1300. Find out the total cost of one blanket and one bedsheet.

Options:

A. Rs. 255

B. Rs. 250

C. Rs. 81.81

D. Rs. 254.545

Solution: Let the cost of blankets be x and the cost of bedsheets be y.

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According to the question:

$5x+ 6y= 1500$...(1)

$6x+ 5y=1300$...(2)

Multiply Eq 1 by 5 and Eq 2 by 6,

we get.

$25x+30y = 7500$...(3)

$36x+30y = 7800$...(4)

Subtract equation (3) from equation (4)

$11x = 300$

$x = \frac{300}{11}$

$5 \times \frac{300}{11} +6y =1500$

$6y = 1500 - \frac{1500}{11}$

$6y = 1500(1- \frac{1}{11})$

$6y = 1500 \times \frac{10}{11}$

$y = \frac{2500}{11}$

Total cost = x+y

=> $\frac{300}{11}+\frac{2500}{11}$

$= \frac{2800}{11} = 254.545$

Correct option: D

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Question 4: What is the x-intercept of the line represented by the equation 2x + 3y = 12?

Options

A) 4

B) 6

C) 8

D) 12

Solution: To find the x-intercept, we set y = 0 and solve for x.

Substituting y = 0 into the equation 2x + 3y = 12, we get 2x + 3(0) = 12. Simplifying, we find 2x = 12, and then x = 6.

Correct Option: B

Question 5: If the line 3x – y = 5 is parallel to the line 2x + ky = 8, what is the value of k?

Options

A) -3

B) -2

C) 2

D) 3

Solution: Two lines are parallel if their slopes are equal.

The slope of the line 3x – y = 5 can be found by rearranging the equation in slope-intercept form (y = mx + b), where m is the slope.

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So, 3x – y = 5 becomes y = 3x – 5, and the slope is 3.

The line 2x + ky = 8 can also be rearranged as y = -(2/k)x + 8/k, where the slope is -2/k. To make both slopes equal (3 and -2/k), we need -2/k = 3. Solving for k, we find k = -2/3.

Correct Option: B

Statistics - Mean, Median, Mode, Variance, and Standard Deviation

MEAN – average value of the data set

symbol(s): $\mu - population\ mean$

$\bar{x}$ – sample mean, $\boxed{\bar{x} = \frac{x_1 + x_2 + \ldots + x_n}{n} = \frac{\sum_{i=1}^{n} x_i}{n}}$

Example 1: Calculate the mean for the data set: 1, 4, 4, 6, 10.

$$\bar{x} = \frac{\sum_{i=1}^{5} x_i}{5} = \frac{x_1 + x_2 + x_3 + x_4 + x_5}{5} = \frac{1 + 4 + 4 + 6 + 10}{5} = \frac{25}{5} = 5$$

MEDIAN – "the middle number", a number that splits data set in half

How to find median?

Step 1: Arrange data in increasing order

Step 2: Determine how many numbers are in the data set = n

Step 3: If n is odd: Median is the middle number

If n is even: Median is the average of two middle numbers

Example 2: Find the median for the data set: 34, 22, 15, 25, 10.

Step 1: Arrange data in increasing order 10, 15, 22, 25, 34

Step 2: There are 5 numbers in the data set, n = 5.

Step 3: n = 5, so n is an odd number Median = middle number, median is 22.

Example 3: Find the median for the data set: 19, 34, 22, 15, 25, 10.

Step 1: Arrange data in increasing order 10, 15, 19, 22, 25, 34

Step 2: There are 6 numbers in the data set, n = 6.

Step 3: n = 6, so n is an even number Median = average of two middle numbers

$$\text{median} = \frac{19 + 22}{2} = 20.5$$

Notes: *Mean and median don't have to be numbers from the data set!*

Mean and median can only take one value each.

Mean is influenced by extreme values, while median is resistant.

L E L O

MODE – The most frequent number in the data set

Example 4: Find the mode for the data set: 19, 19, 34, 3, 10, 22, 10, 15, 25, 10, 6.

The number that occurs the most is number 10, mode = 10.

Example 5: Find the mode for the data set: 19, 19, 34, 3, 10, 22, 10, 15, 25, 10, 6, 19.

Number 10 occurs 3 times, but also number 19 occurs 3 times, since there is no number that occur 4 times both numbers 10 and 19 are mode, mode = {10, 19}.

Notes: Mode is always the number from the data set.

Mode can take zero, one, or more than one values. (There can be zero modes, one mode, two modes, …)

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The difference between value x and population mean μ , $x - \mu$ is **deviation**.

VARIANCE measures how far the values of the data set are from the mean, on average. The average of the squared deviations is the population variance.

Symbol(s): σ^2 – population variance

s^2 – sample variance

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$

$$s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$$

STANDARD DEVIATION – square root of the variance

Symbol(s): σ – population standard deviation

s – sample standard deviation

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}$$

$$s = \sqrt{s^2} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

How to compute variance and standard deviation? (of a sample)

For variance do steps 1-5, for standard deviation do steps 1-6.

Step 1 – Compute the sample mean $\bar{x}$

Step 2 – Calculate the difference of $x_i - \bar{x}$, for each value in the data set

Step 3 – Calculate the squared difference $(x_i - \bar{x})^2$, for each value in the data set

Step 4 – Sum the squared differences $\sum_{i=1}^{n}(x_i - \bar{x})^2$

Step 5 – Divide the sum of squared differences with n-1, $variance = s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$

Step 6 – ONLY FOR STANDARD DEVIATION

Calculate the squared root of variance, $standard\ deviation = \sqrt{variance}$

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Partnership Questions

Q. Ed Shreen invested Rs 55000 in a cosmetic shop for the whole year. After 4 months of Ed Shreen, Charlie Puth joined him and invested Rs 70000. Next year Ed Shreen invested Rs 10000 more and Charlie Puth withdrew Rs 10000 and at the end of two years profit earned by Ed, Shreen is Rs 32375. Find the total profit if they distributed half of the total profit equally and the rest in the capital ratio.

Solution: Ed Shreen invested Rs 55000 for a year and Rs 65000 for the next year. Charlie Puth invested Rs 70000 for 8 months and Rs 60000 for the next year.

Capital Ratio

= 55000×12+65000×12:70000×8+60000×1255000×12+65000×12:70000×8+60000×12

= 660000 + 780000 : 560000 + 720000

= 1440000 : 1280000 = 9 : 8

Let total profit = Rs x

Ed Shreen's profit = x×50x×50
32375=x4+9x3432375=4x+9x34
32375=35x6832375=6835x
x=62,900

Pie Chart Formulas

Formulas of Pie Chart In Data Interpretation

Here , In this Page Formulas of Line Chart in Data Interpretation is given.
Formula:

- Pie graphs are circular shaped graphs which are divided into sectors or slices to represent numerical data.
- In a pie chart, the length or central angle of each sector or slice is proportional to the quantity it represents.

Pie Chart Formulas in DI

A pie chart is a type of pictorial representation of data that divides a circle into various sectors to explain the numeric values. Each section is a proportionate part of the whole circle. The total of all data in a pie is equal to 360° and the total value of a pie is always 100%.

There are two main formulas used in pie charts:

- **To calculate the percentage of the given data, we use the formula:** (Frequency ÷ Total Frequency) × 100
- **To convert the data into degrees we use the formula:** (Given Data ÷ Total value of Data) × 360°

Uses of Pie Chart In Data Interpretation

The main use of a pie chart is to show comparison. When items are presented on a pie chart, you can easily see which item is the most popular and which is the least popular.

Various applications of pie charts can be found in business, school, and at home. For business, pie charts can be used to show the success or failure of certain products or services. They can also be used to show market reach of a business compared to similar businesses.

Note: While pie charts are popular data representations, they can be hard to read, and it can be difficult to compare data from one pie chart to another.

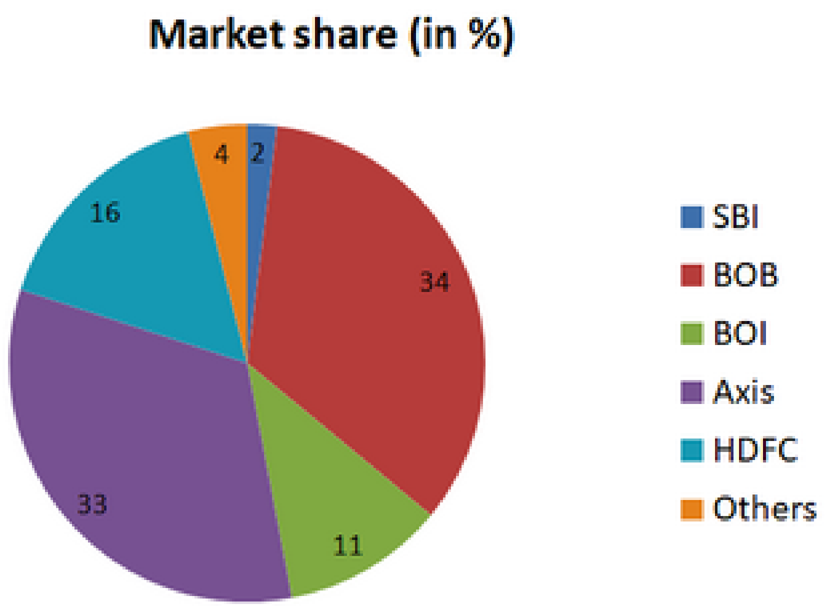
Pie Chart Formula Based Questions

Directions:

The following pie-chart shows the market share of different banks in India. Based on this pie-chart determine the questions given below.

Question 1.

If the value of the market share of BOI is Rs. 4000 crores, then the market share of BOB and Axis bank together is



A. 24,363 crores

B. 24,432 crores

C. 24,864 crores

D. 25, 827 crores

Explanation :

You can see that BOI accounts for 11 % of the market share. And this 11 % is equal to the 4000 crores. So to calculate the total market share of BOB and axis the formula will be, 67/11 x 4000 = 24,363. Thus, the correct answer is A.

Question 2.

If the total market share other than Axis and BOB is Rs. 335,000 crores. Then find the market share of BOI and HDFC banks.

A. 274,560 crores

B. 274,090 crores

C. 274,809 crores

D. Cannot be determined

Explanation :

Here, from the pie-chart, you can determine that the total market share of Axis and BOB in terms of percentage is 67 % and this is equal to Rs. 335,000. In addition to this the other banks that are left accounts for 33 % which equates to 35,000 crores. HDFC and BOI equal the market share of 27 %. Thus, their market share in terms of crores is 27 x 335000/33 => 274090 crores. So, the correct answer is C.

Question 3.

Find the approximate ratio of market share between BOI and BOB.

A. 1: 2

B. 3: 1

C. 1 : 3

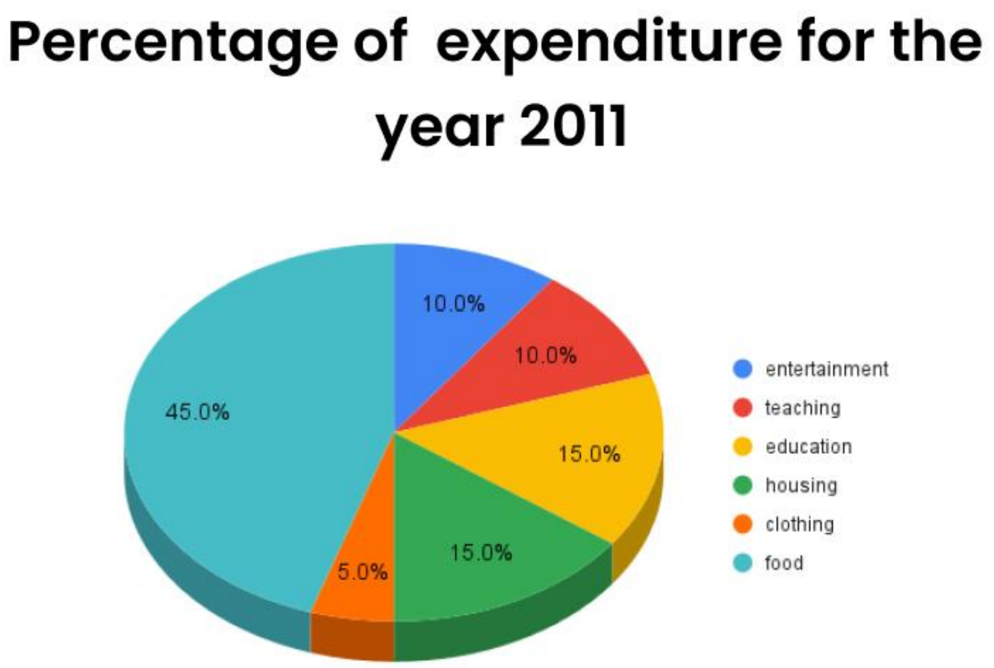
D. Not possible

Explanation :

Take the market share of BOB and BOI and compare them both to find the ratio. As a result, the market share of BOB is given as 34 % and the market share of BOI is given as 11 %. So, the ratio of market share of BOI to a market share of BOB will be 11: 34. This will be close to 1 : 3. So, the correct answer is C.

Directions:

The pie chart given below shows the spending of Arvind Kejriwal's family on different articles for the year 2011 according to data. Analyse the pie chart and answer the questions which follow.



Question 1.

If the total amount that was spent in the year 2011 was 50000 by Kejriwal's family, the amount that was spent on food was

A. Rs.225000
B. Rs.22500
C. Rs.24000
D. Rs.21400

Explanation:

Amount spent on Food = 45% of Rs. 50000/- = Rs. 22500/-

Question 2.

If the total amount that was spent in the year 2011 was Rs. 48000 by Kejriwal's family, the amount that was spent on housing and clothing combined was

A. Rs.9600
B. Rs.8000
C. Rs.10000
D. Rs.12000

Explanation:

Amount spent on Clothing and Housing together = (15% + 5% = 20%) of 48000 = Rs. 9600/-.

How to solve Pie Charts Quickly

How to solve Pie Charts Problems Quickly in DI

Here , In this Page, How to Solve Pie Chart Questions Quickly is given.

Pie charts are a useful way to visualize information that might be presented in a small table.

Definition: A pie chart is a type of graph in which a circle is divided into sectors that each represents a proportion of the whole.

How To Solve Pie Chart Questions:

Pie charts are a useful way to organize data in order to see the size of components relative to the whole, and are particularly good at showing percentage or proportional data.

Concept of Pie Chart

- Reading a pie chart is as easy as figuring out which slice of an actual pie is the biggest.
- Usually, you have several bits of data, and each is pictured on the pie chart as a pie slice. You will see that some data have larger slices than others.
- So you can easily decipher which data is more important to your audience than others.

To solve pie chart questions, follow these steps:

1. Categorize the data and calculate the total.
2. Divide the categories and convert them into percentages.
3. Calculate the degrees of each category by multiplying the percentage by 360 and dividing by 100.
4. Draw a circle of an appropriate radius and a vertical radius inside the circle.
5. Choose the largest central angle and construct a sector of a central angle whose one radius coincides with the radius drawn in step 4, and the other radius is in the clockwise direction to the vertical radius.
6. Calculate the central angle subtended by each category and draw the corresponding sector.

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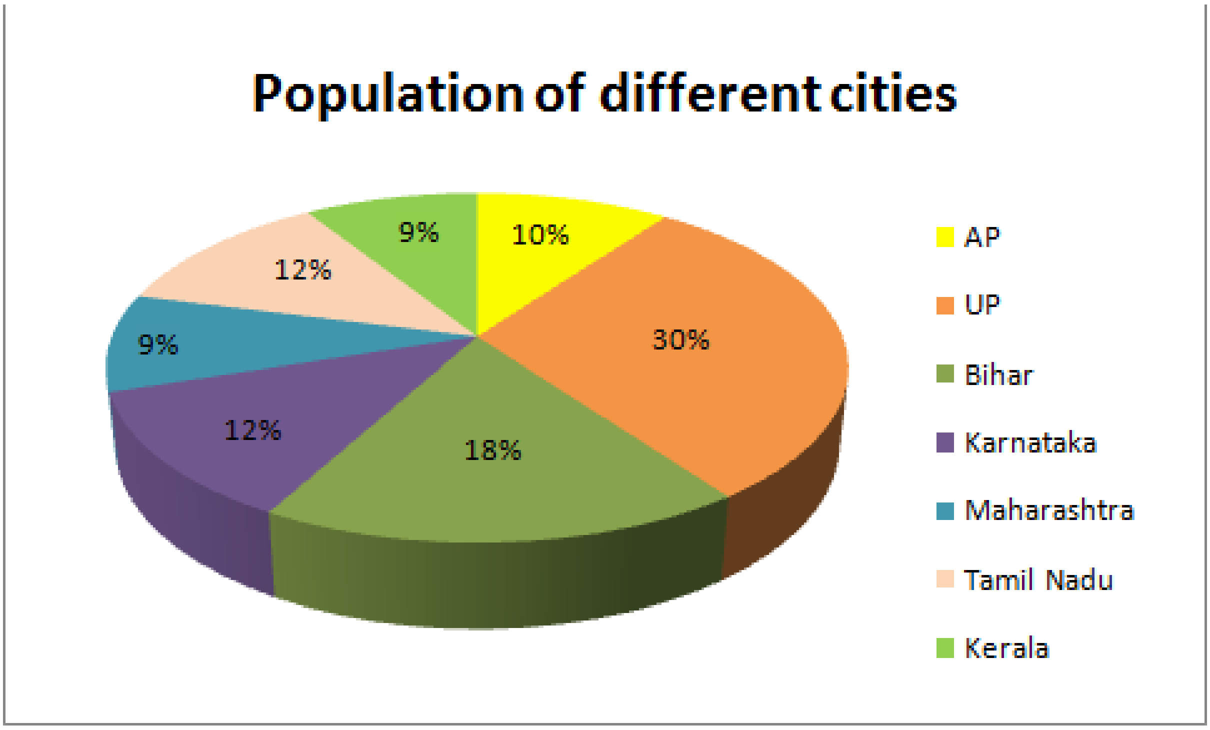
7. Label each sector of the pie chart.

Note: Read the question carefully and identify the specific information you need to find. This will help you avoid unnecessary calculations and focus on the relevant data.

How To Solve Pie Chart in Data Interpretation Questions Quickly

Directions to solve :

The following pie chart shows the amount of subscriptions generated for India Bonds from different categories of investors.



States	Ratio (M-F)
UP	4:3
Bihar	3:2
AP	4:3
Karnataka	4:4
Maharashtra	2:4
Tamil Nadu	3:4
Kerala	5:3

Question 1.

Approximately what will be the percentage of total male in UP, AP and Tamil Nadu of the total population of the given states?

(a.) 29 %

(b.) 25 %

(c.) 27 %

(d.) 28 %

Answer: Option D

Explanation:

= { ((4/7 * 30) + (4/7 * 10) + (3/7 * 12)) /100 } * 100
= 28 %

Question 2.

Women of Andhra Pradesh is approximately what percentage of the women in Tamil Nadu ?

(a.) 65%

(b.) 63%

(c.) 53%

(d.) 58%

Explanation:

{(3/7 * 10) / (4/7 * 12)} * 100

= 62.5

= 63%

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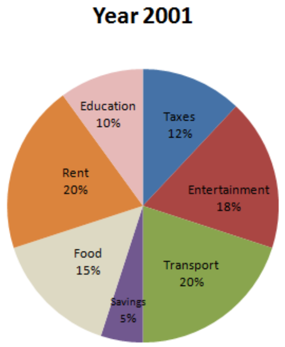
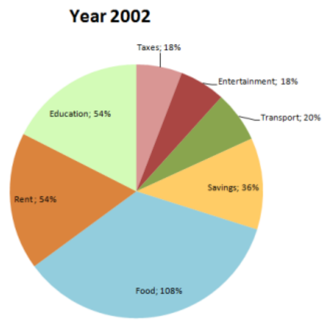
Expenditure Incurred by Mr. Sharma on Various Heads in 2001 & 2002



Total salary = Rs. 1,20,000 p.a.



Total salary = Rs. 2,40,000 p.a.

Question 3.

How much more money does Mr Gupta spend on taxes than on transport in the year 2001?

(a.) Rs 9,200

(b.) Rs 8,370

(c.) Rs ,600

(d.) Rs 8,500

Explanation:

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Money spent on Taxes =12%

Money spent on Transport =20%

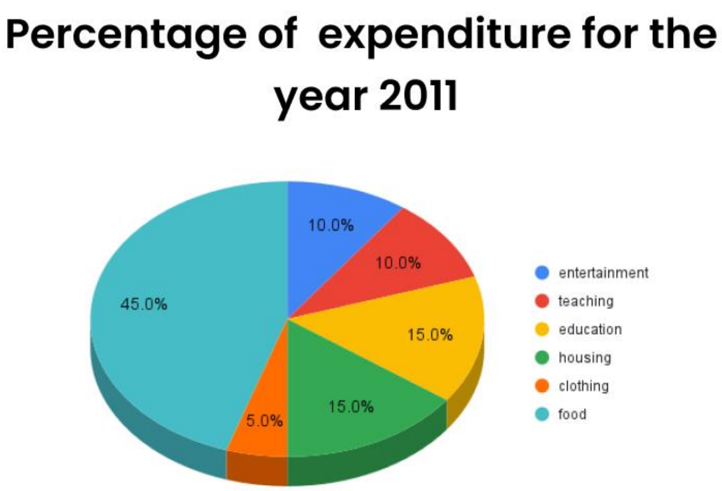
Difference of Taxes and Transport:

= (12-20)/100 * 1,20,000

= **Rs** 9,600

<u>Directions to Solve:</u>

The pie chart given below shows the spending of Arvind Kejriwal's family on different articles for the year 2011 according to data. Analyse the pie chart and answer the questions which follow.



Question 4.

Find the ratio of the amount spent by Arvind Kejriwal's family on teaching and education to clothing and food ?

(a.) 3:2

(b.) 2:3

(c.) 1:5

(d.) 1:2

Explanation:

Required Ratio = 25% of total amt. / 50% of total amt. = 1/2

Question 5.

According to the graph, the maximum amount that was spent by Kejriwal’s family was on which item (if the expenditure that is given to be Rs. 58256)?

(a.) Food
(b.) Housing
(c.) Clothing
(d.) Others

Explanation:

Irrespective of the total expenses, the maximum will be the maximum percentage which is for food i.e. 45% of 58256.

Tips and Tricks and Shortcuts for Pie Charts

Pie Chart Tips and Tricks and Shortcuts

Here on this page Pie Chart Tips, Tricks and Shortcuts is given to solve the question easily and effectively.

Definition:A pie chart is a circular graph that represents data in a visual way. The circle is divided into slices, with each slice representing a particular category. The size of each slice is proportional to the quantity it represents.

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Click here for Data Interpretation Course

Pie Chart Tips, Tricks and Shortcuts :

Pie charts are a common type of data visualization used in data interpretation.

Here are some tips and tricks to solve pie chart questions:

- **Read the data in the pie chart carefully:** If the distribution is given in percent, simply multiply this value to the total amount of data and then divide by 100 to get the actual value.
- **Remember that a whole circle contains 360 degrees:** In a pie chart, each sector represents a certain percentage of the total data, which can be calculated using the formula: percentage of a data = (given data/total of all data) x 100.
- **Calculate the central angle of each sector using the formula:** central angle of a data = (given data/total of all data) x 360 degrees.
- Practice solving pie chart questions with solutions and explanations.

Uses of Pie Chart:

Pie charts are a type of chart used to represent fractions as parts of a whole. They are commonly used to compare data and analyze which data is bigger or smaller. Pie charts are preferred when dealing with discrete data.

Here are some uses of pie charts:

- To show percentages of a whole.
- To represent sample data with data points belonging to different categories.
- To compare areas of growth within a business, such as turnover, profit, and exposure.

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- To represent categorical data.
- To show the performance of a student in a test.

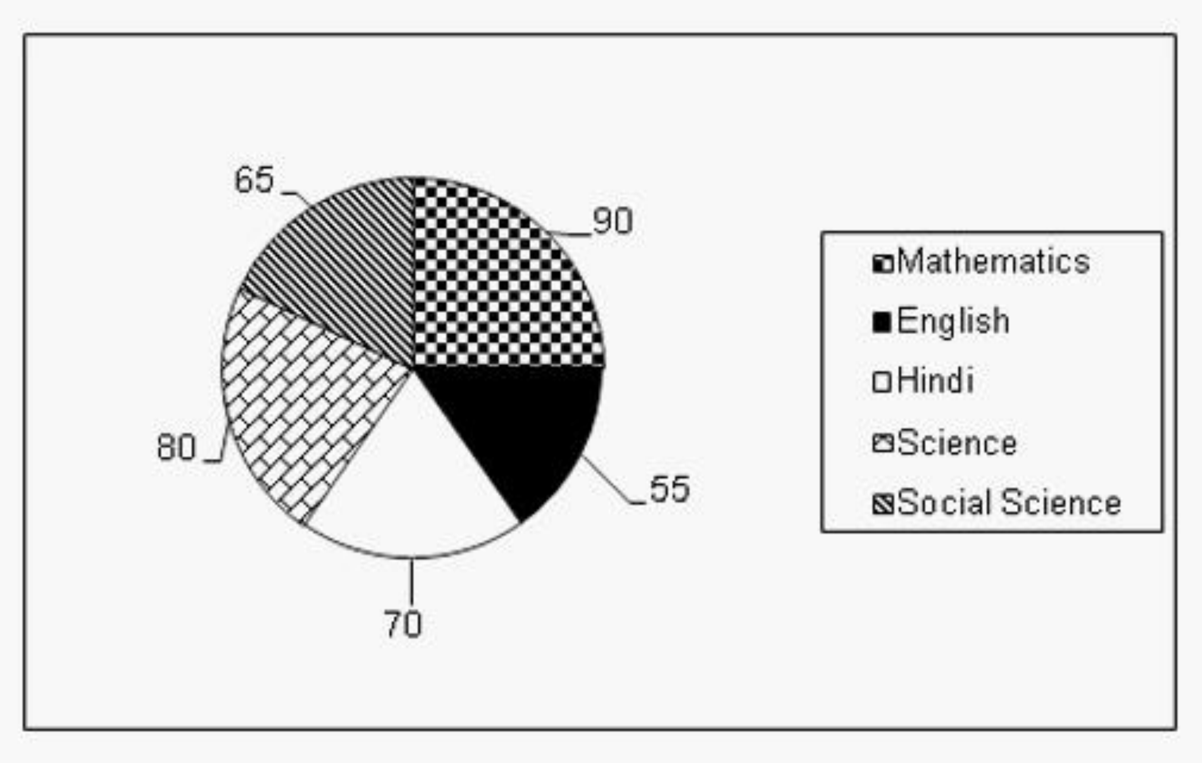
Tips and Tricks and Shortcuts for Pie Chart in DI

DIRECTIONS for Questions 1-5:

Refer to the pie chart given below and answer the questions that follow.

The given pie chart shows the marks scored by a students of G.D.Goenka School in different subjects- English, Hindi, Mathematics, Science and Social Science in an examination. The values given are in degrees.

Assumption: Total marks obtained in the examination are 900.



Question 1.

The difference of marks scored in Social Science and Science by students of G.D.Goenka School is

(a) 37.5

(b) 40

(c) 20

(d) 15

Explanation :
Angle of Science sector is 80^0 and angle of Social Science sector is 65^0. So difference of angle is 15^0 .Difference of marks = (15^0 x 900) / 360^0 = 37.5

Question 2.

What are total marks scored in Social Science and English by students of G.D.Goenka School?

(a) 300
(b) 350
(c) 400
(d) 450

Explanation:

Angle of English sector is 55^0 and angle of Social Science sector is 65^0.So sum of angles is 120^0.Sum of marks =(120^0 x 900) / 360 = 300.

Question 3.

If the marks scored by the student of G.D.Goenka School are 137.5, then the subject is

(a) English
(b) Hindi
(c) Mathematics
(d) Science

Explanation:
Going by the options, marks scored in English = 55 /360 x 900 = 137.5

Question 4.

If the total marks of student of G.D.Goenka School were 3000, then marks in Mathematics would be

(a) 800

(b) 750

(c) 850
(d) 900

Explanation:

Marks obtained in Mathematics would be = 90 / 360 x 3000 = 750

Question 5.

The Marks scored by the student of G.D.Goenka School in English and Mathematics is less than the marks scored in Science and Hindi by

(a) 5%
(b) 4.33%
(c) 3.33%
(d) 6%

Explanation:

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

Bar Chart Formulas

Formulas for Bar Chart in DI

Here , In this Page Formulas of Bar Chart in Data Interpretation is given.
DefinitionA bar chart represents the data as horizontal or vertical bars. The length of each bar is proportional to the amount that it represents.

Formulas for Bar Chart

Types of Bar Chart

There are 3 main types of bar charts:

1. Vertical bar graph: This is the most commonly used bar graph, where the bars are plotted vertically. It represents the grouped data vertically.

2. Horizontal bar graph: In this type of bar graph, the bars are plotted horizontally. It is used to compare data sets that are independent of one another.

3. Double bar graph: It is a graphical representation of data that uses two parallel bars of varying heights to display two sets of data on the same graph. The bars can be arranged either vertically or horizontally.

Properties of Bar Chart:

- The gap between one bar and another is uniform . It can be either horizontal or vertical.
- The bars are of uniform width, and the variable quantity is represented on one of the axes.
- The scale of the bar graph shows the way in which numbers are used in the data. It is a system of marks at fixed intervals that aid in object measurement.

Applications of Bar Chart:

- Comparing summary statistics between categories
- Comparing different groups over time
- Displaying a variable function (sum, average, standard deviation) by categories

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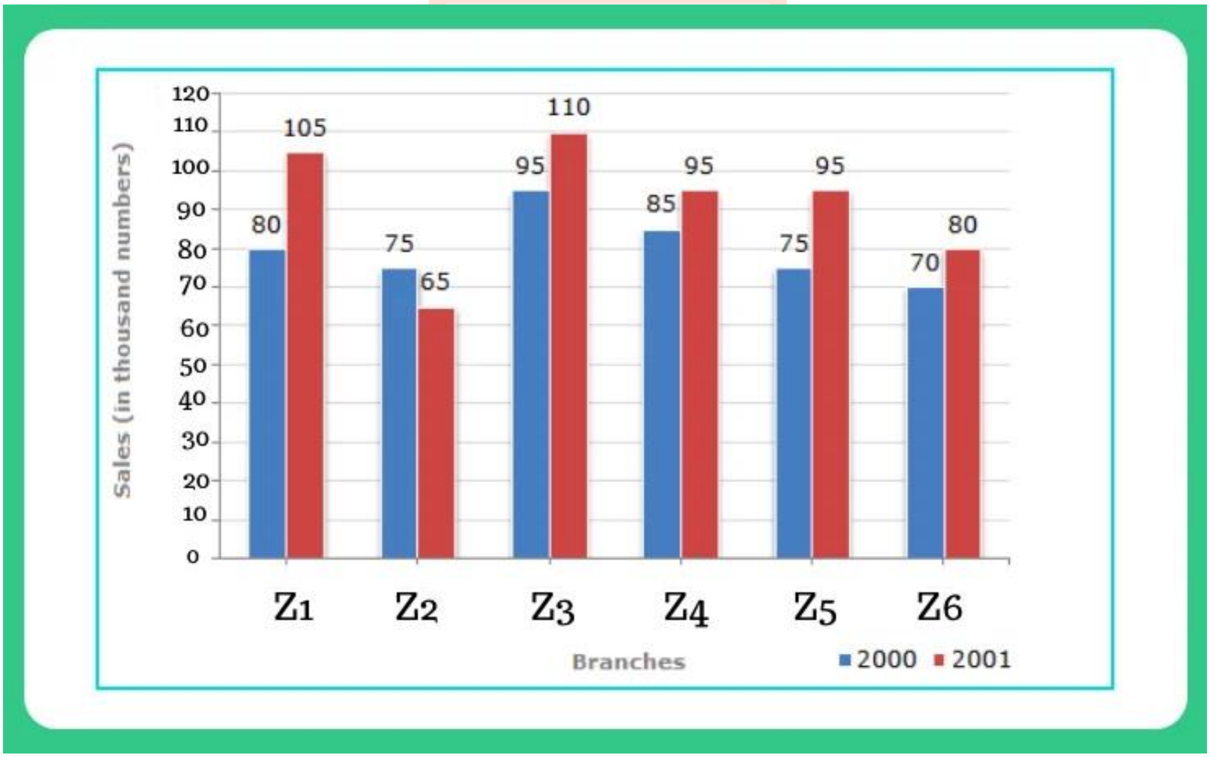
- Comparing different categorical or discrete variables, such as age groups, classes, schools, etc.
- Showing time series data

Note: When constructing a bar chart it is important to choose a suitable scale to represent the frequency.

Bar Chart Formula Based Questions

Common data Question from 1 to 5

The bar graph given below shows the sales of books (in thousand number) from six branches of George Orwell publishing company during two consecutive years 2000 and 2001.



Sales of Books (in thousand numbers) from Six Branches – Z_1, Z_2, Z_3, Z_4, Z_5 and Z_6 of a publishing Company in 2000 and 2001.

Question 1.

What percent of the average sales of branches Z1, Z2 and Z3 in 2001 is the average sales of branches Z1, Z3 and Z6 in 2000?

Options

(A) 75%
(B) 77.5%
(C) 82.5%
(D) 87.5%

Explanations

Average sales (in thousand number) of branches Z1, Z2 and Z3 in 2001

$\frac{1}{3} \times (105 + 65 + 110) = \frac{280}{3}$

Average sales (in thousand number) of branches Z1, Z3 and Z6 in 2000

$\frac{1}{3} \times (95 + 80 + 70) = \frac{245}{3}$

∴ Required Percentage = $\frac{\frac{245}{3}}{\frac{280}{3}} \times 100$ %

= $\frac{245}{280}\times 100$ = 87.5%

Correct Options (D)

Question 2.

Total sales of branches Z1, Z3 and Z5 together for both the years (in thousand numbers) is?

Options

(A) 250
(B) 310
(C) 435
(D) 560

Total sales of branches Z1, Z3 and Z5 for both the years (in thousand numbers)

= (80 + 105) + (95 + 110) + (75 + 95)

= 560.

Correct Options (D)

Question 3.

What is the average sales of all the branches (in thousand numbers) for the year 2000 ?

Options

(A) 73
(B) 80
(C) 83
(D) 88

Explanations

Average sales of all the six branches (in thousand numbers) for the year 2000

= \frac{1}{6}\times [80 + 75 + 95 + 85 + 75 + 70]

= 80

Correct Option (B)

Question 4.

What is the ratio of the total sales of branch Z2 for both years to the total sales of branch Z4 for both years?

Options:

(A) 2:3
(B) 3:5

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(C) 4:5

(D) 7:9

Explanation:

Required ratio

=\frac{(75 + 65)}{(85 + 95)}

=\frac{140}{180}

=\frac{7}{9}

Correct Option (D)

Question 5.

Total sales of branch Z6 for both the years is what percent of the total sales of branches Z3 for both the years?

Options:

(A) 68.54%

(B) 71.11%

(C) 73.17%

(D) 75.55%

Explanation:

Required percentage

=[\frac{(70 + 80)}{(95 + 110)}* 100]%

=[\frac{150}{205} * 100] %

= 73.17%

Correct Option (C)

Solve Bar Chart Quickly

Here, On this page you will get to learn about How to Solve Bar Chart Quickly and easily with help of rules and formulas.

A bar chart is a type of graph that uses rectangular bars to represent data. The length of each bar is proportional to the value of the data it represents.

Note: To create a bar chart, you need to understand its key concepts and the basic formulas for plotting the data.

How to solve Bar Chart Quickly

Concepts for Bar Chart

- **Category:** Each distinct item or group being compared in the bar chart is referred to as a category.
- **Data Series:** In bar charts with multiple bars per category, each group of bars that represents a specific dataset or variable is called a data series.
- **Baseline:** The baseline is the reference line from which the bars start. In a vertical bar chart, it's usually the x-axis, and in a horizontal bar chart, it's the y-axis.
- **Horizontal axis:** The axis that represents the categorical feature in a bar chart.
- **Vertical axis:** The axis that represents the numeric value in a bar chart.

- **Bar length or height:** The length or height of a rectangular bar in a bar chart that represents the value of the data.
- **Scale:** A system of markings spaced at specific intervals that aid in object measurement.
- **Class intervals:** A range of values that are grouped together for analysis and presentation in a bar chart.

Steps to extract information from Bar Chart

Step 1: Write the title of the graph.

Step 2 : Draw and Label Both the Axis of the Graph.

Step 3 : Plot the Data Elements.

Step 4 : Plot Given Element Provided in Data.

Step 5 : Draw the bars for each category, with the height of each bar corresponding to the value it represents.

Questions and Answers to Solve for Bar Chart quickly

Common Data Question for 1 to 5

The following chart represents the number of students who passed the CAT exam or the XAT exam or the CET exam or None of these exams conducted by Education Minister, Dharmendra Pradan. (Assume that there are no students who passed more than one exam.)

Number of students who qualified CAT/XAT/CET Exams

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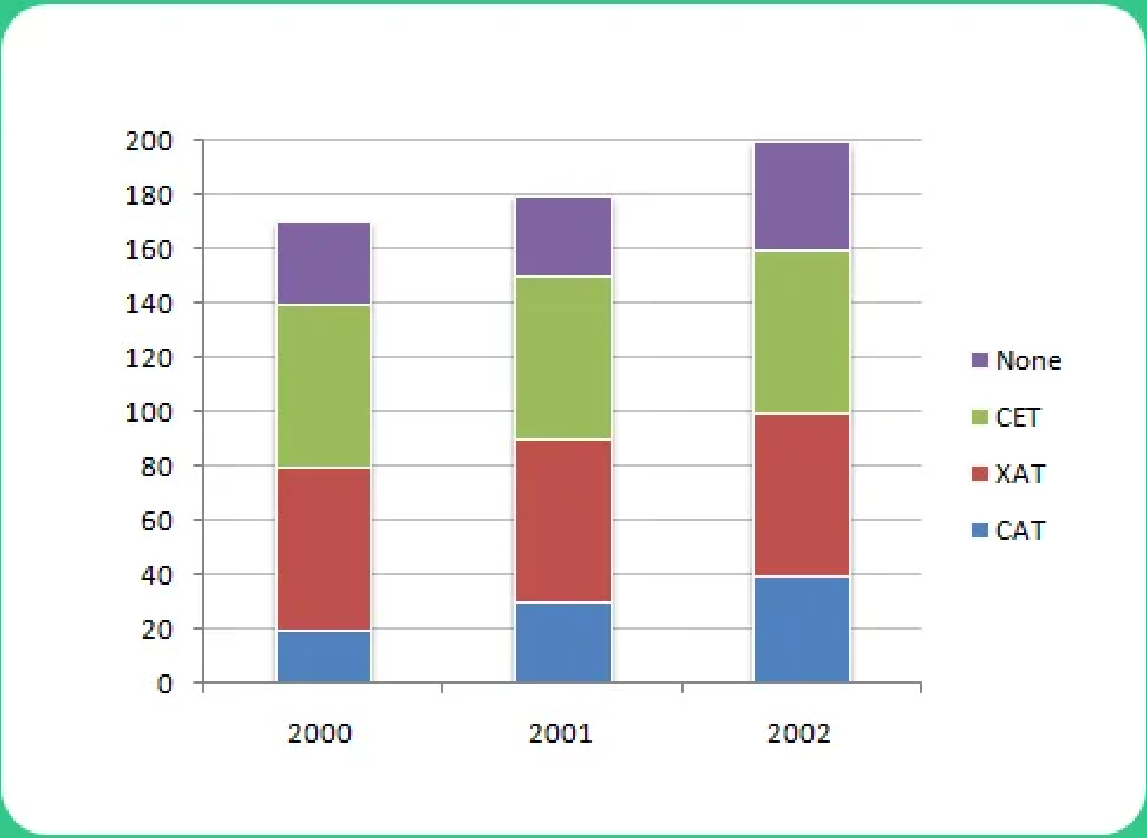

Question 1.

Which year showed the best result in MBA entrance exams (in terms of percentage of students who cleared) ?

A. 2000

B. 2001

C. 2002

D. Cannot be determined

Answer: Option B

Explanation:

Compare the respective pass percentage for three years : 2000, 2001 and 2002

= \frac{140}{170}\times 100 < \frac{150}{180}\times 100 and \frac{150}{180}\times 100 > \frac{160}{200}\times 100

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= 82.35% < 83.33% and 83.33% > 80%

Question 2.

What was the percentage of students who succeeded in at least one of three exams in 2000 ?

A. 82.4 %
B. 82.8 %
C. 82.35 %
D. 83.3 %

Answer: Option C

Explanation:

Total percentage of students who succeeded in at least one of three exams in 2000 =$\frac{140}{170}\times 100$ = 82.35 %

Question 3.

What is the percentage increase in the number of students in 2002 over 2000 ?

A. 30 %
B. 17.64 %
C. 117.6 %
D. 85 %

Answer: Option B

Explanation:

Total percentage increase in the number of students in 2002 over 2000 is = $\frac{30}{170}\times 100$ = 17.64 %

Question 4.

What is the percentage of students who cleared CAT in 2000 ?

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A. 19.56 %

B. 12.65 %

C. 14.28 %

D. 11.76 %

Answer: Option D

Explanation:

Total percentage of students who cleared CAT in 2000 = $\frac{20}{170}\times 100$= 11.76 %

Question 5.

What was the percentage of students who succeeded in at least one of three exams in 2002 ?

A. 80 %

B. 78.5 %

C. 84 %

D. 81.6 %

Answer: Option A

Explanation:

Total percentage of students who succeeded in at least one of three exams in 2000 =$\frac{160}{200}\times 100$ = 80 %

Tips and Tricks and Shortcuts for Bar Chart Questions

Tips and Tricks for Bar Chart

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Here , In this Page Tips and Tricks to Solve Bar Chart is given along with some important points.

Definition:A bar chart, also known as a bar graph, is a graphical representation of data in which rectangular bars or columns are used to represent and compare different categories or groups of data.

Click here for Data Interpretation Course

Tips and Tricks for Bar chart :

- Before you solve any of the questions , first you have to understand what the bar graph is trying to say. Make the habit of scanning the heading firsts.
- You have to understand what is on the x-axis and y-axis and what is the relation between two in terms of length bars.
- These type of questions are pretty easy to solve. Just interpret the data in your mind. Check the length of bars . The answers will come surely.
- Sometimes the calculations of one question will help to calculate the calculations of some other question.

Important points for Tips and Tricks of Bar chart :

- Read the questions along with the instruction carefully.
- Use Approximation in Calculations.
- Effective analysis of given data.

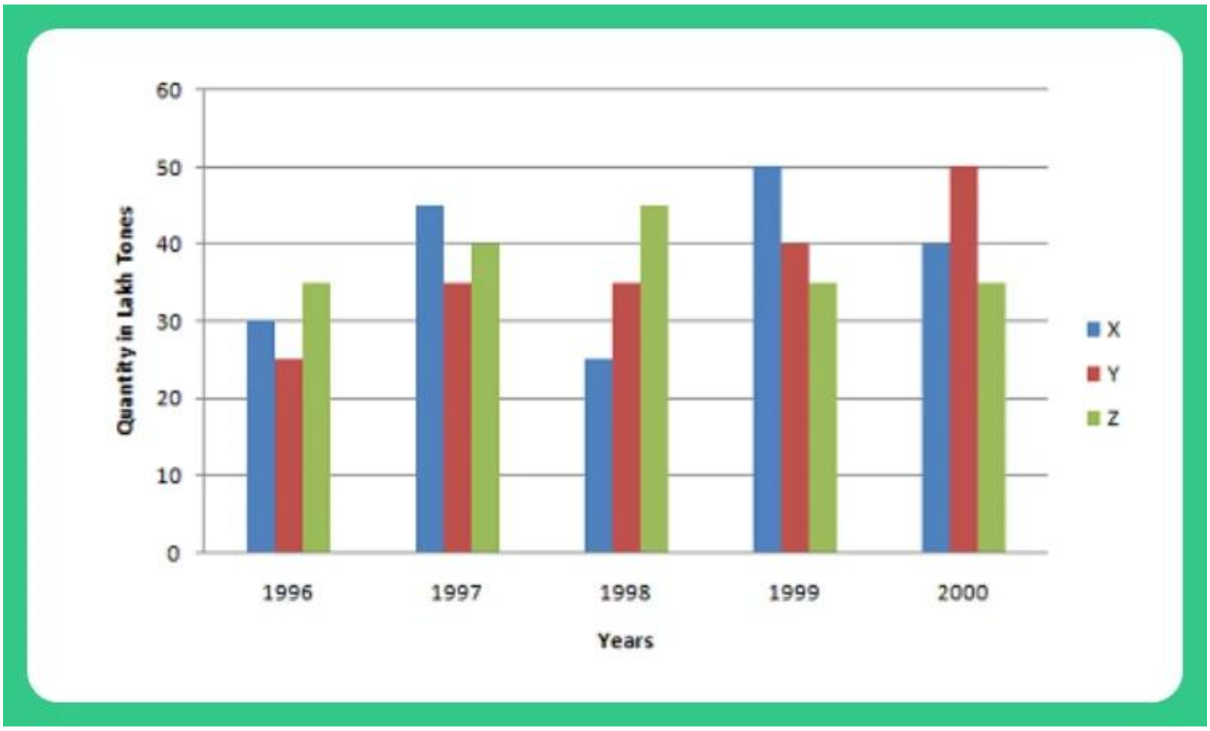
- Do not assume anything other than data provided.
- Skip unnecessary calculations.
- Accuracy is the key factor.
- Clear the fundamentals of DI. DI questions are based on Averages , Percentage and Ratio and Proportion concepts .

Questions and Answers for Bar Chart

Common Data Question for 1 to 5

Production of paper (in lakh tonnes) by three companies X, Y and Z owned by Ratan Tata over the years is given below in a graph. Study the graph and answer the questions that follow.

In X- axis year is given and in Y- axis Quantity in Lakh Tones is given.



Question 1.

What is the difference between the production of company Z in 1998 and company Y in 1996?

(A) 2,00,000 tons
(B) 20,00,000 tons
(C) 20,000 tons
(D) 2,00,00,000 tons

Answer: Option B

Explanation:

Required difference

= [(45 – 25) x 1,00,000] tons

= 20,00,000 tons.

Question 2.

What is the ratio of the average production of company X in the period 1998-2000 to the average production of company Y in the same period?

(A) 1:1
(B) 15:17
(C) 23:25
(D) 27:29
(E) None of these

Answer: Option C

Explanation:

Average production of company X in the period 1998-2000 = [\frac{1}{3} \times (25 + 50 + 40)] = (\frac{115}{3}) lakh tons.

Average production of company Y in the period 1998-2000 = [\frac{1}{3} \times (35 + 40 + 50)] = (\frac{125}{3}) lakh tons.

Required ratio = \frac{\frac{115}{3}}{\frac{125}{3}} = \frac{115}{125} = \frac{23}{25}

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Question 3.

In 1999 Production of Paper of X is What Percent of Production of Paper Y.

(A) 25 %
(B) 30 %
(C) 35 %
(D) 22 %
(E) None of these

Answer: Option E

Explanation:

In 1999 Production of Paper X = 50

In 1999 Production of Paper Y = 40

Required Percentage = \frac{50}{40}\times 100 = 125 %

Question 4.

Which company has the highest average production over a five-year period?

(A) X

(B) Y

(C) Z

(D) X and Z both

Answer: Option D

Explanation:

Average production (in lakh tons) in five years for the three companies are:

For Company X = [1/5 x (30 + 45 + 25 + 50 + 40)] = 190/5 = 38.

For Company Y = [1/5 x (25 + 35 + 35 + 40 + 50)] = 185/5 = 37.

For Company Z = [1/5 x (35 + 40 + 45 + 35 + 35)] = 190/5 = 38.

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Therefore, Average production of five years is maximum for both the Companies X and Z.

Question 5.

What is the percentage increase in the production of Company Y from 1996 to 1999?

(A) 30%
(B) 60%
(C) 50%
(D) 45%

Answer: Option B

Explanation:

Percentage increase in the production of Company Y from 1996 to 1999

= [\frac{(40-25)}{25} * 100] %

= [\frac{15}{25} * 100] %

= 60%.

Tips & Tricks to solve Tabular Chart Questions in DI

How to solve Table Chart Questions

Introduction

Table chart is simplest method used for data. In a table, data is arranged systematically in columns and rows. The first row and the first column are generally used to indicate the titles. It is one of the easiest and most accurate way of presenting the data.

Important Points

1. Read the data very carefully and try to understand what you are being asked to do. To prevent wasting time in calculation and find out what is required.

2. Check the data and information carefully before jumping to answer the questions. Be sure you are looking at the right part of column and tables.

3. Carefully check the units, Be sure you are taking same unit as you have given like in thousand, millions etc. A mistake in units and your answer may be different.

Sample Question

Number of cars sold by 6 Stores in 5 different months

Stores / Months	P	Q	R	S	T	U
Jan	133	161	213	225	282	196
Feb	183	123	277	176	239	268
March	278	154	226	98	178	198
April	178	272	269	284	293	277
May	264	107	237	167	379	237

The above Table shows:

- The number of cars sold by store P (In Jan = 133, Feb = 183, March = 278, April = 178, May = 264)

Like this we can see the others. Lets do solve some questions.

1. Number of cars sold by store T in march is what percent less then number of cars sold by Store P in may? (Rounded off to nearest integer)

(a) 29%

(b) 31%

(c) 37%

(d) 33%

Solution:

Number of cars sold by Store T in March = 178

Number of cars sold by store P in May = 264

Required percentage = (264 – 178 /264) * 100 (in question asked less then number that's why we deducted) = (86/264) * 100 = 32.57%

So rounded figure it will be 33%, **Answer D**

2. What is the average number of cars sold by all the given stores in Feb?

(a) 207

(b) 211

(c) 219

(d) 223

Solution:

To find average we have to add all the figures of Feb month and then divided by 6

= 183 + 123 + 277 + 176 + 239 + 268 / 6 = 1266/6 = 211, **Answer B**

3. Total number of cars sold by store Q during all the given months together is what percent of the total number of cars sold by store S during all the given month together?

(a) 82%

(b) 88%

(c)92%

(d) 86%

Solution:
Total number of cars sold by store Q during all the given months together = 161 + 123 + 154 + 272 + 107 = 817

Total number of cars sold by store S during all the given months together = 225 + 176 + 98 + 284 + 167 = 950

Required percentage = (817/950) * 100= 86%, **Answer D**

4. What is the difference between total number of cars sold by all the given stores together in Jan and total number of cars sold by all the given stores together in April?

(a) 353

(b) 379

(c) 363

(d) 347

Solution:

Total number of cars sold by all the given stores together in Jan = 133 + 161 + 213 + 225 + 282 + 196 = 1210

Total number of cars sold by all the given stores together in April = 178 + 272 + 269 + 284 + 293 + 277 = 1573

Required difference = 1573 – 1210 = 363, **Answer C**

5. What is the respective ratio between total number of cars sold by stores P and R together in March and total number of cars sold by stores T and U together in May?

(a) 9:11

(b) 11:13

(c) 5:7

(d) 13:17

Solution:

Total number of cars sold by stores P and R together in March = 278 + 226 = 504

Total number of cars sold by stores T and U together in May = 379 + 237 = 616

Ratio= 504 : 616 = 9 : 11, **Answer A**

PLACEMENT LELO