APTITUDE
GROUP 4

Content

Simplification

Definition:

➢ Simplify means to make it simple. In mathematics, simply or simplification is reducing the expression/fraction/problem in a simpler form. It makes the problem easy with calculations and solving.

➢ The operations required to simplify things are done in a set order called BODMAS.

Where,

B = Bracket

O = of

D = Division

M = Multiplication

A = Addition

S = Subtraction

Algebra – Definition:

➢ Algebra is a branch of mathematics in which arithmetic operations and other formal manipulations are applied to abstract symbols rather than specific numbers.

1. The sum of two number is 60 and one number exceeds another by 12. Find the number

a) 21, 39 b) 24, 36

c) 22, 38 d) 20 , 40

Answer: b) 24, 36

Solution:

Let the number be 'x'

The greater number x + 12

Sum of two number = 60

x + (x + 12) = 60

2 x + 12 = 60

2x = 60 – 12

2 x =48

$x=\frac{48}{2}$

Smaller number x=24

Greater number x + 12= 24 + 12=36

2. The swum of two number is 116 and one number exceeds another by 32. Find the number

a) 42 , 74 b) 51 , 65

c) 71 , 45 d) 38 , 88

Answer:a) 42 , 74

Solution:

Let the number be 'x'

The greater be x + 32

Sum of two number =116

x + (x + 32) = 116

2 x + 32 =116

2x = 116 – 32

2 x =84

x =$\frac{84}{2}$

Smaller number x=42

Greater numberx + 32 = 44 + 32=74

3. The sum of two number is 80 and one number less than another by 14. Find the number

a) 38, 42 b) 30, 50

c) 28 , 52 d) 33 , 47

Answer:d) 33 , 47

Solution:

Let the greater number be 'x'

The smaller number be x - 14

Sum of two number = 80

x + (x - 14) = 80

2 x - 14 = 80

2x = 80 + 14

2 x =94

x=$\frac{94}{2}$

Greater number x=47

Smaller numberx – 14= 47 - 14=33

4. The sum of two number is 207 and one number is less than another by 53. Find the number.

a) 119 , 66 b) 140 , 87

c) 130 , 73 d) 148 , 95

Answer:c) 130 , 73

Solution:

Let the greater number be 'x'.

The smaller number be x – 53

Sum of two numbers = 207

x + (x - 53) = 207

2 x - 53 = 207

2x = 207 + 53

2 x =260

$x=\frac{260}{2}$

greater x=130

smaller number x - 53= 130 – 53=73

5. one number is twelve times another. If their difference is 143, find the numbers.

a) 15, 158 b) 12, 155

c) 12, 157 d) 13, 156

answer:d) 13 , 156

Solution:

let the number be x

second number be 12x.

Difference,

1 2 x - x = 143

11 x = 143

$x = \frac{143}{11}$

First number x=13

Second number 12x = 12 x 13=156

6. one number is half of the another. If their difference is 51, find the number

a) 102 , 51 b) 106 , 53

c) 98 , 47 d) 88 , 37

Answer:a) 102 , 51

Solution:

let the first number be x

Second number be x/2.

Difference,

$$x - \frac{x}{2} = 51$$

$$\frac{2x - x}{2} = 51$$

$$\frac{x}{2} = 51$$

$$x = 51 \times 2$$

first number x = 102

second number $\frac{x}{2} = \frac{102}{2}$

$= 51$

7. A bus is carrying 67 passengers with some people having ₹6 tickets and the remaining having ₹12 tickets. If the total money received from these passengers with ₹6 tickets.

a) 30 b) 31

c) 35 d) 37

Answer:d) 37

Solution:

let the number of passengers having ₹ 6 tickets be 'x'

then the number of passengers with ₹12 tickets is '67-x'

total money received from the passengers = ₹ 582

i.e.,

$$x \times ₹6 + (67 - x) \times ₹12 = 582$$

$$6x + 804 - 12x = 582$$

$$804 - 6x = 582$$

$$804 - 582 = 6x$$

$$222 = 6x$$

$$\frac{222}{6} = x$$

Number of passengers having ₹6 tickets x = 37 passengers

8. A bus is carrying 40 passengers with some people having ₹7 tickets and the remaining having ₹11 tickets. If the total money received from these passengers is ₹6332, find the number of passengers with ₹11 tickets.

a) 13 b) 14

c) 17 d) 19

answer:a) 13

Solution:

let the number of passengers having ₹ 7

then, the number of passengers having ₹ 11 ticket be '40 – x'

total money received from the passengers = ₹ 332

i.e.,

$$x \times ₹\ 7 + (40 - x) \times ₹\ 11 = 332$$
$$7x + 440 - 11x = 332$$
$$440 - 4x = 332$$
$$440 - 332 = 4x$$
$$108 = 4x$$
$$\frac{108}{4} = x$$

No. Of passengers having ₹ 7 tickets x = 27

No. Of passengers having ₹ 11 tickets,

= 40 - x

= 40 – 27

= 13 passengers

9. A total of 50 currency notes, consisting only of ₹ 2 and ₹ 10 denominations amount to₹ 140. Find the number of ₹2 currency notes in denomination.

a) 42 b) 40

c) 45 d) 43

Answer: c) 45

Solution:

Let the number of ₹ 2 notes be 'x '

Then, the no. Of ₹ 10 notes be ' 50 – x'

Total number = ₹ 140

i.e.,

$$x \times ₹\ 2 + (50 - x) \times ₹\ 10 = 140$$
$$2x + 500 - 10x = 140$$

$$500 - 8x = 140$$
$$500 - 140 = 8x$$
$$360 = 8x$$
$$\frac{360}{8} = x$$

No. Of ₹ 2 notes $x = 45$

10. A total of 110 currency notes, consisting only of ₹ 20 and ₹ 50 denominations, amount to ₹ 4300. Find the number of ₹ 50 currency notes in denominations.

a) 35 b) 40

c) 70 d) 60

Answer: c) 70

Solution:

Let the number of ₹ 20 notes be 'x '

Then, the number of ₹ 50 notes be ' 110 – x'

i.e.,

$$x \times ₹ 20 + (110 - x) \times ₹ 50 = 4300$$
$$20x + 5000 - 50x = 4300$$
$$5500 - 30x = 4300$$
$$5500 - 4300 = 30x$$
$$1200 = 30x$$
$$\frac{1200}{30} = x$$

No. Of ₹ 20 notes $x = 40$

No. Of ₹ 50 notes $= 110 - x$

$=110 - 40$

$=70$ notes.

11.Find two consecutive natural number whose sum is 83.

a) 41 , 42 b) 37 , 38

c) 37 , 46 d) 42 , 43

Answer: a) 41 , 42

Solution:

The numbers are natural and consecutive.

Let the number be 'x ' and 'x + 1'.

$$x \times (x + 1) = 83$$
$$2x + 1 = 83$$

$$2x = 83 - 1$$

$$2x = 82$$

$$x = \frac{82}{2}$$

$$x = 41$$

$$x + 1 = 41 + 1$$

$$= 42$$

Therefore, the required number are 41 and 42.

12. Find two consecutive natural numbers whose sum is 225.

a) 105 , 115 b) 112 , 113

c) 100 , 125 d) 111 , 112

answer: b) 112 , 113

Solution:

The numbers are natural and consecutive

Let the number be 'x ' and 'x + 1'

$$x \times (x + 1) = 225$$

$$2x + 1 = 225$$

$$2x = 225 - 1$$

$$2x = 224$$

$$x = \frac{224}{2}$$

$$x = 112$$

$$x + 1 = 112 + 1$$

$$= 113$$

Therefore, the required numbers are 112 and 113.

Percentage

Definition:-

❖ The term per cent means per hundred or for every hundred. The term per cent is abbreviated as p.c. The symbol % is often used for the term per cent.

❖ A fraction whose denominator is 100 is called a percentage and the numerator of the fraction is called rate per cent.

❖ e.g., $\frac{1}{100}$ and 1% percent means the same. i.e., 1 part out of every hundred parts.

To express X% as a fraction, divide the X by hundred. i.e., $\frac{X}{100}$

To express a/b as a percentage $\left[\frac{a}{b} \times 100\right]$

Results in Consumption:-

❖ It a price of a commodity increase by R% then the reduction in consumption so as not to increase the expenditure is $\left[\frac{R}{100+R} \times 100\right]$

❖ If the price of the commodity decrease by R%, then the increase in consumption so as not to decrease the expenditure is $\left[\frac{R}{100-R} \times 100\right]$

Results in Population:-

❖ Population of a Town/Village (P) is increases at the rate of R% per annum, then

❖ Population after n years = $P\left[1+\frac{R}{100}\right]^{n}$

❖ Population n years ago = $P \Big/ \left[1+\frac{R}{100}\right]^{n}$

Results on Depreciation:-

❖ Value of a machine after n years : $P\left[1-\frac{R}{100}\right]^{n}$

❖ Value of a machine n years ago: $P \Big/ \left[1-\frac{R}{100}\right]^{n}$

Results on comparison:-

❖ If A is R% more than B, then B is less than A by $\left[\frac{R}{100+R} \times 100\right]\%$

❖ If A is R% less than B, then B is more than A by $\left[\frac{R}{100-R} \times 100\right]\%$

1) If 80% of A = 50 % of B and B= X % of A, then the value of X is .....

a) 400 b) 300 c) 160 d) 150

Answer : C) 160

Solution :

80 % of A = 50 % of B

$\frac{80}{100}$ x A = $\frac{50}{100}$ x B

Here B = X % of A

$\frac{\cancel{80}}{\cancel{100}\ 50} \times \frac{\cancel{2}}{\cancel{100}\ \cancel{50}\ 1} \times A = B$

$\frac{8}{5}$ A = B

1.6 A = B

$\frac{160}{100}$ x A = B

B =160 % of A

Therefore, Required value x = 160 %

2) If 90% of A = 30 % of B and B= X % of A, then the value of X is .....

a) 500 b) 350 c) 300 d) 700

Answer : C) 300

Solution :

90 % of A = 30 % of B

$\frac{90}{100}$ x A = $\frac{30}{100}$ x B

Here B = X % of A

$\frac{\cancel{90}}{\cancel{100}} \times \frac{\cancel{100}}{\cancel{30}} \times A = B$

3A = B

Now, $\frac{x}{100}$x A = B

3 $\cancel{A}$ = $\frac{x \times \cancel{A}}{100}$

3 x 100 = x

Therefore,

Required value x = 300

3) If 70% of A = 40 % of B and B= X % of A, then the value of X is .....

a) 175 b) 195 c) 225 d) 255

Answer : C) 175

Solution **:**

70 % of A = 40 % of B

$\frac{70}{100}$ x A = $\frac{40}{100}$ x B

Here B = X % of A

$\frac{\cancel{70}}{\cancel{100}} \times \frac{\cancel{100}}{\cancel{40}} \times A = B$

Now, $\frac{x}{100}$x A = B

$\frac{7}{4}$ ~~A~~=$\frac{x\ X\ ~~A~~}{100}$

$\frac{7}{4}$ x ~~100~~ 25 =x

Therefore, Required valuex = 175

4) If 80% of A = 60 % of B and B= X % of A, then the value of X is .....

a) 156 $\frac{1}{3}$ b) 143 $\frac{1}{3}$ c) 133 $\frac{1}{3}$ d) 174 $\frac{1}{3}$

Answer : C) 133 $\frac{1}{3}$

Solution :

80 % of A = 60 % of B

$\frac{80}{100}$ x A = $\frac{60}{100}$ x B

Here B = X % of A

$\frac{~~4~~}{~~80~~}$ x $\frac{~~100~~}{~~60~~}$ x A = *B*

$\frac{4}{3}$ A = B

Now, $\frac{4}{3}$~~A~~ = $\frac{x}{100}$ x ~~A~~

$\frac{4}{3}$ x 100 = *x*

$\frac{400}{~~43~~}$ = **x**

133 $\frac{1}{3}$ = x

Therefore, Required value, x= 133 $\frac{1}{3}$

5) If 30% of A = 20 % of B and B= X % of A, then the value of X is .....

a) 190 b) 120 c) 260 d) 150

Answer : C) 150

Solution :

30 % of A = 20 % of B

$\frac{30}{100}$ x A = $\frac{20}{100}$ x B

Here B = X % of A

$\frac{~~30~~}{~~100~~}$ x $\frac{~~100~~}{~~20~~}$ x A = *B*

$\frac{3}{2}$ A = B

Now, $\frac{x}{100}$x A = B

$\frac{3}{2}$ ~~A~~= $\frac{x\ X\ ~~A~~}{100}$

$\frac{3}{~~2~~}$ **x ~~100~~ 50 = X**

Therefore, Required value, X = 150

6) If 60% of A = 30 % of B and B= 40 % of C, C = x % of then the value of X is.....

a) 200 b) 500 c) 800 d) 700

Answer : C) 500

Solution :

60 % of A = 30 % of B

$\frac{60}{100}$ x A = $\frac{30}{100}$ x B

$\frac{~~2~~}{~~60~~}$ x $\frac{~~100~~}{~~30~~}$ x A = *B*

2 A = B.....(1)

2 A = $\frac{40}{100}$x C

2 A x $\frac{~~5~~}{\frac{~~40~~}{~~2~~}}$x C

5 A = C .....(2)

C = x % of A

~~5A~~ = $\frac{x}{100}$x ~~A~~

5 x 100 = X

Therefore, Required value, X = 500

7) If 30% of A = 10 % of B and B= 30 % of C, C = X % of A then the value of X is .....

a) 155 b) 375 c) 215 d) 380

Answer : C) 375

Solution :

90 % of A = 40 % of B

$\frac{30}{100}$ x A = $\frac{40}{100}$ x B

$\frac{90}{~~100~~}$ x $\frac{~~100~~}{40}$ x A = *B*

$\frac{9}{4}$A = B.....(1)

B = 60 % of C

$\frac{9}{4}$ A = $\frac{60}{100}$x C

$\frac{3}{4}$ x $\frac{100}{60}$x A = C .....(2)

$\frac{9}{4}$ = x % of A

10 A = $\frac{x}{100}$x A

10 x 100 = X

X = 1000

Therefore, Required value, X = 1000

8) If 90% of A = 40 % of B and B= 60 % of C, C = X % of A then the value of X is .....

a) 155 b) 375 c) 215 d) 380

Answer : C) 375

Solution :

90 % of A = 40 % of B

$\frac{90}{100}$ x A = $\frac{40}{100}$ x B

$\frac{90}{100}$ x $\frac{100}{40}$ x A = *B*

$\frac{9}{4}$A = B.....(1)

B=60 %of C

$\frac{9}{4}$ A = $\frac{60}{100}$x C

$\frac{9}{4}$ x $\frac{100}{60}$ x A= C .....(2)

C = x % of A

$\frac{15}{4}$ A = $\frac{x}{100}$x A

$\frac{15}{4}$ x 100 = X

X = 375

Therefore, Required valueX = 375

9) If 50% of A = 30 % of B and B= 70 % of C, C = X % of A then the value of X is .....

a) 235 $\frac{3}{4}$ b) 216 $\frac{4}{21}$ c) 211 $\frac{10}{417}$ d) 238 $\frac{2}{441}$

Answer : C) 238 $\frac{2}{441}$

Solution :

50 % of A = 30 % of B

$\frac{50}{100}$ x A = $\frac{30}{100}$ x B

$\frac{50}{\cancel{100}}$ x $\frac{\cancel{100}}{\cancel{30}}$ x A = *B*

$\frac{5}{3}$A = B.....(1)

B=70 % of C

$\frac{5}{3}$ A = $\frac{\cancel{70}}{\cancel{100}}$x C

$\frac{5}{3}$ x $\frac{100}{70}$ x A= C

$\frac{50}{21}$~~A~~= C .....(2)

C = x % of A

$\frac{50}{21}$ ~~A~~ = $\frac{x}{100}$x ~~A~~

$\frac{50}{21}$ x 100 = X

$\frac{5000}{21}$ = x

X =238 $\frac{2}{21}$

Therefore, Required valueX = 238 2/21.

10) If 70% of A = 30 % of B and B= 50 % of C, C = X % of A then the value of X is .....

a) 454 $\frac{2}{3}$ b) 464 $\frac{2}{3}$ c) 466 $\frac{2}{3}$ d) 472 $\frac{2}{3}$

Answer : C) 466 $\frac{2}{3}$

Solution :

70 % of A = 30 % of B

$\frac{70}{100}$ x A = $\frac{30}{100}$ x B

$\frac{70}{\cancel{100}}$ x $\frac{\cancel{100}}{\cancel{30}}$ x A = *B*

$\frac{7}{3}$A =B.....(1)

B=50 %of C

$\frac{7}{3}$ A = $\frac{50}{100}$x C

$\frac{7}{3}$ x $\frac{\cancel{100}}{\cancel{50}}$ x A= C

$\frac{14}{3}$A= C .....(2)

C = x % of A

$\frac{14}{3}$ ~~A~~ = $\frac{x}{100}$x ~~A~~

$\frac{14}{3}$ x 100 = X

$\frac{1400}{3}$ = x

X =466 $\frac{2}{3}$

Therefore, Required valueX = 4662/3.

LCM And HCF: Formulas and Tricks With Examples

Factors and Multiples: If a number x divides another number y exactly, we say that x is a factor of y. Also y is called a multiple of x.

Highest Common Factor (HCF)

The H.C.F. of two or more than two numbers is the greatest number that divides each one of them exactly. There are two methods for determining H.C.F.:

1. Prime factorization method

We can determine the H.C.F. of 144, 180 and 108 from the following process.

- 144 = 2 × 2 × 2 × 2 × 3 × 3
- 108 = 2 × 2 × 3 × 3 × 3
- 180 = 2 × 2 × 3 × 3 × 5

In prime factorization of the above mentioned three numbers, the common factorization is 2 × 2 × 3 × 3 = 36.

Thus, the required H.C.F. of 144, 180 and 108 is 36.

2. Division Method

We can determine the H.C.F. of above mentioned numbers from the following process :

144) 180 (1
144
36) 144 (4

Thus, the H.C.F of 144 and 180 is 36.

Now, we find the H.C.F of 36 and 108.

36) 108 (3
108
×××

So, the required H.C.F is 36.

Lowest Common Multiple (LCM)

The L.C.M. of two or more than two numbers is the least number which is exactly divisible by each one of the given numbers.

Formula

Product of two numbers = (their H.C.F.) × (their L.C.M.) .

We can determine L.C.M. of two given numbers by the following two methods:

1. Prime Factorization method

Suppose we have to find the L.C.M. of 12, 16 and 30, then

- $12 = 2 \times 2 \times 3$
- $16 = 2 \times 2 \times 2 \times 2$
- $30 = 2 \times 3 \times 5$

Thus, required L.C.M. of the given numbers

$= 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 240$

2. Division method

We can determine the L.C.M. of above mentioned number from the following process :

2	12, 16, 30
2	6, 8, 15
3	3, 4, 15
	1, 4, 5

Thus, required L.C.M. of the given number = $2 \times 2 \times 3 \times 1 \times 4 \times 5 = 240$

H.C.F. and L.C.M. of Fractions

H.C.F. of factions = $\frac{\text{H.C.F. of Numerators}}{\text{L.C.M. of Denominators}}$

For Example, we have to find the H.C.F. of $\frac{1}{2}$ and $\frac{3}{4}$

Then, H.C.F. of $\frac{1}{2}$ and $\frac{3}{4} = \frac{\text{H.C.F. of 1 and 3}}{\text{L.C.M. of 2 and 4}} = \frac{1}{4}$

L.C.M of fractions = $\frac{\text{L.C.M. of Numerators}}{\text{H.C.F. Denominators}}$

For Example, we have to find the L.C.M. of $\frac{1}{2}$ and $\frac{3}{4}$

Then, L.C.M. of $\frac{1}{2}$ and $\frac{3}{4} = \frac{\text{L.C.M. of 1 and 3}}{\text{H.C.F. of 2 and 4}} = \frac{3}{2}$

Solved Examples

1. Find the greatest number which will divide 410, 751 and 1030 leaving a remainder 7 in each case.

Solution: Required number

= H.C.F. of (410 – 7) , (751 – 7) and (1030 – 7) = 31.

1qw

2. What least number must be subtracted from 1936 so that the remainder when divided by 9, 10, 15 will leave in each case the same remainder 7?

Solution: The L.C.M. of 9, 10 and 15 is 90.

On dividing 1936 by 90, the remainder = 46.

But 7 is also a part of this remainder.

? Required number = 46 – 7 = 39.

3. Find the HCF and LCM of 1.75, 5.6 and 7

Solution: Making the same number of decimal places, the numbers may be written as 1.75, 5.60 and 7.00.

Without decimal points, these numbers are 175, 560 and 700.

Now, the HCF of 175, 560 and 700 is 35.

? HCF of 1.75, 5.6 and 7 is 0.35.

LCM of 175, 560 and 700 is 2800.

? LCM of 1.75, 5.6 and 7 is 28.00 i.e. 28.

4. Find the greatest number of six digits which on being divided by 6,7, 8, 9 and 10 leaves 4, 5, 6, 7 and 8 as remainders respectively.

Solution: The L.C.M. of 6, 7, 8, 9 and 10 = 2520

The greatest number of 6 digits = 999999

Dividing 999999 by 2520, we get 2079 as remainder.

Hence the 6 digit number divisible by 2520 is

999999 – 2079 = 997920

Since 6 – 4 = 2, 7 – 5 = 2,

8 – 6 = 2, 9 – 7 = 2,

10 – 8 = 2,

The remainder in each case is less than the divisor by 2.

? Required number = 997920 – 2 = 997918.

5. Arrange the fractions $\frac{3}{8}, \frac{7}{12}, \frac{2}{3}, \frac{14}{19}, \frac{16}{25}$ and $\frac{1}{2}$ in ascending order of magnitude.

Solution: Converting each of the given fractions into decimal form, we get:

$\frac{3}{8}=0.75, \frac{7}{12}=0.583, \frac{2}{3}=0.666, \frac{14}{19}=0.736$, $\frac{16}{25}=0.64$ and $\frac{1}{2}=0.5$

Clearly, 0.375 < 0.5 < 0.583 < 0.64 < 0.666 < 0.736? $\frac{3}{8}<\frac{1}{2}<\frac{7}{12}<\frac{16}{25}<\frac{2}{3}<\frac{14}{19}$

6. Find the HCF and LCM of $14xy^3$, $22x^2y$ and $26x^3y$?.

Solution: $14xy^3 = 2 \times 7 \times x \times y^3$

$22x^2y = 2 \times 11 \times x^2 \times y$

$26x^3y? = 2 \times 13 \times x^3 \times y?$

HCF = $2 \times x \times y = 2xy$

LCM = $2 \times 7 \times 11 \times 13 \times x^3 \times y? = 2002x^3y?$.

7. The HCF of two polynomials is $x^2 - 1$ and their LCM is $x? - 10x^2 + 9$. If one of the polynomials is $x^3 - 3x^2 - x + 3$, find the other.

Solution: Given that HCF of p (x) and q (x) = $x^2 - 1 = (x + 1) (x - 1)$

Also, LCM of p (x) and q (x)

$= x? - 10x^2 + 9 = x? - 9x^2 - x^2 + 9$

$= x^2 (x^2 - 9) - (x^2 - 9) = (x^2 - 9) (x^2 - 1)$

$= (x + 3) (x - 3) (x + 1) (x - 1)$ and

p (x) = $x^3 - 3x^2 - x + 3 = x^2 (x - 3) - (x - 3)$

$= (x - 3) (x^2 - 1) = (x - 3) (x + 1) (x - 1)$

p(x) .q(x) = (HCF) .(LCM)

? $q(x)=\frac{(HCF)\,(LCM)}{p(x)}=\frac{(x+1)(x-1)(x+3)(x-3)(x+1)(x-1)}{(x-3)(x+1)(x-1)}$

$= (x + 3) (x + 1) (x - 1) = (x + 3) (x^2 - 1) = x^3 + 3x^2 - x - 3$

8. Find the HCF and LCM of 6, 72 and 120, using the prime factorisation method.

Solution: We have : $6 = 2 \times 3$,

$72 = 2^3 \times 3^2$,

$120 = 2^3 \times 3 \times 5$

Here, 2^1 and 3^1 are the smallest powers of the common factors 2 and 3 respectively.

So, HCF (6, 72, 120) = $2^1 \times 3^1 = 2 \times 3 = 6$

2^3, 3^2 and 5^1 are the greatest powers of the prime factors 2, 3 and 5 respectively involved in the three numbers.

So, LCM (6, 72, 120) = $2^3 \times 3^2 \times 5^1 = 360$.

9. Find the GCD of : $14x^3 + 14$, $42 (x^2 + 4x + 3) (x^2 – x + 1)$

Solution: $p (x) = 14x^3 + 14 = 14 (x^3 + 1)$

$= 2 \times 7 (x + 1) (x^2 – x + 1)$

$q (x) = 42 (x^2 + 4x + 3) (x^2 – x + 1)$

$= 42 (x^2 + 3x + x + 3) (x^2 – x + 1)$

$= 42 [x (x + 3) + (x + 3)] (x^2 – x + 1)$

$= 2 \times 3 \times 7 (x + 3) (x + 1) (x^2 – x + 1)$

? GCD of p (x) and q (x)

$= 14 (x + 1) (x^2 – x + 1) = 14 (x^3 + 1)$

10. Two bills of Rs 6075 and Rs 8505 respectively are to be paid separately by cheques of the same amount. Find the largest possible amount of each check.

Solution: Largest possible amount of cheque will be the

HCF (6075, 8505) .

We can write $8505 = 6075 \times 1 + 2430$

Since, the remainder 2430 ? 0 again applying division concept we can write

$6075 = 2430 \times 2 + 1215$

Again remainder 1215 ? 0

So, again applying the division concept we can write

$2430 = 1215 \times 2 + 0$

Here the remainder is zero

So, HCF = 1215

Therefore, the largest possible amount of each cheque will be 1215.

11. A garden consists of 135 rose plants planted in a certain number of columns. There are another set of 225 marigold plantlets which is to be planted in the same number of columns. What is the maximum number of columns in which they can be planted?

Solution: To find the maximum number of columns we need to find the HCF (135, 225)

We can write, $225 = 135 \times 1 + 90$

Since, the remainder 90 ? 0 . So, again applying division concept, we can write,$135 = 90 \times 1 + 45$

The Remaining 45 ? 0 again using division concept, We have,

$90 = 45 \times 2 + 0$

Since, the remainder is 0. So, HCF = 45

Therefore, 45 is the maximum number of columns in which the plants can be planted.

12. A watch ticks 90 times in 95 seconds and another watch ticks 315 times in 323 seconds. If both the watches are started together, how many times will they stick together in the first hour?

Solution: The first watch ticks every $\frac{95}{90}$ seconds.

They will stick together after (LCM. of $\frac{95}{90}$ & $\frac{323}{315}$) seconds.

Now, LCM of $\frac{95}{90}$ and $\frac{323}{315}$ = $\frac{\text{LCM of } 95, 323}{\text{HCF of } 90, 315}$ = $\frac{19\times5\times17}{45}$

The number of times they will tick in the first 3600 seconds

= $3600 \div \frac{19\times5\times17}{45} = \frac{3600\times45}{19\times5\times17} = 100\frac{100}{323}$

Once they have already ticked in the beginning;

so in 1 hour they will tick 100 + 1 = 101 times.

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

Related Pages

- How to Solve HCM and LCM Problems Quickly
- Formulas of HCF and LCM
- Questions of HCF and LCM

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

99999300

300

99999 = 99

Therefore, required number 99999 – 99 = 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

Solution:

Let the two numbers be 36x and 36y

Now, 36x * 36y = 3888

xy = 388836×36

36×363888xy = 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 3: 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 403grams,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=13×31

434=2×7×31

465=3×5×31

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

302+12

30+1 = 16

Correct Option B

Type 6 : Tips , tricks and Shortcuts of 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

D. 20 seconds

Solution :Time taken to meet for the 1st time=

40040+10

40+10400=8 sec.

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

Time taken to meet for the 2nd time=

40020+20

20+20400 = 10 sec.

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

Time taken to meet for the 3rd time=

40010+4010+40400=8 sec. Therefore, Total time= (8+10+8) = 26 seconds.

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.

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 number

2 =2

8 = 2316 = 24

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)

Ratio And Proportion

Definition of Ratio:-

❖ Ratio is a comparison of two numbers (quantities) by division. The ratio of 'a' to 'b' is written as "a:b". In the ratio a:b, a and b are terms of the ratio, "a" is the antecedent and "b" is the consequent.

Proportion:-

❖ A proportion is an expression which states that two ratios are equal.

❖ Each quantity in a proportion is called is its term or its proportional.

❖ The first term and the last term are called extremes, whereas the second and third terms are called middle terms (or means).

❖ when four quantities are in proportion, the last quantity is said to be fourth proportion, to the other terms and also we find,

❖ Product of middle terms = Product of extreme terms

❖ If a:b = c:d, bc : ad

2^{nd} term x 3^{rd} term = 1^{st} term x 4^{th} term

Dividing a given number in the given ratio:-

❖ Let A be a given number. The given ratio is a:b. Here A is to be divided in the ratio a:b.

❖ It implies that A is divided into two parts such that

Value of 1^{st} part: Value of 2^{nd} part = a:b

/ 1^{st} part = $\frac{a}{a+b} \times A$

2^{nd} part = $\frac{a}{a+b} \times A$

❖ Since A is divided into two parts, so first part + second part = A

Fourth Proportional:-

❖ If a:b: :c:d or in other words a:b = c:d, then the quantity of 'd' is called the fourth proportional to a, b and c.

/ a : b = c : d

$\frac{a}{b} = \frac{c}{d}$

ad = bc

Third Proportional:-

❖ The third proportional of a proportion is the second term of the mean terms.

/ a : b: :b : c

a : b = b : c

$\frac{a}{b} = \frac{b}{c}$

$ad = b^2$

$b^2 = ac$

Mean proportional:-

❖ The Mean proportional between the two terms of a ratio in a proportional is the square root of the product of these two.

/ $\sqrt{ab}$

1) If a:b = 2:3, b:c = 4:5 then a:b:c = _____

a) 9:11:15 b) 9:17:18 c) 12:15:25 d) 8:12:15

Answer: d) 8:12:15

Solution:

a:b = 2:3 ⟶ (1)

b:c = 4:5 ⟶ (2)

(1) x 4 a:b = 2x4 : 3x4

(2) x 3 b:c = 4x3 : 5x3

a:b = 8:12

b:c = 12:15

a:b:c = 8:12:15

2) If a:b = 3:5, b:c = 4:9 then a:b:c = _____

a) 10:20:43 b) 12:22:45 c) 12:20:45 d) 9:17:35

Answer: c) 12:20:45

Solution:

a:b = 3:5 ⟶ (1)

b:c = 4:9 ⟶ (2)

(1) x 4 a:b = 3x4 : 5x4

(2) x 5 b:c = 4x5 : 9x5

a:b = 12:20

b:c = 20:45

a:b:c = 12:20:45

3) If a:b = 1:3, b:c = 2:5 then a:b:c = _____

a) 2:6:15 b) 9:12:14 c) 8:10:15 d) 4: 7:10

Answer: a) 2:6:15

Solution:

a:b = 1:3 ⟶ (1)

b:c = 2:5 ⟶ (2)

(1) x 2 a:b = 1x2 : 3x2

(2) x 3 b:c = 2x3 : 5x3a:b = 2:6b:c = 6:15a:b:c = 2:6:15

4) If a:b = 2:5, b:c = 3:8 then a:b:c = _____

a) 4:10:15 b) 5:12:15 c) 6:15:35 d) 6: 15:40

Answer: d) 6: 15:40

Solution:

a:b = 2:5 ⟶ (1)

b:c = 3:8 ⟶ (2)

(1) x 2 a:b = 2x3: 5x3

(2) x 5 b:c = 3x5 : 8x5

a:b = 6:15

b:c = 15:40

/ a:b:c = 6:15:35

5) If a:b = 3:5, b:c = 3:7 then a:b:c = _____

a) 8:12:35 b) 9:15:35 c) 9:11:15 d) 12:20:45

Answer: b) 9:15:35

Solution:

a:b = 3:5 ⟶ (1)

b:c = 3:7 ⟶ (2)

(1) x 2 a:b = 3x3: 5x3

(2) x 5 b:c = 3x5 : 7x5

a:b = 9:15

b:c = 15:35

/ a:b:c = 9:15:35

6) If a:b = 2:3, b:c = 4:5 and c:d = 6:7 then a:b:c:d = _____

a) 16:24:30:35 b) 8:15:30:32 c) 12:25:30:36 d) 12:24:28:33

Answer: a) 16:24:30:35

Solution:

a:b = 2:3 ⟶ (1)

b:c = 4:5 ⟶ (2)

c:d = 6:7 ⟶ (3)

(1) x 8 a:b = 2x8: 3x8

(2) x 6 b:c = 4x6: 5x6

(3) x 5 c:d = 6x5: 7x5

a:b = 16:24

b:c = 24:30

c:d = 30:35

/ a:b:c:d = 16:24:30:35

7) If a:b = 2:3, b:c = 5:8 and c:d = 6:7 then a:b:c:d = _____

a) 10:14:15:18b) 8:12:15:30 c) 10:15:16:28 d) 8:12:18:27

Answer: c) 10:15:16:28

Solution:

a:b = 2:3 ⟶ (1)

b:c = 5:8 ⟶ (2)

c:d = 6:7 ⟶ (3)

(1) x 10 a:b = 2x10 : 3x10

(2) x 6 b:c = 5x6 : 8x6

(3) x 5 c:d = 6x8 : 7x8

a:b = 20:30

b:c = 30:48

c:d = 48:56

/ a:b:c:d = 10:15:16:28

8) If a:b = 4:5, b:c = 5:6 and c:d = 2:3 then a:b:c:d = _____

a) 3:6:10:14b) 3:8:10:12 c) 4:5:6:9 d) 4:6:2:3

Answer: c) 4:5:6:9

Solution:

a:b = 4:5 ⟶ (1)

b:c = 5:6 ⟶ (2)

c:d = 2:3 ⟶ (3)

(1) x 2 a:b = 4x2 : 5x2

(2) x 2 b:c = 5x2 : 6x2

(3) x 6 c:d = 2x6 : 3x6

a:b = 8:10

b:c = 10:12

c:d = 12:18

a:b:c:d = 8:10:12:18

a:b:c:d = 4:5:6:9

9) If a:b = 5:6, b:c = 9:10 and c:d = 4:7 then a:b:c:d = _____

a) 5:9:10:7b) 15:18:20:35 c) 5:10:12:15 d) 15:18:24:35

Answer: b) 15:18:20:35

Solution:

a:b = 5:6 ⟶ (1)

b:c = 9:10 ⟶ (2)

c:d = 4:7 ⟶ (3)

(1) x 3 a:b = 5x3 : 6x3

(2) x 2 b:c = 9x2 : 10x2

(3) x 5 c:d = 4x5 : 7x5

a:b = 15:18

b:c = 18:20

c:d = 20:35

a:b:c:d = 15:18:20:35

10) If a:b = 1:2, b:c = 2:4 and c:d = 3:8 then a:b:c:d = _____

a) 3:6:12:32b) 4:7:10:12 c) 1:2:3:8 d) 4:6:2:3

Answer: a) 3:6:12:32

Solution:

a:b = 1:2 (1) ⟶

b:c = 2:4 (2) ⟶

c:d = 3:8 (3) ⟶

(1) x 3a:b = 1x3 : 2x3

(2) x 3b:c = 2x3 : 4x3

(3) x 4c:d = 3x4 : 8x4

a:b = 3:6

b:c = 6:12

c:d = 12:32

a:b:c:d = 3:6:12:32

Simple Interest & Compound Interest

I. Simple Interest

Definition:

- Interest is the additional money paid for the usage of a certain money.
- The money borrowed is called the Principles.
- The sum of interest and principles is called the amount.

Simple interest: Definition-

- If the interest is calculated on same amount of money ,it is called the simple interest.(S.I)
- Simple interest will be the same for all the years.
- If P is the principal, R is the rate of interest; T6 is the time and S.I the simple interest then.

$$\text{Simple interest} = PTR$$

$$\text{Amount} = P\left(1+\frac{TR}{100}\right)$$

1. Find the simple interest on ₹ 32,000 at 7 % per annum for 4 years.

a) ₹ 7260 b) ₹ 8490 c) ₹ 7580 d) ₹ 8960

Answer:d) ₹ 8960

Solution:

Principal (P) = ₹ 32,000

Rate of Interest (R) = 7% per annum

No. of years (N) = 4 years

$$\text{Simple Interest} = \frac{PNR}{100}$$

$$= \frac{32000 \times 4 \times 7}{100}$$

Simple Interest = ₹ 8960

2. Arjun borrowed a sum of ₹ 5000 from a bank at 5% per annum. Find the interest and amount to be paid at the end of three years.

a) ₹ 350> ₹ 5350 b) ₹ 650, ₹ 5650

c) ₹ 750> ₹ 5750 d) ₹ 950> ₹5950

Answer: c) ₹ 750> ₹ 5750

Solution:

Principal (P) = ₹ 5000

Rate of Interest (R) = 5%

No. of years (N) = 3 years

Simple Interest = $\frac{PNR}{100}$

= $\frac{5000 \times 3 \times 5}{100}$

= ₹ 750

Amount = Principal + S.I

= 5000 + 750

= ₹ 5750

3. Vignesh has paid simple interest on a certain sum of 3 years at 8 % per annum is ₹ 3600. Find the sum.

a) ₹ 15>000 b) ₹ 13,000

c) ₹ 18>000 d) ₹ 18>850

Answer: a) ₹ 15>000

Solution:

Rate of Interest (R) = 8 % per annum

Time (N) = 3 years

Simple Interest = $\frac{PNR}{100}$

3600 = $\frac{P \times 3 \times 3}{100}$

600

1200 25

$\frac{3600 \times 100}{3 \times 8}$ = P

2

P = 15,000

Therefore, vignesh has borrowed a sum of ₹15>000.

4. Find the simple interest on ₹ 25,000 at 6 % per annum for 2 years.

a) ₹ 2680 b) ₹ 3000 c) ₹ 3550 d) ₹ 3790

Answer: b) ₹ 3000

Solution:

Given that,

Principal (P) = ₹ 25,000

No. of Interest (R) = 6 %

No. of years (N) = 2 years

Simple Interest = $\frac{PNR}{100}$

= $\frac{25000 \times 2 \times 6}{100}$

Simple Interest = ₹ 3000

5. Find the simple interest on ₹ 14,000 at 10% per annum for 5 years.

a) ₹ 6400 b) ₹ 6700 c) ₹ 7000 d) ₹ 7300

Answer: c) ₹ 7000

Solution:

Given that,

Principal (P) = ₹ 14,000

Rate of Interest (R) = 10 %

No. of years (N) = 5 years

Simple Interest = $\frac{PNR}{100}$

= $\frac{14000 \times 5 \times 10}{100}$

Simple Interest = ₹ 7000

6. Anbu has paid simple interest on a certain sum of 5 years at 5% per annum is ₹ 500. Find the sum.

a) ₹ 1880 b) ₹ 2000 c) ₹ 2200 d) ₹ 2600

Answer: b) ₹ 2000

Solution:

Given that,

Rate of Interest (R) = 5 %

Time (N) = 5 years

Simple Interest = $\frac{PNR}{100}$

$500 = \frac{P \times 5 \times 5}{100}$

$\frac{\cancel{100}\ 20}{\cancel{500} \times 100} = P$

$\frac{\cancel{5} \times \cancel{5}}{}$

P = 2,000

Therefore, Anbu has borrowed a sum of ₹ 2>000.

7. Vishnu has paid simple interest on a certain sum for 3 years at 12% per annum is ₹ 840. Find the sum.

a) ₹ 2233.33 b) ₹ 2333.33 c) ₹ 2833.33 d) ₹ 2433.33

Answer: b) ₹ 2333.33

Solution:

Given that,

Rate of Interest (R) = 12 %

Time (N) = 3 years

Simple Interest = $\frac{PNR}{100}$

$840 = \frac{P \times 3 \times 12}{100}$

$\frac{70}{\cancel{840} \times 100} = P$

$3 \times \cancel{12}$

$\frac{7000}{3} = P$

P = ₹ 2333.33

Therefore, Vishnu has borrowed a sum of ₹ 2333.33.

8. Given that simple interest on a certain sum of money is ₹ 4016.25 at 9% per annum in 5 years. Find the sum of money.

a) ₹ 8925 b) ₹ 8875 c) ₹ 8575 d) ₹ 8635

Answer: a) ₹ 8925

Solution:

Given that,

Let P be the principal amount.

Rate of Interest (R) = 9 %

Time (N) = 5 years

Simple Interest = ₹ 4016.25

$\frac{PNR}{100} = 4016.25$

$\frac{P \times 5 \times 9}{100} = 4016.25$

$P = \frac{4016.25 \times 100}{5 \times 9}$

$P = \frac{401525}{5 \times 9}$

$P = 8925$

Therefore, the sum of money is ₹ 8925.

9. How much simple interest can a person get on ₹ 8200 at 17.5% per annum for a period of 2 years and 6 months.

a) ₹ 3217.6 b) ₹ 3325.5 c) ₹ 3498.6 d) ₹ 3587.5

Answer: d) ₹ 3587.5

Solution:

Principal (P) = ₹ 8200

Rate of Interest (R) = 17.5 %

No. of years (N) = 2 years 6 months (or) $2\frac{6}{12}$ years

Simple Interest = $\frac{PNR}{100}$

$= \frac{8200 \times 2\frac{1}{2} \times 17.5}{100}$

$P = \frac{82 \times 5 \times 17.5}{2}$

Simple Interest = ₹ 3587.5

10. Devi deposited ₹ 10000 for 4 years at a rate of 6% per annum. Find the interest and amount Devi got.

a) ₹ 2225> ₹ 12225 b) ₹ 2400 , ₹12400

c) ₹ 2200> ₹ 12200 d) ₹ 2800> ₹ 12800

Answer: b) ₹ 2400> ₹ 12400

Solution:

Given that,

Principal (P) = ₹ 10,000

Rate of Interest (R) = 6 %

Time (N) = 4 years

Simple Interest = $\frac{PNR}{100}$

= $\frac{10000 \times 4 \times 6}{100}$

Simple Interest = ₹ 2400

Amount = Principal + S.I

= 10000 + 2400

Amount = ₹ 12400

11. In that time will ₹1860 will become ₹ 2641.20 at 12% per annum simple interest?

a) 2 years 4 months b) 2 years 8 months

c) 3 years 6 months d) 3 years 9 months

Answer: c) 3 years 6 months

Solution:

Amount = ₹ 2641.20

Principal = ₹ 1860

Rate of Interest = 12%

Simple Interest = Amount - Principal

= 2641.20 – 1860

= ₹ 781.20

Simple Interest = $\frac{PNR}{100}$

781.20 = $\frac{1860 \times N \times 2}{100}$

0.7 ~~65.1~~5

781.20 x ~~100~~ = N

~~1860~~ x~~12~~ 1

~~93~~ 1

N = 3.5 years

Time (N) = 3 years 6 months

12. In what time will ₹8000 amount to ₹8360 at 6% annum simple interest?

a) 8 months b) 9 months c) 1 ¼ years d) 1 ½ years

Answer: b) 9 months

Solution:

Principal = ₹ 8000

Amount = ₹ 8360

Rate of Interest (R) = 6%

Amount = Principal + S.I

8360 = 8000 + S.I

8360 - 8000 = S.I

S.I = ₹360

Simple Interest = PNR / 100

360 = 8000 x N x 6 / 100

6 3

360 x ~~100~~ = N

~~8~~000 x ~~6~~ 1

4

N = ¾ years (or) 9 months

Time (N) = 9 months

II. Compound Interest

Definition

- The interest on a loan or deposit calculated based on both the initial amount and previous interest payments from previous periods is known as compound interest (or compounding interest)
- Compound interest also known as “interest on interest”, works in the same way.
- Total amount of principal and interest in future - principal amount at present =compound interest.

- Interest may be compounded yearly, half yearly and quarterly.
- Compound yearly,

$$\text{Amount} = = P\left(1+ \frac{R}{100}\right)^N$$

Where

P = Principal

N = Number of years

R = Rate of interest

- Compounded Half – yearly,

$$\text{Amount} = P\left(1+ \frac{R/2}{100}\right)^{2N}$$

- Compounded quarterly,

$$\text{Amount} = P\left(1+ \frac{R/4}{100}\right)^{4N}$$

1. Find the compound interest on ₹ 10000 for 2 years at 6% per annum. Compounded annually.

a) ₹ 936 b) ₹ 1136 c) ₹ 1036 d) ₹ 1236

Answer: d) ₹ 1236

Solution:

Given that

Principal = ₹ 10000

No. of years = 2 years

Rate of Interest = 6% per anum

$$\text{Amount} = P\left(1 + \frac{R}{100}\right)^N$$

$$= 10000\left(1 + \frac{6}{100}\right)^2$$

$$= 10000\left(\frac{100 + 6}{100}\right)^2$$

$$= 10000\left(\frac{106}{100}\right)^2$$

= 10000 x $\frac{106}{100}$ x $\frac{106}{100}$

Amount = ₹ 11236

Compound Interest = Amount - Principal

= 11236 – 10000

Compound Interest = ₹ 2136

2. Find the compound interest on ₹ 1200 for 2 years at 6% per annum compounded annually.

a) ₹ 148.42 b) ₹ 156.78

c) ₹ 139.61 d) ₹ 172.21

Answer: a) ₹ 148.42

Solution:

Given that,

Principal = ₹ 1200

No. of years = 2 years

Rate of Interest = 6% per annum

Amount = $P1\left(+\frac{R}{100}\right)^{N}$

= $1200\left(1+\frac{6}{100}\right)^{2}$

= $1200\left(\frac{100+6}{100}\right)^{2}$

= $1200\left(\frac{106}{100}\right)^{2}$

= $1200 \times \frac{106}{100} \times \frac{106}{100}$

= $\frac{33708}{25}$

Amount = ₹ 1348.32

Compound Interest = Amount - Principal

= 1348.40 - 1200

Compound Interest = ₹ 148.42

3. Find the compound Interest on ₹ 8000 at 15% per annum for 2 years 4 months, compounded annually.

a) ₹ 2245 b) ₹ 2870

c) ₹ 3109 d) ₹ 3313

Answer: c) ₹ 3109

Solution:

Given that,

Principal = ₹ 8000

No. of years = 2 years 4 months (or) 2 4/12 (or) 2 1/3 years

Rate of Interest = 15% per annum

Amount = $P1\left(+\frac{R}{100}\right)^N$

$= 8000 1\left(+\frac{15}{100}\right)^2 1 + \frac{1}{3}\left(x\ 15\right)$

$= 8000\left(\frac{100 + 15}{100}\right)^2 1\left(+\frac{5}{100}\right)$

$= 8001\left(\frac{15}{100}\right)^2 \left(\frac{105}{100}\right)$

$= 8000 \times \frac{115}{100} \times \frac{115}{100} \times \frac{105}{100}$

Amount = ₹ 11109

Compound Interest = Amount - Principal

= 11109 - 8000

Compound Interest = ₹ 3109

4. Find the compound interest paid when a sum of ₹ 10,000 is invested for 1 year and 3 months at 8 ½ % per annum, compounded annually.

a) ₹ 1017.28 b) ₹ 1030.56

c) ₹ 1077.28 d) ₹ 1080.56

Answer: d) ₹ 1080.56

Solution:

Given that,

Principal (P) = ₹ 10000

No. of years (N) = 1year 3 months (or) 1 3/12 (or) 1 ¼ years

Rate of Interest (R) = 8 ½ %

For first year,

Interest = $\frac{PNR}{100}$

= $\frac{10000 \times 1 \times 8\frac{1}{2}}{100}$

= $100 \times 1 \times \frac{17}{2}$

= ₹ 850

Amount = Interest + Principal

= 850 + 10000

= ₹ 10850

For second year, principal will be amount of previous year (since interest is compounded)

Principal (P) = ₹ 10850

Time = 3 months (or) 3/12 (or) ¼ years

Rate of Interest (R) = 8 ½ %

Interest = $\frac{PNR}{100}$

= $\frac{10850 \times \frac{1}{4} \times 8\frac{1}{2}}{100}$

= $\frac{10850 \times 17 \times 1}{100 \times 2 \times 4}$

= $\frac{3689}{16}$

Interest = ₹ 230.5625

Total Interest = 850 + 230.5625

= ₹ 1080.5625

Compound Interest paid after 1 year and 3 months is ₹ 1080.56.

5. A sum of ₹ 13500 is invested at 16% per annum compound interest for 5 years. Calculate the amount at the end of the first year.

a) ₹ 15660 b) ₹ 17890

c) ₹ 19535 d) ₹ 20990

Answer: a) ₹ 15660

Solution:

Given that

Principal (P) = ₹ 13500

Rate of Interest(R) = 16 %

Amount at the end of 1st year

$$\text{Amount} = P1\left(+\frac{R^N}{100}\right)$$

$$= 135001\left(+\frac{16^1}{100}\right)$$

$$= 13500\left(\frac{116}{100}\right)$$

$$= 13500 \times \frac{116}{100}$$

Amount = ₹ 15660

6. At what rate of compound interest per annum a sum of ₹ 12600 becomes ₹ 15246 in 2 years?

a) 12.5% b) 10%

c) 15% d) 17.5%

Answer: b) 10%

Solution:

Let R% be the rate of interest per annum.

Given,

Principal (P) = ₹ 12600

Amount = ₹ 15246

Time (N) = 2 years

$$\text{Amount} = P1\left(+\frac{R^N}{100}\right)$$

$$15246 = 12600\left(1+\frac{R^2}{100}\right)$$

$$\frac{15246}{12600} = \left(1+\frac{R^2}{100}\right)$$

$$\frac{121}{} = \left(1+\frac{R^2}{}\right)$$

$$\frac{100}{\sqrt{\frac{121}{100}}} = \left(1 + \frac{R}{100}\right)$$

$$\frac{11}{10} = \left(1 + \frac{R}{100}\right)$$

$$\frac{11}{10} - 1 = \frac{R}{100}$$

$$\frac{11 - 10}{10} = \frac{R}{100}$$

$$\frac{1}{10} = \frac{R}{100}$$

$$R = \frac{100}{10}$$

$$R = 10\%$$

/ Rate of Interest per annum = 10%

7. At what rate of compound interest per annum a sum of ₹ 30000 becomes ₹34347 in 2 years?

a) 5.5% b) 4.6%

c) 7% d) 9.5%

Answer: c) 7%

Solution:

Let R% be the rate of interest per annum.

Given,

Principal (P) = ₹ 30000

Amount = ₹ 34347

Time (N) = 2 years

Amount $= P1\left(1 + \frac{R^N}{100}\right)$

$$34347 = 30000\left(1 + \frac{R^2}{100}\right)$$

$$\frac{34347}{30000} = \left(1 + \frac{R^2}{100}\right)$$

$$\frac{11449}{10000} = \left(1 + \frac{R^2}{100}\right)$$

$$\sqrt{\frac{11449}{10000}} = \left(1 + \frac{R}{100}\right)$$

$$\frac{107}{100} = 1 + \frac{R}{100}$$

$$\frac{107}{100} - 1 = \frac{R}{100}$$

$$\frac{107 - 100}{107} = \frac{R}{100}$$

$$\frac{7}{10} = \frac{R}{100}$$

$$R = 7\%$$

/ Rate of Interest (R) = 7%

8. At what rate of compound interest per annum a sum of ₹ 25000 becomes ₹ 35123.20 in 3 years?

a) 12% b) 13.5%

c) 16% d) 18%

Answer: a) 12%

Solution:

Let R% be the rate of interest per annum.

Given,

Principal (P) = ₹ 25000

Amount = ₹ 35123.20

Time (N) = 3 years

$$\text{Amount} = P1\left(+\frac{R^N}{100}\right)$$

$$35123.20 = 25000\left(1 + \frac{R^3}{100}\right)$$

$$\frac{35123.20}{25000} = \left(1 + \frac{R^3}{100}\right)$$

$$\frac{35123.20 \times 100}{25000 \times 100} = \left(1 + \frac{R}{100}\right)^3$$

$$\frac{3512320}{2500000} = \left(1 + \frac{R}{100}\right)^3$$

$$\frac{21952}{15625} = \left(1 + \frac{R}{100}\right)^3$$

$$\sqrt[3]{\frac{21952}{15625}} = 1 + \frac{R}{100}$$

$$\frac{28}{25} = 1 + \frac{R}{100}$$

$$\frac{28}{25} - 1 = \frac{R}{100}$$

$$\frac{28 - 25}{28} = \frac{R}{100}$$

$$\frac{3}{25} = \frac{R}{100}$$

$$\frac{3 \times 100}{25} = R$$

$$R = 12$$

Rate of Interest (R) = 12 %

9. At what rate of compound interest per annum a sum of ₹ 8000 becomes ₹ 8820 in 2 years?

a) 2.7% b) 3.2%

c) 4.8% d) 5%

Answer: d) 5%

Solution>

Let R% be the rate of interest per annum.

Given,

Principal (P) = ₹ 8000

Amount = ₹ 8820

Time (N) = 2 years

$$\text{Amount} = P1\left(+\frac{R}{100}\right)^N$$

$$8820 = 80001\left(+\frac{R}{100}\right)^2$$

$$\frac{8820}{8000} = \left(1+\frac{R}{100}\right)^2$$

$$\frac{441}{400} = \left(1+\frac{R}{100}\right)^2$$

$$\sqrt{\frac{441}{400}} = 1+\frac{R}{100}$$

$$\frac{21}{20} = 1+\frac{R}{100}$$

$$\frac{21-1}{20} = \frac{R}{100}$$

$$\frac{21-20}{20} = \frac{R}{100}$$

$$\frac{1}{20} = \frac{R}{100}$$

$$\frac{100}{20} = R$$

$$R = 5$$

/ Rate of interest (R) = 5 %

10. At what rate of compound interest per annum a sum of ₹ 20000 becomes ₹ 26620 in 3 years?

a) 10% b) 15%

c) 17% d) 21%

Answer: a) 10%

Solution:

Let R% be the rate of interest per annum.

Given,

Principal(P) = ₹ 20000

Amount = ₹ 26620

Time; (N) = 3 years

Amount = $P\left(1+\frac{R}{100}\right)^N$

$26620 = 20000\left(1+\frac{R}{100}\right)^3$

$\frac{26620}{20000} = \left(1+\frac{R}{100}\right)^3$

$\frac{1331}{1000} = \left(1+\frac{R}{100}\right)^3$

$\sqrt[3]{\frac{1331}{1000}} = 1+\frac{R}{100}$

$\frac{11}{10} = 1+\frac{R}{100}$

$\frac{11}{10} - 1 = \frac{R}{100}$

$\frac{11-10}{10} = \frac{R}{100}$

$\frac{1}{10} = \frac{R}{100}$

$\frac{100}{10} = R$

$R = 10$

Rate of Interest (R) = 10 %

11. In how many years will ₹ 3375 become ₹ 4096 at 6 2/3 per annum if the interest is compounded annually.

a) 2 years b)3 years c) 1.5 years d) 1 year

Answer: b) 3 years

Solution:

Principal (P) = ₹ 3375

Amount = ₹ 4096

Rate of Interest = 6 2/3 %

if compounded annually,

$$\text{Amount} = P1\left(+\frac{R}{100}\right)^N$$

$$4096 = 3375\left(1 + \frac{6\ 2/3}{100}\right)^N$$

$$4096 = 3375\left(1 + \frac{20/3}{100}\right)^N$$

$$4096 = 33751\left(+\frac{20}{300}\right)^N$$

$$4096 = 33751\left(+\frac{1}{15}\right)^N$$

$$4096 = 3375\frac{16}{15}^N$$

$$\frac{4096}{3375} = \left(\frac{16}{15}\right)^N$$

$$\left(\frac{16^3}{15}\right) = \left(\frac{16}{15}\right)^N$$

N = 3

Number of years (N) = 3 years

12. In how many years ₹ 3200 become ₹ 3362 at 2.5% per annum if the interest is compounded annually.

a) 2.5 years b) 2 years

c) 1.5 years d) 3 years

Answer: b) 2 years

Solution:

Principal (P) = ₹ 3200

Amount = ₹ 3362

Rate of Interest = 2.5 %

If compounded annually,

$$\text{Amount} = P\left(1 + \frac{R}{100}\right)^N$$

$$3362 = 3200\left(1 + \frac{2.5}{100}\right)^N$$

$$3362 = 3200\left(1 + \frac{5/2^N}{100}\right)$$

$$3362 = 3200\left(1 + \frac{5^N}{200}\right)$$

$$3362 = 3200\left(\frac{205}{200}\right)^N$$

$$3362 = 3200\left(\frac{41}{40}\right)^N$$

$$\frac{3362}{3260} = \left(\frac{41^N}{40}\right)$$

$$\frac{1681}{1600} = \left(\frac{41}{40}\right)^N$$

$$\left(\frac{41^2}{40}\right) = \left(\frac{41}{40}\right)^N$$

$$N = 2$$

Number of years = 2 years.

Time And Work

1. A can do a piece of work in 10 days. B can do a same work at 15 days. How many days can the mark joining together?

a) $9\frac{1}{2}$ days b) 8 days c) 6 days d) $7\frac{1}{2}$ days

Answer : C) 6 days

Solution :

A's one day work = $\frac{1}{10}$

B's one day work = $\frac{1}{15}$

(A+B)'S one day work = $\frac{1}{10} + \frac{1}{15}$

$= \frac{15+10}{150}$

$= \frac{25}{150}$

$= \frac{1}{6}$

Number of days A & B can

do the work = 6 days.

2.A can do a piece of work in 12 days. B can do the same work in 18 days. How many days can the work joining together?

a) $6\frac{3}{4}$ days b) $7\frac{1}{5}$ days c) $6\frac{1}{2}$ days d) $7\frac{1}{3}$ days

Answer : b) $7\frac{1}{5}$ days

Solution :

A's one day work = $\frac{1}{12}$

B's one day work = $\frac{1}{12}$

(A+B)'S one day work = $\frac{1}{12} + \frac{1}{18}$

$= \frac{18+12}{216}$

$= \frac{30}{216}$

$= \frac{5}{36}$

Number of days A & B can do the work together = $\frac{36}{5}$ or $7\frac{1}{5}$ days.

3.A can do a piece of work in 18 days. B can do the same work in 24 days. How many days can the work joining together?

a) $10\frac{2}{7}$ days b) $10\frac{1}{7}$ days c) $13\frac{2}{7}$ days d) $13\frac{1}{7}$ days

Answer : b) $10\frac{2}{7}$ days

Solution :

A's one day work = $\frac{1}{18}$

B's one day work = $\frac{1}{24}$

(A+B)'S one day work = $\frac{1}{18} + \frac{1}{24}$

$= \frac{4+3}{72}$

$= \frac{7}{72}$

Number of days A & B can

do the work together = $\frac{72}{7}$ or $10\frac{2}{7}$ days.

4.A can do a piece of work in 15 days. B can do the same work in 30 days. How many days can the work joining together?

a) 27 days b) 12 days c) 10 days d) 21 days

Answer : b) 10 days

Solution :

A's one day work = $\frac{1}{15}$

B's one day work = $\frac{1}{30}$

(A+B)'S one day work = $\frac{1}{15} + \frac{1}{30}$

= $\frac{2+1}{30}$

= $\frac{3}{30}$

= $\frac{1}{10}$

Number of days A & B can do the work together = 10 days.

5.A can do a piece of work in 21 days. B can do the same work in 30 days. How many days can the work joining together?

a) $27\frac{7}{11}$ days b) $12\frac{2}{9}$ days c) $12\frac{1}{8}$ days d) $12\frac{6}{17}$ days

Answer : b) $12\frac{6}{17}$ days

Solution :

A's one day work = $\frac{1}{21}$

B's one day work = $\frac{1}{30}$

(A+B)'S one day work = $\frac{1}{21} + \frac{1}{30}$

= $\frac{10+7}{210}$

= $\frac{17}{210}$

Number of days A & B can do the work together = $\frac{210}{17}$ (or) $12\frac{6}{17}$ days.

6.A and B join together can do a piece of work at 6 days. A can alone do a work at 18 days. How many days can do the same work B alone?

a) 13 days b) 15 days c) 12 days d) 9 days

Answer : C) 9 days

Solution :

(A+B)'s one day work = $\frac{1}{6}$

A's one day work = $\frac{1}{18}$

B 's one day work = $\frac{1}{6} - \frac{1}{18}$

= $\frac{3-1}{18}$

= $\frac{2}{18}$

= $\frac{1}{9}$

Number of daysB can do the work = 9 days.

7.A and B join together can do a piece of work at 8days. A can alone do a work at 20 days. How many days can do the same work B alone?

a) $13\frac{1}{4}$ days b) $12\frac{2}{3}$ days c) $11\frac{1}{4}$ days d) $17\frac{1}{9}$ days

Answer : b) $13\frac{1}{3}$ days

Solution :

(A+B)'s one day work = $\frac{1}{8}$

A's one day work = $\frac{1}{20}$

B 's one day work = $\frac{1}{8} - \frac{1}{20}$

= $\frac{5-2}{40}$

= $\frac{3}{40}$

= $\frac{3}{40}$

Number of days B can do the work = $\frac{40}{3}$ or $13\frac{1}{3}$ days.

8.A and B join together can do a piece of work at 10 days. A can alone do a work at 20 days. How many days can do the same work B alone?

a) 12 days b) 20 days c) 19 days d) 15 days

Answer : b) 20 days

Solution :

(A+B)'s one day work = $\frac{1}{10}$

A's one day work = $\frac{1}{20}$

B 's one day work = $\frac{1}{10} - \frac{1}{20}$

= $\frac{2-1}{20}$

= $\frac{1}{20}$

Number of days B can do the work = 20 days.

9.A and B join together can do a piece of work at 8 days. A can alone do a work at 16 days. How many days can do the same work B alone?

a) 12 days b) 14 days c) 16 days d) 10 days

Answer : C) 16 days

Solution :

(A+B)'s one day work = $\frac{1}{8}$

A's one day work = $\frac{1}{16}$

B 's one day work = $\frac{1}{8} - \frac{1}{16}$

= $\frac{2-1}{16}$

= $\frac{1}{16}$

Number of days B can do the work = 16 days.

10A and B join together can do a piece of work at 8 days. A can alone do a work at 16 days. How many days can do the same work B alone?

a) $39\frac{1}{6}$ days b) 37 days c) $33\frac{3}{4}$ days d) 40 days

Answer : b) $33\frac{3}{4}$ days

Solution :

(A+B)'s one day work = $\frac{1}{15}$

A's one day work = $\frac{1}{27}$

B 's one day work = $\frac{1}{15} - \frac{1}{27}$

= $\frac{9-5}{135}$

= $\frac{4}{135}$

Number of days B can do the work = $\frac{135}{4}$ (or) 33 $\frac{3}{4}$ days

Reasoning Time Distance

1. Q travels towards East. M travels towards North.S and T travel in opposite directions. T travels towards right of Q. Which of the following is definitely true?

(a) M and S travel in theopposite directions.

(b) S travels towards West.

(c) T travels towards North.

(d) M and S travel in the same direction.

2. P, Q, R, S and T are sitting around a circular table. R is to the right of P and is second to the left of S. T is not between P and S. Who is second to the left of R?

(a) S (b) T

(c) 0 (d) data inadequate

3. Of the five villages P, Q, R, S and T situated close to each other, P is to west of Q, R is to the south of P. T is to the north of Q, and S is to the east of T. Then, R is in which direction with respect to S?

(a) North-West (b) South-East

(c) South-West (d) Data Inadequate

4. M is to the East of D, F is to the South of D and K is to the West of F. M is in which direction with respect to K?

(a) South-West (b) North-West

(c) North-East (d) South-East

5. After 4 pm on a sunny day when Ramesh was returning from his school, he saw his uncle coming in the opposite direction. His uncle talked to him for some time. Ramesh saw that the shadow of his uncle was to his right side. Which direction was his uncle facing during their talk?

(a) North (b) South

(c) East (d) Data inadequate

6. A and B are standing at a distance of 20 km from each other on a straight East-West road.

A and B start walking simultaneously, eastwardsand westwards respectively, and both cover a distance of 5 km. Then A turns to his left and walks 10 km. 'B' turns to his right and walks 10 km and at the same speed. Then both turn to their left and cover a distance of 5 km at the same speed. What will be the distance between them?

(a) 10km (b) 5km

(c) 20km (d) 25 km

7. Alok walked 30 metres towards east and took a right turn and walked 40 metres. He again took aright turn and walked50 metres. Towards which direction is he from his starting point?

(a) South (b) West

(c) South-West (d) South-East

8. Ruchi's house is to the right of Vani's house at a distance of 20 metres in the same row facing North. Shabana's house i in the North- East direction of Vani's house at a distance of 25metres. Determine that Ruchi's house is in whichdirection with respect of Shabana's house?

(a) North-East (b) East (c) South (d) West

9. Y is to the East of X, which is to the North of Z. If P is to the South of Z, then P is in which direction with respect to Y?

(a) North (b) South (c) South-East (d) None of these

10. One afternoon, Manisha and Madhuri were talking to each other face to face in Bhopal on M.G. Road. If Manisha's shadow was exactly to the left of Madhuri, which direction was Manisha facing?

(a) North (b) South

(c) East (d) Data inadequate

'X' started walking straight towards South, He walked a distance of 5 metres and then took a left turn and walked a distance of 3 metres. Then he took a right turn and walked a distance of 5metres again. 'X' is facing which direction now?

(a) North-East (b) South

(c) North (d) South-West

11. If A is to the south of B and C is to the east of B,in what direction is A with respect to C?

(a) North-east (b) North-west

(c) South-east (d) South-west

12. One morning after sunrise, Gopal was facing a pole. The shadow of the pole fell exactly to his right. Which direction was he facing?

(a) South (b) East

(c) West (d) Data inadequate

13. A boy rode his bicycle northwards, then turned left and rode one km and again turned left and rode 2 km. He found himself exactly one km west of his starting point. How far did he ride northwards initially?

(a) 1 km (b) 2km

(c) 3 km (d) 5 km.

14. Ravi wants to go to the university which is opposite to theatre. He starts from his home which is in the East and come to a crossing. The road to the left ends is a theatre, straight ahead isthe hospital- In which direction is the university?

(a) North (b) South

(c) East (d) West

15. A rat runs 20’ towards east and turns to right, runs 10' and turns to right, runs 9‘ and again turns to left, runs 5 and then to left, runs 12' and finally turns to left and runs 6'. Now, whichdirection is the rat facing?

(a) East (b) West

(c) North (d) South

16. If South-east becomes North, North-east becomes west and so on, what will West become?

(a) North-east (b) North-west

(c) South-east (d) South-west

17. P, Q, R and S are playing a game of carrom. P, R and S, Q are partners. S is to the right of R who is facing west. Then, Q is facing

(a) North (b) South

(c) East (d) West

18. A and B start walking, from a point, in opposite directions. A covers 3 km and B covers 4 km. Then A turns right and walks 4 km while B turnsleft and walks 3 km. How far is each from the starting point?

(a) 5 km (b) 4km

(c) 10km (d) 8km

19. Anuj started walking positioning his back towards the sun. After sometime, he turned left, then turned right and then towards the left again.In which direction is he going now?

(a) North or South (b) East or West

(c) North or West (d) South or West

20. From her home, Prema wishes to go to school. From home, she goes towards North and then turns left and then turns right, and finally she turns left and reaches school. In which direction her school is situated with respect to her home?

(a) North-East (b) North-West

(c) South-East (d) South-West

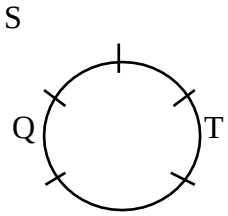
Answer Key

1	(d)	9	(d)	17	(c)
2	(c)	10	(a)	18	(a)
3	(c)	11	(b)	19	(a)
4	(c)	12	(d)	20	(a)
5	(b)	13	(a)		
6	(a)	14	(b)		
7	(c)	15	(a)		
8	(c)	16	(c)		

HINTS & EXPLANATIONS

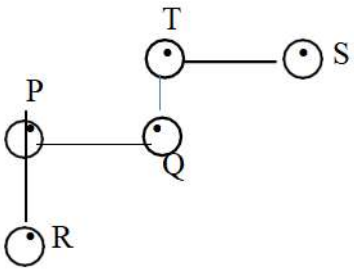
1.We have been given that Q travels towards East and M travels towards North. Now, T travels towards right of Q implies that T travels towards South. Hence, S travels towards North (because S and T Travel in opposite directions). Therefore, it is definitely true that M and S travel in the same direction i.e., North.

2.(c)



Q is second to the left of R.

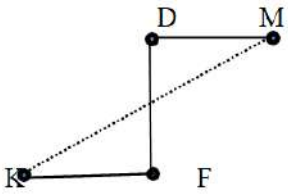
3.



.

Hence, R is to the South-West with respect to S

4. (C)

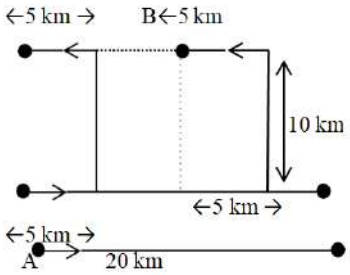


M is to the North-East of K.

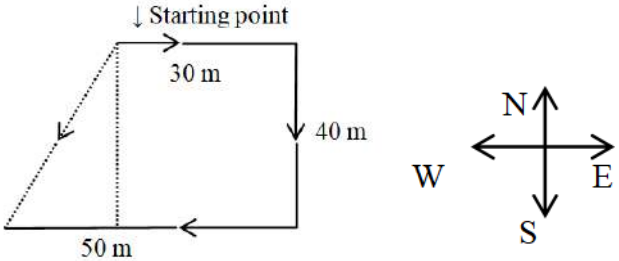
5.(b)

After 4 pm the shadow will be towards East. Now, East is to the right of Ramesh. So Ramesh faces North. And his uncle, who is opposite him,faces South.

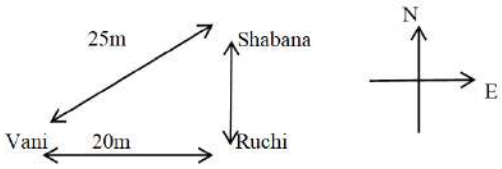
6. (a)



7. (c)



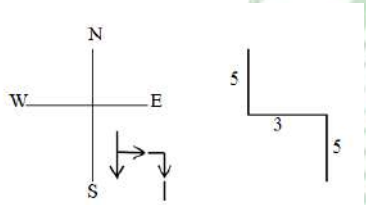
8. (c)



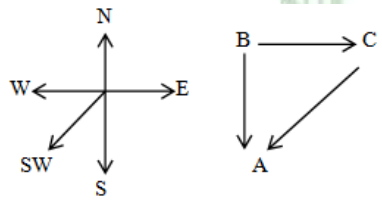
9. (a) In the afternoon the sun is in the west. Hence the shadow is in the east. Now, east is to the left of Madhuri. So, Madhuri is facing south.Therefore, Manisha, who is face to face with Madhuri, is facing north.

10. (a) In the afternoon the sun is in the west. Hence the shadow is in the east. Now, east is to the left of Madhuri. So, Madhuri is facing south.Therefore, Manisha, who is face to face with Madhuri, is facing north.

11. (b)

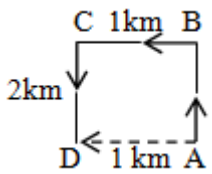


12. (d) Clearly, comparing the direction of A w.r.t. C in thes econd diagram with that in the first diagram, A will be south-west of C.

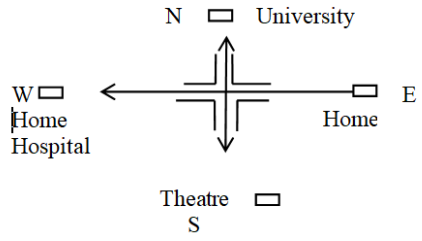


13. (a) The Sun rises in the east. So, in morning, the shadow falls towards the west. Now, shadow of pole falls to the right of Gopal. Therefore, Gopal's right side is the west. So, he is facing South.

14. (b) Clearly, the boy rode from A to B, then to C and finally up to D. Since D lies to the west of A, so required distance =AB = CD = 2 km.

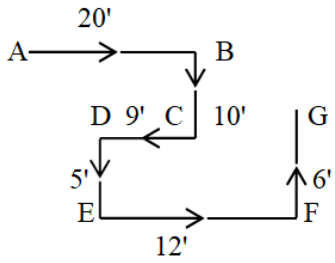


15. (a) Starting from his house in the East, Ravi moves west wards. Then, the theatre, which is to the left, will be in the South. The hospital, which is straight ahead, will be to the West. So, the University will be to the North.

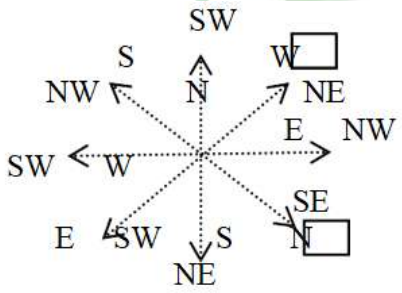


16.

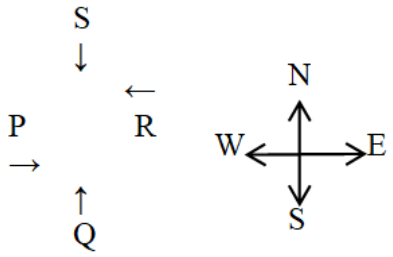
(c) The movements of rat are as shown in figure.Clearly, it is finally walking in the direction FG i.e. North.



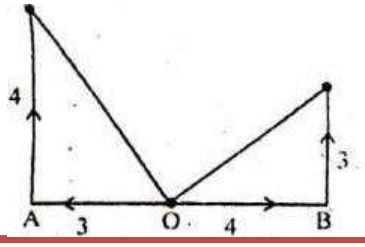
17. (c) Here, each direction moves 90° + 45° = 135°(Anti-clockwise)



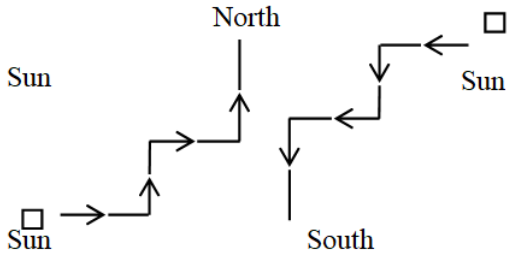
18.



19 (a) Here, O is starting point.



20(a) Clearly, there are two possible movements ofAnuj as shown below:



Number Series

1. BDF, CFI, DHL,?

(a) CJM (b) EIM (c) EJO (d) EMI

2. FAG, GAF, HAI, 1AH,

(a) JAK (b) HAK (c) JAI (d) HAL

3. D I L Q T Y B G?

(a) H (b) I (c) J (d) P

4. BC FG JK__RS VW

(a) LM (b) OP (c) QR (d) NO

5. BYA, CXB, ?, EVD:

(a)DVE (b) DCW (c) DXB (d)DWC

6. LXF, MTJ, NPN, OLR, ?

(a) PHV(b) PIU (c) PKX (d) PJW

7. YANWY, DFMBD,IKNGI,NPMLN, (?),XZMVX

(a) RUMSR(b) SUNQS(c) UWNSU(d) VUMTV

8. PEXKW, RFWMU, TGVOS, VHUQQ, XITSO?

(a) ZJSUM(b) YJSUZ(c) ZKSVJ (d) JZSTN

9. AYBZC, DWEXF, GUHVI, JSKTL, (?), POQPR

(a)MQRDN(b) QMONR(c) MQNRO(d) NQMOR

10. ZYYZR, ABVUM, (?) , BCUTM ,XWABT, CDTSL

(a) YXZAS(b) ZYABT(c) XWYZR(d) YXZAB

Data Interpretation Exercise

DIRECTIONS (Qs. 1-5):Study the following table to answer the given questions Percentage of marks obtained by seven students in six subjects

Subject	ENG	HIS	Com	Math	Science	Econ
(Max, Mark						
↓ Students	(100)	(100)	(100)	(100)	(100)	(100)
Meera	***100***	***80***	***50***	***90***	***90***	***60***
Subodh	***80***	***70***	***80***	***100***	***80***	***40***
Kunal	***90***	***70***	***60***	***90***	***70***	***70***
Soni	***60***	***60***	***65***	***80***	***80***	***80***
Richu	***50***	***90***	***62***	***80***	***85***	***95***
Irene	***40***	***60***	***64***	***70***	***65***	***85***
Vgay	***80***	***80***	***35***	***65***	***50***	***75***

1.What is the total marks obtained by Meera in all the subject?

(a) 448 (b) 580

(c) 470 (d) 74.67

2.What is the average marks obtained by these seven studentsin History? (rounded off to two digits)

(a) 72.86 (b) 27.32

(c) 24.86 (d) 29.14

3.How many students have got 60S or more marks in all thesubjects?

(a) One (b) Two

(c) Three (d) Four

4.What is the overall percentage ofKunal?

(a) 64 (b) 65

(c) 75 (d)64.24

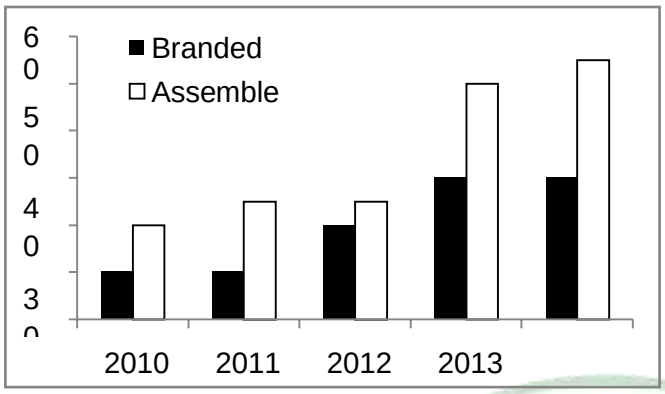
5.In which subject is the overall percentage thebest?

(a) Maths (b) Economics

(c) History (d) Science

DIRECTIONS (Qs. 6-10): Study the following graph carefully and answer the questions given below:

The following graph shows the percentage growth of Branded and Assembled PCs



6.What is the average percentage growth of salesof Assembled PCs for the given years?

(a) 30 (b) 20

(c) 40 (d) 35

7.If the Branded PCs sold in 2011 were 100000,how many Branded PCs were sold in 2014?

(a) 202800 (b) 156000

(c) 234000 (d) 300000

8.What is the difference between total Branded and total Assembled PCs sold for the given years?

(a) 75000 (b) 750000

(c) 175000 (d) Cannot be determined

9.In which year is the difference in the growth between Branded and Assembled PCs lowest'?

(a) 2010 (b) 2013

(c) 2014 (d) None of these

10.For Assembled PCs sale, which year is the per cent growththe highest compared to previous year'?

(a) 2014 (b) 2011

(c) 2013 (d)Cannot be determined

DIRECTIONS(Qs.11-15): Read the following table and answer the questions.

Year	Government	Private
2007-2008	3900	-
2008-2009	29400	-
2009-2010	90000	-
2010-2011	230000	12000
2011-2012	520000	120000
2012-2013	1060000	450000
2013-2014	1550000	950000

11.In which period the percentage increase in the total internet owners is least to that over the earlier period?

(a) 2009-2010 (b) 20102011 (c) 2011-2012 (d) 2013-2014

12.What is the total number of fresh internet owners in the period 2013-14?

(a) 54900 (b) 549000 (c) 9900000 (d) 99000

13.What is (be proportion of Government internetowners to the Private Internet owners in the period 2011-12?

(a) 13:4 (b) 13:3 (c) 3:13 (d) 4:13

14.What is the approximate percentage increase in the Private internet owners in the period 2013-14 over that in the period 2010-11?

(a) 5000 (b) 6000 (c) 8000 (d) 4000

15.What is the approximate percentage of Private interne towners in the total internet owners in 2010-117

(a) 20 (b) 5 (c) 10 (d) 15

DIRECTIONS(Qs.16-20): Study the following table to answer the given questions:

Production (in crore units) of six companies over theyear

Company	Years						Total
Tp	2009	2010	2011	2012	2013	2014	
	103	150	105	107	110	132	707
ZIR	75	80	83	86	90	91	505
AVC	300	300	300	360	370	340	1970
CTU	275	280	281	280	285	287	1688
PEN	25	30	35	40	42	45	217
vSIO	85	87	89	91	92	96	540
Total	863	927	893	964	989	991	5627

16.The production of Company AVC in 2012 is approximately what per cent of its average production over the given years?

(a) 300 (b) 110 (c) 136 (d) 18.25

17.For SIO, which year was the per cent increase of decrease in production from the previous year, the highest?

(a) 2013 (b) 2010 (c) 2014 (d) 2012

18 Which company has less average production in the last three years compared to that of first three year?

(a)No company(b) CTU (c) ZIR (d) None of these

19.The total production of the six companies in the first two given years is what per cent of that of last two given years? (round off up totwo decimal places)

(a) 87.08 (b) 10455

(c) 90.40 (d) 10.62

20.For ZIR, which of the following is thedifference between production in2014 and thatin 2013?

(a) 10,00,00,000 (b) 1,00,00,000

(c) 10,00,000 (d) 40,00,000

Hints & Explanations

1 . (c) Total marks obtained by Meera = 100=80+50+90+90=60=470

2. (a) Average mark obtained by seven students in history

$$=\frac{80+70+70+60+90+60+80}{7} = 72\text{-}86$$

3. (a) Only Kunal and soni got 60% or more marks in all the subjects.

4. (c) Average percentage of kunal $= \frac{90+70+60+90+70+70}{6} = 75\%$

5. (d) Average percentage growth of assemble PCs $= \frac{20+25+25+50+55}{5} = \frac{175}{5} = 35\%$

6. (d) Number of branded PCs sold in 2014 $=10000 \times \frac{30}{10} = 300000$

7. (d) Difference between Assembled andbranded PCs

2010	2011	2012	2013	2014
10%	15%	5%	20%	25%

8. (c) percent growth of Assembled PCs is

1997	1998	1999
No Change	25%	5%

9. (d) percentage increase in the total internetowners

2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
653.85	206.12	168.89	164.46	135.94	65.56

10. (c) reqd numbers =(1550000+950000)-(1060000+450000)=990000

11.(b) reqd ratio = 520000:120000=13:3

12. (c) reqd percentage increase $= \frac{950000 - 12000}{12000} \times 100 \approx 8000\%$

13.(b) Read percentage $\frac{12000}{230000 + 12000} \times 100 \approx 5\%$

14.(b)Production of company AVC in 2012=360 crore units Average production of AVC over the given years= $\frac{1970}{6}$

Hence required percent = $\frac{360x6}{1970}$ x100

=109.64%=110%

15. (c) Approximate percent increase of decrease in production from the previous year for SIO are as follows:

2010=$\frac{2}{85}$ x100 =2.35%

2011=$\frac{2*100}{87}$ = 2.29%

2012=$\frac{2*100}{89}$ = 2.24%

2013 = $\frac{1x100}{91}$ = 4.35%

2014 = $\frac{4*100}{92}$ = 4.35%

You can solve it simple rough work. See the difference of produced units between two consecutive years. The difference is maximum for 2013 to 2014, and production during all these years is almost same. Hence, in the year 2014 SIO registered maximum increase in production over the previous years.

16. d) Sum of the productions of the companiesin first three years and the last three years in crore is as follows

Company	First three years	Last three years
TP	358	349
ZIR	238	267
AVC	900	1070
CTU	836	852
PEN	90	127
SIO	261	279

17.(c) Total production of the companies in first two given years =863+927=1790

Again, total production of the six companies in last two given years years = 989+991=1980

Therefore required percent = $\frac{1790 \times 100}{1980}$ =90.40%

18.(b)The required difference

19.= (91-90) crore units = 1 × 10000000 =10000000 units

20. (c) Those companies are:ZIR PEN and SIO

Puzzles and Dice

Dice is a cube having different numbers on all its faces. The number are usually a single digit from 1 to 6.

Numbers on a dice :-

The scheme of numbering on a dice is specific the sum of the number on the opposite faces will be equal to '7' always. The number 1 will be opposite to number 6. The number 2 is opposite to 5 and 3 is opposite to 4. Such that

1 + 6 = 7

2 + 5 = 7

4 + 3 = 7

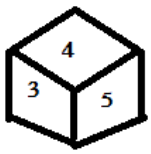
Classification of dice :-

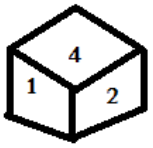
Standard dice: - when the dice are rolled, if the number on the faces of the dice do not match each other, they are called as standard dice.

Ordinary dice: - If one or more than one number matches between two dice then it is called as an ordinary dice.

Rule 1:-

If one of the numbers is common in both the dice when two dice have the same surface then the remaining surfaces of both dice are opposite to each other.





Rule 2:-

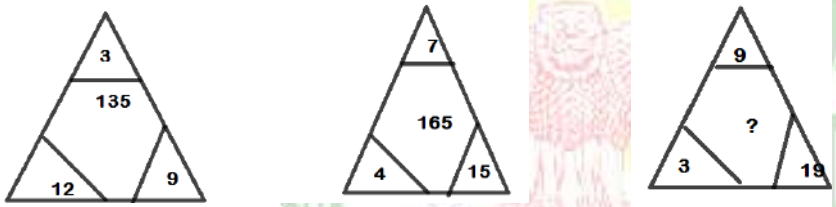
If any two numbers are the same in two dices irrespective of their position on the dice then the remaining third number in both the dice are opposite to each other.

Rule 3:-

If there is one element common on both the dice at the different position, then rotate the dice in a clockwise direction to get the opposite surface.

Exercise

1. Which number should replace the question mark?



a) 286 b)174 c)228 d) 192

Ans :- c) 228

Solution :-

(3 + 12) x 9 = 15 x 9

= 135

(7 + 4)x 15 = 11 x 15

= 165

III ly

(9 +3)x19 = 12 x 9

= 228.

2. What number should replace the question mark:-

82	?	6
49	36	18
74	28	?

a) 16 b) 32 c) 41 d) 56

Ans: a) 16

Solution :-

8 x 2 = 16

1 x 6 = 6

4 x 9 = 36

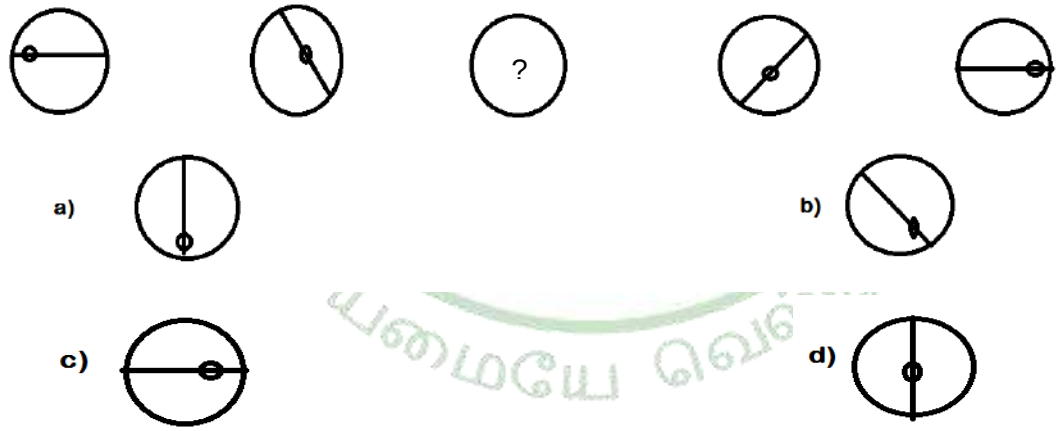
3 x 6 = 18

III ly

7 x 4 = 28

2 x 8 = 16

3. Who is the missing circle ?

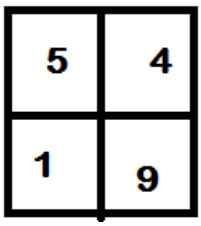


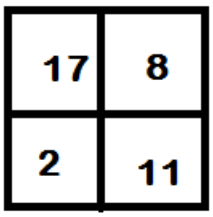
Answer : a) 

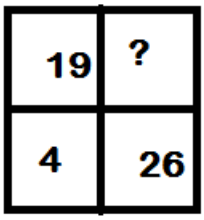
Solution :

The line moves 45 degree at each stage and alternate stage and alternates straight / curved. The dot moves on the line/ middle/ bottom & back again.

4. What number should replace the question mark ?







a)4 b)5 c)8 d)7

Ans :- b) 5

Solution :

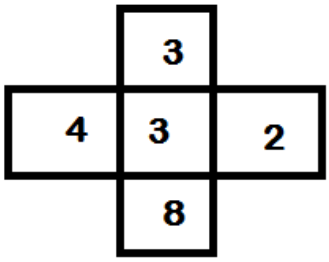
5 + 9 = 1 4

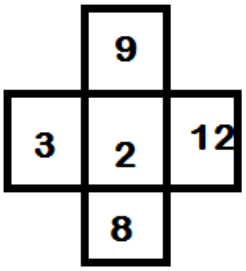
17 + 11 = 2 8

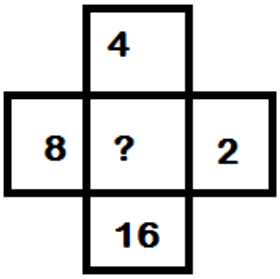
III ly

19 + 26 = 4 5

5. What number should replace the question mark:-







a) 10 b) 5 c) 8 d) 4

Ans:- d) 4

Solution :

(3 x 8) ÷ (4 x 2) = 24 ÷ 8

= 3

(9 x 8) ÷ (3 x 12) = 72 ÷ 36

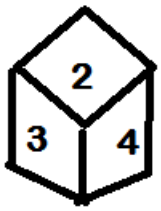
= 2

III ly

(4 x 16) ÷ (8 x 2) = 64 ÷ 16

= 4

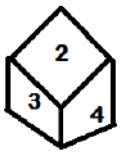
6. Which number comes opposite to 2 ?

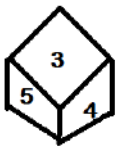


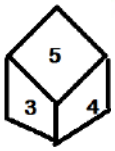
a) 3 b) 6 c) 4 d) 5

Ans :- d) 5

Solution :-

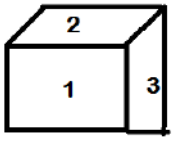


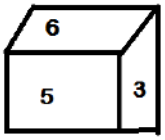




Opposite of 2 is 5.

7. What digit will appear on the face opposite to the face with number 4 ?





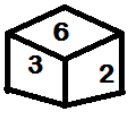
a) 3 b) 5 c) 6 d) 2/3

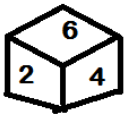
Ans : a) 3

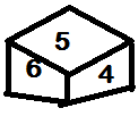
Solution :-

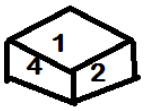
Opposite side of 4 is 3.

8. Which number is on the face opposite to 6?









a) 4 b) 1 c) 2 d) 3

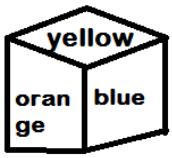
Ans : b) 1

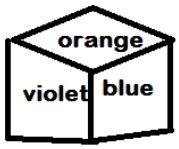
Solution :-

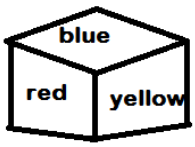
6 ⟶ 1, ~~2~~, ~~3, 4,~~ ~~5~~,

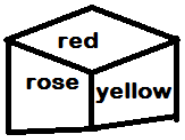
As the numbers 2, 3, 4 and 5 are adjacent to 6. Hence the number on the face opposite to 6 is 1.

9. From the four positions of a dice. given below, find the color which is opposite to yellow?









a) Violet b) Red c) Rose d) Blue

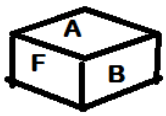
Ans :-a) Violet

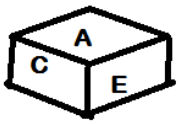
Solution:-

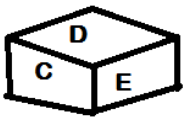
Yellow ⟶ ~~orange~~, ~~blue~~, ~~violet~~, ~~red~~, ~~rose~~.

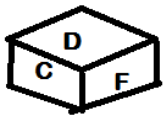
The Colours adjacent to yellow are orange, blue, red and rose. Hence violet will be opposite to yellow.

10. From the positions of a cube are shown below which letter will be on the face opposite to face with 'A'?









a) D b) B c) C d) F

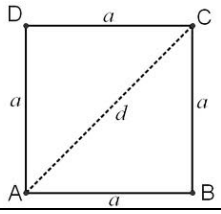
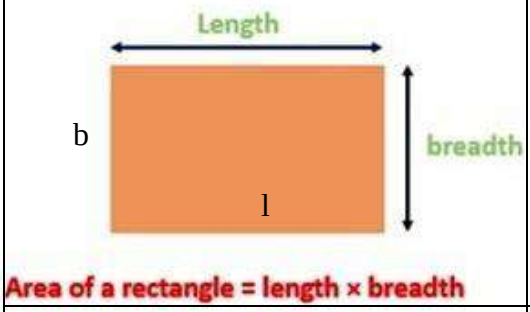
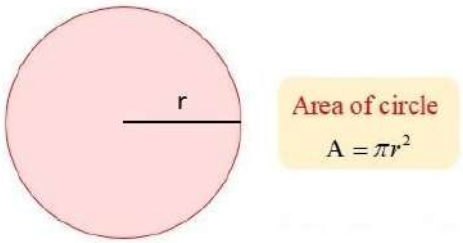
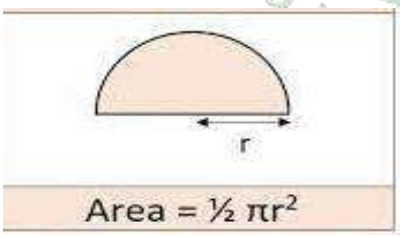
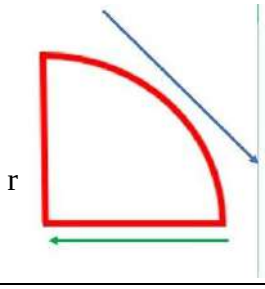
Ans :- a) D

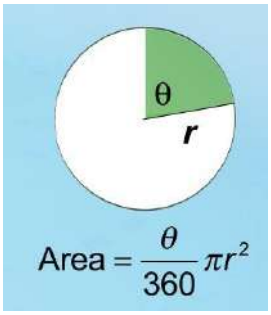
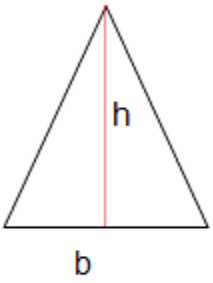
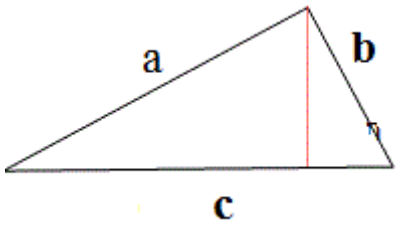
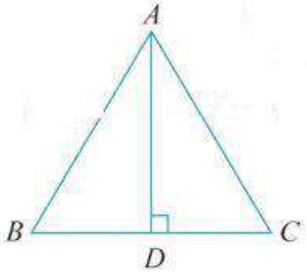
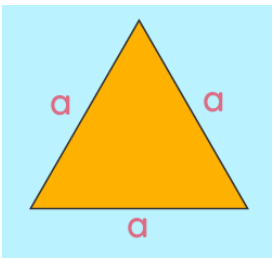
Solution :-

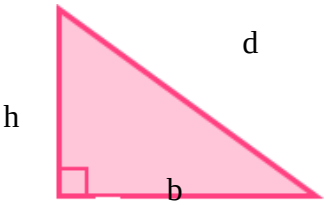
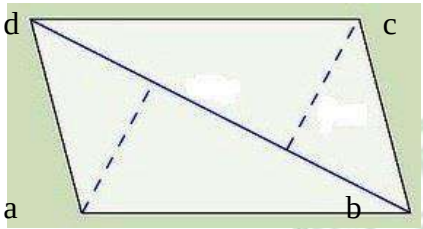
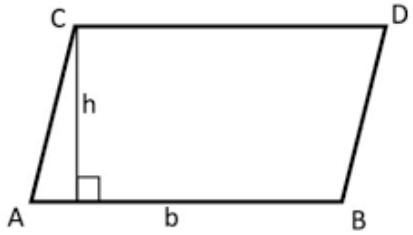
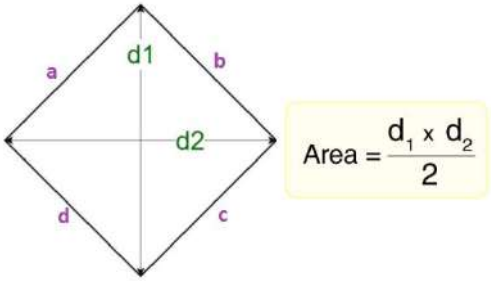
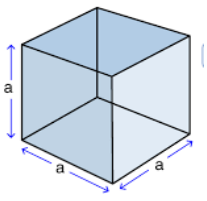
A ⟶ ~~B~~, ~~C~~, ~~D~~, ~~E~~, ~~F~~

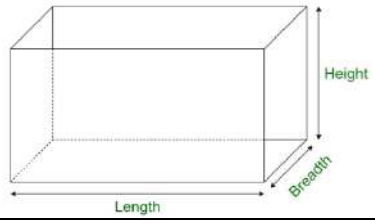
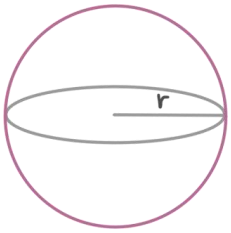
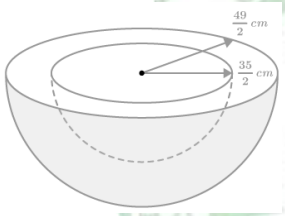
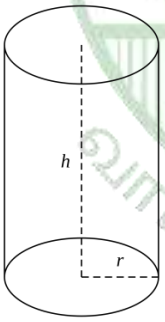
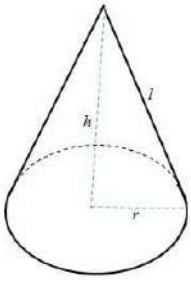
The letters of the adjacent faces to the face with letter A are B, C, E and F. Hence D is the letter of the face opposite to the face with letter C.

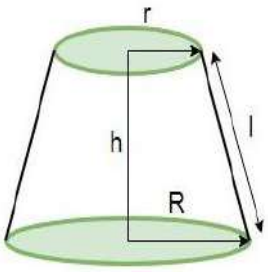
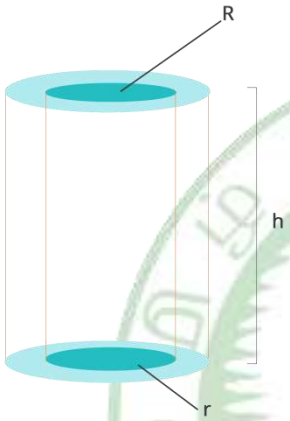
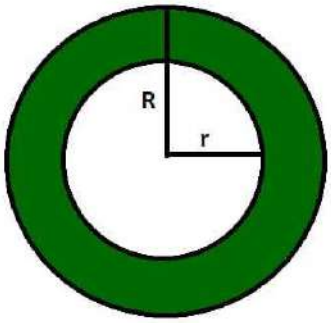
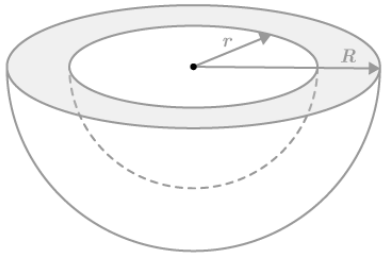
Areas and Volumes Formulae

2 - Dimensional Shapes	Formulae
Square 	Area = a^2 sq units Perimeter = 4a sq units Diagonal = $a\sqrt{2}$ units
Rectangle 	Area = l x b sq units Perimeter = 2 (l + b) units Diagonal = $\sqrt{l^2 + b^2}$ units
Circle  Semi-Circle 	Area = πr^2 sq units circumference = 2 πr^2 sq units Area = 1/2 πr^2 sq units circumference = r (π + 2)sq units
Quadrant Circle 	Area = 1/4 πr^2 sq units circumference = $(\frac{\pi}{2} + 2)$r sq units

Sector Circle  	Area = πr^2 x $\frac{\theta}{360}$ sq units circumference = 2 r + l sq units
Triangle  	Area = 1/2 x b x h sq units Perimeter = a + b+ c units
Scalene Triangle  	Area = $\sqrt{s(s-a)(s-b)(s-c)}$ sq units s = $\frac{a+b+c}{2}$ units
Isosceles Triangle  	Area = h x $\sqrt{a^2 - h^2}$ sq units Perimeter = 2a + 2 $\sqrt{a^2 - h^2}$ units
Equilateral Triangle  	Area = $\frac{\sqrt{3}}{4}$ a^2 sq units Perimeter = 3a units Height = $\frac{\sqrt{3}}{4}$ a units

Right - Angled Triangle  	Area = 1/2 x b x h sq units . Perimeter = h + b + d units
Quaolrilateral  	Area = 1/2 d (h_1 +h_2) sq units Perimeter = AB + BC + CD + DA units
Parallelgoram  	Area = a x h sq units Perimeter = 2 (a + b) units
Rhombus  	Area = 1/2 x d_1 x d_2 sq units Perimeter = 4a units
3- Dimensional Shapes	
Cubė  	Volume = a^3 cu units LSA = $4a^2$ sq units TSA = $6a^2$ sq units Diagonal = a $\sqrt{3}$ units

Cuboid  	Volume = l x b x h cu units LSA = 2h (l + b) sq units TSA = 2(lb +bh+ lh) sq units
Sphere  	Volume $= \frac{4}{3}\ \pi r^3$ cu units CSA $= 4\ \pi r^2$ sq units
Hemisphere  	Volume $= \frac{2}{3}\ \pi r^3$ cu units CSA $= 4\ \pi r^2$ sq units TSA $= 3\pi r^2$ sq units
Cylinder  	Volume = πr^2 h cu units LSA = 2 πrh sq units TSA = 2πr (h+r) sq units
Cone  	Volume $= \frac{1}{3}\ \pi r^2$ h cu units LSA = πrl sq units TSA = πr (l+r) sq units l = $\sqrt{h^2+r^2}$ or r = $\sqrt{l^2-h^2}$ or h = $\sqrt{l^2-r^2}$

Frustum of cone  	Volume = $\frac{1}{3}\pi h\,(R^2 + rR + r^2)$ cu units R = Radius of upper base r = Radius of lower base
Hollow Cylinder  	Volume = $\frac{4}{3}\pi\,(R^2 - r^2)$ cu units CSA = $2\pi h$ (R+r) sq units TSA = 2π (R+r) (R-r+h) sq units
Hollow Sphere  	Volume = $\frac{4}{3}\pi\,(R^3 - r^3)$ cu units TSA = $4\pi\,(R^2 + r^2)$ sq units
Hollow Hemisphere  	Volume = $\frac{2}{3}\pi\,(R^3 - r^3)$ cu units TSA = $3\pi R^2 + \pi r^2$ sq units or $\pi\,(3R^2 + r^2)$

Areas and Volumes

I. SQUARE

1. Find the side of a square shaped postal stamp of perimeter 10 cm

a) 2.8 cm b) 2 cm c) 2.5 cm d) 2.4 cm

Answer: c) 2.5 cm

Solution:-

Perimeter of the square = 4 x S Units

Given, Perimeter of square = 10 cm

4 x S = 10

S = 10/4

S = 2.5 cm

The side of the stamp is 2.5 cm

2. The side of a square is 8 cm. Find its perimeter

a) 30 cm b) 32 cm c) 28 cm d) 24 cm

Answer: b) 32 cm

Solution:-

Perimeter of the square = 4 x S Units

Given, the side of a square = 8 cm

= 4 x 8

S = 32 cm

Perimeter of a square is 32 cm.

3. Find the cost of fencing a square plot of side 14 m at the rate of ₹20 per metre.

a) ₹1020 b) ₹1080 c) ₹1114 d) ₹1120

Answer: d) ₹1120

Solution:-

Perimeter of a square plot = 4 x S Units

Given, the side of a square plot (s) = 14 m

= 4 x 14

S = 56 m

Cost of fencing the plot at the rate of ₹20 per metre = 56 x 20

= ₹1120

4. Find the perimeter and area of the square whose side is 11 cm.

a) 44 cm, 121 cm^2 b) 22 cm, 121 cm^2

c) 44 cm, 111 cm^2 d) 22 cm, 111 cm^2

Answer: a) 44 cm, 121 cm^2

Solution:-

Given, the side of a square (s) = 11 cm

Perimeter of the square = 4 x S Units

= 4 x 11

= 44 cm

Area of a square = $(s)^2$ sq. units

= $(11)^2$

= 121 cm^2

5. A square park has 40 m as its perimeter. what is the length of its side? Also find its diagonal?

a) 8 m, $8\sqrt{2}m$ b) 20 m, $20\sqrt{2}m$

c) 10 m, $10\sqrt{2}m$ d) 4 m, $4\sqrt{2}m$

Answer: c) 10 m, $10\sqrt{2}m$

Solution:-

Given, the perimeter of a square (s) = 40m

4 x S = 40

S = $\frac{40}{4}$

Side of a Square = 10 m

Also, Diagonal of a square = $S\sqrt{2}$ units

= $10\sqrt{2}$ m

Reasoning

1. In each of the following questions, select the related word/number from the given alternative

i) Flow: River: : Stagnant : _____

a) Rain b) Stream c) Pool d) Canal

Answer: c) Pool

ii) Ornithologist: Bird: : Archaeologist: _____

a) Islands b) Mediators c) Archaeology d) Aquatic

Answer: c) Archaeology

Solution:-

As ornithologist is a specialist of Birds. Similarly, Archaeologist is a specialist of Archaeology.

iii) Peacock: India: : Bear: _____

a) Australia b) America c) Russia d) England

Answer: c) Russia

Solution:-

As Peacock is the national bird of India. Similarly, Bear is the national animal of Russia.

iv) Wine: Cellar: : Weapons: _____

a) Godown b) Arsenal c) Armoury d) Dungeon

Answer: b) Arsenal

Solution:-

Cellar is the storage space where wines are stored. Similarly, Arsenal is the storage space where weapons are stored.

v) Chef: Restaurant: : Druggist: _____

a) Medicine b) Pharmacy c) Store d) Chemist

Answer: b) Pharmacy

Solution:-

A Chef works in a restaurant. Similarly, a druggist works in a pharmacy.

vi) Chopper: Meat: : Spanner: _____

a) Vegetables b) Cakes c) Nuts d) Flash

Answer: c) Nuts

Solution:-

Chopper is used for cutting meat and spanner is used for turning nuts.

vii) Liquor: Drink: :_____ : _____

a) Bread: Butter b) Tea: Beverage

c) Snuff: Inhale d) Water: Sip

Answer: c) Nuts

Solution:-

Chopper is used for cutting meat and spanner is used for turning nuts.

Vii) Liquor : Drink : : _____ : _____

a) Bread : Butter b)Tea : Beverage

c) Snuff : Inhale d) Water : Sip

Answer :- b) Tea : Beverage

Liquid is an alcoholic drink

Tea is an aromatic beverage

Viii) Symphony : Music : : _____ : _____

a) Mural : Painting b) Ode : Prose

c) Preface : Book d) Editorial : Journal

Answer : a) Mural : Painting

Solution:-

Symphony is a type of music, Similarly mural is a type of painting.

ix) Newspaper : Hoarding : : Television : _____

a) Press b) Media

c) Broadcast d) Rumour

Answer: b) Media

x) Man: Biography : : Nation : _____

a) Leader b) People

c) Geography d) History

Answer: History

Solution:-

As Biography Contains the story of the man similarly, History contains the story of the natic.

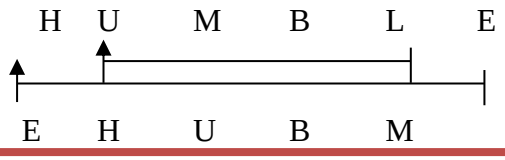
2. If Humble is given by the code EHLUBM.

What does the code EDUCATION mean?

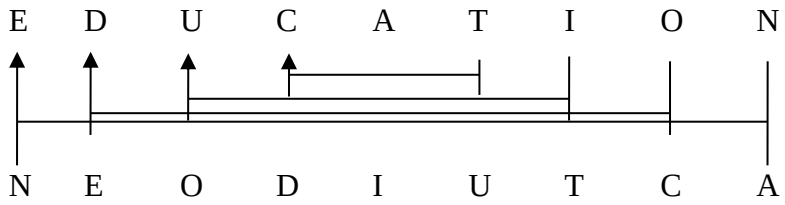
a) NEDOIUTCA b) NEOIDUTCA

c) NEDUOITCA d) NEODIUTCA

Solution:-



Similarly,



3. If in a certain language,MADRASis coded as NBESBT, how is BOMBAY coded in that language ?

a) CPNCBX b) CPNCBZ

c) CPOCBZ d) CQOCBZ

Answer : b) CPNCBZ

Solution :

M	A	D	R	A	S
+1	+1	+1	+1	+1	+1
N	B	E	S	B	T

Similarly

B	O	M	B	A	Y
+1	+1	+1	+1	+1	+1
C	P	N	C	B	Z

4. In a certain code language, OPERATION is written as NODQBUJPO. How is INVISIBLE written in that code?

a) JOWJTJCMF b) JOWJTHAKD

c) HMUHTJCMF d) HMUHTHAXD

Answer : c) HMUHTJCMF

Solution :-

O	P	E	R	A	T	I	O	N
-1	-1	-1	-1	+1	+1	+1	+1	+1
N	O	D	Q	B	U	J	P	O

Similarly,

I	N	V	I	S	I	B	L	E
-1	-1	-1	-1	+1	+1	+1	+1	+1
H	M	U	H	T	J	C	M	F

5. In a certain code, FAVOUR is written as EBUPTS. How is DANGER written in that code?

a) CBFFDS b) CBMHDS

c) EBFHDS d) EBHHFS

Answer : b) CBMHDS

Solution :-

F	A	V	O	U	R
-1	+1	-1	+1	-1	+1
E	B	U	P	T	S

Similarly,

D	A	N	G	E	R
-1	+1	-1	+1	-1	+1
C	B	M	H	D	S

6. In a certain code, Institution is written as NOITUTITSNI. How is PERFECTION written in that code?

a) NOTECFREP b) NOITCEFREP

c) NIOCTEFREP d) NOITCEFERP

Answer : b) NOITCEFREP

Solution :-

I	N	S	T	I	T	U	T	I	O	N
N	O	I	T	U	T	I	T	S	N	I

Similarly,

P	E	R	F	E	C	T	I	O	N
N	O	I	T	C	E	F	R	E	P

7. In a certain code, PRODUCED is written as DORPDECU. How is GOODNESS written in that code?

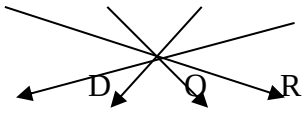
a) DOOSGSEN b) DOOGSESN

c) DOOGSSEN d) DOGOSSEN

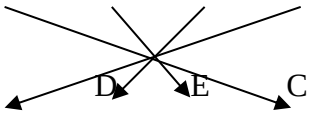
Answer: c) DOOGSSEN

Solution :-

P R O D U C E D

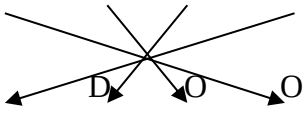


D O R P D E C U

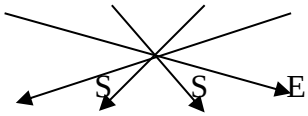


Similarly

G O O D N E S S



D O O G S S E N



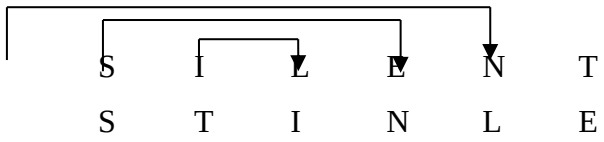
8. In a certain code, SILENT is written as STINCE. How is RETURN written in that code?

a) RNRETU b) RNETRU

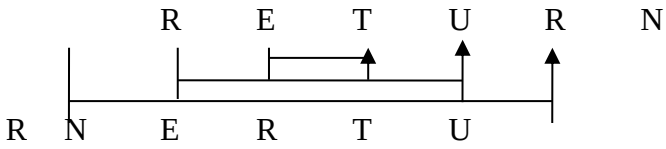
c) RNERTU d) RENRTU

Answer: **c) RNERTU**

Solution:-



Similarly,



9. In a certain code, BOXER is written as AQWGQ. How VISIT is written in that code?

a) UKRKU b) UKRKS

c) WKRKU d) WKRKS

Answer: **b) UKRKS**

Solution:-

B	O	X	E	R
-1	+2	-1	+2	-1
A	Q	W	G	Q

Similarly,

V	I	S	I	T
-1	+2	-1	+2	-1
U	K	R	K	S

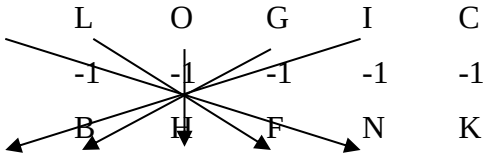
10. LOGIC: BHFNK: :CLERT: _____

a) XVRPA b) QBKJA

c) LPRTU d) JQDKB

Answer: **d) JQDKB**

Solution :-



Similarly