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MATHS CONCEPTS

Concept And Shortcut of Partnership

Introduction:-

When more than one person agree to invest their money to run a business or firm then this kind of agreement is called partnership. The persons involved in the partnership are called partners.

There are two types of partnership.

1. Simple Partnership: In simple partnership, capitals of partners are invested for the same period of time.

2. Compound Partnership: In compound partnership, capitals of partners are invested for the different period of time.

Basic Formulas

If two partners A and B are investing their money to run a business then (Simple Partnership)

$$\frac{\text{Capital of A}}{\text{Capital of B}} = \frac{\text{Profit of A}}{\text{Profit of B}}$$

Capital of A : Capital of B = Profit of A : Profit of B

If two partners A and B are investing their money for different period of time to run a business then

(Compound Partnership)

$$\frac{\text{Capital of A} \times \text{Time period of A}}{\text{Capital of B} \times \text{Time period of B}} = \frac{\text{Profit of A}}{\text{Profit of B}}$$

Capital of A × Time period of A : Capital of B × Time period of B

= Profit of A : Profit of B

If n partners are investing for different period of time then

$C_1T_1 : C_2T_2 : C_3T_3 : \ldots : C_nT_n = P_1 : P_2 : P_3 : \ldots : P_n$

Where C is the capital invested, T is time period of capital invested and P is profit earned.

Shortcut Methods

Rule 1:

If two partners are investing their money C_1 and C_2 for equal period of time and their total profit is P then their shares of profit are

$$\frac{C_1 \times P}{C_1 + C_2} \text{ and } \frac{C_2 \times P}{C_1 + C_2}$$

If these partners are investing their money for different period of time which is T_1 and T_2, then their profits are

$$\frac{C_1 \times T_1 \times P}{C_1T_1 + C_2T_2} \text{ and } \frac{C_2 \times T_2 \times P}{C_1T_1 + C_2T_2}$$

Rule 2:

If n partners are investing their money C_1, C_2, …, C_n for equal period of time and their total profit is P then their shares of profit are

$$\frac{C_1 \times P}{C_1 + C_2 + \cdots + C_n}, \frac{C_2 \times P}{C_1 + C_2 + \cdots + C_n}, \ldots\ldots\ldots, \frac{C_n \times P}{C_1 + C_2 + \cdots + C_n}$$

If these partners are investing their money for different period of time which is T_1, T_2,… , T_n then their profits are

$$\frac{C_1 \times T_1 \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}, \frac{C_2 \times T_2 \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}, \ldots\ldots\ldots, \frac{C_n \times T_n \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}$$

All About Number Series

What is Number Series?

Number series is a arrangement of numbers in a certain order, where some numbers are wrongly put into the series of numbers and some number is missing in that series, we need to observe and find the accurate number to the series of numbers.

In competitive exams number series are given and where you need to find missing numbers. The number series are come in different types. At first you have to decided what type of series are given in papers then according with this you have to use shortcut tricks as fast as you can .

Different types of Number Series

There are some format of series which are given in Exams.

Perfect Square Series:

This Types of Series are based on **square** of a number which is in same order and one square number is missing in that given series.

Example 1: 441, 484, 529, 576?

Answer: $441 = 21^2$, $484 = 22^2$, $529 = 23^2$, $576 = 24^2$, $625 = 25^2$.

Perfect Cube Series:

This Types of Series are based on **cube** of a number which is in same order and one **cube** number is missing in that given series

Example 2: 1331, 1728, 2197, ?

Answer : 11^3 , 12^3 , 13^3 , 14^3

Geometric Series:

This type of series are based on ascending or descending order of numbers and each successive number is obtain by multiplying or dividing the previous number with a fixed number.

Example 3: 5, 45, 405, 3645,?

Answer: 5 x 9 = 45, 45 x 9 = 405, 405 x 9 = 3645, 3645 x 9 = 32805.

Two stage Type Series:

A two tier Arithmetic series is one in which the differences of successive numbers themselves form an arithmetic series.

Example 4: i. 3, 9, 18, 35, 58,——

ii. 6, 9, 17, 23,———-

Mixed Series:

This type of series are more than one different order are given in a series which arranged in alternatively in a single series or created according to any non-conventional rule. This mixed series Examples are describes in separately.

Examples 5:

11, 24, 50, 102, 206, ?

Answer:

11 x 2 = 22 +2 = 24,

24 x 2 = 48 + 2 = 50,

50 x 2 = 100 + 2 = 102,

102 x 2 = 204 + 2 = 206,

206 x 2 = 412 + 2 = 414.
So the missing number is 414.

Number Series Quiz

Directions (1-10): What will come in place of the question marks (?) in the following Number series?

1. 0, 6, 24, 60, 120, 210, ?
A. 336
B. 349
C. 312
D. 337
E. None of these

2. 11, 14, 19, 22, 27, 30, ?
A. 39
B. 34
C. 36
D. 35
E. None of these

3. 6, 12, 21, ? , 48
A. 33
B. 39
C. 36
D. 31
E. None of these

4. 18, 22, 30, ?,78, 142
A. 44
B. 35
C. 46
D. 48

E. None of these

5. 73205, 6655, 605, 55, ?
A. 9
B. 5
C. 13
D. 11
E. None of these

6. 25, 100, ?, 1600, 6400
A. 400
B. 300
C. 360
D. 420
E. None of these

7. 125, ?, 343, 512, 729, 1000
A. 216
B. 215
C. 256
D. 225
E. None of these

8. 1 , 9 , 125 , 343 , ? , 1331
A. 730
B. 729
C. 512
D. 772
E. None of these

9. 121, 144, 169, ?, 225
A. 180
B. 172
C. 186
D. 196
E. None of these

10. ?, 2116, 2209, 2304, 2401, 2500
A. 2124
B. 1972
C. 1521
D. 2025
E. None of these

Answers with Explanation:-

1. (A)
The given series is : $1^3 - 1$, $2^3 - 2$, $3^3 - 3$, $4^3 - 4$, $5^3 - 5$, $6^3 - 6$,
So the missing term = $7^3 - 7 = 343 - 7 = 336$.

2. (D)
The pattern is + 3, + 5, + 3, + 5, ……
So the missing term is = 30 + 5 = 35 .

3. (A)
The pattern is + 6, + 9, + 12, +15 ……..
So the missing term is = 21 + 12 = 33 .

4. (C)
The pattern is +4, +8, +16, +32, +64
So the missing term is = 30 + 16 = 46 .

5. (B)
5 x 11 = 55, 55 x 11 = 605, 605 x 11 = 6655, 6655 x 11 = 73205

6. (A)
25 x 4 = 100, 100 x 4 = 400, 400 x 4 = 1600, 1600 x 4 = 6400.

7. (A)
$125 = 5^3$, $216 = 6^3$, $343 = 7^3$, $512 = 8^3$, $729 = 9^3$, $1000 = 10^3$.

8. (B)
1^3 , 3^3 , 5^3 , 7^3 , 9^3 , 11^3

9. (D)
$121 = 11^2$, $144 = 12^2$, $169 = 13^2$, $196 = 14^2$, $225 = 15^2$.

10. (D)
$2025 = 45^2$, $2116 = 46^2$, $2304 = 48^2$, $2401 = 49^2$, $2500 = 50^2$

Number Series Rules with solved Problems

Series is an important chapter from banking examination point of view. Following are some of the important rules or order on which the number series can be made :-

Pure Series
Difference Series
Ratio Series
Mixed Series
Geometric Series
Two Tier Arithmetic Series
Other Types

1. Pure Series

In this type of number series, the number itself obeys certain order so that the character of the series can be found out.

The number itself may be.

Perfect Square

Example :

121, 144, 169, 225 ?

Answer - 256

Perfect Cube

Example :

6859, 5832, 4913, 4096, 3375, ?

Answer - 2744

2. Difference Series

Example :

1348, 1338, 1318, 1288, 1248, ?

Answer - 1198

3. Ratio Series

Example :

336, 168, 84, 42, 21, ?

Answer - 10.5

4. Mixed Series

Example :

222, 441, 1321, 2639, 7915, ?

Answer - 15827

5. Geometric Series

Example 1. 5, 35, 245, 1715, ?

Ans. 12005

Examples 2. 43923,3993, 363, 33, ?

Ans. 3

6. Two-tier Arithmetic Series

7. Other Type

To find the odd number from the number series. In this type of series the above rules are also followed.

Some Examples ;

2, 3, 7, 22, 89, 440, 2677, 18740
Solution : ×1+1, ×2+1, ×3+1, ×4+1, ×5+1 .....
So, 440 is replaced by 446
5, 6, 14, 40, 89, 170, 291
Solution : +12, +32, +52, +72, +92
So, 14 is replaced by 15.
445, 221, 109, 46, 25, 114, 4
Solution : -3÷2, -3÷2.....
So,46 is replaced by 53.
12, 26, 56, 116, 244, 498, 1008
Solution : ×2+2, ×2+4 ×2+6, ...
So, 116 is replaced by 118
8, 27, 64, 125, 217, 343
Solution : 23, 33, 43, 53,.....
So, 217 is replaced by 216

All About Ratio And Proportion

What is Ratio?

A ratio is a relationship between two numbers by division of the same kind. The ration of a to b is written as a : b = a / b In ratio a : b , we can say that a as the **first term** or **antecedent** and b, the **second term** or **consequent**.

Example : The ratio 4 : 9 we can represent as 4 / 9 after this 4 is a antecedent and , consequent = 9

Rule of ration : In ratio multiplication or division of each and every term of a ratio by the same non- zero number does not affect the ratio.

Different type of ratio problem is given in Quantitative Aptitude which is a very essential topic in banking exam. Under below given some more example for your better practice.
Anything we learn in our school days was basics and that is well enough for passing our school exams. Now the time has come to learn for our competitive exams. For this we need our basics but also we have to learn something new. That's where shortcut tricks and formula are comes into action.

What is Proportion?

The idea of proportions is that two ratio are equal.
If a : b = c : d, we write a : b : : c : d,
Ex. 3 / 15 = 1 / 5
a and **d** called **extremes,** where as **b** and **c** called **mean terms**.

Proportion of quantities

the four quantities a, b, c, d said proportion then we can express it
a : b = c : d
Then **a : b : : c : d <–> (a x d) = (b x c)**
product of means = product of extremes.

If there is given three quantities like **a, b, c** of same kind then then we can say it proportion of continued.
a : b = b : c the **middle number** b is called **mean proportion. a** and **c** are called **extreme numbers.**
So, b^2 = ac. (middle number)^2 = (First number x Last number).

Quiz on ratio and proportion:-

1 If P : Q : R = 2 : 3 : 4 , Then P / Q : Q / R : R / P = ?
A. 8: 9: 24
B. 7: 9: 24
C. 4: 6: 15

D. 8: 11: 24
E. None of these

2: If 2P = 3Q = 4R, Then P : Q : R = ?
A. 2: 3: 5
B. 2: 3: 4
C. 3: 5: 6
D. 1: 2: 3
E. None of these

3: If P : Q = 2 : 3 , Q : R = 4 : 5 and R : S = 6 : 7 , then P : S = ?
A. 18: 25
B. 17: 35
C. 16: 35
D. 8: 11
E. None of these

4:Rama distributes his pencil among his four friends Rakesh, Rahul, Ranjan, and Rohit in the ratio 1 / 2 : 1 / 3 : 1 / 4 : 1 / 5 . What is the minimum number of pencils that the person should have?
A. 66
B. 64
C. 72
D. 77
E. None of these

5: Two numbers are respectively 40% and 60% more than third number. Find the ration of two numbers ?
A. 8: 7
B. 7: 9
C. 9: 11
D. 8: 13
E. None of these

6: Rs 1210 were divided among three person P, Q, R so that P : Q = 5 : 4 and Q : R = 9 : 10. Then R gets the amount.
A. 450
B. 400
C. 500
D. 375
E. None of these

7: Share Rs.4200 among joy, sanjay and bijoy in the ration 2 : 4 : 6.Find the amount received by sanjay.
A. 1200
B. 1300
C. 1400
D. 1500
E. None of these

8 : Find the mean proportional between given two number that is 64 and 49.
A. 45
B. 52
C. 54
D. 56
E. None of these

9: What number has to be added to each term of 3 : 5 to make the ratio 5 : 6 .
A. 7
B. 6
C. 8
D. 5

E. None of these

10: Rs. 385 were divided among P , Q , R in such a way that P had Rs 20 more than Q and R had Rs 15 more than P . How much was R's share?
A. 156
B. 145
C. 152
D. 150
E. None of these

Answers with Explanation:-
1. P : Q : R = 2 : 3 : 4 .
Let P = 2k,
Q = 3k,
R = 4k.
Then,
P / Q = 2k / 3k = 2 / 3 ,
Q / R = 3k / 4k = 3 / 4
R / P = 4k / 2k = 2 / 1.
SO, P / Q : Q / R : R / P = 2 / 3 : 3 / 4 : 2 / 1 = 8 : 9 : 24.

2. Let 2P = 3Q = 4R = k ,
Then ,
P = k / 2,
Q = k / 3 ,
R = k / 4.
SO , P : Q : R = k / 2 : k / 3 : k / 4 = 6 : 4 : 3.

3. (C)

4. Rakesh : Rahul : Ranjan : Rohit = 1 / 2 : 1 / 3 : 1 / 4 : 1 / 5
Step 1: At First we need to do is LCM of 2,3,4 and 5 is 60.
Step 2: Then pencil are distributed in ratio among friends,
Rakesh = (1 / 2 x 60) = 30.
Rahul = (1 / 3 x 60) = 20.
Ranjan = (1 / 4 x 60) = 15.
Rohit = (1 / 5 x 60) = 12.
Step 3: Total number of pencils are (30 x + 20 x + 15 x + 12 x) = 77 x.
For minimum number of pencils x = 1 .
The person should have atleast 77 pencils.

5.Step 1: Let the third number is A
Then first number is 140% of A = 140 x A / 100 = 7A / 5 and second number is 160% of B = 160 x B / 100 = 8B /5.
Step 2: now ratio of first and second number is 7A / 5 : 8B / 5 = 35A : 40B = 7 : 8.

6. P : Q = 5 : 4, Q : R = 9 : 10 = (9 x 4 / 9) : (10 x 4 / 9) = 4 : 40 / 9.
So, P : Q : R = 5 : 4 : 40 /9 = 45 : 36 : 40
Sum of ratio terms is = (45 + 36 + 40) =121.
R share of amount is Rs (1210 x 40 / 121) = Rs. 400.

7. Amount received by sanjay.
4 / 12 X 4200 = 1400= (related ratio / sum of ratio) x Total amount
So, the Amount received by sanjay is 1400.

8. The mean proportion of two numbers is
Root of 64 and 49 is √8 x √ 7 = 8 x 7 = 56.
So, the mean proportional is 56.

9.Let the number to be added x , Then
3 + x / 5 + x = 5 / 6
6 (3 + x) = 5 (5 + x)
x = (25 – 18) = 7
So , the number to be added is 7 .

10. Let Q gets Rs x. Then We can say P gets Rs (x + 20) and R gets Rs (x + 35) .
x + 20 + x + x + 35 = 385
3x = 330
x = 110 .
R's share = Rs(110 + 35) = Rs 145 .

Profit & Loss:
Cost Price-The price at which an article is purchased is called its cost price (C.P.)
Selling Price-The price at which the article is sold is called its selling price (S.P.)

CP = Cost Price = The price at which an object is Purchased
SP = Selling Price = The price at which the object is Sold.
When SP < CP → Loss = CP - SP
When SP > CP → Profit = SP - CP
Note: Loss% and Profit% both are calculated upon CP
Profit% = [Profit/CP] * 100
Loss% = [Loss/CP] * 100

Suppose **Company A produces 1000 T.V in Year 2000 And 1200 T.V in Year 2001. On the other hand Company B produces 5000 T.V in year 2000 and 5500 T.V in year 2001. Which company has the better growth rate ?**
Now Look at company A, The increase is of 200 T.V and Company B the increase if of 500 T.V So in Numerical Sense Company B has Produced more than A.
But we are not talking here about Numerical Growth We are talking about relative Growth. i.e Growth with respect to it's previous year production. [Like things are compared with like thing Only, Just Like you can't compare Apple and Oranges]
Taking That Point Into Consideration The Growth of Company A with respect to it's Previous year production will be (200/1000)*100 = 20%
And that for company B it will be (500/5000)*100 = 10%
So clearly Company A has a better growth rate than company B.

Cost Price aka CP
In my methods I Consider CP to be an Absolute Value of 100%. So if anybody Says he made profit of 20% it means He sells the Object at 120% or C.P 100% and Profit is 20% then it means SP = 1.2x(It will be more clear to you when i will explain Different Case)
Profit or Loss both are calculated with respect to C.P i.e CP is Always used as a base while calculating profit and loss.

Selling Price aka SP
I think by Common Sense you all know that If SP>CP then you will have profit whose value will be (SP - CP) In terms Of numerical Value.
And Profit % will be [(SP-CP)/CP] * 100 or [(Profit/CP)*100] [rememberi told you that profit and loss both are calculated on CP i.e taking CP as Base, So all you have to do is calculate Profit in terms of numerical value(SP - CP) and then divide it by the base(CP) and then multiply it by 100 and you will get your profit %]
Eg. **CP of a pen is 10 Rs and SP is 12 Rs. What is profit and profit % ?**
Pretty easy Huh !! Just calculate profit first So it will be SP - CP = 12-10 = 2RS
And profit % [(SP-CP)/CP]*100 = [(12-10)/10]*100 = [(2/10)*100] = 20%
So now I think The difference between profit and profit % is clear to you.

Now If you know What is Profit then you all must know That what is Loss and when loss Occurs.
Loss occurs when we make some pretty bad decisions and We go out Nuts and Start selling The object at a rate less than the purchasing price of the object.
Lets Put that in Mathematical Way. **If CP>SP then there is a case of loss. to Find out the amount of loss all you have to do is (CP - SP)**

And to calculate Loss% nothing difficult just the usual stuff [(CP-SP)/CP*100] or [(Loss)/CP*100] [Look again I told you both Loss and profit are calculated taking CP as Base. So what i have done in the formula is Thati calculated Numerical Loss and then divided it by our BASE i.e CP and Then Multiplies it by 100 To get our Loss%]
And i don't think I have to explain again the difference between loss and Loss %.
So now Moving On to Other basic Stuff.

Marked Price aka MP= The Price at which a Product is Marked[Like when you go to Your Local Market for buying Some nice Sunglasses(I mean fake RAY BAN's ;)) And the Dealer say the cost is 1000rs and It's Also Marked on the Box but as we all know that it's just a MARKED PRICE and he will eventually sell that Ray Ban to you at 200Rs, And well if you are good at Bargaining then he will even sell it you at 100RS, And If It's me He will give it ME for free and even pay me 50RS back :P Well just Joking :P So that is our Marked Price]

Discount % = It's like concession on the MARKED PRICE. The dealer says I Am just giving You a discount Man You are a regular customer and blah blahblah And you are like my relative and all the BS(But here is the catch The Discount % is always calculated on M.P In the above example of RAY BAN if you want to calculate the Discount % then It's Easy The MP was 1000Rs he Finally Sells you that Ray Ban at 200 So discount Given = MP - SP i.e 1000-200 = 800rs
Now Discount % is calculated taking MP as BASE so Discount % will be
[(MP-SP)/MP]*100 = [(1000-200)/1000]*100 = 80%]

Discount is calculated on MP but Marking of MP is done with respect to CP.
For example if I say I bought Something for 500rs and I marked the Product 60% above the CP then It means I marked the product 60% of 500 = 300 above CP means 500+300 = 800rs. OK

CASE 1- Simple Profit and Profit % Calculation

Mohit Purchased A watch for 1000rs and then Sold it to Nimesh for 1250rs. Calculate the Profit and Profit %?
Most Simple Question Which You will never get in Any Exam :P(But Basics are Basics we gotta revise it at least)
So What happens here Mohit purchases a Watch(You see word Purchase And You know it's CP) at 1000rs
SO C.P = 1000rs
And then he sells it at 1250Rs(You See the Word SELL Ok that's our SP)
So SP = 1250Rs
Now Profit as I told is nothing but SP - CP So profit = 1250-1000 = 250rs
Now Profit % = [(Profit)/CP*100] So profit % = [(250/1000)*100] = 25%

CASE - 2
Now The Watch That Nimesh purchased for 1250rs Is Sold Again by Her at Rs 625. So what will be Loss and Loss %
Again Usual Stuff
Loss = CP - SP
Loss = 1250 -625 = 625
Loss% = [(loss/CP)*100] = [(625/125)*100] = 50%
So we have a 50% loss here.

Case 3 Inversion case
Profit or loss% is Give and CP or SP is Given and you have to find SP or CP
Steve Sells an article for 1200Rs And he makes a profit of 20% in the Transaction. So What is the Cost price?
I told You once If you don't Know about Something Then assume it as x.
So we take CP = x
Now If i sell an article at 20% profit then what will be our SP in terms of x ?
yeah it's pretty simple 1.2x [Because is told you percentage to decimal conersion So 20% here is nothing but 0.2x and total SP will be x+ 0.2x = 1.2x remember add in case of profit and subtract in case of loss]
And according to the Question he sold the article at 1200rs
So 1.2x = 1200rs
So x = 1000Rs.
Steve again sells an article for 1200rs but this time he suffers a loss of 20%. What will be the C.P?
Now just Take CP = x
So as i Told S.P will be ?yeah 0.8x (As i said add in case of profit and subtact in case of loss)
andacoording to the question SP = 1200rs
So 0.8x = 1200
x = 1200/0.8 = 1500rs
So C.P is 1500rs.

If it's given that C.P is 1000rs and profit made is 20%
Then it will be much more simple.
C.P is 1000rs so profit 20% will be 200rs.
So Profit = sp-cp therefore SP = CP + profit = 1000+200=1200rs.

Or If S.P is Given and Also Discount % is given you have to calculate MP

Example S.P = 200rs
Discount % = 80%
Find MP.

Simple Let M.P be X
So S.P after 80% discount will be 0.2x
and according to question S.P = 200
So 0.2x= 200
x = 1000rs = MP

Case 4: Combination Where MP CP SP are Mixed Together.

An article was purchased for Rs. 78,350. Its price was marked up by 30%. It was sold at a discount of 20% on the marked up price. What was the profit percent on the cost price?

Cost price = Rs. 78350
Marked price = 1.3*78350 = 101855(I told in the Start CP is Absolute 100% so If anything is Marked or Sold Above CP by ---% You just have to add that % to 100% and Convert it into it's relative decimal value)
Selling price = 101855*0.8= 81484[Discount is calculated on MP so here MP is Absolute 100%, 20% discount that Means The product is being Sold at 80% of MP or 0.8MP)
Profit = S.P - CP = 81484 - 78350 = 3134
Profit% = (Profit/CP)*100 = (3134/78350)*100 = 4%

Case 5

A man purchases 11 oranges for 10rs and Sells 10 oranges for 11rs.Find profit or loss%?

1st- Basic method.

Find the C.P of 1 orange that will be 10/11
Find SP of 1 orange that will be 11/10
As it's clear SP>CP hence Profit will be SP-CP = 11/10 - 10/11 = (121 - 100)/110 = 21/110
Profit % = [(profit)/CP]*100 = [(21/110)/(10/11)*100] = [(21*11)/(110*10)*100 = 21%

2nd- LCM method.

Take The LCM The two numbers present in the Question i.e LCM of 10 and 11 = 110.
Now this Is the Amount Of oranges you will buy and sell and calculate the profit % on that.
So CP of 110 Oranges = 100rs
S.P of 110 Oranges = 121rs
Profit = 21Rs
Profit % = 21%[calculates on the CP of 110 Oranges]

3rd - fastest Method but Confusing

Write The Purchase line First --- 11 oranges for 10
----------cross multiply-----
Selling Line 2nd 10 oranges for 11
11*11 will be SP and 10*10 will Be CP

Profit % = (11*11 - 10*10)/(10*10)*100 = 21%

Lets See one More Example

A man buys 8 pens for rs 9 and sells 9 pens for rs 8, Find profit or loss%?

By LCM methdo
take lcm of 8 and 9 that will be 72
CP of 72 pens will be 81rs
SP of 72 Pens will be 64Rs
Clearly there is loss which will be equal to 81 - 64 = 17rs
Loss % = (17/81)*100 = 20.98 or 21%
BY Fastest Method.
Write the purchase line 8 pen for 9rs
----------cross multiply
write sale line 9 pen for 8rs
C.P will be 8*8 = 64
S.P will be 9*9 = 81
Loss% will be (17/81)*100 = 20.98%

Case 6:- Dishonest dealer using false Weight and selling at Cost price.

A Dishonest dealer Professes to Sell the product at cost price but Instead of Selling 1000gm He sells only 900gm for 1Kg Wt

You don't need any Formula to Solve This Type of Question. You just have to use your own Mind here.
Now Look what the dealer is actually Doing here.
Dealer says He sell at Cost price Means He say He Sells at the price he purchases.
Now What amount He says He Sells = 1000gm
What Actually He Sells = 900gm

Now you can See here he is only selling 900gm and he is getting the oney for 1000gm
So this money from 100 Grams is His Profit OK.
Now how we calculate profit % ? We take CP as Base and Divide the Profit by CP.

Now look in this Question he is Selling 900 Gram and getting 100gram As profit.
So profit % will be (100/900)*100 = 11.11%

One More Question
A dishonest dealer Professes to sell the goods at cost price but instead of selling 1000 gms he sells only 800 gms for 1KG WT. Find his Gain% ?
Now Just Remember what He says He is Selling or what he gets paid for, he says he sell 1000gram
But What Actually He sells ?yeah exactly 800grams.
So how much he gets Extra or how much he cheats = 200grams
So profit will be (200/800)*100 = 25%

Case 7: Dishonest Dealer and also Selling Above Cost price.
A dishonest dealer Sells his Good 20% above the cost Price and Also cheats the Customer By giving them only 800gm for 1kg wt. What's his Profit % in the whole transaction.
We have to do the same stuff here Just Imagine. If he sells 1kg then how much will get paid for but also remember that he sells his good above 20% of CP Which means that if he sells 1000gm he gets paid for 1200gm. [20% above CP kamatlabyahihuana ?]
So he gets paid for 1200gms and What he actually Sells here is ? Yes 800gms Only
So Profit will be SP - CP = 1200 - 800 = 400gm
Profit % will be (Profit)/CP*100 = [400/800]*100 = 50%

Case 8: When two Articles are Sold at Same Price but one at profit and one at loss and % profit = % loss.
In Such Cases there will always be a loss (%)which will be equal to [(Common Gain or Loss)]/10]^2
Example - **A man Sell two Wrist Watches One at a profit of 20% and one at loss of 20%. The selling price of each watch is 200rs.**
i) Find the Percentage of profit or loss.
ii) Net Amount of profit or loss.

i) As i told there will always be a loss in this case And % loss = [(common gain or loss)/100]^100
Now just put the value % loss = [(20/10)]^2 = 4%
Hence Loss % = 4%

ii) Net Amount of Loss
So His Total SP was 200 + 200 = 400rs
He Suffers a loss = 4% Which means he sells his watch at 96% of their value i.e CP
So acording to Question 96% of CP = 400rs
or 0.96CP = 400rs
CP = 400/0.96
CP = 416.6667
So Net Amount of Loss = CP - SP = 416.667 - 400 = 16.667Rs

Case 9 - Goods passing through Successive hands.
It's a Lot like the method i told you yesterday about consecutive increase or decrease.
But Let's just Check it again.
A sells a good a profit of 20% to B and B Sells That Good to C at a profit of 25% If C pays 225 For It. What was it'sCpst Price for A.
So Just Asumme that CP for A was x
So he sells it at 20% profit That means he sells it at 1.2x
Now S.P of A = C.P of B
So Now B sells it to C at 25% profit
That means B sells it at 1.2*1.25*x
Now C pays 225rs
That mean 1.2*1.25*x = 225
so x = 150Rs
Answer CP for A = 150Rs.
Or you can Also use the formula which i told yesterday [x + y + (xy)/100]
Same way you can solve for 3 persons also.

Case 10 - CP of X articles = SP of Y Articles.
Very Simple If you know the trick behind it.
Eg - CP of 25 Articles is Equal to the SP of 20 Articles. Find the Profit or loss %.
Just write it This was 25CP = 20SP
Now Cross multiply So that Variables gets on One side of the equation and Constant gets on the Other Side.

So SP/CP = 25/20
Now you just have to take that Elements on the opposite sides of Equation represents their corresponding value.
So in Equation SP/CP = 25/20. In front of SP the value is 25(So our SP will be 25)
And in front of CP the value is 20(So out CP is 20)
Now You know CP and SP calculating profit or loss is a child's play now but still we have to play it[Personal Advice Always Believe in complete solution of the question, never leave the question in Mid Way]
So as SP>CP there is profit
And profit will be [(SP-CP)/CP]*100 = (5/20)*100 = 25%

Another Example
CP of 10 articles is equal to the SP of 12 Articles Find the profit or Loss %?
Do the same stuff again
10CP=12SP
Cross multiply now.
SP/CP = 10/12
So SP = 10
and CP = 12
So clearly there is a loss And loss % = (Loss/CP)*100 = (2/12)*100 = 16.66%

Case 1: Marking Above x% and giving discount of y%, Total profit or loss.
Eg A person Marks his good above 50% of CP and Gives Discount of 20% Find his Profit %.
The easiest way to solve this type of question is to assume the CP as 100
So CP is 100
M.P will be 50% above CP that will be 150
Now he gives discount of 20%
As discount is caculated on MP so SP after deducting the discount will be 150*0.8 = 120
Now SP = 120, CP = 100 So profit % will be 20%.

Case 12 - Decrease in Price of Commodity allows A person to Buy X quantity more of an item.
EG - When the price of sugar decreases by 10%, a man could buy 1 kg more for Rs 270. Then, the
original price and final price of the sugar are ?
Now remember i told you a formula yesterday Which Goes something like this[(How Much It is decreased)/(What It Becomes after decrease)*100].
So this Question is Implementation of that Formula only.
Price is decreased by 10%.
So Man can purchase how much extra now ? Apply the formula (How much decrease/ What It becomes)*100 = (10/90)*100 = 100/9 %
So man can buy 100/9 % more sugar now.
Lets Assume that originally He used to buy x kg of sugar

And as it's given in the question He can Buy 1 KG more. So that means that 100/9 % of x = 1kg
(100/900)*x = 1
x = 9kg.
Now Original Quantity = 9kg
So Original Cost = 270/9 = 30Rs/KG
Increased Quantity = 9+1 = 10kg
So Final Price = 270/10 = 27RS/kg

Case 13
A trader allows a discount of 25% on his articles but wants to gain 50% gain. How many times the CP should be marked on the items?
Simple way to solve this Question is By Assuming MP as X and CP as Y.
So Let MP be X, So SP after 25% discount = 0.75x
And He also Wants to Again 50% on CP, So SP in Terms of y will be = 1.5y
Now Both SP are Equal So
0.75x = 1.5y[Now we have to find MP with respect to CP So express the equation in terms of Y]
x = 2y
or x = 200% of Y
So he Should marks his Goods 100% above the CP.

Case 14:- Successive Discount.
We all used to get Amazed when we heard deals like 50% + 49% discount, I always used to wonder how can they sell their product at 1% price LOL. Then i studied % in class 7th and it became clear to me that's it's another way of looting commom man.
So what actually is Successive Discount.

Successive simply means anything which is applied in succession (ekkebaadek apply karna)

So When Pantaloons Say 50% + 30% off It doesn't mean you will get the discount of 80%. If they wanted to give you 80% discount(which they would never do) then they would simply have written 80% instead of 50% + 30%.
For Example You wen to Pantaloons or levis whatever And You Like a jeans Whose MP is 1000rs, and there is a discount of 50% + 30%. So Now You have to apply the 50% discount, By applying that New MP will become 500rs and Now On this 500Rs you will apply the next 30% discount to get the final SP which will be 350Rs.
So Lets See some Examples.
There are 2 Successive discount on Watch Whose MP is 2000rs. the first Discount is of 40% and other is of 20%.
The Good thing with successive discount is that you can apply The discount in any way you want, that means you can apply 20% discount first and if you want you can apply 40% discount first. The answer will remain the same.
So now Lets Apply 40% discount on 2000rs. After applying 40% discount the MP will become 1200rs and On that 1200 we apply another 20% discount So the final SP will become 960Rs.
Now Do the Other Way. First Apply 20% discount on 2000rs So new MP will be 1600 Rs Now apply 40% discount again. And the Final SP will be 960 Rs
You can see the answer is same in both the cases.
But I will tell you simple method Just Multiply It.
I means MP is 2000 You want to apply 40% and 20% Discount Just do it like this was 2000*0.6*0.8 = 960
Sometimes It's Also Asked two successive discount of 30% and 40% is Equal to what Single Discount.
No need to worry Just do the regular Stuff. If MP was 1 after 30% discount it will become 0.7 and after 40% it will be 0.6
So multiply the values.
0.7*0.6 = 0.42.
Now This 0.42 is The Final SP
So total Discount will be equal to 1- 0.42 = 0.58 or 58%

Lets see 1 more example.
What will the Single Equivalent discount for two Successive Discount of 40% and 50%?
Let MP = 1
Now apply discount 0.6*0.5 = 0.3 = SP
So Discount = 1- 0.3 = 0.7 or 70%.

Case-15: Equation Based Question,
it's not a single case many Question can be Made From This case But basic idea is you have to make a mathematical Equation To Solve Such type of Questions.
A trader gets a profit of 25% on an article. If he buys the article at 10% lesser price and sells it for Rs. 2 less, he still gets 25% profit. Find the actual CP of the article.
Let Assume the CP of the article was x. So according to Question The SP must have been 1.25x
Now He buys the article at 10% lesser price that means he buys it at 0.9x
And he sells it 2rs less which means at 1.25x - 2
He will still get 25% profit But This 25% will be calculated on 0.9x because it's the new CP
So 1.25x - 2 - 0.9x = 25% of 0.9x
0.35x -2 = 0.225x
0.35x - 0.225x = 2
0.125x = 2
x = 2/0.125 = 2000/125 = 16
So CP = 16.

Another One
A trader Sells an Article at 25% profit If he had Sold the item at 10 Rs. more the profit would have been 30%. Find The CP?
It's very simple question In this type of question just assume CP as x.
And Convert the % value of Profit into decimal and Then Solve the question Accordingly.
25% of x = 0.25x
and 30% of x= 0.3x
Now in the Question it is said The dealer would get 10rs more if the profit is 30% Or the difference between 25% profit and 30% profit is 10Rs
So 0.3x - 0.25x = 10
0.05x = 10
x = 10/0.05 = 1000/5 = 200

One More Question, **A dealer Sells an Article at 20% profit If he had sold the article at 500rs less he would have suffered a loss of 30%. Find CP**
Just Take CP as x
so 20% profit will be = 0.2x
30% loss = -0.3x[remember loss is assigned as negative]
So according to Question the Difference between 20% profit and 30% loss is 500rs
So 0.2x - (-0.3x) = 500
0.2x + 0.3x = 500
0.5x = 500

x = 500/0.5 = 5000/5 = 1000

Quiz :
Time: (5-6) minutes.

1. Aadesh bought a combined total of 25 monitors and printers. He marked up the monitors by 20% on CP while each printer was marked up by Rs. 2000. He was able to sell 75% of the monitors and 2 printers and make a profit of Rs. 49,000. The remaining monitors and 3 printers could not be sold by him. Find his overall profit or loss if he gets no return on unsold items and it is known that a printer costs 50% of a monitor.
(a) Loss of Rs. 48,500
(b) Loss of Rs. 21,000
(c) Loss of Rs. 41,000
(d) Data Inadequate
(e) None of these

2. A rickshaw dealer buys 30 rickshaws for Rs.4725. Of these, 8 are four seaters and rest are two seaters. At what price must he sell the four seaters so that if he sells the two seaters at 3/4th of this price, he makes a profit of 40% on his outlay.
(a) Rs. 180
(b) Rs. 270
(c) Rs. 360
(d) Rs. 450
(e) None of these

3. Ritesh bought 25 washing machines and microwave ovens for Rs. 2,05,000. He sold 80% of the washing machines and 12 microwaves ovens for a profit of Rs 40,000. Each washing machine was marked up by 20% over cost and each microwave oven was sold at a profit of Rs. 2,000. The remaining washing machines and 3 microwave ovens could not be sold. What is Raghav's overall profit/loss?
(a) Rs. 1000 profit
(b) Rs. 2500 loss
(c) Rs. 1000 loss
(d) Cannot be determined
(e) None of these.

4. A flat and a piece of land were bought by two friends Tarun and Varun respectively at prices of Rs. 2Lakh and Rs. 2.2 Lakh. The price of the flat rises by 20% every year and that of land by 10% every year. After two years, they decided to exchange their possessions. What is approx. percentage gain of the gainer?
(a) 7.56%
(b) 6.36%
(c) 4.39%
(d) 3.36%
(e) None of these

5. Sunil calculates his profit percentage on the selling price whereas Sujeet calculates his profit on the cost price. They find that the difference of their profits is Rs. 900. If the selling price of both of them are the same, and Sunil gets 50% profit and Sujeet gets 40% profit, then find their selling price.
(a) Rs 4200
(b) Rs 4500
(c) Rs 4000
(d) Rs 4800
(e) None of these

6. A reduction of 10% in the price of salt enables a person to buy 2 kg more for Rs.180. Find the reduced and the original price per kg of salt respectively.
(a) Rs 10, Rs 9
(b) Rs 9, Rs 10
(c) Rs 18, Rs 20
(d) Rs 20, Rs 18
(e) Rs 18, Rs 16.2

7. A person sold his watch for Rs. 24. If the percentage of his loss was equal to the cost price , then the watch would have cost him
(a) Rs. 40
(b) Rs. 60
(c) Rs. 50
(d) Rs. 80

(e) None of these

8. A man buys two horses for Rs. 1550. He sells one so as to lose 23% and other so as to gain 27%. On the whole transaction he neither gains nor loses. What does each horse costs?
(a) 807,743
(b) 817,733
(c) 827,723
(d) 837,713
(e) None of these

9. An orange vendor makes a profit of 20% by selling oranges at a certain price. If he charges Rs. 1.2 higher per orange he would gain 40%. Find the original price at which he sold an orange.
(a) Rs. 3
(b) Rs. 12
(c) Rs. 4.8
(d) Rs. 6.0
(e) None of these

10. After selling a watch, shyam found that he had made a loss of 10%. He also found that had he sold it for Rs.27 more, he would have made a profit of 5%. the actual initial loss was what percentage of the profit earned,had he sold the watch for a 5% profit?
(a) 23%
(b) 150%
(c) 200%
(d) 180%
(e) None of these.

Answers & Explanation;

1. a
2. b
3. c
4. e (8.189 approx.)
5. a
6. b
7. e (Either Rs 40 or Rs 60)
8. d
9. e (Rs. 3.60)
10. c

Explanation:

1.Total Number of printers = 5 (2 sold , 3 unsold)
Monitors = 20.
Profit made on Printers sold = 2000*2 = 4000.
Monitors sold = 20*75% = 15
Profit made on Monitors sold = 49000-4000 = Rs.45000.
Profit made per monitor = 45000/15 = 3000.
20% of CP of Monitor = 3000
CP of Monitor = 15000.
CP of Printer = 7500
Total CP = 15000*20 + 7500*5 = 3,37,500
Total SP = 18000*15 + 9500*2 = 2,89,000
Loss = 48,500

2. Total investement = Rs. 4725
Total SP = 1.4*4725 = 6615
Now, Let the price of 4 seater be x then price of two seater will be .75x.
8x + 22*0.75x = 6615
24.5x= 6615 or x = 270

3. Total number of Microwave ovens = 15 (12 sold +3 unsold)
Hence, Washing machines = 10
He sold 12 ovens and 8 washing machines
Hence, In total he sold 80% of both
Thus, He sells 80% of both at a profit of Rs. 40,000.

Cost of 80% of the goods = 0.8*2,05,000 = 1,64,000
Hence, Total SP = 1,64,000+40,000 = 2,04,000
CP = 2,05,000
Loss = Rs.1000

4. After 2 years :-
Flat would be worth = 2Lakh* 1.2*1.2 = Rs. 288000
Land would be worth= 2.2Lakh*1.1*1.1 = Rs. 266200
Profit of the Gainer = Rs. 21800
Profit % of the gainer = 21800*100/266200= 8.189(approx)
Also if loss% woudd have been asked of the loser
loss% = 21800*100/288000 = 7.56 (approx.)

5. Let SP be Rs. 100
CP for Sunil = => (SP-CP)*100/SP = 50
CP for Sunil ==> (100-CP)*100/100 = 50 or CP = Rs. 50
(Divided by SP as Profit calculated on SP)
Profit for Sunil = 100-50 = Rs 50
Now, CP for Sujeet = (SP-CP)*100/CP = 40
(100-CP)*100= 40CP or CP for Sujeet= Rs. 1000/14
Profit for Sujeet = 100-100/14 = 400/14
Now, Difference in profit when SP is 100 = 50-400/14 = 300/14.
Now, Equating difference and SP, we have
300/14 : 100 : : 900 : SP
SP = 900*100*14/300 = Rs. 4200

6 . Let originally he buy X kg for Rs. 180
Now, he will buy X+2 kg for Rs. 180.
Reduction in original price =10%
(180/X)/kg*90/100 = [180/(X+2)]/kg
90(X+2) = 100X
X = 18
Therefore, Originally he bought 18kg.
Original Price = Rs. 10/kg
Reduced Price = Rs. 9/kg

7. SP = Rs. 24
Let CP be X hence, Loss% = X
(X-SP)*100/X = X or (X-24)*100/X = X
X^2-100X+2400 = 0
(X-60)(X-40) = 0
X= 60 or 40

8. Let CP of one be X and other be Y
X+Y = 1550….(i)
ATQ:-
0.77X + 1.27Y = 1550…(ii) (as no profit and no loss is there)
Solving both, we get
50Y = 35650 or Y = 713
Hence, X = 1550-713 = 837
Therefore, CP of each horse = 837,713

9. Let the CP be Rs. x/ orange
Profit = 20%
SP = Rs. 1.20x
Now, If case :-
SP =x+ Rs.1.2
Profit = 40%
Therefore, we can say
1.40x = x+1.2 or x = Rs. 3
Hence, Original SP = Rs 1.2x = Rs. 3.60/-

10. Profit= 5% (If case)
5% of CP ------>Rs. 27
So, CP = Rs. 540
Now, Loss% = 10

Loss =Rs. 54
Required % = 54*100/27 = 200%

Concept of Profit & Loss with Quiz

Dear Readers, here we are providing some useful concept and tricks for Profit & Loss with concept clearing Quiz.Which can be very useful for SBI PO prelims,IBPS PO/Clerk, RBI Assistant,LIC ADO and many more government sector upcoming exams .

Cost Price-The price at which an article is purchased is called its cost price (C.P.)

Selling Price-The price at which the article is sold is called its selling price (S.P.)

If the cost price (C.P.) of the article is equal to the selling price (S.P.), Then there is no loss or gain.

If the selling price (S.P.) > cost price (C.P.), then the seller is said to have a profit or gain,
Gain or Profit = S.P. - C.P.

If the cost price (C.P.) > selling price (S.P.), then the seller is said to have a loss,
Loss = C.P. - S.P.

Gain% = {Gain*100}/{C.P.}

Loss% = {Loss*100}/{C.P.}

S.P.= {(100+Gain%/100)x C.P}

S.P.= {(100-Loss%/100)x C.P}

C.P.= {(100)/(100+Gain%)x S.P}

C.P.= {(100)/(100-Loss%)x S.P}

If an article is sold at a profit/gain of 30%, then S.P. = 130% of the C.P.

If an article is sold at a loss of 20%, then S.P. = 80% of the C.P.

When there are two successive Profit of x % and y % then the resultant profit per cent is given by
[x + y+ (x*y/100)]

If there is a Profit of x% and loss of y % in a transaction, then the resultant profit or loss% is given by
[x – y - (x*y/100)]
Note- For profit use sign + in previous formula and for loss use – sign.
if resultant come + then there will be overall profit . if it come – then there will be overall loss.

If a cost price of m articles is equal to the selling Price of n articles, then Profit percentage
(m-n)/n×100%

If m part is sold at x% profit , n part is sold at y % profit, and p part is sold at z% profit and Rs. R is earned as overall profit then the value of total consignment
R×100 / (mx+ny+pz)

A man purchases a certain no. of article at m a rupee and the same no. at n a rupee. He mixes them together and sold them at p a rupee then his gain or loss %
[{2mn/(m+n)p} -1]× 100
Note += profit ,- = loss

When a person sells two similar items, one at a gain of say x%, and the other at a loss of x%, then in this transaction the seller always incurs a loss given by: = **{x^2/100}%**

A single discount equivalent to discount series of x% and y% given by the seller is equal to
(x +y - xy/100)%

If a seller marks his goods at x% above his cost price and allows purchasers a discount of y % for cash, then overall gain or loss
(x – y –xy/100)%
Profit or loss according to sign .+ = gain, - = loss

If a trader professes to sell his goods at cost price, but uses false weights, then
Gain% = {(Error)/(True value - Error)x 100] %

Quiz Based on Concepts

1. 1/3 of a commodity is sold at 15% profit, ¼ is sold at 20% profit and the rest at 24% profit. If the Total profit is Rs. 80 is earned then find the value of commodity?
A) 350
B) 410
C) 400
D) 300
E) None of these

2. A man purchases a certain no. of apple at 5 per rupee and same no. at 4 per rupee. He mixes them together and sells them at 4 per rupee. What is his gain or loss%?
A) Gain 20 %
B) Gain 11.11%
C) Loss 11.11%
D) Loss 20 %
E) None of these

3. A trader allows a Discount of 5% for cash payment. How much approx % above cost price must he mark his goods to make a profit of 10%?
A) 8.9%
B) 10%
C) 12.75%
D) 15.8%
E) None of these

4. If selling price is doubled, the profit triples. Find the profit percent?
A) 100%
B) 116.67%
C) 200%
D) 300%
E) None of these

5. The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?
A) 2200
B) 2400
C) 2500
D) 2000
E) None of these

6. Abhishek purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?
A) 5.4
B) 5.6
C) 6.5
D) 4.5
E) None of these

7. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:
A) 33.33%
B) 66.66%
C) 44%
D) 50%
E) None of these

8. On selling 17 toys at Rs. 720, there is a loss equal to the cost price of 5 toys . The cost price of a Toy is:
A) Rs. 50
B) Rs. 60
C) Rs. 65
D) Rs. 70
E) None of these

9. A shopkeeper sells some articles at the profit of 25% on the original price. What is the exact amount of profit? To find the answer, which of the following information given in Statements I and II is/are Sufficent?
I. Sale price of the article
II. Number of articles sold
A)Only I is sufficient.
B)Only II is sufficient.
C)Both I & II are sufficient.
D)Either I or II are sufficient.
E)Both I & II are not sufficient.

10. A man purchases 10 Cows at Rs. 3000 each. 1 Cow died. He sold 2 Cows at 5% loss, at what rate he should sale the remaining Cows, so as to gain a Profit of 10 % on the total Cost?
A) Rs.4000
B) Rs.3000
C) Rs.3900
D) Rs. 4500
E) Rs. 4200

Answers

1). C
2). B
3). D
4). A
5). D
6). B
7). C

8). B
9). C
10).C

Explanation:

1. Part sold at 24% profit = 1-(1/3+1/4) = 5/12
Value of commodity = (80×100) / (1/3*15+1/4*20+5/12*24)= 400

2. Gain or loss = [2*5*4/4(5+4) - 1] × 100 % = 11.11%
Sign is + ive so gain 11.11%

3. 10 = x-5 – 5x/100
19x/20 = 15; x=15.789% = approx 15.8%

4. Let C.P. be Rs. x and S.P. be Rs. y.
Then, 3(y - x) = (2y - x) y = 2x.
Profit = Rs. (y - x) = Rs. (2x - x) = Rs. x.
So profit % =100%

5. Let CP is x.
Then (1920-x)/x*100= (x-1280)/x*100
On solving x=1600
Selling Price = 1600*125/100= Rs. 2000

6. Cost price of 1 Toy = 375/12= 31.25
Selling price of 1 toy = Rs.33
Profit= Rs (33-31.25) =1.75
Profit% = 1.75/31.25*100= 5.6

7. Lcm of 5&6 =30
Cost price of 30 articles= 5/6*30 = 25
Selling Price of 30 articles = 6/5*30 =36
% profit = (36-25)/25*100= 44%

8. Cost price of 17 toys – Selling price of 17 toys = cost Price of 5 toys
Cost price of 12 toys = selling Price of 17 toys= 720
Cost price of 1 toy= 720/12= 60

9. Both I & II are sufficient to find the exact amount of profit .

10. Selling Price With Profit of 10 % of total cost = 3000*10*110/100= 33000
Selling Price of 2 cows with 5% loss= 6000*95/100= 5700
Difference = 33000-5700= 27300;
So rate of the cows for selling to gain 10% profit on total = 27300/7= Rs. 3900
(because 1 cow died so remaining= 10-1-2=7)

Average
An average or more accurately an arithmetic mean is, in crude terms, the sum of n different data divided by n.

Averages of a group is defined as the ratio of sum of all the items in the group to the number of items in the group.

Average = **(Sum of all items in the group)/ Number of items in the group**

Now, sum of all items can be 'the sum of number of quantities like apple, people etc' or 'sum of values of the item like 10 coins of 2Rs each etc'.

Some Important Concepts:

1.Average =**total of data/No.of data**

2.If the value of each item is increase by the same value a, then the average of the group or items will also increase by a.

3.If the value of each item is decreased by the same value **a**, then the aveage of the group of items will also decrease by **a.**

4.If the value of each item is multiplied by the same value **a**, then the average of the group or items will also get multiplied by **a.**

5.If the value of each item is multiplied by the same value **a,** then the average of the group or items will also get divided by **a.**

6.If we know only the average of the two groups individually, we cannot find out the average of the combined group of items.

7.Average of n natural no's=**(n+1)/2**

8.Average of even No'=**(n+1)**

9.Average of odd No'= **n**

10.General Formula=**(1st number +Last number)/2**

Quant Quiz on Average

1.The average marks obtained by 120 cndidates in a certain examinationis 35.if the average marks of passed candidate is 39 and that of the failed candidates is 15,what is the number of candidates who passed the examination
(a)110

(b)115
(c)120
(d)100
(e)none of these

2.The average age of 8 persons in a committee is increased by 2 years when two men aged 35 years and 45 years are substituted by two women.Find the average age of these two women.
(a)48
(b)36
(c)42
(d)29
(e)none of these

3.In a class, there are 20 boys whose average age is decreased by 2 months, when one boy aged 18 years is replaced by a new boy.Find the age of new boy.
(a)19 years
(b)14 years 6 month
(c)15 years
(d)14 years 8 month
(e)12 years

4.One -third of certain journey is covered at the rate of 25kmph,one-fourth at the rate of 30kmph and the rest at 50 kmph.Find the average speed for the whole journey.
(a)33.33 kmph
(b)36
(c)42
(d)27
(e)none of these

5.The average salary of the entire staff in a office is Rs 120 per month.The average salary of officers is Rs 460 and of non officers is Rs 110. If the number of officers is 15,then find the No of non-officers in the office.
(a)480
(b)500
(c)600
(d)430
(e)510

6.There were 35 students in a hostel.If the number of students increased by 7, the expenses of the mess increases by Rs. 42 per day,while the average expenditure per head diminishes by Rs.1.Find the original expenditure of the mess.
(a)420
(b)400
(c)480
(d)460
(e)none of these

7.The average weight of A,B,and C is 84 kg. If D joins the group, the average weight of the group becomes 80 kg.If another man E who weights is 3 kg more than D Replaces A, Then the average of B,C,Dand E becomes 79 kg. What is the weight of A?
(a)64
(b)72
(c)75
(d)100
(e)80

8.In an exam, the average was found to be 50 marks. After deducting computational errors the marks of the 100 candidates had to be changed from 90 to 60 each and average came down to 45 marks. Total No of candidates who took the exam were.
(a)300
(b)600
(c)200
(d)150
(e)none of these

9. Find the average of all even No's up to 100 or average of first 50 even No's.
(a)50

(b)50.5
(c)51
(d)49
(e)none of these

10. The average of 8 No's is 20. The average of first two No's is 15.5 and that of next three No's is 64/3.if the 6th No be less than the seventh and eight No. by 4 and 7 respectively, then find eight No.
(a)26
(b)25.5
(c)27
(d)25
(e)none of these

Answers with Explanation:

1. (d) Let No. of passed candidates are x
So, x * 39 + (120 – x) 15= 120 * 35
x = 100
2.(a) Total increase = 8 * 2 = 16 years
So, total age of two women = 35 + 45 +16= 96
Average age of two women=96/2=48 years
3(d) Total decrease = 20 * 2 = 40 month
= 3 years 4 month
So, age of new boy = 18 years – 3 years 4 month
= 14 years 8 month

4.(a) Average speed = total distance / total time
LCM = 3, 4 = 12
Average speed = 12 / (1/3*12*1/25 + ¼ * 12*1/30 +5/50)
= 12/ (4/25 + 3/30+ 5/30
= 150*12/54 = 33.333 kmph

5.(e) Let no. of non- officers be x
15 * 460 + x * 110 = (x + 15) 120
x = 510

6.(a) Let average expenditure per head be = x
So, (35 + 7) (x -1) – 35 x = 42
42 (x -1) – 35x = 42
X =12
Original expenditure of mess = 12 * 35 = 420

7.A + B + C = 3 *84 = 252
A + B + C + D = 4 * 80 = 320 ---- (i)
So, D = 68& E = 68 + 3 = 71
B + C + D +E = 79 * 4 = 316 --- (ii)
From Eq. (i) & (ii)
A-E = 320 – 316 = 4
A = E +4 = 71 + 4 = 75

8.(b) Let the total no. of candidates = x
So, (50x-100 (90-60)) / x = 45
x = 600

9.(c) 2, 4, 6, …… 100
Average = (1st No. + Last No.) /2 = (2+100)/2 = 51

10.(c) Total Sum of 8 nos. = 20 * 8 = 160
Sum of 1st two nos. = 2 * 15.5 = 31
Sum of next three nos. = 3 * 64/3 = 64
Let 6th no. be x
31 + 64 + x + (x+4) + (x+7) = 160
x = 18
8th no. = 18 + 7 = 25

Percentage:

The word defines itself Per means 1 upon something and Cent Is like Paise. In India we have 1 rupee = 100 paise
So per cent = 1/100 Part of something or %[This sign even means 1/100] So if i say 20% of something Just multiply that something by 20/100 or 0.2
Like wise if is say 30% then it simply means i want to know 30/100th or 3/10th part value of something.

Why Do we Use percentage ?
Basically It is used for comparison.
Like Ifi say i got 400 marks in 10th and the other guy says that he got 600 marks in 10th. So Numerically He has got more marks than me But does his score is relatively better than me ?
For that purpose we must know that He got 600 marks out of how many marks. Let's say he got 600 out of 1000. So his percentage marks will be 60%
And I got 400 out of 500. So my % marks will be 80%.

Now you can easily say that My marks are better because i am getting 80% and he is getting 60%.
How to calculate Percentage [You all know it but just say I am telling it to myself :P]
Well the simple formula is [Value/total value] * 100
For example **A Ring Contains 63 gm of Gold and total weight of ring is 70 gm. Find the percentage of Gold in the ring ?**
So By the Formula [Value/Total Value]*100
[63/70]*100
[9/10]*100
90%.

% to Decimal Conversion or Fraction Conversion.

Just remember in Fraction Conversion we leave the fraction as it is without Converting Into Decimal. While in Decimal Conversion we first convert into fraction then Write the Decimal Value of that fraction.
Very easy You just have to dive by 100 nothing else.
For example 30% = 30/100 = 0.3
21% = 21/100 = 0.21
99% = 99/100 = 0.99
60% = 60/100 or 3/5 = 0.6

Case 1 [Percentage of Quantity]
Find the no. of male Students i.e boys, If there are 47% male students in the school and Total no. of students in the school is 1000.
As i said If you See anywhere % of something. Just convert the no. into it decimal value and multiply by that Something.
So in the above Question Boys are 47%[Convert this into Decimal and you will get 0.47] of 1000 [Something]
So what we gonna do friends we will just multiply it by 0.47
So the no. of Boys will be 0.47*1000 = 470.

Lets See another Example.
A student scored 85% marks. Total marks are 400. How much marks did he score.
So a student got 85% marks out of 400
So again 85%[Convert 85% in decimal i.e 0.85] of 400 [something]
So the answer will be 0.85*400 = 340
so 340 is our answer.

Well they can also Change the Final Question.
Like in First Example they asked Find the no. of male students. They could have asked the no. of students that are not male.
So what we should do in that case. Nothing to worry my friend just do the usual job 47% are male that means that the rest 53% are not male now calculate 535 of 1000 that will be your answer i.e 530

Case 2 [Inverse Case]
Now in the case 1 we were just asked to Find the % value something. But What if % value of something is given and we have to find the Total Value. ?
Now to worry below example will make it clear.
30% of a Number is 150. What is the number.

So after examining the question we can say that 30% of Some number is 150[But we don't know yet what is the original number]
When we don't know about something Just Assign a variable to that value.
So we say that the Original Number is x
So as mentioned in the question 30% of x = 150
[Convert 30% into decimal] 0.3*x= 150
0.3x = 150
x = 150/0.3
x = 500
So you see it's Quite easy.
Likewise Many Different Question can be formed on the same logic. Lets discuss 1
There are 200 girls in the class and girls and girls make up 25% of the class. Find the total No. of students in the class.
We don't know the No. of students so assume that no. of students is x
So what is given in the Question.
25% of Total Students in the class are Girls and Total Girls in the class is 200
lets just try convert above [English] Statement into mathematical Form
25% of x = 200
0.25*x = 200x = 200/0.25
x = 800
So total no. of students in the class = 800.

Case 3 - Percentage Change.[Very Important For DI]
The simple Way to put that is [(Change in Quantity/ Original Quantity) *100] Also [change in quantity = Final Quantity - Initial Quantity]
Note- The quantity in whose respect % change is asked is considered as the base By base i mean the original value in the above formula.
Let me make it clear to you with the help of Some Example.
The height of Nikhil some times ago was 160cm. Now his height is 200cm. Find the % change in his height?
So if we analyse the above question We can say that all we have to calculate is the % change in the height of Nikhil with respect to his Earlier Height.
So now lets apply the formula here [(Change in quantity/ Original Quantity) * 100]
Which will be [{(200-160)/160} * 100]
[{40/160}*100]
[(1/4)*100]
25%
So the % change in height = 25%.

Case 4- Use of Base Value and With Respect To Cases[Very very Important For DI]
Suppose Salary of Raman is 80,000 and Salary of Ved is 1,00,000. The questions are
What per cent is the salary of Ved to that of Raman?
It's a very simple Question If you just know in whose respect you have to find the %.
Now in the above Question we have to find the % of ved salary with respect to ELF's Salary [rememberjiske respect me % nikalnahotahaiWohi base hotahai]
So here we have to find Ved's Salary with respect to Raman So we use the formula [(Value/ In whose respect it is asked)*100]
So ved's salary in respect to Raman's salary will be [(1,00,00/80,000)*100] = 125%
So VED's Salary is 125% of Raman's Salary.

If the question was just opposite.
Like **What percent is the salary of Raman to that of Ved. (In this Question the Base will be Ved's Salary)**
So lets just apply the formula [Value/ In whose respect it is asked) * 100]
(80,000/1,00,000)*100 = 80%
So elf's salary is 80% of VED's Salary.

Case 5 - Product Constancy [Most Important Because With it's Application You can also solve Questions related to Time and Work, Speed Time Distance, Average etc. This Concept has a very huge application]
i - Speed*Time = Distance
ii- efficiency*time = work
ii- Length*breadth= area
iv- Average*No. of elements = Total value
v - rate*quantity = Expenditure

let me make you clear with an example.
The price of sugar is increased by 25% then by how much per cent should a customer reduce the consumption (i.e quantity used) Of sugar so that he has not increase his expense on Sugar.
Just remember If one factor of product constancy is increased by P% then the other factor will be decreased by [(p)/(100+p) * 100] To maintain the Product Constancy.

Now in the above Question The rate of sugar is increased by 25% So by how much % we should reduce the quantity to maintain the same expenditure
Just apply the above formula [(p)/(100+p)*100] = (25/125)*100 = 20%
Now It sound Simple but It is difficult to remind these formulas at the time of Solving Question So let me Give you simple method of learning this Formula.
Just Imagine In Your mind that the Quantity is 100. Ok
if the value is inreased by 25 % how much should the consumption be reduced.
Now all you have to remember is [(How much % value is Increased/ What it becomes after increase) * 100]

No as i said In your mind the Quantity is 100. How much the value is increased in the above Question yeah 25%
And how much it will become after 25% increase if the Quantity was 100 yeah That will be 125. So the answer will be (25/125)*100 = 20%
lets try again If the price of petrol is increased by 50%. By how much % the consumption be reduced so the expenditure remains same.

Just apply the formula How much increased = 50
What it will become after 50% increase = 150
% redcution required = (50/150)* 100 = 33.33%
In the same way you can also use the same formula for calculating just the opposite.

For Example **If the price of Sugar is reduced by 20% by how much should the family increase it's consumption So the expenditure remains same?**
How much % decrease ? = yeah it is 20%
What it will become after 20% decrease = Yeah 80
So Increase required = (20/80)*100 = 25%

lets do one more question.
The price of petrol is reduced by 33.33% but how much % should a person increase his consumption so that His expenditure remains constant.

How much decrease = 33.33
What it will become after 33.33% decrease = 66.66
So % increase required = (33.33/66.66)*100 = 50%

The Length of Rectangle is Increased by 25% By what % the breadth be reduced so that are remains Constant?
Try Again How much Increase 25
What it becomes 125
% to be reduced = (25/125)*100 = 20%
Same way the Question of Time Speed Distance can also be solved Buti will teach that when i will Explain Time Speed And Distance.

Case 6 - Increase or decrease In value to Get Back the Original Value.
Remember if a value P is increase by x % then we have to decrease the resultant value by
[{ x/(x+100)} *100]% to get back the original value.
For Example Rocky's Salary is 1000rs and it Increased by 10%. How much % His salary must be Decreased So that he Gets His original Salary.
Apply the above Formula [{x/(x+100)}*100 = [{10/(100+10)}*100] = 100/11 or 9.09090%
In case of Decrease.
The formula will be [{x/(100-x)}*100]%
Rocky Salary is 1000 and it is decreased by 10%. By how much % his salary must be increased so that he gets His Original Salary.
Apply the formula here [{10/(100-10)}*100]% = 100/9 % or 11.11%
But Instead of Doing All this BS you can Also Apply My previous formula here.

Like Salary Increased 10. what wit will become 110.
How much it should be reduced = (10/110)*100 = 100/11 = 9.09%
Again Salary decreased = 10, What it will become 90.
So how much it should be increased to get the original salary = (10/90)*100 = 100/9 = 11.11%

CASE - 7 Concept of "by" and 'to"
Please note that there is very Big Difference between by and to.
Eg . The income is reduced BY 40% it means the New Income 60% of the original value.
And If income is to 40% it means The new Income is 40% of the Original Value.

Case 8 - Consecutive Increase in Percentage.

Suppose the S**alary of Sumit is first increase by 20% and Then again it's Increased by 20%.**
What is the Total Percentage Increase in His Salary.
Now don't try to be smart here and just add 20% and 30%And say That it's 50% Increase-- THAT WILL BE TOTALLY WRONG.
Actuall let me make the Picture a Little bit Clear. What actually Happens in the case of Consecutive Increase and Decrease.
Now Just Suppose that The Salary of Sumit was 1000 Rs. it gets Increased by 20% so What it will become ? Yeah you are right 1200rs.
Now When it is Again Increased by 30% Then we are Calculating that 30% increase on 1200RS ans not on 1000 So the Inrease will be 30% of 1200 which will be 360. So increased salary will be 1200 + 360 = 1560.

Now are two Shortcut Methods Here.

1st Simple Multiplication.
When I say Something is increased by 20% It means It's Value Is increased by 20 % or It's Total value is 120% of the original Value Ok ?
Like 100 is incresed by 20% That means it's final value will be 100 + 20% of 100 = 100 + 20 = 120.
So if Sumit Salary is Increased By 20% that the Value will be 100*1.2.
And If it's Again increased by 30% then the value will be 100*1.2*1.3 = 100*1.56 = 156.
Total increase = 56.
Percentage Increase = 56%

2nd Method Formula Approach.

Well the formula is [x + y + (xy)/100]% [Note this formula works only when there is 2 increases]
Now apply the formula in above Question you will get 20 + 30 + (20*30)/100 = 50 + 600/100 = 50 + 6 = 56%

Same Sumit's Salary is 1000rs and if it's asked the Salary of Sumit is Increased First by 20% then 30% and then again by 40% then what will be Total Increase and Final Salary.
It's Pretty simple now 1000*1.2*1.3*14 = 2184
That's the final Salary and % inrease = [(2184-1000)/1000]*100 = (1184/1000)*100 = 118.4%

Some Similar Questions Are like.
The Side of Square is Increased by 10% what will be the increase in Area.
So Just Let The Value of Eaxh side is x, If it's Increased by 10% Then it will become 1.1x
As You know are = Side*side
So Initially The Area without Increase Would Have been x*x = x^2
After Increase the Area will be 1.1x*1.1x = 1.21x^2
So total % increase in area will be 21%.

Case -9 Consecutive Increase and Decrease Simultaneously
In the last case we saw the case of % increase but now we will learn how to solve when there is a consecutive Increase and as well As decrease.
It's same as the last example.
Sumit's Salary is 1000rs Suppose the salary of Megamind was first Increased by 30% and Then decreased by 20%. What will be final Increase or Decrease in His Salary.
Just do The same Thing 30% increase means 1000*1.3
And then 20% Decrease mean 0.8times [remember we have to decrease here and 20% decrease means 0.2 Point decrease]
So total decease = 1000*1.3*0.8 = 1040.
Final Increase = 40RS
% Increase will be 4%.
With Formula.
Remember the formula x + y + (xy)/1000
Same formula can be used here But remember Increase means +ve Sign and decrease means -ve sign,
So apply here now 30 - 20 + (30)(-20)/100 = 10 - 600/100 = 10 - 6 = 4%.

Quiz :

Time : 5-6 minutes.

1. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. What are the marks obtained by them?
A) 42, 36
B) 44, 39
C) 42, 33
D) 44, 37
E) None of these.

2. A fruit seller had some oranges. He sells 40% oranges and still has 420 oranges. How many oranges he had originally?
A) 690
B) 700
C) 720
D) 745
E) None of these.

3. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?
A) 45(6/11) %
B) 45(7/11) %
C) 45(5/11) %
D) 46(5/11) %
E) None of these.

4. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, what was the number of valid votes that the other candidate got?
A) 3690
B) 2700
C) 5720
D) 4745
E) None of these

5. A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are
A) 600
B) 700
C) 520
D) 500
E) None of these.

6. A housewife saved Rs. 2.50 in buying an item on sale. If she spent Rs. 25 for the item, approximately how much percent she saved in the transaction ?
A) 6 %
B) 7 %
C) 10 %
D) 9(1/11) %
E) None of these.

7. A pipe X is 30 meters and 45% longer than another pipe Y. find the length of the pipe Y?
A) 600/29 meter
B) 37.25 meter
C) 20 meter
D) 50 meter
E) None of these.

8. On my sister's 15th birthday, she was 159 cm in height, having grown 6% since the year before. How tall was she the previous year ?
A)156 cm
B) 150 cm
C) 155 cm
D) 172 cm
E) None of these

9. Sumit got 30% of the maximum marks in an examination and failed by 10 marks. However, Sujith who took the same examination got 40% of the total marks and got 15 marks more than the passing marks. What were the passing marks in the examination?
A) 96
B) 150
C) 75
D) 85
E) None of these

10. 30% of the men are more than 25 years old and 80% of the men are less than or equal to 50 years old. 20% of all men play football. If 20% of the men above the age of 50 play football, what percentage of the football players are less than or equal to 50 years?
A) 60 %
B) 50%
C) 80 %
D) 85 %
E) None of these

Answers:

1. C
2. B
3. C
4. B
5. D
6. D
7. A
8. B
9. D
10.C

Concept on CI and SI with Quiz

Simple Interest (SI)

Principal: - The money borrowed or lent out for certain period is called the principal or the Sum.

Interest: - Extra money paid for using other money is called interest.

If the interest on a sum borrowed for certain period is reckoned uniformly, then it is called simple interest.

Let Principal = P, Rate = r % per annum (p.a.), and Time = t years then

Simple Interest(SI)= ((P×r×t))/100

Using this formula we can also find out
P=(100×SI)/(r×t);

r=(100×SI)/(P×t);

t=(100×SI)/(P×r).

Compound Interest:

When compound interest is applied, interest is paid on both the original principal and on earned interest.
So for one year Simple interest and Compound interest both are equal.
Suppose if you make a deposit into a bank account that pays compounded interest, you will receive interest payments on the original amount
that you deposited, as well as additional interest payments.

This allows your investment to grow even more than if you were paid only simple interest.
So Amount at the end of 1st year (or Period) will become the principal for the 2nd year (or Period) and
Amount at the end of 2nd year (or Period) becomes the Principal of 3rd year.

Amount = Principal + Interest

A= P (1+r/100) ^n

A= Amount,
P= Principal,
r= Rate %,
n= no. of years.

So Compound Interest = [P (1+r/100) ^ n - P]
= P [(1+r/100) ^ n – 1]

Condition:-

1.When interest is compounded annually,
Amount = P(1+r/100)^n

2.When interest is compounded half yearly,
Amount = P(1+(r/2)/100)^2n

3.When interest is compounded Quarterly,
Amount =P(1+(r/4)/100)^4n

4.When interest is compounded annually but time is in fraction, say 3 whole 2/5 year
Amount = P(1+r/100)^3×(1+(2r/5)/100)

5.When Rates are different for different years, say r1%, r2%, and r3% for 1st, 2nd and 3rd year respectively.

Then,
Amount = P(1+r1/100)×(1+r2/100)×(1+r3/100).

Present worth of Rs. x due n years hence is given by:

Present Worth = x/(1+r/100)

Difference between Compound Interest & Simple interest Concept For Two years
CI – SI =P(r/100)^2
For Three Year
CI – SI =P(r^2/(100^2))×(300+r)/100)
For Two year
CI/SI=(200+r)/200

Quant Quiz for Simple Interest & Compound Interest

1. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:
A) Rs. 720
B) Rs. 698
C) Rs. 678
D) Rs. 696
E) none of these

2. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9 % p.a. in 5 years. What is the sum?
A) Rs. 8045
B) Rs. 8925
C) Rs. 8900
D) Rs. 8032.45
E) none of these

3. A sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is:
A) 12 %
B) 13 %
C) 8 %
D) 12.5 %

4. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at 6.25% p.a. for 2 years.Find his gain in the transaction per year.
A) Rs. 112.50
B) Rs. 175

C) Rs. 150
D) Rs. 125.50

5. A man took loan from a bank at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 interest only for the period.The principal amount borrowed by him was:
A) Rs. 12000
B) Rs.15000
C) Rs. 12500
D) Rs. 22000

6.How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?
A)3 year
B)4 year
C)5 year
D)6 year

7. Bhavika took a loan of Rs. 1200 with simple interest for as many years as the rate of interest.If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?
A)3.6
B) 5
C) 6
D)25

8. A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is:
A) 5 %
B) 7%
C)10 %
D) 12%

9.**A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year.**
At the end of the year, the amount he would have gained by way of interest is:
A)123
B) 122
C)121
D)120

10.The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:
A)2.5
B) 2
C) 3
D) 4
E) none of these

11.At what rate of compound interest per annum will a sum of Rs. 1200 become Rs. 1348.32 in 2 years?
A)8 %
B) 9%
C) 6 %
D) 8.5 %
E) none of these

12.The difference between simple interest and compound on Rs. 1200 for one year at 10% per annum reckoned half-yearly is:
A)Rs. 3
B) Rs. 4
C) Rs. 3.5
D) Rs. 7.5
E) none of these

13.The least number of complete years in which a sum of money put out at 20% compound interest will be more than doubled is:
A) 4
B) 5
C) 6
D) 2.5
E) none of these

14.What will be the compound interest on a sum of Rs. 25,000 after 3 years at the rate of 12 p.c.p.a.?
A) Rs.10123.20
B) Rs. 9000
C) Rs. 12000
D) Rs. 10163.34
E) none of these

15.Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:
A)Rs. 1650
B)Rs. 2000
C)Rs. 1750
D) Rs.1550
E) none of these

Answers with Explanation:

Anwers:

1.B

2.B

3.A

4.A

5.B

6.B

7.C

8.C

9.C

10.B

11.C

12.A

13.A

14.A

15.C

Explanation

1.S.I. for 1 year = Rs. (854 - 815) = Rs. 39.

S.I. for 3 years = Rs.(39 x 3) = Rs. 117.

Principal = Rs. (815 - 117) = Rs. 698.

2.Sum = (100× S.I.)/ r × t

= (100 × 4016.25)/ 9 × 5 = Rs. 8925

3.S.I. for 3 years = Rs. (12005 - 9800) = Rs. 2205.

S.I. for 5 years= Rs. 3675

Principal = Rs. (9800 - 3675) = Rs. 6125

Hence Rate = {(100 × 3675) / 6125 × 5} % = 12 %

4.Gain in 2 years = Rs. [{(5000×6.25×2)/100} – {(5000×4×2)/100}]

= Rs. (625- 400) = Rs. 225.

So gain in 1 year = Rs.225/ 2 = Rs. 112.50

5.Principal = Rs. {(100× 5400)/ (12×3)} = Rs.15000.6.Time =(100×81)/ (450×4.5) years = 4 years

7.Let rate = r% and time = r years

Then (1200×r×r)/100= 432

12 r^2= 432

r=6 %

8.Let the rate be r% p.a.

Then,(5000 x r x 2)/100 +(3000 x r x 4)/100 = 2200.

100R + 120R = 2200

R = 2200/220= 10.

Rate = 10%.

9.Amount = Rs. [1600×(1+ 5/200)^2 + 1600 × (1+5/200)]

= Rs. 3321

So CI = Amount- Principal

= Rs. 3321 – Rs. 3200 = Rs. 121

10.Amount = Rs. (30000 + 4347) = Rs. 34347,

Let the time be n years then

30000(1+7/100) ^n = 34347

(107/100) ^n = 34347/30000

So n= 2 year.

11.Let rate r % per annum

1200× (1+r/100) ^ 2 = 1348.32

(1+r/100) ^ 2 = 1348.32/1200

1+r/100 = 106 / 100

r= 6 %

12.SI =Rs. (1200 ×10×1)/100= Rs. 120

CI = Rs.[1200×(1+5/100) ^2 - 1200] = Rs.123

So CI-SI = Rs. 3

13.P(1+20/100) ^n > 2P

(6/5)^ n >2

(6/5×6/5×6/5×6/5)>2

so n = 4 years

14.Amount= Rs. 25000(1+12/100)^3= 35123.20

So CI= Rs. (35123.20 - 25000) = Rs. 10123.2015.C.I.= Rs. 4000(1+10/100)^2 – 40= Rs. 840

Sum= Rs. (420 × 100)/(3×8) = Rs. 1750

Time & Work

Note -: In conventional Method work is always treated as 1

Example: So if I say that a person can complete a work in 15 days that means he will do 1/15 work in one day, It's simple maths.

Now another person does the same work in 30 days. So he will do 1/30 work in 1 day.

Now if i ask in how many days they will complete the work together. What we gonna do is Add their 1 day of work like 1/15 + 1/30 = (2+1)/30 = 3/30 = 1/10

Now this 1/10 we got is actually their 1 day work, So if they do 1/10 work in one day then it's simple they will complete the whole work in 10 days.

Now that was the conventional method and I believe that you all know how to solve Questions through Conventional method.

So now lets move on to the Faster method i.e efficiency method.

In efficiency method the Work is not treated in numerical value, Like in Conventional method the work is 1 but here the work is treated as percentage.

So by common sense the work is always treated as 100%

So when i say a person completes a work in 15 days it means he will do 100/15 % work in 1 day i.e 6.66% work in 1 day

If another person does the work in 30 days that means he will do 3.33% work in 1 day.

And together they will do 6.66 + 3.33 = 9.99 or 10% work in one day So in how many days they will do the complete work, that will be 100/10 = 10 days.

Now it may sound difficult That we have to convert Each value in % but don't worry you don't have to convert each value, You just have to learn all the values till 1/30 and then it will be a cakewalk.

Now we will take Some standard Cases Of time and work and you all are free to ask any problem if you have in any case.

Case 1 - A does a work in X days, B does a Work in Y days In how many days they will complete the work.

Question- A completes the work in 10 days and B completes the work in 15 days In how many days they will complete the work.

Conventional Method

Work done by A in 1 day = 1/10

Work Done by B in 1 day = 1/15

Work done By A& B together in 1 day = 1/10 + 1/15 = (3+2)/30 = 5/30 = 1/6

As A & B Completes 1/6 work in one day So they will complete the whole work in 6 Days.

Efficiency **method.**

Efficiency of A =100/10 = 10%

Efficiency of B = 100/15 = 6.66%

Efficiency of A & B Together = 10+ 6.66 = 16.66%

So the time taken by A & B together to Complete the work will be 100/16.66 = 6 Days.

Case -2 A can do a work in X days and B can do it Y days, In how many days the work is completed if they work alternatively Started by A.

Now in these type of question the person are not actually working together, what happens in this type of question is that A works for 1 day and then on 2nd day B work and on 3rd again A work and on Fourth again B works and so on till the work is completed.

For example A can do a work in 10 days B can do it 15 days and how many days they will finish it if The work is started by A

So again work done by A in one day = 1/10

" " " " " B " " = 1/15

Now the work done by Togther will be = 1/10 + 1/15 = 1/6 [Note now this 1/6 work is not done by them in 1 day but in 2 days Actually, See A worked for 1 day and did 1/10 work on the second day B worked and finished the 1/15 work So in total 2 days they did 1/6 work]

So in 2 days they did 1/6 work so in how many days they will complete the whole work, Simple 12 days.

Efficienecy Method

A's Efficiency = 10%

B's Efficiency = 6.66%

A + B Efficiency = 16.66%

Work done by A and B in 2 days [remember 2 days because they are not working together but working alternatively] = 16.66%

So time taken by them to complete 100% work = 100/(16.66 = 6 [but always remember multiply this by 2, Beacause 16.66% work is done by them in 2 days and not in 1 day.

So The answer will be 6*2 = 12 days.

Case 3: A can do a work in X days, B can do the work Y days and A leaves after working Z days.

Question- A can do a work in 10 days and B can do it in 15 days, A works for 2 days and then leaves, In how many days will the work be completed?

Now here we can se that A leaves after 2 days that means A and B only worked for 2 days and the remaining work is done by B alone.

So first we have to calculated the work done by A and B together in 2 days.

So work done be A in 1 day = 1/10

"" " " " B " " " = 1/15

Work done by A & B together is 1 day = 1/10 + 1/15 = 1/6

Work done by A & B together in 2 days = (1/6) * 2 = 1/3

So remaining work = 1 - 1/3 = 2/3

Now this 2/3 work has to be done by B alone.

So it takes 15 days for B to do Complete work, How much time it will be taken by B to do 2/3 work ? So it will be 15*(2/3) = 10 days

So the work will be completed in 2 + 10 days = 12 days

Efficiency method

A's efficiency = 10%

B's Efficiency = 6.66%

Total a+b = 16.66%

work done by A and B together in 2 days = 16.66*2 = 33.33%

Work remaining = 66.66%

time taken by B to complete 66.66% work = 66.66/6.666 = 10 days

Total time = 10+2 = 12 days

Case 4

A can do a piece of Work in 10 days and B can do it in 15 days, In how many days will the work be completed if B leaves 2 days before the completion on work.

Now in this question B leaves before 2 days

Together they can do the work in what = 1/10 + 1/15 = 1/6

That means 6 Days.

That means Together they could have completed the work in 6 days but B works only till 4th day and The remaining work will be done by A alone

So they worked together for 4 days in all So work done by them in 4 days = (1/6)*4 = 4/6 = 2/3

remaining work = 1/3

Now this 1/3 work will be done by A alone

Now A can do the complete work in 10 days, So the time taken by him to do 1/3 work = 10 * (1/3) = 10/3 days or 3.33 days

So total time taken = 4+ 3.33 days = 7.33 days

Efficiency method

A's efficiency = 10%

B's efficiency = 6.66%

Total = 16.66%

Work will be completed in 6 days

Work done in 4 days = 66.66%

remaining = 33.33%
A will complete the remaining in = 33.33/10 = 3.33
Total = 4+3.33 = 7.33

Case 5: A can do a Work in X days B can Do it in Y days, In how many days The work will get completed if B leaves 2 days before the actual completion of work.

Question: A can do a work in 10 days B can do it in 15 days, In how many days The work will get completed if B leaves 2 days before the Actual Completion of Work.what is the difference between this Actual completion of work and Completion of Work?
See in last example the work was supposed to get completed in 6 days, So we just Solved the question taking into consideration that B leaves 2 days before the completion of work i.e B worked for 4 days and the rest 2 days work was don by A alone and Completes that work in 3.33 days Total 7.33 days.
So if i ask In this question If B left 2 days before the actual completion then it means B should have left on 5.33 days Got it ?
Now back to the question.
Now just imagine that the work gets completed in x days.
So A would work for x days[A works for the whole time]
And B would work for x-2 days[because B left 2 days before the actual completion of work]
So now According to Question
x/10 + (x-2)/15 = 1 [Beacuse work is always one]
(3x+2x-4)/30 = 1
5x -4 = 30
5x = 34
x = 6.8 days.
So the work will be completed in 6.8 Days.
It can also be asked That after how many days B left, So the answer would be Simple 6.8 - 2 = 4.8 days

Efficiency Method
A's Efficiency = 10%
B's Efficiency = 6.66%
Let the no. of days be x
soAccordring to question
10x + 6.66(x-2) = 100[Work is always 100% in efficiency method]
10x + 6.66x - 13.33 = 100
16.66x = 113.33
x = 113.33/16.66 = 6.8
Answer = 6.8 days

Time, Speed & Distance Concepts

If I'm typing all this, and I stop in the middle, then only my average speed of typing goes down. Time never stops. With each second that pass, Present becomes past and future becomes present. This is the first thing you need to know.

The second thing is speed.

In time-distance problems, if we take Distance as a constant thing, then speed and time becomes variables. We change speed, and thereby we changes the time taken.

Suppose, Delhi to Agra is 120 km. And my motorcycle covers 40 km in one hour. So, how much time I will take to reach Agra?

Simple! 3 hrs. time.

But my friend's car covers 60 km in an hour. He will take how much time?

Simple! 2 hrs. time.

Means to say, my friend will reach Agra 1 hour before me.

So, keeping the distance constant, we got two times for two speeds. The time taken is inversely

proportional to speed.

Basic formula we used here for calculation of time taken is:

Time taken = Distance/Speed

And using this formula, we can calculate speed, or, distance, if two other things are known

Speed = Distance/Time

Distance = Speed * Time

Feel this in mind before we go further...

Let's now entertain the concept of average speed!

Question: I travel half of my journey by Bus with speed of 60kmph and the rest half on my friend's motorcycle with speed of 80kmph. What is my average speed of total journey?

Average speed is that speed which covers the total distance in the total time (that is, the total time taken to cover the distance if I go by variable speeds)

Average speed = Total distance / Total time taken

Now, here in this question, 'speed' is variable (means changing). Distance is taken constant. So, Time taken will also be variable depending upon the speeds.

Time = Distance/speed, T= D/S

Let total distance be 2D, so that for 1st speed we have half distance 'D', and for second speed we have second half distance 'D'

S1 = 60kmph
S2 = 80kmph

So, we have

T1 = D/60
T2 = D/80

Now, average speed = total distance / total time

Total distance = distance for 1st time + Distance for 2nd time = 2D
Total time = D/60 + D/80 = [7D/240]

Average speed will be = [2D] / ([7D/240]) = 480/7 kmph

Let's derive this formula

Let 1st speed (60) = X
Let 2nd speed (80) = Y

T1 = D/X
T2 = D/Y

Total Distance = 2D
Total time = D/X + D/Y = [Y+X]*D/[XY]

Average Speed will be = [2D] / ([Y+X]*D/[XY]) = [2XY]/[X+Y]

Note: This formula we have derived taking the distances for both the speed as equal. So, if in questions, distances varies, this formula will fail to be applicable.

If you can remember the formula, then its fine, but if not, it's still is fine. Problem is to just find the average speed. Our suggestion is to stick to basic concepts.

Now let's test you:

Quiz Ques 1: Uday travels one third of its journey by train with speed of 60kmph and the rest of journey by car with speed of 80kmph. Find his average speed of his journey?

(Answer to this and all quiz questions later)

The distance of the college and home of Rajeev is 80km. One day, he was late by 1 hour than normal time to leave for college, so he increased his speed by 4kmph and thus he reached to college at the normal time. What is the changed speed of Rajeev?

To solve this question, first feel what the question is saying.

Distance is 80km. It is constant. Only speed is changed.

Now, let's say his normal speed is X kmph, Then he will reach the college in 80/X hour time. (Equation 1)

With [X+4] speed, he will reach the college in 80/[X+4] hour time. (Equation 2)

Now the question says, he is late 1 hour but with X+4 speed, he reaches the college on time.

That means time in (Equation 1) must be 1 hour more than the time in (Equation 2)

Quiz Ques 2: Can you solve further and find the increased speed of Rajeev?

Let's now solve a very good question which will clear many concepts in a single run!!

The distance between two places P and Q is 700km. Two persons A and B started towards Q and P from P and Q simultaneously. The speed of A is 30kmph and speed of B is 40kmph. They meet at a point M which lies on the way from P to Q.

(i) How long will they take to meet each other at M?

(ii) What is the ratio of PM : MQ?

(iii) What is the distance MQ?

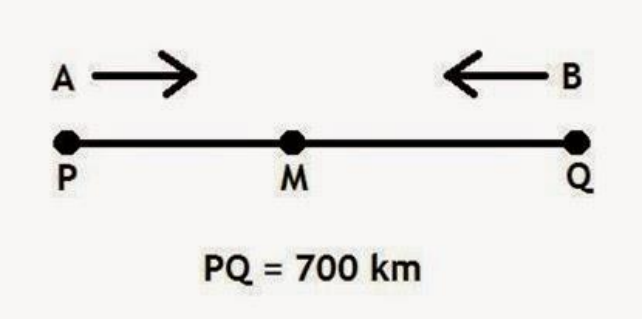
(iv) What is the extra time needed by A to reach at Q than to reach at P by B?

(V) What is the ratio of time taken by A and B to reach their respective destinations after meeting at M?

(vi) In how many hours will they be separated by only 560 km before meeting each other?

(vii) How long will it take to separate then by 280 km from each other when they cross M (time to be considered after their meeting)?

First of all we'll make a diagram. Diagram making is important for solving questions like these. Diagrams makes us feel the question a little more clearly.



The concept of relative motion is entertained here.

By relative motion, we means the motion of one thing with respect to another thing. Suppose you're sitting on the pillion seat behind the motorcycle of your friend who is driving the motorcycle at 40kmph, then the relative speed of you with respect to motorcycle (or your friend) will be zero because for your friend, you are not moving an inch. But with respect to a person selling ice cream in the corner shop, your relative speed will be 40kmph, because for him, you're moving with a speed of 40kmph.

Now, you steal his ice cream, and get ahead. He also had a bike and he's now driving his bike behind you with a speed of 50kmph. Will he catch you?

Of course, he will. Coz now, the relative speed of him is 10kmph more with respect to you. He will catch you sooner.

The concepts when put mathematically is this:

If two bodies A and B are moving with speed Sa and Sb, then relative speed will be

Sa - Sb, if they're moving in the same direction, and

Sa + Sb, if they're moving in the opposite direction.

(i) Now apply this concept.

A and B, both are moving in opposite direction with speeds of 30kmph and 40kmph. So, their relative speed will be?

Ans: 30+40 = 70kmph.

They will take how much time to reach at point M?

They will cover total Distance = 700km / with speed of 70 kmph = will take Time = 10 hour to reach at point M

Understand this before you go further to solve the rest of questions!

(ii) It took 10 hour by both of them to reach at M.

With speed 30kmph, A has covered 30*10 = 300km = PM

With speed 40kmph, B has covered 40*10 = 400km = MQ

Ratio of distances PM : MQ = 300 : 400 = 3 : 4

Note: know this that if time is taken constant, the ratio of distances will be equal to the ratio of their speed. (Just because distance = speed * time)

How?

D1 = S1*T1
D2 = S2*T2

T1 = T2

------> D1/D2 = S1/S2

(iii) Distance MQ = 400 km

(iv) Time taken by A to reach Q = distance/speed = 700km/30kmph = 70/3 hour
Time taken by B to reach P = distance/speed = 700km/40kmph = 70/4 hour

Extra time taken by A will be ---- 70/3 - 70/4 = 70/12 hour

Understand this before you go further!!

(v) When A has reached at point M, A has covered 300km (because PM = 300km) and B has covered 400km (because MQ = 400km). Now, A has to cover 400km more and B has to cover 300km more. So,

Time Ta taken by A to cover MQ = distance MQ/speed = 400/30 hour
Time Tb taken by B to cover PM = distance PM/speed = 300/40 hour

Ratio of their time = Ta/Tb = [400/30]/[300/40] = 16/9

If derived (just like we've solved), we will get to know that this ratio [Ta/Tb] of their time is the ratio of the reciprocal of squares of their speed.

Why not we derive this?

Suppose A travels X km with speed Sa and B travels 700-X km with speed Sb and reaches point M in time T.

Time taken to reach point M will be equal.

i.e. [X]/Sa = [700-X]/Sb
i.e. [700-X]/[X] = [Sb/Sa]

Now, for A, rest distance to cover is 700-A with speed Sa, and for B, rest distance to cover is X with speed Sb, they will take time Ta and Tb to reach their destinations.

Ta = [700-X]/Sa
Tb = [X]/Sb

So, ratio of their times will be = Ta/Tb = ([700-X]/Sa) / ([X]/Sb) = ([700-X]/[X]) * ([Sb/Sa])

But we know that [700-X]/[X] = [Sb/Sa]

So, putting this in equation, we gets, Ta/Tb = ([Sb/Sa]) * ([Sb/Sa])

i.e. Ta/Tb = square of [Sb/Sa] ------ (note Sb/Sa and not Sa/Sb)

Sb = 40 kmph, Sa = 30kmph ∴ Ta/Tb = square of [40/30] = square of [4/3] = 16/9

(vi) They will be separated by only 560 Km if they have covered 700-560 = 140 km.

With relative speed of 70kmph, they will cover 140km in 2 hour. So, that means, after 2 hour, they will be separated by 560km

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(vii) Again, after crossing at the point M, their relative speed still will be the same. I.e. they will cover 280km in 280/7 = 4 hour time.

Understood? Now, try to solve this question!!

Quiz Ques 3: A lives at P and B lives at Q. A usually goes to meet B at Q. He covers the distance in 3 hour at 150kmph. On a particular day, B started moving away from A While A was moving towards Q, thus A took 5 hours to meet B. What is the speed of B?

Concept of Boats and Stream

The concepts of boats and streams is also based on this relative speed.

When boat goes downstream, the speed of flowing water helps the boat to move faster with more speed. When boat goes upstream, the speed of flowing water tries to cancel the speed of boat. The boat moves slower this time.

If, speed of stream = S and speed of boat is B, then

Downstream speed, D = B + S
Upstream speed, U = B - S

B generally means speed of boat in still water.

Hence, B = [D+U]/2 and S = D-B = [D-U]/2

Let's apply this concept in this question:

Ques: A man can row 9 kmph in still water. It takes him twice as long as to row up as to row down, Find the rate of stream of water.

Let distance covered by boat be 'D'
Speed of stream be 'S'
Speed of boat is 9kmph

- Downstream time Td = distance/speed = D/[9+S]
- Upstream time Tu = distance/speed = D/[9-S]

Tu is twice than Td

- D/[9-S] = 2*D/[9+S]

On solving, we will get S = 3 kmph

Understood? Solve this question now:

Quiz Ques 4: A man can row at 10 kmph in still water. If the river flows at 3 kmph and, it takes 12 hours more in upstream than to go downstream for the same distance. How far is the place?

Concept of Races

In races, questions are asked of two or three player race. Questions are like,

Ques: In a race between Ram and Rahim, Ram has won the 1 km race by 100 meters. What is the ratio of their speeds?

The concepts are no different than those that we have already covered. Just some twists in the questions. The objective is to find what the question is saying. Answers will follow.

Now, first step and the most important step is to feel in mind's eye what all is happening in the race. When Ram has just won the race of 1km, Rahim is how far behind him?

Ans is 100 meters behind him.

And Ram has covered 1000 meters, Rahim has covered how much distance?

Ans is 900 meters.

And Ram has covered 1000 meters in the same time it took Rahim to cover 900 meters.

Distance covered are in the ratio of 1000:900

Know the previous concept that when distance is different and time is constant, speed is directly proportional to the distance.

So, speed ratio of Ram : Rahim will also be 1000:900 = 10 : 9

This question will cover the remaining logic.

Ques: in a 1000m race, Ravi gives Vinod a start of 40m and beats him by 19 seconds. If Ravi gives a start of 30 sec to Vinod, then Vinod beats Ravi by 40m. What is the ratio of speed of Ravi to that of Vinod?

Case1: Now, visualize, in 1000m race, Ravi has given Vinod a start of 40m and beats him by 19 seconds. Means to say, Ravi runs 1000m while Vinod runs only 960m.

Second thing, when Ravi completed his 1000m, Vinod is still running and he runs for 19s more.

When putting it mathematically, if Ravi has completed the 1000m in T1 seconds, Vinod took T1+19 seconds to complete the 960m.

Case2: Ravi gives Vinod a start of 30s, then Vinod beat Ravi by 40m. Means to say, When the race is finished, Vinod has run 1000m while Ravi has run only 960m.

Second thing, Vinod has given the start of 30s. When Vinod has completed his 1000m, Ravi is still behind him 40m (i.e. Ravi has completed 960m)

When putting it mathematically, if Vinod has run 1000m in T2+30 seconds, Ravi has run 960m in T2 seconds.

Based on all the above facts, we'll find their speeds.

Ravi's speed = 1000/T1 = 960/T2

T1 = [25/24]*T2

Also, Vinod's Speed = 960/[T1 + 19] == 1000/[T2 + 30]

Solving this by putting T1's value, we gets, T2 = 120s

Required ratio = [960/T2] / [1000/(T2 + 30)] == [960/120] / [1000/150] = 6/5 = Answer.

If you understood all this, try solvingthesequestion using the same basic concepts.

Quiz Ques5: In a 1600m race, A beats B by 80m and C by 60m. If they run at the same time, then by what distance will C beat B in a 400 m race?

Quiz Ques 6: A beats B by 100m in a race of 1200m and B beats C by 200m in a race of 1600m. Approximately by how many meters can A beat C in a race of 9600m?

Circular Motion Concept

In circular tracks, the radius should be given or the length of the track is given. If length is given then its okay, if radius is given then put the formula L = 2*pi*radius to find the length of track.

Two or more runners will run this track with unequal speeds. They will run in the same direction or opposite direction.

We've covered that when two people run in same direction, their relative speed = speed of person with more speed - speed of person with less speed.
And when they run in opposite direction, their relative speed becomes = speed of 1st person + speed of 2nd person.

This same concept is to be used here.

Time taken by them to meet for first time will be = length of trace / relative speed.

Means to say, if A runs 1000m race with speed of 25mps and B runs race with speed of 15mps and they both are running in opposite direction, then

Time taken = length of track 1000m / relative speed 25+15mps = 1000/40 = 25seconds

If they run in the same direction, they will take = 1000/10 = 100 seconds.

Sometimes, question is asked of their meeting at the same starting point. For, this, LCM of their time is taken

That is to say, if A runs 1000m with 25mps speed, he will take = 40sec
B runs 1000m with 15mps speed = he will take = 200/3 sec

LCM of 40 and 200/3 = 200

So, they will take 200 sec to meet again at starting point.

This covers the basics of Time and Distance.

Note: These time and speed questions entertains practical imagination of examinee. If one can practically feel how boring it is to drive at 30 kmph and how thrilling the drive becomes if we go at 90 kmph, then he can do more with these questions. The idea is just to get a feel out of these questions. Answers will automatically follow.

Time and Speed

(1). Relation between distance ,time and speed:
Distance = speed x Time

(2). To convert speed of any object from KMPH to MPS multiply the speed by = 1000 / 3600 = **5 / 18**

(3). To convert speed of any object from MPS to KMPH multiply the speed by = 3600 / 1000 = **18/ 5**

(4). If the speed ratio of A and B is a:b then ratio of time to cover certain distance is = **1/a : 1/b = b : a**

(5). If a person covers certain distance with speed x KMPH and return back with speed y KMPH then his average speed throughout the journey is
Average speed = **2xy/(x+y)KMPH**

(6). If a certain distance is covered with 3 diffrent speed x KMPH, y KMPH and z KMPH then average speed throughout the journey is
Average speed = **3xyz/(xy+yz+zx)KMPH**

(7). If 2 different distances covered with speed x KMPH and y KMPH respectively but required same time the then average speed throughout the journey is
Average speed = **(x+y)/2 KMPH**

(8). If 2 trains start at the same time from different points suppose A and B respectively toward each other and after crossing if they take a and b seconds time resp to reach at B and A point then
(A's speed) : (B's speed) = √b : √a
Formulae based on Train Problems
Relative Speed (Train Problems):

(9)If two trains are moving in the same direction with speed x KMPH and y KMPH where x>y in that case their relative speed is given as :(x-y) KMPH

(10)If two trains are moving in the opposite direction with speed x KMPH and y KMPH in that case their relative speed is given as: (x+y) KMPH

Quant Quiz on Time and Distance
1.Walking at 7/8th of his usual speed, a man reached his destination 16 minutes later than the time he usually takes to reach his destination. Find the usual time taken by him to reach his destination.
(a) 1 hour, 44 minutes
(b) 1 hour, 52 minutes
(c) 1 hour, 36 minutes
(d) 1 hour, 40 minutes

2.A person goes to office by train. He walks to the railwy station closest to his home to catch the train. One day, he walked at 4 km/hr and missed the train by 5 minutes. The next day, he walked at 6 km/hr and reached the station 7 minutes before the arrival of the train. find the distance between his home and the station.
(a) 2.4 km
(b) 1.8 km
(c) 3.6 km
(d) 3 km

3. Ashok covered a distance of 225 km as follows. He covered the first 15 km at 45 km/hr, the next 120 km at 60 km/hr and the remaining journey at 90 km/hr. Find his average speed for the journey of 225 km.
(a) 65 km/hr
(b) 67.5 km/hr
(c) 70 km/hr
(d) 73.5 km/hr

4. A person went from P to Q, at an average speed of a km/hr, from Q to R at an average speed of b km/hr, and from R to S at an average speed of the c km/hr. If PQ = QR = RS, then the average speed of the person for traveling from P to S was
(a) (a + b + c)/ 3
(b) 3abc/(ab + bc + ca)

(c) 3abc/(a + b + c)
(d) 3(ab + bc + ca)/(a + b + c)

5. Car P starts from town X toward town y. Car Q stars from Y towards X. Both the cars start simultaneously and travel their meet after journeys at uniform speeds. XY = 200 km. Both cars meet after 2 hours. If P and Q had travelled in the same direction both the cars would have met in 4 hours. Find the speed of P.
(a) 60 kmph
(b) 85 kmph
(c) 75 kmph
(d) 80 kmph

6. Train P overtakes train Q double its length and travelling at half of speed of train P in 36 seconds. Train P crosses train R going in the opposite direction at double its speed in 8 seconds. If the speed of train P is 72 kmph then the length of train R is .....
(a) 330 m
(b) 360 m
(c) 390 m
(d) 420 m

7. A 480 m long train was travelling at 72 km/hr. It took 32 seconds to cross a cyclist travelling in the same direction as the train. Find the speed of the cyclist.
(a) 12 km/ph
(b) 15 km/ph
(c) 18 km/ph
(d) 9 km/ph

8. A train, 180m long, crossed a 120 m long platform in 20 seconds, and another train travelling at the same speed crossed an electric pole in 10 seconds. In how much time will they cross each other when they are travelling in the opposite direction.?
(a) 11 sec
(b). 13 sec
(c) 12 sec
(d) 14 sec

9. On a circular track, time taken by A and B to meet when travelling in the opposite directions is 1/4 of time taken when they travel in the same direction. Find the ratio of their speeds?
(a) 5: 3
(b) 6 : 5
(c) 4 : 3
(d) 3 : 2

10. How long will three persons starting at the same point and travelling at 4 km/hr, 6 km/hr and 8 km/hr around a circular track 2 km long take to meet at the starting point?
(a) 1/2hr
(b) 1hr
(c) 1.5 hrs
(d) 2 hrs

Answers with Explanation
1. (b) Ratio
Speed 8 : 7
Time 7 : 8
1 = 16
7 = 7 X 16 = 112 min
= 1 hr 52 min

2. (a) Let S1 = 4 kmph, S2 = 6 kmph
Distance = (S1 × S2)/ (S1-S2) X total time in hr
Distance = (4 ×6)/ (6- 4) x (7+5)/60
= (4 ×6)/2 × 1/5 = 2.4 km

3. (b) Average speed = Total distance / Total time
= 225/(15/45 + 120/60 + 90/90) = 67.5 km/h

4. (b) by above concept No. 6

5. (c) Let speed of car P = S1
& speed of car Q = S2
From Ist case:
2S1 + 2S2 = 200 - (i)
From 2nd case, When cars travelled in Same direction
200/ (S1 - S2) = 4
4 S1 - 4 S2 = 200 (ii)
From Equation (i) & (ii)
S1 = 75 kmph

6. (b) For Train P
length = L, Speed = 72 kmph
For train Q
length = 2L, Speed = 36 kmph
(L + 2L)/(72 - 36)X5/18
L= 120 meter
For train R
Speed = 2 X 72 = 144 kmph
& length = x meter
(120 + x) / (144 + 72)X5/18 = 8
x = 360 meter

7. (c) Let speed of cyclist = x kmph
480/(72 - x) X 5/18 = 32
x = 18 kmph

8. (a) Let speed of 1st train = x kmph
(180 + 120)/(x X 5/18) = 20
x = 54 kmph
T/(54 X 5/18) = 10, T = 150 meter
So, (180 + 150) / (54 + 54) X5/18 = 11 sec

9. (a) Let speed of A = x kmph
& speed of B= y kmph& x > y
When they are travelling in same direction, time taken be t
2PiR/ (x - y) = t ..... (i)
When they are travelling in opposite direction
2PiR/(x + y) = t/4 ..... (ii)
From Eq (i) & (ii)
x + y /x - y = 4
By C & D
x/y = (4 + 1)/(4 -1) = 5/3
x : y = 5 : 3

10. (b) Time taken for the three people meet in hours
= LCM (2/4, 2/6, 2/8)
= 1 hours

All About Time And Distance

Introduction:-
The terms time and distance are related to the speed of a moving object.
Speed: Speed is defined as the distance covered by an object in unit time.

$$\text{Speed} = \frac{\text{Distance Covered}}{\text{Time Taken}}$$

Some Important Facts
Distance travelled is proportional to the speed of the object if the time is kept constant.
Distance travelled is proportional to the time taken if speed of object is kept constant.
Speed is inversely proportional to the time taken if the distance covered is kept constant.

If the ratio of two speeds for same distance is a:b then the ratio of time taken to cover the distance is b:a

Relative Speed

If two objects are moving in same direction with speeds of x and y then their relative speed is (x - y)
If two objects are moving is opposite direction with speeds of x and y then their relative speed is (x + y)

Unit Conversion

$$x \text{ km/hr} = \left(x \times \frac{5}{18}\right) \text{ m/sec}$$

$$x \text{ m/sec} = \left(x \times \frac{18}{5}\right) \text{ km/hr}$$

Some Important Shortcut Formulas

Rule 1: If some distance is travelled at x km/hr and the same distance is travelled at y km/hr then the average speed during the whole journey is given by

$$\text{Average speed} = \frac{2xy}{x+y} \text{ km/hr}$$

Example
John goes from his home to school at the speed of 2 km/hr and returns at the speed of 3 km/hr. What is his average speed during whole journey in m/sec?
Sol:
Let's say x = 2 km/hr
And y = 3 km/hr, so

$$\text{Average speed} = \frac{2xy}{x+y} = \frac{2 \times 2 \times 3}{2+3} = 2.4 \text{ km/hr}$$

Now, average speed in m/sec
= 2.4*(5/18) = .67m/sec

Rule 2: If a person travels a certain distance at x km/hr and returns at y km/hr, if the time taken to the whole journey is T hours then the one way distance is given by

$$\text{One Way Distance} = T\left(\frac{xy}{x+y}\right) \text{ km}$$

Example
Mr Samson goes to market at the speed of 10 km/hr and returns to his home at the speed of 15 km/hr. If he takes 3 hours in all, what is the distance between his home and market?
Sol:
Let's say x = 10 km/hr
y = 10 km/hr, and
T = 3 hrs, then

$$\text{One Way Distance} = T\left(\frac{xy}{x+y}\right) = 3 \times \left(\frac{10 \times 15}{10+15}\right) = 18\,km$$

So the distance between home and market is 18 km.

Rule 3: If two persons A and B start their journey at the same time from two points P and Q towards each other and after crossing each other they take a and b hours in reaching Q and P respectively, then

$$\frac{A^{'}Speed}{B^{'}Speed} = \frac{\sqrt{b}}{\sqrt{a}}$$

Example
Two persons Ram and Lakhan start their journey from two different places towards each other's place. After crossing each other, they complete their journey in 1 and 4 hours respectively. Find speed of Lakhan if speed of ram is 20 km/hr.
Sol:
Let's say A = Ram and B = Lakhan
a = 1 and b = 4, then

(20/Lakhan speed) = (2/1)
Lakhan's Speed = 10 km/hr

Rule 4: If the same distance is covered at two different speeds S_1 and S_2 and the time taken to cover the distance are T_1 and T_2, then the distance is given by

$$Distance = \left(\frac{S_1 S_2}{S_1 - S_2}\right) \times (T_1 - T_2)$$

Example
Two trucks travel the same distance at the speed of 50 kmph and 60 kmph. Find the distance when the distance when the time taken by both trucks has a difference of 1 hour.
Sol:
Let's say S_1 = 50 kmph,
S_2 = 60 kmph
$T_1 - T_2 = 1$

Distance = [(50*60)/(60-50)]*1 = 300km

Quiz On Time And Distance:-

1.Busses start from a bus terminal with a speed of 20 km/hr at intervals of 10 minutes. What is the speed of a man coming from the opposite direction towards the bus terminal if he meets the buses at intervals of 8 minutes?
a.3 km/hr
b.4 km/hr
c.5 km/hr
d.7 km/hr
e.None of these

2.The distance between two cities A and B is 330km. A train starts from A at 8 (a)m. and travels towards B at 60 km/hr. Another train starts from B at 9 (a)m. and travels towards A at 75 km/hr. At what time do they meet?
a.10 am.
b.10 : 30 am.
c.11 am.
d.11 : 30 am.
e.None of these

3.Two trains are moving on two parallel tracks but in opposite directions. A person sitting in the train moving at the speed of 80 km/hr passes the second train in 18 seconds. If the length of the second train is 1000 m, its speed is?
a.100 km/hr
b.120 km/hr
c.140 km/hr
d.150 km/hr
e.None of these

4.In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer. Abhay's speed is?

a.5kmph
b.6kmph
c.6.25kmph
d.7.5kmph
e.None of these

5.It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is?
a. 2 : 3
b. 3: 2
c. 3 : 4
d. 4 : 3
e. None of these

Answers with Explanation:-

1.(c)
Distance covered in 10 minutes at 20 kmph = distance covered in 8 minutes at (20+x) kmph
20× 10/60=8/60(20+x)
200 = 160 + 8x
8x = 40
x=40/8=5 kmph

2.(c) Distance travelled by first train in one hour
= 60 x 1 = 60 km
Therefore, distance between two train at 9 a.m.
= 330 – 60 = 270 km
Now, Relative speed of two trains = 60 + 75 = 135 km/hr
Time of meeting of two trains =270/135=2 hrs.
Therefore, both the trains will meet at 9 + 2 = 11 A.M.

3.(b) Let the speed of second train be x m/s.
80 km/h = (80×5)/18 m/s
According to the question 1000/(x+(80×5)/18)=18
100 – 18x + 400
x=666/18 m/s
= 600/18×18/5 km/h = 120 km/h

4.(a)
Let Abhay's speed be x km/hr.
Then, 30/x-30/2x= 3
6x = 30
x = 5 km/hr.

5.(c)
Let the speed of the train be x km/hr and that of the car be y km/hr.
Then, 120/x+480/y= 8 1/x+4/y=1/15 ....(i)
And, 200/x+400/y=25/3 1/x+2/y=1/24 ....(ii)
Solving (i) and (ii), we get: x = 60 and y = 80.
Ratio of speeds = 60 : 80 = 3 : 4.

Permutation & Combination and Probability

Permutation& Combination and Probability:
Permutation and Combination are not that important for the purpose of exam Because Question are rarely asked from This Topic but We have to learn them anyway because Question of probability can't be solved without learning permutation and combination. So will give you all a little hint about what is permutation and what is combination and then we will move on to Probability.

But Before That Just Look at A very Important Concept Without Which You can't solve a single Question of permutation/combination or probability.
And that Factorial Notation.
It's represented by (!) and it is read as Factorial.
So if i write 5! it will be read as Five Factorial.
And what it means ? It means to simply multiply all the numbers in decreasing order till 1.
Like if i write 6! it means 6*5*4*3*2*1 = 720
Or 7! = 7*6*5*4*3*2*1 = 5040
For Fast Calculation You all must learn the value of factorial till 10.
Just Learn these values
1! = 1
2! = 2
3!= 6
4! = 24
5! = 120
6! = 720
7! = 5040
8! = 40320
9! = 362880
10! = 3628800

Well Before I Start Explaining Permutation and combination one thing i want to tell and that is It's the easiest topic that you will find in maths. Most people are unable to understand it and that's why people think it's complex and all type of misconceptions but trust me it's the easiest topic in the whole mathematics and It's not actually even maths, It's less about Calculation and more about Logical Thinking. Well We all can't Calculate Fast but we all can think fast.

So what is permutation?
In Simple words it's arrangement or No. of ways things can be arranged.
Suppose there are 3 words ABC and if it's asked How many ways these three can be arranged then all yu or What are the no. of permutations Possible. Then all you have to do is Arrange this things in as many ways it's Possible.
Let's try to arrange them now. SO There is ABC, ACB, BAC, BCA, CAB, CBA Are there any more ways these can be arranged ?try it ? No These are the all possible arrangements. So The answer to the above Question will be 6. That is ABC can be arranges in different ways.

Now there were only 3 alphabets What if there were more like You have to Arrange ABCDEFGHI. Now for 3 alphabets it was easy you easily arranged them But Arranging these 9 letters will take you days and even then you will not be able to get a certain answer.

So what we should do here. No need to worry our mathematicians were genius they created a very simple formula for that.
And Formula is like this.
N Different things can be arranged in N! ways.
So in above Question there were 9 alphabets so the no. of possibele arrangements will be 9! = 362880.
So that was out basic concept Now let's move on to another basic concept.

So in the above questions It was Asked in how many ways ABCDEFGHI Can be arranged. In this question they were asking the possible arrangements of all the 9 Alphabets, They can also Ask In how many ways 4 alphabets from above 9 alphabets can be arranged.

In such type of Questions there is another formula Which is very veryvery important because it will be used in almost every question.
So the formula is Out of n things r things can be arranged in nPr ways. and

$$nPr = n!/(n-r)!$$

So in the above Question it is asked that in how many ways 4 alphabets from the total 9 alphabets can be arranged.
So apply the formula nPr = 9P4 = 9!/(9-4)! = 9*8*7*6*5*4*3*2*1/5*4*3*2*1 =9*8*7*6 = 3024.

Now there is a trick to easily calculate nPr by which you won't have to do any division work.

Like if it say 9P3 then you just have to multiply Starting from 9 in decreasing order till the next 2 digit i.e 9P3 = 9*8*7. Why we multiply till 7 only ?that is because the value of r is 3 and total multiplication should contain the value of r.
Another example if it 7P2 then you will just do 7*6[2 number because r = 2 ok]
if it's 7P4 then the answer will be 7*6*5*3[4 no. because value of r=4]
So If it's 10P5 then the value will be 10*9*8*7*6 [5 digit because value of r = 5]

I think you understand my point now. Now move on to the cases.
Actually there are infinite cases in Permutation and Combination 100's of different type of question can be formed So i will only discuss the cases that are important for the exam, And if you have any problem in any other case then you can ask me personally.

Case - 1 Simple Arrangement Case well all words are unique.

By UNIQUE i mean all alphabets are different
In how many ways the letters of the word ROCKET can be arrnged.
very Simple just count the no. of words in ROCKET that will be 6
So number of arrangements will be n! that will be 6!

CASE - 2 Arrangement When All the words are not UNIQUE.
That means some words are repeated.
Like No. of possible arrangements of word TITANIC
Now In this case you Just have to find the total possible ways first without even thinking about Repeated words and then after that You will divide that with the numbers of times a Word is repeated.
So in the above Question Total alphabets = T = 2, I = 2. A= 1 C =1 N = 1Total 7 So Permutations will be 7! and Now you will divide It by No. of times A word is repeated SO T is repeated 2 times and I is repeated two times So divde 7! by these 2.
So final Answer will be 7!/(2!*2!)

Let's See another Example. In how many ways the letters of the word RUNNING Can be arranged.
So total no. of alphabets in the above Words = 7
No. of words that are repeated = N = 3 times repeated.
So the solution will be Total permutation divided by no. of times a word is repeated and that will be 7!/3! that will be your answer.

Case 3 - Arrangement Some Words are always together and Some Words and Never together.
No of possible arrangements of the words LAYERING When Vowels are always together.
In this case what we do Is we consider the no. of Vowels as 1 single alphabet That [AEI] is a one single alphabet In that way they will always be together and the rest words are LYRNG.
So the total no. of alphabets will be 6 ? Why 5 Alphabets are LYRNG and [AEI] is Onealhpabet remember so The total alphabet will be 6
And no. of possible arrangements will be 6!
But but the question is not complete yet [AEI] Though considered as 1 alphabet but stil the words AEI can change places within itself Like AEI it also can be AIE or EIA. So there are 3 words so no. of total arrangements that they can do within itself will be 3!
So our final answer will be 6!*3![that is because 6! is the no. of possible ways when AEI are together and And multiplied by 3! because AEI can change places within themselves in 3! possible Ways]

If it was asked that VOWELS in LAYERING are never together that what we will do ?
This Question can't be solved directly.
In order to solve this We will have to FIND the total no. of arrangements of the word LAYERING and then Subtract the no. of arrangemnts in which AEI are Always together.
So no. of possible arrangements of LAYERING will be 8!
And We already Solved that when AEI are always together the no. of possible ways are 6!*3!
So no. of possible ways when AEI are never together will be 8! - 6!*3!

Now i told you that there are many more cases but that are really not important I am explaining these cases because they are important and help ypu while solving Probability.

Now We should move on to the next Topic That Is Combination. Now you know that Permutation means Arrangement or no. of possible ways A thing can be arranged.
What is the meaning of Combination.
Combination is a simple act of Choosing or Selection.
Like When it is asked What are no. of possible ways Word TITAN can be arrange You have to find The Permutation.
But if it is asked what are no. of possible ways You can Select 2 alphabet from the word TITAN, It means you have to find Combination.
The act of selection or Choosing is called COMBINATION.
Now you all must know what is nPr so it's time to move towards nCr
Like nPr = n!/(n-r)!

nCr is somewhat simillar but that is just an extra r! in the denominator

So nCr = n!/[(n-r)!*r!]

nCr means r things has to be selected out of n things.
Like in the above Question No. of possible ways 2 alphabets can be selected from the word TITAN
So total no. of alphabets n = 5
no. of alphabets which we have to select r = 2
So the answer will be 5C2 = 5!/(5-2)!*2! = 5!/3!*2! = 5*4/2*1 = 10

Now i told you have to calculating nPr in a simple way Just like that we can also calculate nCr in a simple way All you have to do is Follow the method of nPr and In division you have to also multiply in increasing order from 1
Like 6C3 = 6*5*4/1*2*3
And 9C2 = 9*8/1*2
and 10C4 = 10*9*8*7/1*2*3*4
7C5 = 7*6*5*4*3/1*2*3*4*5

This much knowledge of combination is enough for solving the Questions of Probability.
So without wasting Time just move on to our main Topic ie Probability.

Probability

So what is Probability ?

Probability is Just the chances have happening of an event. Like what are the chances that You will Become a PO or An Income Tax Inspector or a Clerk. What are the chances that you will find the love of you life (That chance of that is very rare)
These all chances are just the game of Probability. Our Life is Also The sum of all these chances, the chances we take Like What are the chances that you will study after 12 instead of gossiping on whatsapp.
So how de we find the probability of happening of an event. In mathematical terms probability = Number of favourable Outcomes/ Total outcomes
No. of favourable outcomes means the outcomes which we want.
Total outcomes Means the total possible outcomes (That's the reason we studied Permutation and Combination so that we can find total outcomes]
Let me give you a very realistic example. What is the probability that You will Become a PO in SBI ?
So We have to find the favourable outcomes here That will be the No. of Posts in SBI[because if you get any of the post in the total post you will be a PO]
So total no. of Posts In SBI this time is 2000
And what are the total outcomes or What are the total no. of Applicants = 20,00,000
So what is the probability that You will be 1 of them Simple Probability of You getting selected = favourable Outcomes/ total outcomes = 2,000/20,00,000 = 1/1000
That is Your Chances. Or in other words 1 in a thousand Aspirant can become a PO in SBI.
So i think Now you have the basic Idea what is PROBABILITY.

So now Lets Move On to Questions.
But before that.VERY VERY VERYVERYVERY IMPORTANT
AND = Multiplication(*)
OR = Addition (+)
If anywhere and I mean Anywhere you see a question which say what is the probabilty of getting X or Y, It simply means that you have to find probabilty of X and Probability of Y and ADD them, The word OR means Addition Always Keep in Mind that.
And if It is asked what is the prbability of getting X and Y, It simply means that you have to find the probability of X and Y and Multiply them, The word AND means Multiplication Always remember that.
At least = Minimum We require [Orkam se kamKitna hone chahiyeUsasejyadabhihosaktahai but usasekamnahihonachahiye]
Example If we want at least 2that measn Minimum we need 2 We can have 3 or 4 or 5 It doesn't matter but Should not be less than 2.
At Most = Maximum We Require[Jyada se JyadaKitnahosaktahai, Usase Kam hosaktahaifaraknahipadta but usasejyada ahi honachahiye]
Example if we want AT MOST 2 That means we can have 2 we can have 1 and we can have 0 also any less value it doesn't But we can can't have anything greater than 2.
These cases will be more clear to you when we will solve some Questions.

Questions related to Balls.
Case 1: Normal Case
There are Total 5Red, 3Blue and 2 Green bals In a Bag, Two balls are taken out at random What is the probability that
i)-2 Balls will be Green.

ii- 2balls will be RED
iii) - 2 balls will be BLUE.
i) What is the probability that 2 balls are taken out at random from a bag and both balls are Green.
So Calculate First the favourable Outcomes. That is how many ways 2 balls can be taken out from a bag which have 2Green balls = 2C2 = 1
Now calculate Total Outcomes. That is how many ways 2 balls can be taken out from the bag containing total 10 balls [5red + 3Blue + 2 Green = Total 10] = 10C2 = 10*9/1*2 = 45
So probability = favourable outcomes/total outcomes = 1/45

ii) What is the probability that 2 balls are taken out from bag and both are RED
So Calculate First the favourable Outcomes. That is how many ways 2 balls can be taken out from a bag which have 5Red balls = 5C2 = 5*4/1*2 = 10
Now calculate Total Outcomes. That is how many ways 2 balls can be taken out from the bag containing total 10 balls [5red + 3Blue + 2 Green = Total 10] = 10C2 = 10*9/1*2 = 45
So probability = favourable outcomes/total outcomes = 10/45 = 2/9

iii) What is the probability that 2 balls are taken out from bag and both are Blue.
So Calculate First the favourable Outcomes. That is how many ways 2 balls can be taken out from a bag which have 3BLUE balls = 3C2 = 3*2/1*2 = 3
Now calculate Total Outcomes. That is how many ways 2 balls can be taken out from the bag containing total 10 balls [5red + 3Blue + 2 Green = Total 10] = 10C2 = 10*9/1*2 = 45
So probability = favourable outcomes/total outcomes = 3/45 = 1/15.

CASE 2 - AND Case.
There are Total 5Red, 3Blue and 2 Green bals In a Bag, Three balls are taken out at random What is the probability that
i) 2 balls are Red and 1 ball is Green
ii) 2balls are Blue and 1 ball is Green

i) What is the probabilty that 3 balls are taken out and out of those 3 balls 2 balls are red and 1 is green.
In this questions there are 2 events i.e getting 2 red ball and getting 1 green ball
So first we have to calulate the seperate probabilities first.
So no. of ways 2 Red balls can be selected out of total 5 balls = 5C2 = 5*4/1*2 = 10
So no. of ways 1 Green ball can be selected out of total 2 balls = 2C1 = 2
So Favourable Outcomes i.e No. of ways 2 Red balls AND 1 Green Ball can Be Selected = 10*2 = 20[Whenver you see and Just Multiply it]
And Total No. of Outcomes i.e Selecting 3 balls out of total 10 balls = 10C3 = 10*9*8/1*2*3 = 120
So probability of getting 2 Red and 1 green Balls = favourable outcomes/total outcomes = 20/120 = 1/6

ii) What is the probabilty that 3 balls are taken out and out of those 3 balls 2 balls are BLUE and 1 is GREEN
So no. of ways 2 BLUE balls can be selected out of total 3 balls = 3C2 = 3*2/1*2 = 3
So no. of ways 1 Green ball can be selected out of total 2 balls = 2C1 = 2
So Favourable Outcomes i.e No. of ways 2 BLUE balls AND 1 Green Ball can Be Selected = 3*2 = 6[Whenver you see and Just Multiply it]
And Total No. of Outcomes i.e Selecting 3 balls out of total 10 balls = 10C3 = 10*9*8/1*2*3 = 120
So probability of getting 2 BLUE and 1 green Balls =favourable outcomes/total outcomes = 6/120 = 1/20

Case 3: OR CASE
There are Total 5Red, 3Blue and 2 Green bals In a Bag, 2 balls are taken out at random What is the probability that 2 balls are Red or 2 balls are Blue
In this questions there are 2 events i.e getting 2 red ball or getting 2 Blue balls
So first we have to calulate the seperate probabilities first.
So no. of ways 2 Red balls can be selected out of total 5 balls = 5C2 = 5*4/1*2 = 10
So no. of ways 2 BLUE balls can be selected out of total 3 balls = 3C2 = 3*2/1*2 = 3
So Favourable Outcomes i.e No. of ways 2 RED balls OR 2 BLUE Balls can Be Selected = 10 + 3 = 13[Whenver you see OR Just ADD it]
Now calculate Total Outcomes. That is how many ways 2 balls can be taken out from the bag containing total 10 balls [5red + 3Blue + 2 Green = Total 10] = 10C2 = 10*9/1*2 = 45
So the probability of getting 2 Red ball or 2 Blue balls = favourable outcomes/total outcomes = 13/45

CASE 4 - AT LEAST CASE
There are Total 5Red, 3Blue and 2 Green bals In a Bag, Three balls are taken out at random What is the probability that At least 2 Balls are RED.
Now What i Told you In At Least Case You have to select at least 2 means You can have all 3 balls red But at least 2 balls should be RED means we will have to find the probability of getting 2 red balls OR 3 red balls.
So there are 2 cases here 1st case is when we get 2 red balls and 1 ball can be of any other colour
and 2nd case is when we get all 3 balls as red.

1st case
So no. of ways 2 Red balls can be selected out of total 5 balls = 5C2 = 5*4/1*2 = 10
And No. ways 1 ball can be selected out of rest 5 balls = 5C1 = 5
Our Favourable outcomes I.e getting 2 red balls and 1 ball of any colour = 5*10 = 50 [And case so multiply]
And Total No. of Outcomes i.e Selecting 3 balls out of total 10 balls = 10C3 = 10*9*8/1*2*3 = 120
So Probability of getting 2 red balls and 1 ball of any other colour = favourable outcomes/total outcomes = 50/120 = 5/12
2nd case When we get all 3 balls as red.
So no of ways 3 red balls can be selected out of total 5 red balls i.e also our favourable outcome = 5C3 = 5*4*3/1*2*3 = 10
And Total No. of Outcomes i.e Selecting 3 balls out of total 10 balls = 10C3 = 10*9*8/1*2*3 = 120
So probability of getting 3 red balls =favourable outcomes/total outcomes = 10/120 = 1/12

Now Either Case One will happen OR Case 2 will happen. that means either we will get 2red balls and 1 other ball or we will get all 3 red balls So As i already explained that In OR case Probabilities gets added so we will just add the probability To get the final probability.
So when 3 balls are taken out at random the probability that at least 2 balls are green = 1/12 + 5/12 = 6/12 = 1/2

Case 5 At MOST CASE
There are Total 5Red, 3Blue and 2 Green bals In a Bag, Three balls are taken out at random What is the probability that At Most 2 Ball is RED.
So as i told you all in case of AT most We can have any number less than But not greater than That means We can Have 2 Red balls out of 3 balls and We also can 1 red ball out of 3 balls and we can also have 0 red balls but we can't have More than 2 Red ball. That means all 3 balls can't be RED.
So we will solve same like the last case.
No. Of ways 2 red balls and 1 others balls can be selected = 5C2*5C1 = 10*5 = 50
No. Of ways 1 red balls and 2 others balls can be selected = 5C1*5C2 = 5*10 = 50
Now Of ways Balls are selected that there are NO red balls That means All three balls are of Other Colours = 5C3 = 10
Total No. Of Outcomes = 10C3 = 10*9*8/1*2*3 = 120
So Probability will be (50+10 +50)/120 = 110/120 = 11/12

Quiz :-

Time:- (4-5 minutes)

1. A bag has six red marbles and six blue marbles. If two marbles are drawn randomly from the bag, what is the probability that they will both be red?
A) 1/2
B) 11/12
C) 5/12
D) 5/22
E)1/3

2. There are five students in a study group: two finance majors and three accounting majors. If two students are chosen at random, what is the probability that they are both accounting students?
A) 3/10
B) 2/5
C) 1/5
D) 3/5
E) 4/5

3. At a certain business school, 400 students are members of the sailing club, the wine club, or both. If 200 students are members of the wine club and 50 students are members of both clubs, what is the probability that a student chosen at random is a member of the sailing club?
A) 1/2
B) 5/8
C) 1/4
D) 3/8
E) 3/5

4. A bag contains 3 red marbles, 3 blue marbles, and 3 green marbles. If a marble is randomly drawn from the bag and a fair, six-sided dice is tossed, what is the probability of obtaining a red marble and getting 6 from dice?
A. 1/15
B. 1/6
C. 1/3
D. 1/4
E. 1/18

5. A letter is randomly select from the word "STUDIOUS". What is the probability that the letter be a U?
A. 1/8
B. 1/4
C. 1/3
D. 1/2
E. 3/8

6. In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?
A.124045
B.20890
C. 133156
D. 120960
E. None of these

7. How many 4-letter words with can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?
A. 400
B. 4050
C. 5040
D. 5773
E. None of these

8. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?
A. 156
B. 209
C. 193
D. 245
E. None of these

9. In a bag, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?
A. 3/91
B. 1/3
C. 3/7
D. 7/15
E. None of these

10. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?
A. 3/13
B. 1/13
C. 7/52
D. 9/13
E. None of these

Answers:-

1.D
Probability that both are red marbles = 6/12 x 5/11 = 5/22
2. A
Probability of first student to be accounting student =3/5
Probability of second student to be accounting student =2/4 = 1/2
Probability that both students to be accounting students =3/5 x 1/2 = 3/10
3.B
Members in sailing club = 250
Probability of choosing member from sailing club = 250/400 = 5/8
4.E
Probability getting red marble = 3/9 = 1/3
Probability of getting 6 = 1/6
Probability of getting red marble and 6 = 1/3 x 1/6 = 1/18
5. B
Probability of choosing u - 2/8 = 1/4
6.D
No. of ways = {8! /(2! * 2!)}×{4!/2!}= 10080 *12 =120960
7. C

Required no. of words = 10p4 = 10*9*8*7 = 5040
8.B
For at least one boy required no. of way =(6C1*4C3)+(6C2*4C2)+(6C3*4C1)+(6C4) =209
9.B
Total no. of balls = 8+7+6 = 21
Probability to chose neither red nor green ball = 7/21= 1/3
10. A
Required Probability = 12/52 =3/13

Probability

Probability: A mathematically measure of uncertainty is known as probability.

Random Experiment: An experiment in which all possible outcomes are known and exact Outcome can be not be predicted, is called a random experiment.

Eg. Rolling an unbiased dice has all six outcomes (1, 2, 3, 4, 5, 6) known but exact outcome can be predicted.

Outcome: The result of a random experiment is called an outcome.

Sample Space: The set of all possible outcomes of a random experiment is known as sample space.

eg . The sample space in throwing of a dice is the set (1, 2, 3, 4, 5, 6)

Trial : The performance of a random experiment is called a trial.

eg. The tossing of a coin is called trial

Event: An event is a set of experimental outcomes, or in other words it is a subset of sample space.

eg. On tossing of a dice, let A denotes the event of even number appears on top A: { 2, 4, 6 }

Mutually Exclusive Events : Two or more events are said to be mutually exclusive if the occurrence of any one excludes the happening of other in the same experiment.

eg. On tossing of a coin it head occur, then it prevents happing of tail, in the same single experiment.

Exhaustive Events : All possible outcomes of an event are known as exhaustive events.

eg. In a through of single dice the exhaustive events are six { 1, 2, 3, 4, 5, 6 }

Equally Likely Event : Two or more events are said to be equally likely if the chances of their happening are equal.

eg. In throwing of an unbiased coin, result of Heat and Tail is equally likely.
Playing Cards:

(1) Total number of card are 52.

(2) There are 13 cards of each suit named Diamond, Hearts, Clubs and Spades

(3) Out of which Hearts and diamonds are red cards.

(4) Spades and Clubs are black cards

(5) There are **four face cards each in number four Ace, King, Queen and Jack**

Black Suit Card- (26)
i) Spade (13)
ii) Club (13)
Red Suit Card–(26)
i) Diamond (13)
ii) Heart (13)
(6) Each Spade, Club, Diamond, Heart has 9 digit cards 2, 3, 4, 5, 6, 7, 8, 9 and 10

(7) There are **4 Honors cards each Spade, Club, Diamond, Heart** contains 4 numbers of Honours cards Ace, King, Queen and Jack

Quiz

TIME: (3-5) min

1. A bag contains 12 white and 18 black balls. Two balls are drawn in succession without replacement. What is the probability that first is white and second is black?
A) 36/135
B) 36/145
C) 18/ 91
D) 30/91
E) None of these

2. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?
A) 3/16
B) 1/8
C) 3/4
D) 1/2
E) None of these

3. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected is:
A) 21/46
B) 21/135
C) 42/135
D) Can't be determined
E) None of these

4. A card is drawn from a pack of 52 cards. The probability of getting a queen of club or a king of heart is?
A) 3/26
B) 3/52
C) 1/26
D) 1/4
E) None of these

5. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are blue, is:
A) 1/91
B) 2/91
C) 3/91
D) 4/91
E) None of these.

6. A bag contains 2 yellow, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?
A) 5/7
B) 1/21
C) 10/21
D) 2/9

E) None of these

7. Three coins are tossed. What is the probability of getting at most two tails?
A) 1/8
B) 5/8
C) 3/8
D) 7/8
E) None of these

8. **One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?**
A) 1/13
B) 2/13
C) 3/13
D) 3/52
E) None of these

9. P and Q sit in a ring arrangement with 10 persons. What is the probability that P and Q will sit together?
A) 2/11
B) 3//11
C) 4/11
D) 5/11
E) None of these

10. Two dice are thrown simultaneously. Find the probability of getting a multiple of 2 on one dice and multiple of 3 on the other dice.
A) 1/9
B) 11/36
C) 13/36
D) Data inadequate
E) None of these

Answers
1. B
2. C
3. A
4. C
5. D
6. C
7. D
8. C
9. A
10.B

Explanation:

1. The probability that first ball is white= 12c1/30c1= 2/5
Since, the ball is not replaced; hence the number of balls left in bag is 29.
Hence the probability the second ball is black= 18c1/29c1 =18/29
Required probability = 2/5*18/29 = 36/145

2. In a simultaneous throw of two dice, we have n(S) = (6 x 6) = 36.
Then, E = {(1, 2), (1, 4), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (3, 4),
(3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 2), (5, 4), (5, 6), (6, 1),
(6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}
n(E) = 27.
so probability = 27/36 = 3/4

3. Probability = 10c1*15c2/25c3
= 21/46

4. 2/52 = 1/26

5. 6c3/15c3 =4/91

6. 5c2/7c2 = 10/21

7. 7/8

8. 12/52 =3/13

9. n(S)= number of ways of sitting 12 persons at round table:
=(12-1)!=11!
Since two persons will be always together, then number of persons:
=10+1=11
So, 11 persons will be seated in (11-1)!=10! ways at round table and 2 particular persons will be seated in 2! ways.
n(A)= The number of ways in which two persons always sit together =10!×2
So probability = 10!*2!/11!= 2/11

10. 11/36

All About Partnership

Introduction:-

When more than one person agree to invest their money to run a business or firm then this kind of agreement is called partnership. The persons involved in the partnership are called partners.

There are two types of partnership.

1. Simple Partnership: In simple partnership, capitals of partners are invested for the same period of time.

2. Compound Partnership: In compound partnership, capitals of partners are invested for the different period of time.

Basic Formulas

If two partners A and B are investing their money to run a business then (Simple Partnership)

$$\frac{\text{Capital of A}}{\text{Capital of B}} = \frac{\text{Profit of A}}{\text{Profit of B}}$$

Capital of A : Capital of B = Profit of A : Profit of B

If two partners A and B are investing their money for different period of time to run a business then

(Compound Partnership)

$$\frac{\text{Capital of A} \times \text{Time period of A}}{\text{Capital of B} \times \text{Time period of B}} = \frac{\text{Profit of A}}{\text{Profit of B}}$$

Capital of A × Time period of A : Capital of B × Time period of B

= Profit of A : Profit of B

If n partners are investing for different period of time then

$C_1T_1 : C_2T_2 : C_3T_3 : \ldots : C_nT_n = P_1 : P_2 : P_3 : \ldots : P_n$

Where C is the capital invested, T is time period of capital invested and P is profit earned.

Shortcut Methods

Rule 1:

If two partners are investing their money C_1 and C_2 for equal period of time and their total profit is P then their shares of profit are

$$\frac{C_1 \times P}{C_1 + C_2} \text{ and } \frac{C_2 \times P}{C_1 + C_2}$$

If these partners are investing their money for different period of time which is T_1 and T_2, then their profits are

$$\frac{C_1 \times T_1 \times P}{C_1T_1 + C_2T_2} \text{ and } \frac{C_2 \times T_2 \times P}{C_1T_1 + C_2T_2}$$

Rule 2:

If n partners are investing their money C_1, C_2, …, C_n for equal period of time and their total profit is P then their shares of profit are

$$\frac{C_1 \times P}{C_1 + C_2 + \cdots + C_n}, \frac{C_2 \times P}{C_1 + C_2 + \cdots + C_n}, \ldots\ldots\ldots, \frac{C_n \times P}{C_1 + C_2 + \cdots + C_n}$$

If these partners are investing their money for different period of time which is T_1, T_2,… , T_n then their profits are

$$\frac{C_1 \times T_1 \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}, \frac{C_2 \times T_2 \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}, \ldots\ldots\ldots, \frac{C_n \times T_n \times P}{C_1T_1 + C_2T_2 + \cdots + C_nT_n}$$

Quiz On Partnership

1. Anil, Mukesh and Ritesh started a business each investing Rs.20,000. After 4 month Anil withdraws Rs.6000, Mukesh withdraws Rs.8000, Ritesh invest Rs.6000 more At the end of the years, a total profit was Rs.65600. Find the share of Ritesh.

A. Rs. 20000
B. Rs. 28800
C. Rs. 17600
D. Rs. 19200
E. None Of These

2. Joy started a business and he invested in 76000, After some month, amar came to join with him and invest 57000.The end of the year the total profit was divided among them into ratio form 2 : 1.Find after how many months amar join.

A. 4
B. 6
C. 8
D. 3
E. None Of These

3. Samir started a software business by investing Rs. 40,000 . After six months ,Nitish Joined him with a capital of Rs. 60,000 . After 3 years , they earned a profit of Rs . 27,900 . What was Samir's share in the profit ?

A. Rs. 12400
B. Rs. 13000
C. Rs. 13200
D. Rs. 15000
E. None Of These

4. Anil, Mukesh and Ritesh started a business by investing Rs. 125000 Rs. 150000 and Rs.175000 respectively. Find the share of Mukesh, out of an annual profit of Rs. 93,600..

A. Rs. 36400
B. Rs. 31200
C. Rs. 32500
D. Rs. 33200
E. None Of These

5. Jon and Harry started a partnership business investing some amount of money in the ratio of 2 : 3 . Ron joined them after six months with an amount equal to that of Harry . In what proportion should the profit at the end of one year be distributed among Jon , Harry and Ron ?
A. 5:3:4
B. 4:6:2
C. 5:3:2
D. 4:6:3
E. None Of These

6. Manoj received Rs. 6000 as his share out of the total profit of Rs. 9000 which he and Ramesh earned at the end of one year. If Manoj invested Rs.120000 for 6 months, whereas Ramesh invested his amount for the whole year, what was the amount invested by Ramesh?
A.Rs. 20000
B.Rs. 30000
C.Rs. 40000
D.Rs. 50000

7. Yogesh started a business investing Rs. 45000. After 3 months, Pranab joined him with a capital of Rs. 60000. After another 6 months, Atul joined them with a capital of Rs. 90000. At the end of the year, they made a profit of Rs. 20000. What would be Atuls share in it?
A.Rs 7000
B.Rs 6000
C.Rs 5000
D.Rs 4000
E. None Of These

8. In business, A and C invested amounts in the ratio 2:1, whereas the ratio between amounts invested by A and B was 3:2, If Rs 157300 was their profit, how much amount did B receive?
A.Rs 48000
B.Rs 47000
C.Rs 47400
D.Rs 48400
E. None Of These

9. Manoj got Rs.6000 as his share out of a total profit of Rs.9000 which he and Ramesh earned at the end of one year. If Manoj invested Rs.20,000 for 6 months, where as Ramesh invested his amount for the whole year, what was the amount invested by Ramesh ?
A. Rs.30000
B. Rs.40000
C. Rs.10000
D. Rs.5000
E. None Of These

10. Rs.700 is divided among A,B and C so that A receives half as much as B and B half as much as C. Then C's share is :
A. Rs.200
B. Rs.300
C. Rs.400
D. Rs.600
E. None Of These

TIME TAKEN:

Within 10 min : **EXCELLENT**
10-14 min : **YOU CAN DO BETTER**
More than 14 min : **YOU NEED TO WORK HARD**

Answers with Explanation:-

1. (B):
Ratio capital of Anil, mukesh and Ritesh.
= (20,000 x 4 + 14000 x 8) : (20,000 x 4 + 12000 x 8) : (20,000 x 4 + 26000 x 8)

= 192000 : 176000 : 288000
Anil share = (65600 x 192 / 656) = 19200
Mukesh share = (65600 x 176 / 656) = 17600
Ritesh share = (65600 x 288 / 656) = 28800

2. (A):
Step 1: we can assume that amar join into business after x months.Soamar money was invest into (12 – x) months.
Step 2: 76000 x 12 / 57000 x (12 – x) = 2 / 1
912000 = 114000 (12 – x) = 114 (12 – x) = 912 = x = 4
After 4 months amar join the business.

3. (A):
Short tricks : Samir : Nitish share of capital
= (40,000 x 36) : (60,000 x 30) = 1440000 : 1800000 = 4 : 5 .
Samir's share is = Rs . 27900 x 4 / 9 = Rs. 12400.

4. (B):
Ration of share Anil, Mukesh and Ritesh = Ratio of their investment
Anil :Mukesh : Ritesh = 125000 : 150000 : 175000 = 5 : 6 : 7
Anil share = Rs. [93600 x 5 / 18] = 26000.
Mukesh share = Rs. [93600 x 6 / 18] = 31200.
Ritesh share = Rs. [93600 x 7 / 18] = 36400

5. (D):
Short tricks : Let the initial investment money ratio of Jon and Harry is 2x and 3x So Jon , Harry and Ron ratio of investment is (Jon : Harry : Ron) = (2x X 12) : (3x X 12) : (3x X 6) = 24 : 36 : 18 = 4 : 6 : 3

6. (B):
Suppose Ramesh invested Rs. x. Then,
Manoj : Ramesh = 120000 * 6 : x *12.
720000/12x: 6000/3000
x = 30000

7. (D):
Just take care of the months of investment, rest all will be simple.
Yogesh:Pranab:Atul = 45000*12:60000*9:90000*3 = 2:2:1
Atul's share = Rs. 20000 * (1/5) = Rs. 4000

8. (D):
A:B = 3:2 = 6:4
A:C = 2:1 = 6:3
A:B:C = 6:4:3
B share = (4/13)*157300 = 48400

9. (D)
Let the amount invested by Ramesh = Rs.x.Then, 20000×6 : 12x=6000:3000
or 12000012x=21 or x = 5000

10. (C)
Let C's share = Rs.x. Then
B's share = Rs.x2
And, A's share = Rs.x4
A:B:C = x4:x2:x=1:2:4

Hence, C's share = Rs.(700×47) = Rs.400

Pipe and Cisterns

Nature of Pipe :

Inlet: A pipe connected with a tank or reservoir for filling is called as inlet

Outlet: A pipe connected with a tank and used for empties it is called outlet.

Concept:

If a pipe can fill a tank in x hours, then the part filled in 1 hour = **1 / x**

If a pipe can fill a tank in x hours and another pipe can empty the full tank in y hours, then the net part filled in 1 hour, when both the pipes are opened:

(1/x-1/y)

Time taken to fill the tank, when both the pipes are opened:

(x×y / y-x)

If a pipe can fill a tank in x hours and another fill the same tank in y hours, then the net part filled in 1 hr, when both pipes are opened:

(1/x+1/y)

So time to fill the tank will be:

[x×y/(x+y)]

If a pipe fills a tank in x hrs and another fills the same tank in y hrs, but a third empties the full tank in z hrs and all of them are opened together, the net part filled in 1 hr:

(1/x+1/y-1/z)

So time taken to fill the tank:

xyz/(yz+xz-xy)

1). Two pipes A & B can fill a tank in 36 hours and 45 hours respectively. If both the pipes are open simultaneously. How much times will be taken to fill the tank?

A) 15 hour

B) 25 hour

C) 20 hour

D) 30 hour

E) None of these

2) If A & B two pipes can fill a tank in 10 hour, when A pipe can fill a tank in 6 hour alone ,then in how much time will be taken to fill/empty the tank when pipe B open alone ?

A) Filled in 20 hr

B) Empty in 15 hr

C) Empty in 20 hr

D) Filled in 15 hr

E) None of these

3) Pipe A and B can fill a tank in 10 hour and 12 hour respectively but pipe C can empty the same tank in 15 hour, In how much time it will take fill the tank when the three pipes are opened together?

A) 8.5 hour

B) 10 hour

C) 12 hour

D) 15 hour

E) None of these

4) Two pipes A & B fill an empty tank in 40 minutes and 60 minutes respectively, If both pipes are open simultaneously after how much time should A be closed so that tank is filled in 36 minutes?

A) 36 min

B) 20 min

C) 25 min

D) 16 min

E) None of these.

5) Three taps A,B and C together can fill an empty tank in 4 hours, After 1hour , C is closed and the tank is filled in 6 more hours. Find the time in which C alone can fill the empty tank?

A) 18 hour

B) 10 hour

C) 12 hour

D) 15 hour

E) None of these.

6) Two pipe p1 and p2 can fill a tank in 40 minutes and 60 minutes respectively, both the taps are opened and after 10 minutes P1 was shut. In how much more time would the tank would be fill ?

A) 35 minutes

B) 45 minutes

C) 40 minutes

D) 50 minutes

E) None of these.

7) Three taps A,B and C can fill a tank in 20,30 and 40 minutes respectively. All the taps are opened simultaneously and after 5 minutes tap A was closed and then after 6 minutes tab B was closed .At the moment a leak developed which can empty the full tank in 60 minutes. What is the total time taken for the completely full?

A) 44 minutes

B) 25 minutes

C) 35 minutes

D) 24 minutes

E) None of these

8) Pipe A can fill the tank in half the time in which Pipe B can fill the same tank. If both the pipes are open simultaneously .it takes 8 hour to fill the tank .In how many hours can A alone fill the tank?

A) 12 hour

B) 10 hour

C) 8 hour

D) 15 hour

E) None of these

9) Three taps P,Q and R can individually fill a cistern in 7, 14 and 21 hours respectively .Tap P is opened first for 1 hour and then Tap P is closed and Tap Q is opened for 1hour, tap Q is then closed and Tap R is then opened for 1

hour after which Tap R is closed and Tap P opened again. This Process is continued till the tank is full. In how much time will the tank be completely full ?

A) 11 hour

B) 12 hour

C) 13 hour

D) 14 hour

E) None of these.

10) There are three taps A,B, and C. A takes thrice as much time as B and C together to fill the tank . B takes twice as much time as A and C to fill the tank. In how much time can the Tap C fill the tank individually, if they would require 10 hours to fill the tank, When opened simultaneously ?

A) 14 hour

B) 25 hour

C) 15 hour

D) 20 hour

E) None of these.

Answers
1) C
2) B
3) A
4) D
5) E
6) A
7) D
8) A
9) A
10)E

Mixture and Alligation

Alligation

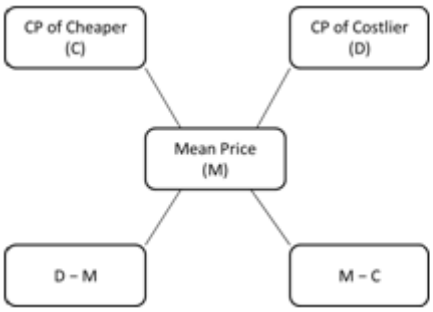
Mixture: Mixing of two or more than two type of quantities gives us a mixure.
Quantities of these elements can be expressed as percentage or ratio.
(1) Percentage:- (20% of sugar in water)

(2)Fraction:- A solution of sugar and water such that
(sugar : water = 1:4)

Alligation: Alligation is a rule which is used to solve the problems related to mixture and its ingredient.It is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of desired price.
Alligation Rule:-
When two elements are mixed to make a mixture and one of the elements is cheaper and other one is costlier then

$$\frac{\text{Quantity of Cheaper}}{\text{Quantity of Costlier}} = \frac{\text{CP of Costlier} - \text{Mean Price}}{\text{Mean Price} - \text{CP of Cheaper}}$$

Here Mean Price is CP of mixture per unit quantity.
Above rule can be written as,



Cheaper Quantity **:** Costlier Quantity = (D – M) **:** (M – C)

Trick:
If n different vessels of equal size are filled with the mixture of P and Q in the ratio **p1 : q1, p2 : q2, ……, pn : qn** and content of all these vessels are mixed in one large vessel, then

$$\frac{\text{Quantity of P}}{\text{Quantity of Q}} = \frac{\frac{p_1}{p_1+q_1} + \frac{p_2}{p_2+q_2} + \cdots + \frac{p_n}{p_n+q_n}}{\frac{q_1}{p_1+q_1} + \frac{q_2}{p_2+q_2} + \cdots + \frac{q_n}{p_n+q_n}}$$

Quant Quiz on mixture and Allegation:-

1. A can contains a mixture of two liquids A and B in the ratio 7:5 when 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7:9. How many litres of liquid A was contained by the can initially?

A.28 litres
B.21 litres
C.45 litres
D.36 litres

2.A man travelled a distance of 90Km in 9 hours partly on foot at 8 kmph and partly on bicycle at 17 kmph. Find the distance travelled on foot.

A.46 km
B.56 km
C.62 km
D.52 km

3.A milk vendor has 2 cans of milk .The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the container so as to get 12 litres of milk such that the ratio of water to milk is 3:5?

A.6 litres
B.1 litres
C.8 litres
D.7 litres

4. In what ratio must a person mix three kinds of wheat costing him Rs 1.20,Rs 1.44 and Rs 1.74 per Kg so that the mixture may be worth Rs 1.41 per Kg?

A.11:77:7
B.25:45:8
C.27:23:6
D.11:45:7

5.A painter mixes blue paint with white paint so that the mixture contains 10% blue paint.In a mixture of 40 litres paint how many litres blue paint should be added so that the mixture contains 20% of blue paint.

A. 2.5 litres
B. 4litres
C. 5litres
D.2 litres

Answers

1. (B) Let initially contained 7x & 5x
So,

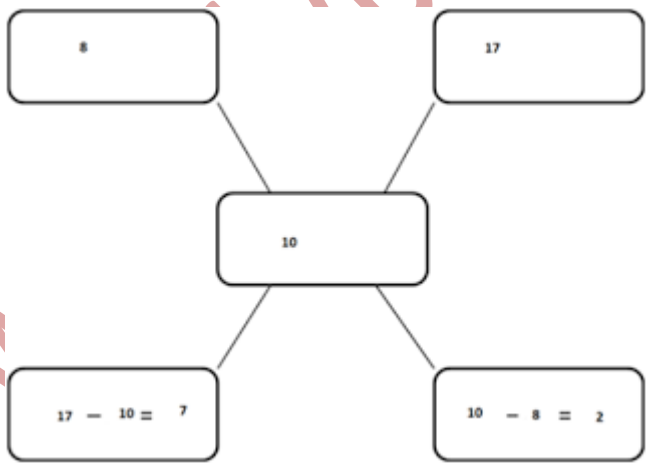
(7x-9/12*7)/(5x-9/12*5+9)=7/9

(12x-9)/(60x+63)=1/9

x=3

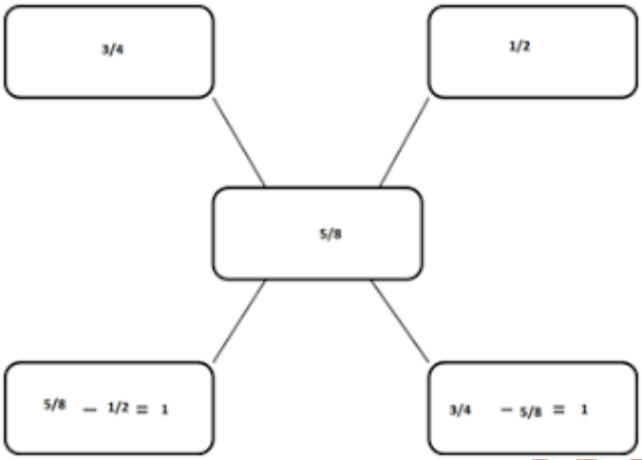
Required Quantity = 7x = 7*3=21 litres

2. (B) Average Speed = 90/9=10kmph
So,
By Rule of Allegations



Required Distance = 7*8=56 km

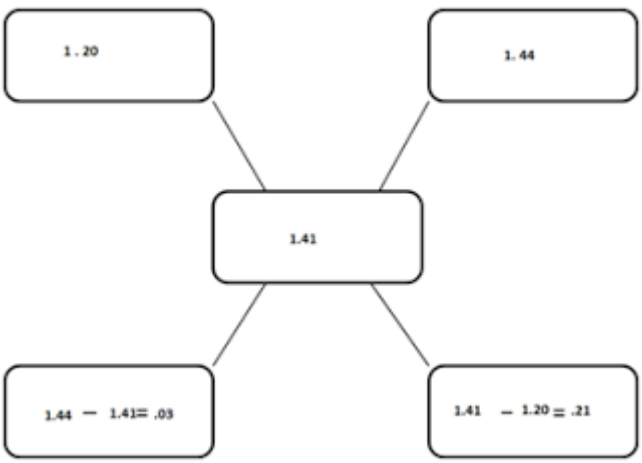
3. (A) Milk in 1st can = ¾
Milk in IInd can = ½
Milk in Resultant mixture = 5/8
So,



1 + 1 = 12
2 = 12
1 = 6 liter

4. (A) In first case, We take 1. 20, 1.44 & 1. 41

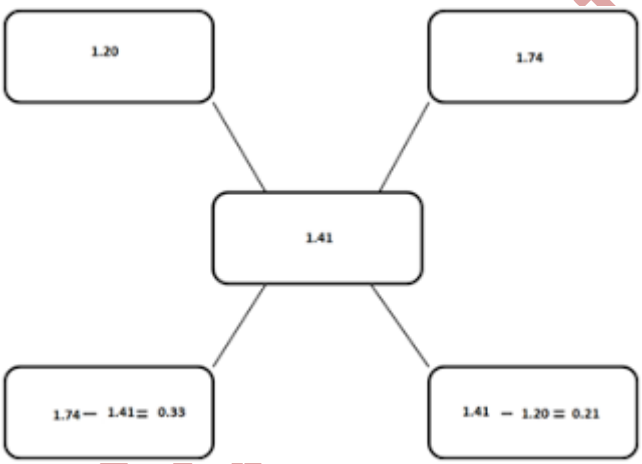
So,



1:7

In second case, We take 1.20, 1. 74 & 1. 41

so,

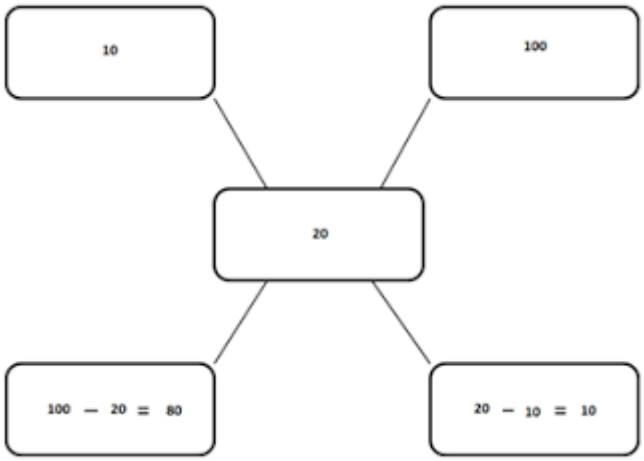


11 : 7

Since I : II = 1.7
I : III = 11 : 7
So, I : II : III = 11 : 77 : 7

5. (C) Percentage of blue point, in pure Blue point =100%

So,



8 : 1

Since 8 = 40
1 = 5 liters

Inequalities

In quadratic Equations We have the following options to choose from :-

i. X >Y

ii. Y>X

iii. X >= Y

iv. Y>= X

v. X = Y or relationship cannot be established.

(i) Now, Suppose on solving the quadratic equation we get X = -1, 2 And Y = -2, -3

On putting these values on number line we will see that X lies on the right of Y. Hence, We can say that X>Y or Y<X.

(ii) Now, Suppose if after solving the equation we get X = -1 , 2 and Y= 3,4.

On putting these values on number line we see that Y lies to the right of X without touching X at any point. Hence, We can say that Y>X or X<Y.

(iii) If X= 3,4 and Y= 2,3. Putting this on number line we get X to the right of Y but touching Y at one single point i.e., 3. Hence, X>=Y or Y<=X.

(iv) If X=3,4 and Y=4,5. Putting these values on number line we will see that Y lies to the right of X but touching X at 4. Hence, Y>=X or X<=Y.

(v) Now, Suppose X= 2,4 and Y= 3,5. Putting these values on number line we will see that X touches Y at all the points between 3 and 4 i.e., at 3, 3.1, 3.2, 3.3 etc. upto 4 hence, in this case we cannot relate X and Y and Hence, Will answer as Relationship cannot be established.

Also suppose if y=7 and X= 4,8 then X<y also X>y . Hence, in this case also no relationship can be established.

Example some quadratic equation:

Example 1:

(i) 6X^2 +11X + 3 = 0

(ii) 6X^2 + 10X +4= 0

Answer :

(i) Shortcut tricks :

This equation +6 is coefficient of x^2 .

+ 11 is coefficient of x

+3 is constant term.

Step 1: we multiply (+6) x (+3) = +18 = 2x3x3

Step 2: we break 2x3x3 in two parts such that addition between them is 11. So, 2x3x3 = 2 x 9. Also, 9 +2 = 11

So , +9 and +2 = Sum of is +11 .

Step 3: Change the sign of both the factors , So +9 = -9 and +2 = -2 . and divide by coefficient of x^2 , So we get -9 / 6 = -3 / 2 and -2 / 6 = – 1 / 3 .

Therefore, X = -3/2 , -1/3

Similarly Solving (ii),

6x4= 24 = 2x2x2x3

Break 2x2x2x3 into two parts such that their sum becomes 10.

2x2 and 2x3 are two parts of 24 whose sum is 10.

Now, Change the sign of both the factors and divide by coefficient of X^2.

So, +4 = > -4/6

And +6 = > -6/6

Y = --2/3 , -1

So, in all X= -1.5, -0.33

And, Y = -0.667, -1

Now, Putting these values on Number line we get to knw that from -0.667 to -1

The values of X and Y coincides .

Hence, as X and Y coincides at more than 1 point,

We can Say X=Y or Relationship between X and Y cannot be established.

EXERCISE

Give answer

(i). If x>y

(ii). If x>=y

(iii). If x<y

(iv). If x<=y

(v). x=y or relationship cannot be established

1) (a) 3X^2+8X+4 = 0 and (b) 4Y^2-19Y+12= 0.

2) (a) X^2 + X-20= 0 and (b) Y^2-Y-30= 0.

3) (a) X^2- 365 = 364 and (b) y- (324) ^(1/2) = (81)^(1/2).

4) (a) 225X^2-4 = 0 and (b) (225y)^(1/2) +2 = 0

5) (a) x^2 = 729 and (b) Y= (729)^(1/2)

6) (a) 2x^2 + 11x + 14 = 0 and (b) 4y^2 + 12y +9 =0

7) (a) x^2-7x+12=0 and (b) y^2+y-12=0

8) (a) x^4- 227= 398 and (b) y^2 + 321=346

9) (a) x^2-1=0 and (b) y^2+4y+3=0

10)(a) x^2-7x+12=0 and (b) y^2-12y+32=0

Answers:

1) (iii) x<y
2) (v) No relationship can be established between x and y

3) (iv) x<=y
4) (v) No relationship can be established
5) (iv) X<= Y
6) (iii) x<y
7) (ii) X>=Y
8) (v) No relationship between X and Y.
9)(ii) X>=Y
10) (iv) x<=y

Solution:-
Solving we get X= -2/3 or -2
Y= 3/4 or 4

Solution:-
X=4,-5
Y= -4,6

Solution:-
X= +27, -27
Y= +27

Solution:-
X= +2/15 and -2/15
Y= 4/225
Comparing we get X>Y and X<Y
Hence, no relationship can be established

Solution:-
X=+27, -27 and Y= +27
Comparing we get X<=Y

Solution:-
X=-7/2 or -2
Y=-3/2

Solution:-
X=4,3
Y=-4,3
So, X>=Y

Solution:-
X=+5,-5 and Y= +5,-5
Comparing, we get X=Y, X<Y, X>Y.
Therefore, no relationship can be established between X and Y.

Solution:-
X=+1,-1 and Y= -1,-3
Comparing we get X>=Y

Solution:-
X=3,4 and Y= 4,8
X<= Y