GENERAL APTITUDE

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Todays topics

1. Mixtures & Alligation
2. Profit & Loss
3. Ratio & Proportion
4. Percentage

Mixtures & Alligation

- **Alligation** : It is the rule which enables us to find the ratio in which two or more ingredients at given prices must be mixed to produce a mixture of a desired price.(mixing / linking)
- **Mean Price** : The cost price of a unit quantity of mixture is called the mean price.
- **Dearer** : The more expensive ingredient

- Note :

Always maintain the order in which problem is given else answer gets changed

Mixtures & Alligation

Type 1 oranges at Rs.60 per kg and Type 2 oranges at Rs.120 per kg and when mixed cost is Rs.75 per kg. Find the ratio in which Type 1 and Type 2 oranges are mixed.

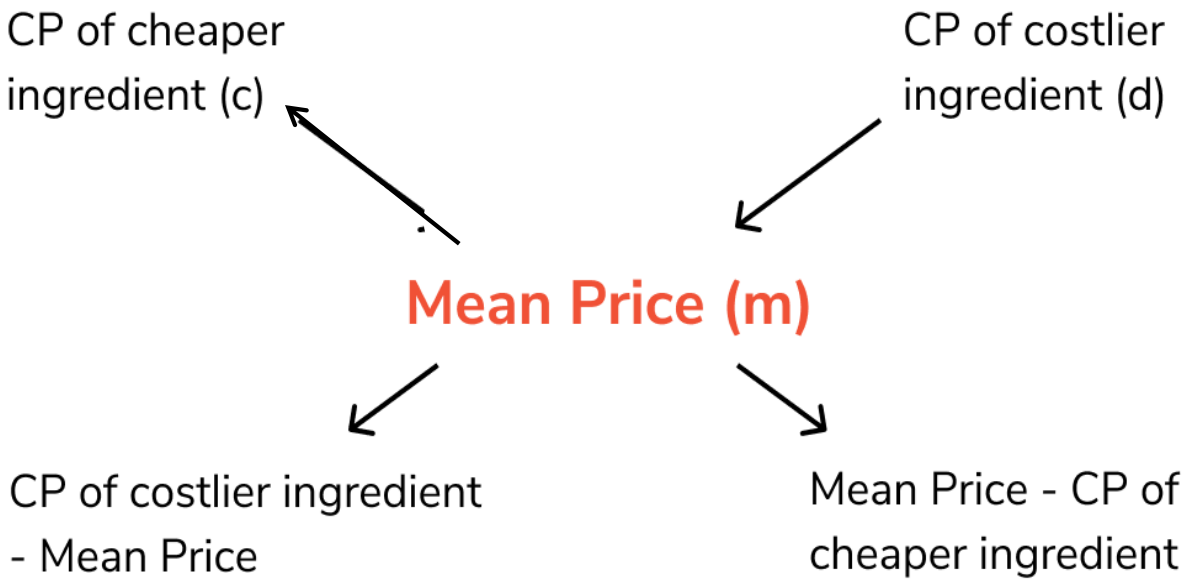
Soln:

Type 1 60 Type 2 120

75

x = d-m y =m-c

$$\frac{x}{y} = \frac{d-m}{m-c} = \frac{120-75}{75-60} = \frac{45}{15} = \frac{3}{1} = 3:1$$



$$\frac{\text{Quantity of cheaper ingredient}}{\text{Quantity of costlier ingredient}} = \frac{d - m}{m - c}$$

Mixtures & Alligation

Q1. In a 729 litres mixture of acid and water, the ratio of acid to water is 7 : 2. to get a new mixture containing acid and water in the ratio 7 : 3, the amount of water to be added is:

A. 81 litres

B. 71 litres

C. 56 litres

D. 50 litres

Ans: A

Mixtures & Alligation

Q.2 Two types of rice costing Rs. 180/kg and Rs. 280/kg. In what ratio should these be mixed so that obtained mixture sold at Rs.240/kg to earn a gain of 20% is ?

A. 4 : 1 B. 1 : 4 C. 1 : 13 D. 2 : 13

Ans: A

- Mean price is always CP
- Steps-
- 1. m=?
- 2. m = cost price(CP)
- 3. SP = given
- 4. find x/y=?

In case of profit, $SP = \frac{C.P. \times (100 + \%gain)}{100}$

Mixtures & Alligation

Q3. A trader has 50 kg of pulses, part of which he sells at 14% gain and rest at 6% loss. On the whole his loss is 4%. How much quantity is sold at 14% gain and that at 6% loss?

A. 15kg,35kg.

B. 5kg,45kg.

C. 10kg,40kg.

D. 45kg,5kg.

E. 40kg,10kg

Ans: B

Mixtures & Alligation

- **Final concentration = Initial $(1-\frac{R}{Initial})^n$**

- where,
- Final concentration is the amount of concentration remaining after the process
- n is the number of times the process is done and
- R is the replaced quantity.
- Initial is the initial concentration

Mixtures & Alligation

Q4. A container contains 25 lit of milk. From this container, 5 lit of milk is taken out and replaced by water. This process is further repeated two times. How much milk is there in the container now?

A. 11.5 lit

B. 14.8 lit

C. 13.5 lit

D. 12.8 lit

Ans: D

Mixtures & Alligation

Q.5 Acid and water in two vessels A and B are in the ratio 5 : 3 and 5 : 4 respectively. In what ratio, the liquid of both the vessels be mixed to obtain a new mixture in vessel C in the ratio 7 : 5?

A. 2 : 3

B. 3 : 2

C. 3 : 5

D. 5 : 3

Ans: A

For these type of questions consider 1 ingredient out of the two ingredients and represent as fraction of one.

Profit & Loss

- **Basics**

Profit (Gain) = (S.P – C.P)

Loss =(C.P – S.P)

% gain = (Gain / C.P) x 100

% loss = (Loss / C.P) x 100

- **Multipliers to find S.P**

In Case of Profit : S.P. = C.P. x **(100 +%gain)/100**

In Case of Loss : S.P. = C.P. x **(100 - %loss)/100**

i.e For sale at 25% profit S.P. = 125 % of C.P.

For sale at 25% loss S.P. = 75% of C.P.

Profit & Loss

Q6. A trader sells one capacitor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is:

A. 5 15/17% loss

B. 5 15/17% gain

C. 6 2/3% gain

D. 6 2/3% loss

E. None of these

Ans: B

Profit & Loss

- **Two Different Articles Sold at same SP**

Article1 → SP Rs S → % gain or % loss = x%

Article2 → SP Rs S → % gain or % loss = y%

Overall % gain/loss = $\frac{(100 + x)y + (100 + y)x}{(100 + x) + (100 + y)}$

When x = y

Overall % loss = $-(x/10)^2$

Profit & Loss

Q7. A man sold two tables at Rs. 1200 each. On one he gained 20% and on the other he loss 20%. His gain or loss in the whole transaction is:

A. 1% loss

B. 2% loss

C. 4% loss

D. 15 gain

Ans: C

Profit & Loss

Q8. A vendor bought coffee pack at 6 for a rupee. How many for a rupee must he sell to gain 20%?

A. 3

B. 4

C. 5

D. 6

Ans: C

Profit & Loss

Q9. A shopkeeper mixes 26 kg of wheat at Rs.20 per kg with 30 kg of wheat of other variety at Rs.36 per kg and sells the mixture at Rs.30 per kg. His profit percent is:

A. 5%

B. 10%

C. 8%

D. None of these

Ans: A

Profit & Loss

Q10. A bookseller obtains 40 pens for Rs. 3200 and sells them at a profit equal to the selling price of 8 pens. What is the selling price of one dozen pens, if the price of each pen is same?

A. Rs. 720

B. Rs. 960

C. Rs. 1200

D. Rs. 1440

Ans: C

Profit & Loss

- Merchant, while selling goods, add certain percentage on the cost price. This addition is called percentage mark up, and the price thus obtained is called as marked price.
- The operative relationship is:
- CP + Mark Up = Marked Price
- CP + %Mark Up on CP = Marked Price
- **Marked Price - % discount = Selling Price**

Profit & Loss

Q11. A dealer buys an article marked at Rs. 25,000 with 20% and 5% off. He spends Rs. 1,000 for its repairs and sells it for Rs. 25,000. What is his gain or loss percent?

A. 25% loss

B. 25% gain

C. 10% gain

D. 10% loss

Ans: B

Profit & Loss

Q12. A shopkeeper marks up the price of an item by 50% above the cost price and then offers a discount of 20% on the marked price. What is the overall profit percentage?

A. 20%

B. 25%

C. 30%

D. 40%

Ans: A

CP + %Mark Up on CP = Marked Price

Marked Price - % discount = Selling Price

Percentage

- Percentage is a fraction whose denominator is 100(per 100)

Fraction x100	% ÷100	Fraction	%
3/4	75%	5/4	125%
4/5	80%	3/2	150%
2/3	66.66 %	1/16	6.25%
5/6	83.33 %		
6/5	120%		

Fraction	%	Fraction	%	Fraction	%
1/1	100%	1/6	16.66 %	1/11	9.09 %
1/2	50%	1/7	14.28 %	1/12	8.33 %
1/3	33.33 %	1/8	12.5 %	1/13	7.69 %
1/4	25%	1/9	11.11 %	1/14	7.14 %
1/5	20%	1/10	10%	1/15	6.66 %

Percentage

Q. x is 83.33% of y. So y is ____% of x

Solution:

$x = 83.33y$

$x = \frac{5}{6} y$

So, $y = \frac{6}{5} x$

y = 120% (from chart)

Fraction x100	% 100	Fraction	%
3/4	75%	5/4	125%
4/5	80%	3/2	150%
2/3	66.66 %	1/16	6.25%
5/6	83.33 %		
6/5	120%		

Percentage

Q13. A student has to score 40% marks for passing the examination. If he gets 178 marks, he fails by 22 marks, find the maximum marks.

A. 500

B. 300

C. 100

D. 150

Ans: A

Number System

Q14. The sum of two numbers is 25 and their HCF and LCM are 3 and 105 respectively. Find the sum of the reciprocal of the two numbers.

A. 5/36 B. 6/35 C. 5/63 D. 3/56

Ans: C

- Product of two given numbers is equal to the product of their HCF & LCM

  A x B = HCF(A,B) x LCM(A,B)

Percentage

Q15. If A's salary is 20% more than B's salary, by what percentage is B's salary less than A's?

A. 16.67%

B. 20.4%

C. 25.6%

D. 18.9%

Ans: A

Percentage

Q16.A population of a town increases by 10% in the first year and decreases by 10% in the second year. What is the net percentage change in the population after two years?

A. 2% decrease

B. 0%

C. 1% increase

D. 1% decrease

Ans: D

If a number is increased / decreased by x% then there is always a loss of $-(x/10)^2$

Percentage

- **Two Step change of Percentage**

  In first step if number is changed by a% and the result is again changed by b% the net percentage change of original number is given by

  Net % Change in Number = a + b + ab/100 (+ve or –ve)

Percentage

Q. If a number is increased by 12 % & then decreased by 18% then the net % change in number is

Soln:

Net % Change in Number = a + b + ab/100 (+ve or –ve)

% Change = 12 – 18 + (12 x -18)/100

= -6 – 2.16

= - 8.16%

Ratio & Proportion

- **Ratio** : Ratio is a comparison of two numbers (quantities) by division.
- The ratio of a to b is written as
- **a : b = a/b = a ÷ b.**

* Ratio is defined only for two values of same units

  ratio between 20 kg & 50 kg is 2:5

Ratio & Proportion

- **Some Useful Results**
- **If a:b = c:d or a/b = c/d**

1. **a x d = b x c**
2. **b/a = d/c** (Invertendo)
3. **a/c = b/d** (Alternendo)
4. **a+b/b = c+d/d** (By Componendo)
5. **a-b/b = c-d/d** (By Dividendo)
6. **(a+b)/(a-b) = (c+d)/(c-d)** (By Componendo & Dividendo)

Ratio & Proportion

- **Proportion** : A proportion is an expression that states that two ratios are equal.

  i.e. **a : b = c : d** e.g **2 : 3 = 4 : 6** or **2 : 3 :: 4 : 6**

  a, b, c & d are called the 1st, 2nd, 3rd & 4th proportional.

  1st & 4th proportionals are called extreme terms &

  2nd & 3rd proportionals are called mean terms.

  Product of means = Product of extremes. **bc = ad**

- **Continued Proportion**

  Three quantities are said to be in continued proportion if

  a : b = b : c or a/b = b/c

  If a : b :: b : c then $b^2 = ac$ (b is the mean proportion of a & c)

  a : b = b : c = c : d or a/b = b/c = c/d

Ratio & Proportion

Q17. The incomes of A and B are in the ratio 5:4, and their expenses are in the ratio 3:2. If each saves ₹1600, what is A's income?

A. ₹3400

B. ₹4400

C. ₹4000

D. ₹3600

Ans: C

Ratio & Proportion

Q18. A sum of ₹680 is divided among A, B, and C in such a way that A gets 2/3 of what B gets, and B gets 1/4 of what C gets. How much money does C get?

A. ₹480

B. ₹360

C. ₹120

D. ₹180

Ans: A

Ratio & Proportion

Q19. A certain sum is divided between A, B, C and D such that the ratio of the shares of A and B is 1 : 3, that of B and C is 2 : 5, and that of C and D 2 : 3. If the difference the shares of A and C is Rs. 3,510, Find the share of D.

A. Rs.4,320

B. Rs.3,240

C. Rs.6,075

D. Rs.4,050

Ans: C

Ratio & Proportion

Q20. Two numbers are in ratio 13: 9 and their HCF is 13. Find the largest number.

A. 169

B. 117

C. 52

D. 143

Ans: A


THANK
YOU!

GENERAL APTITUDE

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Todays topics

1. Interest
2. Partnership
3. Average
4. Probability

Interest

If P = Principal, R = Rate of interest, N = Time in years, I = Interest, A = Amount

Then **A = P + I**

Simple Interest

S.I. = (P x R x N) / 100

Basic principal remains constant.

S.I. is good example of AP(Arithmetic Progression)

Compound Interest

$A = P (1+ R/100)^T$

C.I. = A – P

T = periods of compounding,

R = rate for compounding period

Basic principal keeps on increasing as we get interest on interest.

C.I. is good example of GP(Geometric Progression)

Interest

Q1. A sum of Rs.12500 amounts to Rs.15500 in 4 years at the rate of simple interest. What is the rate of interest?

A. 7%

B. 6%

C. 9%

D. 10%

Ans: B

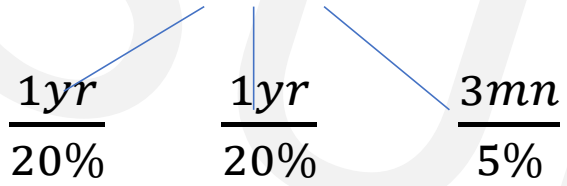
Interest

Q2. When annual compounding is done, a sum amounts to Rs. 5000 in 6 years and Rs. 7200 in 8 years. What is the interest rate?

A. 10% B. 15% C. 20% D. 25%

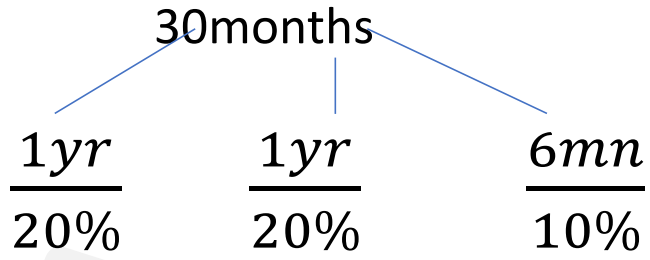
Ans: C

Interest

- T = 27months
- R = 20% p.a.
  - 27months
- 

- **Formula:**
- 27months = $2\frac{1}{4}$ yrs
- A = **P (1+ R/100)^n x (1+ $\frac{R/4}{100}$)^{4n}**
- **where, n is in years**

T = 30 months
R = 20% p.a.



Formula:

30months = $2\frac{1}{2}$ yrs

A = **P (1+ R/100)^n x (1+ $\frac{R/2}{100}$)^{2n}**

where, n is in years

Interest

Q3. A sum of Rs.10000 was deposited in a bank for a period of 27 months at the rate of 20%p.a. on compound interest. What will be the total amount received?

A. Rs.15120

B. Rs.13430

C. Rs.14400

D. Rs.13600

Ans: A

- 27months = $2\frac{1}{4}$ yrs
- A = **P (1+ R/100)^n x (1+ $\frac{R/4}{100}$)^{4n}**
- **where, n is in years**

Interest

Q4. A invests Rs.16000 at the rate of 10%p.a. for 1 year, if the interest is compounded half yearly, then find the amount received by A at the end of the year?

A. Rs. 17640

B. Rs. 16450

C. Rs. 17650

D. Rs. 12600

Ans: A

Interest

Q5. If a certain sum of money amounts to Rs. 3500 in 5years and Rs.5000 in 10years at compound interest. Find sum?

A. Rs. 1090 B. Rs. 1300 C. Rs. 2450 D. Rs. 1780

Ans: C

$$P = \frac{\text{square of smaller amount}}{\text{Bigger amount}}$$

$$= \frac{(3500)^2}{5000}$$

Note : - only applicable if number of years is double

Interest

Q6. The simple interest on a certain sum at the rate of 12.5% per annum for 6 years is Rs. 13,500 less than the principal. Find the simple interest.

A. Rs. 13,500

B. Rs. 54,000

C. Rs. 40,000

D. Rs. 40,500

Ans: D

Interest

Q7. A certain sum of money becomes Rs.2100 at some rate of simple interest in 2 years and Rs. 2250 in 5 years. Find the principal and rate%

A. Rs.2000 ,2.5%

B. Rs.2300 ,3%

C. Rs.1800 ,4%

D. Rs.2200 ,3.5%

Ans: A

Interest

Q8. The compound interest on Rs. 8000 for 9 months at 20% p.a. being compounded quarterly.

A. Rs. 1361

B. Rs. 1261

C. Rs. 1431

D. Rs. 1298

Ans: B

Interest

Q9. Simple interest on a sum of money for 5 years is 2/5 times the principal, Find the rate for simple interest.

A. 13% B. 12% C. 9% D. 8%

Ans: D

Interest

Q10. What is the simple interest on Rs. 32,000 at 8.5% per annum for period from 10^{th} Feb., 2019 to 24^{th} April, 2019?

A. Rs. 550

B. Rs. 555

C. Rs. 544

D. Rs. 540

Ans: C

Interest

- If the difference between compound and simple interest is of **two years** than,
  Difference = $P(R)^2/(100)^2$
  Where P = principal amount, R = rate of interest

- If the difference between compound and simple interest is of **three years** than,
  Difference = $3 \times P(R)^2/(100)^2 + P(R/100)^3$.
  Here also, P = principal amount, R = rate of interest

Interest

Q11. The difference between compound interest and simple interest on a sum of Rs.15000 for 2 years is Rs.96. What is the rate of interest per annum?

A. 8%

B. 10%

C. 12%

D. Cannot be determined

E. None of these

Ans: A

Ratio & Proportion

Dividing a given number in the given Ratio :

Let T be the Total Amount . Let the given ratio be a:b:c

This means A is divided into three parts such that

First Part = T x a/(a+b+c)

Second Part = T x b/(a+b+c)

Third Part = T x c/(a+b+c)

And First Part + Second Part + Third Part = T

Any Part = Total Amount x (Its related ratio term / Sum of Ratio Terms)

Interest

Q12. K started a business investing Rs. 90000. After five months, S joined with a capital of Rs 80000. If at the end of the year, they earn a profit of Rs. 69700, then what will be the share of S in the profit ?

A. Rs. 23800

B. Rs. 23000

C. Rs. 22800

D. Rs. 22600

Ans: A

Partnership

Q13. Three partners x, y, z start a business . y's Capital is four times z's capital and twice x's capital is equal to thrice y's capital . If the total profit is Rs.17171 at the end of a year ,Find out y's share in it.

A. Rs. 6242

B. Rs. 6424

C. Rs. 6244

D. Rs. 6247

Ans: C

Partnership

Q14. Three partners shared the profit in a business in the ratio 8 : 7 : 5. They had partnered for 7 months, 8 months and 14 months respectively. What was the ratio of their investments?

A. 20 : 64 : 49

B. 64 : 49 : 20

C. 20 : 49 : 64

D. 49 : 64 : 20

Capital	1st partner	2nd partner	3rd partner
	X	Y	Z
Time	7	8	14
Profit	8	7	5

Ans: B

Profit = Investment(invested capital) x time period of investment

$$\textbf{Investment(invested capital)} = \frac{\textbf{Profit}}{\textbf{time period}}$$

Partnership

Q15.A start a business with Rs. 850000. He was joined afterwards by B with Rs. 425000. For how much period does B join, if the profits at the end of the year are divided in the ratio of 30 : 10 ?

A. 4 months

B. 5 months

C. 6 months

D. 8 months

Ans: D

- Capital of A = Rs. 850000 Capital of B = Rs. 425000
- Ratio of P1:P2=30:10
- **using formula,**
- $\frac{C1T1}{C2T2} = \frac{P1}{P2}$
- In this type , the time period is 12 months i.e. one year

Probability

Q17. What is the probability of getting at least one tail when two coins are tossed?

A. 1/2

B. 3/4

C. 1/4

D. 2/4

Ans: B

On tossing a coin, the probability of each outcome is 1/2

P(Head) + P(Tail) = 1

Step 1: First, find the number of favorable outcomes from the given question.

Step 2: Then, find the total number of outcomes.

Step 3: Apply the probability formula to find the card probability.

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$

(H,H),(H,T),(T,T),(T,H)

Probability

Q16. What is the probability of drawing two cards from a deck of cards with/without replacement when the first card is heart and second card is diamond?

A. 12 / 204

B. 14 / 204

C. 16 / 204

D. 13 / 204

Ans: D

w/o replacement

with replacement

Probability

Q18. In a hotel, 60% had vegetarian lunch while 30% had non-vegetarian lunch and 15% had both types of lunch. If 96 people were present, how many did not eat either type of lunch ?

A. 20

B. 24

C. 26

D. 28

Ans: B

Note:

P(A or B) = P(A) + P(B) – P(A and B) where A and B are the two events.

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- This is also known as the addition theorem of probability.

Averages

- **Simple Average** :
- An average of a set of values is the sum of values divided by the total number of values.
- Average of ‘n’ values = (Sum of the ‘n’ values)/n
- This is also called as Arithmetic Mean.
- Average (A) = Sum (S)/ Number(n)
- S = A x n

Probability

Q19. The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is:

A. 35 years

B. 40 years

C. 50 years

D. 60 years

Ans: B

Probability

Q20. Three boxes have some average weight. When one box which weighs 89 kg is replaced by another box, the average weight increases by 5kg. How much the new box weighs?

A. 109kg

B. 94kg

C. 104kg

D. 84kg

Ans: C


THANK
YOU!

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Todays topics

1. Time & Work
2. Wages (Man days)
3. Pipes & Cisterns
4. Permutations & Combinations

Time & Work

- Work (Effort) = Manpower x time.
- If A can do a piece of work in x days then work done by A in one day is equal to 1/x of the entire work.
- If A is twice as good a workman as B then A will take half the time taken by B to do a same piece of work.
- If number of people to do a certain work is increased (or decreased) the time taken to do the same work will decrease (or increase)
- Total work = LCM
- Efficiency = (Total work)/(Total time)
- OR
- Total work = Efficiency x Total time

Time & Work

A and B can do a piece of work in 6 and 12 days, respectively. They (both) will complete the work in how many days?

A. 9

B. 18

C. 6

D. 4

.Total time $= \frac{TW}{Tefficieny}$

Ans: D

Time & Work

- $T_{A+B} = \frac{TW}{Tefficieny} = \frac{axb}{a+b}$

- Works only for A + B
- Does not work for A+B+C

Work & Time

Q1. If Raj and Kiran together can complete a work in 18 days, Raj and Sharad together in 12 days, and Kiran and Sharad together in 9 days, then Kiran alone can do the work in:

A. 18 days

B. 24 days

C. 30 days

D. 40 days

Ans: B

Total work = Days x units/day

Work & Time

Q2. Shankar can complete a piece of work in 18 days, Sham in 20 days and Rahul in 30 days, Sham and Rahul together start the work and forced to leave after 2 days. The time taken by Shankar alone to complete the remaining work is:

A. 10 days

B. 12 days

C. 15 days

D. 16 days

Ans: C

Work & Time

Q3. Sheela can complete a piece of work in 36 days, Meena in 54 days and Tina in 72 days. All the three began the work the work together but Sheela left 8 days before the completion of the work and Meena 12 days before the completion of work. Only Tina worked up to the end. In how many days was the work completed?

A. 24 days

B. 25 days

C. 27 days

D. 30 days

Ans: A

Work & Time

Q4. Shubham, Seema and Viraj completed a work costing Rs. 1800. Shubham work for 6 days, Seema for 4 days and Viraj for 9 days. If their daily wages are in the ratio of 5 : 6 : 4, how much amount will be received by Shubham?

A. Rs. 800

B. Rs. 600

C. Rs. 900

D. Rs. 750

Ans: B

Work & Time

Q5. Nayan can do a piece of work in 20 days, Nayan and Kamal together can do in 12 days. If Kamal does the work only for half a day daily then in how many days the work will be completed ?

A. 14

B. 17

C. 12

D. 15

Ans: D

Work & Time

Q6. A,B,C together earn Rs.150 per day, while A & C together earn Rs.94 and B & C together earn Rs.76. The daily earning of C is?

A. Rs.70

B. Rs.20

C. Rs.50

D. Rs.40

Ans: B

Time & Work

- Efficiency = capacity to do work
- Efficiency and time are inversely proportional
- Efficiency $\propto \frac{1}{T}$
- Efficiency and work are directly proportional
- Efficiency $\propto$ W

Chain Rule

Q7. If 10 men can do a job in 20 days, then 20 men with twice the efficiency can do the same job in:

A. 5 days

B. 40 days

C. 10 days

D. 20 days

Ans: A

Total work = Day × Efficiency × Men

Chain Rule

- In chain rule problems all entities are of the same efficiency or work capacity.
- The entities may be men, women, tractors, engines, pumps, horses, lawn mowers etc.

- Work Done = No. of Men x Days x Hrs/day
- W = MxDxH

- W1 = M1xD1xH1, W2=M2xD2xH2
- $\frac{W1}{W2} = \frac{M1xD1xH1}{M2xD2xH2}$

Chain Rule

Q8. 2men and 1women together can complete a piece of work in 14days,while 4women and 2men together can do it in 8 days. If a man gets Rs.600 per day, how much should a women get per day?

A. Rs.400

B. Rs.600

C. Rs.240

D. Rs.200

Ans: A

Work & Time

Q9. A can do a piece of work in 70 days and B is 40% more efficient than A. The number of days taken by B to do the same work is?

A. 50 days

B. 40 days

C. 30 days

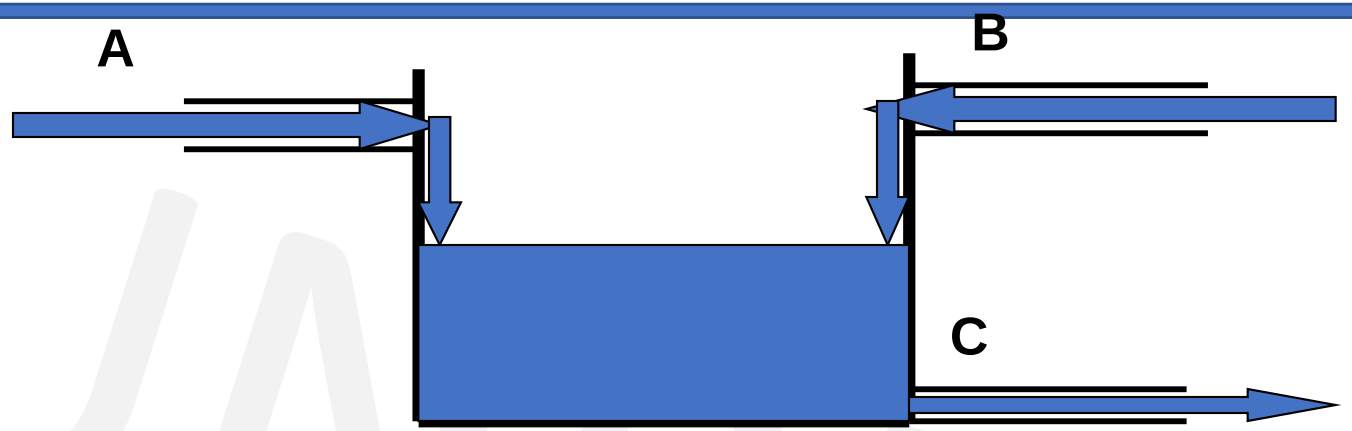
D. 20 days

Ans: A

A is 50% more efficient than B

	A	B
• Eff (Ratio)	150%	100%
• time(Ratio)	100%	150%

Pipes & Cisterns



- A cistern may have inlet pipe or outlet pipe.
- Conventionally filling a tank is treated as positive work and emptying a tank as negative work.
- Net work done = (Sum of work done by inlets) – (sum of work done by outlets)

Pipes & Cisterns

Q10. Two pipes, P and Q can fill a cistern in 12 and 15 minutes respectively. Both are opened together, but at the end of 4 minutes, P is turned off. In how many more minutes will Q fill the cistern?

A. 11 minutes

B. 6 minutes

C. 12 minutes

D. 10 minutes

Ans: B

Total time needed to fill the cistern = 10mins

Pipes & Cisterns

Q11. Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in:

A. 1 13/17 hours

B. 2 8/11 hours

C. 3 9/17 hours

D. 4 1/2 hours

Ans: C

Pipes & Cisterns

Q12. A container can empty the full tank in 9 hours. An inlet pipe fills water at the rate of 4 liters a minute. When the tank is full, the inlet is opened and due to the leak, the tank is empty in 12 hours. How many liters does the container hold?

A. 8640 lit

B. 1440 lit

C. 9250 lit

D. 2880 lit

Ans: A

- Time taken by the leak at the bottom to empty the full tank alone $= \frac{XY}{Y - X}$
- where, X = number of hrs to fill/empty tank , Y = number of hrs to fill/empty tank with leakage

Pipes & Cisterns

Q13. Two pipes A and B can fill a tank with water in 30 minutes and 45 minutes respectively. The third pipe C can empty the tank in 36 minutes. First A and B are opened. After 12 minutes C is opened. Total time (in minutes) in which the tank will be filled up is -

A. 12 minutes

B. 24 minutes

C. 30 minutes

D. 36 minutes

Ans: B

Chain Rule

Q14. If 2 men or 3 women or 4 boys can do a piece of work in 52 days, then the same piece of work will be done by 1 man and 1 woman and 1 boy in:

A. 48 days

B. 36 days

C. 45 days

D. 50 days

Ans: A

Chain Rule

Q15. If 3 men or 4 women can plough a field in 43 days, how long will 7 men and 5 women take to plough it?

A. 10 days

B. 11 days

C. 9 days

D. 12 days

Ans: D

Pipes & Cisterns

Q16. A tank is filled in 8 hours by three pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank?

A. 60 hours

B. 49 hours

C. 56 hours

D. None of these

Ans : C

Permutation & Combination

- What is permutation?
- It is the number of ways a group of things can be arranged.

E.g: Consider 3 letters A,B,C . In how many ways they can be arranged?

- A B C
- A C B
- B A C
- B C A
- C A B
- C B A

6 ways to arrange these 3 letters

- For 3 letter / 4 letter words its possible but for more number of letters we need a formula-
- $nPr = \frac{n!}{(n-r)!}$

Permutation & Combination - Remember

0! = 1

1 ! = 1

2! = 2 x 1 = 2

3! = 3 x 2 x 1 = 6

4! = 4 x 3 x 2 x 1 = 24

5! = 5 x 4 x 3 x 2 x 1 = 120

6! = 6 x 5 x 4 x 3 x 2 x 1 = 720

7! = 7 x 6 x 5 x 4 x 3 x 2 x 1 = 5040

Permutation & Combination

Q17. In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

A. 120

B. 720

C. 4320

D. 2160

Ans: B

Permutation & Combination

Q18. How many words can be formed using letters of the word ‘POLITICS’?

A. 208 ways

B. 1467 ways

C. 19076 ways

D. 20160 ways

Ans: D

Permutation & Combination

Q19. There are five girls and six boys in a group. From this group a committee of 4 is to be chosen. How many different ways can a committee be formed that contain atleast three girls ?

A. 55

B. 65

C. 25

D. 192

Ans: B

Permutation & Combination

Q20. In how many ways 4 men and 3 women can be seated in a row so that they are alternate.

A. 144

B. 288

C. 12

D. 256

Ans: A

Difference between permutation and combination

What is permutation?

Permutation: The various ways of arranging a given number of things by taking some or all at a time are all called as permutations.
Permutation includes word formation, number formation, circular permutation, etc. **In permutation, objects are to be arranged in particular order.** It is denoted by $^{n}P_{r}$ **or P(n, r).**

Example: Arrange the given 3 numbers 1, 2, 3 by taking two at a time.
Now these numbers can be arranged in 6 different ways: **(12, 21, 13, 31, 23, 32).**

Here,

12 and 21, 13 and 31 or 23 and 32 do not mean the same, because here order of numbers is important.

Difference between permutation and combination

- **What is combination?**

  Combination: Each of different groups or selections formed by taking some or all number of objects is called a combination.

  Combination is used in different cases which include team/group/committee.

  In combination, objects are selected randomly and here order of objects doesn't matter. It is denoted by **$^{n}C_{r}$ or C(n, r) or $^{n}C_{r} = {}^{n}C_{(n-r)}$.**

  Example: If we have to select two girls out of 3 girls X, Y, Z, then find the number of combinations possible.

  Now only two girls are to be selected and arranged. Hence, this is possible in 3 different ways: **(XY, YZ, XZ,).**

  Here,
  You cannot make a combination as XY and YX, because these combinations mean the same.


THANK
YOU!

GENERAL APTITUDE

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Todays topics

1. Time, Speed & Distance
2. Trains, Boats & Streams
3. Surds and Indices
4. Problems on Ages
5. Cyclicity & Remainders

Time & Distance

- **Speed = Distance / Time**
- **Distance = Speed x Time**
- **Time = Distance / Speed**

- **Imp : Convert every term to same units**
- **1 Km/hr = 5/18 m/s & 1 m/s = 18/5 km/hr**

- If a bowler has a run up of 100 m & he runs at a speed of 36 km/hr the time he takes to complete his runup is
- **36 x 5/18 m/s = 10m/s**
- **100m ÷10 m/s = 10 s**

Time & Distance

- If the same distance is traveled at different speeds S1 & S2 then average speed is given by-

$$Sa = \frac{(2 \times S1 \times S2)}{(S1 + S2)}$$

If the same distance is traveled at different speeds S1 ,S2 & S3 then average speed is given by-

$$Sa = \frac{(3 \times S1 \times S2 \times S3)}{(S1S2 + S2S3 + S1S3)}$$

Time & Distance

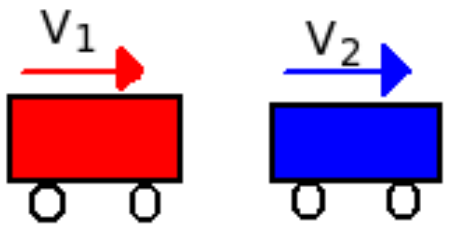
If different distance D1,D2 & D3 travelled is at different speeds S1 ,S2 & S3 then average speed is given by-

$$Sa = \frac{(D1 + D2 + D3)}{\left(\frac{D1}{S1} + \frac{D2}{S2} + \frac{D3}{S3}\right)}$$

Time & Distance

- **Speed & distance are directly proportional.**
- **S α D**
- **Distance & Time are directly proportional.**
- **D α T**
- **Speed & time are inversely proportional.**
- **S α 1/T**
- **Relative speed** is **defined** as the **speed** of a moving object with respect to another. When two objects are moving in the same direction, **relative speed** is calculated as their difference and if objects are moving in opposite direction then calculate as their sum.
- **Relative speed = X-Y (same direction)**
- **Relative speed = X+Y (opposite direction)**

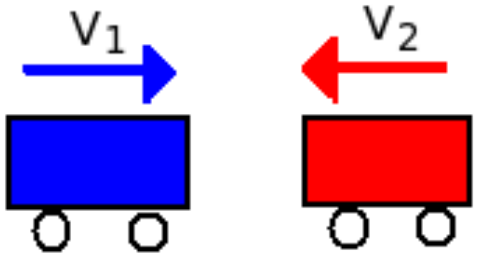
Relative Speed-



Objects Moving in Same direction

Relative Speed = $V_1 - V_2$

Relative Speed = $V_2 - V_1$



Objects Moving in Opposite Direction

Relative Speed = $V_1 + V_2$

Distance, Speed & Time

Q1. If a train run at 40 km/hr, it reaches its destination late by 11 mins, but if it runs at 50km/hr, it is late by 5 mins only. The correct time(in mins) for the train to complete its journey is

A. 10mins

B. 12mins

C. 19mins

D. 8 mins

Ans: C

Distance, Speed & Time

Q2. By walking at 3/4th of his usual speed, a man reaches office 20 minutes later than usual. What is his usual time?

A. 10 mins

B. 12 mins

C. 19 mins

D. 60 mins

Ans: D

Distance, Speed & Time

Q3. A person travels 285 km in 6 hrs in two stages. In the first part of the journey, he travels by bus at the speed of 40 km per hr. In the second part of the journey, he travels by train at the speed of 55 km per hr. How much distance did he travel by train?

A. 165 km

B. 145 km

C. 205 km

D. 185 km

E. 180 Km

Ans: A

Distance, Speed & Time

- Late/early
- Early/late

(+) timings

- Late/late
- Early/early

(-) timings

$$D = \frac{\Delta t \times s1 \times s2}{|s1 - s2|}$$

Distance, Speed & Time

Q4. A boy walking at a speed of 20km/hr reaches his school 30mins late. Next time he increases the speed by 4km/hr but still he is late by 10mins.Find the distance of his school from his house?

A. 30km

B. 40km

C. 50km

D. 9km

Ans: B

Distance, Speed & Time

Q7. If A travels to his school from his house at the speed of 6 km/h, then he reaches the school 9 minutes late. If he travels at the speed of 8 km/h, he reaches the school 8 minutes earlier than school time. The distance of his school from his house is:

A. 4.3 km

B. 3.4 km

C. 6.8 km

D. 6.4 km

Ans: C

Distance, Speed & Time

Q5. Kartik left for the city A from City B at 5:20am.He traveled at a speed of 80km/hr for 4hrs 15mins.After that, the speed was reduced to 60km/hr.If the distance between two cities is 350km,at what time did Kartik reach city A?

A. 9:20am

B. 9:25am

C. 9:35am

D. 9:45am

Ans: D

Distance, Speed & Time

Q6. A man walking at a speed of 10km/hr. After every kilometer he takes a rest of 5mins.How much time will he take to cover a distance of 5km?

A. 60mins

B. 50mins

C. 40mins

D. 70mins

Ans: B

Distance, Speed & Time

Q8. The ratio between the speeds of a bike and a scooter is 4:5, respectively. Also, a car covered a distance of 540 km in 6 hours. The speed of the bike is half the speed of the car. How much distance will the scooter cover in 8 hours?

A. 500 km

B. 450 km

C. 680 km

D. 700 km

Ans: B

Distance, Speed & Time

Q9. A train starts from Mumbai towards Nagpur at 7:00 am with a speed of 60 kmph while another train starts from Mumbai in the same direction at 8:30 am at 80 kmph. At what distance from Mumbai do they meet?

A. 225 km

B. 300 km

C. 360 km

D. 400 km

Ans: C

Trains

- **Trains**
- Let S1 = speed of train, S2 = Speed of Object
  L1 = length of the train, L2 = Length of the object.
  t = time taken by train to completely pass the object

Case A : Stationary object without considerable length

L1 = S1x t

Trains

Q. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train ?

A. 120 metres B. 180 metres C. 324 metres D. 150 metres

Ans : D

Case A : Stationary object without considerable length

L1 = S1x t

= 60x5/18 x 9

=150m

Trains

- **Trains**
- Let S1 = speed of train, S2 = Speed of Object
  L1 = length of the train, L2 = Length of the object.
  t = time taken by train to completely pass the object

Case B : Stationary object with considerable length

L1+L2 = S1x t

Trains

Q. A train of length 600 m running at a speed of 48km/hr crosses the complete platform in 2 min. What is the length of the platform?

A. 500 m B. 700 m C. 900 m D. 1000 m

- **Soln**:
- Convert 48km/hr into m/sec
- Case B : **L1+L2 = S1x t** (Train passing the platform)
- 600+L2 = 40/3 x 120
- L2 = 1600 -600
- L2 = 1000 m
- **Ans D**

Trains

- **Trains**
- Let S1 = speed of train, S2 = Speed of Object
  L1 = length of the train, L2 = Length of the object.
  t = time taken by train to completely pass the object

Case C : Moving object without considerable length

L1 = (S1±S2) x t

Time & Distance

Q. A train of length 600m running at a speed of 60km/hr crossed a man coming from the opposite direction on a bike in 20 sec. Find the speed of the bike.

A.24 km/hr B. 36 km/hr C. 40 km/hr D. 48 km/hr

Soln:

60 km/hr = 60 x 5/18 = 50/3 m/s

Case B : **L1 = (St+Sb) x t** (Train passing the bike)

600 = (50/3+Sb) x 20

Sb = 40/3 m/s x 18/5 = 48 km/hr

Ans: D

Trains

- **Trains**
- Let S1 = speed of train, S2 = Speed of Object
  L1 = length of the train, L2 = Length of the object.
  t = time taken by train to completely pass the object

Case D : Moving Object with considerable length

L1+L2 = (S1±S2) x t

Trains

Q. Two trains of lengths 100 m and 200 m respectively running in opposite directions at a speed of 60 km/hr and 30 km/hr respectively. In what time will they cross each other?

A. 16 sec B. 10 sec C. 12 sec D. 14 sec

Soln:

When two trains crosses each other in opposite direction then their Distance & Relative Speeds get added.

L1 + L2 = (S1 + S2) x t

100 + 200 = (60+ 30) x t

300m = 90 km/hr x t but 90km/hr = 25m/sec

300 = 25 x t

t = 12 sec

Ans: C

Trains

Q10. Two trains running in opposite directions cross a man standing on the platform in 270 seconds and 170 seconds respectively and they cross each other in 230 seconds. The ratio of their speeds is:

A. 1 : 3

B. 3 : 2

C. 3 : 4

D. 2 : 3

Ans: B

Trains

Q11. A train 150 m long passes a cyclist, moving at 8 km/hr in the same direction as the train, in 12 seconds. What is the speed of the train?

A. 50 km/hr

B. 53 km/hr

C. 60 km/hr

D. 65 km/hr

Ans: B

Time & Distance

- **Boats & Streams**
- If Speed of boat in still water = **x kmph**
- Speed of the stream = **y kmph** then

- Speed of the boat downstream **Sd = (x+y) kmph**
- Speed of the boat upstream **Su = (x-y) kmph**

- Speed of Boat in still water **X = ½ (Sd + Su)**
- Speed of the stream **Y = ½ (Sd – Su)**

Boats & Streams

Q12. A boat running downstream covers a distance of 20 km in 1.5 hours, while for covering the same distance upstream, it takes 5 hours. What is the speed of the boat in still water?

A. 5.3 km/hr

B. 7.2 km/hr

C. 8.7 km/hr

D. 10.1 km/hr

Ans: C

Boats & Streams

Q13. A boat can travel with a speed of 17 km/hr in still water. If the speed of the stream is 5 km/hr, find the time taken by the boat to go 88 km downstream.

A. 3.25 hours

B. 3.75 hours

C. 4.00 hours

D. 4.50 hours

Ans: C

Boats & Streams

Q14. In one hour, a boat goes 33 km/hr along the stream and 15 km/hr against the stream. The speed of the boat in still water (in km/hr) is:

A. 22 kmph

B. 25 kmph

C. 24 kmph

D. 23 kmph

Ans: C

Ages

Q15. Father is aged three times more than his son sachin. After 8 years, he would be two and a half times of sachin's age. After further 8 years, how many times would he be of sachin's age?

A. 2 times

B. 2 1/2 times

C. 2 3/4 times

D. 3 times

Ans: A

Ages

Q16. 20 years ago, age of father was thrice the age of his son. Ten years hence, father's age will be twice that of his son. The ratio of their present ages is

A. 11:2

B. 10:1

C. 11:5

D. 9:2

Ans : C

Ages

Q17. One year ago, the ratio of Honey and Piyush ages was 2: 3 respectively. After five years from now, this ratio becomes 4: 5. How old is Piyush now?

A. 5 years

B. 25 years

C. 10 years

D. 15 years

Ans: C

Indices & Surds

Q20. Simplify $\left(\frac{343}{1024 \times 8 \times 4}\right)^{1/3} \times (256)^{1/2}$

A. 7/16

B. 7/4

C. 49/2

D. 7/2

Ans: D

Cyclicity & Remainders

Number	Cyclicity	Power Cycle
1	1	1
2	4	2, 4, 8, 6
3	4	3, 9, 7, 1
4	2	4, 6
5	1	5
6	1	6
7	4	7, 9, 3, 1
8	4	8, 4, 2, 6
9	2	9, 1
10	1	0

Cyclicity & Remainders

Q. Find the last digit of 13^{59}

A. 5 B. 6 C. 7 D. 3

Solution :

No of digits in the base does not make a difference

Last digit of the base decides cyclicity.

Cyclicity of 3 is : 3, 9, 7, 1 (4)

59/4 = 14 remainder 3

= 3^3 = 27

So last digit is 7

Ans : C

Cyclicity and Remainder

Q18. Find the remainder, when (15^23+23^23) is divided by 19

A. 4

B. 15

C. 0

D. 18

Ans: C

Cyclicity and Remainder

Q19. When 2^256 is divided by 17, the remainder would be ?

A. 1

B. 16

C. 14

D. None of these

Ans: A

Cyclicity and Remainder

Q. When 7^84 is divided by 342, the remainder would be ?

A. 1

B. 341

C. 49

D. None of these

Ans: A

Surds and Indices

Rules of Indices: -

i. $a^n * a^m = a^{m+n}$

ii. $\frac{a^m}{a^n} = a^{m-n}$

iii. $(a^n)^m = a^{mn}$

iv. $(ab)^n = a^n * b^n$

v. $(\frac{a}{b})^n = \frac{a^n}{b^n}$

vi. $a^0 = 1$ (where a $\neq 0$)

vii. $a^{-n} = \frac{1}{a^n}$

Rules of Surds: -

i. $\sqrt[n]{a} = a^{\frac{1}{n}}$

ii. $\sqrt[n]{ab} = a^{\frac{1}{n}} * b^{\frac{1}{n}}$

iii. $\sqrt[n]{\frac{a}{b}} = \frac{a^{\frac{1}{n}}}{b^{\frac{1}{n}}}$

iv. $(\sqrt[n]{a})^n = a$

v. $(\sqrt[n]{a})^m = a^{\frac{m}{n}}$


THANK
YOU!