

Blood Relations

Father's side - Paternal
Mother's side - Maternal

default - father.

Family Tree

D → Male → 1st gen O → female.

- → 0 gen ⇌ (0 gen) has a wife.

\boxed{A}
↑
B A father of B B
↓
 \boxed{A} A son of B.

\boxed{A}
↑
↑ } 2 gen A grandfather of B.
↑
B

↑ - father/mother
↓ - son/daughter

In eq

father/mother ⇒ + 1

son/daughter ⇒ - 1.

Problems on Ages

PAST ← PRESENTS → FUTURE

17 ← $\xrightarrow{-10}$ (27) $\xrightarrow{+10}$ 37

(Ago, before) (after, hence)

$x - n$
↓
years.

x years

$x + n$
↓
years.

① Father age is 3 times the age of son.

$$S = x \quad F = 3x$$

② Father is aged 8 times more than his son.

$$S = x \quad F = x + 3x = 4x$$

Further \rightarrow again + previous

Avg

$$\text{avg} = \frac{\text{sum of obs}}{\text{tot no of obs}}$$

Probability

AND $\rightarrow \times$
OR $\rightarrow +$

$$P = \frac{\text{Fav o/c}}{\text{Tot o/c}}$$

$$5C_3 = \frac{5 \times 4 \times 3}{1 \times 2 \times 3}$$

$$100C_1 = 100 - 97 = 3 \\ = 100C_3$$

$$1 \text{ coin} = 2^1 = 2$$

$$2C = 2^2 = 4 \quad 3C = 2^3 = 8$$

$$1 \text{ die} = 6^1 = 6$$

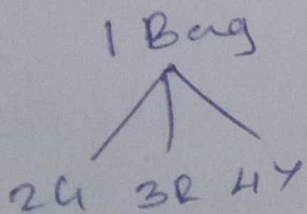
$$2d = 6^2 = 36$$

either or $\Rightarrow +$ nor \Rightarrow avoid it

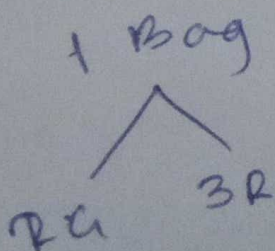
at least \Rightarrow min to max Almost \Rightarrow max to min

neither nor \Rightarrow avoid both

$$\text{Tot} = 3 \quad 2 \text{ is red} \\ 3C_2 + 6C_1 \rightarrow 6 + 4$$



$$\textcircled{3} = \text{Tot} \quad 2 \text{ is red} \\ 3C_2 + 2C_1$$



Permutation

①

$${}^n P_r = \frac{n!}{(n-r)!} \quad n > r$$

$$1! = 1$$

$$2! = 2$$

$$3! = 6$$

$$4! = 24$$

$$5! = 120$$

$$6! = 720$$

$$7! = 5040$$

$$8! = 40320$$

Permutat \rightarrow go for all possibilities
Comb \rightarrow go for required perm

Ex 3 balls \rightarrow ① ② ③ \rightarrow pick 2 randomly

Comb

1, 2 }
2, 3 } 3.
1, 3 }

perm

1, 2 }
2, 1 }
3, 2 } 6.
2, 3 }
1, 3 }
3, 1 }

\Rightarrow How many ways words can be arranged

① Non-repeated letter \Rightarrow no of letter!

② Repeated letter $\Rightarrow \frac{\text{no of letter!}}{\text{repeated letter!} \times \text{repeated 2!}}$

③ vowel together \Rightarrow L E A R N
(no repe)

L E A R N
- L - R - N - E A
 ↓ ↗
 4! 2!

for repe $\cdot 4! \times 2!$

rep! \rightarrow (cons, vowel)

① Vowels never come together.
tot - vowel together.

② No 2 vowels comes together
NP₂ × remainder!

Eg: BANKER no 2 vowels together

B_N_K_R = (A E)
→ $5P_2 \times 4!$

→ repeat means all divided by

$$\frac{2P_2 \times 4!}{3!} \Rightarrow \text{eg.}$$

③ Repetition allowed

CAT → CCC, CAA, ... $\frac{3^3}{\text{letter repeat!}}$

④ Repetition not allowed \Rightarrow default.

CAT $\Rightarrow 3!$ (kiss)

5 person 1 chair = 5

5 person 5 chair = 5!

Time & Work

Chain Rule

Form 1

$$\frac{P_1 H_1 D_1}{P_2 H_2 D_2} = \frac{W_1}{W_2}$$

P = no of person

H = no of hrs

D = no of days.

W = work.

Form 2

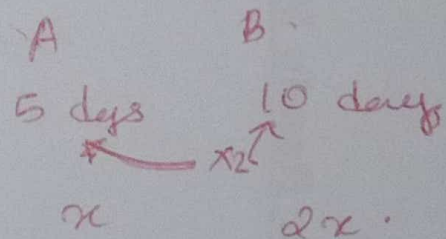
$$P_1 H_1 D_1 = P_2 H_2 D_2$$

↓
use if no work given & when same work in both case.

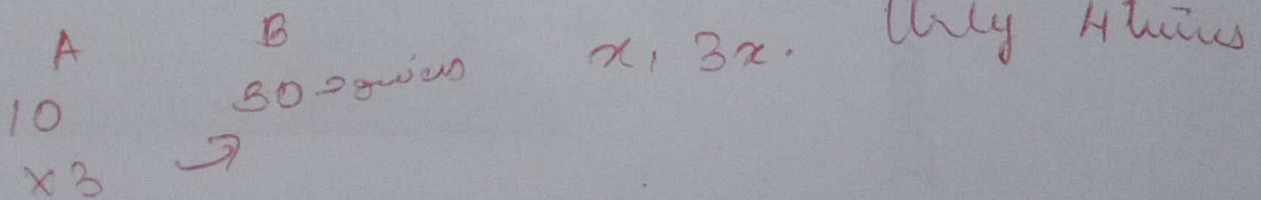
Efficiency

↑ efficiency ↓ time

⇒ A is 2 times efficient than B.



⇒ work →



⇒ A is 50% more efficient than B

A → 100%	B → 150%
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2

Man eff 3 times
than a boy
(days) (work)

$x : 3x$ $3 : 1$
↓
1 part
of job

1 part
of job

\Rightarrow

A	B
x	$\frac{1}{4}x$

 \rightarrow crossmul.

50.1. n

$$= \frac{50}{100} \times x$$

Fraction of work

$\Rightarrow \frac{2}{3}$ rd work completed by A in 10 days

$$\text{work} = \frac{5}{10} \times \frac{3}{2}$$

work = 15 days

\Rightarrow A completes a piece of work in 20 days
2/5 work done time

$$\frac{4}{10} \times \frac{2}{5} = \underline{\underline{8 \text{ days}}}$$

\Rightarrow Only $4/5$ work by A+B \Rightarrow find $A+B = ? \times 4/5$

→ B w log wat is portions of work³ done by A.

find $A+B = x$.

$$x \times \frac{1}{\text{w of A}} = \dots$$

Work & Wages

work π wage π .

<u>AB</u>	A	B
	5	2

5/7	2/7
↑ w of	w of ↓

Step 1 - 1 day w done.

s 2 - find Ratio

s 3 - find share $\Rightarrow \frac{\text{ratio A}}{\text{tot}} \times \text{tot amt}$.

Leaving

shortcut method $(A+B) - () + ()$

Profit & Loss

①

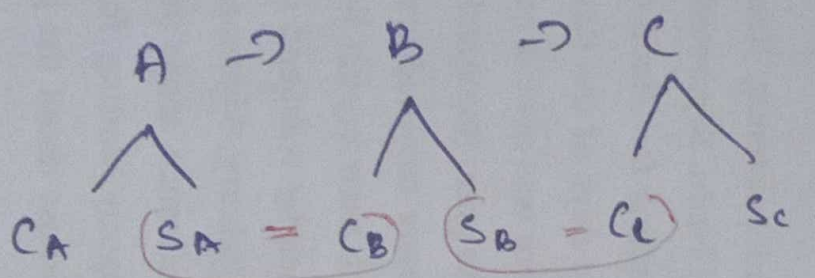
$$A \rightarrow B.$$

CP \rightarrow price (bought)

SP \rightarrow price (sold).

$$SP > CP \Rightarrow \text{Profit}$$

$$CP > SP \Rightarrow \text{Loss}.$$



$$SA \text{ of } A = \text{C.B. of } B.$$

$$P = S - C$$

$$L = C - S$$

% \Rightarrow depends of C (base val).

$$P\% = \frac{P}{C} \times 100$$
$$= \frac{S - C}{C} \times 100$$

$$L\% = \frac{L}{C} \times 100$$
$$= \frac{C - S}{C} \times 100$$

Model I (same in next page) -

$$S = \left(\frac{100 + P\%}{100} \right) C$$

$$S = \left(\frac{100 - L\%}{100} \right) C$$

can
find
C.

$$C = 100 \%$$

$$S = \left(\frac{100 + G\%}{100} \right) CP \quad S = \left(\frac{100 - L\%}{100} \right) CP$$

$$C = \left(\frac{100}{100 + G\%} \right) SP \quad C = \left(\frac{100}{100 - L\%} \right) SP$$

NOTE: 2 article sell at same SP & 1st art gain $x\%$, 2 art loss $x\%$. then find $L\%$.

$$\text{loss} = \left[\frac{x^2}{100} \right]$$

$$40\% \text{ profit} = \frac{100 + 40}{CP} = \frac{140}{100}$$

If CP & SP unknown

$\Rightarrow CP \Rightarrow 100$ always

$$20\% \text{ loss} = \frac{100 - 20}{CP} = \frac{80}{100}$$