DISCLAIMER

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Thank you and good luck for your journey.

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TOPIC : TIME & WORK

1) TYPE 1 : A & B together work for 'x' days, B alone works for 'y' days. how many days will A take alone?

$$A = \frac{x \times y}{y - x}$$

2.) TYPE 2 : if x men take y days, 'a' women take 'b' days how many days will 8m and 4 co will take.

$$\Rightarrow \frac{18}{x \times y} + \frac{4}{a \times b}$$

3.) TYPE 3 : A takes 'x' days ; B takes 'y' days, then A+B together will take how many days ?

$$\Rightarrow A + B = \frac{A \times B}{A + B} = \frac{x \times y}{x + y}$$

4.) Type 4 : A → x , B → y, C → z , how many days if 3 work together ?

$$A + B + C = \frac{x \times y \times z}{x + y + z}$$

5.) TYPE 5 : if 3m or 4W or 8B do a work in 25 days, then how many days will 2m and 3W and 4B take ?

$$\Rightarrow \frac{\text{no. of days}}{\frac{\text{and M}}{\text{or M}} + \frac{\text{and W}}{\text{or W}} + \frac{\text{and B}}{\text{or B}}}$$

6.) Type 6 : A takes 15 days. B is 50% more efficient. how many days 'B' will take alone?

$$\Rightarrow \frac{100}{100 + 50} \times 15 .$$

7.) type 7 : x takes 12 days to complete, y takes 16 days and they together work for 3 days. x leaves, how many days y will take to finish?

$$\Rightarrow Y - \frac{x + y}{x} \times \underset{\text{together}}{\text{both}} \qquad \Rightarrow \quad 16 - \frac{18 + 12}{12} \times 3 .$$

individual

- geometric progression: a, ar, ar^2, ar^3

  first term : a

  nth term = ar^{n-1}

  $r = \dfrac{t_n}{t_{n-1}}$

  sum of 'n' terms = $\dfrac{a[r^n-1]}{(r-1)}$

- Average:

  when a term is misread. Eg: 46 is read as 64

  Q.] avg of 50 items is 42 & 46 is misread as 64.

  $\therefore$ new avg = $\dfrac{\text{total items} \times \text{avg} - \text{wrong term} + \text{right terms}}{\text{total items}}$

  $= \dfrac{50 \times 42 - 64 + 46}{50}$

- divisibility:

  72 - by 8 & 9 both

  36 - by 6 & 4 both.

  45 - by 5 & 9 both

  18 - by 2 & 9

  12 by 3 & 4.

  8 - if last 3 digits are divisible by 8

  4 - if last 2 digits are divisible by 4.

Maths Quick Revision

(i) **Permutation** : $^nP_r = \dfrac{n!}{(n-r)!}$

(ii) **combination** : $^nc_r = \dfrac{n!}{r!(n-r)!}$

(iii) **profit & loss** : $P = CP - SP$

P of $A:B = 5:4 \Rightarrow 5x : 4x$.

- **simple interest** : $\dfrac{P \times R \times T}{100} = $ Interest.

- **compound interest** : $P\left[1 + \dfrac{rate}{100}\right]^n \to $ years. $= $ amount.

- **principle amt.** = $\dfrac{x \,(\text{installment})}{\left[1 + \dfrac{r}{100}\right]} + \dfrac{x}{\left[1 + \dfrac{r}{100}\right]^2}$
(installments)

- **volume** :
  (i) cone : TSA $\pi r(r+l)$, CSA : $\pi r l$, vol : $\pi r^2 h \dfrac{1}{3}$

  (ii) cylinder : TSA : $2\pi r(r+h)$

  (iii) triangle : area $= 1/2 \times b \times h$

- **Percentage** :
  (i) how much % is A more than B : $\dfrac{A-B}{B} \times 100$.

- **work & time** : x.
  (i) A & B together complete x% of work in y days
  $\therefore$ total time taken by $(A + B) = \dfrac{y}{x/100}$ days.

  (ii) efficiency of A $= \dfrac{\text{total work compute}}{\text{days taken}}$

  (iii) if c is m% more than B :
  efficiency of $B = \dfrac{\in \text{ of } c}{(100+m)/100}$

amount of total work $=$ LCM of two days given.

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    speed in still water = x , speed in current = y

    upstream = $x - y$

    downstream = $x + y$. $1 \dfrac{km}{hr} = \dfrac{5}{18}$ m/sec

- % discounts : a% b% c% $100 m^2 = 1 dam^2$

    $a + b = \left(a + b - \dfrac{a \times b}{100} \right) \% = m\%$

    $m + c = \left(m + c - \dfrac{m \times c}{100} \right) \%$

- trigo :

    $\sin x = \dfrac{height}{hypo.}$

    $\cos x = \dfrac{breadth}{hypo}$

    $\tan = \dfrac{height}{breadth}$

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    (i) Profit = SP - CP

    (ii) $P\% = \dfrac{profit}{CP} \times 100$ $L\% = \dfrac{loss}{CBP} \times 100\%$

    (iii) if loss% is given : $CP = \dfrac{SP}{100 - L\%} \times 100$

    (iv) if profit% is given : $CP = \dfrac{SP}{100 + P\%} \times 100$

- mean, median & mode:

    (i) mean = $\dfrac{sum}{total\ items}$

    (ii) median =

          a] odd = $\dfrac{n+1}{2}$

          b) even = $\dfrac{n/2 + n + 1}{2}$

    (iii)) mode: element that appears max no. of times. (2 nos can be modes).

Permutation:

Type 1: vowels together: FUZZTONE.
- letters: 8
- vowels: U O E (3) → 3! ways.
- consonant: 5.

a ways arranged = 5 + 1 (vowel group) = 6! ways.
repeated words = 2
∴ permutation = $\frac{6!}{2!} = 3! \times 3!$

Type 2: vowels are never together:
never together = total possible − always together.
ways
Eg: SISTER : vowels together = IE = 2! final ans = $\frac{6!}{2!} - \frac{5! \times 2!}{2!}$
words arranged = $\frac{6!}{2!}$

Type 3: how many 2 digits formed from 1, 2, 2, 3, 4.
$$\frac{^5P_2}{2! \ (\text{repeated nos.})}$$

how may 4 digit formed from 0, 1, 2, 3.
first digit = 1, 2, 3 & never 0, = 3! × 3 (as 3 digits).
1|2|3. ↙ _ _ _
3!
remaining spaces.

Type 4: distinct characters: Eg: shirt = 5!
repeated characters eg: MISSISSIPPI = $\frac{11!}{2! \ 4! \ 4!}$

Type 5: arrange words such that repeation is allowed.
Eg: SHIRT: 5^5

Type 6: vowels only occupy ODD position. Eg: FRIDGE
v – I E
$\overline{1} \ \overline{2} \ \overline{3} \ \overline{4} \ \overline{5} \ \overline{6}$
odd posi = 3
no. of ways = $^3P_2$.
remaining = 4 letters.
total = $^3P_2 \times 4!$

• Type 7 : no two letters together.
  eg : PLACES : vowel : A E , remaining : 4
       _ P _ L _ C _ S _   A E = $^5P_2$
       total = $^5P_2 \times 4!$

→ trick for average:
• type 1 : 31 students avg wt = 11·5, teacher added, avg now's
  12·5. find teachers wt.

$$1 \begin{bmatrix} 31 & \to & 11 \cdot 5 \\ 32 & \to & 12 \cdot 5 \end{bmatrix} +1$$

wt = diff of left × bottom right + diff of right × top left.

wt = 1 × 12·5 + (+1) × 31

= 12·5 + 31 = 43·5 kg

→ Syllogism :
  Rules 1 :   +re   +re   →   +re .
              +re   -re   →   -ve
              -re   -ve   →   no conclusion.

  Rule 2 :   all   100   50
             some   50   50
             no   100   100 .

      statement - income
      conclusion - expenditure

calendars

1 week → 7 days

1 year → 52 weeks + 1 odd day.

leap yr → 52 week + 2 odd days.

days: 0-S , 1-M, 2-T, 3-W, 4-TH, 5-F, 6- Sat.

month: [J F M] [A M J] [J A S] [O N D]

0 3 3 6 1 4 6 2 5 0 3 5

year: 1600 - 1699 → 6.

1700 - 1799 → 4

1800 - 1899 → 2

1900 - 1999 → 0

2000 - 2099 → 6.

Q.) day on 26th Jan, 1942

last 2 dig of yr → 47

divide by ④ → 11 (quotient)

take the date → 26

no. of month → 0

no. of yr → 0.

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add → 84

divide by ⑦ → 0 (remainder) → sunday.

θ.) day on 5th oct, 2016.

last 2 digit = 16

divide by 4 = 04

take date = 05

no. of month = 0

no. of yr = 06

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31

divide by 9 = 3.

Q.) today is monday, 30 days from now will be?

$$7 \overline{)30(} \quad 4$$
$$\underline{-28}$$
$$2$$

wednesday

monday + 2 ⎬

Q.) Jan 4 2016 (mond) then what day will
jan 4, 2017.

2016 - leap yr.

Jan 4 2016
$$\underline{+2}$$
Jan 4 → wednesday

Q.) 1march 2006 (wed), then 1 march 2010?

2007 → 1
2008 → 2
2009 → 1
2010 → 1
$$\overline{5 \text{ days}}$$

wed
↓
mon.

0.) today is monday, after 64 days it will be?

7×9 = 63

63+1

m+1 → tuesday.

2.) 8th may 2006 → wed, 8th may 2005?

⊕ · 2005 → 1 odd day.
2006 -1 → tuesday