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~~ w will take.

$$\Rightarrow \frac{8}{x \times y} + \frac{4}{a \times b}$$

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?

$$\Rightarrow Y - \frac{x+y}{x} \times \underbrace{\text{both}}_{\text{together}} \quad (\text{individual}) \quad \Rightarrow 16 - \frac{16+12}{12} \times 3.$$

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

  first term: a

  n^{th} term $= ar^{n-1}$

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

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

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

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

- 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 : ${}^nP_r = \frac{n!}{(n-r)!}$

(ii) combination : ${}^nC_r = \frac{n!}{r!(n-r)!}$

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

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

- simple interest : $\frac{P \times R \times T}{100}$ = Interest.
- compound interest : $P\left[1 + \frac{\text{rate}}{100}\right]^{n \to \text{years}}$ = amount.
- principle amt. (installments) = $\frac{x \text{ (installment)}}{\left[1 + \frac{r}{100}\right]} + \frac{x}{\left[1 + \frac{r}{100}\right]^2}$
- volume :

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

(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 : $\frac{A-B}{B} \times 100$.

- work & time :

(i) A & B together complete x % of work in y days

∴ total time taken by (A+B) = $\frac{y}{x/100}$ days.

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

(iii) if C is m % more than B :

efficiency of B = $\frac{\text{C of C}}{(100+m)/100}$

amount of total work = LCM of two days given.

- upstream & downstream:

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

  upstream = $x - y$

  downstream = $x + y$

  $1\ km/hr = \frac{5}{18}\ m/sec$

- % discounts: a%, b%, c%.

  $100\ m^2 = 1\ dam^2$

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

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

- trigo: $\sin x = \frac{height}{hypo.}$

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

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

- Profit & loss:

  (i) Profit = SP − CP

  (ii) $P\% = \frac{Profit}{CP} \times 100$ $\quad L\% = \frac{Loss}{CP} \times 100\%$

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

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

- mean, median & mode:

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

  (ii) median =

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

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

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

Permutation:

Type 1: vowels together: FUZZTONE.

letters: 8

vowels: U O E (3) → 3! ways.

consonants: 5.

ways arranged = 5+1 (vowel group) = 6! ways.

repeated words = 2

∴ permutation = $\frac{6!}{2!}$ = 3! × 3!

Type 2: vowels are never together:

never together = total possible − always together.

ways

Eg: SISTER : vowels together = 1E = 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.

$\frac{^5P_2}{2!}$ (repeated nos.)

how may 4 digit formed from 0, 1, 2, 3.

first digit = 1, 2, 3 & never 0, = 3! × 3 (as 3 digits).

11213. ← _ _ 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 − IE

odd posi = 3

no. of ways = $^3P_2$.

remaining = 4 letters.

total = $^3P_2 \times 4!$

_ _ _ _ _ _
1 2 3 4 5 6

• Type 7 : no two vowels together.

eg: PLACES: vowel: A E ; remaining : 4.

_ P _ L _ C _ S _ AE = $^5P_2$

total = $^5P_2 \times 4!$

→ trick for average:

• type 1: 31 students avg wt = 11.5, teacher added, avg now is 12.5. find teachers wt.

$$1 \begin{cases} 31 \longrightarrow 11.5 \\ 32 \longrightarrow 12.5 \end{cases} +1$$

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

wt = $1 \times 12.5 + (+1) \times 31$

= $12.5 + 31 = 43.5$ kg.

→ Syllogism:

Rules 1: +ve +ve → +ve.

+ve −ve → −ve

−ve −ve → no conclusion.

Rule 2:

all	100	50
some	50	50
no	100	100.

statement - income

conclusion - expenditure

DATE

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, 1947.

last 2 dig of yr → 47

divide by (4) → 11 (quotient)

take the date → 26

no. of month → 0

no. of yr → 0

84

divide by (7) ⇒ 0 (remainder) → Sunday.

Q.) day on 5th Oct, 2016.

last 2 digit = 16

divide by 4 = 04

take date = 05

no. of month = 0

no. of yr = 66

31

divide by 7 = 3.

DATE

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

$$7 \overline{)30} \quad 4$$

-28

2

wednesday

monday + 2

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

2016 - leapyr.

Jan 4 2016

$+2$

Jan 4 → wednesday.

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

2007 → 1

2008 → 2 — wed

2009 → 1 — ↓ mon.

2010 → 1

5 days.

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

$7 \times 9 = 63$

$63 + 1$

$m + 1$ → tuesday.

Q.) 8th mar 2006 → wed, 8th mar 2005?

2005 → 1 odd day.

2006 - 1 → tuesday.