* SDC-II - Aptitude:

1) Finding factors of a number:

* prime factorize the given number into $2^x \times 3^y \times 5^z$

→ Find no. of factors of number $= (x+1)*(y+1)*(z+1)$

→ No. of factors of given number except 1 and itself = no. of factors − 2.

→ No. of pair of factors = no. of factors / 2 (even no. of factors)

$= (\text{no. of factors} + 1)/2$ (odd no. of factors).

→ No. of pair of different factors = (No. of factors − 1)/2.

→ No. of prime factors = $(x + y + z)$.

2) Divisibility rules:

→ by 2: all even numbers

→ by 3 | 9: sum of digits should be divisible by 3|9 respectively.

→ by 4: last 2 digits of given no. is divisible by 4.

→ by 5: last digit is 0/5.

→ by 6: divisible by 2 & 3 respectively.

→ by 7: multiply unit digit by 2; subtract the value from remaining digits and continue the process.

→ by 8: last 3 digits are divisible by 8.

→ by 10: last digit is 0

→ by 11: find sum of alternative digits & subtract & result should be equal to zero or a multiple of 11:

3) Finding the unit digit of a given number with a certain power value:

→ if unit digit of the given no is 0, 1, 5, 6 then the any power of given no is the same no. respectively.

→ If unit digit of given number is 4;
if power is odd ⇒ unit digit is 4
if power is even ⇒ unit digit is 6.

→ If unit digit of given number is 9
power is odd ⇒ unit digit is 9
power is even ⇒ unit digit is 1

→ unit digit is 2; if power is multiple of

$1 \rightarrow 2$
$2 \rightarrow 4$
$3 \rightarrow 8$
$4 \rightarrow 6$

} This repeats.

* → If unit is 3; power is

$1 \to 3$
$2 \to 9$
$3 \to 7$
$4 \to 1$
} Repeats after 4 terms each time.

- → If unit digit is 7, power is

$1 \to 7$
$2 \to 9$
$3 \to 3$
$4 \to 1$
} Repeats

- → If unit digit is 8, power is

$1 \to 8$
$2 \to 4$
$3 \to 2$
$4 \to 6$
} Repeat.

* A no. is divided by d_1 & d_2 with r_1 & r_2 as remainders respectively; the remainder if the no. is divided by $d_1 * d_2$; then

$$\text{rem} = d_1 * r_2 + r_1$$

4) LCM & HCF:

HCF → largest factor of all the given numbers.
LCM → smallest no. which exactly divisible by all the nos.

1) LCM of fractions: $\frac{\text{LCM of numerator values}}{\text{HCF of denominator values}}$.

2) HCF of fractions: $\frac{\text{HCF of numerator}}{\text{LCM of denominator}}$.

3) HCF × LCM = a × b

4) Greatest no. that will divide x, y, z & leaving reminders a, b, c = HCF of $((x-a), (y-b), (z-c))$

5) Greatest no. that will divide x, y, z and leaving remainders R = HCF $((x-R), (y-R), (z-R))$

6) Greatest no. that will divide x, y, z & leaving same remainder in each case = HCF $(|x-y|, |y-z|, |z-x|)$

7) Least no. that will be exactly divisible by x, y, z = LCM of x, y, z.

8) Least no. that will be divisible by x, y, z & leave the same remainder R = LCM of $(x,y,z)+R$

9) Least no. that will divisible by x, y, z & leave remainders a, b, c = LCM of $(x,y,z) - k$

$$[k = x-a = y-b = z-c]$$

5) Ratio & Proportions:

a : b :: c : d

Product of extremes = product of means

6) Problems on ages

→ after n yrs ⇒ x + n
→ n yrs ago ⇒ x − n

7) Partnership:

A : B : C

x y z → capitals

x*12 : y*12 : z*12

p : q : r

Share of A = $\frac{p}{p+q+r}$ * Profit

Share of B = $\frac{q}{p+q+r}$ * profit

Share of C = $\frac{r}{p+q+r}$ * profit

If there is working partner (WP); he shall get extra pay for the work.

x% of profit goes to the WP = x%(P)

Share of A = $\frac{p}{p+q+r}$ * P + x%P

8) Averages

→ Combined group avg: avg marks of boys & girls then total avg

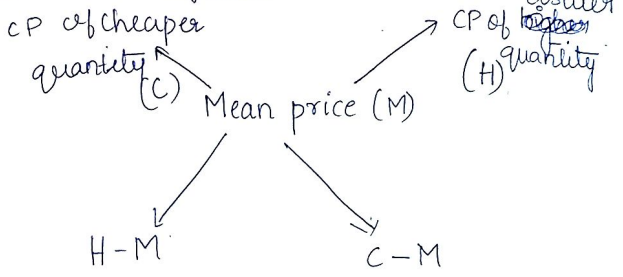
→ Include/Exclude case.

→ Replacement case.

New person value − Removed person value

= no. of persons * change in avg.

9) Mixtures & Allegations:



$\frac{\text{Quantity of cheaper}}{\text{Quantity of costlier}} = \frac{H-M}{C-M}$

10) Percentages:

→ General Based questions ⇒ x% of y = $\frac{x*y}{100}$

→ Population Based questions ⇒

original population (P)

increase rate = r% per annum.

Population after n years = $P\left(1+\frac{r}{100}\right)^n$

Population before n yrs = $P\left(1+\frac{r}{100}\right)^{-n}$

→ Machine based questions.

Original/Present value = M

depreciation rate = r%.

Value after n yrs = $M\left(1-\frac{r}{100}\right)^n$

Value before n yrs = $M\left(1-\frac{r}{100}\right)^{-n}$.

→ Election based Questions

total polled votes = Valid votes + Invalid votes.

total polled votes $= \frac{100 \times M}{2*W-100} + I.V.$

M → majority votes
W → winner %
I.V → Invalid votes.

→ Marks Based Questions:

* pass marks % = x %
candidate got y marks failed by z marks

Max. Marks = M = $\frac{100(y+z)}{x}$

* candidate who got x% in an examination fails by 'a' marks while another candidate who got y% marks gets marks more than the minimum required marks

Max. Marks = $\frac{100(a+b)}{y-x}$

→ Consumption based questions:

* price of commodity ↑ses by r%;
So that no change of expenditure
reduction in consumption = $\left(\frac{r}{100+r}*100\right)\%$

↓ses by r%
↑ in consumption = $\left(\frac{r}{100-r}*100\right)\%$

* value ↑sed (+) / ↓sed (−) successively by x% & y%
then change in % = $\left(\pm x \pm y \pm \frac{xy}{100}\right)$

11) Profit & Loss:

Profit = SP − CP
Loss = CP − SP

% P = $\frac{\text{Profit}}{CP} \times 100$
% L = $\frac{\text{Loss}}{CP} \times 100$.

$SP = CP * \left(\frac{100+\%P}{100}\right)$ | $CP = SP * \left(\frac{100}{100+\%P}\right)$

$SP = CP * \left(\frac{100-\%L}{100}\right)$ | $CP = SP * \left(\frac{100}{100-\%L}\right)$

Profit/Loss → applied to CP
discount → applied to SP

2 successive discounts x%, y%

$$x+y-\frac{xy}{100}$$

12) Blood Relations problems.
Series
Coding & Decoding
→ Depends on different logic.

13) Time and work:

1) A → x days } LCM
   B → y days }

(i) Efficiency of A = $\frac{\text{LCM}}{x}$ = p parts/day

B = $\frac{\text{LCM}}{y}$ = q parts/day.

* A & B can finish the work in x days while A alone finish it in y days. then B alone finishes it in $\frac{xy}{y-x}$ days.

* X_1 men & Y_1 men → can do in D days
  X_2 & Y_2 can do in $\frac{D * X_1 * Y_1}{(X_2 Y_1 + X_1 Y_2)}$ days.

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

P → no. of persons
D → days
H → hours
W → work.