(S1) (20% of A levels)

(50 Marks) (7-8 Questions) (1h 15 min).

Super Easy Paper ⟶ Percentile ↑

2000 — 2019	2020 ⟶ onward
S1 ⟶ P6 (61, 62, 63)	S1 ⟶ P5 (51, 52, 53)

Syllabus is same
only paper name changed.

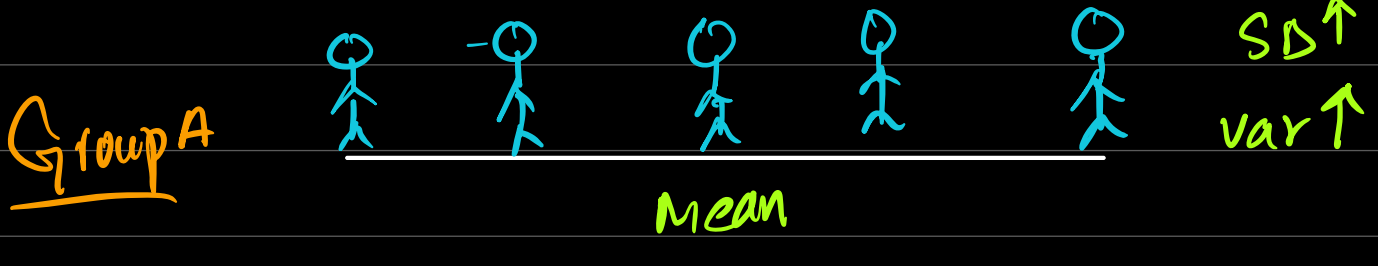
(P1), P3, M1 | Reading Time | SOLVING TIME.

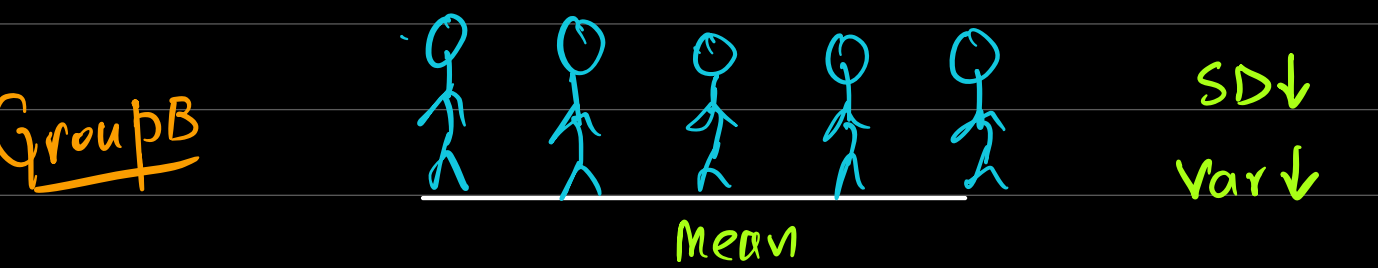
S1 | 80% Reading Time | 20% Solve

Mean — Average

STANDARD DEVIATION
VARIANCE

Rough definition
gap of other values from Mean value.





MEAN | STANDARD DEVIATION | VARIANCE

$\Sigma x^2 \neq (\Sigma x)^2$

Find x^2 terms and then add them $\neq$ Add all x terms and then take square

$x = a, b$

$\Sigma x^2 = a^2 + b^2$ | $(\Sigma x)^2 = (a+b)^2$

1) RAW DATA (NO TABLE)

(X) Ages: 7, 4, 3, 6, 6, 5 $\quad n = 6$

X	X^2
7	49
4	16
3	9
6	36
6	36
5	25
$\Sigma x = 31$ (Sum (Total))	$\Sigma x^2 = 171$

$$\text{MEAN} = \frac{\Sigma x}{n} = \frac{31}{6} = 5.1667$$

$$\text{STANDARD DEVIATION} = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$$

$$= \sqrt{\frac{171}{6} - \left(\frac{31}{6}\right)^2} = 1.3437$$

$$\text{VARIANCE} = (\text{SD})^2 = (1.3437)^2 = 1.80556$$

2) FREQUENCY DISTRIBUTION TABLE (SINGLE VALUE TABLE)

	x^2	0	1	4	9	
	x/mark	0	1	2	3	
	f	10	5	25	60	$\Sigma f = 100$
$fx = f \times x$	fx	0	5	50	180	$\Sigma fx = 235$
$fx^2 = f \times x^2$	fx^2	0	5	100	540	$\Sigma fx^2 = 645$

$$\text{MEAN} = \frac{\Sigma fx}{\Sigma f} = \frac{235}{100} = 2.35$$

$$\text{STANDARD DEVIATION} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2} = \sqrt{\frac{645}{100} - \left(\frac{235}{100}\right)^2}$$

$$SD = 0.963068$$

$$\text{VARIANCE} = (SD)^2 = (0.963068)^2 = 0.9275$$

3) FREQUENCY DISTRIBUTION TABLE (RANGE TABLE)

x^2	25	625	2025	
$\frac{a+b}{2}$ = X = Mid Value of x	5	25	45	
x/marks	$0<x\leq 10$	$10<x\leq 40$	$40<x\leq 50$	
f	40	30	10	$\Sigma f = 80$
fx	200	750	450	$\Sigma fx = 1400$
fx^2	1000	18750	20250	$\Sigma fx^2 = 40000$

$$\text{MEAN} = \frac{\Sigma fx}{\Sigma f} = \frac{1400}{80} = 17.5$$

$$\text{STANDARD DEVIATION} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2} = \sqrt{\frac{40000}{80} - \left(\frac{1400}{80}\right)^2}$$

$$= 13.9194$$

$$\text{VARIANCE} = (SD)^2 = (13.9194)^2 = 193.7497$$

PROBABILITY DISTRIBUTION TABLE

X^2	1	4	9	16	
X	1	2	3	4	
$P(x)$	0.2	$P = 0.4$	0.1	0.3	$\leq P(x) = 1$
$X \cdot P(x)$	0.2	0.8	0.3	1.2	$E(X) = 2.5$ → Mean
$X^2 \cdot P(x)$	0.2	1.6	0.9	4.8	$E(X^2) = 7.5$ → does not mean anything itself.

1) Sum of $P(x) = 1$

$0.2 + p + 0.1 + 0.3 = 1$

$p = 0.4$

2) EXPECTED VALUE OF X = MEAN = $E(X)$

$$E(X) = \leq [x \cdot P(x)]$$

3) EXPECTED VALUE OF $X^2 = E(X^2) = \leq [x^2 \cdot P(x)]$

4) STANDARD DEVIATION $= \sqrt{E(X^2) - [E(X)]^2}$

$= \sqrt{7.5 - (2.5)^2}$

$= 1.11803$

5) VARIANCE $= (SD)^2 = (1.11803)^2 = 1.25$

STANDARD DEVIATION

RAW DATA

$$SD = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$$

FREQUENCY TABLE

$$SD = \sqrt{\frac{\Sigma f x^2}{\Sigma f} - \left(\frac{\Sigma f x}{\Sigma f}\right)^2}$$

PROBABILITY TABLES

$$SD = \sqrt{E(x^2) - [E(x)]^2}$$