"Coefficient of Variation"

Relative measure of variance and Standard deviation is called coefficient of variation and is denoted by C.V.

* **Population Coef. of Variation**

$$= CV = \frac{\sigma}{\mu} \times 100\%$$

More Consistent

$C.V_A > C.V_B$

Ans: B.

* **Sample coefficient of variation:**

$$CV = \frac{S}{\bar{x}} \times 100\%$$

Q-1: The following are the scores made by two batsmen A and B in a series of innings:

A:	12	15	6	73	7	19	199	36	84	29
B:	47	12	76	48	4	51	37	48	13	0

i) find coefficient of variation of both players.

ii) Who is better as a run getter?

iii) Who is more consistent player?

X_A	X_A^2	X_B	X_B^2
12	144	47	2209
15	225	12	144
6	36	76	5776
73	5329	48	2304
7	49	4	16
19	361	51	2601
199	39601	37	1369
36	1296	48	2304
84	7056	13	169
29	841	0	0
480	54938	336	16892

$\therefore \quad n_A = 10, \quad \Sigma X_A = 480. \quad \Sigma X_A^2 = 54938$

i)

$$\bar{X}_A = \frac{\Sigma X_A}{n_A} = \frac{480}{10} = 48.$$

$$S_A^2 = \frac{\Sigma X_A^2}{n_A} - \left[\frac{\Sigma X_A}{n_A}\right]^2$$

$$= \frac{54938}{10} - (48)^2$$

$$= 5493.8 - 2304 = 3189.8 \quad (2)$$

$\therefore S_A = \sqrt{3189.8} = 56.47$

Thus

$$CV_A = \frac{S_A}{\bar{X}_A} \times 100\ \%$$

$$= \frac{56.47}{48} \times 100\ \%$$

$$= 117.67\%$$

Now

$n_B = 10, \quad \Sigma X_B = 336, \quad \Sigma X_B^2 = 16892.$

$$\therefore \bar{X}_B = \frac{\Sigma X_B}{n_B} = \frac{336}{10} = 33.6$$

$$\& \quad S_B^2 = \frac{\Sigma X_B^2}{n_B} - \left[\frac{\Sigma X_B}{n_B}\right]^2$$

$$= \frac{16892}{10} - (33.6)^2$$

$$= 1689.2 - 1128.96$$

$$= 560.24$$

$$\therefore S_B = \sqrt{560.24} = 23.67$$

$$C.V_B = \frac{S_B}{\bar{X}_B} \times 100\ \%$$

$$= \frac{23.67}{33.6} \times 100\ \%$$

$$= 70.45\ \%$$

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ii) Because

$$\bar{X}_A > \bar{X}_B$$

i.e; 48 > 33.6

Therefore batsman A. is better as a run getter.

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iii) Because

$$C.V_A > C.V_B$$

$$117.67\% > 70.45\%$$

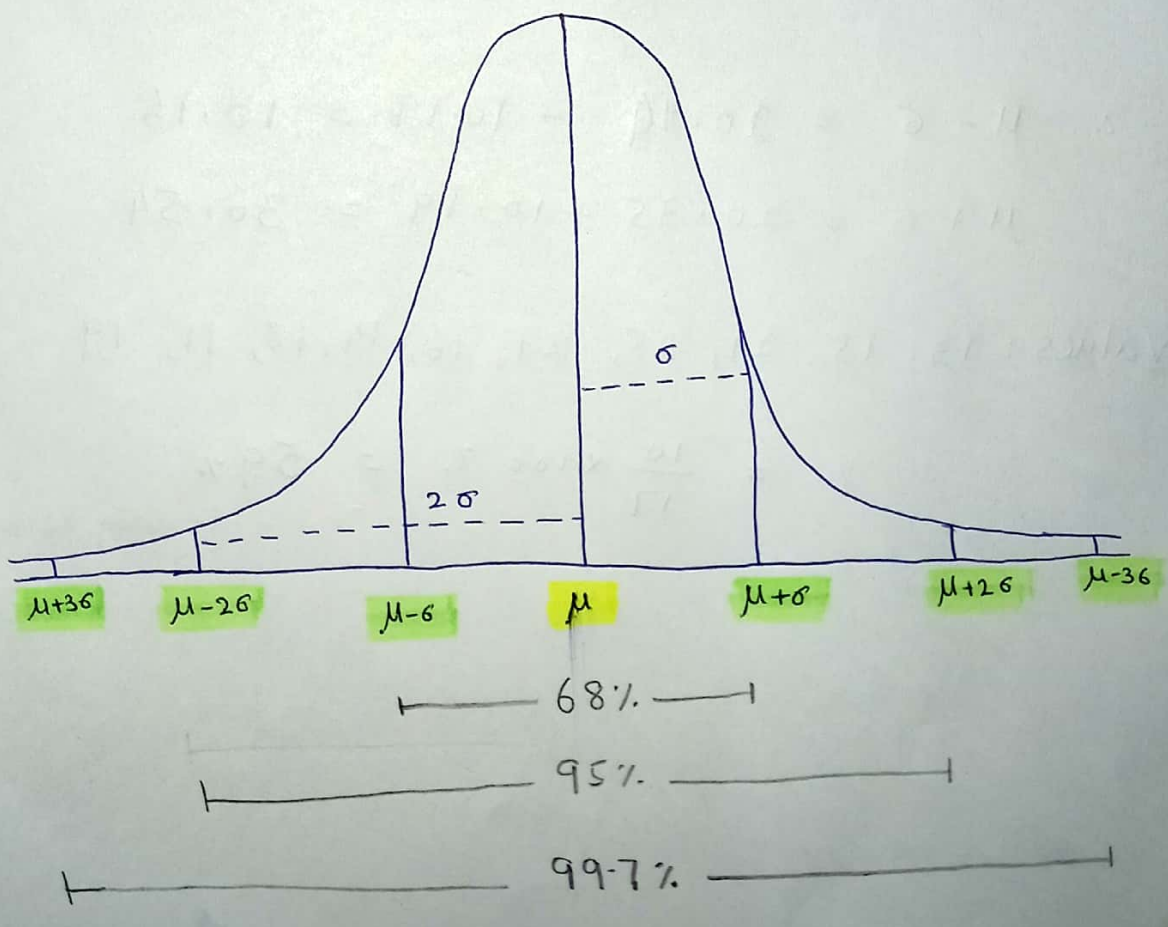
Therefore batsman B is more consistent player.

Activity:-

If two machines A and B are tested and following informations are recieved:

	Machine A	Machine B
n	50	45
$\bar{x}$	112	128
S	76	51

Which machine is more consistent? and Why?



i) $\mu \pm \sigma$ contains approx. 68% data.

ii) $\mu \pm 2\sigma$ contains approx. 95% data.

iii) $\mu \pm 3\sigma$ contains approx. 99.7% data.

Q-1:- Check approximations for the following data set:

13, 15, 21, 9, 36, 25, 35, 29, 16, 14, 18, 39, 32, 11, 6, 19, 8.

Sol:- For the given data set:-

$\mu = 20.35$ $\quad\quad$ $\sigma = 10.19$

i) $\therefore \mu - \sigma = 20.35 - 10.19 = 10.16$

$\mu + \sigma = 20.35 + 10.19 = 30.54$

Values: 13, 15, 21, 25, 29, 16, 14, 18, 11, 19

$\therefore \% = \frac{10}{17} \times 100\ \% = 59\%$

(∵ data is not large)

i) If 47 values have mean and standard deviation as 10 and 3 respectively, then there will be approximately 95 % of values in the range 4 to 16.

ii) 99.7 % of data approx. lies in $\mu \pm 3\sigma$ of any data.

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