Procedure for calculating expected return, variance of returns, standard deviation of returns, and coefficient of variation.

Expected Return = Sum of (Actual Return × Probability of Return)

$$\overline{R} = \sum_{i=1}^{n} R_i P_i$$

Where $\overline{R}$ = Expected return,

R_i = Actual return *i,*

P_i = Probability of return i

Variance = Sum of (Square of the deviation of actual returns from the expected return × probability of return)

$$\sigma_r^2 = \sum_{i=1}^{n} (R_i - \overline{R})^2 \times P_i$$

Where σ_r^2 = variance of returns and other symbols retain their meaning as explained above.

Standard Deviation = $\sqrt{Variance}$

$= \sigma_r$

$= \sqrt{\sum_{i=1}^{n} (R_i - \overline{R})^2 \times P_i}$

Coefficient of Variation = Standard deviation of return expressed as a proportion to the mean return.

CV = $CV = \dfrac{\sigma_r}{\overline{R}}$

It is much expeditious to calculate the above measures by constructing a table as below.

<u>When calculating, you may elect to keep the percentages for the actual return as they are or to use decimals. However for ease of manipulation, you are encouraged to keep the percentages.</u>

Practice Question 3

For Asset X

Actual Return / R_i ***1***	**Probability of Return/ P_i** ***2***	**Actual Return x Probability of Return/ R_iP_i** ***3 = (1 x2)***	**Square of deviation of actual return from expected return / $(R_i - \overline{R})^2$** ***4 = (1 – Expected Return)²***	**Square of deviation of actual return from expected return x Probability of Return/ $\sum_{i=1}^{n}(R_i - \overline{R})^2 \times P$** ***5 = 2 x4***
8	**0.10**	**0.80**	**7.29**	**0.73**
9	**0.20**	**1.80**	**2.89**	**0.58**
11	**0.30**	**3.30**	**0.09**	**0.03**
12	**0.40**	**4.80**	**1.69**	**0.68**
	$\overline{R}$ **=**	**10.7%**	σ_r^2 **=**	**2.02%**

(i) Expected Return for Asset X = 10.7%
(ii) Variance of Asset X returns = 2.02%
(iii) Standard deviation for Asset X returns = $\sqrt{variance}$

= $\sqrt{2.02}$

= 1.42%

(iv) Coefficient of variation = $\frac{sd}{\overline{R}}$

= $\frac{1.42}{10.7}$

$= 0.13$

For Asset Y

Actual Return / R_i	**Probability of Return/** P_i	**Actual Return x Probability of Return/** R_iP_i	**Square of deviation of actual return from expected return /** $(R_i - \overline{R})^2$	**Square of deviation of actual return from expected return x Probability of Return/** $\sum_{i=1}^{n}(R_i - \overline{R})^2 \times P$
1	***2***	***3 = (1 x2)***	***4 = (1 – Expected Return)²***	***5 = 2 x4***
10	**0.25**	**2.50**	**1.32**	**0.33**
11	**0.35**	**3.85**	**0.02**	**0.01**
12	**0.40**	**4.80**	**0.72**	**0.29**
	$\overline{R}$ **=**	**11.15%**	σ_r^2 **=**	**0.63%**

(i) Expected Return for Asset Y = 11.15%

(ii) Variance of Returns of Asset Y = 0.63%

(iii) Standard deviation of Returns of Asset Y = $\sqrt{\text{variance}}$

= $\sqrt{0.63}$

= 0.79%

(iv) Coefficient of Variation $= \dfrac{sd}{\overline{R}}$

$= \dfrac{0.79}{11.15}$

= **0.07**

Asset Y is preferred over Asset X as its coefficient of variation is lowest.