Skewness:

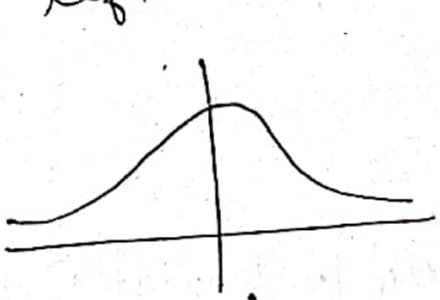
For a symetrical distribution the frequencies are symmetrically distributed about the mean. In this distribution, mean, mode and median coincides.

ie, $M = M_o = M_d$,

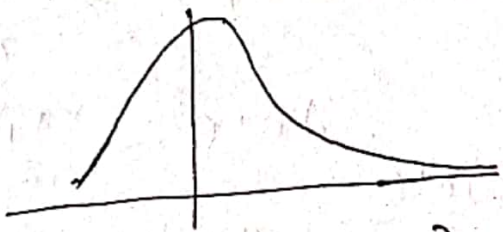
M = Mean
M_o = Mode
M_d = Median.

Skewness means lack of symmetry. Skewness indicates whether the curve is turned more to one side than to other ie whether the curve has a longer tail on one side.

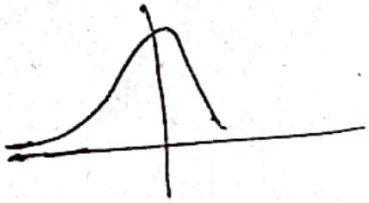
Skewness is +ve if the longer tail of the distribution lies towards the right and negative if it lies towards the left.



symmetric



(positive skewness)



(negative skewness.

Measures of skewness :

Bowley's co-efficient of skewness based on Quartile and is defined as,

$$S_K = \frac{Q_3 + Q_1 - 2Md}{Q_3 - Q_1}.$$

Karl Pearson's co-efficient of skewness is defined as,

$$S_K = \frac{\text{Mean} - \text{Mode}}{\text{Standard deviation}}$$

$$= \frac{M - M_o}{\sigma}$$

$$= \frac{3(M - M_d)}{\sigma} \quad \left[\text{Mode} = 3\,\text{Median} - 2\,\text{Mean}\right]$$

The values of Bowley's co-efficient of skewness lies between -1 and 1 and Karl Pearson's co-efficient of skewness lies between -3 and 3.

Ex:-> Find out the co-efficient of skewness and draw the curve of distribution from the following table giving the wages of 230 persons.

Wages	No of persons
70 - 80	12
80 - 90	18
90 - 100	35
100 - 110	42
110 - 120	50
120 - 130	45
130 - 140	20
140 - 150	8

Sol^{n}

wages	Mid value (x_i)	No of person (f)	C.F (c)	$u = \frac{x-105}{10}$	fu.	fu^2.
70 - 80	75	12	12	-3	-36	108
80 - 90	85	18	30	-2	-36	72
90 - 100	95	35	65	-1	-35	35
100 - 110	105	42	107	0	0	0
110 - 120	115	50	157	1	50	50
120 - 130	125	45	202	2	90	180
130 - 140	135	20	222	3	60	180
140 - 150	145	8	230	4	32	128
		N = 230			$\sum fu = 125$	$\sum fu^2 = 753$

$$\text{Mean} = a + h \frac{\sum fu}{N}$$

$$= 105 + 10 \times \frac{125}{230}$$

$$= 110.4$$

Here, highest frequency is 50 and so modal class is 110 – 120

$\therefore l = 110, \quad f_m = 30, f_1 = 42, f_2 = 45,$

$h = 10$

$\therefore$ Mode, $M_0 = l + \frac{f_m - f_1}{2f_m - f_1 - f_2} \times h$.

$= 116.2$

Standard deviation,

$$\sigma = h \sqrt{\frac{1}{N}\Sigma' f u^2 - \left(\frac{1}{N}\Sigma' f u\right)^2}$$

$$= 10 \times \sqrt{\frac{753}{230} - \left(\frac{125}{230}\right)^2}$$

$= 17.3$

Measures of skewness,

$$S_K = \frac{M - M_0}{\sigma}$$

$$= \frac{110.4 - 116.2}{17.3}$$

$$= -.33$$

Hence, the skewness is negative.

∴ The figure of distribution is,