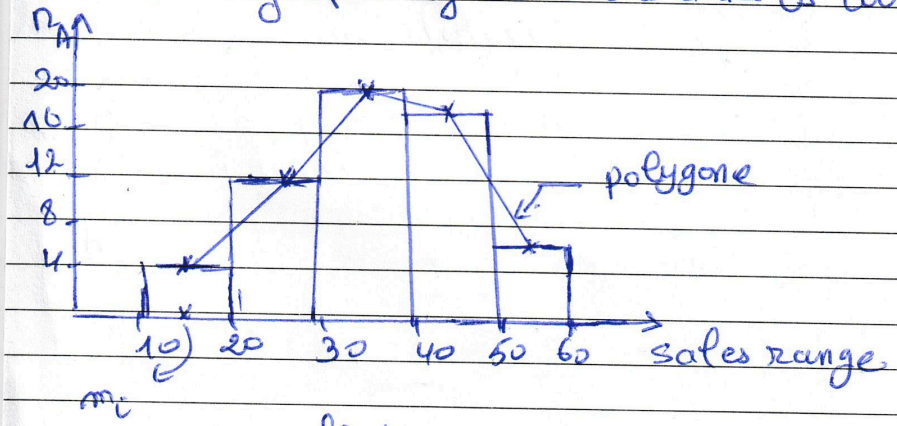
Series No 2

Solution of problem

① The variable is : Monthly sales of employees.
its type : is continous quantitative.

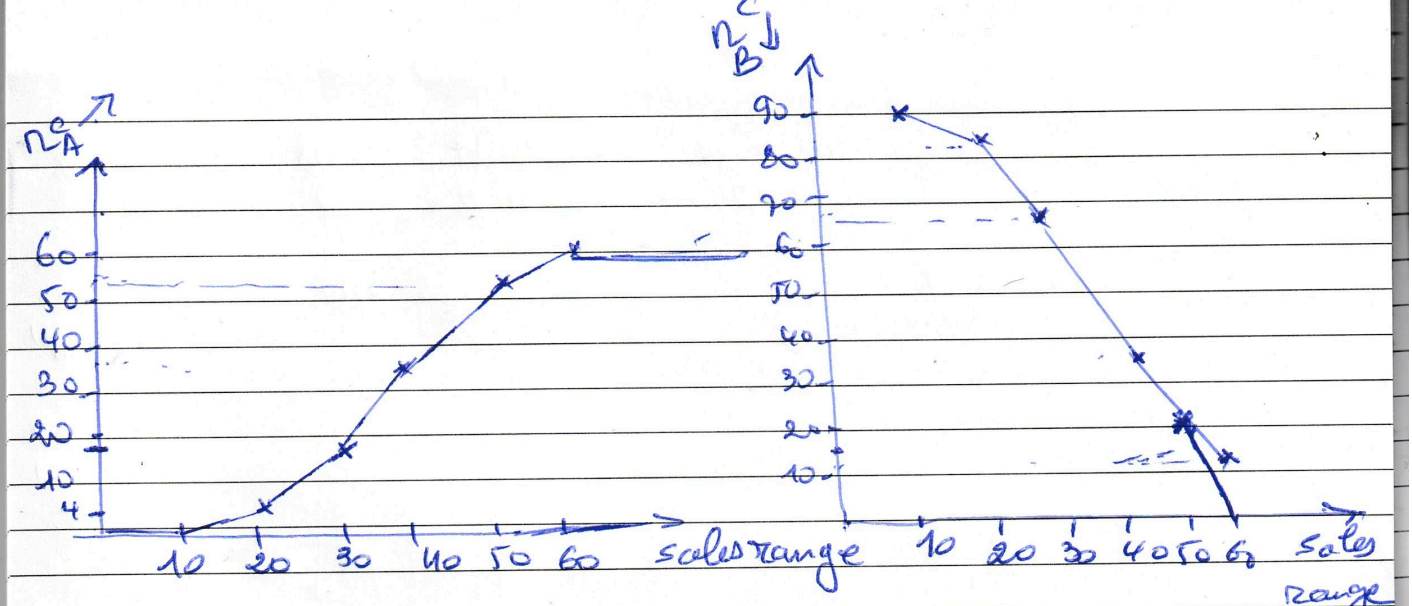
② The graphe of continous data is an histogram



histogram

Table of frequency

Sales Rang ($ 1000s)	n_A	n_B	$m_i = \frac{a+b}{2}$	$n_A^{<}$ (less than ogive)	upper Value	$n_B^{>}$ (more than ogive)	lower value	$n_B^{<}$
[10,20[	4	8	15	4	20	90	10	8
[20,30[	12	16	25	16	30	82	20	24
[30,40[	20	30	35	(36)	40	66	30	(54)
[40,50[	18	22	45	54	50	36	40	76
[50,60[	6	14	55	60	60	14	50	90
Tot	60	90	/	/	/	/	/	



Less than ogive. More than ogive

⑤ The central tendency measures for each dept are as follows: ($\bar{x}$, M_o, M_e)

* Department A:

- The Mean $\bar{x}_A = \frac{1}{N}\sum_{i=1}^{5} m_i n_i = \frac{15\times4 + 25\times12 + 35\times20 + 45\times12 + 55\times6}{60}$

$\simeq 36,67$ (in 1000s).

$M_o = ?$ modal class is $[30,40[$ (heighest frequency)

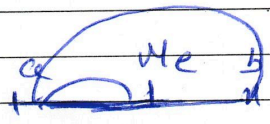
$\Rightarrow M_o \simeq \frac{30+40}{2} = 35$.

$M_e = ?$ $n^{c\uparrow}(M_e) = \frac{N}{2} = \frac{60}{2} = 30 \Rightarrow M_e \in [30,40[$

We applay this formula:

$$M_e = a + \frac{\frac{N}{2} - n^c_b}{n_{M_e}}(b-a) \text{ ol};$$

$$\frac{M_e - a}{b-a} = \frac{\frac{N}{2} - n^c_{\nearrow}(a)}{n^c(b) - n^c_{\nearrow}(a)}$$



$$M_e = a + \frac{\frac{N}{2} - n^c(a)}{n^c(b) - n^c(a)} (b-a).$$

$$= 30 + \frac{30 - n^c(30)}{n^c(40) - n^c(30)} (40-30)$$

$$= 30 + \frac{30-16}{36-16} \times 10$$

$M_e = 37$.

*Department B

- $\bar{X}_B = \frac{1}{N} \sum m_i n_i = \frac{1}{90} (15 \times 8 + 25 \times 16 + 35 \times 30 + 45 \times 32,5 \times 14)$
$= 37$

- M_0, modal class is $[30, 40[$, $M_0 = \frac{30+40}{2} = 35$
- M_e : ? $\frac{N}{2} = \frac{90}{2} = 45 \rightarrow M_e \in [30, 40[$

$$M_e = 30 + \frac{\frac{N}{2} - n^c(30)}{n^c(40) - n^c(30)} (40-30)$$

$$= 30 + \frac{45-24}{54-24} (40-30) = 37.$$

$M_e = 37$

(5) calculat° of Q_1, Q_3 and IQR.

Dept A

$Q_1 = ?$

$\frac{N}{4} \Rightarrow \frac{60}{4} = 15 \Rightarrow Q_1 \in [20,30[$

$$\frac{Q_1 - 20}{30-30} = \frac{\frac{N}{4} - n^c(20)}{n^c(30) - n^c(20)}$$

$$\Rightarrow Q_1 = 20 + \frac{15-4}{16-20} \times (30-20)$$

$Q_1 = 29,17$

* $Q_3 = ?$ $\frac{3N}{4} = \frac{3 \times 60}{4} = 45 \Rightarrow Q_3 \in [40,50[$

$$Q_3 = 40 + \frac{\frac{3N}{4} - n^c(40)}{n^c(50) - n^c(40)} \times (50-40)$$

$$= 40 + \frac{45-36}{54-36} \times 10$$

$Q_3 = 45$, $IQR = Q_3 - Q_1 = 45 - 29,17 = 15,83$

for Dept B, we applay the same step.

$Q_1 = ?$, $\frac{N}{4} = \frac{90}{4} = 22,5$

$Q_1 \in [20,30[$

$$Q_1 = 20 + \frac{22,5-8}{16} \times 10 = 29,06$$

$Q_3 = ?$ $\frac{3N}{4} = \frac{3 \cdot 90}{4} = 67,5 \Rightarrow Q_3 \in [40,50[$

$$Q_3 = 40 + \frac{67,5-54}{22} \times 10 = 46,14 \Rightarrow IQR = 46,14 - 29,06 = 17,08$$

6) calculation of the variance and, standard deviation and coefficient of variation.

for depart A

Variance $S_A^2 = \frac{1}{N} \sum (x_i - \bar{x})^2 n_i$ or $S^2 = \frac{1}{N} \sum x_i^2 n_i - (\bar{x})^2$

$= 113,80$

Standard deviat° $S = \sqrt{113,80} = 10,65$

$S = 10,65$.

* Coefficient of variat°:

$$CV_A = \frac{S_A}{\bar{x}_A} \times 100 = \frac{10,65}{36,67} \times 100 = 29,03\%$$

$CV_A = 29,03\%$

Depart B:

$S_B^2 = 102,67$

$S_B = \sqrt{102,67} = 10,13$

$$CV_{(B)} = \frac{10,13}{37} \times 100 = 27,35\%$$

7) Departmant B has a slightly higher mean Sales of 37 compared to 36,67 for departmant A.

8)

8) Both departments have the same most common sales range [30, 40[, but more employees in dept B perform in this level.

9) Both departments have the same range, the spread of sales is bager in dept B as indicated by its higher standard deviation and CV, This could mean sales values are more variable relative to their mean.

10) Department B appears to perform slightly better overall, with a higher mean sales, a higher concentration in the peak sales range, and more evenly spread distribution. This suggests that dept B might have more consistent and higher overall sales compared to department A.