STATISTICS

1

Exercise 19-1

Sol.1 Given observations

8, 6, 10, 12, 1, 3, 4, 4

∴ Mean = $\dfrac{\text{Sum of observations}}{\text{Total No. of observations}}$

$= \dfrac{8+6+10+12+1+3+4+4}{8}$

$= \dfrac{48}{8} = 6$ //

Sol.2 No. of people = 5

Their replied hours = 10, 7, 13, 20, 15

Mean = $\dfrac{\text{Sum of observations}}{\text{Total No. of observations}}$

$= \dfrac{10+7+13+20+15}{5}$

$= \dfrac{65}{5} = 13$

∴ 13 hours were spent in their Social Work.

Sol-3 Given six consecutive years

1620, 2060, 2540, 3250, 3500, 3710

$$Mean = \frac{Sum\ of\ the\ consecutive\ years}{Total\ no.\ of\ consecutive\ years}$$

$$= \frac{1620 + 2060 + 2540 + 3250 + 3500 + 3710}{6}$$

$$= \frac{16680}{6} = 2780\ //$$

Sol 4 The first twelve natural numbers are

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

$$\therefore Mean = \frac{Sum\ of\ the\ twelve\ natural\ numbers}{total\ number\ of\ twelve\ natural\ numbers}$$

$$= \frac{1+2+3+4+5+6+7+8+9+10+11+12}{12}$$

$$= \frac{78}{12} = 6.5$$

Sol 5 (i) The first six prime numbers are

2, 3, 5, 7, 11, 13

$$Mean = \frac{Sum\ of\ the\ prime\ numbers}{Total\ no.\ of\ prime\ numbers}$$

$$= \frac{2+3+5+7+11+13}{6}$$

$$= \frac{41}{6} = 6.8333$$

5(ii) The first seven odd prime numbers are.

3, 5, 7, 11, 13, 17, 19

∴ Mean = $\dfrac{3+5+7+11+13+17+19}{7}$

$= \dfrac{75}{7} = 10\dfrac{5}{7}$

6(i) Given marks of a student are

81, 72, 90, 90, 85, 86, 70, 93, 71

Mean = $\dfrac{81+72+90+90+85+86+70+93+71}{9}$

$= \dfrac{738}{9} = 82\,11$

(ii) The mean of age of three students is 15 years

Their ratio's are 4:5:6

Let vijay's age is 4x

Rahul age is 5x

Rakhi age is 6x.

$\dfrac{4x+5x+6x}{3} = 15$

$\dfrac{(4+5+6)x}{3} = 15$

$\dfrac{15x}{3} = 15$

$15x = 45$

$x = 45/15 = 3$

Vijay age $= 4x$

$\qquad = 4 \times 3 = 12$

Rahul age $= 5x$

$\qquad = 5 \times 3 = 15$

Rakhi age $= 6x$

$\qquad = 6 \times 3 = 18$

$\therefore$ Vijay age $= 12$ years

Rahul age $= 15$ years

Rakhi age $= 18$ years

(vii) the Mean of 5 numbers is 20
sol

one observation is included then mean is 6

Mean of 5 numbers $= 20 \times 5$

$\qquad = 100$

Let excluded number is 'x'

The remaining numbers mean is 23.

$\qquad 5x - x = 4x$

$\qquad \qquad = 4 \times 23$

$\qquad \qquad = 92$

$\therefore x = 100 - 92 = 8$ //

$\therefore$ Excluded number is "8"

8801 The Mean of 25 observations is 27

One observation is included then the mean is 26 of observations

Then mean will remains same is "27"

∴ Mean = 27

7801 Mean of 5 observations is 15 = $15 \times 3 = 75$

Mean of first 3 observations = 14

$14 \times 3 = 42$

$42 + d + e = 75$

$d + e = 75 - 42$

$= 33$

Mean of Last 3 observations = 17

$17 \times 3 = 51$

$a + b + f = 75$

$a + b = 75 - 51$

$= 24$

∴ $a + b + d + e + f = 75$

$24 + 33 + f = 75$

$57 + f = 75$

$f = 75 - 157$

$= 18$

∴ Third observation is 18

So/10 | Mean of 8 variates = 10.5

Given Seven numbers are

3, 15, 7, 19, 2, 17, 8

Mean $= \dfrac{3+15+7+19+2+17+8+x}{8}$

$10.5 = \dfrac{71+x}{8}$

$10.5 \times 8 = 71+x$

$84 = 71+x$

$x = 84-71$

$x = 13$ "

11So) The Mean Weight of 8 students = 45.5 kg.

Mean Weight of 8 students = $\dfrac{\text{Sum of Weights of 8 Students}}{8}$

$45.5 = \dfrac{\text{Sum of Weights of 8 Students}}{8}$

Sum of weights of 8 Students $= 45.5 \times 8$

$= 364$ kgs

Two weights of 41.7 and 53.3 kgs are added

$= 364 + 41.7 + 53.3$

Sum of weights of 10 students = 459 kg

Mean $= \dfrac{\text{Sum of Weights of 10 students}}{10}$

$= \dfrac{459}{10} = 45.9$ kgs.

12. Mean of 9 observations = 35

Mean of observations = $\dfrac{\text{Incorrect Sum of 9 observations}}{9}$

35×9 = Incorrect Sum of 9 observations.

Incorrect Sum of 9 observations = 315

one observation was detected as 81 was mis read as 18

$= 315 - 18 + 81$

$= 378$

Mean of 9 observations $= \dfrac{378}{9}$

$= 42$

13. Given marks of 11 questions

7, 3, 4, 1, 5, 8, 2, 2, 5, 7, 6.

These numbers were arranged in ascending order

1, 2, 2, 3, 4, 5, 5, 6, 7, 7, 8

∴ Total no. of observations = 11

Median $= \dfrac{n+1}{2}$ th observation.

$\dfrac{11+1}{2} = \dfrac{12}{2} = 6$ th observation.

∴ Hence, Median = 5.

14xl Given numbers

2, 3, 4, 3, 0, 5, 1, 1, 3, 2.

$$\text{Mean} = \frac{2+3+4+3+0+5+1+1+3+2}{10}$$

$$= \frac{24}{10} = 2.4$$

∴ Mean = 2.4

Median.

The numbers were arranged in the form of ascending order

0, 1, 1, 2, 2, 3, 3, 3, 4, 5

$$\text{Median} = \frac{n+1}{2} \text{ th observation}$$

$$= \frac{10+1}{2} \text{ th observation}$$

$$= \frac{11}{2} = 5.5 \text{ th observation}$$

∴ Median = 2.5

5sol Given numbers

24, 30, 28, 17, 22, 36, 30, 19, 32, 18, 20, 24

$$\text{Mean} = \frac{24+30+28+17+22+36+30+19+32+18+20+24}{12}$$

$$= \frac{300}{12} = 25$$

∴ Mean = 25

Median.

The numbers are arranged in ascending order

17, 18, 19, 20, 22, 24, $\overset{24}{2}$8, 30, 30, 32, 36.

Median $= \dfrac{n+1}{2}$ th observation

$= \dfrac{12+1}{2}$ th observation

$= \dfrac{13}{2}$ th observation $= 6.5$ th observation

Median $= 25_{,,}$

670] Given numbers

41, 39, 52, 48, 54, 62, 46, 52, 40, 96, 42, 40, 98, 60, 52

Mean $= \dfrac{41+39+52+48+54+62+46+52+40+96+42+40+98+60+52}{15}$

$= \dfrac{822}{15} = 54.8$

$\therefore$ Mean $= 54.8$

Median

The numbers are arranged in the form of ascending order

39, 40, 40, 41, 42, 46, 48, 52, 52, $\overset{52}{5}$4, 60, 62, 96, 98

Median $= \dfrac{n+1}{2}$ th observation

$= \dfrac{15+1}{2} = \dfrac{16}{2} = 8$

$\therefore$ Median $= 8_{,,}$

17th) The points scored by kabaddi team

7, 17, 2, 5, 27, 15, 8, 14, 10, 48, 10, 7, 24, 8, 28, 18

$$\text{Mean} = \frac{7+17+2+5+27+15+8+14+10+48+10+7+24+8+28+18}{16}$$

$$= \frac{248}{16} = 15.5$$

Mean = 15.5

Median

The points are arranged in the form of ascending order.

2, 5, 7, 7, 8, 10, 10, 14, 15, 17, 18, 24, 27, 28, 48.

$$\text{Median} = \frac{n+1}{2} \text{th observation}$$

$$= \frac{16+1}{2} \text{th observation}$$

$$= 8.5$$

Median = 12.

18th) Given numbers

17, 21, 23, 29, 39, 40, x, 50, 51, 54, 59, 67, 91, 93.

$$\text{Median} = \frac{\frac{n}{2}\text{th observation} + (\frac{n}{2}+1)\text{th observation}}{2}$$

$$47.5 = \frac{7\text{th observation} + 8\text{th observation}}{2}$$

$$47.5 = \frac{x+50}{2}$$

$$95 = x+50$$

$$x = 95-50$$

$$= 45$$

19 | Given numbers

3, 6, 7, 10, x + x + 4 + 19, 20, 25, 28

Median $= \dfrac{\frac{n}{2}\text{th observation} + \left(\frac{n}{2}+1\right)\text{th observation}}{2}$

$13 = \dfrac{5\text{th observation} + 6\text{th observation}}{2}$

$13 = \dfrac{x + x + 4}{2}$

$13 \times 2 = 2x + 4$

$26 = 2x + 4$

$2x = 26 - 4$

$2x = 22$

$x = \dfrac{22}{2} = 11$

Exercise - 19.2

Solution -1 :-

(i) discrete

(ii) continuous

(iii) discrete

(iv) continuous

(v) continuous.

Solution - 2 :-

Given data

13, 6, 10, 5, 11, 14, 2, 8, 15, 16, 9, 13, 14, 11, 9, 5, 7, 12, 20, 21, 18, 1, 8, 12, 18.

classes	0-4	5-9	10-14	15-9	20-24
frequency	2	7	8	6.	2

Solution - 3

(i)

classes	1-10	11-20	21-30.	31-40
frequency	8	7	6	6.

(ii) Range = Maximum value - Minimum value.

$$= 40 \qquad - 2$$

$$= 38$$

(iii) third class of frequency table.

$$= \frac{21 + 30}{2}$$

$$= \frac{51}{2}$$

$$= 25.5$$

Solution -4 :-

Variate :- A particular value of a variable is called variate

Class Size :- The difference b/w the actual upper limit and the actual lower limit of a class is called its class size.

class mark :- The class mark of a class is the value mid way between its actual lower limit and actual upper limit

class limits :- In discrete distribution, the original class limits are called stated class limits

true class limits :- In a continuous distribution, the class-limits are called true class limits (or) actual class limits

frequency of a class :- the number of times a variate occurs in a given data is called frequency of that variate.

cummulative frequency of a class :-

The sum of frequencies of all the previous classes and that particular class is called the cummulative frequency of the class.

Solution - 5 :-

(i) frequency

(ii) size

(iii) 14

(iv) class mark.

(v) 6.5

solution - 6 :-

(i)

Classes	1-10	11-20.	21-30	31-40	41-50
frequency	7	8	7	10.	8.

(ii)

classes	0.5 - 10.5	10.5 - 20.5	20.5 - 30.5	30.5 - 40.5	40.5 - 50.5
frequency	7	8	7	10	8

(iii) lower limit = 20.5

upper limit = 30.5

(iv) $\dfrac{30.5 + 40.5}{2} = \dfrac{71}{2} = 35.5$

Solution – 7 :-

(i) upper limit = 52   lower limit = 48.

(ii) upper limit = 52.5   lower limit = 47.5

(iii) 37.5 and 42.5

(iv) 45

(v) 5.

Solution – 8 :-

Marks%	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
frequency	7	11	20	46	57	37	15	7
c. frequency.	7	18	38	84	141	178	193.	200

Solution – 9 :-

classes	0-10	10-20	20-30	30-40	40-50
frequency	5	5	7	10	8
c. frequency	5	10	17	27	35

No. of students obtaining below 20 marks = 10.

Solution - 10 :-

Classes	Tally Marks	frequency	Cumulative frequency
0 - 10	|||	3	3
10 - 20	||	2	5
20 - 30	||||| |||||		11	16
30 - 40	||||| ||||| ||||| |||	18	34
40 - 50	—	—	34
50 - 60	|||	3	37
60 - 70	||	2	39
70 - 80	|||	3	42
80 - 90	|||||	5	47
90 - 100	|||	3	50

(ii) the class that has highest frequency is
    30 - 40.

(iii) the students score less than 40 marks are 34

(iv) 13

Solution - 11 :-

class	0-4	4-7	7-10	10-13	13-16
frequency	7	31	137	73	52

No. of children in the age group of 10

10-13 = 73.

Solution - 12 :-

class	0-10	11-20	21-30	31-40	41-50	51-60
frequency.	2	5	11	14	11	7

Solution - 13 :-

class	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
frequency.	2	1	4	4	9	5	3	4

Solution - 14 :-

classes	23.5-27.5	27.5-31.5	31.5-35.5	35.5-39.5	39.5-43.5
frequency.	4	7	4	4	11

Solation -158-

(i) class size = 134 - 124 = 10.

lower limit = 119, upper limit = 129

(ii) class size = 30.5 - 23.5 = 7

lower limit = 20. upper limit = 27

Exercise – 19.3.   ①

Solution – 1 :–

The required bar graph as shown below.

Scale on y-axis   1 cm = 30 cus.
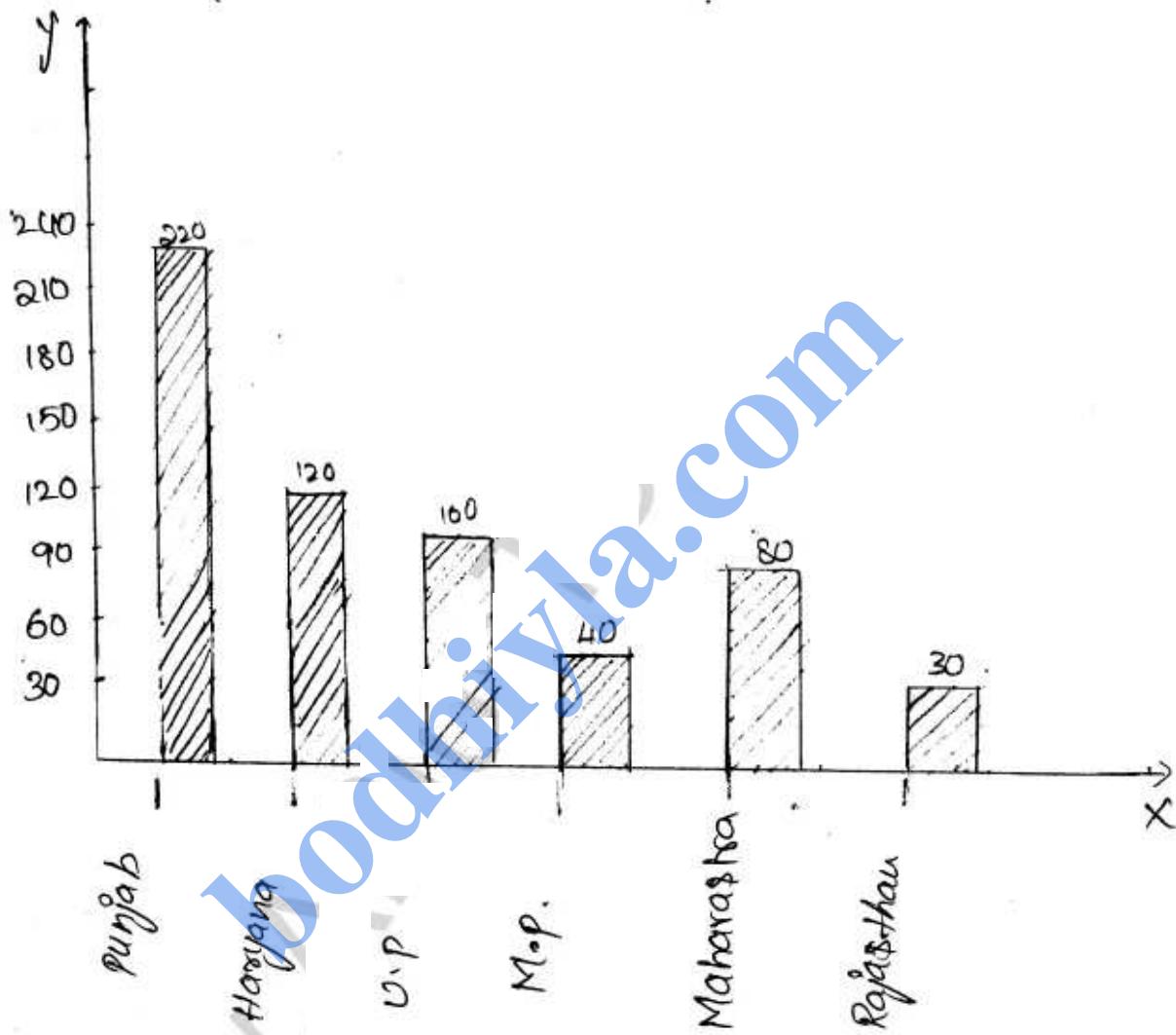
Solution – 2 :-

The bar graph required is shown below.

Scale on y axis
1 unit = 50cm
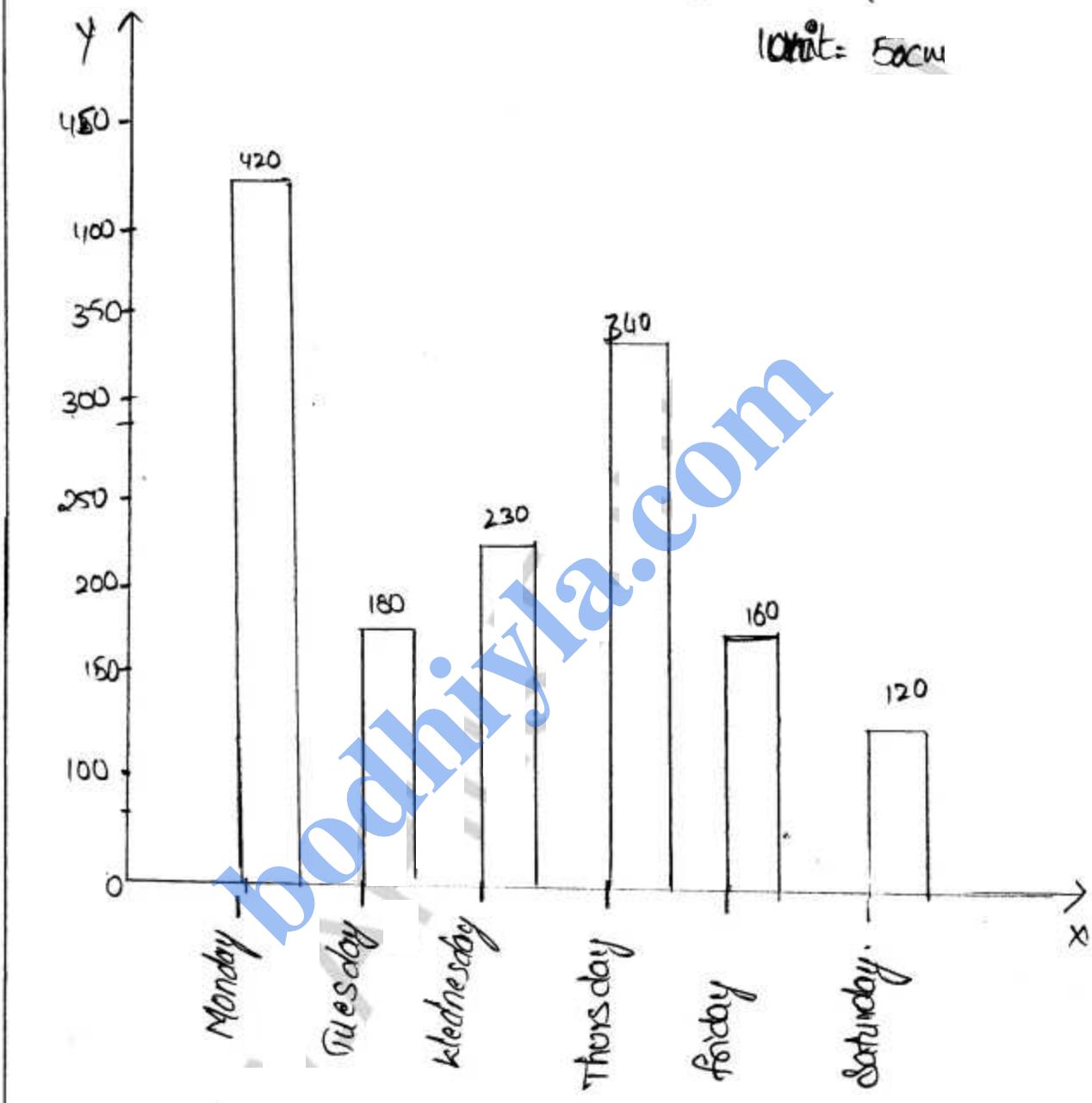
Solution - 3 :-

The required bar graph is shown below
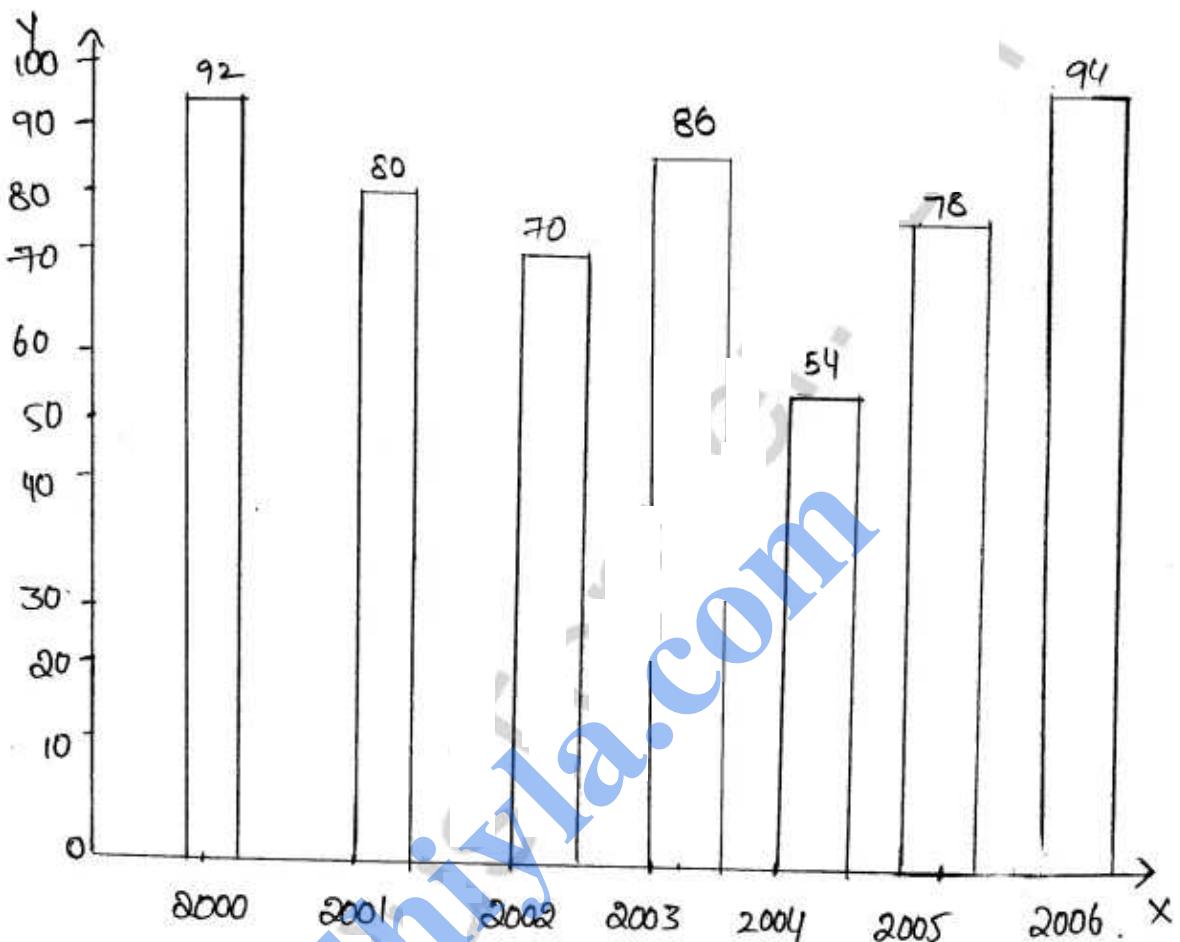
Scale on x axis 1cm = 1unit

Scale on y axis 10cm = 1unit

Solution - 4 :-

The required horizontal bar graph is shown below

Scale

on y-axis 1 unit = 5 cms.

Solution - 5

The required bar graph as shown below

⑤

Scale on y axis.

1 unit = 10 cms

- Girls

- Boys.
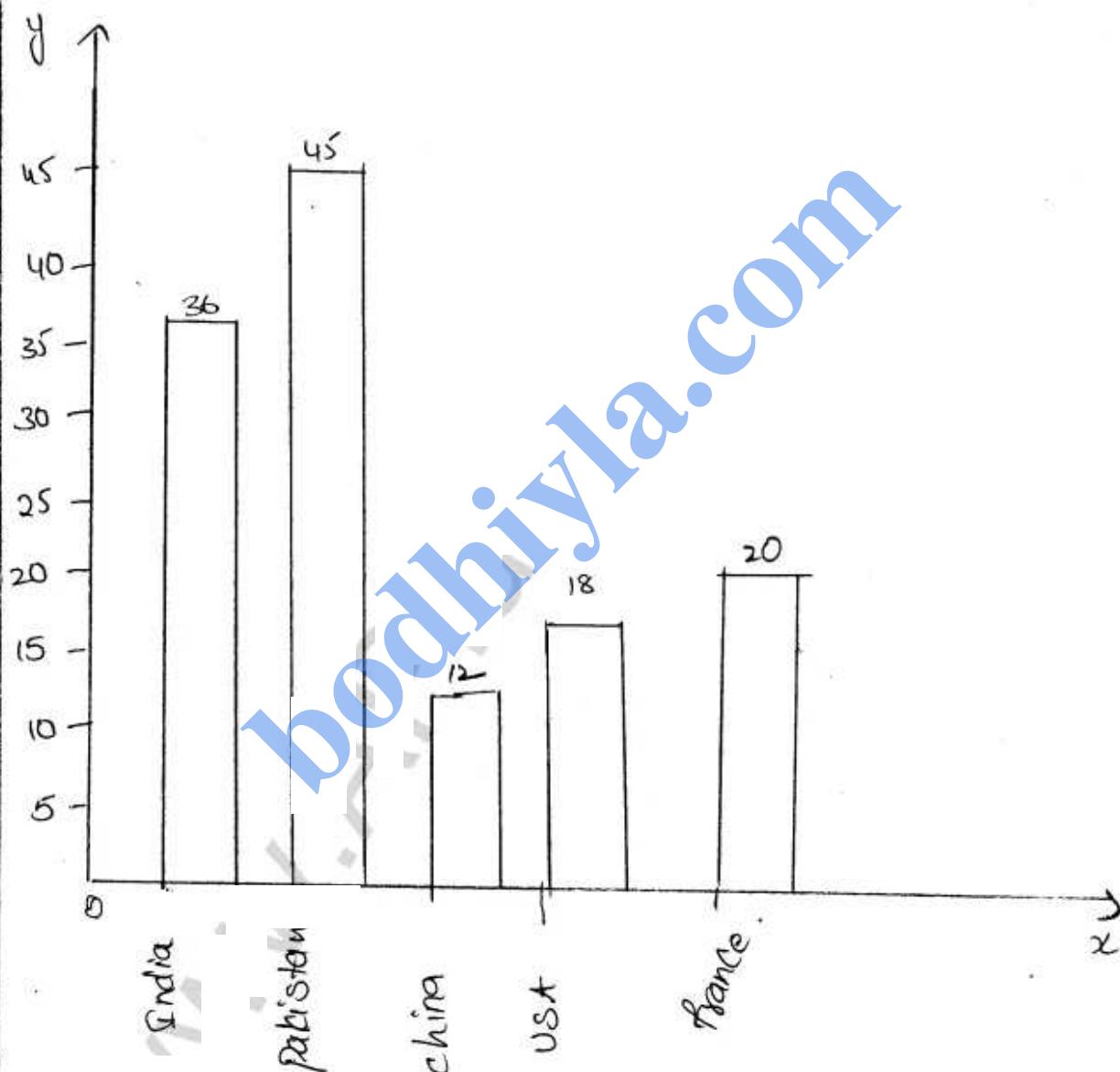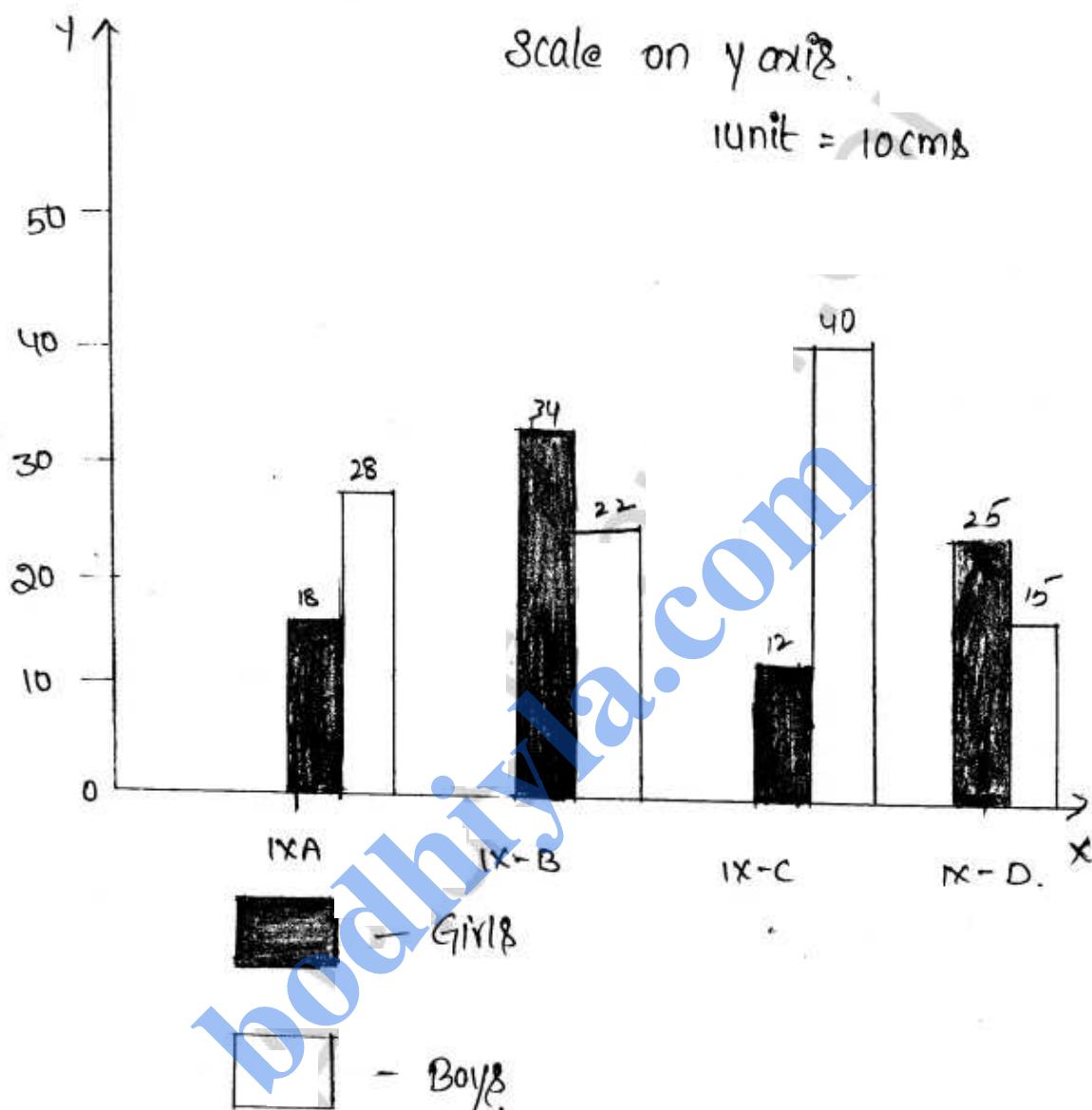
Solution - 6 :-

The histogram is shown below
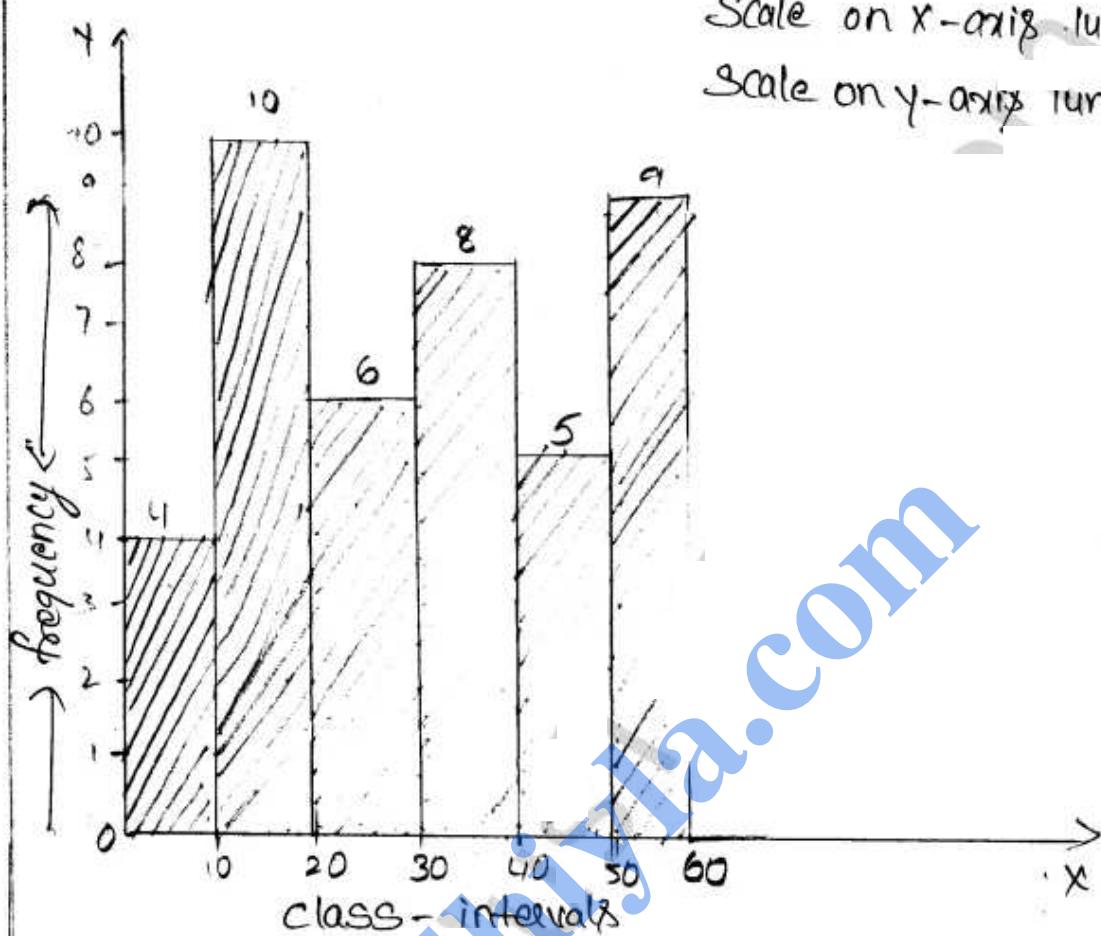
Scale on x-axis 1unit = 10cm
Scale on y-axis 1unit = 1cm

Solution.7:-

The required histogram is shown below.

Scale on x axis 1unit = 100cms
Scale on y axis 1unit = 5cms
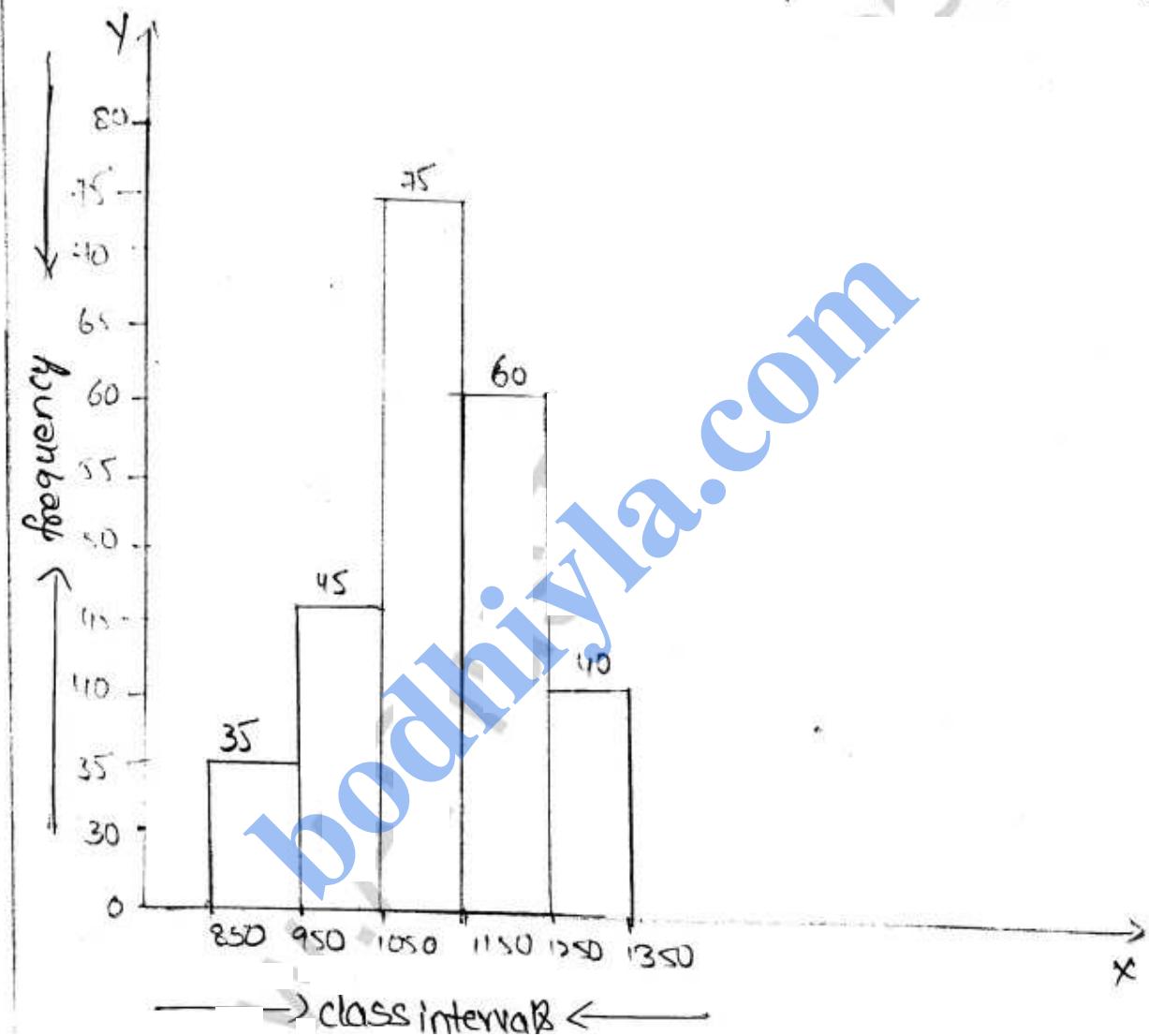
Solution – 8 :-

The required histogram as shown below
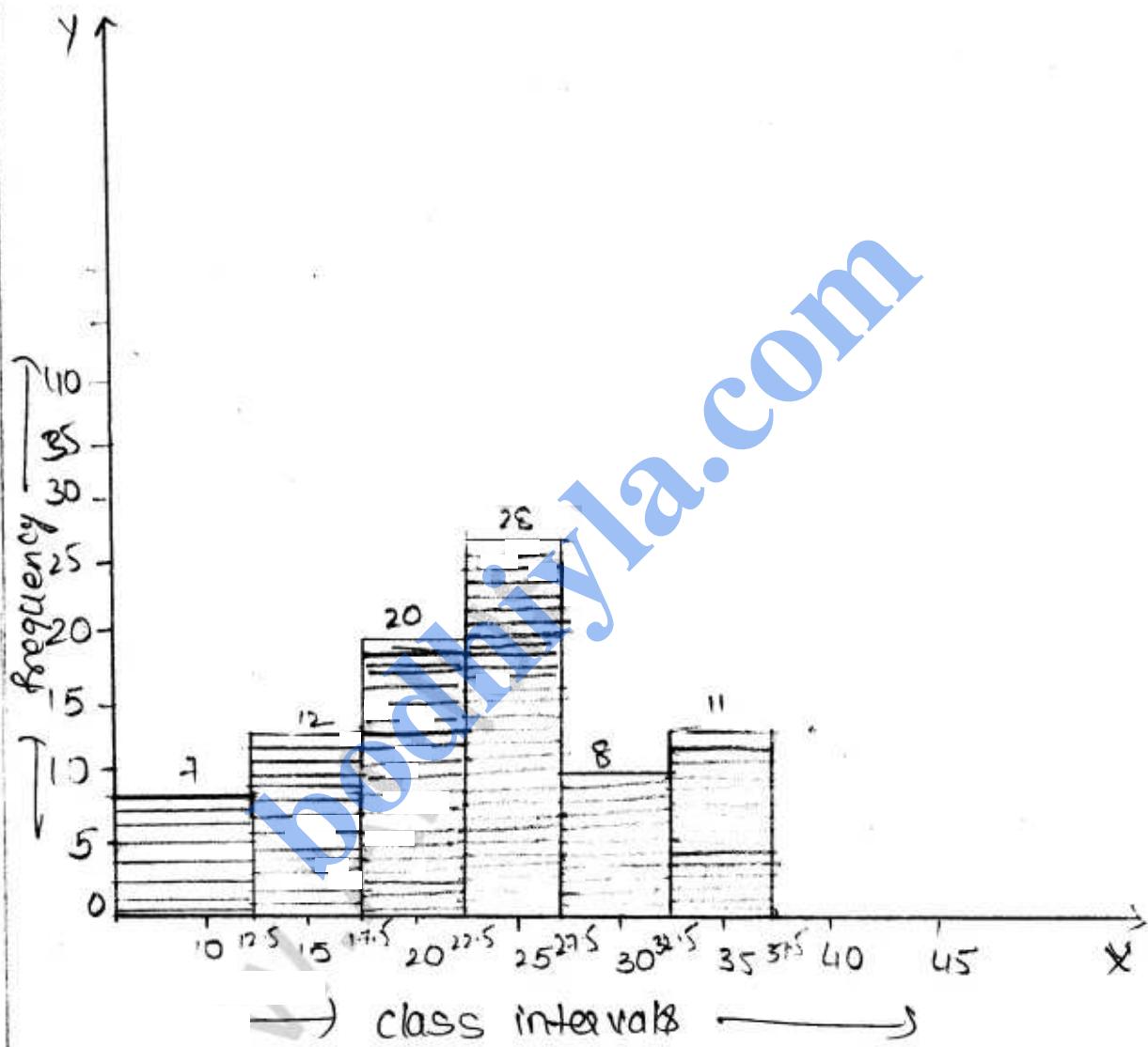
Scale on X-axis 1unit = 5cm8

Scale on Y-axis 1unit = 5cm8

→ class intervals →

Solution - 9 :

The required histogram as shown below

Scale on x axis 1unit = 2cms

Scale on Y axis 1unit = 5cms.

→ frequency

→ class Intervals ←
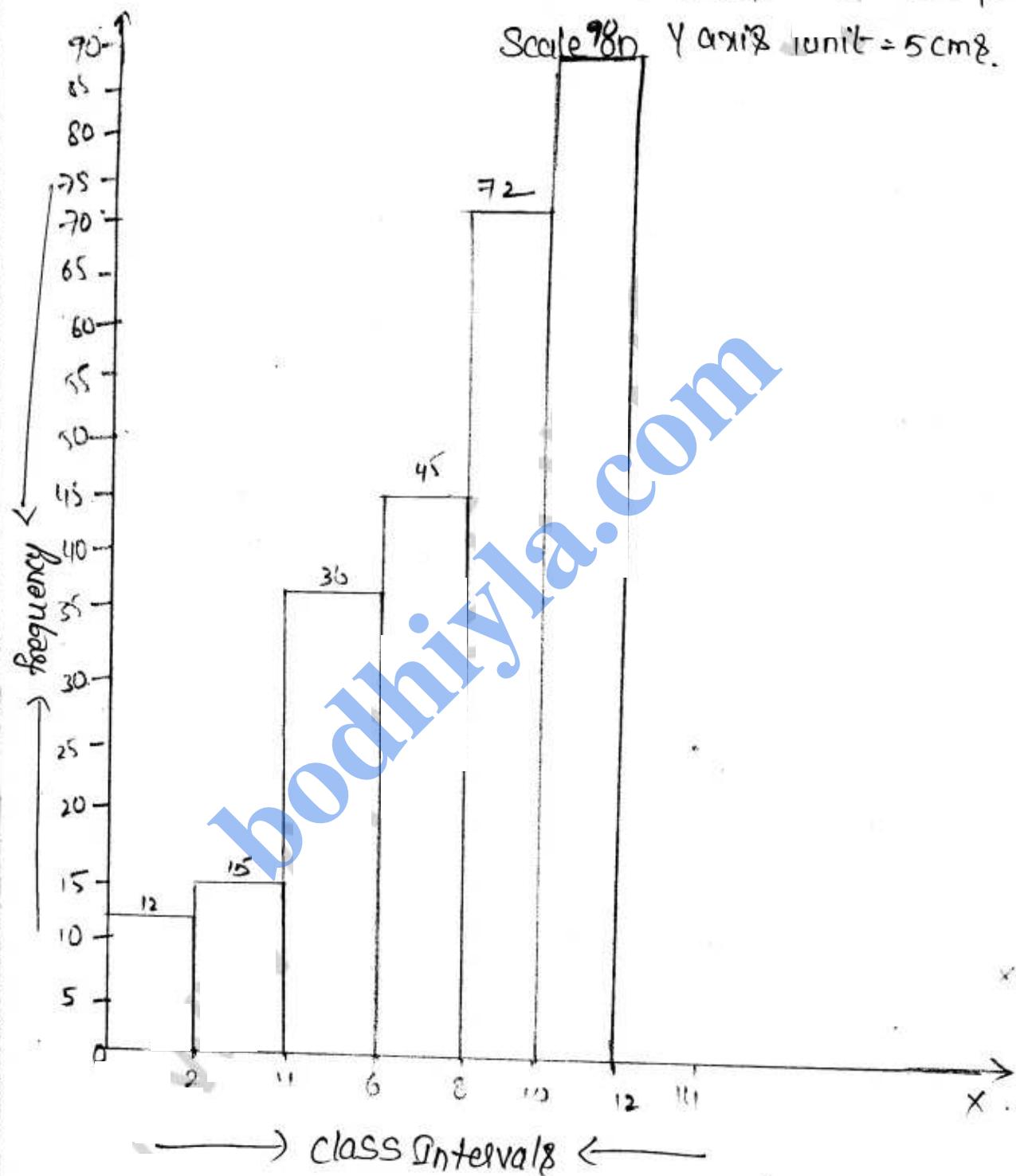
Solution -10 :-

The required his-to-gram as shown below.
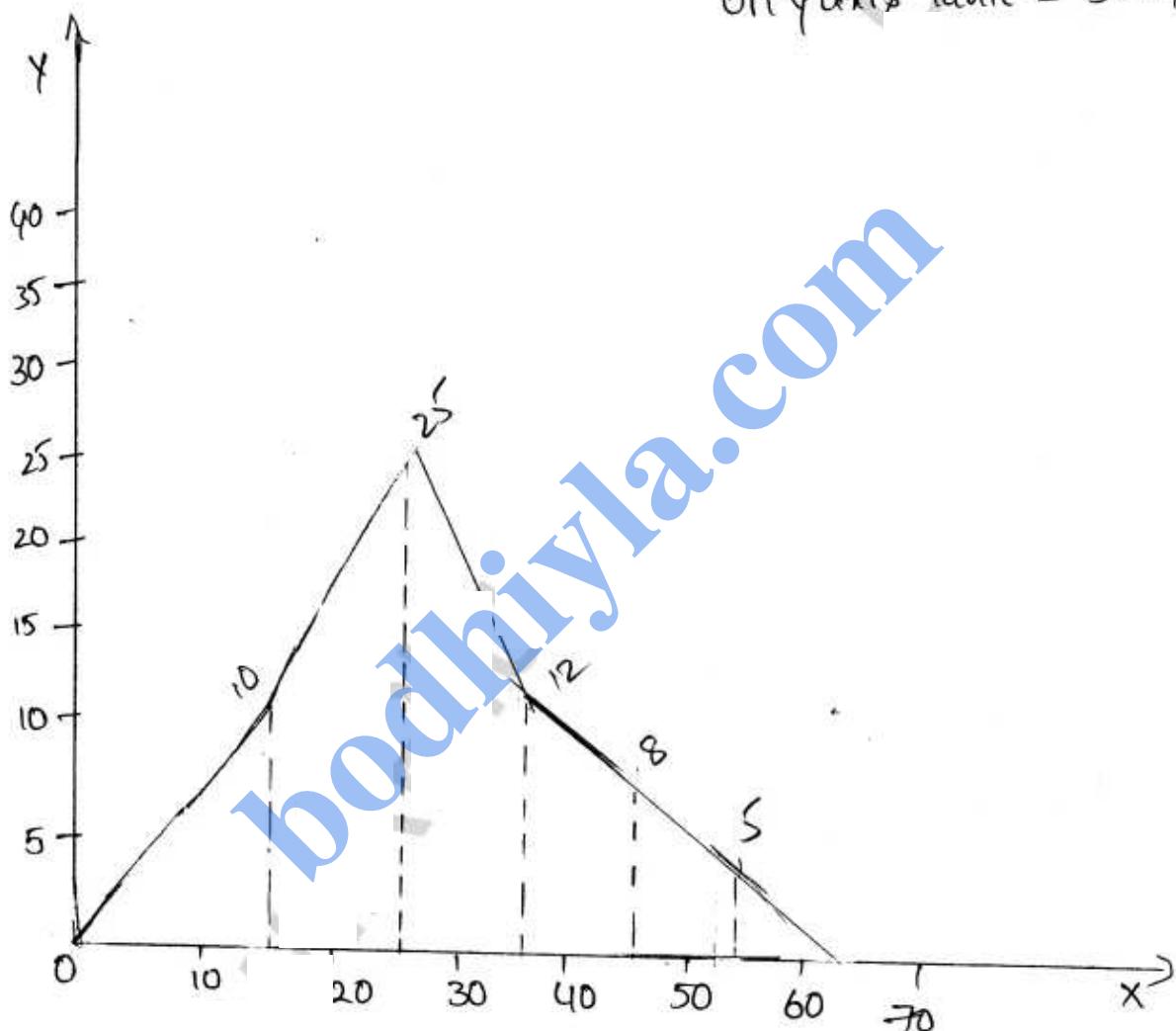
∴ The given frequency distribution is discontinuous, to convert into continuous frequency distribution

adjustment factor = $\dfrac{\text{lower limit of one class - upper limit of previous class}}{2}$

$$= \dfrac{66-65}{2} = \dfrac{1}{2} = 0.5$$

Continuous frequency distribution for the given data is

class before adjustment	class after adjustment	frequency.
59 - 65	59.5 - 65.5	10
66 - 72	65.5 - 72.5	5
73 - 79	72.5 - 79.5	25
80 - 86	79.5 - 86.5	15
87 - 93	86.5 - 93.5	30
94 - 100	93.5 - 100.5	10

(11)

Scale on x axis 1 unit = 6 cms.

Scale on Y axis 1 unit = 5 cms

Solution -11

The required frequency polygon as shown below.

Solution - 12

The required frequency polygon as shown below

Scale
on x axis 1unit = 10 cms
on y axis 1unit = 5 cms

Solution–13.

The given frequency distribution is discontinaous, to convert it into a continuous distribution

adjustment factor = $\dfrac{\text{lower limit of one class} - \text{upper limit of previous class}}{2}$

$$= \dfrac{21 - 20}{2} = \dfrac{1}{2} = 0.5$$

| class before Adjustment	class after adjustment	frequency.
16 – 20	16.5 – 20.5	4
21 – 25	20.5 – 25.5	12
26 – 30	25.5 – 30.5	18
31 – 35	30.5 – 35.5	26
36 – 40	35.5 – 40.5	14
41 – 45	40.5 – 45.5	10
46 – 50	45.5 – 50.5	6.

scale

on x axis 1unit = 4cms
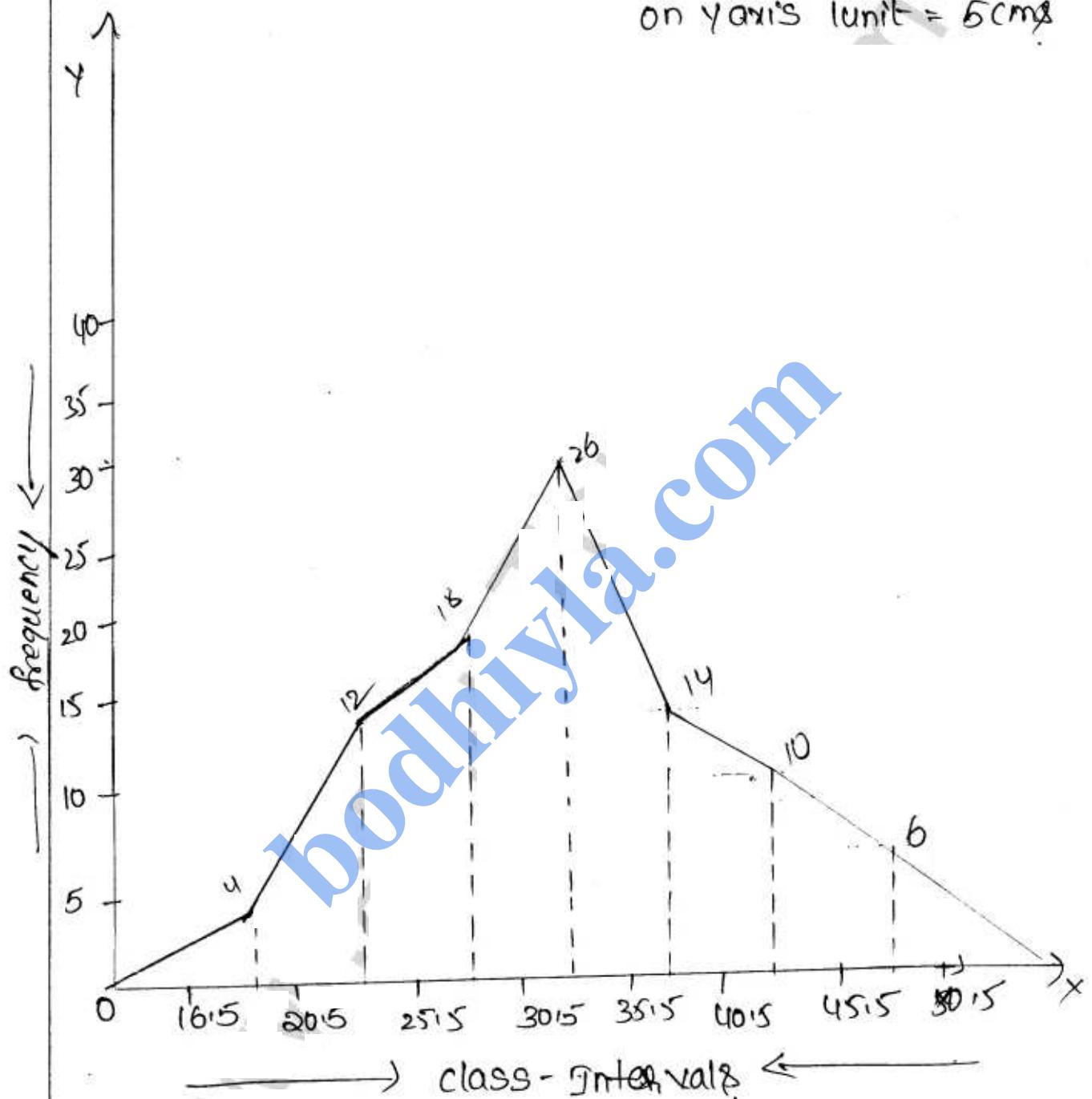
on y axis 1unit = 5cms

Solution - 14

The required frequency polygon as shown below.

Scale
on x axis 1unit = 10 cms
on y axis 1unit = 5 cms
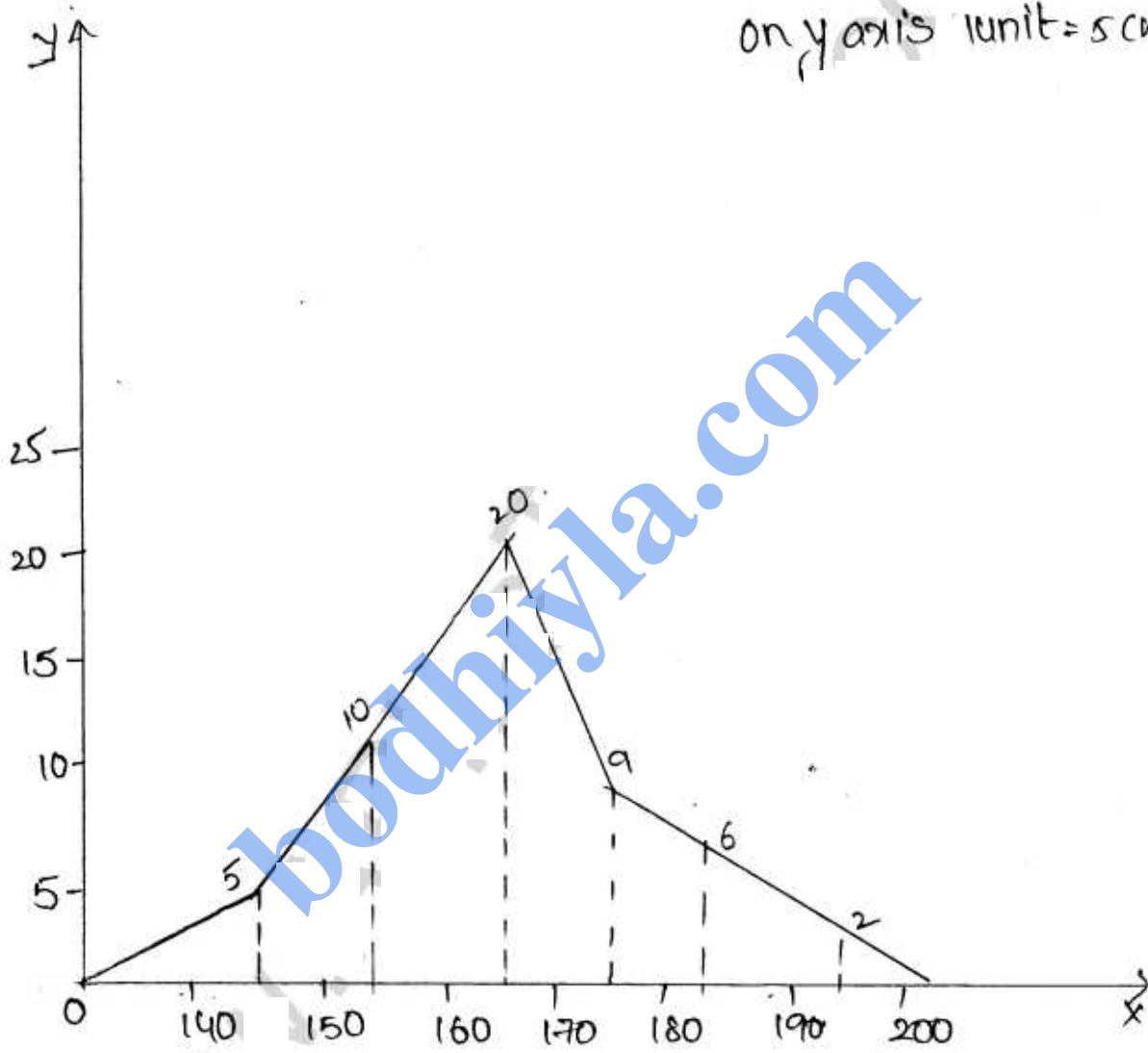
Solution – 15 :–

the required histogram and frequency polygon as shown below
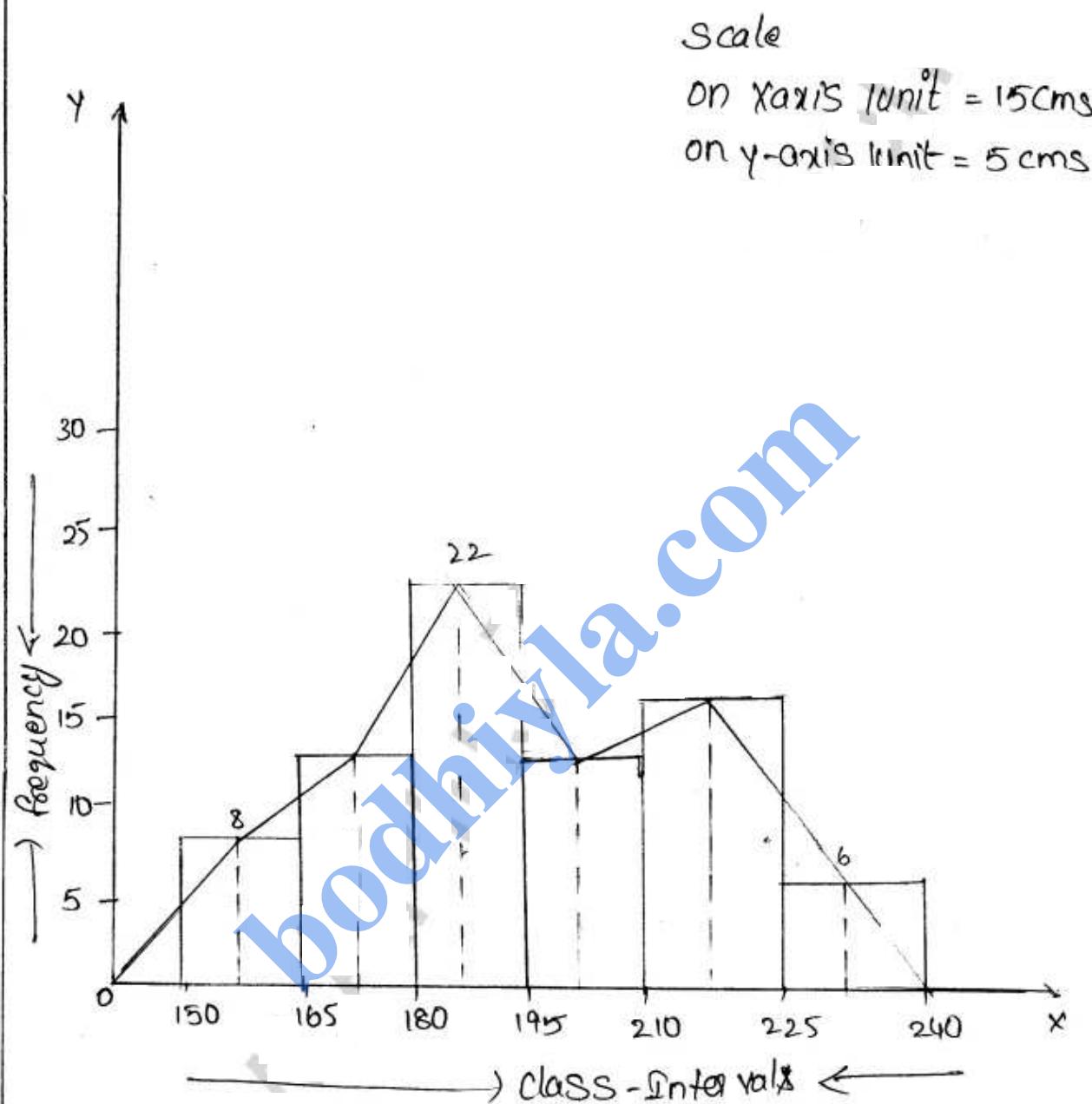
Scale

on x-axis 1unit = 15 cms

on y-axis 1unit = 5 cms

Solution - 16 :-

The required histogram and frequency polygon as shown below.

Scale

on x - axis 1 unit = 10 cms

on y - axis 1 unit = 5 cms.

class Interval

Solution - 17.

Given water bills. of 32 houses in a Locality are
30, 48, 52, 78, 103, 85, 37, 94, 78, 73, 66, 52, 92, 65, 78
81, 64, 60, 75, 78, 108, 63, 71, 54, 59, 75, 100, 103, 35, 89,
95, 73.

class inter val	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
frequency	3	1	4	5	9	3	3	3

3° The required histogram and frequency polygon as shown below

scale
on x axis 1unit = 10 cms
on y-axis 1unit = 1 cm
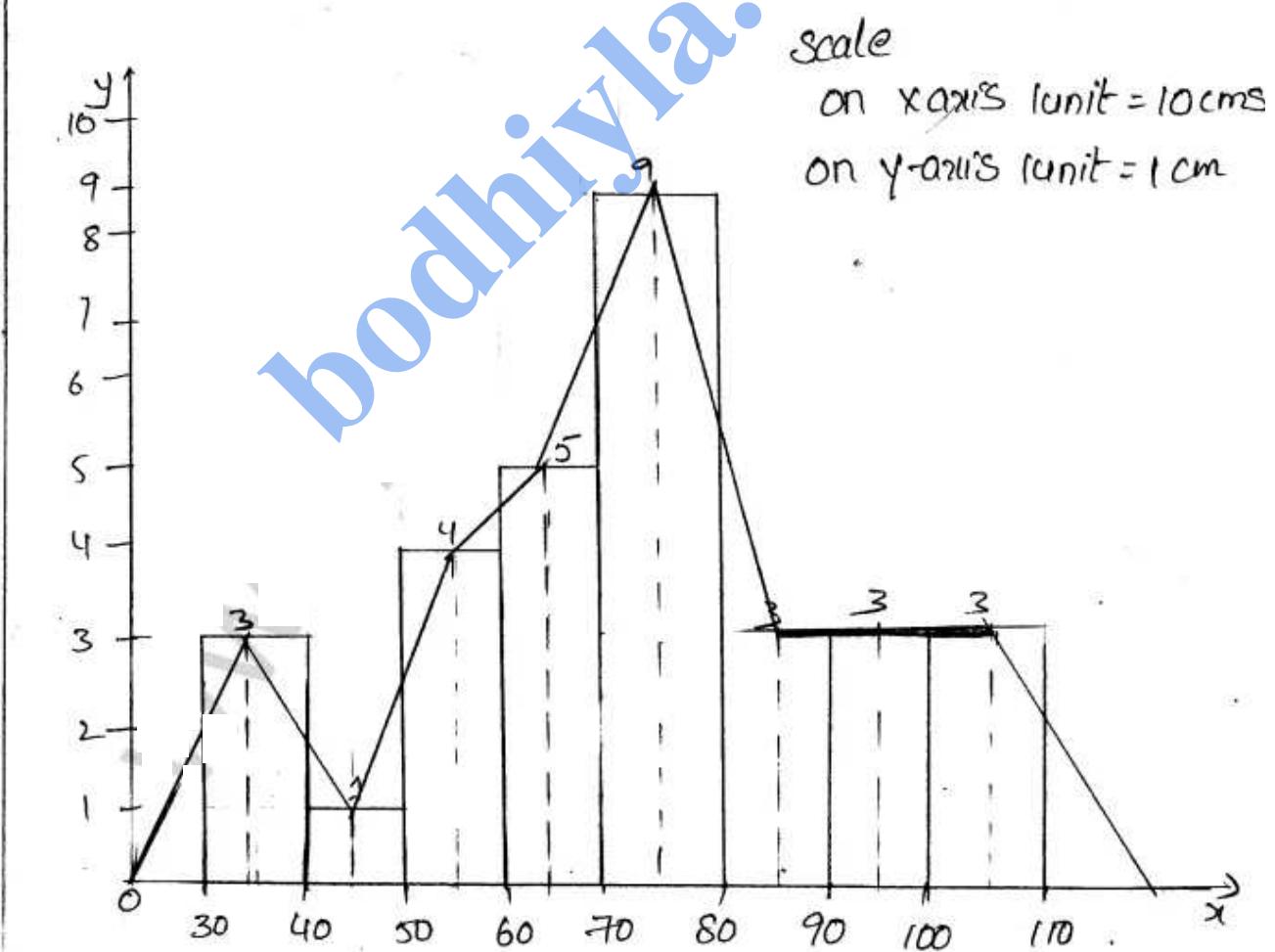
class Interval	40-42	42-44	44-46	46-48	48-50	50-52	52-54
frequency	2	12	7	6	7	4	2

Scale

on x-axis 1unit = 2cms no

on y-axis 1unit = 1cm
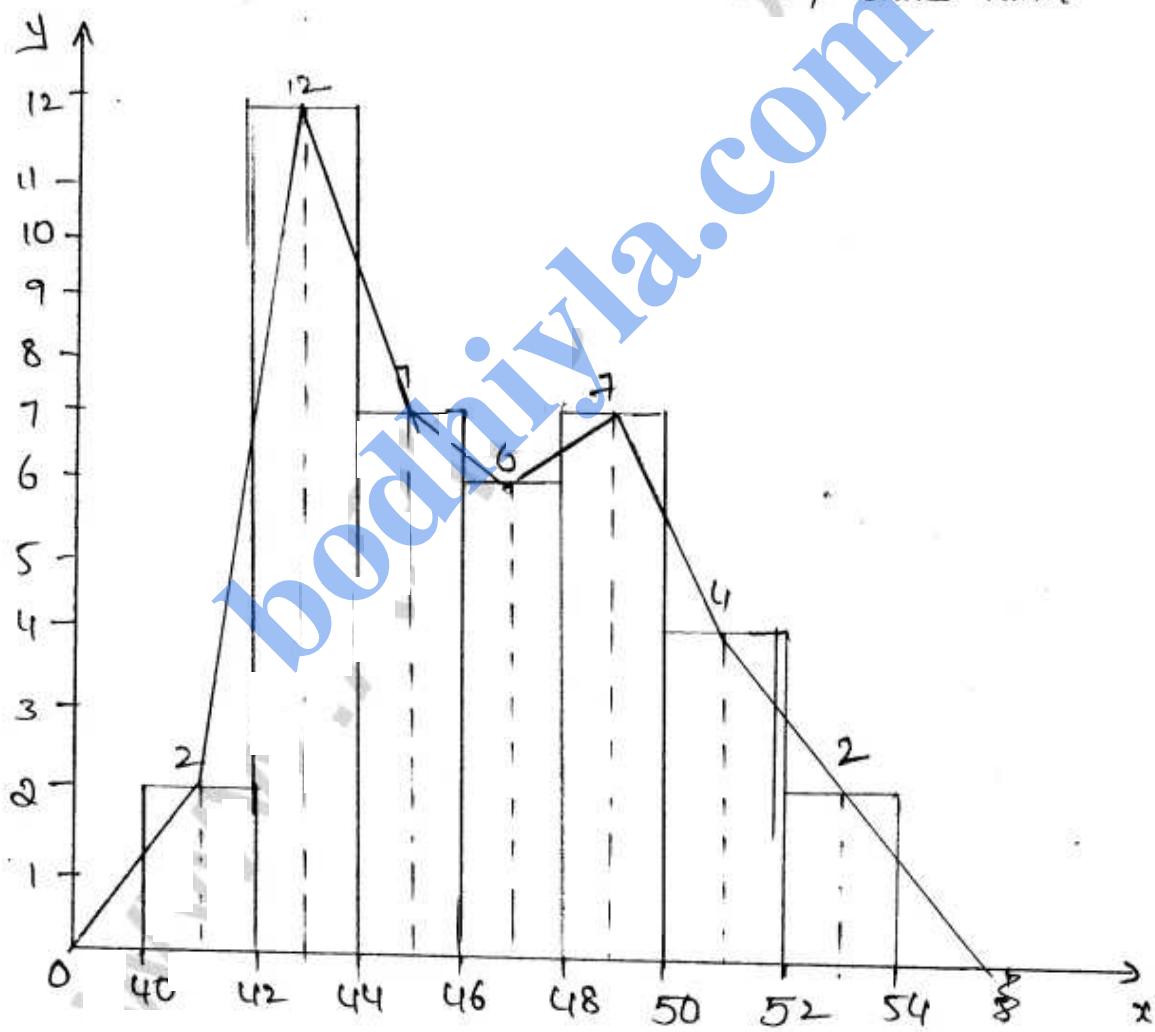
Solution - 19 :-

(i) 18

(ii) 475 - 500

(iii) 34

(iv)

classes	frequency.	cummulative frequency.
375 - 400	6	6
400 - 425	18	24
425 - 450	10	34
450 - 475	20	54
475 - 500.	4	58