

Chapter (2)

Describing Data

Frequency Distributions and Graphic Presentation

Examples

Frequency Table for Qualitative Data (nominal)

Example (1):

We select SRS consists of 52 books that display the color of the cover of each of those books

Orange, Blue, Orange, yellow, Red, Green, Orange, Blue, yellow, Red, Green, Red, Orange, yellow, Blue, Red, Orange, Blue, yellow, Red, Red, Green, Orange, Blue, Red, Green, Blue, Green, Blue, Red, Orange, Red, Blue, Green, Orange, Red, Orange, Blue, Orange, yellow, Blue, Green, Red, Red, Blue, Green, Red, Blue, Red, Red, Blue, Red

Construct the frequency & Relative table

Solution:

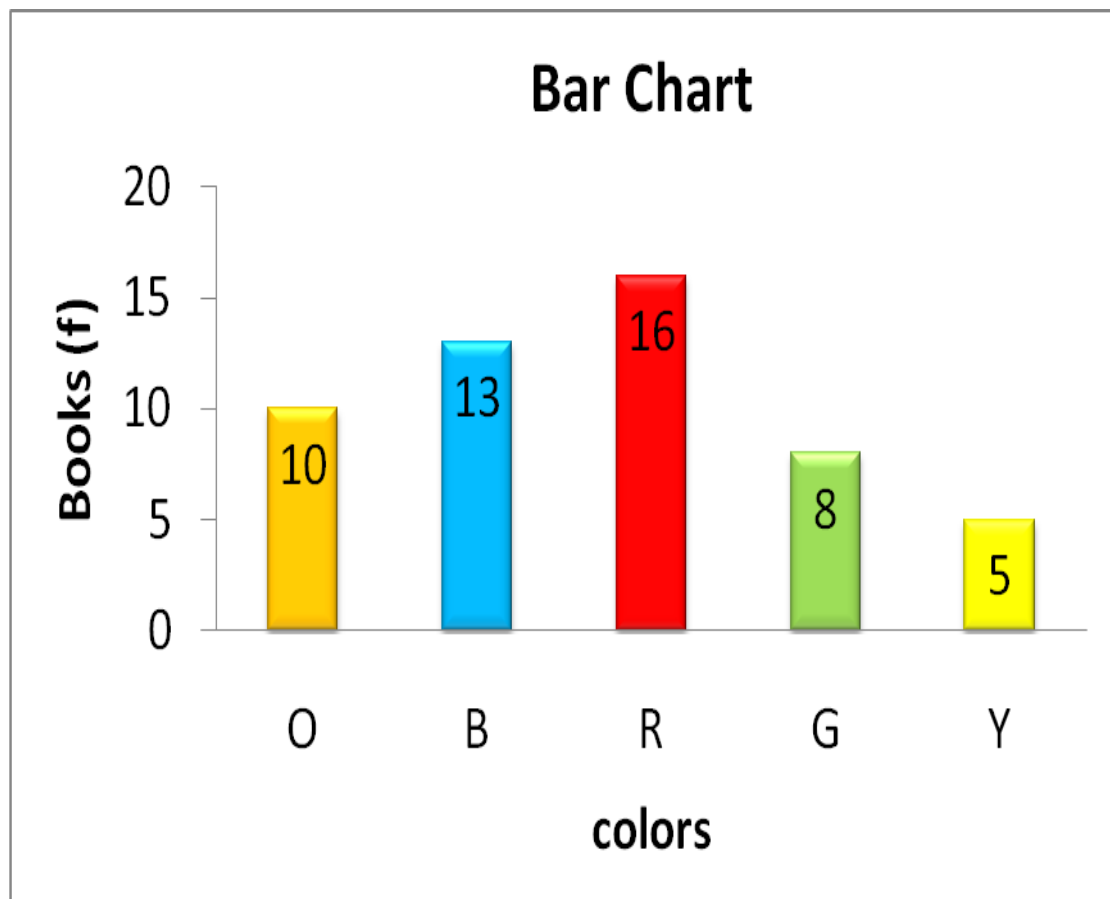
Colors	Tally mark	Frequency
Orange		10
Blue		13
Red		16
Green		8
yellow		5
Total		52

Class (Colors)	Frequency	Relative Freq.	percent%
Orange	10	0.19	19
Blue	13	0.25	25
Red	16	0.31	31
Green	8	0.15	15
yellow	5	0.1	10
Total	52	1	100

Bar and Pie Charts

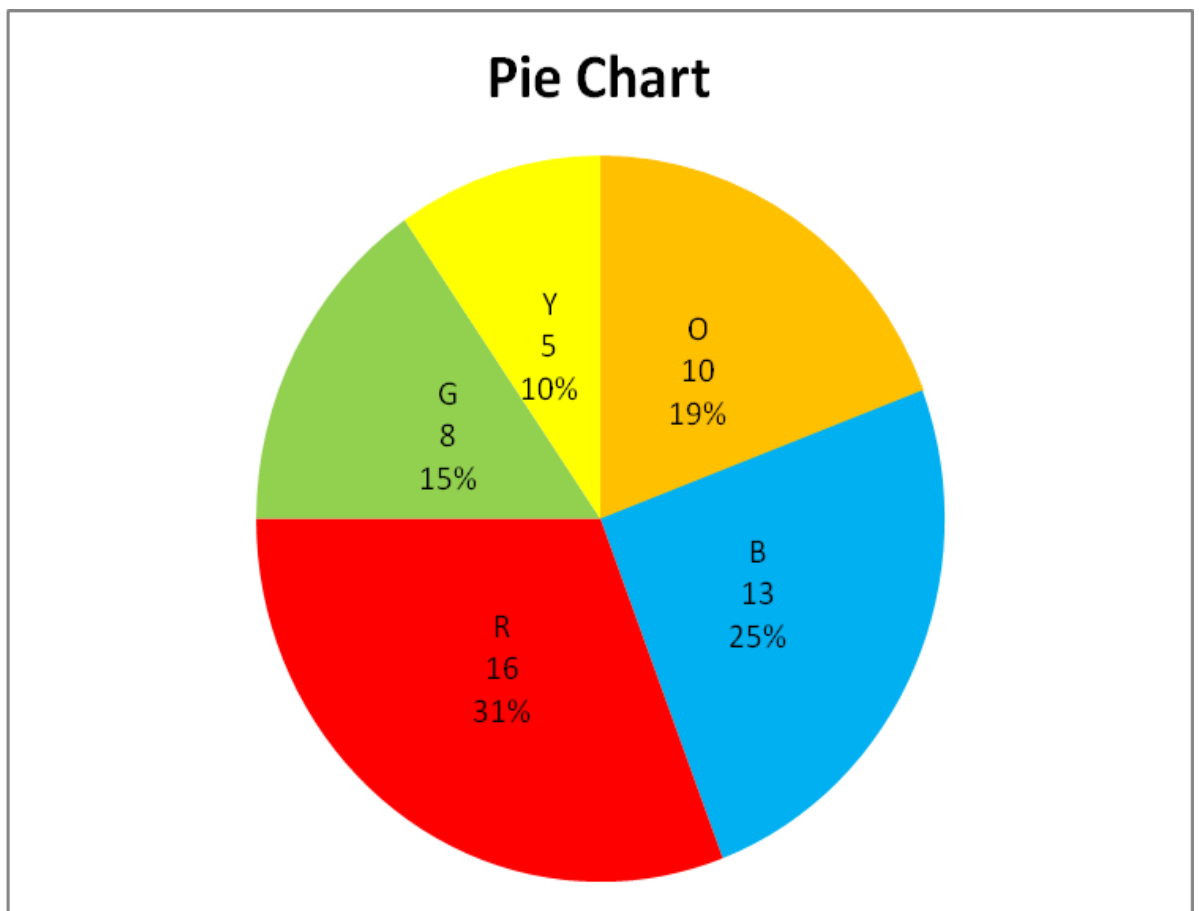
Example (2): Recall the frequency distribution that we had previously constructed in example (1) and Construct a **bar & pie chart** to represent this Table.

Class (Colors)	Orange	Blue	Red	Green	yellow	Total
Frequency	10	13	16	8	5	52



Pie chart:

Colors	Frequency	relative frequency
O	10	0.19
B	13	0.25
R	16	0.31
G	8	0.15
Y	5	0.1
Total	52	1



Frequency Table for Qualitative Data (ordinal)

Example (3):

The following data are grades of (25) students in the final exam:

F , B , D , C , A , D , D , F , C , C , A , C , D , C , F , B , B , D , A , C , D , B , C , D , C

Construct the:

- Frequency & Relative table.
- Ascending frequency table

Class	Tally	Frequency	Relative Frequency	percent%
F	///	3	0.12	12
D	/// ///	7	0.28	28
C	/// /// ///	8	0.32	32
B	///	4	0.16	16
A	///	3	0.12	12
Total		25	1	100

Ascending frequency table

class	ACF
< F	0
< D	3
< C	10
< B	18
< A	22
≤ A	25

Frequency Table for Quantitative Data (Discrete)

Example (4):

The following data represent the number of children of (25) families :
 0 , 1 , 2 , 2 , 4 , 1 , 2 , 3 , 5 , 3 , 3 , 1 , 0 , 3 , 1 , 4 , 2 , 3 , 0 , 5 , 3 , 2 , 0 ,
 2

- Construct the frequency table.
- Construct the relative , percent frequency & Ascending table

Frequency table

Class (Number of children)	Tally	Frequency
0	////	4
1	////	4
2	/// /	6
3	/// /	6
4	///	3
5	//	2
Total		25

Relative & percent frequency

Class (Number of children)	Frequency	relative Frequency	percent frequency
0	4	0.16	16 %
1	4	0.16	16 %
2	6	0.24	24 %
3	6	0.24	24 %
4	3	0.12	12 %
5	2	0.08	8 %
Total	25	1	100%

Ascending frequency table

class	ACF
< 0	0
< 1	4
< 2	8
< 3	14
< 4	20
< 5	23
≤ 5	25

Creating a Frequency Distribution Table

Example (5):

The following data are marks of (25) students in the final exam:

18, 20, 23, 32, 35, 36, 31, 33, 28, 37, 40, 22, 25, 24, 29, 25, 34, 42, 41, 36, 28, 40, 37, 19, 33

- Construct the frequency table.
- Construct the relative , percent frequency & Ascending table

(Quantitative and Continuous)

Solution:

- Step 1: Decide on the number of classes.

A useful recipe to determine the number of classes (k) is the “2 to the k rule.” Such that $2^k > n$.

So $n = 25$. If we try $k = 4$, which means we would use 6 classes, then $2^4 = 16$, somewhat less than 25. Hence, 4 is not enough classes. If we let $k = 5$, then $2^5 = 32$, which is greater than 25.

So the recommended number of classes is 5.

- Step 2: Determine the class interval or width.

The formula is: $i \geq (H-L)/k$

Where i is the class interval,

H is the highest observed value,

L is the lowest observed value,

And k is the number of classes

$$i \geq (42-18)/5$$

$$i \geq 4.8 \quad \text{Use a class width of 5 degrees}$$

- Step 3: first value = 18

Class	Tally mark	Frequency
18 - 23	////	4
23 - 28	////	4
28 - 33	//// /	5
33 - 38	//// / ///	8
38 - 43	////	4
Total		25

Class	Frequency	Relative Freq.	percent%
18 - 23	4	0.16	16
23 - 28	4	0.16	16
28 - 33	5	0.20	20
33 - 38	8	0.32	32
38 - 43	4	0.16	16
Total	25	1	100%

Construct the Ascending Table

class' upper bound	ACF	Relative ACF
< 18	0	0
< 23	4	0.16
< 28	8	0.32
< 33	13	0.64
< 38	21	0.84
≤ 43	25	1

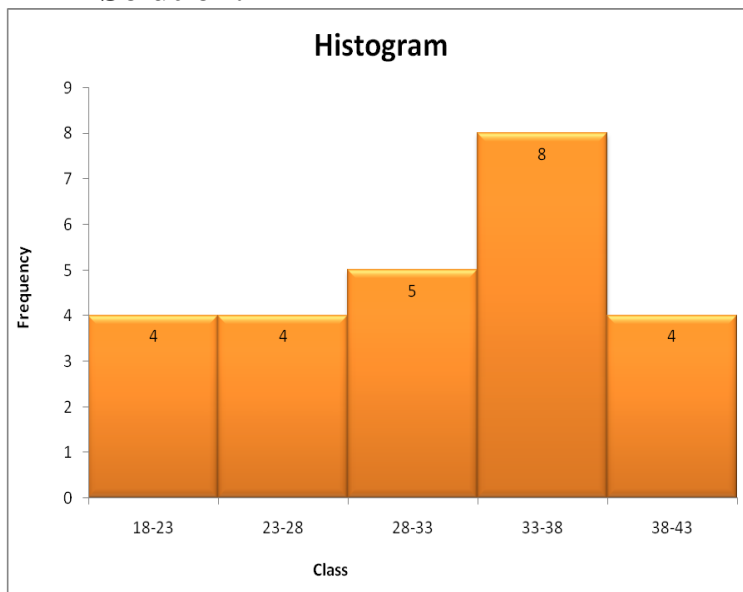
Example (6)

Recall the frequency distribution that we had previously constructed in example (5) :

Class	Frequency
18 - 23	4
23 - 28	4
28 -- 33	5
33 - 38	8
38 - 43	4
Total	25

1. Construct a **histogram** to represent this Table
2. Construct a **frequency polygon curve**.
3. Construct **ascending curve**.

Solution:



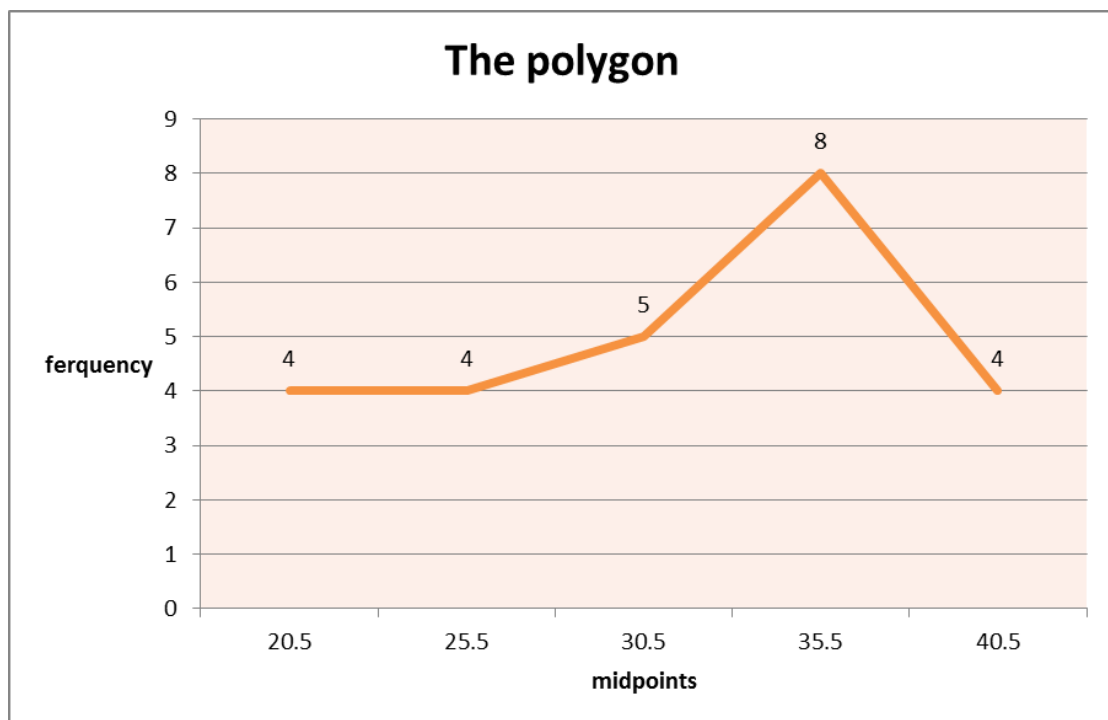
2- The polygon

First compute the midpoint for each class:

$$\text{Midpoint} = \frac{\text{lower limit} + \text{Upper limit}}{2}$$

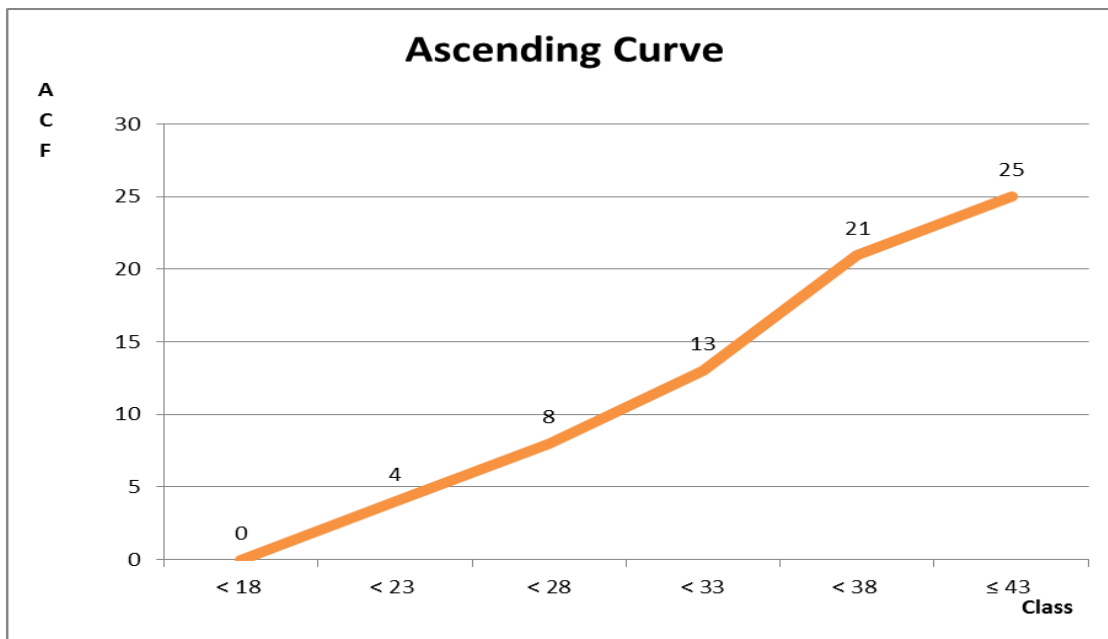
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Class	Frequency	Midpoint
18 – 23	4	20.5
23 - 28	4	25.5
28 - 33	5	30.5
33 - 38	8	35.5
38 - 43	4	40.5
Total	25	



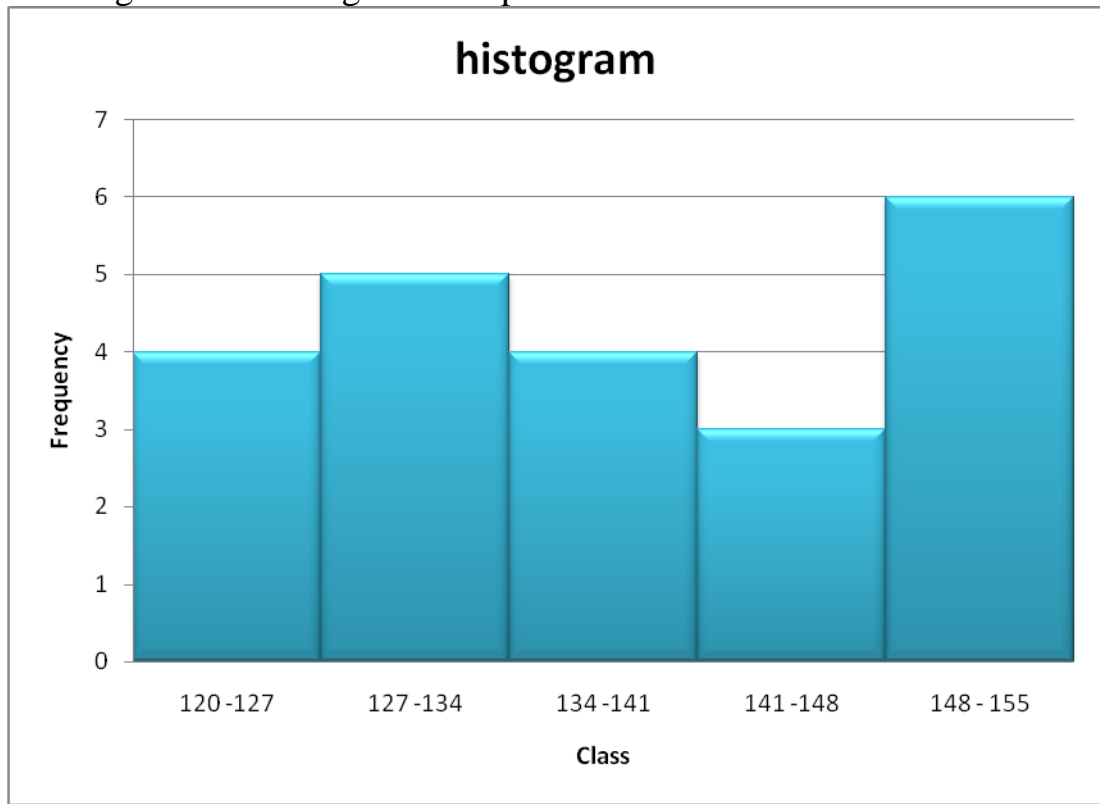
Ascending curve

class' upper bound	ACF
< 18	0
< 23	4
< 28	8
< 33	13
< 38	21
≤ 43	25



Example (7)

A histogram of the heights of 22 plants is as follows:



What the relative frequency is of plants that length between (134-141) cm?

The relative frequency = $4/22 = 0.18$

Example (8)

If you have 115 student Scores ranging between 30 - 92. Using 2^k rule in determining the number of classes, what is the class interval?

- $n = 115$
- Range = $H-L = 92-30 = 62$
- The number of classes (k)
 $2k > n$ $2k > 115$ $k=7$
- Width or class interval
 $i \geq (H-L)/k$
 $i \geq 62/7$
 $i \geq 8.86$
 $i \geq 9$