Math 2201 **Date:**_____

5.2 Frequency Tables, Histograms and Frequency Polygons

Frequency distribution is a set of intervals that can be displayed in three forms: a table, a **histogram** and a **frequency polygon**. Histograms and frequency polygons provide a pictorial representation of the data. This provides an opportunity for people to draw conclusions and make inferences from the data. Frequency polygons are especially helpful when comparing multiple sets of data because they can be graphed on top of each other.

Frequency Distribution: a set of intervals, table or graph, usually of equal width, into which raw data is organized; each interval is associated with a frequency that indicates the number of measurements in the interval.

Example 1:
The following frequency distribution was for a set of Math 2201 test scores.

Class (Rs.)	Tally Marks	Frequency Students
20 - 30	𝍸	5
30 - 40	𝍸 |||	8
40 - 50	𝍸 ||||	9
50 - 60	𝍸 𝍸	10
60 - 70	𝍸 |	6
70 - 80	||	2
Total		**40**

Bins → (20–29), (30–39), (40–49)

(A) How many students failed the test?

$5+8+9=22$

(B) How many students passed the test?

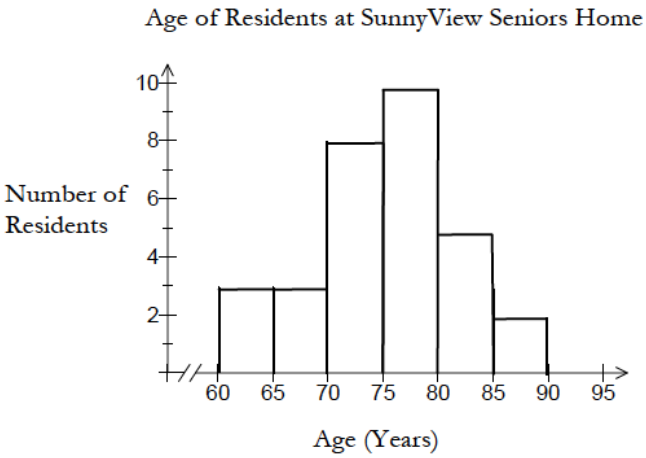
$10+6+2=18$

(C) How many students scored above 60%?

$6+2=8$

Histogram: the graph of a frequency distribution, in which equal intervals associated with these intervals are indicated by the area of the rectangles drawn for these intervals.

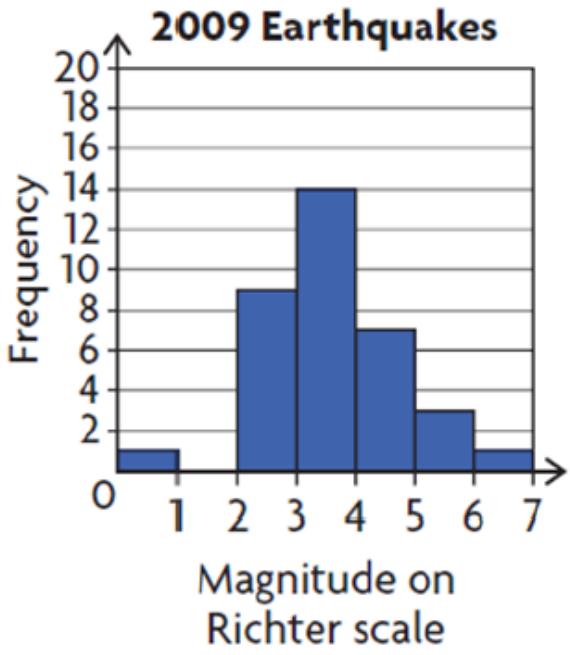
Consider the following graph:
The first bar in this graph begins at 60 on the horizontal axis and ends at 65. The second bar starts where the first bar ends, namely 65-70. As the intervals are required to be non-overlapping, the convention is that the lower limit of each interval includes the number. For example, in the graph to the right, the data value 65 would be placed in the 65 - 70 interval.



Note: the book explains this differently.

Histogram vs. Bar Graph
Histograms and bar graphs are not the same thing, although many people confuse them.

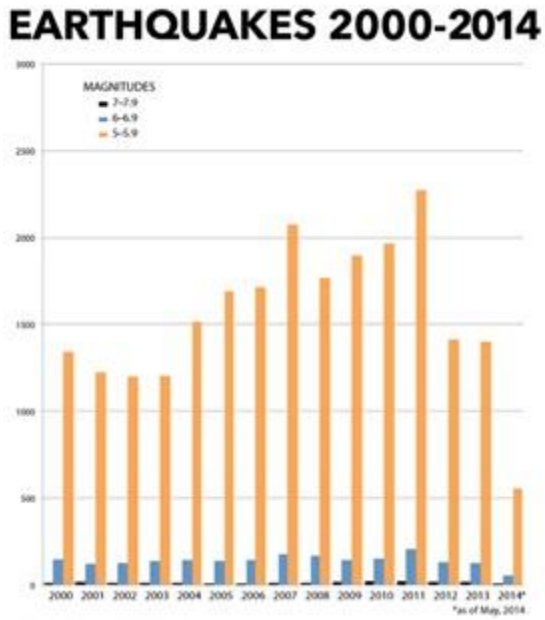
Histogram



- no gaps between bars
- continuous data

"connect the dots"

Bar Graph



- gaps between bars
- discrete data

"don't connect the dots"

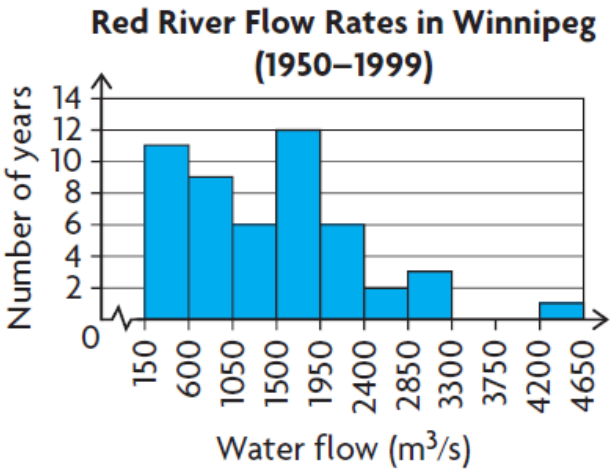
Example 2:
Answer the following questions based on the histogram shown.

(A) For how many years is the water flow between $1500 - 1950\ m^3/s$?

12

(B) For how many years is the water flow between $2850 - 3300\ m^3/s$?

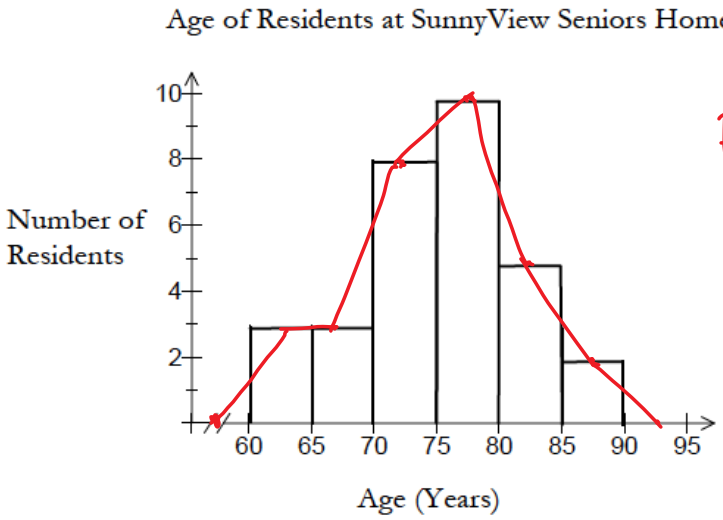
3



Frequency polygon: The graph of a frequency distribution, produced by joining the midpoints of the intervals using straight lines.

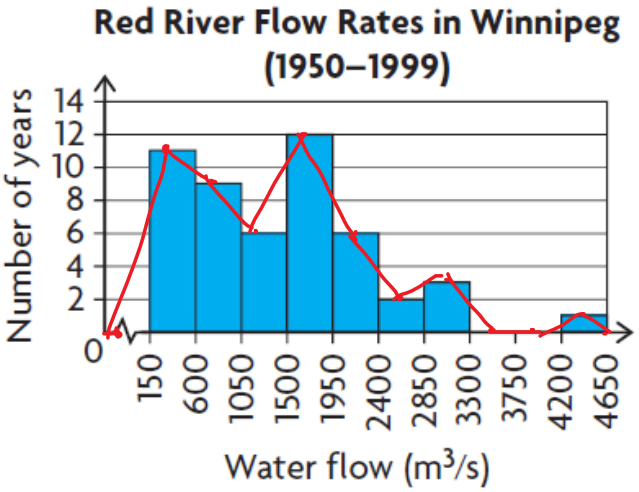
To plot each vertex for the frequency polygon, students can determine the midpoint of the interval and then join the vertices with line segments. Be sure to connect the endpoints to the horizontal axis.

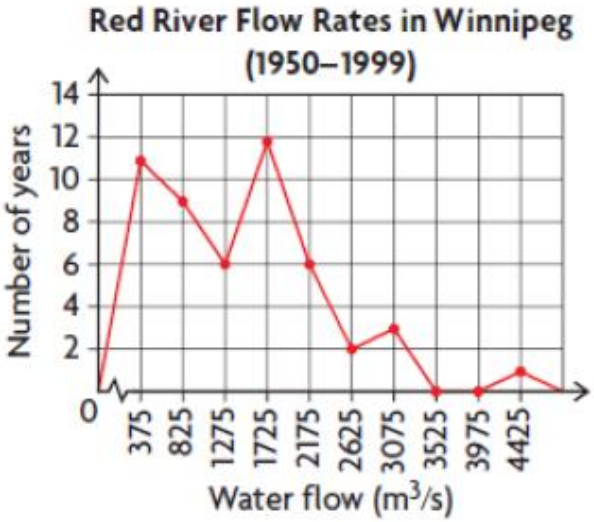
Example 3:
Consider the histogram example from above. By connecting the midpoints of each bar, we can create the corresponding frequency polygon.



Frequency Polygon.

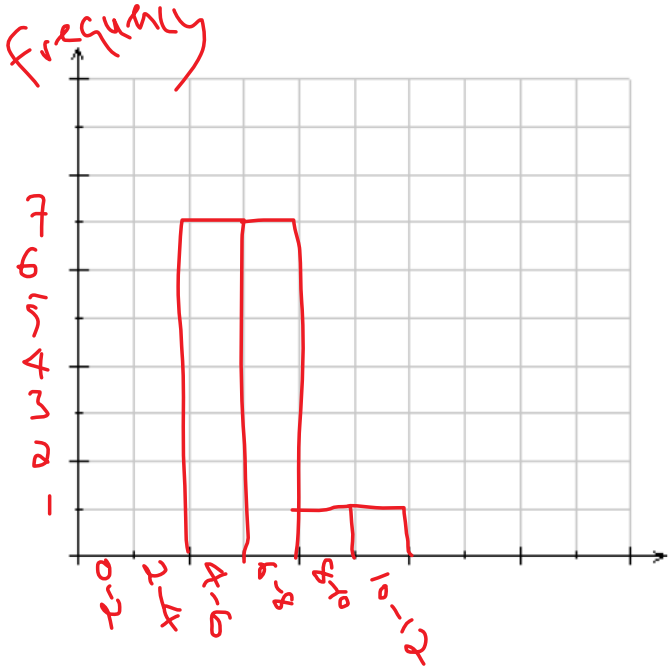
Example 4:
Consider the histogram along with the corresponding frequency polygon. Explain how the frequency polygon was obtained using the histogram.





Example 5:
Choose an attribute common to all students. For example, the number of siblings, number of weekly text messages sent or received, numbers of hours watching television, etc. Collect the data from the class, select an appropriate bin size and display the information in a frequency table. Construct a histogram of the data and then describe the data distribution.

Screen time (hours)	Tally	Frequency
0–2	—	0
2–4	—	0
4–6	𝍸 II	7
6–8	𝍸 II	7
8–10	I	1
10–12	I	1

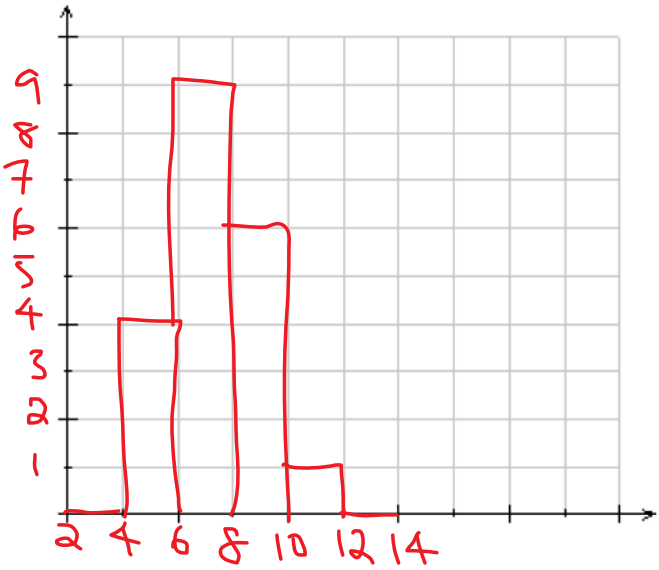


Your turn:

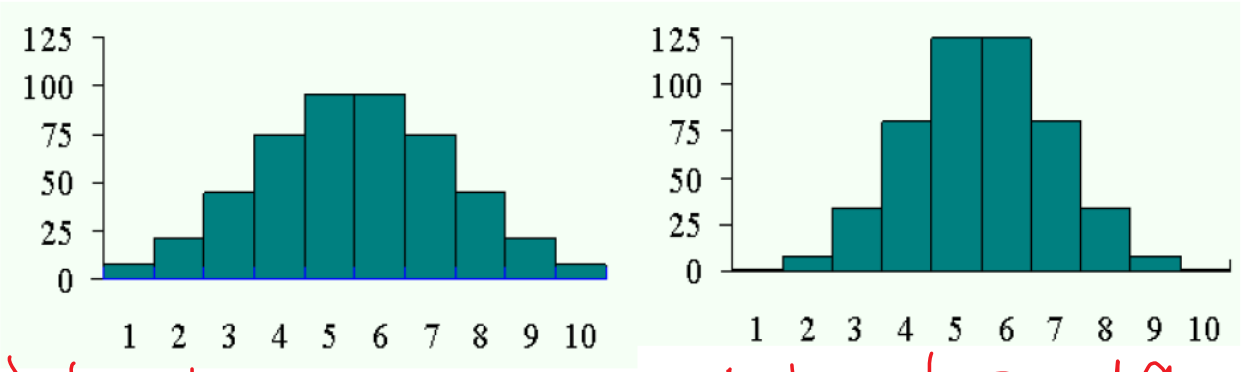
1. The marks awarded for an assignment for a Grade 11 class of 20 students are given below. Present this information in a frequency table and display the data on a histogram. Describe how the data is distributed.

6 7 5 7 7 8 7 6 9 7
4 10 6 8 8 9 5 6 4 8

Mark (out of 10)	Tally	Frequency
2-4	—	0
4-6	1111	4
6-8	𝍸 1111	9
8-10	𝍸 1	6
10-12	1	1
12-14	—	0



2. Which of the distribution of scores has the larger dispersion? Justify your reasoning.



Data at 1 and 10.
Range = 10 − 1 = 9
More spread out.

Data at 2 and 9
Range = 9 − 2 = 7
More clustered around center.

Textbook Questions: page 249 - 251, #2, 3, 6