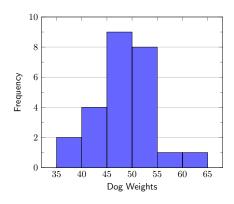
# Histograms

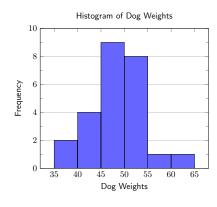
#### **Summary**

- 1. Histograms are one of the most common visual displays of quantitative data.
- 2. They can show frequencies, relative frequencies, or densities.
- 3. Cumulative histograms display running totals.

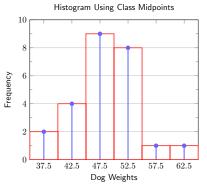
A histogram is like a bar graph but without any gaps between consecutive bars.



- Each bar is called a class (or bin)
- The lower class limit of the first class is 35, of the 2nd class is 40, etc.
- The class width in the above histogram is 5
- Each observed quantitative value is placed into a class or bin.

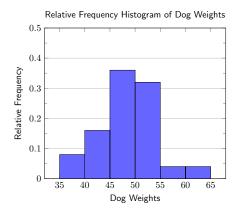


Class	Frequency	Class Midpoint
$35 \le x < 40$	2	37.5
$40 \le x < 45$	4	42.5
$45 \le x < 50$	9	47.5
$50 \le x < 55$	8	52.5
$55 \le x < 60$	1	57.5
$60 \le x < 65$	1	62.5



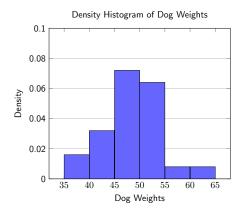
### **Relative Frequency Histogram**

- Create a relative frequency histogram much the same way we created relative frequency bar graphs.
- $\bullet$  Total heights of all rectangles must equal 1.00, or 100%

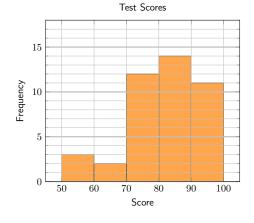


### **Density Histogram**

- Similar to a relative frequency histogram but the total area of all rectangles must equal 1.
- We will see these a lot with probability distributions later.



**Example 1.** Answer each of the following given the histogram below.

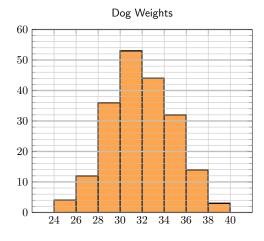


- (a) What is the class width?
- (b) What is the midpoint of the 4th class?
- (c) What is the relative frequency of the 5th class?

**Example 2.** Create a histogram from the measurements below. Use the minimum value as the lower class limit of the first class and use a class width of 2.

9	2	10	1	4
5	1	6	7	4
6	5	4	8	10
3	1	2	3	9
8	6	1	1	10

**Example 3.** Use the histogram below of the weights of 200 dogs to answer each.



- (a) Find the total number of dogs whose weight is at least 34 pounds.
- (b) What percentage of dogs have weights between 26 and 28 pounds?

# **Cumulative Histograms**

A **cumulative histogram** is one in which the frequency (or relative frequency) of each class is a running total up to that class.

**Example 4.** Use the table below to create a cumulative frequency histogram of dog weights from the beginning of the section.

Class	Frequency	Total
$35 \le x < 40$	2	
$40 \le x < 45$	4	
$45 \le x < 50$	9	
$50 \le x < 55$	8	
$55 \le x < 60$	1	
$60 \le x < 65$	1	