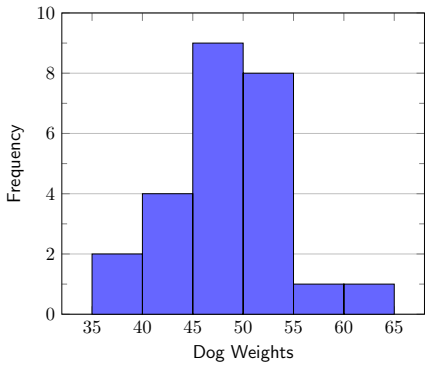
Histograms

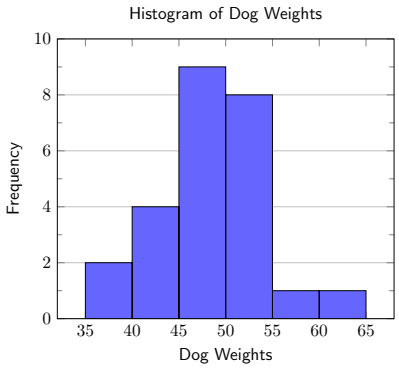
Summary

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.

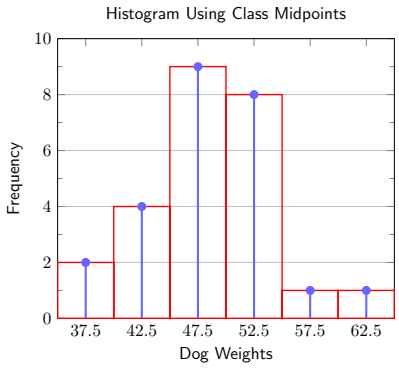
A **histogram** is like a bar graph but without any gaps between consecutive bars.



- 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.

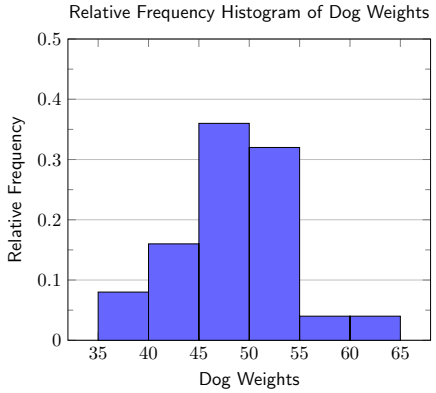


Class	Frequency	Class Midpoint
$35 \leq x < 40$	2	37.5
$40 \leq x < 45$	4	42.5
$45 \leq x < 50$	9	47.5
$50 \leq x < 55$	8	52.5
$55 \leq x < 60$	1	57.5
$60 \leq x < 65$	1	62.5



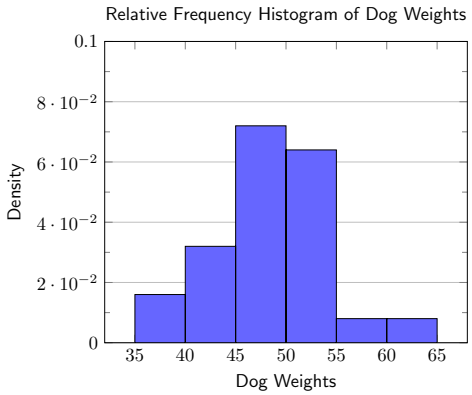
Relative Frequency Histogram

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

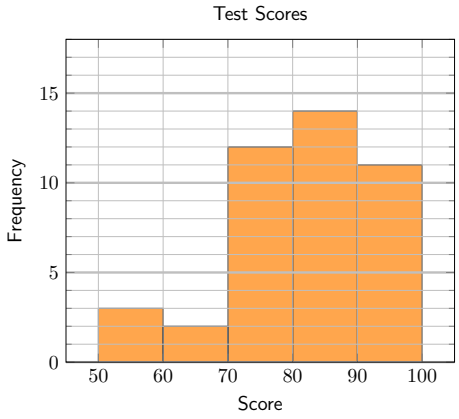


Density Histogram

- 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?

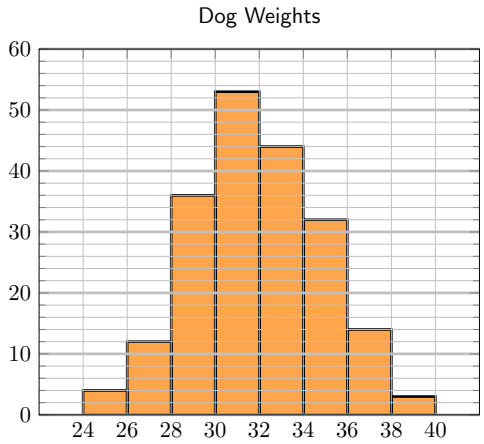
(b) What is the midpoint of the 4th class?

(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
$35 \leq x < 40$	2	
$40 \leq x < 45$	4	
$45 \leq x < 50$	9	
$50 \leq x < 55$	8	
$55 \leq x < 60$	1	
$60 \leq x < 65$	1	