

# Histograms

# Objectives

- 1 Create a frequency distribution for quantitative data
- 2 Create and interpret histograms

# Frequency Distribution for Quantitative Data

The weights (in pounds) of 25 husky dogs are shown below:

53	46	44	47	50
49	47	44	61	44
35	46	49	51	48
50	52	44	50	47
58	47	52	37	54

Suppose we want to create a frequency distribution for the weights of these awesome dogs.

# Frequency Distribution for Quantitative Data

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Suppose we want to create a frequency distribution for the weights of these awesome dogs.

Since this data is quantitative, we are going to have to decide what each of our ranges of weights in our classes is going to be.

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The difference between two consecutive lower class limits is called the **class width**.

Let's create a frequency distribution for the dog weights using a class width of 5 pounds.

# Frequency Distribution of the Weights of Adorable Huskies

<b>Weight</b>	<b>Frequency</b>
35 – 39	2
40 – 44	4
45 – 49	9
50 – 54	8
55 – 59	1
60 – 64	1

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In the above table, we are only considering integer weight values.

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However, any dog that weighs more than 39.5 pounds, but less than 44.5 pounds, would have to go into the 40 – 44 pound class.

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However, any dog that weighs more than 39.5 pounds, but less than 44.5 pounds, would have to go into the 40 – 44 pound class.

Going a half of another decimal place below the lower class limit and above the upper class limits give us the **class boundaries**.

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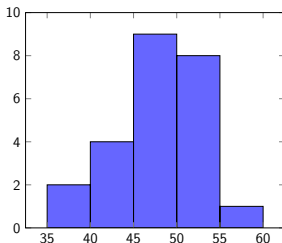
A histogram is like a bar graph in which there are no gaps between classes.



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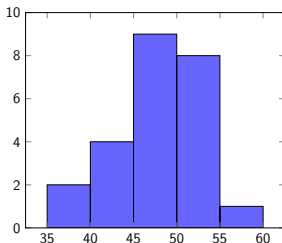
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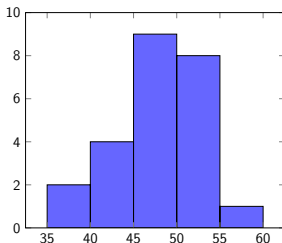


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# Histograms of Quantitative Data

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We can also use class midpoints when graphing histograms.

To find the class midpoint, add the lower class limit and upper class limit. Then divide by two.

# Relative Frequency Histogram

We can even make a relative frequency histogram of a data set.

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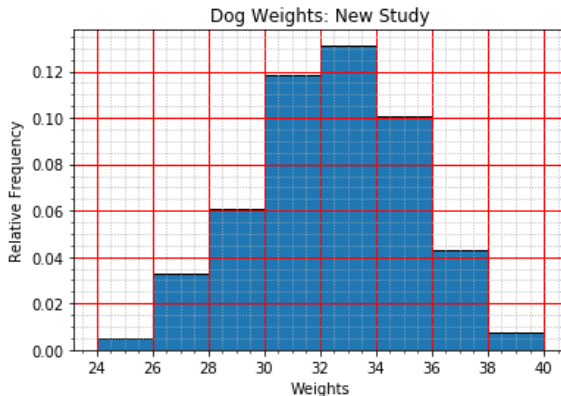
We can even make a relative frequency histogram of a data set.

The total area of all rectangles will equal 100%.

# Relative Frequency Histogram

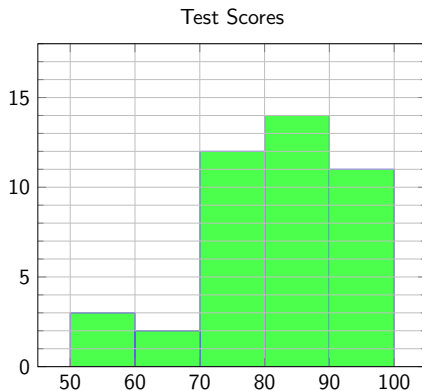
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# Example 1

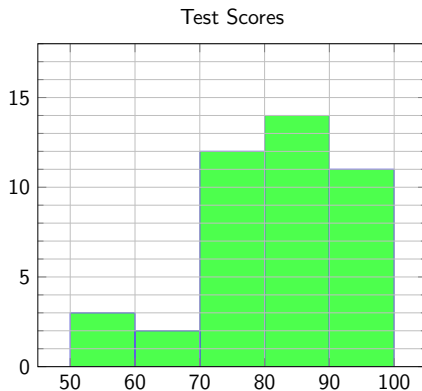
Answer each given the histogram below.



(a) What is the class width?

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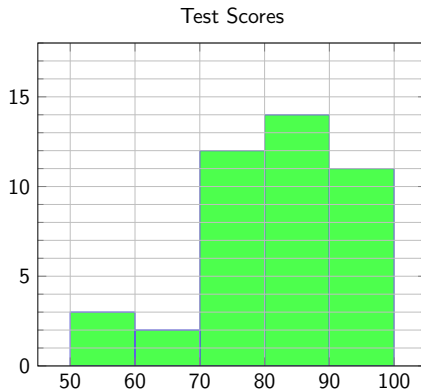


(a) What is the class width? 10



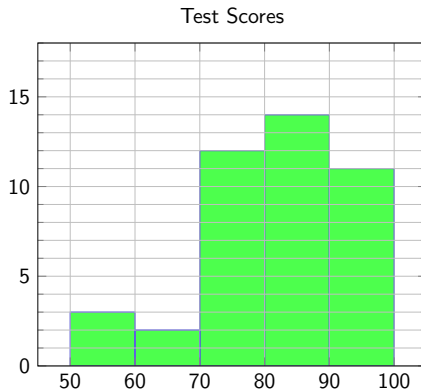
# Example 1

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



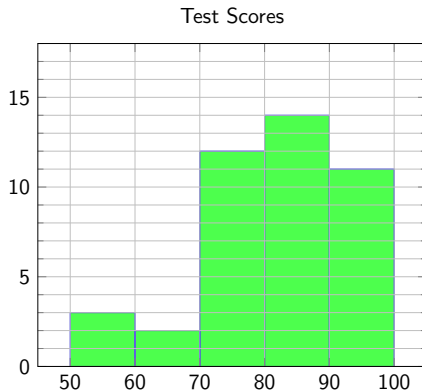
# Example 1

(b) What is the class midpoint of the 4th class? 85



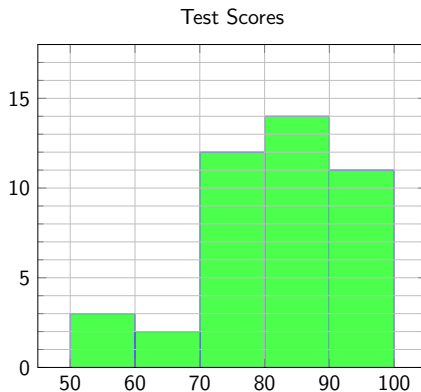
# Example 1

(c) What are the class boundaries of the second class?



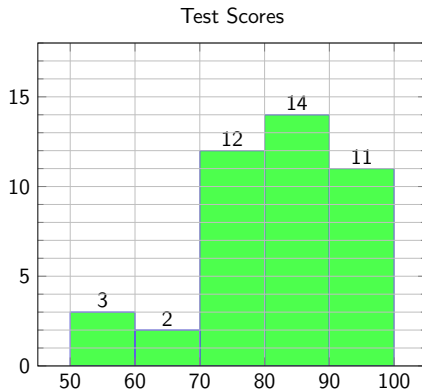
# Example 1

(c) What are the class boundaries of the second class?  
59.5 and 70.5



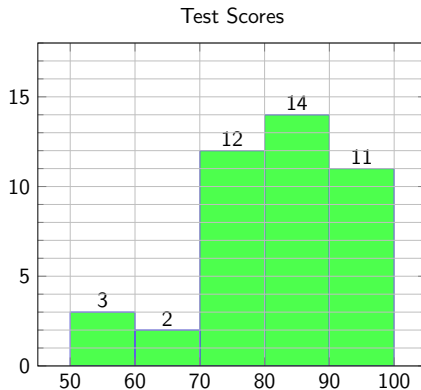
# Example 1

(d) What is the relative frequency of the 5th class?



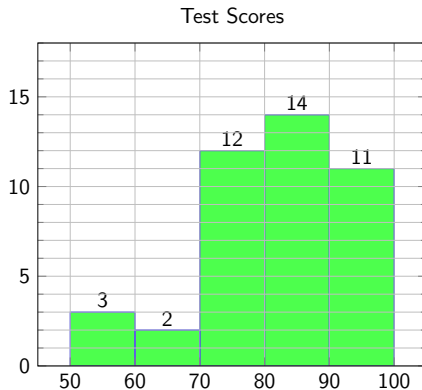
# Example 1

(d) What is the relative frequency of the 5th class?



# Example 1

(d) What is the relative frequency of the 5th class? 11/42



## 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



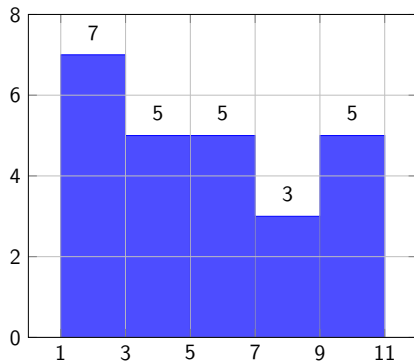
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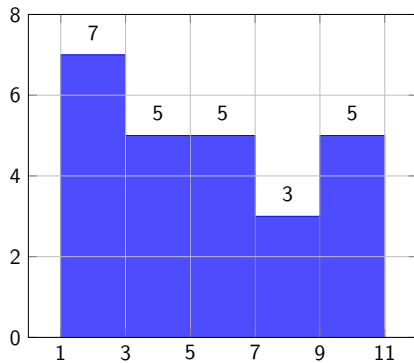
9	2	10	1	4
5	1	6	7	4
6	5	4	8	10
3	1	2	3	9
8	6	1	1	10

Use 1,3,5,7,9, and 11 as the lower class limits.

## Example 2

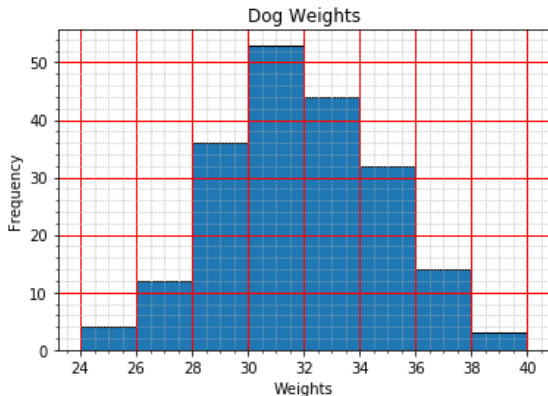


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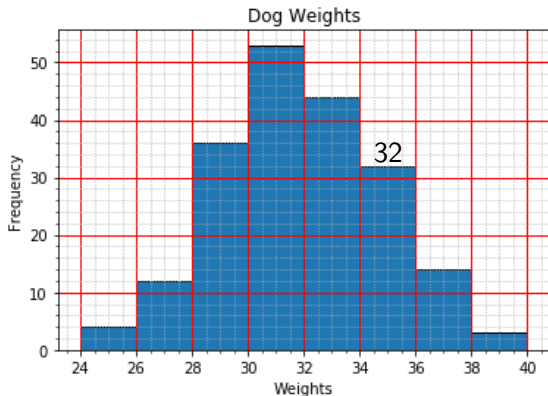
## Example 3

- (a) Given the histogram below of the weights of 200 dogs, find the total number of dogs whose weight is at least 34 pounds.



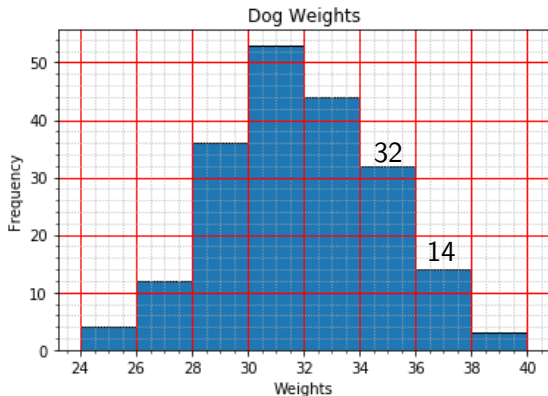
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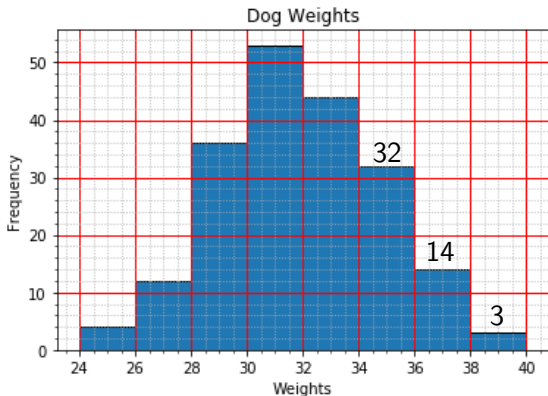
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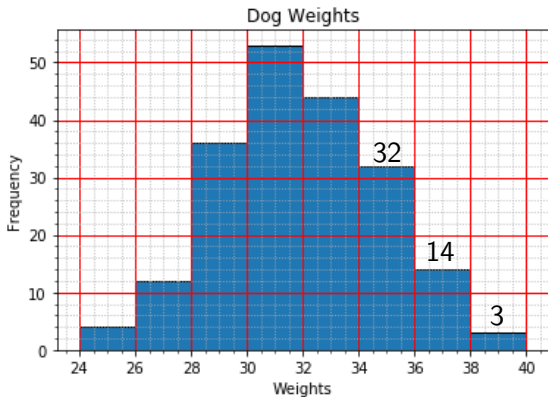
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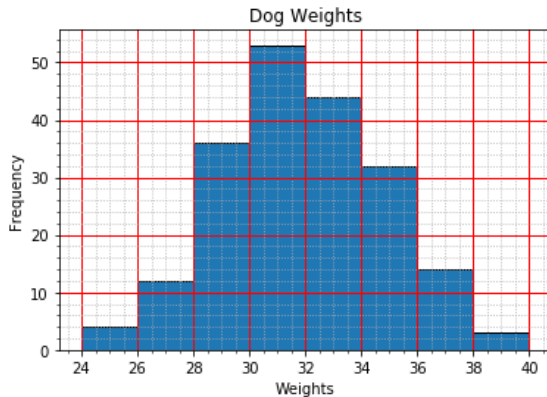


Total: 49



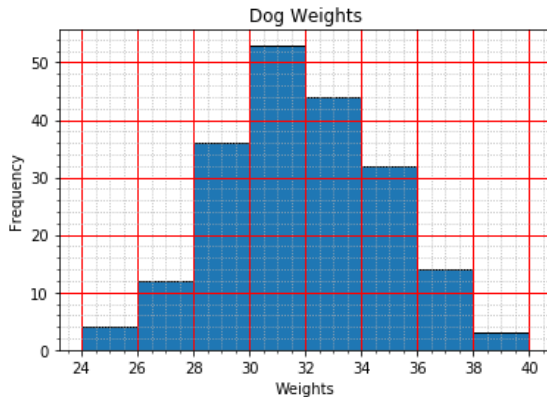
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(b) What percentage of the dogs have weights between 26 and 28 pounds?



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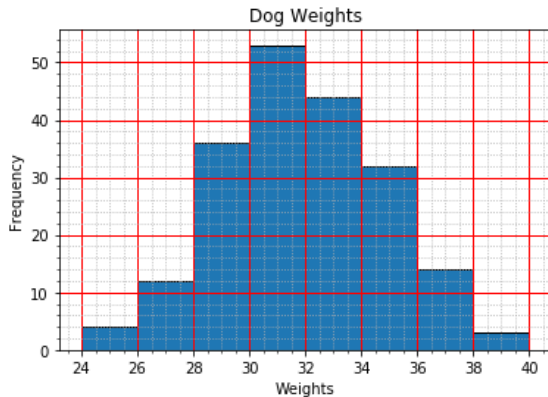
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12/200

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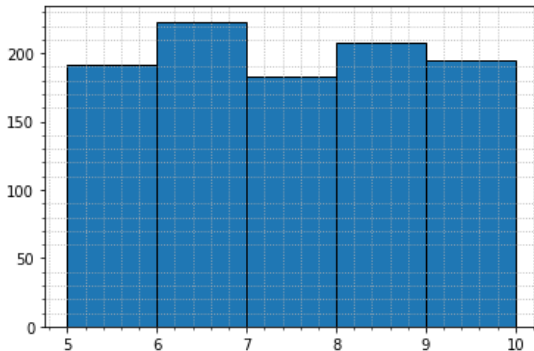


12/200

6%

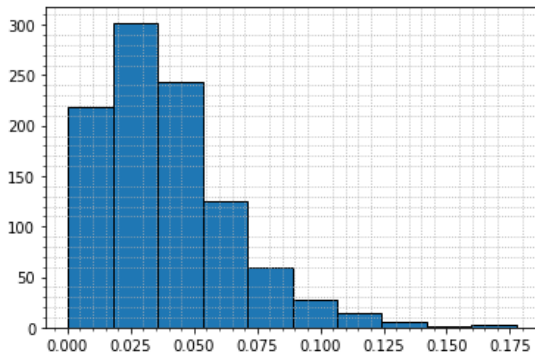
# Some Common Histogram Shapes

Uniform distribution:



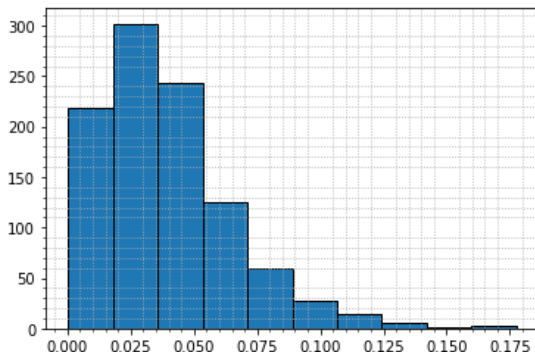
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Right (a.k.a. positively) skewed



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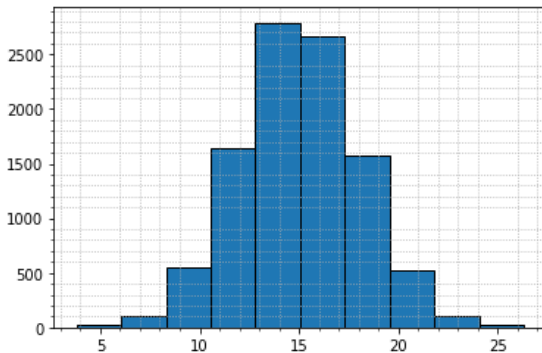
Right (a.k.a. positively) skewed



*Note:* Skewness refers to the tail

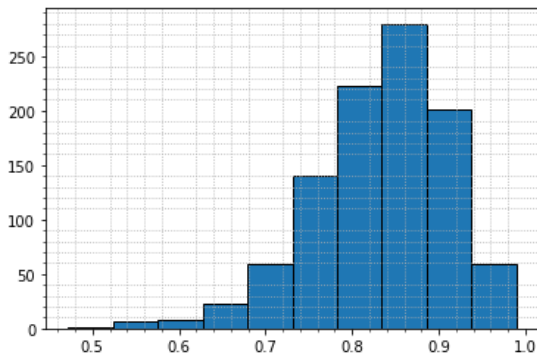
# Some Common Histogram Shapes

Normal (a.k.a. bell-shaped)



# Some Common Histogram Shapes

Left (a.k.a. negatively) skewed





# Cumulative Histogram Distributions

The cumulative relative frequency histogram below shows a running total of relative frequencies of scores for a mathematics test.

