

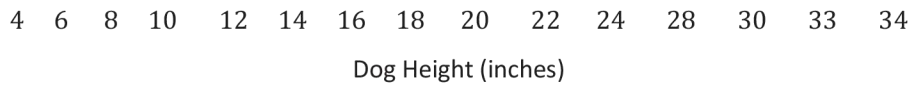
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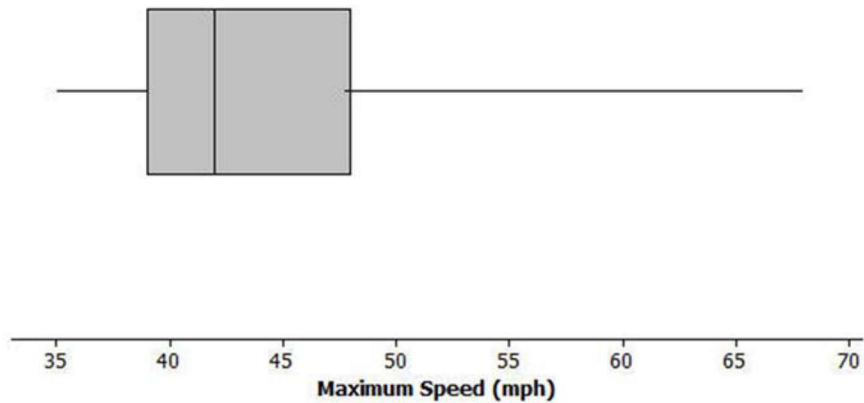
## More Practice with Box Plots

Given the following information, create a box plot and find the IQR.

For a large group of dogs, the shortest dog was 6 inches, and the tallest was 32 inches. One half of the dogs were taller than 18 inches. One fourth of the dogs were shorter than 15 inches. The upper quartile of the dog heights was 23 inches.



1. The box plot below summarizes the maximum speeds of certain kinds of fish.



- a. Estimate the 5-number summary from the box plot.
- b. The fastest fish is the sailfish at 68 mph followed by the marlin at 50 mph. What does this tell you about the spread of the fish speeds in the top quarter of the plot?
- c. Use the 5-number summary and the IQR to describe the speeds of the fish.
2. Suppose you knew that the interquartile range for the number of hours students spent playing video games during the school week was 10. What do you think about each of the following statements? Explain your reasoning.
- a. About half of the students played video games for 10 hours during a school week.
- b. All of the students played at least 10 hours of video games during the school week.
- c. About half of the class could have played video games from 10 to 20 hours a week or from 15 to 25 hours.

3. Suppose you know the following for a data set: minimum value is 130, the lower quartile is 142, the IQR is 30, half of the data are less than 168, and the maximum value is 195.
- Think of a context for which these numbers might make sense.
  - Sketch a box plot.
  - Are there more data values above or below the median? Explain your reasoning.
4. The speeds for the fastest dogs are given in the table below.

Breed	Speed (mph)
Greyhound	45
African Wild Dog	44
Saluki	43
Whippet	36
Basanji	35
German Shepherd	32
Vizsla	32
Doberman Pinscher	30

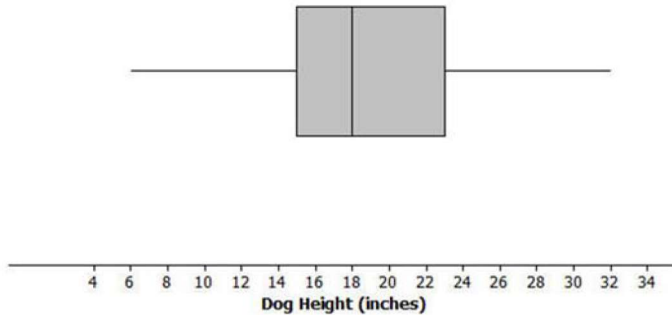
Breed	Speed (mph)
Irish Wolfhound	30
Dalmatian	30
Border Collie	30
Alaskan Husky	28
Giant Schnauzer	28
Jack Russell Terrier	25
Australian Cattle Dog	20

Data Source: <http://www.vetstreet.com/our-pet-experts/meet-eight-of-the-fastest-dogs-on-the-planet>;  
<http://canidaepetfood.blogspot.com/2012/08/which-dog-breeds-are-fastest.html>

- Find the 5-number summary for this data set and use it to create a box plot of the speeds.
- Why is the median not in the center of the box?
- Write a few sentences telling your brother or sister about the speed of the fastest dogs.

Given the following information, create a box plot and find the IQR.

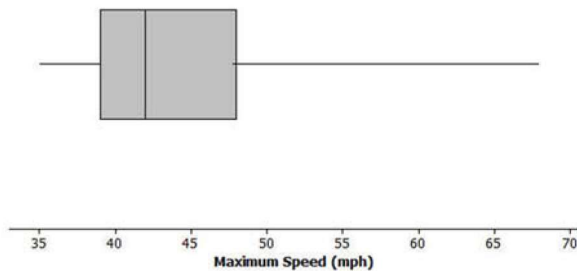
For a large group of dogs, the shortest dog was 6 inches, and the tallest was 32 inches. One half of the dogs were taller than 18 inches. One fourth of the dogs were shorter than 15 inches. The upper quartile of the dog heights was 23 inches.



The IQR is  $23 - 15 = 8$ .

All students should be encouraged to do problems 1 and 2 to be sure they understand the concepts developed in the lesson. Problem 4b should be discussed in some way as a whole class to raise awareness that medians are about counts and relative position of ordered data and not about distance or location.

1. The box plot below summarizes the maximum speeds of certain kinds of fish.



a. Estimate the 5-number summary from the box plot.

*Answers will vary: Min – 35 mph; Q1 – 39 mph; Median – 42 mph; Q3 – 48 mph; Max – 68 mph.*

b. The fastest fish is the sailfish at 68 mph followed by the marlin at 50 mph. What does this tell you about the spread of the fish speeds in the top quarter of the plot?

*The Q3 is about at 48, so all but one of the top quarters are bunched between 48 and 50 mph.*

c. Use the 5-number summary and the IQR to describe the speeds of the fish.

*The speeds of fish vary from 35 mph to 68 mph. The IQR is 9 mph; the middle half of the speeds is between 39 mph and 48 mph. Half of the speeds are less than 42 mph.*

Note: Data for box plot is provided below.

Fish	Maximum speed (mph)
Sailfish	68
Marlin	50
Wahoo	48
Tunny	46
Bluefin tuna	44
Great blue shark	43
Bonefish	40
Swordfish	40
Bonito	40
Four-winged flying fish	35
Tarpon	35

Data Source: <http://www.thetravelalmanac.com/lists/fish-speed.htm>

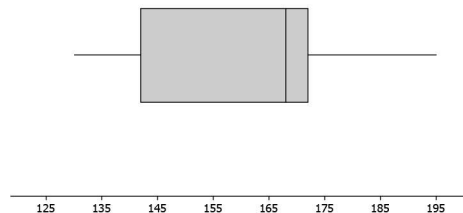
2. Suppose you knew that the interquartile range for the number of hours students spent playing video games during the school week was 10. What do you think about each of the following statements? Explain your reasoning.
- a. About half of the students played video games for 10 hours during a school week.  
*This may not be correct as you know the width of the interval was 10, but you do not know where it starts or stops. You do not know the lower or upper quartile.*
- b. All of the students played at least 10 hours of video games during the school week.  
*This may not be correct for the same reason as in part (a).*
- c. About half of the class could have played video games from 10 to 20 hours a week or from 15 to 25 hours.  
*Either could be correct as the only information you have is the width of 10, and the statement says "could" not "is".*

3. Suppose you know the following for a data set: minimum value is 130, the lower quartile is 142, the IQR is 30, half of the data are less than 168, and the maximum value is 195.

- a. Think of a context for which these numbers might make sense.

*Answers will vary: The number of calories in a serving of fruit.*

- b. Sketch a box plot.



- c. Are there more data values above or below the median? Explain your reasoning.

*The number of data values on either side of the median should be about the same, one half of all of the data.*

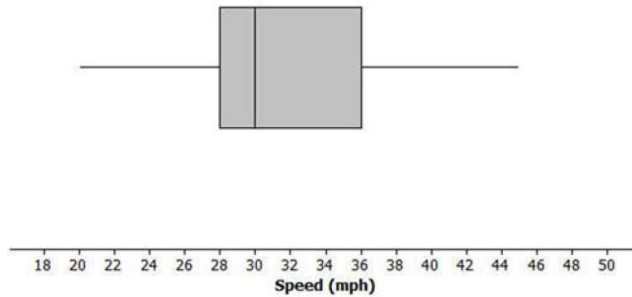
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a. Find the 5-number summary for this data set and use it to create a box plot of the speeds.



*Min = 20, Q1 = 28, Median = 30, Q3 = 36, Max = 45*

b. Why is the median not in the center of the box?

*The median is not in the center of the box because about  $\frac{1}{4}$  of the speeds are between 30 and 36, and another  $\frac{1}{4}$  are closer together, between 28 and 30. The data are skewed with lots of them at the lower speeds.*

c. Write a few sentences telling your brother or sister about the speed of the fastest dogs.

*Half of the dogs run faster than 30 mph; the fastest dog in the list is the greyhound with a speed of 45 mph. The slowest dog in the list is the Australian cattle dog. The middle 50% of the speeds are between 28 and 36 mph.*