

Measuring Variability

Best Sunscreens

Brand	Price Per Ounce
Banana Boat Baby Block Sunblock	\$1.13
Banana Boat Kids Sunblock	0.90
Banana Boat Sport Sunblock	0.92
Banana Boat Sport Sunscreen	4.91
Banana Boat Ultra Sunblock	0.91
Coppertone Kids Sunblock With Parsol 1789	1.25
Coppertone Sport Sunblock	4.79
Coppertone Sport Ultra Sweatproof Dry	2.02
Coppertone Water Babies Sunblock	1.17
Hawaiian Tropic 15 Plus Sunblock	0.81
Hawaiian Tropic 30 Plus Sunblock	0.90
Neutrogena UVA/UVB Sunblock	2.17
Olay Complete UV Protective Moisture	1.59
Ombrelle Sunscreen	2.17
Rite Aid Sunblock	0.50
Walgreens Ultra Sunblock	0.68

Source: www.consumerreports.org

✓ Check Your Understanding

The table on page 108 gives the price per ounce of each of the 16 sunscreens rated as giving excellent protection by *Consumer Reports*.

- Find the median and quartiles of the distribution. Explain what the median and quartiles tell you about the distribution.
- Which sunscreen is at about the 70th percentile in price per ounce?



Maria's Grades

8, 9, 6, 7, 9, 8, 8, 6, 9, 9,
8, 7, 8, 7, 9, 9, 7, 7, 8, 9

Tran's Grades

9, 8, 6, 9, 7, 9, 8, 4, 8, 5,
9, 9, 9, 6, 4, 6, 5, 8, 8, 8

Gia's Grades

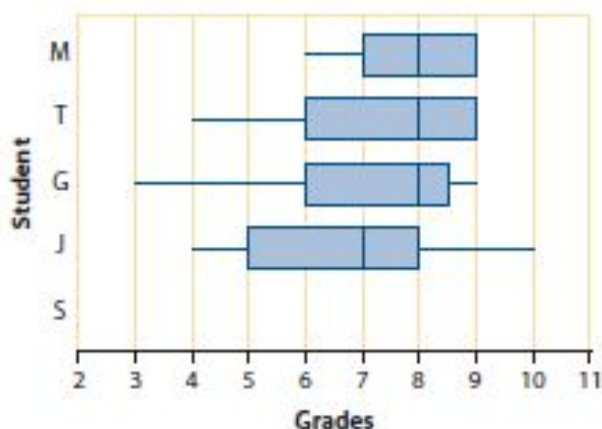
8, 9, 9, 9, 6, 9, 8, 6, 8, 6,
8, 8, 8, 6, 6, 6, 3, 8, 8, 9

Jack's Grades

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

Susan's Grades

8, 8, 7, 9, 7, 8, 8, 6, 8, 7,
8, 8, 8, 7, 8, 8, 10, 9, 9, 9

Math Homework Grades

- On a copy of the plot, make a box plot for Susan's homework grades.
- Why do the plots for Maria and Tran have no whisker at the upper end?
- Why is the lower whisker on Gia's box plot so long? Does this mean there are more grades for Gia in that whisker than in the shorter whisker?
- Which distribution is the most symmetric? Which distributions are skewed to the left?
- Use the box plots to determine which of the five students has the lowest median grade.
- Use the box plots to determine which students have the smallest and largest interquartile ranges.
 - Does the student with the smallest interquartile range also have the smallest range?
 - Does the student with the largest interquartile range also have the largest range?
- Based on the box plots, which of the five students seems to have the best record?

Resting pulse rates have a lot of variability from person to person. In fact, rates between 60 and 100 are considered normal. For a highly conditioned athlete, "normal" can be as low as 40 beats per minute. Pulse rates also can vary quite a bit from time to time for the same person. (Source: www.nlm.nih.gov/medlineplus/ency/article/003399.htm)

- a. Take your pulse for 20 seconds, triple it, and record your pulse rate (in number of beats per minute).
- b. If you are able, do some mild exercise for 3 or 4 minutes as your teacher times you. Then take your pulse for 20 seconds, triple it, and record this exercising pulse rate (in number of beats per minute). Collect the results from all students in your class, keeping the data paired (*resting*, *exercising*) for each student.
- c. Find the five-number summary of resting pulse rates for your class. Repeat this for the exercising pulse rates.
- d. Above the same scale, draw box plots of the resting and exercising pulse rates for your class.
- e. Compare the shapes, centers, and variability of the two distributions.
- f. What information is lost when you make two box plots for the resting and exercising pulse rates for the same people?
- g. Make a scatterplot that displays each person's two pulse rates as a single point. Can you see anything interesting that you could not see from the box plots?
- h. Make a box plot of the differences in pulse rates, (*exercising* – *resting*). Do you see anything you didn't see before?

