

U.S. Census at School Measurement Guide

Census at School is an international classroom project with measurements taken in **centimeters** for some questions and **millimeters** for others. Please measure using the appropriate metric units indicated in the questions.

HEIGHT

4. How tall are you without your shoes on? Answer to the nearest centimeter.

THOUGHTS ABOUT THE QUESTION

The original international question was, "How tall are you? Answer to the nearest centimeter." This was later changed to, "How tall are you without your shoes on? Answer to the nearest centimeter." Why do you think the question was changed?

When grade 4–12 students' heights are measured in centimeters, what do you think the values will be? The shortest? The tallest? If you plot a graph of students' heights, what shape do you predict the distribution will be?

To what other body measurements do you think height might be related? You may wish to investigate whether there is a relationship between height and arm span.

PURPOSE OF THE QUESTION

This question is one of the international questions asked by all countries participating in Census at School.

CONSIDERING SOURCES OF VARIATION AND MEASURES

How can we, as a class, make height measurements to ensure accuracy?

Consider:

- One person making all the measurements.
- Attaching a height chart to the wall using an official height chart or attaching two or more tape measures to the wall.
- Using a book as the guide, rather than a ruler. The book can be placed with the flat spine against the wall and then slid down until it touches the person's head. This takes the measure at right angles. With a ruler, there is a tendency to angle the ruler up or down.
- Measuring height correctly in centimeters, not in feet or inches, as is common in the United States. Students likely will not have a sense of their height in centimeters. Keep in mind that a 4 ft tall student is 122 cm and a 6 ft tall student is 183 cm. Make sure the heights measured in centimeters are reasonable values.

HEIGHT MEASUREMENT STATION

Work in pairs to take one another's height measurements.

- Take your shoes off. Stand with your back to the wall against the height measurement chart/tape measure.
- Get your partner to take the provided textbook and place it on the wall above your head. Make sure the spine of the book is flat against the wall.
- Your partner will slide the book down until it touches your head.
- Your partner will read the height off the chart to the nearest **centimeter** (not feet or inches). The height is shown by looking at the bottom of the spine of the book.
- Check to make sure your height measured in centimeters is a reasonable value (height measurements in centimeters for students in grades 4–12 will generally be between 120 and 200 cm).
- Record your height measurement in **centimeters** as a number for Question 4.



RIGHT FOOT LENGTH

5. What is the length of your right foot (without your shoe on)? Answer to the nearest centimeter.

THOUGHTS ABOUT THE QUESTION

Who might be interested in data about right foot lengths (e.g., shoe manufacturers)? How might they use the data to support what they do?

When grade 4–12 students' right foot lengths are measured in centimeters, what do you think the values will be? The shortest? The longest?

To what other body measurements do you think right foot length might be related? For example, do you expect taller students to have longer feet?

If you plot a graph of students' right foot lengths, what shape do you predict the distribution will be?

PURPOSE OF THE QUESTION

This question is one of the international questions asked by all countries participating in Census at School.

FURTHER INVESTIGATION

Collect measures for both feet and look for patterns. Record differences (if any) in length. Record which foot is longer (or neither if both are the same length). Do people have the same right foot length as left foot length? If one foot is longer, does it tend to be the foot that is the same as handedness? For example, does a right-handed person have a longer right foot?

CONSIDERING SOURCES OF VARIATION AND MEASURES

How can we, as a class, make right foot measurements to ensure accuracy?

Consider:

- One person making all the measurements.
- Using a foot measurement chart or attaching tape measures to the floor.
- Drawing lines all the way across the measurement chart at each centimeter.
- Placing the chart/tape measures flat on the floor against a wall.
- Measuring right foot length correctly in centimeters, not in inches as is common in the United States. Students likely will not have a sense of their foot length in centimeters. Keep in mind that a 6-inch right foot length is approximately 15 cm and a 12-inch right foot length is approximately 30 cm. Make sure the foot lengths measured in centimeters are reasonable values.

RIGHT FOOT LENGTH MEASUREMENT STATION

Work in pairs to take one another's right foot length measurements.



- Prepare a foot measurement chart (at least 50 cm long) with rule lines across at every centimeter, or use a tape measure.
- Place the chart or tape measure on the floor against a wall.
- Stand with the back of your right foot against the wall. You must have your shoes off.
- Get your partner to read the length of your right foot to the nearest centimeter (not inches or your shoe size) off the chart for you.
- Check to make sure your right foot length measured in centimeters is a reasonable value (right foot length measurements in centimeters for students in grades 4–12 will generally be between 13 and 33 cm).
- Record your right foot length in centimeters as a number for Question 5.

ARM SPAN

6. What is your arm span? (Open arms wide and measure distance across your back from tip of right hand middle finger to tip of left hand middle finger.) Answer to the nearest centimeter.

THOUGHTS ABOUT THE QUESTION

The original international question was, "What is your arm span? Answer to the nearest centimeter." This question was changed to, "What is your arm span? Answer to the nearest centimeter. (Open arms wide, measure distance from tip of right hand middle finger to tip of left hand middle finger.)" Why do you think the question was changed?

Many arm span measurements with the original international question were about half the expected arm span. What do you think happened when those measurements were taken?

When students' arm spans are measured, what do you think the values will be? The shortest? The longest? Do you think the arm span will be similar to any other body measurements? If you plot a graph of students' arm spans, what shape do you predict the distribution will be?

PURPOSE OF THE QUESTION

This question is one of the international questions asked by all countries participating in Census at School.

CONSIDERING SOURCES OF VARIATION AND MEASURES

How can we, as a class, make arm span measurements to ensure accuracy?

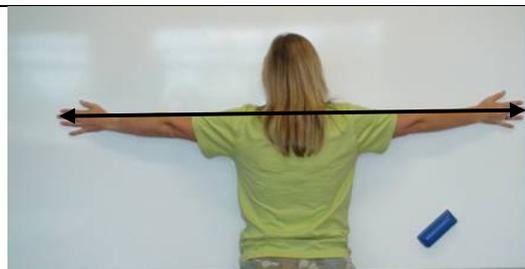
Consider:

- One person making all the measurements.
- Making a chart and attaching it to the wall so it starts at a corner or a specified point on the wall. This can be done by making a measurement chart or attaching two or more tape measures to the wall.
- Marking the measurements on a whiteboard and making the measurements there.
- Discussing possible common mistakes students make when measuring their arm spans?
- Measuring arm span correctly in centimeters, not in feet or inches as is common in the United States. Students likely will not have a sense of their arm span in centimeters. Keep in mind that a 4 ft arm span is 122 cm and a 6 ft arm span is 183 cm. Make sure the arm spans measured in centimeters are reasonable values.

ARM SPAN MEASUREMENT STATION

Work in pairs to take one another's arm span measurements.

- Stand facing the wall or whiteboard.
- Raise both your arms until they are at right angles to your body.
- Place one set of fingertips at the beginning of the chart/starting point for the measurement.
- Your partner will read the arm span measurement to the nearest **centimeter** (not inches or feet) off the board or chart.
- Check to make sure your arm span measured in centimeters is a reasonable value (arm span measurements in centimeters for students in grades 4–12 will generally be between 120 and 200 cm).
- Record your arm span measurement in **centimeters** as a number for Question 6.



LEFT FOOT LENGTH

14. What is the length of your left foot (without your shoe on)? Answer to the nearest centimeter.

THOUGHTS ABOUT THE QUESTION

Who might be interested in data about left foot lengths? How might they use the data to support what they do?

When grade 4–12 students' left foot lengths are measured in centimeters, what do you think the values will be? The shortest? The longest?

If you plot a graph of students' left foot lengths, what shape do you predict the distribution will be?

To what other body measurements do you think left foot length might be related?

Do people have the same left foot length as right foot length? If one foot is longer, does it tend to be the foot that is the same as handedness? For example, does a left-handed person have a longer left foot?

PURPOSE OF THE QUESTION

This question is similar to one of the international questions (right foot length) and allows students to compare right and left foot lengths.

CONSIDERING SOURCES OF VARIATION AND MEASURES

How can we, as a class, make right foot measurements to ensure accuracy?

Consider:

- One person making all the measurements.
- Using a foot measurement chart or attaching tape measures to the floor.
- Drawing lines all the way across the measurement chart at each centimeter.
- Placing the chart/tape measures flat on the floor against a wall.
- Measuring left foot length correctly in centimeters, not in inches as is common in the United States. Students likely will not have a sense of their foot length in centimeters. Keep in mind that a 6-inch left foot length is approximately 15 cm and a 12-inch left foot length is approximately 30 cm. Make sure the foot lengths measured in centimeters are reasonable.

LEFT FOOT LENGTH MEASUREMENT STATION

Work in pairs to take one another's left foot length measurements.

- Prepare a foot measurement chart (at least 50 cm long) with rule lines across at every centimeter, or use a tape measure.
- Place the chart or tape measure on the floor against a wall.
- Stand with the back of your left foot against the wall. You must have your shoes off.
- Your partner will read the length of your left foot to the nearest **centimeter** (not inches or your shoe size) off the chart for you.
- Check to make sure your left foot length measured in centimeters is a reasonable value (left foot length measurements in centimeters for students in grades 4–12 will generally be between 13 and 33 cm).
- Record your left foot length in **centimeters** as a number for Question 14.



LEFT INDEX AND RING FINGER LENGTHS

16. What is the length of your index finger (finger next to your thumb) on your left hand? Answer to the nearest millimeter.

17. What is the length of your ring finger (located between your middle finger and little finger) on your left hand? Answer to the nearest millimeter.

THOUGHTS ABOUT THE QUESTION

Who would be interested in data about index and ring finger lengths? How might they use the data to support what they do?

When grade 4–12 students' left index and ring finger lengths are measured in millimeters, what do you think the values will be? The shortest? The longest?

If you plot a graph of students' index or ring finger lengths, what shape(s) do you predict the distributions will be?

Do grade 4–12 students tend to have the same left index finger length as left ring finger length, or does one tend to be longer? If so, which finger tends to be longer? Does this pattern differ for males and females?

PURPOSE OF THE QUESTIONS

These questions have a specific activity in mind regarding whether the index finger or the ring finger is longer or whether the fingers are the same length. Data will be used to check out conjectures about the lengths of these fingers.

CONSIDERING SOURCES OF VARIATION AND MEASURES

How can we, as a class, make finger length measurements to ensure accuracy?

Consider:

- One person making all the measurements.
- From where to measure the length of the fingers.
- Common mistakes students make when measuring their finger lengths.
- Measuring left index and ring finger lengths correctly in millimeters, not in inches or centimeters. Students likely will not have a sense of their finger lengths in millimeters. Keep in mind that a 3-inch long finger is approximately 76 millimeters and a 4-inch long finger is approximately 102 millimeters. Make sure the finger lengths measured in millimeters are reasonable values.

FINGER LENGTH MEASUREMENT STATION

Work in pairs to take one another's left finger length measurements.

- The index finger is the finger next to the thumb. The ring finger is the third finger from the thumb.
- Left index and ring finger measurements are to be taken with the fingers bent at approximately right angles (see pictures).
- The measurement is from the knuckle to the end of the finger (soft tissue, not fingernail).
- Line up the knuckle with the zero and read off the length of the finger (to the nearest mm) from the ruler.
- These will be our only measurements in millimeters. Remember, there are 10 millimeters in one centimeter.
- Read the lengths of your left index finger and left ring finger to the nearest **millimeter** (not centimeter).
- Check to make sure your measured left index and ring finger lengths in millimeters are reasonable values (finger length measurements in millimeters for students in grades 4–12 will generally be between 60 and 110 mm).
- Record your left index and ring finger measurements in **millimeters** as numbers for questions 16 and 17.

