



### Part 1. Math review

1. Which is the average or arithmetic mean of 1, 2, 3 and 4? \_\_\_\_\_.

$$\frac{1 + 2 + 3 + 4}{4} = 2.5$$

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A class has 20 students where 3 of them are left-handed.

2. What is the fraction of left-handed students in the class? \_\_\_\_\_.

3/20: 3 in every 20 students are left handed or 15 in every 100 students are left handed.

3. What is the percentage of left-handed students in the class? \_\_\_\_\_.

15%

4. What is the proportion (in decimals) of left-handed students in the class? \_\_\_\_\_.

.15

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5.  $\frac{48+45+47+44}{4} = \frac{184}{4} = \frac{92}{2} = \frac{46}{1} = 46$

6.  $(-3)^2 = -3 * -3 = 9$

7.  $10 + 5 * 3 = 10 + (5 * 3) = 10 + 15 = 25$

8. Solve the following equation for X:  $2 = \frac{x-1}{6}$

$$12 = x - 1$$

$$-x = -12 - 1 = -13$$

$$x = 13$$

9. Which number of the following pairs is larger?

a) -2 or -1      -1.

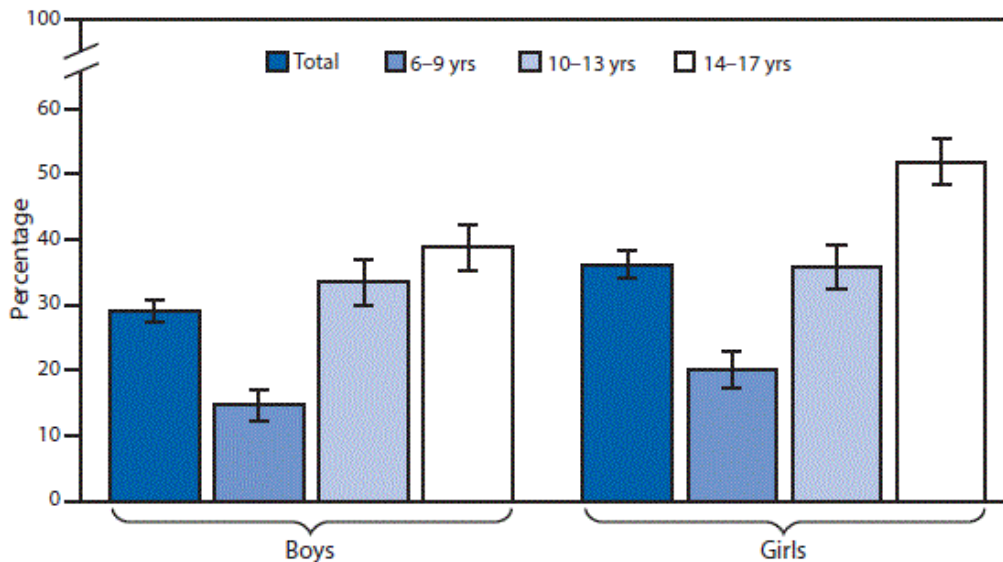
b) |-3| or |2|      |-3| = 3.

### Part 2 – Statistical Analysis and Design for Data Collection

*QuickStats*: Percentage\* of Children Aged 6–17 Years Who Wear Glasses or Contact Lenses,† by Sex and Age Group — National Health Interview Survey, 2016§

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**Source:** National Center for Health Statistics. National Health Interview Survey, 2016. <https://www.cdc.gov/nchs/nhis.htm>.



† Based on the survey response of “yes” to the question “Does (child’s name) wear eyeglasses or contact lenses?” Children who are blind were excluded from these estimates.

§ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population and are derived from the National Health Interview Survey Sample Child component.

- 1. Main research question:**  
The distribution of children wearing eyeglasses or contact lenses grouped by age and gender.
- 2. Which is the population of interest?**  
Children aged between 6-17 years in the US.
- 3. Which is the characteristic of interest?**  
Whether a child wears eyeglasses or contact lenses.
- 4. Among both girls and boys, which age group is more likely to wear eyeglasses or contact lenses?**  
The age group 14-17
- 5. Among both girls and boys, which age group is less likely to wear eyeglasses or contact lenses?**



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The age group 6-9

In 2016, the percentage of children aged between 6–17 years who wear eyeglasses or contact lenses was higher among girls (36.2%) compared to the boys (29.1%). Girls aged between 6–9 years (20.2%) and 14–17 years (51.9%) were more likely to wear eyeglasses or contact lenses when compared with boys of the same age groups (14.9% and 38.8%, respectively). There was no statistically significant difference by gender for children aged 10–13 years (35.9% among girls, 33.5% among boys). Among both girls and boys, children aged 14–17 years were most likely to wear eyeglasses or contact lenses, and children aged 6–9 years were least likely to wear eyeglasses or contact lenses.

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6. Which of the following best describes the purpose of selecting a sample?
- To get information about some population
  - To get information only about the sample
  - To take a census
  - To bias the results towards a certain answer
7. Taylor Swift wants to know the proportion of her fans who want her to sing New Romantics at tomorrow's concert. In order to estimate this, she takes a sample of 150 of her fans and asks them if they want her to sing this song. Of the 150 fans, 90 of them (60%) want her to sing New Romantics. What is the statistic and what is its value?
- The statistic is the proportion of all Taylor Swift fans who want her to sing New Romantics, which is 0.6.
  - The statistic is the proportion of the 150 sampled Taylor Swift fans who want her to sing New Romantics, which is 90.
  - The statistic is the proportion of the 150 sampled Taylor Swift fans who want her to sing New Romantics, which is 0.60.
  - The statistic is the proportion of all Taylor Swift fans who want her to sing New Romantics, which is unknown.
  - The statistic is the group of Taylor Swift fans who want her to sing New Romantics.
8. In an election district, 73% of all registered voters are Democrats. A survey of a simple random sample of 500 voters from this district had 68% Democrats. Identify the parameter(s) and statistic(s)
- Both 68% and 73% are statistics.
  - Both 68% and 73% are parameters.
  - 73% is a parameter and 68% is a statistic.
  - 73% is a statistic and 68% is a parameter.



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- e. 73% and 500 are statistics and 68% is a parameter.
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Determine if the following is an example of descriptive or inferential statistics.

10. Researchers interviewed 500 people about an upcoming election. Based on the responses, they predicted that candidate Johnson would get 47% to 61% of the total vote.

*It is an example of inferential statistics; it predicts the % vote share based on the 500 people in the sample who were interviewed.*

11. 500 people were interviewed about an upcoming election. 52% of the people said they supported candidate Johnson.

*It is an example of descriptive statistics because it summarizes/describes the data.*

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12. To estimate the percentage of households in Connecticut which use fuel oil as a heating source, a researcher collects information from 1000 Connecticut households and asked them whether they use fuel oil as their heating source. Identify the population, the statistic, the sample, the parameter, the variable and the individual.

- *Population – collection of all households in Connecticut*
- *Individual – a household in Connecticut*
- *Sample – the 1,000 selected Connecticut households*
- *Variable – whether they use fuel oil as a heating source or not.*
- *Parameter – the proportion of the households in Connecticut which use fuel oil as a heating source.*
- *Statistic – the proportion of the 1,000 households in the sample which use fuel oil as a heating source.*

13. Determine what the key terms refer to in the following study. A fitness center is interested in the mean amount of time a client exercises in the center each week, so they send out a survey to 100 randomly selected clients.

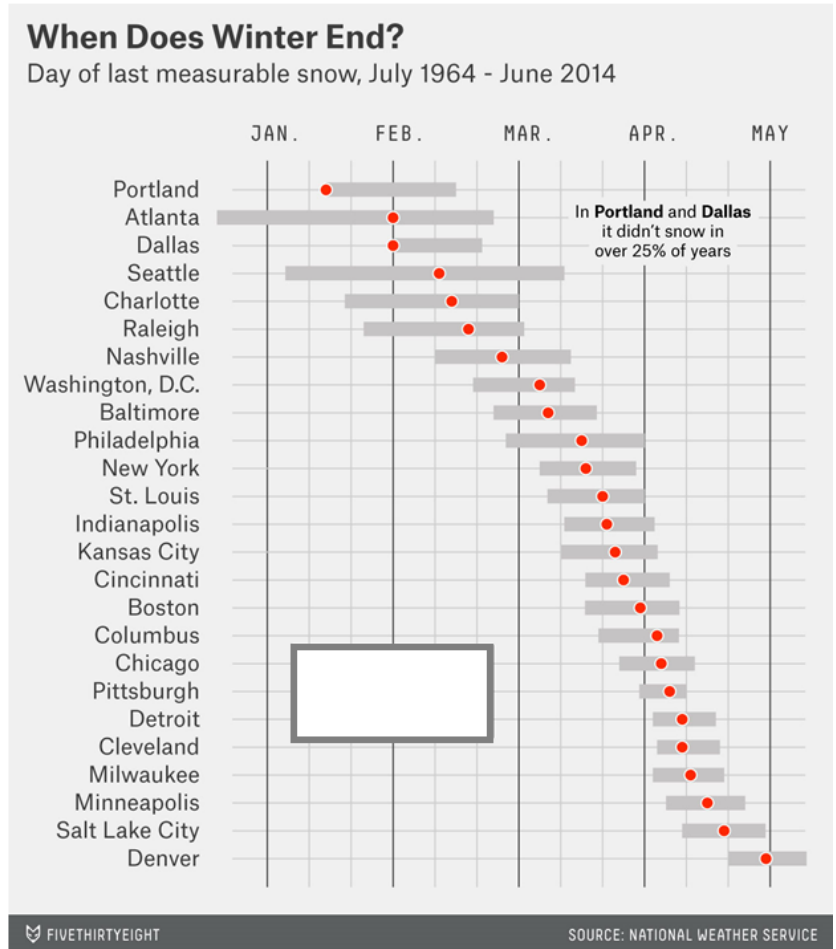
- a. Variable       **c**   All fitness center clients  
b. Statistic      **f**   The mean amount of time for all clients  
c. Population   **a**   The number of hours per week a client exercise  
d. Sample        **b**   The mean amount of time for the 100 clients surveyed  
e. Data           **d**   The 100 clients surveyed  
f. Parameter     **e**   a specific number of hours reported by a single client, i.e. 2, 3, 4.5

14. “When does winter end?” – The following graph shows the day of last measurable snow from July 1964 and June 2014 for 25 large metropolitan areas. These areas have recorded measurable snow in at least 50% of their winters.

Consider the red dots being the typical days of the last measurable snow for each area. The gray region represents a measure of the variability of the days of the last measurable snow. Based on the plot, which metropolitan area(s) show a larger variation (or spread) of the winter season.

*It seems that the end of the winter has more spread in Atlanta and Seattle compared to the typical day than the other metropolitan areas.*

*Another finding is that the metropolitan areas with an earlier end of the winter have more variability with respect to the typical day. For example, Denver has a smaller variability (smaller spread) with respect the typical value than for example Atlanta.*



<https://fivethirtyeight.com/features/has-the-snow-finally-stopped/>