1 Get Started on the Culminating Project

Overview and Connection to the Culminating Project

This Learning Task focuses on helping students learn what a statistical question is, understand the difference between numerical and categorical data, and represent data using dot plots. Students will apply these concepts in the Class Profile Culminating Project, in which they will conduct surveys to learn more about their class, interpret and represent their data, and compare their class with other sixth-grade classes across the country.

Learning Objectives

Students will be able to

- Identify statistical questions.
- Create survey questions using statistical questions.
- Distinguish between categorical and numerical data.
- Represent data using dot plots.
- Explain similarities and differences in data using the vocabulary of statistics.

Driving Questions

- How can we write our own statistical questions in order to design a survey that will give us meaningful information about the typical student in our class?
- How can we display our data in a meaningful way? (e.g. visual representations such as dot plots).

Assessment

Check for Understanding • Statistical Questions

Timeline

Lesson 1 • Class Profile

Lesson 2 • Statistical Questions

Lesson 3 • Dot Plots

Check for Understanding • Statistical Questions

Materials, Supplies, and Technology

- Computers with internet access if available
- Census at School Questionnaire (if students have internet access they can fill this out online; if not, use the questionnaire provided in Handouts and Assessments)
- Measuring tape
- Examples of dot plots
- Chart paper
- Pencils and colored markers
- Copies of Check for Understanding • Statistical Questions (see Handouts and Assessments)

Resources

- http://www.huffingtonpost.com/vincent-marrero/i-am-trayvon-martin_b_1376160.html (example of using audio interviews to write an article)
- www.weebly.com (website-building resource)
- http://www.law.yale.edu/admissions/profile.htm (example of a class profile)
- http://onlinemba.unc.edu/admissions/class-profile/ (example of a class profile)
- http://www.amstat.org/censusatschool/about.cfm (online source of data for students to research and compare their Class Profile with city, state, and national data; they do this in Learning Task 4)
- https://tuvalabs.com/ (another online resource for national data)
- http://flowingdata.com/ (example of data representations)
- https://www.one.org/us/2014/05/20/12-data-visualizations-that-illustrate-povertys-biggest-challenges/ (example of data representations)
- TED Talk: Hans and Ola Rosling (a video showing that there is a high statistical chance of people being wrong about what they think they know)

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LESSON 1

CLASS PROFILE

WARM-UP

Introduction to Class Profiles

- Tell students that for the Culminating Project, they will collect, analyze, and summarize data about their class to create a Class Profile. They will then use that profile to see how they compare to sixth graders across the country. Explain that students can present their Class Profile in a variety of ways: website, book, poster, brochure, PowerPoint presentation, or Facebook® wall display.
- Share with students what profiles of a class might look like. Display some of the class profile examples listed in the Learning Task 1 overview resources, such as:
    - http://www.law.yale.edu/admissions/profile.htm
    - http://onlinemba.unc.edu/admissions/class-profile/
- Ask students why a class profile might be important or useful.
- Explain that mathematicians known as ***statisticians*** collect, analyze, and summarize data about a variety of real-world situations: characteristics of groups of people, how something changes over time, whether the benefits of a decision outweigh the costs, and more. Students will take on the role of statisticians as they create their Class Profile.

PROJECT ACTIVITY

School Census

- Have students complete the Census at School Questionnaire. If you don't have computer access for each student, make copies of the questionnaire (see Handouts and Assessments) for students to fill out.

NOTE

You can create class codes beforehand to share with students. Students will need measuring tapes to complete some questions.

Complete the Census at School Questionnaire. online or your teacher may give a copy of "U.S. Census at School Questionnaire."

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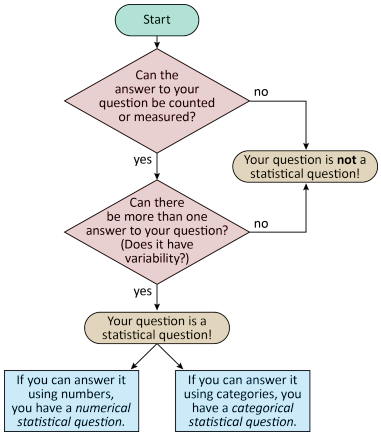
LESSON 2
STATISTICAL QUESTIONS

WARM-UP

Statistical Flowchart

- Explain that in order to collect the right data, mathematicians ask statistical questions. In order to be a statistical question, the answers must:
  - Be countable or measurable (that is, they can be counted or measured)
  - Have variability (that is, there must be more than one answer to the question)
- Have students look at the Statistical Questions Flowchart in their Student Edition.

1. Review this Statistical Questions Flowchart.



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- Then have students decide whether or not the questions in their Student Edition are statistical questions.

2. Use the Statistical Questions Flowchart to decide whether or not each of the questions below is a statistical question.
   a. When is your birthday?
      No, it is not a statistical question.
   b. How many minutes do students typically read each day?
      Yes, it is a statistical question.
   c. How many people live in California in 2017?
      No, it is not a statistical question.
   d. What is your favorite movie?
      No, it is not a statistical question.
   e. What are your class's favorite movies?
      Yes, it is a statistical question.

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PROJECT ACTIVITY

Who Are We?

- Assign each team (or have them choose) one of the "Topics for Survey Questions"in the Student Edition. Each team should work on a different topic.

1. Read over the topic that your teacher assigns you (or choose a topic) in the table below. Each topic provides an example of a categorical and numerical question.

Topics for Survey Questions

Health Categorical: What is your favorite way to stay healthy? Numerical: How many hours of sleep do you typically get?	**Hobbies and Sports** Categorical: What is your favorite type of art? Numerical: How fast can you run 400 meters?
Travel Categorical: How do you get to school? Numerical: How many minutes does it take you to get to school?	**Home** Categorical: What types of celebrations does your family have? Numerical: How many celebrations do you participate in during a typical month?
School Categorical: What languages are spoken at your school? Numerical: How many students are in a typical class at your school?	**Career Interests** Categorical: What job would you like to have? Numerical: How many hours do you spend on schoolwork in a typical week?
Food Categorical: What is your favorite food? Numerical: How many servings of vegetables do you eat in a typical day?	**Entertainment** Categorical: What is your favorite type of music? Numerical: How many songs do you have on your favorite playlist?

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- Have the teams write statistical questions that fit their topic in order to create a "Who Are We?" survey. They will use the survey later to collect data about the class.

LESSON 2 • STATISTICAL QUESTIONS

- Each team should write at least four survey questions that will yield categorical data and four survey questions that will yield numerical data.

2. Write eight statistical questions about your topic—four that will yield numerical data and four that will yield categorical data.

Our Team's Topic: _____

Four Numerical Statistical Questions	Four Categorical Statistical Questions
Answers will vary.	***Answers will vary.***

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- As students work, check to make sure that all team members understand the task by asking probing questions such as:
  - How do you know that a question is measurable?
  - How do you know that a question can have variability?
  - How could you change a question to make it a statistical question?
  - What makes a question a statistical question?
  - What distinguishes categorical data from numerical data?

Closing/Homework

- Collect examples of numerical questions to make a survey for tomorrow's warm-up and project activity.

Math Curricular Connections Suggestions

Engage NY: What is a statistical question?

Khan Academy: Statistical questions

LESSON 3
DOT PLOTS

WARM-UP

Survey and Sleep Log

- Pool students' questions into one "Who Are We?" survey. Have students complete the survey. Provide the questions using Google Forms, Surveymonkey, printed paper, or some other medium.

NOTE

If using paper, consider giving this survey at the end of the previous class, since it will take some time to compile results that are needed for the project activity.

- Introduce students to the Sleep Log. Explain that with the Sleep Log, students will collect another set of data that they can add to their Class Profile.

1. Your teacher will give you the "Who Are We?" survey comprised of the questions the teams wrote in the previous lesson.
2. Answer each of the questions. The data will later be collected into a Class Profile that you will compare with other sixth graders across the country.
3. Over the course of the unit, you will fill in this Sleep Log to record the number of minutes you sleep each night. The purpose of this log is to create a classroom-wide data set that you will track and analyze. Everyone in the class will track their sleep, including your teacher!

Sleep Log

Date	Minutes of Sleep	Date	Minutes of Sleep	Date	Minutes of Sleep
1.	***Answers will vary.***	15.		29.	

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PROJECT ACTIVITY

Dot Plots

- Display one or more examples of dot plots for students and review how they are created as needed. (See suggested curricular connections for an example of a dot plot.)
- Have students create a dot plot of one of the numerical statistical questions from the "Who Are We?" survey as instructed in their Student Edition.

1. With your team, choose one of the numerical questions from the "Who Are We?" survey you just took.
2. Use the data from that question to create a dot plot on chart paper using pencil. Make sure it includes everything it needs before adding color.
3. You can use the dot plot tool to help you get organized.
4. Answer the questions below about the dot plot.

The numerical statistical question we are using is:

Answers will vary.

Our dot plot needs:

- ❑ An appropriate title
  — What, specifically, does the data show?
  Answers will vary.
- ❑ A label for the numbers at the bottom
  — What do these numbers mean?
  Answers will vary.
- ❑ Precision
  — Do the dots match the data you collected?
  Answers will vary.
- ❑ The number of observations you are reporting
  — How many pieces of data did you collect?
  Answers will vary.

Attach or Insert the picture of your finished dot plot here.

Answers will vary.

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Math Curricular Connections Suggestions

Engage NY: Dot Plots

Khan Academy: Dot plots & frequency tables

CHECK FOR UNDERSTANDING

Statistical Questions

- Distribute the Learning Task 1 assessment—Check for Understanding • Statistical Questions.

1. Give an example of a question that is **not** a statistical question.
   Answers will vary.

2. Change your question so that it becomes a statistical question.
   Answers will vary.

3. Give an example of a statistical question that yields numerical data.
   Answers will vary.

4. Give an example of a statistical question that yields categorical data.
   Answers will vary.

5. In your own words, describe your thinking about what makes a question a statistical question.
   Answers will vary.

HANDOUTS AND ASSESSMENTS