

11.6**Making Inferences from Experiments**

For use with Exploration 11.6

Essential Question How can you test a hypothesis about an experiment?

1 EXPLORATION: Resampling Data

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. A randomized comparative experiment tests whether water with dissolved calcium affects the yields of yellow squash plants. The table shows the results.

Yield (kilograms)	
Control Group	Treatment Group
1.0	1.1
1.2	1.3
1.5	1.4
0.9	1.2
1.1	1.0
1.4	1.7
0.8	1.8
0.9	1.1
1.3	1.1
1.6	1.8

- a. Find the mean yield of the control group and the mean yield of the treatment group. Then find the difference of the two means. Record the results.

- b. Write each yield measurement from the table on an equal-sized piece of paper. Place the pieces of paper in a bag, shake, and randomly choose 10 pieces of paper. Call this the “control” group, and call the 10 pieces in the bag the “treatment” group. Then repeat part (a) and return the pieces to the bag. Perform this resampling experiment five times.

- c. How does the difference in the means of the control and treatment groups compare with the differences resulting from chance?

11.6 Making Inferences from Experiments (continued)**2 EXPLORATION: Evaluating Results**

Work as a class. To conclude that the treatment is responsible for the difference in yield, you need strong evidence to reject the hypothesis:

Water dissolved in calcium has no effect on the yields of yellow squash plants.

To evaluate this hypothesis, compare the experimental difference of means with the resampling differences.

- Collect all the resampling differences of means found in Exploration 1(b) for the whole class and display these values in a histogram.
- Draw a vertical line on your class histogram to represent the experimental difference of means found in Exploration 1(a).
- Where on the histogram should the experimental difference of means lie to give evidence for rejecting the hypothesis?
- Is your class able to reject the hypothesis? Explain your reasoning.

Communicate Your Answer

- How can you test a hypothesis about an experiment?
- The randomized comparative experiment described in Exploration 1 is replicated and the results are shown in the table. Repeat Explorations 1 and 2 using this data set. Explain any differences in your answers.

	Yield (kilograms)									
Control Group	0.9	0.9	1.4	0.6	1.0	1.1	0.7	0.6	1.2	1.3
Treatment Group	1.0	1.2	1.2	1.3	1.0	1.8	1.7	1.2	1.0	1.9

11.6

Notetaking with Vocabulary

For use after Lesson 11.6

In your own words, write the meaning of each vocabulary term.

randomized comparative experiment

control group

treatment group

mean

dot plot

outlier

simulation

hypothesis

Notes:

11.6 Notetaking with Vocabulary (continued)**Extra Practice**

1. A randomized comparative experiment tests whether students who are given weekly quizzes do better on the comprehensive final exam. The control group has 10 students and the treatment group, which receives weekly quizzes, has 10 students. The table shows the results.

	Final Exam Scores (out of 100 points)									
Control Group	82	55	76	92	76	76	82	58	69	79
Treatment Group	92	90	88	73	88	63	94	81	81	77

- a. Find the mean score of the control group.
- b. Find the mean score of the treatment group.
- c. Find the experimental difference of the means.
- d. Display the data in a double dot plot.
- e. What can you conclude?

11.6 Notetaking with Vocabulary (continued)

2. Resample the data in Exercise 1 using a simulation. Use the means of the new control and treatment groups to calculate the difference of the means.

	Final Exam Scores (out of 100 points)									
New Control Group										
New Treatment Group										

3. To analyze the hypothesis below, use the histogram which shows the results from 200 resamplings of the data in Exercise 1.

Weekly Quizzes have no effect on final exam scores.

Compare the experimental difference in Exercise 1 with the resampling differences. What can you conclude about the hypothesis? Do weekly quizzes have an effect on final exam scores?

