

Discuss



- Report to the class the average circumference of the heads of the students in your group. Give the mean.
- Compare the means for all the groups. What can you say about them?
- Estimate the average circumference for the whole class using the means for each group.
- A. How would you find the mean if there were five people in your group?
B. Three people?
- How could you use a calculator to find the mean? (Hint: What steps did you go through to find the mean using the strips?)

Explore

Using a Calculator to Find the Mean

Michael's group used a chart to think through their answer to Question 5.

Finding the Mean

Steps with adding machine tape	Steps on the calculator
1. We taped the strips together.	1. Add the lengths of the strips together. $56 + 52 + 50 + 54 = 212$ cm
2. We folded the long strip into 4 equal parts.	2. Divide the total length by the number of people in our group. $212 \div 4 = 53$ cm
3. The length of one-fourth of the long strip is 53 cm.	3. The mean is 53 cm. On average, the circumference of our heads is 53 cm.

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Student Guide

Questions 1–15 (SG pp. 179–183)

- * Answers will vary depending on class data.
- Answers will vary. The means from some groups might match. Others should be “close.” Students might mention the range of means recorded.
- * Answers will vary. See the lesson.
- A. Fold the long strip into 5 equal pieces.
B. Fold the long strip into 3 equal pieces.
- Add the measurements and divide by the number of people in the group (the number of values).

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These are the keystrokes that Michael's group used. Try them on your calculator.

What is showing on your display now? What does the number in the window tell you?
What is showing on your display now? What does the number in the window tell you?

56 + 52 + 50 + 54 = + 4 =

6. A.*

60 + 57 + 56 + 54 = ÷

4 =

B.* 57 cm

C.* 57 cm

Michael's group found the mean by adding the values for each head circumference and dividing by the number of students in the group. The mean for any data set is an average that is found by adding the values in the set of data and dividing by the number of values.

6. The data for Group 2 is shown below.

Group 2's Data

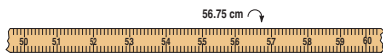
Name	Circumference of Head (in cm)
Jacob	60
Tanya	57
Maya	56
Jessie	54



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They used a calculator to find the mean for their data. The display on their calculator read 56.75.

- Write calculator keystrokes for finding the mean for Group 2.
- Is 56.75 cm closer to 56 cm or 57 cm?



C. Give the mean to the nearest whole centimeter.

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*Answers and/or discussion are included in the lesson.

7. A.* Answers will vary.
 B.* The mean found using the calculator should be close to the mean found using the strips of paper.

8. A. Group 3: 57 cm; Group 4: 52 cm

B. Group 3:

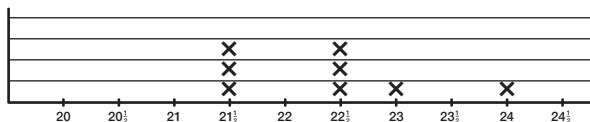
$$\boxed{58} + \boxed{59} + \boxed{54} = \boxed{\div} \boxed{3} =$$

Group 4:

$$\boxed{53} + \boxed{53} + \boxed{51} = \boxed{\div} \boxed{3} =$$

C. Group 3: 58 cm; Group 4: 53 cm

9.



10. A. 6 students
 B. 1 student
11. $22\frac{1}{2}$ inches. Possible response: I saw that there were 8 data points so the median would be between the 4th and 5th data point. Since they are both $22\frac{1}{2}$, the median is $22\frac{1}{2}$.

12.* Since there are six data points with $\frac{1}{2}$ you can add all of the $\frac{1}{2}$ s.

$$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{6}{2} = 3$$

You can then add all the whole numbers on the calculator.

$$\boxed{21} + \boxed{22} + \boxed{23} + \boxed{22} + \boxed{22}$$

$$\boxed{24} + \boxed{21} + \boxed{21} + \boxed{3} = \boxed{179}$$

You would divide 179 by 8 because there are 8 pieces of data. $\boxed{179} \div \boxed{8} = 22.375$. This is closer to 22, so the mean is 22 inches.

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7. A. Use your data table and your calculator to find the mean circumference for your group. Give your answer to the nearest centimeter. (Hint: Look at a meterstick to help you find the nearest centimeter, or think of dollars and cents.)
 B. Compare the number you found for the mean on your calculator to the number your group found by measuring the folded strip. Are the numbers close?
8. Groups 3 and 4 had only three students each.
 A. Find the mean for each data set. Give your answer to the nearest centimeter.
 B. Show the calculator keystrokes you used to find the mean.
 C. Find the median for each set of data.

Group 3's Data		Group 4's Data	
Name	Circumference of Head (in cm)	Name	Circumference of Head (in cm)
John	58	Keenya	53
Jerome	59	Grace	53
Lee Yah	54	Ana	51

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Line Plots to Find the Median

Use the *Using a Line Plot* page in the *Student Activity Book* to complete Questions 9–11.

Groups 5 and 6 measured their head circumferences using inches instead of centimeters. Mrs. Dewey asked them to record their measurements to the nearest $\frac{1}{2}$ inch. Their data tables are shown below. Mrs. Dewey asked them to show their data using a line plot.

Group 5's Data		Group 6's Data	
Name	Circumference of Head (in inches)	Name	Circumference of Head (in inches)
Irma	$21\frac{1}{2}$	Nila	$22\frac{1}{2}$
Nicholas	$22\frac{1}{2}$	Frank	24
Luis	23	Linda	$21\frac{1}{2}$
Romesh	$22\frac{1}{2}$	Jackie	$21\frac{1}{2}$

9. Irma's and Nicholas's data is shown on the line plot on the *Using a Line Plot* page in the *Student Activity Book*. Add the data for the other members in Group 5 and for all of the students in Group 6.
10. A. How many students have a head circumference that is less than 23 inches?
 B. What is the difference between the number of students with a head circumference of $21\frac{1}{2}$ inches and the number of students with a head circumference of 23 or 24 inches?
11. Use the line plot to find the median head circumference for these eight students. Be ready to explain how you found your answer.
12. What strategy could you use to find the mean head circumference for these two groups? Explain your answer.

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*Answers and/or discussion are included in the lesson.

✓ **Check-In: Questions 13-15**

13. Each day for a week, students in Room 204 recorded the temperature outside at noon in degrees Fahrenheit (F). The data is recorded in the table below.
- A. Find the mean temperature. Show your calculator keystrokes. Give your answer to the nearest whole degree.
 - B. Find the median temperature.



Temperature Data

Day	Temperature at Noon (in degrees F)
Monday	47
Tuesday	38
Wednesday	37
Thursday	43
Friday	46

14. In the first six soccer games of the season, Jackie's team scored 2, 3, 4, 0, 1, and 2 goals.
- A. Find the mean number of goals.
 - B. Find the median number of goals.
 - C. Look back. Do your answers make sense? Are the averages you found typical scores for Jackie's team?
15. Each week a fourth-grade class has a test on 20 spelling words. A student got 13 right the first week, 19 right the second week, 12 right the third week, 20 right the fourth week, and 11 right the fifth week.
- A. On average, how many words did the student get right?
 - B. Did you use the median or the mean? Why?

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Use the *Practice Finding Means* pages in the *Student Activity Book* for more practice finding the mean.

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13. A.* 42° ; $211 \div 5 = 42.2$ This is closer to 42° .

$$\boxed{47} \boxed{+} \boxed{38} \boxed{+} \boxed{37} \boxed{+} \boxed{43} \boxed{+} \boxed{46} \\ \boxed{=} \boxed{\div} \boxed{5} \boxed{=}$$

B.* 43°

14. A.* 2 goals

B.* 2 goals

C.* Yes. Yes.

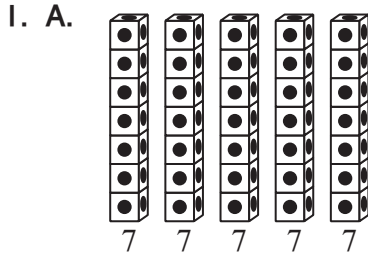
15. A.* Answers will vary; median of 13 correct or mean of 15 correct

B.* See the lesson.

Student Activity Book

Practice Finding Means

Questions 1–4 (SAB pp. 153–156)



Mean is 7 cubes.

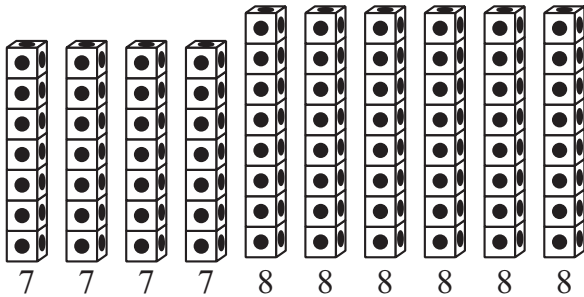
B.

$$\begin{array}{ccccccccc} \boxed{6} & + & \boxed{5} & + & \boxed{8} & + & \boxed{10} & + & \boxed{6} \\ \hline \boxed{=} & \div & \boxed{5} & = & & & & & \end{array}$$

7 cubes

C. Answers should be the same.

2. A.



Mean is estimated as 8 words since most towers have 8 cubes after evening them out.

B.

$$\begin{array}{ccccccccc} \boxed{9} & + & \boxed{6} & + & \boxed{9} & + & \boxed{10} & + & \boxed{6} \\ \hline \boxed{+} & \boxed{8} & + & \boxed{10} & + & \boxed{4} & + & \boxed{7} & + \\ \hline \boxed{7} & = & \div & \boxed{10} & = & & & & \end{array}$$

Mean to the nearest word is 8 words.

C. If students rounded their answers for part B, answers should be the same.

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Name _____ Date _____

Practice Finding Means

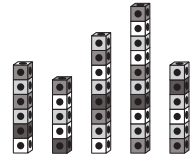
✓ Self-Check

Use the questions in the menu to choose practice.

Practice Menu

Can I Do This?	Working On It! I could use some extra help.	Getting It! I just need some more practice.	Got It! I'm ready for a challenge.
Find the mean using cubes.	Q# 1	Q# 2	Q# 4
Find the mean using a calculator.	Q# 2	Q# 3	Q# 3

1. Luis pulled five handfuls of connecting cubes from a paper bag and built towers with the cubes. He built the five towers shown in the picture.



A. Use connecting cubes, pennies, or blocks to find the mean number of cubes in Luis's towers. Draw a picture or tell how you found the mean.

B. Find the mean using a calculator. Show the calculator keystrokes you used.

C. Were your answers for parts A and B the same? If not, explain why they were different.

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The Meaning of the Mean

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Name _____ Date _____

2. Maya took a spelling test every week for ten weeks. The data table shows the number of words out of 10 she spelled correctly on each test.

Test	Words Correct
Test 1	9
Test 2	6
Test 3	9
Test 4	10
Test 5	6
Test 6	8
Test 7	10
Test 8	4
Test 9	7
Test 10	7

A. Use connecting cubes, pennies, or blocks to find the mean number of correctly spelled words. Show or tell how you found the mean.

B. Find the mean using a calculator. Show the calculator keystrokes you used.

C. Were your answers for parts A and B the same? If not, explain why they were different.

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Answer Key • Lesson 3: The Meaning of the Mean

Name _____ Date _____

3. The data table for a group of students from the experiment Arm Span vs. Height is shown below.

Jerome's Group

Name	S Arm Span (in inches)	H Height (in inches)
Jerome	49	50
Keenya	54	55
Frank	59	57
Luis	58	58
Roberto	55	57
Ana	52	52
Jacob	56	56

A. Find the mean arm span to the nearest inch. Show or tell how you found your answer.

B. Find the mean height to the nearest inch. Show or tell how you found your answer.

C. Look back at your answers. Are they reasonable? Show or tell how you know.

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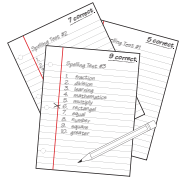
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3. **A.** 55 inches. Strategies will vary.
B. 55 inches. Strategies will vary.
C. Answers may vary. Students may say answers are reasonable because the mean arm span is very close to the mean height, or that 55 inches is equal to 4 ft 9 inches, which is a typical height for a fourth-grader.

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Name _____ Date _____

4. John took three spelling tests with ten words on each test. He spelled 5 words correctly on the first test, 7 words on the second test, and 9 words on the third test.



A. What is the mean number of words John spelled correctly?

B. John has three more tests to take. If he wants to keep his mean score the same as it is now, how many words should he spell correctly on each of his next three tests? Show or tell how you found your answer. (Hint: You can use cubes, pennies, or blocks to stand for the correct words on each test.)

C. Instead of keeping his average the same, John decides he wants to raise his mean score to 8 words. How many words should he spell correctly on each of his next three tests? Show or tell how you found your answer.

D. Is there more than one correct answer to the question in Questions 4B and 4C? If so, how many different answers can you find?

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4. **A.** 7 words
B. Answers may vary. The sum of the next three scores should be 21. Possible combinations (in any order) of test scores are:
- | | |
|----------|----------|
| 7, 7, 7 | 7, 6, 8 |
| 7, 5, 9 | 7, 4, 10 |
| 10, 5, 6 | 10, 3, 8 |
| 10, 9, 2 | 9, 6, 6 |
| 9, 8, 4 | 9, 9, 3 |
| 9, 10, 2 | 8, 10, 3 |
| 8, 9, 4 | 8, 8, 5 |
- C.** Answers may vary. The sum of the next three scores should be 27. Possible combinations (in any order) of test scores are: 9, 9, 9 10, 9, 8 10, 10, 7.
- D.** There is more than one possible answer. See above.

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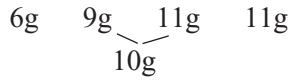
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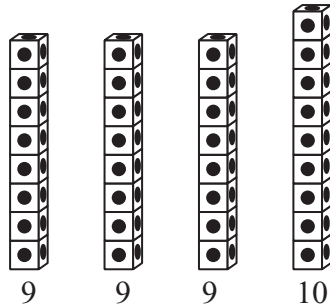
Cookie Factory (TG pp. 1–2)

Questions 1–4

1. A. 10 grams. Possible response:



B. Possible response:



3 towers have 9 cubes and 1 tower has 10 cubes, so the mean is 9 cubes.

2. A. 10 chips

B. 8 chips

3. Response may vary. The mean number of chips takes all the cookies into account, and therefore provides a more “honest” expected number of chips. Students may argue that the median is the better average because the cookie with only two chips is not typical and should not affect the average. Either average is reasonable, but students must justify their reasoning.

4. The Happy Factory cookies should have more chips. The mean number of chips is greater.

Yum Yum Cookie Factory mean is 8 chips.

Happy Cookie Factory mean is 11 chips.

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Name _____ Date _____

Cookie Factory

1. At the Yum Yum Cookie Factory, a worker finds the mass of 4 cookies. The masses of the cookies are 11 grams, 6 grams, 11 grams, and 9 grams.

A. Find the median mass of the cookies. Show how you found the median.

B. Find the mean using connecting cubes or tiles. Show how you evened out the cubes or tiles in the space below.

2. A worker at the Yum Yum Cookie Factory inspected 5 chocolate chip cookies and found the number of chips shown below on each cookie.

A. Find the median number of chips.

B. Find the mean number of chips.

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Name _____ Date _____

3. Write the median or mean in the blank on the package. Choose the average that gives the customer the best information about how many chips to expect in each cookie.

4. Jessie inspected 5 chocolate chip cookies from a different factory, the Happy Cookie Factory. She found a mean of 11 chips.

Jessie bought one bag of cookies from the Yum Yum Factory and another from the Happy Cookie Factory. If both bags have the same number of cookies, predict which bag will have more total chocolate chips. Explain how you made your prediction.

Cookie Factory Feedback Box	Expectation	Check In	Comments
Find the median of a data set. [Q# 1A, 2A]	E5		
Find the mean of a data set using manipulatives and numerical procedures. [Q# 1B, 2B]	E6		
Make predictions and generalizations using medians and means. [Q# 3, 4]	E8		

Assessment Master TG • Grade 4 • Unit 5 • Lesson 3 2

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