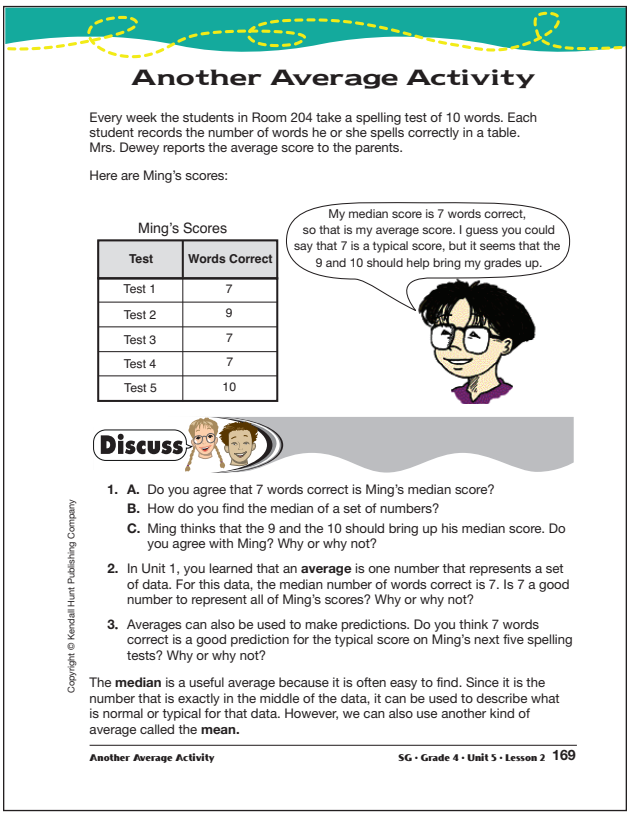

Another Average Activity

Every week the students in Room 204 take a spelling test of 10 words. Each student records the number of words he or she spells correctly in a table. Mrs. Dewey reports the average score to the parents.

Here are Ming's scores:

Ming's Scores

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

My median score is 7 words correct, so that is my average score. I guess you could say that 7 is a typical score, but it seems that the 9 and 10 should help bring my grades up.

Discuss

1. **A.** Do you agree that 7 words correct is Ming's median score?
   B. How do you find the median of a set of numbers?
   C. Ming thinks that the 9 and the 10 should bring up his median score. Do you agree with Ming? Why or why not?
2. In Unit 1, you learned that an **average** is one number that represents a set of data. For this data, the median number of words correct is 7. Is 7 a good number to represent all of Ming's scores? Why or why not?
3. Averages can also be used to make predictions. Do you think 7 words correct is a good prediction for the typical score on Ming's next five spelling tests? Why or why not?

The **median** is a useful average because it is often easy to find. Since it is the number that is exactly in the middle of the data, it can be used to describe what is normal or typical for that data. However, we can also use another kind of average called the **mean.**

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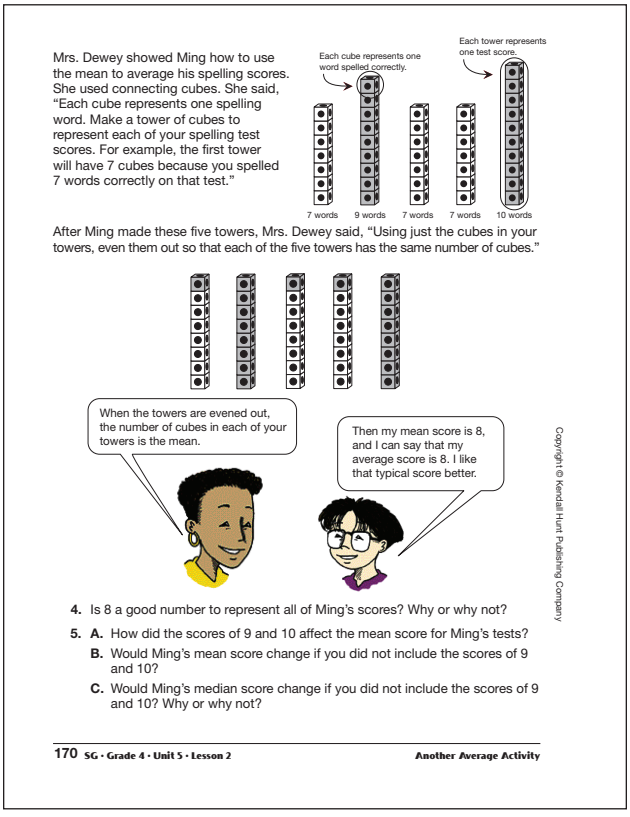

Mrs. Dewey showed Ming how to use the mean to average his spelling scores. She used connecting cubes. She said, "Each cube represents one spelling word. Make a tower of cubes to represent each of your spelling test scores. For example, the first tower will have 7 cubes because you spelled 7 words correctly on that test."

Each cube represents one word spelled correctly.

Each tower represents one test score.

7 words 9 words 7 words 7 words 10 words

After Ming made these five towers, Mrs. Dewey said, "Using just the cubes in your towers, even them out so that each of the five towers has the same number of cubes."

When the towers are evened out, the number of cubes in each of your towers is the mean.

Then my mean score is 8, and I can say that my average score is 8. I like that typical score better.

4. Is 8 a good number to represent all of Ming's scores? Why or why not?
5. **A.** How did the scores of 9 and 10 affect the mean score for Ming's tests?
   B. Would Ming's mean score change if you did not include the scores of 9 and 10?
   C. Would Ming's median score change if you did not include the scores of 9 and 10? Why or why not?

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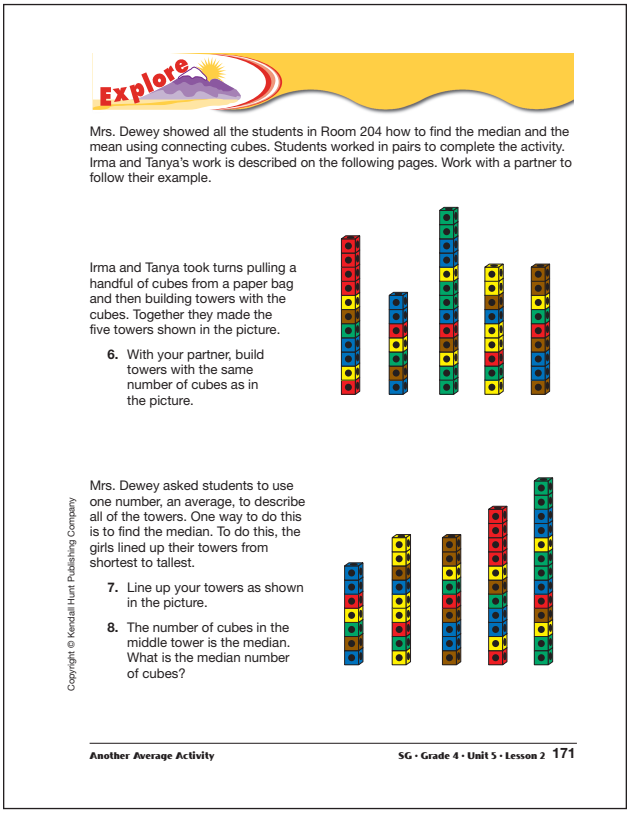
Questions 1–21 (SG pp. 169–174)

1. **A.** Yes. Arrange the numbers from smallest to largest: 7, 7, 7, 9, 10—7 is in the middle.
   B. List the numbers in order and find the middle value. Or, mark off the largest and smallest values until the value in the middle is left.
   C. The 9 and the 10 do not bring up Ming's median score. The middle score is still 7 even after the 9 and 10 are added.
2. Answers will vary. Students should be able to justify their answers. One possible response: No, Ming scored higher than a 7 on two tests. The 9 and 10 should bring his grade up. Another possible response: Yes. He scored 7 three times and 7 is the median.
3.* Answers will vary but students must justify their answers. No, the 9 and 10 in the data show that Ming could do better than a 7. Or, yes, 7 is the median score and you can use it to make predictions. See the Content Note in the lesson.
4.* Yes, Ming got a total of 40 words correct. If he got the same number right on each test he would get 8 right.
5.* **A.** It made it higher than the median.
   B. Yes, the mean would have been 7.
   C. No, the median would still be 7.

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

6.–7. Students should build five towers and line them up in order as shown in the *Student Guide.*

8. 9 cubes



Explore

Mrs. Dewey showed all the students in Room 204 how to find the median and the mean using connecting cubes. Students worked in pairs to complete the activity. Irma and Tanya's work is described on the following pages. Work with a partner to follow their example.

Irma and Tanya took turns pulling a handful of cubes from a paper bag and then building towers with the cubes. Together they made the five towers shown in the picture.

6. With your partner, build towers with the same number of cubes as in the picture.

Mrs. Dewey asked students to use one number, an average, to describe all of the towers. One way to do this is to find the median. To do this, the girls lined up their towers from shortest to tallest.

7. Line up your towers as shown in the picture.

8. The number of cubes in the middle tower is the median. What is the median number of cubes?

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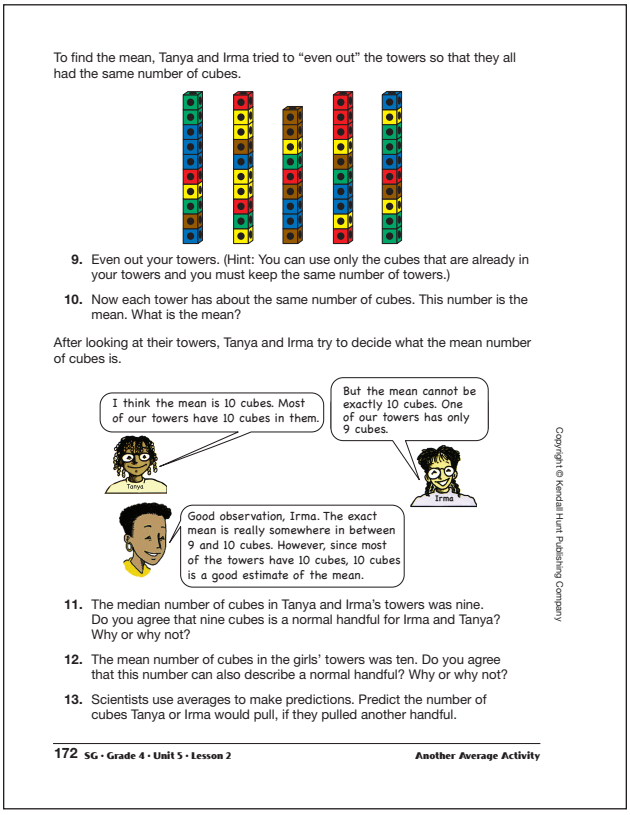
9. See the figure in the *Student Guide.*

10.* 10 cubes

11. Yes; 9 cubes is the median. Tanya and Irma pulled handfuls smaller than 9 and larger than 9 cubes. The middle value is a good predictor.

12.* Yes; 10 cubes is the mean. Taking the cubes from the towers with 11 and 13 cubes and placing them on the towers with 7 and 9 cubes increased the number of cubes in those towers to 10 cubes. The higher values, 11 cubes and 13 cubes, increase the average. The mean (10 cubes) is the number of cubes the girls would have pulled, if they pulled the same number each time. See the Content Note in Lesson Guide 2.

13.* 9 or 10 cubes



To find the mean, Tanya and Irma tried to "even out" the towers so that they all had the same number of cubes.

9. Even out your towers. (Hint: You can use only the cubes that are already in your towers and you must keep the same number of towers.)

10. Now each tower has about the same number of cubes. This number is the mean. What is the mean?

After looking at their towers, Tanya and Irma try to decide what the mean number of cubes is.

11. The median number of cubes in Tanya and Irma's towers was nine. Do you agree that nine cubes is a normal handful for Irma and Tanya? Why or why not?

12. The mean number of cubes in the girls' towers was ten. Do you agree that this number can also describe a normal handful? Why or why not?

13. Scientists use averages to make predictions. Predict the number of cubes Tanya or Irma would pull, if they pulled another handful.

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

14. With your partner, complete the same activity that Irma and Tanya did.
   - **A.** Return the cubes to your bag. Be sure they have all been separated.
   - **B.** Pull out one handful of cubes and build a tower with the cubes in your hand. Take turns with your partner until you have built five towers.
   - **C.** Find the median number of cubes in your towers.
   - **D.** Draw a picture of your towers. Record the median on your drawing.
   - **E.** Find the mean number of cubes. Record the mean on your drawing. (Remember, you must keep the same number of towers. Do not add any more cubes from the bag or put any cubes back in the bag.)

Using Cubes to Solve Problems

Solve the following problems. Use towers of cubes to help you.

15. Jacob surveyed five families on his block. He filled in the following data table. Jacob found the median and the mean number of people in a household using towers.
   - **A.** Jacob built five towers. Why?
   - **B.** What did each tower stand for?
   - **C.** What did each cube stand for?
   - **D.** Use towers to find the median.
   - **E.** Use towers to find the mean. (*Hint:* Use the closest number for your answer.)

Jacob's Data

Family	Number of People in Household
Scott-Haines	2
Thomas	6
Molina	3
Chang	5
Green	3

16. When Mrs. Dewey was in the fourth grade, she took a math quiz each week. Every quiz had ten problems. She got 10 problems right the first week, 7 problems right the second week, 8 problems right the third week, and 4 problems right the fourth week. Use towers to find the median and mean.
   - **A.** How many towers will you build?
   - **B.** What does each tower stand for?
   - **C.** What does each cube stand for?
   - **D.** Find the median. (*Hint:* What number is halfway between the number of cubes in the middle two towers?)
   - **E.** Even out the towers to find the mean. (You must use the same number of towers as in Question 16A.)

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14.* Answers will vary.

15. A. He surveyed five families.

B.* Each tower stands for one family.

C.* Each cube stands for one family member.

D. 3 people

E. 4 people; When evening out towers, students should end up with 4 towers of 4 cubes and 1 tower of 3 cubes. Since most of the towers have 4 cubes, the mean is 4 people.

16. A. 4 towers

B. Each tower stands for one math quiz score.

C. Each cube represents a correct answer.

D.* $7\frac{1}{2}$ correct problems

E.* 7 correct problems

17. When Rita, a new Girl Scout® leader, was introduced to her group of girls, she asked them how old they were. Keenya, Shannon, Ana, Grace, and Maya all said they were 10 years old.
   - **A.** What one number can be used to describe the age of the girls?
   - **B.** What is the median age for this group of Girl Scouts®?
   - **C.** What is the mean?

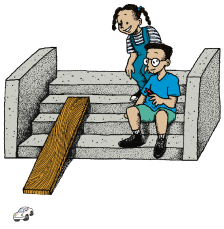
18. How are the median and mean alike? (Hint: What do they tell us?)

19. How are the two kinds of averages different? (Hint: How do you find each one?)

20. Which average is easier to find?

✓ **Check-In: Question 21**

21. Jackie rolled a toy car down a ramp and measured the distance it rolled. The first time it rolled 13 cm, the second time it rolled 14 cm, and the third time it rolled 18 cm.
   - **A.** Use cubes to find the median distance the car rolled.
   - **B.** Use cubes to find the mean.
   - **C.** Which number, the mean or the median, better describes the distance the car typically rolls? Explain your answer.
   - **D.** Jackie's brother, Derrick, rolled another toy car down the same ramp three times. His car rolled 13 cm the first time, 19 cm the second time, and 17 cm the third time. If Jackie and Derrick rolled their cars down the same ramp side-by-side, predict which car would roll a greater distance. Explain how you made your prediction.



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17. A.* 10 years old

B.* 10 years

C.* 10 years

18.* They both tell us what is typical for the data.

19.* The mean is found by evening out the data. The median is finding the middle of the data.

20.* The median is usually easier because you just line up the data and find the middle.

21. A. 14 cm

B. 15 cm

C.* See Lesson Guide.

D.* Based on both median and mean distances, Derrick's car will probably roll farther. See Lesson Guide.

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

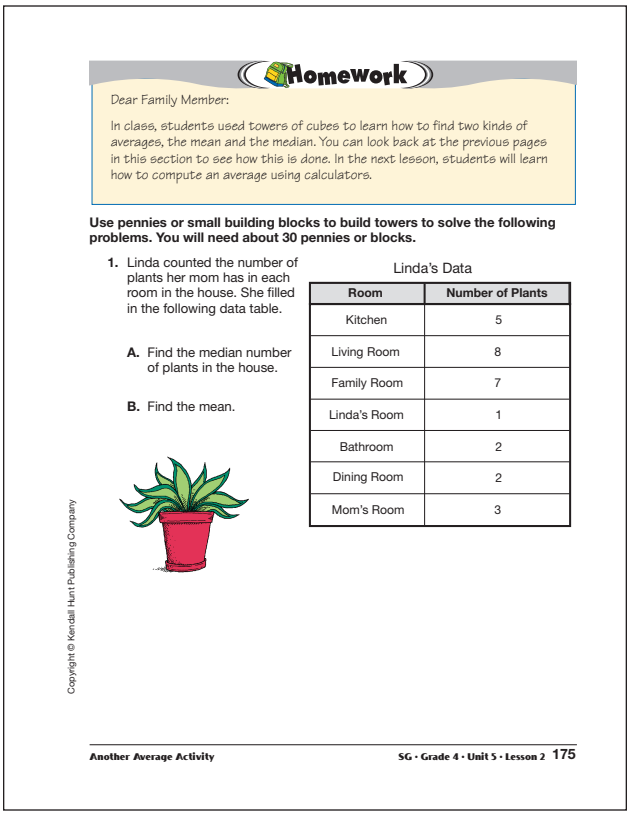
Student Guide

Homework (SG pp. 175–176)

Questions 1–3

1. **A.** 3 plants
   B. 4 plants

2. **A.** 6 baskets
   B. 6 baskets
3. **A.** 2 books
   B. 3 books
   C. Answers will vary. The higher values, 3 and 5, are involved in the computation of the mean and therefore increase the average to 3 books. The median (2 books) does not take into account the week Jerome read 3 books nor the week he read 5 books; however, it is a "typical" number of books that Jerome read during the 5-week period.



Homework

Dear Family Member:

In class, students used towers of cubes to learn how to find two kinds of averages, the mean and the median. You can look back at the previous pages in this section to see how this is done. In the next lesson, students will learn how to compute an average using calculators.

Use pennies or small building blocks to build towers to solve the following problems. You will need about 30 pennies or blocks.

1. Linda counted the number of plants her mom has in each room in the house. She filled in the following data table.

A. Find the median number of plants in the house.

B. Find the mean.

Linda's Data

Room	Number of Plants
Kitchen	5
Living Room	8
Family Room	7
Linda's Room	1
Bathroom	2
Dining Room	2
Mom's Room	3

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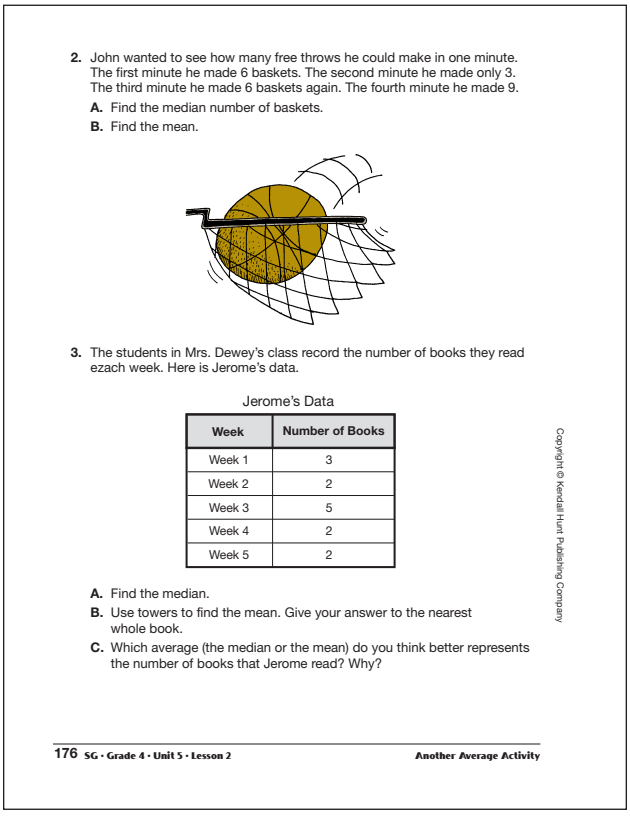

2. John wanted to see how many free throws he could make in one minute. The first minute he made 6 baskets. The second minute he made only 3. The third minute he made 6 baskets again. The fourth minute he made 9.

A. Find the median number of baskets.

B. Find the mean.

3. The students in Mrs. Dewey's class record the number of books they read ezach week. Here is Jerome's data.

Jerome's Data

Week	Number of Books
Week 1	3
Week 2	2
Week 3	5
Week 4	2
Week 5	2

A. Find the median.

B. Use towers to find the mean. Give your answer to the nearest whole book.

C. Which average (the median or the mean) do you think better represents the number of books that Jerome read? Why?

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