Student Guide

Mean Or Median (SG pp. 340–346)
Questions 1–22

1. **A.*** 65 cubes

   B.* See Figure 1 in the lesson.

   C.* See Figure 1 in the lesson.

2.* 13 cubes

3.* The mean; Possible response: The median did not take into account the high scoring games.

4. 46 cubes; Each cube represents 1 book.

5. 6 towers; Each tower represents the books 1 student read.

6.* Between 7–8 books

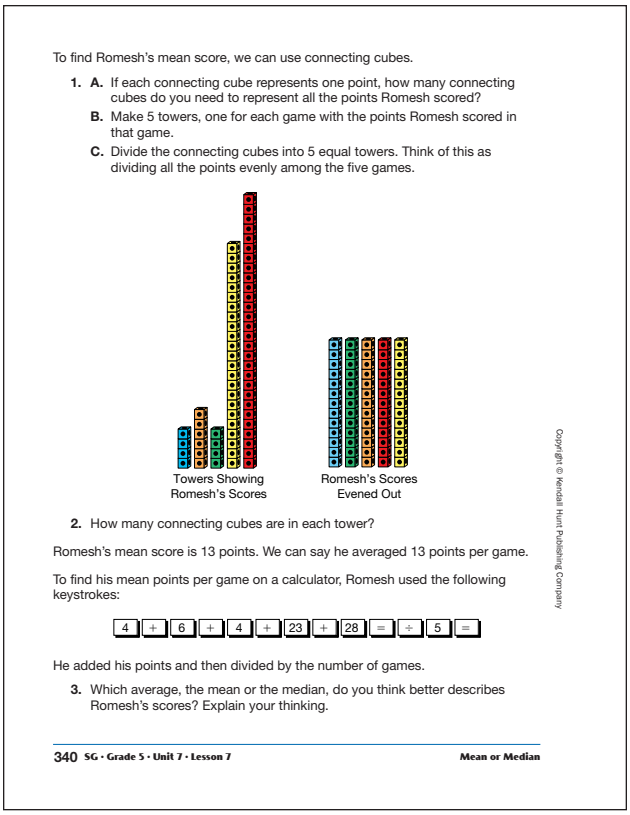
7.* Rounding to the nearest tenth gives us 7.7 books.

   A. 8, 2, 6, 11, 12, and 7

   B. 6

8.* $7\frac{1}{2}$ books

9.* They are very close.



To find Romesh's mean score, we can use connecting cubes.

1. **A.** If each connecting cube represents one point, how many connecting cubes do you need to represent all the points Romesh scored?
   B. Make 5 towers, one for each game with the points Romesh scored in that game.
   C. Divide the connecting cubes into 5 equal towers. Think of this as dividing all the points evenly among the five games.

Towers Showing Romesh's Scores

Romesh's Scores Evened Out

2. How many connecting cubes are in each tower?

Romesh's mean score is 13 points. We can say he averaged 13 points per game.

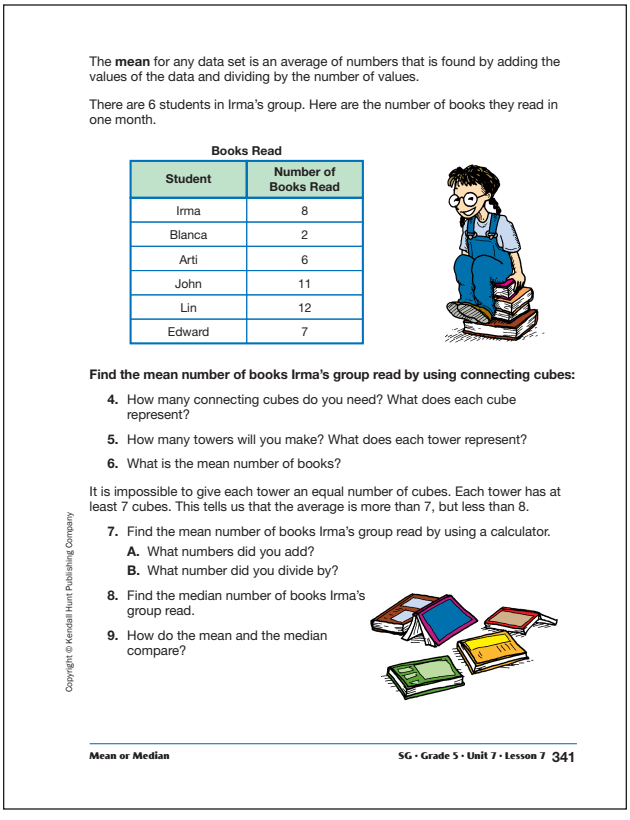
To find his mean points per game on a calculator, Romesh used the following keystrokes:

4 + 6 + 4 + 23 + 28 = ÷ 5 =

He added his points and then divided by the number of games.

3. Which average, the mean or the median, do you think better describes Romesh's scores? Explain your thinking.

***Student Guide* - Page 340**



The **mean** for any data set is an average of numbers that is found by adding the values of the data and dividing by the number of values.

There are 6 students in Irma's group. Here are the number of books they read in one month.

Books Read

Student	Number of Books Read
Irma	8
Blanca	2
Arti	6
John	11
Lin	12
Edward	7

Find the mean number of books Irma's group read by using connecting cubes:

4. How many connecting cubes do you need? What does each cube represent?
5. How many towers will you make? What does each tower represent?
6. What is the mean number of books?

It is impossible to give each tower an equal number of cubes. Each tower has at least 7 cubes. This tells us that the average is more than 7, but less than 8.

7. Find the mean number of books Irma's group read by using a calculator.
   A. What numbers did you add?
   B. What number did you divide by?
8. Find the median number of books Irma's group read.
9. How do the mean and the median compare?

***Student Guide* - Page 341**

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

10. Shannon and Roberto's social studies teacher Mrs. Smith gives geography quizzes. Here are Shannon's and Roberto's quiz scores.

Geography Quiz Scores

Shannon	3	9	9	2	9
Roberto	15	4	4	15	3

A. Do you think Shannon would want Mrs. Smith to find her average using the mean or the median? Explain.

B. Do you think Roberto would want Mrs. Smith to find his average using the mean or the median? Explain.

11. During winter break, Romesh and Alexis played a computer game. During the first game, Romesh got to level 5 while Alexis got to level 8. They kept track of how far they got each game.

Game Level Reached

Game	Romesh's Level	Alexis's Level
Game 1	5	8
Game 2	10	2
Game 3	7	5
Game 4	3	18
Game 5	11	18
Game 6	14	8
Game 7	12	5
Game 8	10	16

Romesh says he found their averages and decided that he is the better player. Alexis says she found their averages too, and she claims that she is the better player. Can they both be right? Explain.

***Student Guide* - Page 342**

12. Sometimes, the mean better describes the data. Other times, the median better describes the data. Here are yearly salaries at the Happy Day Manufacturing Company.

Yearly Salaries

Position	Salary
President	$259,000
Vice-President	$123,000
Worker #1	$36,000
Worker #2	$25,000
Worker #3	$18,000
Worker #4	$32,000
Worker #5	$25,000
Worker #6	$22,000
Worker #7	$27,000

The president of the company announced that the average salary was $63,000 a year.

A. Is she correct?

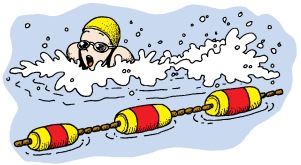
B. Is the mean a better description of the data than the median? Explain.

13. Last summer, Alexis swam the breaststroke in 5 swim meets. Her times are listed below.

56.6 seconds 51.3 seconds 44.8 seconds
47.5 seconds 45.8 seconds

A. Find her median time.

B. Use a calculator to find the mean.



***Student Guide* - Page 343**

10. **A.*** Median. Shannon's mean score is between 6 and 7 and her median score is 9. The median gives a higher score.

B.* Mean. Roberto's mean score is between 8 and 9 and his median score is 4. The mean gives the higher score.

11. Romesh's median is 10 and his mean is 9. Alexis's median is 8 and her mean is 10. If you compare their medians, Romesh is the better player. If you compare their means, Alexis is the better player. In this case, the mean may represent the data better. The median does not consider Alexis's three high scores of 16, 18, and 18. However, these scores help to pull up her mean. Some students may therefore consider Alexis the better player.

12. **A.*** Yes, the mean is $63,000.

B.* No, most of the employees make between 20–30 thousand dollars. The median of $27,000 would better represent the salaries.

13. **A.** Median = 47.5 seconds

B.* Mean = 49.2 seconds

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

14. **A.*** 20
B.* 17

15. **A.** 17 **B.** 42
C. 0 **D.** 4
E. 8 **F.** 2
G. 30

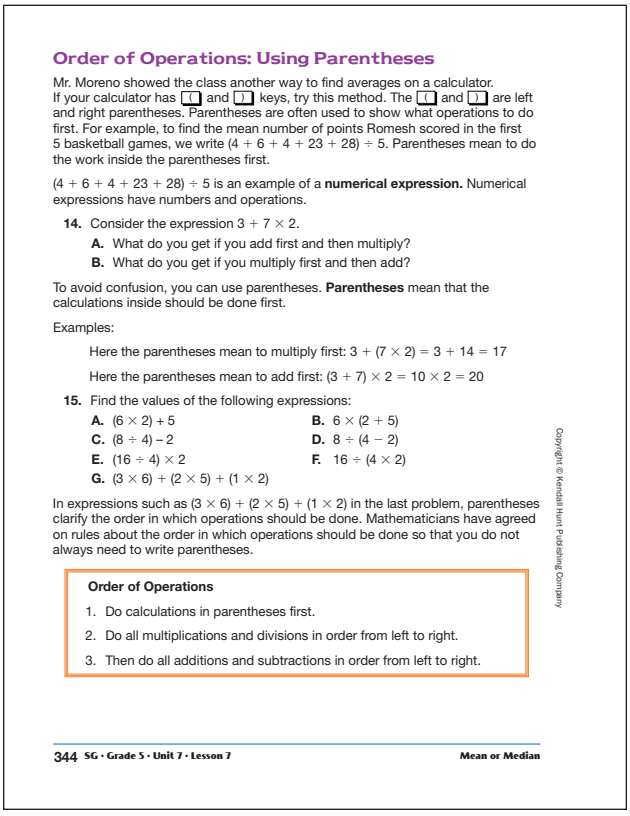
16. **A.** 16 **B.** 1
C. 16 **D.** 9

17. **A.** 8 **B.** 12
C. 16 **D.** 2

18. **A.** 7 **B.** 34
C. 7 **D.** 6

19. **A.** 35 **B.** 120

20. Answers will vary depending on the calculator.



Order of Operations: Using Parentheses

Mr. Moreno showed the class another way to find averages on a calculator. If your calculator has (and) keys, try this method. The (and) are left and right parentheses. Parentheses are often used to show what operations to do first. For example, to find the mean number of points Romesh scored in the first 5 basketball games, we write (4 + 6 + 4 + 23 + 28) ÷ 5. Parentheses mean to do the work inside the parentheses first.

(4 + 6 + 4 + 23 + 28) ÷ 5 is an example of a **numerical expression.** Numerical expressions have numbers and operations.

14. Consider the expression 3 + 7 × 2.
A. What do you get if you add first and then multiply?
B. What do you get if you multiply first and then add?

To avoid confusion, you can use parentheses. **Parentheses** mean that the calculations inside should be done first.

Examples:

Here the parentheses mean to multiply first: 3 + (7 × 2) = 3 + 14 = 17

Here the parentheses mean to add first: (3 + 7) × 2 = 10 × 2 = 20

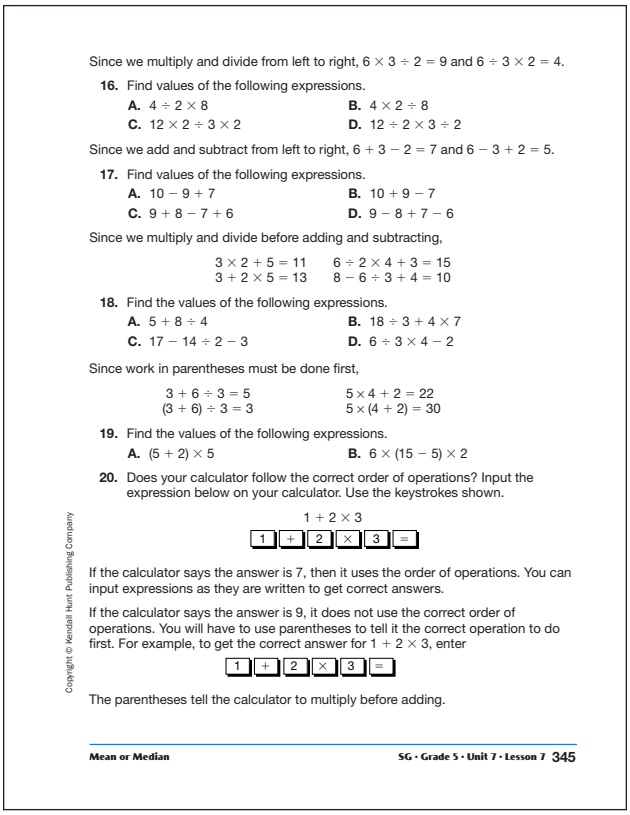
15. Find the values of the following expressions:
A. (6 × 2) + 5 **B.** 6 × (2 + 5)
C. (8 ÷ 4) – 2 **D.** 8 ÷ (4 − 2)
E. (16 ÷ 4) × 2 **F.** 16 ÷ (4 × 2)
G. (3 × 6) + (2 × 5) + (1 × 2)

In expressions such as (3 × 6) + (2 × 5) + (1 × 2) in the last problem, parentheses clarify the order in which operations should be done. Mathematicians have agreed on rules about the order in which operations should be done so that you do not always need to write parentheses.

Order of Operations
1. Do calculations in parentheses first.
2. Do all multiplications and divisions in order from left to right.
3. Then do all additions and subtractions in order from left to right.

344 SG • Grade 5 • Unit 7 • Lesson 7 Mean or Median

***Student Guide* - Page 344**



Since we multiply and divide from left to right, 6 × 3 ÷ 2 = 9 and 6 ÷ 3 × 2 = 4.

16. Find values of the following expressions.
A. 4 ÷ 2 × 8 **B.** 4 × 2 ÷ 8
C. 12 × 2 ÷ 3 × 2 **D.** 12 ÷ 2 × 3 ÷ 2

Since we add and subtract from left to right, 6 + 3 − 2 = 7 and 6 − 3 + 2 = 5.

17. Find values of the following expressions.
A. 10 − 9 + 7 **B.** 10 + 9 − 7
C. 9 + 8 − 7 + 6 **D.** 9 − 8 + 7 − 6

Since we multiply and divide before adding and subtracting,

3 × 2 + 5 = 11 6 ÷ 2 × 4 + 3 = 15
3 + 2 × 5 = 13 8 − 6 ÷ 3 + 4 = 10

18. Find the values of the following expressions.
A. 5 + 8 ÷ 4 **B.** 18 ÷ 3 + 4 × 7
C. 17 − 14 ÷ 2 − 3 **D.** 6 ÷ 3 × 4 − 2

Since work in parentheses must be done first,

3 + 6 ÷ 3 = 5 5 × 4 + 2 = 22
(3 + 6) ÷ 3 = 3 5 × (4 + 2) = 30

19. Find the values of the following expressions.
A. (5 + 2) × 5 **B.** 6 × (15 − 5) × 2

20. Does your calculator follow the correct order of operations? Input the expression below on your calculator. Use the keystrokes shown.

1 + 2 × 3

[1] [+] [2] [×] [3] [=]

If the calculator says the answer is 7, then it uses the order of operations. You can input expressions as they are written to get correct answers.

If the calculator says the answer is 9, it does not use the correct order of operations. You will have to use parentheses to tell it the correct operation to do first. For example, to get the correct answer for 1 + 2 × 3, enter

[1] [+] [2] [×] [3] [=]

The parentheses tell the calculator to multiply before adding.

Mean or Median SG • Grade 5 • Unit 7 • Lesson 7 345

***Student Guide* - Page 345**

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

✓ Check-In: Questions 21-22

21. First find the values of the following expressions without a calculator. Then use a calculator to check your work.

A. $3 \times (12 - 6) =$ **B.** $3 \times 12 - 6 =$

C. $(6 + 3) \times (5 - 2) =$ **D.** $6 + 3 \times 5 - 2 =$

E. $16 \div 4 - 2 =$ **F.** $16 \div (4 - 2) =$

G. $100 \div 10 - 5 =$ **H.** $100 \div (10 - 5) =$

22. Ana's group collected data for the lab *Distance vs. Time*. Jerome was the walker. He walked along a track, and the rest of the group reported the time he took to walk 6 yards, 9 yards, and 12 yards. Ana was the timer at 6 yards. On the first trial she didn't know how to use the stopwatch. Here is the first row of their data table:

Distance vs. Time

D Distance in Yards	*T* Time in Seconds				Ordered Pair (,)
	Trial 1	Trial 2	Trial 3	Average	
6	10	3	5		

A. Find the mean value of the three trials. Write a number sentence using parentheses to show how to find the mean.

B. Find the median value of the three trials.

C. Which average, the median or the mean, represents the data better? Explain your reasoning.

***Student Guide* - Page 346**

21. A. 18 **B.** 30
C. 27 **D.** 19
E. 2 **F.** 8
G. 5 **H.** 20

22. A. 6 seconds. $(10 + 3 + 5) \div 3 = 6$

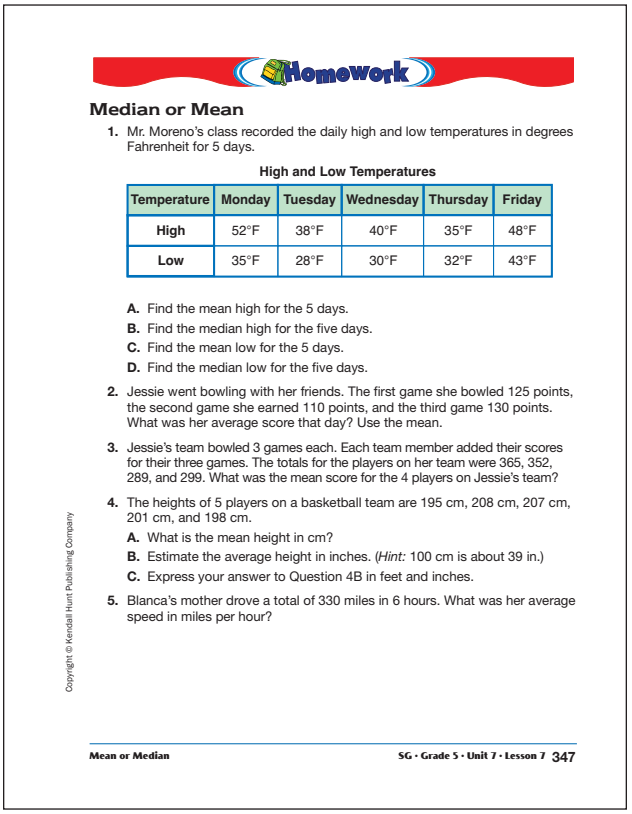
B.* 5 seconds

C.* Median; The first trial involves errors since Ana didn't know how to use the stopwatch. The median is not affected by the extreme value of 10 seconds.

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

Homework (SG pp. 347–348)
Questions 1–22

1. **A.** Between 42° and 43°.
   B. 40°
   C. Between 33° and 34°.
   D. 32°
2. Between 121 and 122 points
3. About 326 points
4. **A.** Between 201 and 202
   B. About 78 inches
   C. About $6\frac{1}{2}$ feet
5. 55 miles per hour
6. **A.** 16 years old
   B. 10 years old
   C. The median since it is not affected by the much older student of 64 years. All of the other students are 11 or under so the mean of 16 years old may not represent the data as well.
7. 12
8. 3
9. 31
10. 4
11. 35
12. 5
13. 47
14. 6
15. 6
16. 15
17. 4
18. 27
19. 2
20. 4
21. 7
22. 1



Homework

Median or Mean

1. Mr. Moreno's class recorded the daily high and low temperatures in degrees Fahrenheit for 5 days.

High and Low Temperatures

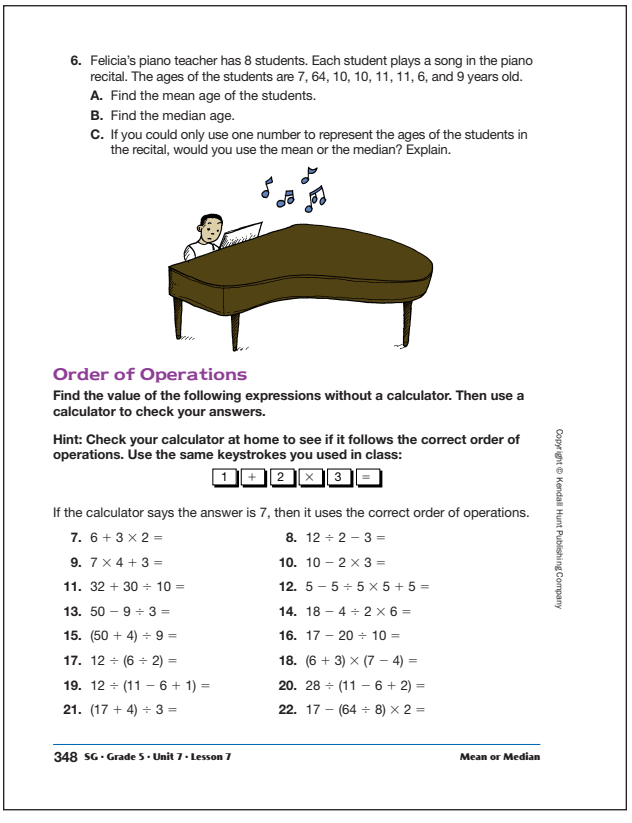
Temperature	Monday	Tuesday	Wednesday	Thursday	Friday
High	52°F	38°F	40°F	35°F	48°F
Low	35°F	28°F	30°F	32°F	43°F

   A. Find the mean high for the 5 days.
   B. Find the median high for the five days.
   C. Find the mean low for the 5 days.
   D. Find the median low for the five days.

2. Jessie went bowling with her friends. The first game she bowled 125 points, the second game she earned 110 points, and the third game 130 points. What was her average score that day? Use the mean.
3. Jessie's team bowled 3 games each. Each team member added their scores for their three games. The totals for the players on her team were 365, 352, 289, and 299. What was the mean score for the 4 players on Jessie's team?
4. The heights of 5 players on a basketball team are 195 cm, 208 cm, 207 cm, 201 cm, and 198 cm.
   A. What is the mean height in cm?
   B. Estimate the average height in inches. (*Hint:* 100 cm is about 39 in.)
   C. Express your answer to Question 4B in feet and inches.
5. Blanca's mother drove a total of 330 miles in 6 hours. What was her average speed in miles per hour?

Mean or Median SG • Grade 5 • Unit 7 • Lesson 7 347

***Student Guide* - Page 347**



6. Felicia's piano teacher has 8 students. Each student plays a song in the piano recital. The ages of the students are 7, 64, 10, 10, 11, 11, 6, and 9 years old.
   A. Find the mean age of the students.
   B. Find the median age.
   C. If you could only use one number to represent the ages of the students in the recital, would you use the mean or the median? Explain.

Order of Operations

Find the value of the following expressions without a calculator. Then use a calculator to check your answers.

Hint: Check your calculator at home to see if it follows the correct order of operations. Use the same keystrokes you used in class:

[1] [+] [2] [×] [3] [=]

If the calculator says the answer is 7, then it uses the correct order of operations.

7. $6 + 3 \times 2 =$
8. $12 \div 2 - 3 =$
9. $7 \times 4 + 3 =$
10. $10 - 2 \times 3 =$
11. $32 + 30 \div 10 =$
12. $5 - 5 \div 5 \times 5 + 5 =$
13. $50 - 9 \div 3 =$
14. $18 - 4 \div 2 \times 6 =$
15. $(50 + 4) \div 9 =$
16. $17 - 20 \div 10 =$
17. $12 \div (6 \div 2) =$
18. $(6 + 3) \times (7 - 4) =$
19. $12 \div (11 - 6 + 1) =$
20. $28 \div (11 - 6 + 2) =$
21. $(17 + 4) \div 3 =$
22. $17 - (64 \div 8) \times 2 =$

348 SG • Grade 5 • Unit 7 • Lesson 7 Mean or Median

***Student Guide* - Page 348**