


Grade 8 Mathematics

Algebra: Lesson 6

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol () by them.

Purpose of Lesson 6:

- In this lesson, the tutor and the students will
 - ✓ find square roots.

Equipment/Materials Needed:

- Copies of Student Sheet 92
- Paper and pencils
- Chalkboard
- Calculator (optional)


Preparations before beginning Lesson 6:

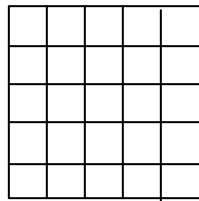
- Run one copy of Student Sheet 92 for each student.
- Have paper and pencils available.
- If you allow students to use calculators, borrow the calculators from one of the teachers.

Lesson 6: Algebra

Say:

In Lesson 5 of Algebra, you found the squares of numbers. Remember that 5^2 means $5 \cdot 5$ and is equal to 25. If you draw a picture of this operation, you could show a square that is five units long and five units wide.

 Draw this square on the board.



5

$$5 \times 5 = 25 \text{ or } 5^2 = 25$$

5

Say:

You also learned that 25 is the square of 5. Sometimes you are given a square and you need to find the number that was squared. Think of a square that contains 36 blocks. How long is each side of the square? (6 blocks) 36 is the square of 6. Six is called the *square root* of 36. Think of a square that contains 100 blocks. What is the length of the square? (10 blocks) Ten is the square root of 100.

 Write these sentences on the board.

100 is the square of 10.

10 is the square root of 100.

$$100 = 10^2$$

$$10 = \sqrt{100}$$

Say:

$10^2 = 100$, so 100 is the square of 10. Ten is the square root of 100, or the square root of 100 is 10. You can use the sign ($\sqrt{\quad}$) to show that you are taking the square root of a number. What is the square root of 64? (8)

What is $\sqrt{9}$? (3)

A *perfect square* is a number whose square root is an exact whole number. Name the perfect squares that are less than or equal to 100. (1, 4, 9, 16, 25, 36, 49, 64, 81, 100)

🗨 If your students will use calculators, give out the calculators now.

Say:

Sometimes in problems, you need to find the square root of a number that is not a perfect square. A calculator will help you estimate. On many calculators, there is a square root key. It sometimes looks like this: $\sqrt{\quad}$. On some calculators, to find the square root, enter the number, and then press $\sqrt{\quad}$. On other calculators, you press $\sqrt{\quad}$, and then the number. If you have a calculator, press $\sqrt{\quad}$; then 16 or press 16; then $\sqrt{\quad}$. One of these sequences should give you four.

🗨 Read this problem to the students.

Your family is getting ready to build a square patio. The plans say that the patio will have an area of 28 sq. ft. What is the length of each side of the patio to the nearest tenth of a foot?

Say:

What kind of figure is the patio? (square) How can you find the length of one side of a square, if you are given the area? (take the square root) What is the formula for the area of a square? ($A = s \times s$, or $A = s^2$) Let's reason out how long the side will be. A side length of five feet would give what area? (25 sq. ft.) A side length of six feet would give what area? (36 sq. ft.) The side length must be between five and six feet. If you use your calculator, what is the side length to the nearest tenth of a foot? (5.3 feet)

🗨 Give students Student Sheet 92.

Answers:

1. 9
2. 7
3. 6
4. 1
5. 12
6. 10
7. Disagree, 9^2 is 81, so $\sqrt{85}$ must be larger than 9.
8. More, the square root of 36 is 6, so $\sqrt{37}$ must be larger than 6.
9. $4^2 = 16$ and $5^2 = 25$, so $\sqrt{23}$ is between 4 and 5.
10. 121; 1
11. 60 cm
12. 12 inches

🗨 Have one student summarize today's lesson. Students need to be able to find the square root in many types of measurement problems and in the use of the Pythagorean Theorem.

Student Sheet 92 (Algebra: Lesson 6)

Find the square root of these numbers.

1. $\sqrt{81}$

2. $\sqrt{49}$

3. $\sqrt{36}$

4. $\sqrt{1}$

5. $\sqrt{144}$

6. $\sqrt{100}$

Answer the following questions.

7. Tricia estimates that $\sqrt{85}$ is about eight. Do you agree or disagree? Explain.
8. Is $\sqrt{37}$ more or less than 6? Explain.
9. Between which two whole numbers is $\sqrt{23}$?
10. Which of the following numbers are perfect squares?
50 200 140 121 1
11. What is the length of a square tablecloth that has an area of 3600 square centimeters?
12. A square chessboard has an area of 144 square inches. How long is each side of the board?