
Squares – Perfect or Not

ID: 11730

Time required
45 minutes

Activity Overview

In this activity, students develop an understanding of the relationship between a number and its square root. They will first recognize perfect squares and order them from least to greatest with other numbers. Then students will estimate the square root of a number using perfect squares.

Topic: Numbers and Operations

- *Understand meanings of operations and how they relate to one another*
- *Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems*

Teacher Preparation and Notes

- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- *Grid paper may be helpful for students that are more visual learners. Have grid paper available as needed for students.*
- ***To download the student worksheet and navigator files, go to education.ti.com/exchange and enter “11730” in the quick search box.***

Associated Materials

- *MGAct12_SquareRoots_worksheet_TI73.doc*
- *MGAct12_LrnChk_TI73.edc*
- *MGAct12_Nav01_TI73.act*
- *MGAct12_Nav02_TI73.act*
- *MGAct12_Nav03_TI73.act*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Square Roots (TI-73 Explorer) — 6680*
- *Perfect Squares and Roots (TI-84 Plus family) — 1436*
- *Find the Square Root... (TI-30XS MultiView) — 8343*
- *Walking the Fence Line (TI-83 family) — 4656*

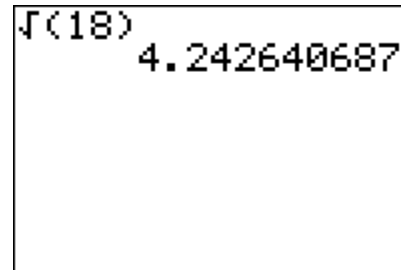
Problem 1 – Ordering Squares

The lesson can start with a brief discussion about what it means to square a number. Then, give students a square and ask how you would find the number that can be squared to find the square.

Questions 1-2

Students should recognize perfect squares to be able to find the square root. If desired, students can take time to explore square roots on the calculator. To find the square root of a number, press $\boxed{2nd} \boxed{x^2}$, then enter the number, press $\boxed{)}$, and press \boxed{ENTER} .

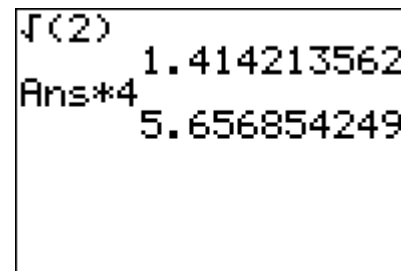
Students need to recognize that square roots between perfect squares have roots that fall between the roots of the perfect squares as well. For example, any square root between $\sqrt{9}$ and $\sqrt{16}$ will be between 3 and 4.



Problem 2 – Finding the Running Distance

Questions 3-6

In this set, students may forget to multiply the square root by 4, the total number of sides. The intent of this exercise is to help students make a stronger connection between a square root and the length of the side of the square. To use the TI-73 to perform the calculations, press $\boxed{2nd} \boxed{x^2} \boxed{2} \boxed{)}$ \boxed{ENTER} $\boxed{\times} \boxed{4} \boxed{ENTER}$.



Problem 3 – Mixed Up Carpets

Questions 8-11

Students may take several approaches to solving this set of problems. They may find the area of each room and then compare to the size of the carpets. Help students see that they can estimate the size of the non-square rooms as squares and then compare to the carpet sizes.

Students can also take the square root of each carpet roll and see what the length of a square room would likely be.

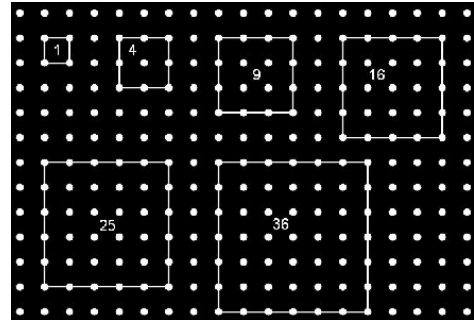
Grid paper may be a good in this situation so students can draw the rooms and visualize what the area of each would be.

Extension – TI-Navigator™

1. Load the **MGAct12_Nav01_TI73.act** activity settings file into Activity Center.

Explain to students that the numbers shown inside each of the six squares represent the area of that square. Ask them to determine the length of the side of each square, and collect the answers using Quick Poll.

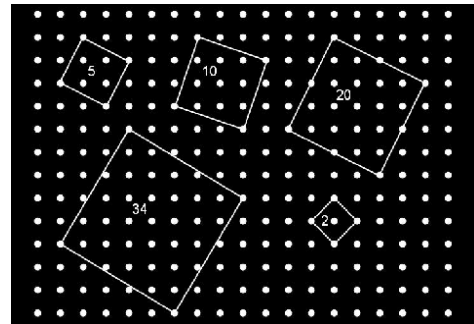
Tell students that the numbers representing each area are considered perfect squares, and that each side length represents the corresponding square root of that number. Explain that numbers are considered perfect squares if their square roots are natural numbers (whole numbers greater than or equal to 1).



2. Now load the **MGAct12_Nav02_TI73.act** activity settings file into Activity Center.

Explain to students that, once again, the numbers contained within each square represent the area of that square. As with the previous activity, the lengths of the sides of each square represent the square root of that number.

Using **Quick Poll**, ask students to estimate the lengths of the sides of the squares whose areas are 5 and 20. Review the results. Continue with the remaining squares. Then, have students exit NavNet and actually calculate the square roots.



3. Load the **MGAct12_Nav03_TI73.act** activity settings file into Activity Center.

Start the activity and call out a whole number (not a perfect square) whose square root is between 0 and 16. Instruct students to move their cursor to its approximate location on the number line and mark the point.

Have students send their point and discuss the results. Repeat the activity with several different numbers to allow students time to master this important skill.

4. Use **MGWeek12_LrnChk_TI73.edc** to assess student understanding of square roots.

Solutions to Student Worksheet
Problem 1

1. $2, \frac{8}{3}, 4, \sqrt{25}, 6, \sqrt{49}, \sqrt{81}, 10$

2. $-\sqrt{64}, -\sqrt{36}, -3, -1, \sqrt{16}, 5, 7, \sqrt{121}$

Problem 2

3. long

4. none

5. long

6. short

7. Answers will vary. Students should recognize that they must take the square root of the area to get the length of one side and then multiply by 4.

Problem 3

8. Bedroom 2

9. Living Room

10. Hallway

11. Bedroom 1

Problem 4

12. about 5.5, 5.48

13. about 6.5, 6.48

 14. about $-3.9, -3.87$

15. about 7, 7.07

16. about 0.5, 0.5

17. about 0.8, 0.71