LESSON MAKER PRO

Roots on the Line

Find rational roots and estimate irrational ones.

GRADE 8 · 8.NS.A

CCSS.Math.Content.8.NS.A "Know that there are numbers that are not rational, and approximate them by rational numbers."

NAME _____ DATE _____

SQUARE ROOT CLUES

A rational number can be written as a fraction of integers. The square root of a perfect square is rational, but the square root of a whole number that is not a perfect square is irrational. To approximate a square root, compare nearby squares.

WORKED EXAMPLE

Approximate sqrt45 to the nearest tenth.

1. $6^2 = 36$ and $7^2 = 49$, so sqrt45 is between 6 and 7.
2. Compare: $6.7^2 = 44.89$ and $6.8^2 = 46.24$.
3. The midpoint is 6.75. Since $6.75^2 = 45.5625 > 45$, sqrt45 is below 6.75 and rounds to 6.7.

Answer: sqrt45 is approximately 6.7.

PRACTICE 6 problems

1 Is sqrt81 rational or irrational? If it is rational, state its value.

ANSWER _____

2 Is sqrt28 rational or irrational?

ANSWER _____

3 Place sqrt24 between two consecutive whole numbers.

ANSWER _____

4 Approximate sqrt70 to the nearest tenth.

ANSWER _____

5 Compare sqrt10 and 13/4. Write <, >, or =.

ANSWER _____

6 Approximate sqrt15 to the nearest tenth.

ANSWER _____

APPLY IT Show your work

1 A gaming club sets up a rectangular tournament area that is 10 meters long and 11 meters wide. A player walks straight across the area from one corner to the opposite corner. About how far does the player walk, to the nearest tenth of a meter?

WORK SPACE

ANSWER _____

2 A music app says a playlist is 2.75 minutes long. Is this length rational or irrational? Write it as a fraction in simplest form.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Without using a calculator, decide whether 7.0 or 7.1 is closer to sqrt50. Explain your reasoning with squares.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Is sqrt81 rational or irrational? If it is rational, state its value.	**Rational, 9**
2	Is sqrt28 rational or irrational?	**Irrational**
3	Place sqrt24 between two consecutive whole numbers.	**4 < sqrt24 < 5**
4	Approximate sqrt70 to the nearest tenth.	**8.4**
5	Compare sqrt10 and 13/4. Write <, >, or =.	**sqrt10 < 13/4**
6	Approximate sqrt15 to the nearest tenth.	**3.9**

PART 2 · APPLY IT

1. **14.9 meters** Use the Pythagorean theorem: the diagonal is sqrt(10^2 + 11^2) = sqrt221. Since 14.8^2 = 219.04 and 14.9^2 = 222.01, sqrt221 is about 14.9.
2. **Rational, 11/4** A terminating decimal is rational. Convert 2.75 to 275/100, then simplify to 11/4.

CHALLENGE

7.1 is closer to sqrt50. Since 7.05^2 = 49.7025, sqrt50 is greater than 7.05, the midpoint between 7.0 and 7.1.

For approximations, accept only the stated nearest-tenth value. For the playlist fraction, accept 11/4 because the prompt asks for simplest form.