

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 $\sqrt{45}$ to the nearest tenth.

1. $6^2 = 36$ and $7^2 = 49$, so $\sqrt{45}$ is between 6 and 7.

2. $7^2 = 49$ and $6.8^2 = 46.24$.

3. 45 is closer to 44.89 than to 46.24.

Answer: $\sqrt{45}$ is approximately 6.7.

PRACTICE 6 problems

1 Is $\sqrt{81}$ rational or irrational? If it is rational, state its value.

ANSWER _____

2 Is $\sqrt{28}$ rational or irrational?

ANSWER _____

3 Place $\sqrt{24}$ between two consecutive whole numbers.

ANSWER _____

4 Approximate $\sqrt{70}$ to the nearest tenth.

ANSWER _____

5 Compare $\sqrt{10}$ and $13/4$. Write $<$, $>$, or $=$.

ANSWER _____

6 Approximate $\sqrt{15}$ 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

CHALLENGE

Without using a calculator, decide whether 7.0 or 7.1 is closer to $\sqrt{50}$. Explain your reasoning with squares.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Is $\sqrt{81}$ rational or irrational? If it is rational, state its value.	Rational, 9
2	Is $\sqrt{28}$ rational or irrational?	Irrational
3	Place $\sqrt{24}$ between two consecutive whole numbers.	$4 < \sqrt{24} < 5$
4	Approximate $\sqrt{70}$ to the nearest tenth.	8.4
5	Compare $\sqrt{10}$ and $1\frac{3}{4}$. Write $<$, $>$, or $=$.	$\sqrt{10} < 1\frac{3}{4}$
6	Approximate $\sqrt{15}$ to the nearest tenth.	3.9

PART 2 • APPLY IT

- 14.9 meters** Use the Pythagorean theorem: the diagonal is $\sqrt{10^2 + 11^2} = \sqrt{221}$. Since $14.8^2 = 219.04$ and $14.9^2 = 222.01$, $\sqrt{221}$ is about 14.9.
- Rational, $1\frac{1}{4}$** A terminating decimal is rational. Convert 2.75 to $\frac{275}{100}$, then simplify to $1\frac{1}{4}$.

CHALLENGE

7.1 is closer to $\sqrt{50}$. Since $7.05^2 = 49.7025$, $\sqrt{50}$ 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 $1\frac{1}{4}$ because the prompt asks for simplest form.