

Root Size Quest

Use square-number benchmarks to estimate and compare roots.

GRADE 8 • 8.NR.1.2

8.NR.1.2 "Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions."

NAME _____

DATE _____

SQUARE ROOT BENCHMARKS

To estimate $\sqrt{n}$, find perfect squares close to n . To compare positive square roots, compare the numbers inside the square roots, or square a nearby decimal benchmark.

WORKED EXAMPLE

Estimate $\sqrt{50}$ to the nearest tenth.

- $7^2 = 49$ and $8^2 = 64$, so $\sqrt{50}$ is between 7 and 8.
- $7.1^2 = 50.41$, so $\sqrt{50}$ is less than 7.1.
- $7.05^2 = 49.7025$, so $\sqrt{50}$ is greater than 7.05 and rounds to 7.1.

Answer: $\sqrt{50} \approx 7.1$

PRACTICE 6 problems

- 1** Between which two consecutive whole numbers is $\sqrt{27}$?

ANSWER _____

- 2** A number line is labeled every tenth. Between which two tenths would you place $\sqrt{38}$?

ANSWER _____

- 3** Compare $\sqrt{18}$ and 4.2. Write $<$, $>$, or $=$.

ANSWER _____

- 4** Estimate $\sqrt{32} + \sqrt{9}$ to the nearest whole number.

ANSWER _____

- 5** Estimate $\sqrt{72}$ to the nearest tenth.

ANSWER _____

- 6** Compare $\sqrt{11}$ and $10/3$. Write $<$, $>$, or $=$.

ANSWER _____

APPLY IT Show your work

- 1** You design a square sticker for your laptop. Its area is 65 square centimeters. Estimate the length of one side to the nearest tenth of a centimeter.

WORK SPACE

ANSWER _____

- 2** For a music-club display, a square album-cover image has an area of 150 square inches. A border strip runs along one side and sticks out 2 inches beyond each end. Estimate the strip length to the nearest whole inch.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Which whole number is closest to $\sqrt{15} + \sqrt{24}$? Explain your reasoning using tenths benchmarks.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Between which two consecutive whole numbers is $\sqrt{27}$?	$5 < \sqrt{27} < 6$
2	A number line is labeled every tenth. Between which two tenths would you place $\sqrt{38}$?	$6.1 < \sqrt{38} < 6.2$
3	Compare $\sqrt{18}$ and 4.2. Write $<$, $>$, or $=$.	$\sqrt{18} > 4.2$
4	Estimate $\sqrt{32} + \sqrt{9}$ to the nearest whole number.	9
5	Estimate $\sqrt{72}$ to the nearest tenth.	8.5
6	Compare $\sqrt{11}$ and $10/3$. Write $<$, $>$, or $=$.	$\sqrt{11} < 10/3$

PART 2 • APPLY IT

- 8.1 cm** The side length is $\sqrt{65}$. Since $8.05^2 = 64.8025$ and $8.1^2 = 65.61$, $\sqrt{65}$ rounds to 8.1.
- 16 inches** The strip length is $\sqrt{150} + 4$. Since $12^2 = 144$ and $12.5^2 = 156.25$, the total is between 16 and 16.5 inches, so it rounds to 16 inches.

CHALLENGE

9; $3.8 < \sqrt{15} < 3.9$ because $3.8^2 = 14.44$ and $3.9^2 = 15.21$. Also, $4.8 < \sqrt{24} < 4.9$ because $4.8^2 = 23.04$ and $4.9^2 = 24.01$. Therefore, $8.6 < \sqrt{15} + \sqrt{24} < 8.8$, so 9 is closest.

Accept equivalent inequality statements with the same correct bounds. For estimated values, accept only the stated nearest tenth or nearest whole number.