LESSON MAKER PRO

Root Range Rescue

Estimate square roots, compare values, and use irrational numbers in real situations.

GRADE 8 · NY-8.NS.2

NY-8.NS.2 "Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions."

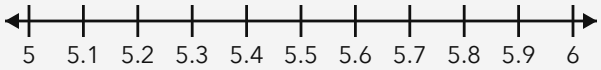
NAME _____ DATE _____

BRACKET AND ESTIMATE

To estimate a square root, find the two perfect squares around the number. Then test nearby tenths or hundredths to decide where the root belongs. Use the approximation to compare numbers or estimate an expression.

WORKED EXAMPLE

Use the number line to estimate sqrt(30) to the nearest tenth.

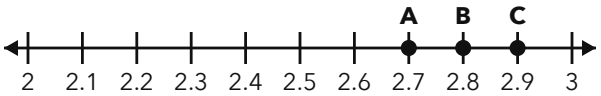


1. $5^2 = 25$ and $6^2 = 36$, so sqrt(30) is between 5 and 6.
2. $5.4^2 = 29.16$.
3. $5.5^2 = 30.25$, which is closer to 30.
4. So sqrt(30) is about 5.5 to the nearest tenth.

Answer: 5.5

PRACTICE 6 problems

1 Which labeled point best represents sqrt(8)?



ANSWER _____

2 Use nearby perfect squares to compare the numbers. Write <, >, or =. sqrt(45) ___ 7

ANSWER _____

3 Estimate sqrt(50) + sqrt(9) to the nearest tenth.

ANSWER _____

4 Which labeled point is closest to -sqrt(7)?



ANSWER _____

5 Use an approximation to compare the numbers. Write <, >, or =. 3sqrt(2) ___ 4

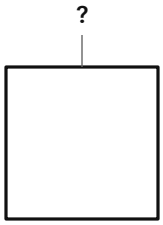
ANSWER _____

6 Estimate sqrt(18) - sqrt(2) to the nearest tenth.

ANSWER _____

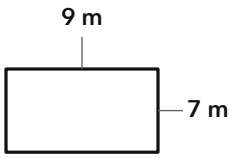
APPLY IT Show your work

1 The square art panel shown has an area of 50 square inches. Estimate the side length to the nearest tenth. Is a 7.3-inch LED strip long enough to cover one side? If so, about how much strip is left?



ANSWER _____

2 A robotics team runs a cable diagonally across the rectangular practice mat shown. Estimate the cable length to the nearest tenth. About how much shorter is this diagonal route than a route along two sides of the mat?



ANSWER _____

CHALLENGE One step up

Without a calculator, decide whether sqrt(48) + sqrt(3) is greater than or less than 9. Explain your reasoning using an approximation or comparison.

WORK SPACE AND ANSWER

ANSWER KEY # Root Range Rescue

GRADE 8 · NY-8.NS.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Which labeled point best represents sqrt(8)?	**B**
2	Use nearby perfect squares to compare the numbers. Write <, >, or =. sqrt(45) ___ 7	**sqrt(45) < 7**
3	Estimate sqrt(50) + sqrt(9) to the nearest tenth.	**10.1**
4	Which labeled point is closest to -sqrt(7)?	**B**
5	Use an approximation to compare the numbers. Write <, >, or =. 3sqrt(2) ___ 4	**3sqrt(2) > 4**
6	Estimate sqrt(18) - sqrt(2) to the nearest tenth.	**2.8**

PART 2 · APPLY IT

1. **The side length is about 7.1 inches. Yes, the strip is long enough, with about 0.2 inch left.** The side length is sqrt(50), which is about 7.1. Subtract 7.1 from 7.3 to estimate the leftover strip.
2. **The diagonal cable is about 11.4 m. It is about 4.6 m shorter.** Use the Pythagorean theorem: the diagonal is sqrt(7^2 + 9^2) = sqrt(130), about 11.4. The route along two sides is 16 m, so 16 - 11.4 is about 4.6.

CHALLENGE

sqrt(48) + sqrt(3) is less than 9. Since sqrt(48) = 4sqrt(3), the expression is 5sqrt(3). Because 1.8^2 = 3.24 is greater than 3, sqrt(3) is less than 1.8, so 5sqrt(3) is less than 5(1.8) = 9.

Accept equivalent comparison statements and correctly rounded decimal estimates. For the challenge, accept any valid reasoning that shows sqrt(3) is less than 1.8 and therefore 5sqrt(3) is less than 9.