LESSON MAKER PRO

Square Root Detective

Use perfect squares to explain when a square root is irrational.

GRADE 7 · 7A.AF.B.15.b

7A.AF.B.15.b "Explain that the square root of a non-perfect square is irrational."

NAME _____ DATE _____

THE BIG IDEA

A perfect square is a whole number made by multiplying a whole number by itself. The square root of a perfect square is a whole number, so it is rational. The square root of a whole number that is not a perfect square is irrational, which means it cannot be written as a fraction of two integers.

WORKED EXAMPLE

Is sqrt(150) rational or irrational? Explain using nearby perfect squares.

1. $12^2 = 144$ and $13^2 = 169$.
2. $144 < 150 < 169$, so $12 < \text{sqrt}(150) < 13$.
3. 150 is not a perfect square.

Answer: sqrt(150) is irrational.

PRACTICE 6 problems

1 Between which consecutive whole numbers is sqrt(11)? Is it rational or irrational? Use square numbers to explain.

ANSWER _____

2 Is sqrt(28) rational or irrational? Show the two consecutive perfect squares that support your answer.

ANSWER _____

3 Find sqrt(64).

ANSWER _____

4 A student says sqrt(70) = 8 because 70 is close to 64. Explain why the student is incorrect, and classify sqrt(70) as rational or irrational.

ANSWER _____

5 Is sqrt(99) rational or irrational? Explain using the nearest perfect squares.

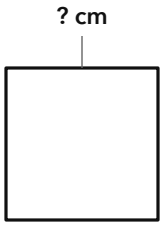
ANSWER _____

6 Find sqrt(121) and classify it as rational or irrational.

ANSWER _____

APPLY IT Show your work

1 A laptop sticker has an area of 42 cm^2. Use the shape shown to find the two consecutive whole numbers its side length falls between. Why is the exact side length irrational?



ANSWER _____

2 In a game, a player's power rating is the square root of their energy points. Kai has 52 energy points. Between which consecutive whole numbers is Kai's power rating? Explain why the exact rating is irrational.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student claims sqrt(48) is rational because 48 is divisible by the perfect square 16. Is the student correct? Name the nearby perfect squares and explain your answer.

WORK SPACE AND ANSWER

ANSWER KEY

Square Root Detective

GRADE 7 · 7A.AF.B.15.b

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Between which consecutive whole numbers is sqrt(11)? Is it rational or irrational? Use square numbers to explain.	**3 < sqrt(11) < 4 because $3^2 = 9$ and $4^2 = 16$. Since 11 is not a perfect square, sqrt(11) is irrational.**
2	Is sqrt(28) rational or irrational? Show the two consecutive perfect squares that support your answer.	**25 < 28 < 36. Since 28 is not a perfect square, sqrt(28) is irrational.**
3	Find sqrt(64).	**8**
4	A student says sqrt(70) = 8 because 70 is close to 64. Explain why the student is incorrect, and classify sqrt(70) as rational or irrational.	**$8^2 = 64$ and $9^2 = 81$, so 8 < sqrt(70) < 9. Since 70 is not a perfect square, sqrt(70) is irrational.**
5	Is sqrt(99) rational or irrational? Explain using the nearest perfect squares.	**81 < 99 < 100. Since 99 is not a perfect square, sqrt(99) is irrational.**
6	Find sqrt(121) and classify it as rational or irrational.	**sqrt(121) = 11. It is rational.**

PART 2 · APPLY IT

1. **The side length is between 6 cm and 7 cm. Its exact length, sqrt(42) cm, is irrational because 42 is not a perfect square.** The side length is sqrt(42) cm. Since 36 < 42 < 49, it falls between 6 cm and 7 cm, and 42 is not a perfect square.
2. **Kai's power rating is between 7 and 8. The exact rating, sqrt(52), is irrational because 52 is not a perfect square.** 49 < 52 < 64, so 7 < sqrt(52) < 8. Since 52 is not a perfect square, its square root is irrational.

CHALLENGE

No. The nearby perfect squares are 36 and 49, and 36 < 48 < 49. Since 48 is not a perfect square, sqrt(48) is irrational, even though 16 is a factor of 48.

Accept equivalent explanations that correctly identify a non-perfect square as the reason its square root is irrational. For bounds, accept either inequalities or words.