LESSON MAKER PRO

Rationality Rules

Use fraction forms to classify sums and products.

HIGH SCHOOL · HSN-RN.B.3

CCSS.Math.Content.HSN-RN.B.3 "Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational."

NAME _____ DATE _____

THE BIG IDEA

Rational numbers are fractions of integers, including integers such as 4 = 4/1. The sum and product of two rational numbers are rational because each result can be written as a fraction of integers. A rational plus an irrational is irrational, and a nonzero rational times an irrational is irrational, but 0 times an irrational is 0, which is rational.

WORKED EXAMPLE

Classify 11/14 + sqrt(23).

1. 11/14 is rational, and sqrt(23) is irrational.
2. Assume 11/14 + sqrt(23) is rational.
3. Then sqrt(23) = (11/14 + sqrt(23)) - 11/14 would be rational.
4. This contradicts the fact that sqrt(23) is irrational.

Answer: Irrational.

PRACTICE 6 problems

1 Find 3/8 + 5/12. Is the result rational or irrational?

ANSWER _____

2 Find (-7/9) * (18/35). Is the result rational or irrational?

ANSWER _____

3 Classify 4/11 + sqrt(2). Give one reason.

ANSWER _____

4 Classify (-3/5) * sqrt(13). Give one reason.

ANSWER _____

5 Simplify sqrt(25) + 7/10. Is the result rational or irrational?

ANSWER _____

6 Classify 0 * sqrt(17) as rational or irrational.

ANSWER _____

APPLY IT Show your work

1 A student edits a short video. One transition lasts 5/6 second, and a sound effect lasts sqrt(3) seconds. If the times are added, write the exact total and classify it.

WORK SPACE

ANSWER _____

2 For a club T-shirt design, a logo is sqrt(10) cm wide. The printer enlarges every length by 3/2. Write the exact new width and classify it.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Without using decimals, decide whether (5/3)sqrt(12) + 7/9 is rational or irrational. Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY # Rationality Rules

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find 3/8 + 5/12. Is the result rational or irrational?	**19/24, rational**
2	Find (-7/9) * (18/35). Is the result rational or irrational?	**-2/5, rational**
3	Classify 4/11 + sqrt(2). Give one reason.	**Irrational, because 4/11 is rational and sqrt(2) is irrational.**
4	Classify (-3/5) * sqrt(13). Give one reason.	**Irrational, because -3/5 is a nonzero rational number and sqrt(13) is irrational.**
5	Simplify sqrt(25) + 7/10. Is the result rational or irrational?	**57/10, rational**
6	Classify 0 * sqrt(17) as rational or irrational.	**0, rational**

PART 2 · APPLY IT

1. **5/6 + sqrt(3) seconds, irrational** 5/6 is rational and sqrt(3) is irrational. Their sum is irrational.
2. **(3sqrt(10))/2 cm, irrational** Multiply: (3/2) * sqrt(10) = (3sqrt(10))/2. Since 3/2 is nonzero rational and sqrt(10) is irrational, the product is irrational.

CHALLENGE

Irrational. sqrt(12) is irrational, so (5/3)sqrt(12) is irrational because 5/3 is nonzero rational. Adding 7/9, a rational number, keeps the result irrational.

Accept equivalent fraction forms, such as 5 7/10 for 57/10. For classification items, require that students identify the rational and irrational numbers and apply the correct sum or product rule.