Rational and Irrational Numbers Worksheet

Algebra 1 · Common Core 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.

Practice

Builds the skill step by step.

1. What kind of number is the sum of two rational numbers?
   A. always rational
   B. always irrational
   C. sometimes rational
   D. never a real number

2. What kind of number is $3 + \sqrt{2}$?
   A. rational
   B. an integer
   C. a whole number
   D. irrational

3. Which number is rational?
   A. $\sqrt{2}$
   B. $\sqrt{16}$
   C. π
   D. $\sqrt{15}$

4. Which number is irrational?

   A. 0.75

   B. -3

   C. π

   D. $\frac{2}{9}$

5. What kind of number is $2\sqrt{5}$?

   A. an integer

   B. rational

   C. zero

   D. irrational

6. What kind of number is $0.25 + \frac{1}{3}$?

   A. an integer

   B. undefined

   C. rational

   D. irrational

7. What kind of number is $0 \times \sqrt{2}$?

   A. negative

   B. rational

   C. irrational

   D. undefined

8. What kind of number is $\sqrt{9} + \sqrt{4}$?

   A. rational

   B. irrational

   C. undefined

   D. negative

9. What is a rational number?

   A. a number that can be written as a fraction of two integers with a nonzero denominator

   B. any number with a decimal

   C. any square root

   D. a number greater than zero

10. What is $\frac{1}{2} + \frac{1}{3}$?

ALBERT

Name _____ Date _____

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On Level

Grade-level practice.

1. Explain why the sum of two rational numbers is always rational.

2. $\sqrt{2} \cdot \sqrt{2} = 2$. What does this show?

   A. 2 is irrational.

   B. The product of two irrational numbers can be rational.

   C. $\sqrt{2}$ is rational.

   D. Every product is rational.

3. What is $\sqrt{2} + (-\sqrt{2})$?

   A. an irrational number

   B. undefined

   C. 0, which is rational

   D. $\sqrt{2}$

4. Which must be irrational?

   A. $\sqrt{3} - \sqrt{3}$

   B. $\sqrt{25}$

   C. $\sqrt{3} \cdot \sqrt{3}$

   D. $5 + \sqrt{3}$

5. What kind of number is $4\sqrt{2} - 4\sqrt{2}$?

   A. undefined

   B. irrational

   C. negative

   D. rational (it equals 0)

6. Explain why $3 + \sqrt{2}$ is irrational.

7. What is $(\frac{2}{3})(\frac{9}{4})$?

8. What kind of number is $(\sqrt{3})^2$?

   A. negative

   B. rational

   C. undefined

   D. irrational

9. What kind of number is $\pi \div \pi$?

   A. zero

   B. irrational

   C. rational

   D. undefined

10. Which statement is true?

    A. The sum of two irrational numbers can be rational.

    B. The sum of two irrational numbers is always irrational.

    C. The product of two rationals can be irrational.

    D. Every square root is irrational.

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Challenge

Multi-step and word problems that stretch it.

1. Explain why $5\sqrt{2}$ is irrational.

2. Which product is irrational?

   A. $\sqrt{2} \cdot \sqrt{3}$

   B. $\sqrt{3} \cdot \sqrt{12}$

   C. $\sqrt{5} \cdot \sqrt{5}$

   D. $\sqrt{8} \cdot \sqrt{2}$

3. x is a nonzero rational number and y is irrational. What is $x \cdot y$?

   A. always irrational

   B. always rational

   C. sometimes rational

   D. zero

4. What kind of number is $(1 + \sqrt{2})(1 - \sqrt{2})$?

   A. irrational

   B. undefined

   C. zero

   D. rational (it equals -1)

5. What kind of number is $\sqrt{(\frac{1}{4})}$?

   A. negative

   B. undefined

   C. rational (it equals $\frac{1}{2}$)

   D. irrational

6. What is $(2 + \sqrt{3}) + (5 - \sqrt{3})$?

7. The decimal 0.1010010001… continues with one more 0 each time. Is it rational?

   A. No: it never repeats.

   B. Yes: it uses only 0s and 1s.

   C. Yes: it has a pattern.

   D. No: it is negative.

8. Is 0.333… (repeating) rational?

   A. Only if rounded.

   B. No: it is less than 1.

   C. No: it never ends.

   D. Yes: it equals $\frac{1}{3}$.

9. Write 0.444… (repeating) as a fraction in simplest form.

10. Which is a counterexample to "the product of two irrational numbers is irrational"?

    A. $\pi \cdot 2$

    B. $\sqrt{2} \cdot \sqrt{3}$

    C. $\sqrt{5} \cdot \sqrt{5}$

    D. $\sqrt{7} \cdot 3$