CC-1 Operations With Rational and Irrational Numbers

Content Standard

N.RN.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 . . .

For each sum, determine whether the result is a rational number or an irrational number.

1. $\frac{5}{8} + \frac{3}{5}$
2. $-\frac{1}{4} + \frac{2}{5}$
3. $-\frac{1}{2} + \sqrt{2}$
4. $\sqrt{5} + \left(-\frac{3}{11}\right)$
5. $\frac{1}{4} + \sqrt{12}$
6. $-\frac{3}{11} + \left(-\frac{1}{3}\right)$

For each product, determine whether the result is a rational number or an irrational number.

7. $\frac{1}{2} \cdot \frac{2}{15}$
8. $\sqrt{2} \cdot \frac{2}{5}$
9. $-\frac{3}{5} \cdot \frac{4}{9}$
10. $\frac{5}{8} \cdot \sqrt{7}$
11. $-\frac{3}{4} \cdot \frac{2}{9}$
12. $-\frac{4}{9} \cdot -\sqrt{5}$

For Exercises 13–16, predict whether the sum or product will be a rational or irrational number. Explain.

13. The sum of two rational numbers.
14. The product of a nonzero rational number and an irrational number.
15. The product of two rational numbers.
16. The sum of a rational number and an irrational number.
17. Can the sum of two irrational numbers be rational? If so, give an example. If not, explain why not.
18. Can the product of two irrational numbers be rational? If so, give an example. If not, explain why not.

Guided Instruction

PURPOSE To build an understanding of operations with rational and irrational numbers

PROCESS Students will

- identify if the sum or product is rational or irrational

DISCUSS Students first focus on determining if the sum of two rational numbers is rational and if the sum of a rational and irrational number is irrational. Then the students explore the product of these groups of numbers.

Q What can you say about the sum of two rational numbers? **[The sum of two rational numbers is always rational.]**

Q What can you say about the sum of a nonzero rational number and an irrational number? **[The sum of a nonzero rational number and an irrational number is always irrational.]**

Q What can you say about the product of two rational numbers? **[The product of two rational numbers is always rational.]**

Q What can you say about the product of a nonzero rational number and an irrational number? **[The product of a nonzero rational number and an irrational number is always irrational.]**

Mathematical Practices This Concept Byte supports students in becoming proficient in using properties, Mathematical Practice 2.

Answers

1. rational
2. rational
3. irrational
4. irrational
5. irrational
6. rational
7. rational
8. irrational
9. rational
10. irrational
11. rational
12. irrational
13. Rational; check students' explanations.
14. Irrational; check students' explanations.
15. Rational; check students' explanations.
16. Irrational; check students' explanations.
17. yes; sample answer: $\sqrt{2} + (-\sqrt{2}) = 0$
18. yes; sample answer: $\sqrt{2} \times \sqrt{2} = 2$