Rational Numbers

1. Gunther Jr. High School has a student to teacher ratio of 30 to 2. Which of the following rational numbers is an equivalent representation of this ratio?

○ **A.** $^{28}/_2$
○ **B.** $^{32}/_2$
○ **C.** 60
○ **D.** $^{30}/_2$

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2. Sarah used her calculator to compute 2 ÷ 9, which resulted in a repeating decimal: 0.22222222…

Sarah concluded that $^2/_9$ is not a rational number. Is she correct?

○ **A.** No; any number that can be expressed as the ratio of an integer to a nonzero integer is a rational number.
○ **B.** No; all decimals are rational numbers.
○ **C.** No; any nonnegative number is a rational number.
○ **D.** Yes; terminating decimals are rational numbers and repeating decimals are not rational numbers.

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3. Which of the following sets contains only rational numbers?

○ **A.** $\{\sqrt{3}, \,^8/_{22}, \, 16.6, \, \sqrt{36}\}$

○ **B.** $\{1{,}703, \,^8/_{17}, \, 16.207, \, \sqrt{5}\}$

○ **C.** $\{1{,}703, \,^8/_{17}, \, 16.207, \, \sqrt{36}\}$

○ **D.** $\{1{,}753, \, \pi, \, 21.207, \, \sqrt{36}\}$

4. Prove that the decimal number

$$612.3$$

is rational by finding its fractional form.

○ **A.** $6{,}123/10$
○ **B.** $615/10$
○ **C.** $6{,}123/100$
○ **D.** $612\ ^3/_{100}$

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5. Keith is wondering if zero is a rational number. Which statement below correctly answers his question?

○ **A.** Zero is not a repeating decimal. Therefore it is a rational number.
○ **B.** A number cannot be divided by zero. Therefore, zero is not a rational number.
○ **C.** Zero is a rational number because zero divided by a nonzero integer equals zero. For example, $^0/_5 = 0$.
○ **D.** Zero is neither a negative number nor a positive number. Therefore it is not a rational number.

Answers

1. D
2. A
3. C
4. A
5. C

Explanations

1. The ratio of 30 to 2 can be written as the fraction $\frac{30}{2}$.

2. Sarah's statement is incorrect. A nonterminating decimal can be a rational number. Any number that can be expressed as the ratio of an integer to a nonzero integer is a rational number.

   $\frac{2}{9}$ is the ratio of an integer to a nonzero integer.

3. Any number that can be expressed as an integer divided by a nonzero integer is a **rational number**. In decimal notation, rational numbers either terminate or repeat.

   Any number that has a nonterminating, nonrepeating decimal representation is an **irrational number**.

   $\sqrt{3}$, $\sqrt{5}$, and π are all irrational numbers.

4. A terminating decimal can be written as a fraction by writing it the way it is pronounced.
   $$612.3 = \text{six hundred twelve and three tenths}$$
   $$= 612 + \frac{3}{10}$$
   $$= \frac{6{,}120}{10} + \frac{3}{10}$$
   $$= \frac{6{,}123}{10}$$

5. Any number that can be expressed as the ratio of an integer to a nonzero integer is a rational number. Therefore, zero is a rational number. In the example, $\frac{0}{5} = 0$, the numerator is an integer, the denominator is a nonzero integer, and the result is zero.