ALBERT

Name _____ Date _____

Rational and Irrational Numbers Worksheet

Grade 8 · Common Core 8.NS.A.1

> Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

Practice

Builds the skill step by step.

1. Which number is irrational?

   A. $\sqrt{16}$

   B. $\sqrt{7}$

   C. $\frac{3}{4}$

   D. 0.25

2. Write $\frac{5}{9}$ as a decimal, writing six digits after the point.

3. Is 0.125 rational or irrational?

   A. Rational

   B. Irrational

   C. Neither

   D. Both

4. Write 0.7 as a fraction in simplest form.

5. Which decimal repeats?

   A. 0.4

   B. 0.8

   C. 0.375

   D. 0.363636..., with 36 repeating

6. Write 0.444... (the 4 repeats forever) as a fraction.

7. Which number is rational?

   A. π

   B. √5

   C. √49

   D. √10

8. Write $\frac{2}{11}$ as a decimal, writing six digits after the point.

9. Write 0.666... (the 6 repeats forever) as a fraction in simplest form.

10. A number's decimal goes on forever and never repeats. The number is...

    A. rational

    B. irrational

    C. a whole number

    D. a fraction of two integers

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On Level

Grade-level practice.

1. Write 0.454545... (45 repeats forever) as a fraction in simplest form.

2. Write 0.1666... (only the 6 repeats) as a fraction in simplest form.

3. Which list has only irrational numbers?

   A. $\sqrt{2}$, π, $\sqrt{11}$

   B. $\sqrt{2}$, $\sqrt{9}$, π

   C. π, 3.14, $\sqrt{3}$

   D. $\sqrt{5}$, $\frac{1}{3}$, $\sqrt{6}$

4. Write 0.363636... (36 repeats forever) as a fraction in simplest form.

5. Write 1.333... (the 3 repeats forever) as a mixed number.

6. How many of these numbers are irrational?

   $\sqrt{25}$, $\sqrt{12}$, $-\frac{7}{3}$, 0.010010001... (one more 0 each time), 2π

7. Which is the decimal form of $\frac{7}{12}$?

   A. 0.712

   B. 1.714285…

   C. 0.583583…, with 583 repeating

   D. 0.583333…, with the 3 repeating

8. Write 0.090909… (09 repeats forever) as a fraction in simplest form.

9. Write 2.272727… (27 repeats forever) as a mixed number in simplest form.

10. Which statement is true?

    A. Every repeating decimal is rational.

    B. Every square root is irrational.

    C. π equals $\frac{22}{7}$ exactly.

    D. 0.333… is irrational because it never ends.

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Challenge

Multi-step and word problems that stretch it.

1. Write 0.8333… (only the 3 repeats) as a fraction in simplest form.

2. Write 0.142142142… (142 repeats forever) as a fraction in simplest form.

3. Ava wants to write 0.777… as a fraction. She writes $x = 0.777\ldots$ and $10x = 7.777\ldots$. Then she writes $10x - x = 7$, so $x = \frac{7}{10}$. What is her mistake?

   A. There is no mistake

   B. $10x$ should be $77.777\ldots$

   C. She should subtract 0.7, not x

   D. $10x - x$ is $9x$, so $x = \frac{7}{9}$

4. Write 0.2454545… (only 45 repeats) as a fraction in simplest form.

5. Is 0.12122122212222… (one more 2 in each group) rational or irrational?

6. Let $x = 0.999\ldots$ (the 9 repeats forever). Use $10x - x$ to find x as a whole number.

7. Order from least to greatest: $\frac{5}{11}$, 0.45, 0.454

8. A calculator shows $\sqrt{3}$ as 1.732050808. Which statement is true?

   A. $\sqrt{3}$ is rational because every square root is rational.

   B. The calculator shows a rounded value; the decimal for $\sqrt{3}$ never ends or repeats.

   C. $\sqrt{3} = 1.732050808$ exactly, so $\sqrt{3}$ is rational.

   D. The decimal for $\sqrt{3}$ starts repeating after the last 8.

9. Write 0.5888… (only the 8 repeats) as a fraction in simplest form.

10. Add 0.333… (the 3 repeats) and 0.454545… (45 repeats). Write the sum as a fraction in simplest form.