LESSON MAKER PRO

Decimal Detective

Turn repeating decimals into fractions.

GRADE 8 · 8.NS.A.1

CCSS.Math.Content.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..."

NAME _____ DATE _____

THE BIG IDEA

Every number has a decimal expansion. A decimal that ends or repeats is rational, while a decimal that never ends and never repeats is irrational. Parentheses show the digits that repeat, and multiplication plus subtraction can turn a repeating decimal into a fraction.

WORKED EXAMPLE

Write 0.(7) as a fraction in simplest form.

1. Let x = 0.777...
2. Multiply by 10: 10x = 7.777...
3. Subtract: 10x - x = 7, so 9x = 7.
4. Divide by 9: x = 7/9.

Answer: 7/9

PRACTICE 6 problems

1 Write 0.(3) as a fraction in simplest form.

ANSWER _____

2 Write 0.(27) as a fraction in simplest form.

ANSWER _____

3 Write 0.1(6) as a fraction in simplest form.

ANSWER _____

4 Write 2.4(5) as a fraction in simplest form.

ANSWER _____

5 Write 0.08(3) as a fraction in simplest form.

ANSWER _____

6 Write 1.2(34) as a fraction in simplest form.

ANSWER _____

APPLY IT Show your work

1 A video-editing app shows that Maya's finished clip is 0.1(8) hour long. Write the clip length as a fraction of an hour in simplest form.

WORK SPACE

ANSWER _____

2 A game report displays a player's win rate as 0.(45). Write this win rate as a fraction in simplest form.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Write 3.0(27) as a fraction in simplest form. Explain why you multiply by two different powers of 10 before subtracting.

_____

_____

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Write 0.(3) as a fraction in simplest form.	**1/3**
2	Write 0.(27) as a fraction in simplest form.	**3/11**
3	Write 0.1(6) as a fraction in simplest form.	**1/6**
4	Write 2.4(5) as a fraction in simplest form.	**221/90**
5	Write 0.08(3) as a fraction in simplest form.	**1/12**
6	Write 1.2(34) as a fraction in simplest form.	**611/495**

PART 2 · APPLY IT

1. **17/90 hour** Let x = 0.1888.... Then 100x - 10x = 18 - 1, so 90x = 17 and x = 17/90.
2. **5/11** Let x = 0.4545.... Then 100x - x = 45, so 99x = 45 and x = 45/99 = 5/11.

CHALLENGE

333/110. Let x = 3.0272727.... Multiply by 1000 and by 10 so the repeating parts line up: 1000x - 10x = 3027.2727... - 30.2727... = 2997. Thus 990x = 2997, so x = 333/110. The two powers of 10 move the one nonrepeating digit and the two repeating digits into matching positions.

Accept equivalent fractions if the conversion is correct, but students should simplify when directed. Parentheses mean that only the digits inside the parentheses repeat.