LESSON MAKER PRO

Decimals That Repeat

Turn repeating decimals into exact fractions.

GRADE 8 · 8.NS.1d

8.NS.1d "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

A repeating decimal has a group of digits that continues forever. To write it as a fraction, call the decimal x. Multiply x by powers of 10 until the repeating parts line up, then subtract the equations.

WORKED EXAMPLE

Write 0.1666... as a fraction.

1. Let x = 0.1666...
2. Multiply by 10: 10x = 1.6666...
3. Multiply by 100: 100x = 16.6666...
4. Subtract: 90x = 15, so x = 15/90.

Answer: 1/6

PRACTICE 6 problems

1 Write 0.333... as a fraction in simplest form.

ANSWER _____

2 Write 0.454545... as a fraction in simplest form.

ANSWER _____

3 Write 0.0666... as a fraction in simplest form.

ANSWER _____

4 Write 0.1222... as a fraction in simplest form.

ANSWER _____

5 Write 2.777... as a fraction in simplest form.

ANSWER _____

6 Write 0.090909... as a fraction in simplest form. Is it greater than or less than 1/10?

ANSWER _____

APPLY IT Show your work

1 A game awards 0.363636... point for each badge. What fraction of a point is one badge worth? How many points are 11 badges worth?

WORK SPACE

ANSWER _____

2 A video creator sets a clip to play at 0.8333... times its normal speed. Write this speed as a fraction of normal speed. If the clip normally plays 60 frames each second, how many frames play each second at the new speed?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Write 0.1232323... as a fraction in simplest form. Explain which digits line up when you subtract.

WORK SPACE AND ANSWER

ANSWER KEY

Decimals That Repeat

GRADE 8 · 8.NS.1d

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Write 0.333... as a fraction in simplest form.	**1/3**
2	Write 0.454545... as a fraction in simplest form.	**5/11**
3	Write 0.0666... as a fraction in simplest form.	**1/15**
4	Write 0.1222... as a fraction in simplest form.	**11/90**
5	Write 2.777... as a fraction in simplest form.	**25/9**
6	Write 0.090909... as a fraction in simplest form. Is it greater than or less than 1/10?	**1/11; less than 1/10**

PART 2 · APPLY IT

1. **4/11 point per badge; 4 points for 11 badges** Let x = 0.363636.... Then 100x - x = 36, so x = 36/99 = 4/11. Multiply 4/11 by 11 to get 4 points.
2. **5/6 of normal speed; 50 frames per second** Let x = 0.8333.... Subtract 10x = 8.333... from 100x = 83.333... to get 90x = 75, so x = 5/6. Then 60 times 5/6 is 50.

CHALLENGE

61/495. If x = 0.1232323..., then 10x = 1.232323... and 1000x = 123.232323.... The repeating digits 23 line up, so 990x = 122 and x = 122/990 = 61/495.

Accept equivalent fractions if students have not simplified them. In the challenge, students should identify the repeating 23 in both equations they subtract.