LESSON MAKER PRO

Decimal Detectives

Follow the remainders to find the pattern.

GRADE 7 · 7.NOS.A.2.d

7.NOS.A.2.d "Analyze the decimal representation of a quotient resulting from dividing rational numbers to determine whether it terminates or repeats and use this pattern to explain why all rational numbers have decimal forms that either terminate or..."

NAME _____ DATE _____

WATCH THE REMAINDER

When you divide, a remainder of 0 means the decimal terminates. If a remainder appears again, the same division steps and digits will repeat. There are only finitely many possible remainders, so every quotient of two integers with a nonzero divisor must terminate or repeat.

WORKED EXAMPLE

Divide 5 by 12. Write the decimal and tell whether it terminates or repeats.

1. 12 goes into 50 four times, with a remainder of 2.
2. 12 goes into 20 once, with a remainder of 8.
3. 12 goes into 80 six times, with a remainder of 8 again.

Answer: 5/12 = 0.41666... . The remainder of 8 repeats, so the digit 6 repeats.

PRACTICE 6 problems

1 Divide 3 by 8. Write the decimal and tell whether it terminates or repeats.

ANSWER _____

2 A student says 2/9 ends after two decimal places. Find its decimal and explain whether the student is correct.

ANSWER _____

3 Divide 4 by 11. Write the first six digits after the decimal point and name the block of digits that repeats.

ANSWER _____

4 Divide 7 by 20. Write the decimal and tell whether it terminates or repeats.

ANSWER _____

5 When you divide 1 by 6, the remainder after the hundredths digit is 4. The next step gives a remainder of 4 again. Write the decimal and explain what the repeated remainder tells you.

ANSWER _____

6 Divide 9 by 16. Write the decimal and tell whether it terminates or repeats.

ANSWER _____

APPLY IT Show your work

1 A 4-minute song is split into 15 equal clips for a video edit. How many minutes long is each clip? Write the decimal and tell whether it terminates or repeats.

WORK SPACE

ANSWER _____

2 A 7-kilometer bike trail is divided into 8 equal sections for a route map. How long is each section in kilometers? Write the decimal and tell whether it terminates or repeats.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Divide 13 by 30. Write its decimal, tell whether it terminates or repeats, and explain why every quotient of two integers with a nonzero divisor must have one of these two kinds of decimals.

WORK SPACE AND ANSWER

ANSWER KEY

Decimal Detectives

GRADE 7 · 7.NOS.A.2.d

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Divide 3 by 8. Write the decimal and tell whether it terminates or repeats.	**3/8 = 0.375; terminates.**
2	A student says 2/9 ends after two decimal places. Find its decimal and explain whether the student is correct.	**2/9 = 0.222... . The student is incorrect because the digit 2 repeats without ending.**
3	Divide 4 by 11. Write the first six digits after the decimal point and name the block of digits that repeats.	**The first six digits are 363636. The repeating block is 36.**
4	Divide 7 by 20. Write the decimal and tell whether it terminates or repeats.	**7/20 = 0.35; terminates.**
5	When you divide 1 by 6, the remainder after the hundredths digit is 4. The next step gives a remainder of 4 again. Write the decimal and explain what the repeated remainder tells you.	**1/6 = 0.1666... . The repeated remainder means the digit 6 will keep repeating.**
6	Divide 9 by 16. Write the decimal and tell whether it terminates or repeats.	**9/16 = 0.5625; terminates.**

PART 2 · APPLY IT

1. **Each clip is 0.2666... minute long; the decimal repeats.** Divide 4 by 15. The remainder of 10 recurs, so the digit 6 repeats.
2. **Each section is 0.875 kilometer long; the decimal terminates.** Divide 7 by 8. The remainder reaches 0 after three decimal places.

CHALLENGE

13/30 = 0.4333...; it repeats. For any nonzero divisor, use its positive value when dividing. Only finitely many remainders are possible: 0 through one less than that value. A remainder of 0 makes the decimal terminate. Otherwise, a remainder must appear again, causing the digits to repeat.

Accept a bar over the repeating digit or block in place of an ellipsis. For explanations, accept any accurate statement that a repeated remainder leads to repeated digits.