DO NOW: I-5 REVIEW



Lesson Check

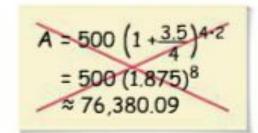
Do you know HOW?

- **1.** What is the growth factor in the equation $y = 34 \cdot 4^{x}$?
- **2.** What is the initial amount in the function $y = 15 \cdot 3^{x}$?
- **3.** What is the decay factor in the function $y = 17 \cdot 0.2^{x}$?
- A population of fish in a lake decreases 6% annually. What is the decay factor?
- Suppose your friend's parents invest \$20,000 in an account paying 5% interest compounded annually. What will the balance be after 10 yr?

Do you UNDERSTAND? MATHEMATICAL PRACTICES



- 6. Vocabulary How can you tell if an exponential function models growth or decay?
- 7. Reasoning How can you simplify the compound interest formula when the interest is compounded annually? Explain.
- 8. Error Analysis A student deposits \$500 into an account that earns 3.5% interest compounded quarterly. Describe and correct the student's error in calculating the account balance after 2 yr.



7.8 GEOMETRIC SEQUENCES

AGENDA FOR TODAY

- Do Now
- Intro to Geometric Sequence
- Skill 1: Identifying if it is a sequence
- Skill 2: Finding Recursive and Explicit formulas
- Skill 3: Using sequences as functions
- Practice
- Closure/ Shout out

 Objective: students will use the properties of exponential functions to find patterns in geometric sequences

INTRO TO GEOMETRIC SEQUENCE

take note

Key Concept Geometric Sequence

A geometric sequence with a *starting value* $\frac{a}{a}$ and a *common ratio* r is a sequence of the form $\frac{a}{a}$, $\frac{ar^2}{ar^3}$, ...

A recursive definition for the sequence has two parts:

$$a_1 = a$$
 Initial condition $a_n = a_{n-1} \cdot r$, for $n \ge 2$ Recursive formula

An explicit definition for this sequence is a single formula:

$$a_n = a_1 \cdot r^{n-1}$$
, for $n \ge 1$

Every geometric sequence has a starting value and a common ratio. The starting value and common ratio define a unique geometric sequence.

SKILL I: IS IT A SEQUENCE?



 Rule: if it is being multiplied by the same number between each term, then it is a sequence



QUICK PRACTICE

Determine whether the sequence is a geometric sequence. Explain.



See Problem 1.

10. 2, 8, 32, 128, . . .

11. 5, 10, 15, 20, . . .

12. 162, 54, 18, 6, . . .

13. 256, 192, 144, 108, . . .

14. 6, -12, 24, -48, . . .

15. 10, 20, 40, 80, . . .

Find the common ratio for each geometric sequence.

16. 3, 6, 12, 24, . . .

17. 81, 27, 9, 3, . . .

18. 128, 96, 72, 54, . . .

19. 5, 20, 80, 320, . . .

20. 7, -7, 7, -7, . . .

21. 2, -6, 18, -54, . . .

SKILL 2: RECURSIVE AND EXPLICIT FORMULAS

Recursive:

• Explicit:

$$a_1 = a$$
 Initial condition $a_n = a_{n-1} \cdot r$, for $n \ge 2$ Recursive formula

$$a_n = a_1 \cdot r^{n-1}$$
, for $n \ge 1$

Find the recursive and explicit formulas for the sequence 7, 21, 63, 189, . . .

LET'S PRACTICE

Find the recursive and explicit formulas for each of the following. **a.** 2, 4, 8, 16, **b.** 40, 20, 10, 5, . . .

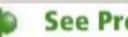
Write a recursive formula and an explicit formula for each sequence. Find the 8th term of each sequence.

a. 14, 84, 504, 3024, ...

b. 648, 324, 162, 81, . . .

YOU TRY...

Write the explicit formula for each geometric sequence.



See Problem 2.

24. 200, 40, 8,
$$1\frac{3}{5}$$
, ...

Write the recursive formula for each geometric sequence.

32.
$$-\frac{1}{36}, \frac{1}{12}, -\frac{1}{4}, \frac{3}{4}, \dots$$

33. 192, 128,
$$85\frac{1}{3}$$
, $56\frac{8}{9}$, . . .

SKILL 3: USING SEQUENCES AS FUNCTIONS

A geometric sequence has an initial value of 6 and a common ratio of 2. Write a function to represent the sequence. Graph the function.

$$a_n = a_1 \cdot r^{n-1}$$
 Explicit formula $f(x) = 6 \cdot 2^{x-1}$ Substitute $f(x)$ for $f(x)$

$$f(x) = 6 \cdot 2^{x-1}$$
 Substitute $f(x)$ for a_n , 6 for a_1 , and 2 for r .

PARTNER UP AND GRAPH!

A geometric sequence has an initial value of 18 and a common ratio of $\frac{1}{2}$. Write a function to represent this sequence. Graph the function.

EXAMPLE 2:

Two managers at a clothing store created sequences to show the original price and the marked-down prices of an item. Write a recursive formula and an explicit formula for each sequence. What will the price of the item be after the 6th markdown?

First Sequence

\$60, \$51, \$43.35, \$36.85,...

Second Sequence

\$60, \$52, \$44, \$36, ...

CLOSURE

- Where would you find or use geometric sequences?
- How does this concept use the other skills we have learned in chapter 7?
- Shout out

- Objective: students will use the properties of exponential functions to find patterns in geometric sequences
- . .