ALBERT

Name _____ Date _____

Arithmetic and Geometric Sequences Worksheet

Algebra 1 · Common Core HSF-BF.A.2

> Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Practice

Builds the skill step by step.

1. The arithmetic sequence 5, 9, 13, ... has explicit rule $a_n = 4n + 1$. What is a_{10}?

2. What is the common difference of 20, 17, 14, ...?

3. What is the common ratio of 3, 6, 12, ...?

4. The geometric sequence 3, 6, 12, ... continues. What is the 6th term?

5. Which recursive rule gives 7, 10, 13, ...?

   A. $a_1 = 3, a_n = a_{n-1} + 7$

   B. $a_1 = 7, a_n = a_{n-1} + 3$

   C. $a_1 = 7, a_n = 3a_{n-1}$

   D. $a_1 = 10, a_n = a_{n-1} - 3$

6. Which explicit rule gives 2, 10, 50, …?

   A. $a_n = 5 \cdot 2^{n-1}$

   B. $a_n = 8n - 6$

   C. $a_n = 2 \cdot 5^{n-1}$

   D. $a_n = 2 \cdot 5^n$

7. An arithmetic sequence has $a_1 = 4$ and common difference 6. What is a_5?

8. A geometric sequence has $a_1 = 81$ and common ratio $\frac{1}{3}$. What is a_4?

9. Is 1, 4, 16, 64, … arithmetic or geometric?

   A. geometric

   B. arithmetic

   C. both

   D. neither

10. Leo has 100 dollars and saves 25 dollars a week: $a_n = 100 + 25n$ after n weeks. What is a_8?

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On Level

Grade-level practice.

1. $a_1 = 12$ and $a_n = a_{n-1} - 4$. The explicit rule is $a_n = 16 - 4n$. What is a_{20}?

2. $a_n = 5 \cdot 3^{n-1}$. In the recursive form, what is a_1?

3. An arithmetic sequence has $a_3 = 11$ and $a_7 = 27$. What is the common difference?

4. For that sequence ($a_3 = 11$, $a_7 = 27$), what is a_1?

5. A geometric sequence of positive numbers has $a_2 = 6$ and $a_4 = 54$. What is the common ratio?

6. Row 1 of a stadium section has 20 seats, row 2 has 24 and row 3 has 28. How many seats are in row 25?

7. A culture has 100 bacteria at hour 0 and doubles every hour. How many are there at hour 5?

8. A salary starts at 40,000 dollars and rises 2,000 dollars each year. What kind of sequence models it?

   A. arithmetic

   B. geometric

   C. neither

   D. both

9. Translate the recursive rule $a_1 = 8$, $a_n = \frac{1}{2}a_{n-1}$ into an explicit rule and explain.

10. Which term of 4, 11, 18, ... is 151?

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Challenge

Multi-step and word problems that stretch it.

1. The geometric sequence 2, −6, 18, … continues. What is the 6th term?

2. An arithmetic sequence has $a_5 = 30$ and $a_{12} = 65$. What is a_{20}?

3. A ball is dropped from 10 feet, and each bounce reaches 80% of the previous height. How high is the 4th bounce?

4. Which term of 3, 7, 11, … is the first one greater than 200?

5. Which explicit rule is the same as $a_n = 3 + 4(n - 1)$?

   A. $a_n = 4n + 3$

   B. $a_n = 3n + 4$

   C. $a_n = 7n - 4$

   D. $a_n = 4n - 1$

6. A geometric sequence has $a_1 = 1000$ and common ratio 1.05. What is a_3?

7. A theater has 15 rows. Row 1 has 12 seats and each row has 2 more than the row before. How many seats are there in all?

8. A town of 5,000 people grows 3% each year. Explain why this is a geometric sequence and write a rule for the population in year n (year 1 = 5,000).

9. $a_n = 7 - 2n$. What is the common difference?

10. An arithmetic sequence and a geometric sequence both start 2, 4, …. What is the 5th term of the geometric one minus the 5th term of the arithmetic one?