

AP Precalculus
Arithmetic vs Geometric Sequences

Arithmetic vs Geometric Sequences | APPC-U02-P01

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for terms, safe explicit form, and exponential limitation, explicit rule, signs, and real-domain limitation, all ratios and sequences, possible completions, two valid completions and conclusion and classification with failure evidence.

8 PDFs and a README; 51 buyer pages.

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Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Classify the consecutive terms 1, 4, 9, 16 as arithmetic, geometric, or neither. For the answer bank, record the classification. Complete and justify all parts of the original task in your work. _____ Bank label: _____	Determine the sequence type for $-4, -9, -14, -19$ and state its step change. For the answer bank, record the common difference. Complete and justify all parts of the original task in your work. _____ Bank label: _____
Translate $a_0=12$ and $a_n=a_{n-1}-7$ into a direct rule for whole-number n. For the answer bank, record the expression for a_n. Complete and justify all parts of the original task in your work. _____ Bank label: _____	Convert $b_n=125(0.2^{n+1})$, $n = 0, 1, 2, \dots$, to a recurrence with the correct zeroth term. For the answer bank, record the zeroth term b_0. Complete and justify all parts of the original task in your work. _____ Bank label: _____
Classify 7, 14, 28, 56 and state the common change. For the answer bank, record the common ratio. Complete and justify all parts of the original task in your work. _____ Bank label: _____	Write an explicit formula for $b_1=100$ and $b_n=b_{n-1}-15$ for $n \geq 2$. For the answer bank, record the expression for b_n. Complete and justify all parts of the original task in your work. _____ Bank label: _____
For $a_n=\frac{7-2n}{5}$ at whole-number $n \geq 0$, find a_0 and an exact recurrence. For the answer bank, record the zeroth term a_0. Complete and justify all parts of the original task in your work. _____ Bank label: _____	An arithmetic sequence has $a_{10}=1$ and decreases by 2 each step. Write a_n from $n = 1$ onward and find a_1. For the answer bank, record the first term a_1. Complete and justify all parts of the original task in your work. _____ Bank label: _____

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

START Given $a_0=7$ and $a_n=a_{n-1}+4$ for $n \geq 1$, write a direct rule for whole-number n. Your response: _____	Incoming: $d = 5$ and $a_2=-1$. An arithmetic sequence has $a_3=14$ and $a_8=34$. Find its common difference and a_1. Context/domain: sequence <table border="1"> <tbody> <tr> <td>3</td> <td>14</td> </tr> <tr> <td>8</td> <td>34</td> </tr> </tbody> </table> Your response: _____	3	14	8	34
3	14				
8	34				
Incoming: $r = 3$ and $a_1=-9$. A geometric sequence with positive ratio satisfies $a_2=12$ and $a_5=324$. Recover r and a_1. Your response: _____	Incoming: $d = -3$ and $a_1=31$. An arithmetic sequence satisfies $a_6=-5$ and $a_{10}=19$. Determine d and extrapolate backward to a_1. Your response: _____				
Incoming: $r = -3$, uniquely. For an arithmetic sequence indexed from 0, $a_2=5$ and $a_7=-10$. Find the common difference and a_0. Context/domain: sequence <table border="1"> <tbody> <tr> <td>2</td> <td>5</td> </tr> <tr> <td>7</td> <td>-10</td> </tr> </tbody> </table> Your response: _____	2	5	7	-10	Incoming: Geometric with ratio 0.8. A positive-ratio geometric sequence has $a_4=54$ and $a_7=2$. Recover the common ratio and a_1. Your response: _____
2	5				
7	-10				

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

The exact terms are 2, 10, 50, 245. A student calls them geometric with ratio 5. Evaluate the claim and state the fourth term that would make it true. Student work/claim: The first two ratios equal 5, so all four given terms form a geometric sequence. Identify the first invalid step or inference in the displayed work. Correct it and complete the original task.

A student labels 10, 7, 4, 1, -3 arithmetic with $d = -3$. Decide whether the complete exact list supports the claim and repair the last term if needed. Student work/claim: Every difference in the given list is -3 . Identify the first invalid step or inference in the displayed work. Correct it and complete the original task.

Can the blank in 4, ?, 14, 19, 25 be filled so the entire exact list is arithmetic? Explain which evidence is decisive. Student work/claim: Filling the blank with 9 makes the entire list arithmetic. Identify the first invalid step or inference in the displayed work. Correct it and complete the original task.

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Full Worked Solutions - excerpt

Worked example

Problem. Given $a_0 = 7$ and $a_n = a_{n-1} + 4$ for $n \geq 1$, write a direct rule for whole-number n .

Answer. $a_n = 7 + 4n$ for $n = 0, 1, 2, \dots$

Explanation and check.

From index 0 to index n there are n additions of 4, so the term is $7 + 4n$.

Worked example

Problem. Starting at $a_3 = 81$, each later term is one third of the previous term. Write the explicit rule for $n \geq 3$.

Answer. $a_n = 81\left(\frac{1}{3}\right)^{n-3}$.

Explanation and check.

The exponent is zero at the first allowed index and counts the subsequent divisions by 3.