Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Arithmetic Sequence Explicit and Recursive Rules

Arithmetic Sequence Explicit and Recursive Rules | A1-U04-P11

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for derived rule, comparison, diagnosis, or justified conclusion.

8 PDFs and a README; 46 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

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Name: ____________ **Date:** ____________ **Class:** ____________

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

A declared arithmetic sequence has $a_1 = 4$ and $a_2 = 7$. Its domain is the integers $n \geq 1$. Derive both an explicit rule and a recursive rule. Bank label: ______	A book club log has 0 pages at index 0 and changes by 15 pages per index. Here n counts finished sessions. Write matching explicit and recursive rules for the recorded quantity b_n. Bank label: ______
Translate this initialized recurrence into one explicit formula: $a_6 = -2, a_n = a_{n-1} + 4$ for integers $n \geq 7$. Bank label: ______	The same sequence is given by $c_n = -5 + 2(n - 4)$; $c_4 = -5, c_n = c_{n-1} + 2$. For the task 'explain the change from one stage to the next', choose a useful form and justify the choice. Bank label: ______
Translate this initialized recurrence into one explicit formula: $a_1 = 3, a_n = a_{n-1} + 4$ for integers $n \geq 2$. Bank label: ______	A planted tree row has 23 trees at index 4 and changes by 3 trees per index. Here the first supplied row is row 4. Write matching explicit and recursive rules for the recorded quantity p_n. Bank label: ______
Replace the repeated update with direct index access: $a_1 = 10, a_n = a_{n-1} - 2$ for integers $n \geq 2$. Bank label: ______	$d_2 = 6, d_3 = 2$, and $d_n = 2d_{n-1} - d_{n-2}$ for $n \geq 4$. Find d_4, d_5, d_6 and decide whether the observed change is constant. Bank label: ______

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Express the same indexed sequence without predecessor notation: $a_7 = 5, a_n = a_{n-1} - 1$ for integers $n \geq 8$.	A savings envelope has 25 dollars at index 0 and changes by 6 dollars per index. Here n counts completed weekly deposits. Write matching explicit and recursive rules for the recorded quantity a_n.
Write a closed arithmetic rule equivalent to $a_1 = -7, a_n = a_{n-1} - 4$ for integers $n \geq 2$.	A candle measurement has 30 centimeters at index 0 and changes by -1 centimeters per index. Here n counts elapsed hours. The record stops at index 30. Write matching explicit and recursive rules for the recorded quantity c_n.
Express the same indexed sequence without predecessor notation: $a_1 = 8, a_n = a_{n-1} + 0$ for integers $n \geq 2$.	A constant-additive sequence includes $a_1 = 12$ and $a_5 = 0$. Its domain is the integers $n \geq 1$. Derive both an explicit rule and a recursive rule.

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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.

Incoming: $a_3 = 15$.

Translate this initialized recurrence into one explicit formula: $a_{-2} = 9, a_n = a_{n-1} - 4$ for integers $n \geq -1$.

Your response: ____________

Incoming: For integers $n \geq -2, a_n = 9 - (4)(n + 2)$.

Reverse the known additive updates to recover the anchor: $a_n = a_{n-1} + \frac{3}{2}$ for $n \geq 1$, and $a_9 = \frac{27}{2}$. The sequence begins at $n = 0$. Find a_0.

Your response: ____________

Incoming: For integers $n \geq 8, a_n = 17 - (3)(n - 8)$.

Determine the missing initial value for this forward recurrence: $a_n = a_{n-1} + \frac{7}{3}$ for $n \geq 4$, and $a_{15} = 43$. The sequence begins at $n = 3$. Find a_3.

Your response: ____________

Incoming: For integers $n \geq 3, a_n = 11 - (6)(n - 3)$.

Supply both parts of the recursive specification for $a_n = (0)n + 6$ for integers $n \geq 1$.

Your response: ____________

Incoming: For integers $n \geq 0, a_n = -\frac{3}{2} + (\frac{5}{2})(n)$.

Work backward by the indexed number of steps: $a_n = a_{n-1} + 0$ for $n \geq 8$, and $a_{19} = 19$. The sequence begins at $n = 7$. Find a_7.

Your response: ____________

Incoming: $a_4 = 25, a_n = a_{n-1} + 6$ for integers $n \geq 5$.

$b_0 = 1, b_1 = 4$, and $b_n = b_{n-1} + 2b_{n-2}$ for $n \geq 2$. Compute b_2, b_3, b_4.

Your response: ____________

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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.

Audit this sequence work: Terms are $5, 8, 11, \ldots$ at $n = 1, 2, 3, \ldots$. A student proposes $a_n = 5 + 3n$. Identify the defect and state a correction.

Audit this sequence work: A student converts $b_n = 9 + 4n$ for $n \geq 0$ to $b_0 = 9, b_n = b_{n-1} + 9$. Identify the defect and state a correction.

Audit this sequence work: A table gives $g_2 = 11, g_5 = 2$ for an arithmetic sequence. A proposed rule is $g_n = 11 - 9(n-2)$. Identify the defect and state a correction.

Audit this sequence work: For $a_n = 7 - 2(n-4), n \geq 4$, a student gives the recurrence $a_1 = 7, a_n = a_{n-1} - 2$. Identify the defect and state a correction.

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Full Worked Solutions - excerpt

Worked example

Problem. Convert the explicit arithmetic rule to a complete recurrence: $a_n = (3)n + 2$ for integers $n \geq 1$.

Answer. $a_1 = 5, a_n = a_{n-1} + 3$ for integers $n \geq 2$.

Explanation and check.

The coefficient of n is the consecutive-term difference; evaluate the formula at the first allowed index for the anchor.

Worked example

Problem. Convert the explicit arithmetic rule to a complete recurrence: $a_n = (-5)n + 20$ for integers $n \geq 6$.

Answer. $a_6 = -10, a_n = a_{n-1} - 5$ for integers $n \geq 7$.

Explanation and check.

The coefficient of n is the consecutive-term difference; evaluate the formula at the first allowed index for the anchor.