

AP Precalculus
Sequences to Linear and Exponential Models

Sequences to Linear and Exponential Models | APPC-U02-P02

96 problems · Four activity formats

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Topic focus
Across 96 tasks this topic asks for differences, ratios, interpretation, domain judgment, domain distinction, two compatible models, existence and reason and class and amount.
8 PDFs and a README; 62 buyer pages.

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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.

Extend $a(n) = -4 + 1.5n$ from whole-number indices to all real x and evaluate $f(-2)$. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. _____ Bank label: _____	An account begins with \$140 and receives exactly \$25 each week with no interest. Is the weekly pattern linear or exponential, and what is the balance after one week? For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. _____ Bank label: _____
A sequence starts at 18 and increases by 6 per index. If the constant rate is extended between indices, what is its value at index 2.5? For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. The starting value is the value at index 0. _____ Bank label: _____	A material starts at 250g and loses 12% of current mass per hour. Give its factor and model. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value. _____ 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.

The sequence rule is $a(n) = 3 + 2n$ for whole-number n at least 0. Extend the same linear rule to real x at least 0, then find $f(2.5)$. 	Exact samples at $x = 0, 1, 2, 3$ are 5, 8, 11, 14. Which model class is consistent, and what does the finite table not prove? Context/domain: real-input data <table border="1"> <tbody> <tr><td>0</td><td>5</td></tr> <tr><td>1</td><td>8</td></tr> <tr><td>2</td><td>11</td></tr> <tr><td>3</td><td>14</td></tr> </tbody> </table> 	0	5	1	8	2	11	3	14
0	5								
1	8								
2	11								
3	14								
A balance starts at \$200 and rises each hour by 10% of the initial \$200, not its current value. Construct a real-time rule and classify it. 	For exact points (0, 1), (2, 7), and (5, 16), compare change per input unit rather than raw differences. Which class is supported? Context/domain: real-input data <table border="1"> <tbody> <tr><td>0</td><td>1</td></tr> <tr><td>2</td><td>7</td></tr> <tr><td>5</td><td>16</td></tr> </tbody> </table> 	0	1	2	7	5	16		
0	1								
2	7								
5	16								
$L(x) = 4 + 16x$ and $E(x) = 4(3^x)$ share (0, 4) and (2, 36). Compare their values at $x = 1$. Context/domain: matched models <table border="1"> <tbody> <tr><td>0</td><td>4</td></tr> <tr><td>2</td><td>36</td></tr> </tbody> </table> 	0	4	2	36	A linear table gives 10, 15, 20 and an exponential table gives 10, 15, 22.5 at $x = 0, 1, 2$. After the shared +5, what differs? 				
0	4								
2	36								

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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

Production starts at 12 units and adds 6 units per minute. Write the model. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your response: _____

Incoming: Both give factor 0.8: $\sqrt{0.64} = 0.8$ and cube root of $0.512 = 0.8$.

A sequence has value -2 at index 0 and adds 5 at each next whole-number index. Extend its constant-rate rule to real x and evaluate it at $x = -1.5$. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your response: _____

Incoming: L keeps $+5$ while ratios fall; E keeps ratio 2 while increments grow 5, 10, 20.

At consecutive inputs $-2, -1, 0, 1$, the exact outputs are $-7, -2, 3, 8$. Classify the data from their change pattern. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Context/domain: integer samples

-2	-7
-1	-2
0	3
1	8

Your response: _____

Incoming: Linear: 105. Exponential: 15.

A population starts at 90 and grows 7% of current size per year. Write the model. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

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.

A display begins with 46 items and staff add exactly 7 items each day. Classify the model and find the count after four days. Student work: exponential; 74 items. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Use $L(x) = 12 + 6x$ and $E(x) = 12(2^x)$ to refute “same starting value means same change.” Identify the precise error or unsupported step in the stated claim or method, then give the corrected conclusion and justify it from the supplied information.

Pallet count is $p(n) = 40 + 6n$ after n completed trucks. Does $p(2.5) = 55$ describe a sequence term in this context? Student work: No. The algebraic line gives 55, but 2.0 completed trucks is outside the stated event domain. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

An amount starts at 400mg and loses 5% of its current amount each hour. Classify the change and find the amount after two hours. Student work: linear decay; 361mg. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

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Full Worked Solutions - excerpt

Worked example

Problem. A tank starts with $500L$ and drains at a fixed $30L$ per day. Write the model and name its change type.

Answer. $V(t) = 500 - 30t$, a linear decrease while $V(t) \geq 0$.

Explanation and check.

A fixed amount per time unit gives slope -30 rather than a percentage.

Worked example

Problem. An investment starts at \$ 600 and grows 5% of its current balance per year. State its factor and continuous-time rule.

Answer. The factor is 1.05 , so $B(t) = 600(1.05^t)$.

Explanation and check.

Current-value growth preserves a 1.05 multiplier while dollar increments change.