Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Sequences to Linear & Exponential Models | Algebra 1 | 10-Topic Bundle

10-topic bundle | 960 problems | Four activity formats

Included topics

The following pages list all 10 included resources in the suggested order, with a link to each product. Each resource retains its complete preview.

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

80 PDFs and 10 READMEs; 579 buyer PDF pages across the 10 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Included topics

10-topic bundle | 960 problems | Four activity formats

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01 **Sequences as Discrete Functions**

View individual product and its full preview

02 **Arithmetic Sequence Explicit and Recursive Rules**

View individual product and its full preview

03 **Linear Models from Initial Value and Rate**

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04 **Identifying Geometric Sequences**

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05 **Explicit Geometric Sequence Rules**

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06 **Recursive Geometric Sequence Rules**

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07 **Exponential Function Rules and Evaluation**

View individual product and its full preview

08 **Exponential Growth Models**

View individual product and its full preview

09 **Exponential Decay Models**

View individual product and its full preview

10 **Linear vs Exponential Models**

View individual product and its full preview

10 included resources | Complete resource previews follow this guide.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Sequences as Discrete Functions

Discrete vs. Continuous Functions and Domain | A1-U04-P10

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for verified sequence interpretation, value, domain, graph, or judgment.

8 PDFs and a README; 61 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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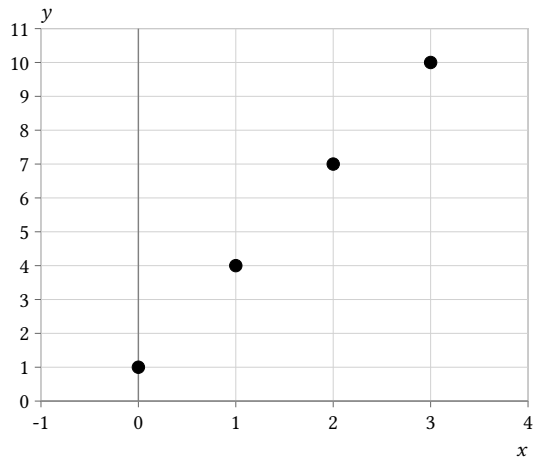
Algebra 1

Sequences as Discrete Functions

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.

A graph shows filled points $(0, 1), (1, 4), (2, 7), (3, 10)$ and explicitly says the sequence ends at $n = 3$. Should an arrow extend the pattern?



Bank label: _____

Given d_1=20 and d_n=d_{n-1}-n for $n \geq 2$, generate d_2, d_3, d_4.

Bank label: _____

A listed sequence starts at index 3: x_3=20, x_4=17, x_5=14. Which notation names the first listed value?

Index	Value
3	20
4	17
5	14

Bank label: _____

A sequence starts 1, 2, 5 and is explicitly known to have constant second difference 2. Is the next term determined?

Bank label: _____

Algebra 1

Sequences as Discrete Functions

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Given $a_n = n^2 - 3n + 5$ for positive integers, compute a_1, a_4, and a_7.	A sequence begins at $n = 4$ and follows $t_n = 5 + 3(n - 4)$. Find t_4 and t_9.
For $n = 1, 2, 3, \ldots$, the sequence is $a_n = 3n + 2$. Find a_4.	A sequence is defined only at perfect-square indices no greater than 25, beginning with 1. List the domain.
For $n = 0, 1, 2, \ldots$, define q_n as n plus -1 raised to the nth power. Find q_2 and q_3.	A sequence is defined only for n in $\{1, 4, 9, 16\}$ by $d_n = \sqrt{n} + n$. Evaluate d_9 and decide whether d_{10} exists.

Algebra 1

Sequences as Discrete Functions

Name: _____ **Date:** _____ **Class:** _____

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: Sample 4 has measured temperature 18.5 degrees.

The pairs for a sequence are $(1, 5), (2, 8), (3, 5)$. What does q_3 equal?

Index	Value
1	5
2	8
3	5

Your response: _____

Incoming: The lookup gives $q_3 = 5$.

Let e_0=2 and e_n=e_{n-1}+2n for $n \geq 1$. Determine e_1 through e_3.

Your response: _____

Incoming: The table entry is $c_0 = 7$.

The sequence T_k gives the temperature of sample k, and samples are numbered starting at 1. Interpret T_4=18.5.

Your response: _____

Incoming: No. $A_3 = 9$, whereas $B_3 = 15$.

The rule d_n=$5 - 4n$ applies for $n = 1, 2, 3, \ldots$. Find d_3.

Your response: _____

Incoming: The rule gives $p_6 = 15$.

The rule e_n is supplied for integers $2 \leq n \leq 6$. List its domain.

Your response: _____

Incoming: The fifth term is $b_5 = 10$.

The rule j_n=$(n - 2)^2 + 1$ is defined for $n = 0, 1, \ldots, 6$. Fill the entries for $n = 2$ and $n = 5$.

Your response: _____

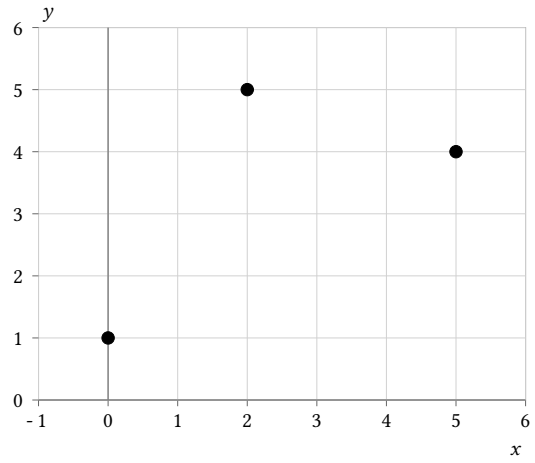
Algebra 1

Sequences as Discrete Functions

Name: _____ **Date:** _____ **Class:** _____

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 sequence graph has exactly $(0,1),(2,5),(5,4)$. A student adds points $(1,3),(3,\frac{14}{3}),(4,\frac{13}{3})$ by connecting segments. Diagnose all added points.

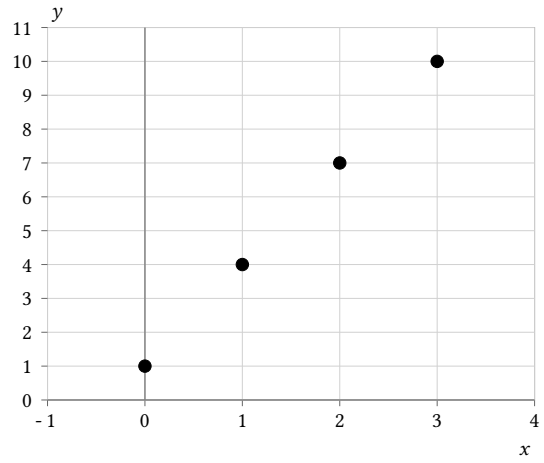


Sequences as Discrete Functions

Full Worked Solutions - excerpt

Worked example

Problem. A graph shows filled points $(0,1),(1,4),(2,7),(3,10)$ and explicitly says the sequence ends at $n=3$. Should an arrow extend the pattern?



Answer. No. The graph is exactly those four points and has no continuation arrow.

Explanation and check.

A visible pattern does not override the stated finite domain $\{0,1,2,3\}$.

Worked example

Problem. Given $d_1=20$ and $d_n=d_{n-1}-n$ for $n\geq 2$, generate d_2, d_3, d_4.

Answer. The values are $d_2=18, d_3=15$, and $d_4=11$.

Explanation and check.

Subtract 2, then 3, then 4 from the current preceding value.

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

Arithmetic Sequence Explicit and Recursive Rules

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: _____

Algebra 1

Arithmetic Sequence Explicit and Recursive Rules

Name: _____ **Date:** _____ **Class:** _____

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.

Algebra 1

Arithmetic Sequence Explicit and Recursive Rules

Name: _____ **Date:** _____ **Class:** _____

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: _____

Algebra 1

Arithmetic Sequence Explicit and Recursive Rules

Name: _____ **Date:** _____ **Class:** _____

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.

Arithmetic Sequence Explicit and Recursive Rules

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.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear Models from Initial Value and Rate

Linear Models from Initial Value and Rate | A1-U05-P16

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for an exact affine rule, domain, interpretation, or corrected model.

8 PDFs and a README; 50 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

Linear Models from Initial Value and Rate

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.

At use count $18,250$ grams remain and 15 grams are used per count. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = 18$ as the intercept. Bank label: _____	At week 40, a fund is 1000 dollars and then changes -22 dollars per week. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = 40$ as the intercept. Bank label: _____
A vertical coordinate starts at 3 units and changes by $-\frac{7}{3}$ units per step. Let t be the number of steps. Construct $Q(t)$ in units; identify the value at $t = 0$ and preserve the sign of the supplied rate. Bank label: _____	At $t = -8$ relative to calibration, a signal is 12 and rises $\frac{5}{2}$ per time unit. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = -8$ as the intercept. Bank label: _____
An inventory starts at 100 and processes at most 8 whole orders. Use the supplied initial-rate rule $Q(t) = 100 - 12t$. State the valid domain for t in orders, combining input type with the process limit. Bank label: _____	For the contextual model $Q(t) = 4 - \frac{1}{3}t$ on domain $-6 \le t \le 0$, explain the intercept and slope in the original units and say whether $Q(0)$ is observed or extrapolated. Q is a historical offset and $t = 0$ is the end of the observation window. Bank label: _____
A process has initial value 9 miles and rate 45 miles per hour. Express its model using meters and input measured in seconds; output counts multiply by $\frac{201168}{125}$ and input counts by 3600. Bank label: _____	For the contextual model $Q(t) = 31 + 5t$ on domain $t \ge 7$, explain the intercept and slope in the original units and say whether $Q(0)$ is observed or extrapolated. Q is a quantity measured from a baseline date, but observations start seven periods later. Bank label: _____

Algebra 1

Linear Models from Initial Value and Rate

Name: _____ **Date:** _____ **Class:** _____

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.

A temperature deviation rises from -10 to a cutoff of 8. Use the supplied initial-rate rule $Q(t) = -10 + \frac{9}{4}t$. State the valid domain for t in hours, combining input type with the process limit.	A signed elevation is -5 meters at time zero and falls 2 meters per kilometer traveled. Let t be the number of kilometers. Construct $Q(t)$ in meters; identify the value at $t = 0$ and preserve the sign of the supplied rate.
A process has initial value 2 liters and rate 6 liters per package. Express its model using liters and input measured in items; output counts multiply by 1 and input counts by 3.	A process has initial value $\frac{13}{6}$ gallons and rate $-\frac{17}{9}$ gallons per hour. Express its model using quarts and input measured in minutes; output counts multiply by 4 and input counts by 60.
A process has initial value 12 liters and rate 5 liters per hour. Express its model using milliliters and input measured in minutes; output counts multiply by 1000 and input counts by 60.	At $t = \frac{3}{2}$ days, a total is 9 and grows 4 units per day. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = \frac{3}{2}$ as the intercept.

Algebra 1

Linear Models from Initial Value and Rate

Name: _____ **Date:** _____ **Class:** _____

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: At t = 4, $A = 18$ and $B = 17$. Both initial value and rate change, so neither parameter alone explains the output gap.

For the contextual model $Q(t) = -5 - 4t$ on domain $-2 \le t \le 6$, explain the intercept and slope in the original units and say whether $Q(0)$ is observed or extrapolated. Q is position relative to a marker and $t = 0$ is a chosen clock reference.

Your response: _____

Incoming: In $Q(t) = -5 - 4t$, -5 is observed at the chosen zero; -4 is the signed output change per one input unit. Context: Q is position relative to a marker and $t = 0$ is a chosen clock reference.

Models $A(t) = 18 - \frac{1}{2}t$ and $B(t) = 18 - \frac{3}{4}t$ have the same starting value. Explain how the changed rate affects later outputs and compare them at $t = 10$.

Your response: _____

Incoming: In $Q(t) = 72 - 9t$, 72 is observed at the chosen zero; -9 is the signed output change per one input unit. Context: Q is percentage points remaining, not a multiplicative percent change.

Compare the redesigned affine models $A(t) = -10 + 7t$ and $B(t) = 5 + 3t$. Separate the start change from the rate change before checking $t = 4$.

Your response: _____

Incoming: At t = 6, $A = 100$ and $B = 120$. Both initial value and rate change, so neither parameter alone explains the output gap.

For the contextual model $Q(t) = 500 + 20t$ on domain $0 \le t \le 6$, explain the intercept and slope in the original units and say whether $Q(0)$ is observed or extrapolated. Q includes a fixed setup contribution plus production over hours.

Your response: _____

Incoming: At t = 7, $A = 44$ and $B = 65$. The models start together, and their rate difference changes the gap with t.

For the contextual model $Q(t) = 90$ on domain $0 \le t \le 12$, explain the intercept and slope in the original units and say whether $Q(0)$ is observed or extrapolated. Q is a fixed sensor reading and t is hours.

Your response: _____

Incoming: $Q(t) = 0 + \frac{7}{3}(t - 12)$, equivalently $Q(t) = -28 + \frac{7}{3}t$; therefore $Q(0) = -28$.

A process has initial value 0 items and rate 300 items per hour. Express its model using items and input measured in minutes; output counts multiply by 1 and input counts by 60.

Your response: _____

Algebra 1

Linear Models from Initial Value and Rate

Name: _____ **Date:** _____ **Class:** _____

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.

Choose an efficient method, explain why it fits the given representation, and then complete the task exactly. Compare the redesigned affine models $A(t) = 500 + 20t$ and $B(t) = 450 + 25t$. Separate the start change from the rate change before checking $t = 4$.

Choose an efficient method, explain why it fits the given representation, and then complete the task exactly. Both parameters differ in $A(t) = 8 + \frac{3}{2}t$ and $B(t) = 12 + \frac{1}{2}t$. Compare the exact rational starts and rates, then evaluate each at $t = 6$.

Models $A(t) = 10 + 3t$ and $B(t) = 16 + 3t$ share one rate. Isolate the effect of changing the initial value, then check the fixed gap at $t = 4$.

Models $A(t) = 6 + 12t$ and $B(t) = 9 + 12t$ share one rate. Isolate the effect of changing the initial value, then check the fixed gap at $t = \frac{5}{2}$.

Linear Models from Initial Value and Rate

Full Worked Solutions - excerpt

Worked example

Problem. At use count $18,250$ grams remain and 15 grams are used per count. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = 18$ as the intercept.

Answer. $Q(t) = 250 - 15(t - 18)$, equivalently $Q(t) = 520 - 15t$; therefore $Q(0) = 520$.

Explanation and check.

Start from the reference form using $(t - 18)$ and rate -15. Expanding gives the initial value

$250 - (-15)(18) = 520$

Worked example

Problem. At week 40, a fund is 1000 dollars and then changes -22 dollars per week. Construct an anchored linear model and then rewrite it to identify $Q(0)$. Do not treat the value at $t = 40$ as the intercept.

Answer. $Q(t) = 1000 - 22(t - 40)$, equivalently $Q(t) = 1880 - 22t$; therefore $Q(0) = 1880$.

Explanation and check.

Start from the reference form using $(t - 40)$ and rate -22. Expanding gives the initial value

$1000 - (-22)(40) = 1880$

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Identifying Geometric Sequences

Identifying Geometric Sequences | A1-U07-P09

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for compatible ratio set, set of compatible ratios, ratio in exact form, common ratio, geometric decision and ratio and three indexed terms.

8 PDFs and a README; 59 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

Identifying Geometric Sequences

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.

For $n = 1, 2, 3, 4$, a sequence has terms $2, 6, 18, 54$. Is the displayed sequence geometric? If so, give the common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
1	2
2	6
3	18
4	54

Bank label: _____

Determine whether $80, 40, 20, 10$ has a constant multiplicative step. State that step as a common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Bank label: _____

Does the finite sequence $7, -7, 7, -7, 7$ have one common ratio? Explain the alternating signs. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Bank label: _____

At indices 3 through 6, the terms are $-4, 8, -16, 32$. Decide whether these consecutive terms are geometric and identify r. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
3	-4
4	8
5	-16
6	32

Bank label: _____

Algebra 1

Identifying Geometric Sequences

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

A table gives $a_0 = -5$, $a_1 = -15$, $a_2 = -45$, and $a_3 = -135$. Test every transition for a common ratio.

Index n	Given term
0	-5
1	-15
2	-45
3	-135

The first four terms in a table are $-81, -27, -9, -3$. Are they geometric, and why do the terms remain negative?

Index n	Given term
1	-81
2	-27
3	-9
4	-3

A table lists $3, 12, 48, 193$ at consecutive indices. Test the geometric claim and identify the first transition that fails.

Index n	Given term
1	3
2	12
3	48
4	193

A table starts at $n = 4$ with $a_4 = 9$, $a_5 = 27$, $a_6 = 81$, and $a_7 = 243$. Does the nonunit starting index affect the common-ratio test?

Index n	Given term
4	9
5	27
6	81
7	243

Observed terms at $n = 1$ through 4 are $4, 12, 36, 108$. State the common ratio supported by these data, then explain what the finite table does not prove about later terms.

At four consecutive indices the terms are $2, -4, 8, -15.5$. Test the proposed geometric pattern, locate the failure, and state the term that would preserve the earlier ratio.

Index n	Given term
5	2
6	-4
7	8
8	-15.5

Algebra 1

Identifying Geometric Sequences

Name: _____ **Date:** _____ **Class:** _____

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

The entries $\frac{5}{2}$, $\frac{5}{4}$, $\frac{5}{8}$, and $\frac{5}{16}$ are consecutive terms. Verify or reject the claim that they form a geometric sequence. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: The common ratio is $-\frac{2}{3}$.

Assume $4, 12$ begin a geometric sequence. Find the next term. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: Yes; $r = 2$.

A table row reads $243, 81, 27, 9$ at consecutive indices. Determine its common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: $48, -6$

A geometric sequence has $a_2 = 1.2$ and $a_3 = 6$. Determine a_4 from the ratio in the table. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
2	1.2
3	6

Your response: _____

Incoming: The sequence is geometric with $r = -\frac{1}{2}$.

A geometric sequence has $a_1 = 3$ and $a_2 = 6$. Find a_3 and a_4. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
1	3
2	6

Your response: _____

Incoming: $r = \frac{1}{5}$

Use exact fraction arithmetic to test $\frac{3}{2}, -1, \frac{2}{3}, -\frac{4}{9}$ for one common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Algebra 1

Identifying Geometric Sequences

Name: _____ **Date:** _____ **Class:** _____

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 geometric sequence $5, 15, \_\_\_\_, 135$ has one missing term. Recover it and verify both neighboring transitions. Choose a recovery method justified by the given positions: use a quotient of known adjacent nonzero terms, or use the multiplicative relation across an index gap. Explain which information supports your choice, apply it, and check every possible ratio or missing term against the original sign and geometric conditions.

A real geometric sequence has consecutive terms $64, x, 16$. Find every possible x and the corresponding common ratio. Choose a recovery method justified by the given positions: use a quotient of known adjacent nonzero terms, or use the multiplicative relation across an index gap. Explain which information supports your choice, apply it, and check every possible ratio or missing term against the original sign and geometric conditions.

Identifying Geometric Sequences

Full Worked Solutions - excerpt

Worked example

Problem. Starting with $a_9 = 125$, apply $r = \frac{1}{5}$ to complete a_{10} and a_{11}.

Answer. $a_{10} = 25$ and $a_{11} = 5$.

Explanation and check.

Successive division by 5 produces 25 and 5.

Worked example

Problem. Given $a_3 = 1$ and $r = -4$, supply the next two entries.

Answer. $a_4 = -4$ and $a_5 = 16$.

Explanation and check.

Multiply by -4 twice: 1 becomes -4, then 16.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Explicit Geometric Sequence Rules

Explicit Geometric Sequence Rules | A1-U07-P10

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Explicit Geometric Sequence Rules.

8 PDFs and a README; 54 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

Explicit Geometric Sequence Rules

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.

Term 0 of a geometric sequence is 7. Every step doubles the preceding term. Give an explicit formula valid for whole-number indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	The fifth term is 9 and the common ratio is 1. Give an anchor-form rule for all positive indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
A two-sided integer-indexed geometric sequence satisfies $a_3 = -11$ and $r = 1$. State an anchor rule and its simplest equivalent form. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	A finite geometric sequence is indexed from 1 through 14, has $a_{10} = 1024$, and uses $r = \frac{1}{2}$. Give a single explicit expression on precisely that domain. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
The value at $n = 5$ is -32 in a geometric sequence with ratio -2. State a formula and explicitly retain the whole-number index domain. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	*Abi*-infinite geometric sequence is indexed by all integers, has $a_{-2} = 5$, and uses $r = 3$. Build the explicit rule from that negative-index anchor. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
State a_n for integer $n \geq 6$ if $a_8 = \frac{1}{16}$ and the sequence advances by a factor of -2. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	For indices 1 through 9, build an anchor rule from $a_5 = \frac{3}{32}$ and $r = \frac{1}{2}$, then give an equivalent expression anchored at index 1. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____

Algebra 1

Explicit Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Let m be a real number. A geometric sequence begins its stated domain at $n = 2$ with $a_2 = m$ and ratio 5. Give a formula that retains m as a parameter.	Let q be a nonzero real number. An integer-indexed geometric sequence has $a_0 = 8$ and ratio q. Give its explicit rule for every integer index.
For real parameter c, write the positive-index geometric sequence satisfying $a_4 = c$ and $r = -3$.	A positive-index geometric sequence has first term 8 and common ratio 0. Give an explicit rule that is valid at $n = 1$ without relying on 0^0.
At time index 0 a discrete state is -3; every later state is obtained by multiplying the current state by 0. State its explicit value for all nonnegative indices, handling the initial index explicitly.	A sequence begins with $a_1 = 5$ and has common ratio 0; the observed $a_4 = 0$ is consistent with that rule. Write a complete explicit description rather than substituting into $5(0)^{n-1}$ at $n = 1$.

Algebra 1

Explicit Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

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: $a_n = -81(-\frac{1}{3})^{n-6}, n \geq 1$.

For nonnegative integer n, describe the geometric sequence anchored by $a_0 = \frac{5}{2}$ with common ratio 6. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $A_n = 50(4)^{n-3}, n \geq 1$.

Indices 2 through 8 form a finite geometric list. Its index-3 entry is -7 and its ratio is -4. Give a rule only for those listed indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $R_n = 15(2)^{n-7}, n \geq 1$.

After discount round 2, a modeled price is 72 dollars. Every additional round retains $\frac{4}{5}$ of the preceding price, and rounds begin at 0. Write the round-n sequence. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 48(-\frac{1}{2})^{n-4}, n \geq 1$.

On the index domain $n \geq 4$, a geometric sequence has $a_7 = 2$ and $r = 3$. Write a rule whose exponent visibly counts from index 7. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 160(\frac{3}{4})^{n-3}, n \geq 0$.

Form the nth-term expression for a geometric sequence with $a_6 = -81$ and $r = -\frac{1}{3}$. Its index set is $1, 2, 3, \ldots$. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 6(5)^{n-4}, n \geq 1$.

A sequence indexed by $n = 0, 1, 2, \ldots$ has $a_2 = 12$ and common ratio -2. Express a_n using the supplied anchor. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Algebra 1

Explicit Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

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 geometric table begins with $(n,\ a_n) = (1, 3)$ and $(2, 6)$. Recover its explicit nth-term rule. Choose an explicit-rule construction method: anchor the formula at a supplied indexed term, or first recover the term at the stated starting index and anchor there. Explain which is more direct for these givens, use that method, and verify all supplied indexed terms and any sign restrictions. Retain every admissible rule if the data do not select one.

Index n	Given value
1	3
2	6

The entries at indices 0 and 1 are 5 and 15 in a geometric sequence. Find r and express a_n for every nonnegative integer n. Choose an explicit-rule construction method: anchor the formula at a supplied indexed term, or first recover the term at the stated starting index and anchor there. Explain which is more direct for these givens, use that method, and verify all supplied indexed terms and any sign restrictions. Retain every admissible rule if the data do not select one.

Explicit Geometric Sequence Rules

Full Worked Solutions - excerpt

Worked example

Problem. Decide whether $a_n = 2(-1)^{n-1}$ and $b_n = -2(-1)^n$ produce the same alternating values at matching positive indices.

Answer. Yes, they are identical on $n \geq 1$.

Explanation and check.

Multiplying $(-1)^n$ by -1 is the same as lowering the exponent by one: $-2(-1)^n = 2(-1)^{n-1}$.

Worked example

Problem. Construct the positive-index rule satisfying $a_3 = -4$, $a_5 = -16$, and $r > 0$.

Answer. $a_n = -4(2)^{n-3}, n \geq 1$.

Explanation and check.

The two-step relation yields $r^2 = 4$, with real candidates ± 2. The stated positive ratio selects 2.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Recursive Geometric Sequence Rules

Recursive Geometric Sequence Rules | A1-U07-P11

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Recursive Geometric Sequence Rules.

8 PDFs and a README; 61 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

Recursive Geometric Sequence Rules

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.

A discrete state is -2 at time 0 and is quadrupled at every tick. Give its initial condition and one-step recurrence. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Bank label: _____

State a recurrence for a sequence whose first declared term is $a_5 = 9$ and whose common ratio is 2. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_5	9

Bank label: _____

Convert the table values $\frac{1}{3}, \frac{2}{3}, \frac{4}{3}$ at consecutive positive indices into a recursive definition. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given index	Given value
1	$\frac{1}{3}$
2	$\frac{2}{3}$
3	$\frac{4}{3}$

Bank label: _____

Write a complete recurrence for the positive-index terms $64, -16, 4$, preserving the exact signed factor. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given index	Given value
1	64
2	-16
3	4

Bank label: _____

Algebra 1

Recursive Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Let c be real. Define recursively the positive-index geometric sequence with first value c and multiplier 4.

Given indexed term	Value
a_1	c

For real parameter q, write the zero-indexed recurrence having $a_0 = 7$ and common multiplier q.

Given indexed term	Value
a_0	7

Only $a_1 = 2$ and $a_3 = 18$ are known. Write every real geometric recurrence compatible with those observations, including each initial condition and update range.

Given indexed term	Value
a_1	2
a_3	18

The table shows 0 at indices 1, 2, and 3. Give two different complete geometric recurrences that extend this table and explain why the displayed values do not identify one multiplier.

Given index	Given value
1	0
2	0
3	0

A nonzero sequence value at index 5 is x. Moving one index left multiplies a value by 3. Write the forward recurrence and choose a valid initial condition at index 5 for the domain $n \geq 5$.

Given indexed term	Value
a_5	x

Starting at $a_{-2} = 3$ and multiplying the immediately prior term by -2, fill a_{-1}, a_0, a_1, and a_2.

Given indexed term	Value
a_{-2}	3

Algebra 1

Recursive Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

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: $a_2 = 7$ and $a_3 = 7$.

For $a_0 = 8$ and $a_n = 0a_{n-1}$, find a_1 and a_2. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_0	8

Your response: _____

Incoming: $a_1 = -10, a_2 = -20$, and $a_3 = -40$.

A table has 64 at index 4 and uses the multiplier $-\frac{1}{2}$. Determine the entries at indices 5, 6, and 7. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_4	64

Your response: _____

Incoming: $a_2 = 27, a_3 = 9$, and $a_4 = 3$.

A recurrence is anchored by $a_4 = \frac{1}{5}$ and multiplies by 5. Find a_5 through a_7. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_4	$\frac{1}{5}$

Your response: _____

Incoming: $a_3 = 10, a_4 = 20, a_5 = 40$, and $a_6 = 80$.

A geometric update starts from $a_5 = -2$ and multiplies by 4. Determine a_6, a_7, and a_8. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_5	-2

Your response: _____

Incoming: $a_2 = 6$ and $a_3 = -12$.

Given $a_3 = 4$ and $a_n = 5a_{n-1}$, evaluate a_4 and a_5. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_3	4

Your response: _____

Incoming: $a_3 = 2, a_4 = -\frac{2}{3}$, and $a_5 = \frac{2}{9}$.

Use the index-7 initial condition 10 and multiplier 3 to determine the next two indexed terms. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_7	10

Your response: _____

Algebra 1

Recursive Geometric Sequence Rules

Name: _____ **Date:** _____ **Class:** _____

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 first three terms are $2, 6, 18$ at indices $1, 2, 3$. Write a recursive definition that includes its starting value and valid update range. Choose how to establish the update multiplier from these givens: infer it from an available adjacent nonzero pair, or translate/use the supplied per-step multiplier or description. Explain which evidence supports your route, then give the complete recursive specification in the originally requested index form and range.

Given index	Given value
1	2
2	6
3	18

A table starts at $n = 0$ with values $5, 10, 20$. State its geometric recurrence using the zero-index convention. Choose how to establish the update multiplier from these givens: infer it from an available adjacent nonzero pair, or translate/use the supplied per-step multiplier or description. Explain which evidence supports your route, then give the complete recursive specification in the originally requested index form and range.

Given index	Given value
0	5
1	10
2	20

Recursive Geometric Sequence Rules

Full Worked Solutions - excerpt

Worked example

Problem. The recurrence $a_1 = 4, a_n = a_{n-1} + 3$ is attached to the geometric table $4, 12, 36$. Repair the update operation.

Answer. $a_1 = 4$; $a_n = 3a_{n-1}$ for $n \geq 2$.

Explanation and check.

The values triple rather than increase by 3, so the recurrence must multiply the preceding term by 3.

Worked example

Problem. Audit $a_0 = 7, a_n = 2a_{n-1}$ for $n \geq 0$. Repair the range so the initial condition is not also forced to reference an undefined a_{-1}.

Answer. $a_0 = 7$; $a_n = 2a_{n-1}$ for $n \geq 1$.

Explanation and check.

Index 0 is supplied directly, so the first recurrence output is index 1.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Function Rules and Evaluation

Exponential Function Rules and Evaluation | A1-U07-P12

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Function Rules and Evaluation.

8 PDFs and a README; 57 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.

Published by Tusils LLC.

Algebra 1

Exponential Function Rules and Evaluation

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.

What output does $f(x) = 4(5)^x$ assign to the origin input $x = 0$? Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Find $q(2)$ for $q(x) = (\frac{3}{4})4^x$, applying the coefficient after the power. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $z(2)$ for $z(x) = 25(\frac{1}{5})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Find $F(-1)$ for $F(x) = 7(\frac{1}{7})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $G(-3)$ under $G(x) = -16(\frac{1}{2})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Compute $J(-1)$ for $J(x) = 10(\frac{1}{10})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $K(-4)$ exactly if $K(x) = -3(2)^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Evaluate $M(-2)$ for $M(x) = -2(3)^x$, and explain why combining -2 and 3 into a base -6 changes the rule. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____

Algebra 1

Exponential Function Rules and Evaluation

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Under the convention $f(x) = ab^x$ with $a \neq 0, b > 0$, and $b \neq 1$, classify $f(x) = 3(2)^x$.	Is $g(x) = x^3$ an exponential function of x under the stated constant-base convention? Explain the structural reason.
Classify $h(x) = 5x + 2$ as exponential or nonexponential and give one decisive feature.	Does $p(x) = 7(\frac{1}{2})^x$ qualify as a nonconstant exponential function on the real numbers?
Classify $q(x) = -4(3)^x$. Does the negative coefficient prevent exponential structure?	A model is $F(t) = 12(3)^t$, where t is years after 2018 and F is measured in colonies. Interpret 12 and 3.

Algebra 1

Exponential Function Rules and Evaluation

Name: _____ **Date:** _____ **Class:** _____

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: $D(0) = -9$.

Find $h(\frac{1}{2})$ for $h(x) = 18(\frac{1}{36})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Incoming: $A(3) = -32$.

Evaluate $C(-2)$ for $C(x) = 3(\frac{1}{3})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Incoming: $j(3) = 56$; equal input step 3; output ratio 8.

The displayed table for $k(x) = 3(4)^x$ begins at $x = 1$. Supply the missing middle value. For the match, record all missing values in table order together with the equal input step and its output ratio, and complete the original verification.

Rule: $k(x) = 3(4)^x$

x	k(x)
1	12
2	_____
3	192

Your response: _____

START

Evaluate $f(2)$ for $f(x) = 3(2)^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Algebra 1

Exponential Function Rules and Evaluation

Name: _____ **Date:** _____ **Class:** _____

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.

Complete the missing entry in the table for $f(x) = 3(2)^x$, then verify the equal-step ratios. Choose how to fill the missing entries: substitute the missing inputs directly into the given rule, or use a known table output with the multiplier for the actual input step. Explain why your chosen route applies, use it, and complete the original ratio verification.

Rule: $f(x) = 3(2)^x$

x	f(x)
0	3
1	_____
2	12

For $g(x) = 20(\frac{1}{2})^x$, fill the $x = 1$ row and use it to check the listed value at $x = 3$. Choose how to fill the missing entries: substitute the missing inputs directly into the given rule, or use a known table output with the multiplier for the actual input step. Explain why your chosen route applies, use it, and complete the original ratio verification.

Rule: $g(x) = 20(\frac{1}{2})^x$

x	g(x)
0	20
1	_____
3	$\frac{5}{2}$

Exponential Function Rules and Evaluation

Full Worked Solutions - excerpt

Worked example

Problem. Compare $A(x) = 6(2)^x$ and $B(x) = 3(2)^{x+1}$ for an arbitrary real x.

Answer. $A(x) = B(x)$ for every real x.

Explanation and check.

$B(x) = 3(2)(2^x) = 6(2^x)$, which is exactly $A(x)$.

Worked example

Problem. Without separately evaluating both powers, compare $f(3)$ and $f(4)$ for $f(x) = 3(2)^x$.

Answer. $f(4) > f(3)$, and $f(4) = 2f(3)$.

Explanation and check.

The inputs differ by one, so the later output contains one additional factor of the base 2.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Growth Models

Exponential Growth Models | A1-U07-P15

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Growth Models.

8 PDFs and a README; 62 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

Exponential Growth Models

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.

Write the culture size $C(t)$ after t hours, assuming the percent update applies once per hour. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Initial: 200 Origin: $t = 0$ at observation Given rate: 20% per hour Bank label: _____	Build $F(t)$ when the known value 90 occurs at $t = -1$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Input: cycle-time coordinate t Given rate: 10% per cycle Value at t minus1: 90 Bank label: _____
The clock labels the observation time as $t = -2$. Write a rule valid across $t = 0$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Input: signed hour t Given rate: 10% per hour Value at t minus2: 300 Bank label: _____	Build a model that uses $n = 0$ before the first update and matches the observed value 120 at $n = 1$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Domain: n nonnegative integers Input: n intervals from pre-update time Given rate: 20% per interval Value after interval1: 120 Bank label: _____

Algebra 1

Exponential Growth Models

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Find the multiplier for each statement and explain why the phrases are not equivalent. Given statements: A: next value is 18% of current B: next value is 18% more than current	A trial's output increases by 140% after each launch. Determine the factor and interpret it as a percent of the preceding output. Given rate: 140% increase per launch
Give the quarterly factor for 2.5% growth as both a decimal and a fraction. Given rate: 2.5% per quarter	A quantity grows by 200% each interval. Is its factor 2 or 3? Justify. Given rate: 200% increase per interval
Find the multiplier, and state the implied percent increase. Given statement: the next count is 120% of the current count	Find the final amount after the two successive growth intervals. Initial: 100 Rates: 10%, 20%

Algebra 1

Exponential Growth Models

Name: _____ **Date:** _____ **Class:** _____

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

A quantity increases by 5% each interval. What multiplier represents one interval of growth? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 5% per interval

Your response: _____

Incoming: 1.05

Membership grows 12% per month. Give the monthly growth factor. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 12% per month

Your response: _____

Incoming: 100

Determine the cycle-0 quantity. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Cycles: 2

Later: 675

Given rate: 50% per cycle

Your response: _____

Incoming: $A(t) = 500(1.20)^{t-3}$.

Under the continuous interval model, find $F(\frac{1}{2})$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Model: $F(t) = 180(1.44)^t$ for real $t \geq 0$

Time: $\frac{1}{2}$ interval

Your response: _____

Incoming: 1.0004

What multiplier implements the stated update after one round? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given statement: add 30% of the current amount after each round

Your response: _____

Incoming: 1.75

A measurement increases 0.1% each hour. What hourly multiplier should be used? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 0.1% per hour

Your response: _____

Algebra 1

Exponential Growth Models

Name: _____ **Date:** _____ **Class:** _____

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.

Find the modeled amount after two periods. Choose a calculation route: substitute the elapsed update count directly into the model, or track successive interval multiplications when the stated time and domain permit complete updates. Explain why the selected route fits these givens, use it, and preserve the original time origin and rounding instruction.

Model: $A(n) = 100(1.10)^n$

Time: 2

What is the modeled quantity after three complete cycles? Choose a calculation route: substitute the elapsed update count directly into the model, or track successive interval multiplications when the stated time and domain permit complete updates. Explain why the selected route fits these givens, use it, and preserve the original time origin and rounding instruction.

Cycles: 3

Initial: 80

Given rate: 50% per cycle

Exponential Growth Models

Full Worked Solutions - excerpt

Worked example

Problem. Find the multiplier for each statement and explain why the phrases are not equivalent.

Given statements: A: next value is 18% of current B: next value is 18% more than current

Answer. A uses 0.18; B uses 1.18.

Explanation and check.

Percent of names the entire next amount, while percent more names an addition to the retained original.

Worked example

Problem. A quantity grows by 200% each interval. Is its factor 2 or 3? Justify.

Given rate: 200% increase per interval

Answer. The factor is 3.

Explanation and check.

The increase is two copies of the current amount; adding the retained copy makes three copies total.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Decay Models

Exponential Decay Models | A1-U07-P16

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Decay Models.

8 PDFs and a README; 59 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

Exponential Decay Models

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.

After one 20% loss, 80 remains. What amount was present immediately before the loss? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	A quantity is 45 just after it is halved. Find its value just before that event. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
What input amount gives 306 after multiplication by the retention factor 0.85? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	If 72 is 60% of the amount that existed before a loss, what was that earlier amount? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
A modeled amount is 240 after one 4% decrease. Find the amount one interval earlier. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	Find the amount two decay steps before 128 when each step retains 80%. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
After three successive halvings, a quantity is 18. What was it before any halving? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	An amount is 81 after four steps that each retain 75%. Find its value before the four steps. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____

Algebra 1

Exponential Decay Models

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

For this fictional mathematical model, write $V(y)$. The initial amount is 15000 and loses 12% per year. Let y be the elapsed years.	Construct $I(w)$ for w weeks after the reference count. The amount is 1200 at week 0 and loses 8% per week.
Model the amount after n completed filter passes and state the domain. The initial amount is 250 and loses 12% per pass. Let n be a nonnegative integer.	Write the model in hours without turning the rate into an hourly rate. The initial amount is 40 and loses 5% every 2 hours. Let t be elapsed hours.
Construct the model in years. The initial amount is 900 and loses 3% per half-year. Let y be elapsed years.	Construct the decay rule in elapsed days. The initial amount is 240 and loses 9% every 3 days. Let d be elapsed days.

Algebra 1

Exponential Decay Models

Name: _____ **Date:** _____ **Class:** _____

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: 12.5% per step.

A constant retention factor acts twice. Determine the exact fraction lost on each action.

The amount changes from 144 to 100 after two steps.

Your response: _____

Incoming: 36% per step.

What percent is lost during each of the four equal periods? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

period	**0**	**4**
quantity	256	16

Your response: _____

Incoming: 13%.

Solve for q, then state the percent loss for the update. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $250q = 232.5$, where q is the retention factor.

Your response: _____

Incoming: 40% per period.

Determine the constant loss percentage for each of the two equal time intervals. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

time	**0**	**2**
value	400	225

Your response: _____

Incoming: 25% per interval.

Solve for the admissible q and express the corresponding percent loss. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $1000q^3 = 729$ with $0 < q < 1$.

Your response: _____

Incoming: $\frac{1}{3}$ is lost per period.

For the positive decay factor q, state the percent lost per step. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $250q^2 = 40$.

Your response: _____

Algebra 1

Exponential Decay Models

Name: _____ **Date:** _____ **Class:** _____

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.

Choose the correct factor and state the loss represented by each rejected choice.

The amount loses 0.08% per hour. Choose among 0.92, 0.992, and 0.9992.

Audit the claimed pair and correctly interpret factor 0.23.

A student pairs $a23\%$ loss with a factor of 0.23.

Determine Q_0 and verify it by a forward substitution.

Use $Q(n) = Q_0(0.9)^n$ with the observation $Q(2) = 243$.

Exponential Decay Models

Full Worked Solutions - excerpt

Worked example

Problem. Solve $X(0)(0.8)^3 = 64$ for $X(0)$.

Answer. $X(0) = 125$.

Explanation and check.

Because $(0.8)^3 = 0.512, X(0) = \frac{64}{0.512} = 125$.

Worked example

Problem. A sequence has constant ratio 0.9 and $A_7 = 196.83$. Find A_4.

Answer. $A_4 = 270$.

Explanation and check.

There are three forward factors from index 4 to 7, so $A_4 = \frac{196.83}{(0.9)^3} = 270$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear vs Exponential Models

Linear vs Exponential Models | A1-U07-P17

96 problems · Four activity formats

Topic focus

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8 PDFs and a README; 70 buyer pages.

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Algebra 1

Linear vs Exponential Models

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.

Use the equal-step behavior to classify this table, including its one-unit factor. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
−2	1
−1	3
0	9

Bank label: _____

Classify the relationship and quantify its unit change. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
−1	6
0	4
1	2

Bank label: _____

Determine the relationship class and distinguish its ratios from its differences. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

n	A
0	100
1	90
2	81
3	72.9

Bank label: _____

Classify the table and report the rate per one x-unit. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
0	2
3	14
6	26

Bank label: _____

Algebra 1

Linear vs Exponential Models

Name: _____ **Date:** _____ **Class:** _____

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.

Account for the unequal x-gaps and classify the relationship.

Precision of given values: exact

x	y
0	2
1	4
3	16

Use change per x-unit, not raw y-differences, to classify the table.

Precision of given values: exact

x	y
0	4
2	10
5	19

A student notices the first ratio is 2. Decide whether the whole table supports an exponential model.

Precision of given values: exact

x	y
0	10
1	20
3	50

State why these rows alone do not select uniquely between the two model classes.

Precision of given values: exact

x	y
0	2.5
2	2.5
5	2.5
9	2.5

Do not decide from the first pair alone. Classify using all intervals.

Precision of given values: exact

x	y
0	50
1	45
2	39
3	32

Can the table alone establish a global linear or exponential mechanism? Explain.

Model assumption: none

x	y
0	5
1	10

Algebra 1

Linear vs Exponential Models

Name: _____ **Date:** _____ **Class:** _____

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: Exponential decay with unit factor $\frac{1}{9}$.

Rewrite with one exponential base, then classify the change. Rule: $e(x) = 6\frac{2^x}{3^x}$

Your response: _____

Incoming: The linear rule $L(x) = 5x$ predicts 15; the exponential rule $E(x) = 2.5(2)^x$ predicts 20.

Build decreasing linear and exponential candidates through the rows and compare the missing middle value. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: 1

x	y
0	16
2	4

Your response: _____

Incoming: $L(x) = 100 + 10.5x$ gives 110.5; $E(x) = 100(1.1)^x$ gives 110, a difference of 0.5.

Build the models and evaluate both one unit after $x = 0$. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: 1

Input	Given output
0	8
3	64

Your response: _____

Incoming: $L(x) = 6x + 10$ gives 10; $E(x) = 8(2)^x$ gives 8 at $x = 0$.

Build linear and exponential candidates and fill the missing middle value. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: -1

x	y
-2	9
0	1

Your response: _____

Algebra 1

Linear vs Exponential Models

Name: _____ **Date:** _____ **Class:** _____

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.

Classify the relationship as linear, exponential, neither, or ambiguous, and give the decisive equal-step pattern. Choose a first diagnostic test: compare output differences for equal input steps, or compare output ratios where division is defined. Explain why that test is useful for these exact rows, use it, and complete the original classification. If the first test is inconclusive, state what further check or model assumption is needed.

Precision of given values: exact

x	y
0	3
1	7
2	11

Determine the model class supported by all consecutive entries. Choose a first diagnostic test: compare output differences for equal input steps, or compare output ratios where division is defined. Explain why that test is useful for these exact rows, use it, and complete the original classification. If the first test is inconclusive, state what further check or model assumption is needed.

Precision of given values: exact

x	y
0	2
1	6
2	18
3	54

Linear vs Exponential Models

Full Worked Solutions - excerpt

Worked example

Problem. Rewrite q in coefficient-times-power form, then classify it. Rule: $q(x) = 2^{x+1}$

Answer. $q(x) = 2(2)^x$ is exponential with unit ratio 2.

Explanation and check.

The exponent rule $2^{x+1} = 2^x$ times 2 exposes the constant multiplicative factor.

Worked example

Problem. Simplify the formula and use a change calculation to classify it. Rule: $m(x) = 9\frac{x}{3} + 5$

Answer. $m(x) = 3x + 5$ is linear, and $m(x+1) - m(x) = 3$.

Explanation and check.

Dividing the x-term by 3 gives a constant coefficient of 3.