

Algebra 1
Exponential Decay Models

Exponential Decay Models | A1-U07-P16

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
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Topic focus
This topic is a focused set of 96 practice tasks on Exponential Decay Models.
8 PDFs and a README; 59 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.

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: _____

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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. 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.

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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: 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. <table border="1" data-bbox="824 604 1469 667"> <thead> <tr> <th>period</th> <th>0</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>quantity</td> <td>256</td> <td>16</td> </tr> </tbody> </table> Your response: _____	period	0	4	quantity	256	16
period	0	4					
quantity	256	16					
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. <table border="1" data-bbox="824 1039 1469 1102"> <thead> <tr> <th>time</th> <th>0</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>value</td> <td>400</td> <td>225</td> </tr> </tbody> </table> Your response: _____	time	0	2	value	400	225
time	0	2					
value	400	225					
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: _____						

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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.

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 a 23% 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 $A_4 = \frac{196.83}{(0.9)^3} = 270$.