

AP Precalculus
Exponential Parameters and Reference Points

Exponential Parameters and Reference Points | APPC-U02-P03

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for adjusted ratios and limitation, adjusted sequences and conclusion, actual constant, base sign and consequence, degenerate class and failed condition and domain failures.

8 PDFs and a README; 57 buyer pages.

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Name: _____ Date: _____ Class: _____

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

Classify $h(x) = 4(1^{x-7}) - 2$ and give its actual value for every x. 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: _____	Does $f(x) = (\frac{1}{2})(\frac{5}{4})^x$ define a real nonconstant exponential on all real inputs? Explain. 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: _____
Is $f(x) = -8(6^x)$ a real nonconstant exponential on all real x? Explain. 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: _____	For $N(t) = 40(0.9^{t-6}) + 12$, what happens at day 6, and what does 40 measure there? 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: _____
Translate the base 0.875 in $q(x) = 90(0.875^x)$ into a percent change per unit x. 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: _____	For which real p is $g(x) = 7(5 - 2p)^x$ a real nonconstant exponential on all real inputs? 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. Give the whole requested response, including any reasoning the question asks for.

For which real m does $f(x) = 4(m + 2)^x$ define a real nonconstant exponential for every real x? _____ _____	For $f(x) = 7(2^x) + 5$, what ratio stays constant when x increases by 1? _____ _____
A student says $P(t) = 800(1.04^t)$ grows by 1.04% per year. Correct the statement. _____ _____	Does $g(x) = 2(-3)^x$ define a real exponential for every real x? Give a decisive input. _____ _____
For $f(x) = 6(2^{x-3})$, identify the input where the coefficient 6 appears as an output, then find $f(0)$. _____ _____	Interpret the base 0.73 in $A(t) = 320(0.73^t)$ as a percent change per unit time. _____ _____

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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 For $f(x) = 9(2^x) + 4$, find $f(0)$ and interpret the coefficient 9 relative to the baseline. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Your response: _____	Incoming: $f(0) = 13$; the coefficient 9 is the displacement $13 - 4$ from baseline 4. For $g(x) = -11(3^x)$, find $g(0)$ and interpret the coefficient. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Your response: _____
Incoming: $g(0) = -11$; the coefficient is the zero-input output. Is $q(x) = 7((2 - \sqrt{3})^x)$ a valid real nonconstant exponential for all real x? Justify the base bounds. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Your response: _____	Incoming: Yes. Since $1 < \sqrt{3} < 2$, the base $2 - \sqrt{3}$ lies strictly between 0 and 1 and is not 1. For $f(x) = 4(3^x) - 10$, state the constant ratio involving displacement from the baseline. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Your response: _____
Incoming: $\frac{f(x+1)+10}{f(x)+10} = 3$. For $D(t) = 22(0.75^{t-3}) - 5$, find $D(3)$ and express $D(0)$. What does 22 represent? Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Your response: _____	Incoming: $D(3) = 17$ and $D(0) = 22(\frac{4}{3})^3 - 5$; 22 is displacement above baseline -5 at day 3. Compare $f(x) = 12(0.6^x)$ and $g(x) = 6(0.6^x)$. How does the coefficient change affect every output? 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.

Compare $f(x) = 8(1.2^{x-2}) + 5$ and $g(x) = 8(0.7^{x-2}) + 5$. Give their shared reference point and describe their directions to its right. Student work: Both pass through $(3, 13)$. To the right, f 's displacement grows while g 's displacement decays. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

A table of integer inputs makes $u(x) = 5(-2)^x$ look defined. Why is it not a real exponential on all real inputs? Student work: Fractional inputs such as $x = \frac{1}{2}$ produce nonreal values, so integer evidence does satisfy the all-real domain requirement. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Interpret factors 1.12 and 0.12 as percent changes of a positive quantity. Distinguish percent of the prior value from percent increase or decrease. Student work: Factor 1.12 means 112% remains and a 12% increase. Factor 0.12 means 12% remains and an 87% decrease. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

For $f(x) = 3(4^x) - 2$, compare raw output ratios and baseline-adjusted ratios at $x = 0, 1, 2$. Student work: Outputs 1, 10, 46 have raw ratios 10 and 4.6. Adding 2 gives displacements 3, 12, 47 with ratio 4. 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. For $h(x) = 5(4^{x-1}) - 3$, compute $h(1)$ and $h(0)$. Which quantity is represented directly by the coefficient 5?

Answer. $h(1) = 2$ and $h(0) = -\frac{7}{4}$. The coefficient 5 is the displacement $h(1) - (-3)$, not either displayed output by itself.

Explanation and check.

At $x = 1$ the factor is 1, then the baseline -3 must still be added.

Worked example

Problem. For which real c is $h(x) = (c - 5)(2^x)$ a nonconstant exponential?

Answer. All real c except $c = 5$.

Explanation and check.

The base is already valid; only the coefficient must be nonzero.