

AP Precalculus
Equivalent Polynomial Forms

Equivalent Polynomial Forms | APPC-U01-P13

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for form choice and exact revealed feature, consistent candidate with decisive evidence, first error, corrected identity, and lost graph feature, complete exact polynomial and requested coefficient, factored form plus newly visible feature and feature meaning with units and domain check.

8 PDFs and a README; 78 buyer pages.

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Name: _____ Date: _____ Class: _____

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

An answer may be used more than once.

Factor $P(x) = 2x^2 - 16x + 32$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots. _____ Bank label: _____	Rewrite $f(x) = 2x^2 + 1$ in vertex form. On the stated domain $-2 \leq x \leq 3$, determine the minimum value and where it occurs; justify the bound using square nonnegativity and check whether the vertex is feasible. _____ Bank label: _____
Factor $P(x) = 2x^2 + 18x$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots. _____ Bank label: _____	Rewrite $f(x) = x^2 + 8x + 13$ in vertex form. On the stated domain all real x, determine the minimum value and where it occurs; justify the bound using square nonnegativity and check whether the vertex is feasible. _____ Bank label: _____
Factor $P(x) = 3x^2 - 42x + 147$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots. _____ Bank label: _____	Rewrite $f(x) = 3x^2 + 12x + 11$ in vertex form. On the stated domain $-1 \leq x \leq 2$, determine the minimum value and where it occurs; justify the bound using square nonnegativity and check whether the vertex is feasible. _____ Bank label: _____
Factor $P(x) = 3x^2 - 18x$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots. _____ Bank label: _____	Two equivalent descriptions of the same polynomial are vertex: $(x + 1)^2 + 2$; standard: $x^2 + 2x + 3$. Which named form most directly answers the request for vertex? State the feature it reveals and explain why equivalence alone does not make both forms equally efficient. _____ Bank label: _____

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

Rewrite $f(x) = 2x^2 - 12x + 17$ in vertex form. On the stated domain $1 \leq x \leq 6$, determine the minimum value and where it occurs; justify the bound using square nonnegativity and check whether the vertex is feasible.

Factor $P(x) = 2x^2 + 32x + 128$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots.

Use the supplied complete Pascal table to expand $(4x - 4)^5$ and explain how signs and nonunit factors enter each coefficient.

Context/domain: precalculus

j	C(n,j)	power of x	power of constant term	resulting coefficient
0	1	5	0	1024
1	5	4	1	-5120
2	10	3	2	10240
3	10	2	3	-10240
4	5	1	4	5120
5	1	0	5	-1024

Determine all real parameter values that make the two forms $a(x - 3)^2 + k$ and $x^2 - 6x + 8$ identical for every x . Match only decisive coefficients first, then verify every coefficient.

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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

Two equivalent descriptions of the same polynomial are factored: $2(x-2)(x-5)$; standard: $2x^2 - 14x + 20$. Which named form most directly answers the request for initial output $f(0)$? State the feature it reveals and explain why equivalence alone does not make both forms equally efficient.

Your response: _____

Incoming: The roots $t = 0$ and $t = 9$ mean the object is at height 0 feet at launch and landing; both are feasible endpoints.

Use the supplied complete Pascal table to expand $(x+1)^2$ and explain how signs and nonunit factors enter each coefficient.

Context/domain: precalculus

j	C(n,j)	power of x	power of constant term	resulting coefficient
0	1	2	0	1
1	2	1	1	2
2	1	0	2	1

Your response: _____

Incoming: Use the factored form; it directly reveals $x = -1$ and $x = 2$.

Factor $P(x) = x^2$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots.

Your response: _____

Incoming: $(x-1)^3 = x^3 - 3x^2 + 3x - 1$.

Two equivalent descriptions of the same polynomial are vertex: $3(x+2)^2 - 1$; standard: $3x^2 + 12x + 11$. Which named form most directly answers the request for quadratic extremum and where it occurs? State the feature it reveals and explain why equivalence alone does not make both forms equally efficient.

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A student claims $3(x - 2)^2 - 1$ is identically equal to $x^2 - 4x + 3$. Locate the algebraic error, write the corrected identity, and name one graph feature or value changed by the false rewrite. Diagnose the missing factor of 3 in expansion; compare the values at $x = 0$. Give the corrected identity and explain why the claimed expressions are not equivalent.

A student claims $3x^2 + 2$ is identically equal to $x^2 + 2$. Locate the algebraic error, write the corrected identity, and name one graph feature or value changed by the false rewrite. Diagnose the omitted coefficient 3; compare the values at $x = 1$. Give the corrected identity and explain why the claimed expressions are not equivalent.

A student claims $(x + 2)^2$ is identically equal to $x^2 + 4$. Locate the algebraic error, write the corrected identity, and name one graph feature or value changed by the false rewrite. Diagnose the omitted cross term; compare both vertices and the values at $x = 1$. Give the corrected identity and explain why the claimed expressions are not equivalent.

A student claims $(x + 5)^2$ is identically equal to $x^2 + 25$. Locate the algebraic error, write the corrected identity, and name one graph feature or value changed by the false rewrite. Diagnose the omitted cross term; compare the values at $x = 1$. Give the corrected identity and explain why the claimed expressions are not equivalent.

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Full Worked Solutions - excerpt

Worked example

Problem. Factor $P(x) = x^2$ to reveal useful structure. Explain the feature made visible by the factorization rather than merely listing roots.

Answer. $P(x) = xx = x^2$; the repeated factor shows a double zero at $x = 0$.

Explanation and check.

The factorization $xx = x^2$ is an identity. The repeated factor shows a double zero at $x = 0$.

Worked example

Problem. Determine all real parameter values that make the two forms $a(x + 3)^2 + k$ and $x^2 + 6x + 7$ identical for every x . Match only decisive coefficients first, then verify every coefficient.

Answer. $a = 1, k = -2$.

Explanation and check.

Coefficient matching yields the unique pair $a = 1, k = -2$, and substitution reproduces $x^2 + 6x + 7$.