Polynomial Structure Check

Write polynomials in standard form and name their important parts

Name: _____ Date: _____

Polynomial Parts: Problem 1

Directions: Write each polynomial in standard form: arrange terms from the greatest exponent to the least exponent. Then complete the table.

Word bank

- **Term:** a number, a variable part, or a product of numbers and variables separated by + or - signs.
- **Coefficient:** the numerical factor of a term. For example, in $-4x^3$, -4 is the coefficient. A constant such as 7 can be written as $7x^0$, so 7 is also a coefficient.
- **Degree:** the greatest exponent of a variable with a nonzero coefficient.
- **Leading coefficient:** the coefficient of the first term in standard form.
- **Constant term:** the term with no variable.

1. Analyze: $7 - 4x^3 + 9x$

What to write	Your analysis
Standard form	
Terms in standard form	
Coefficients, in order	
Degree	
Leading coefficient	
Constant term	

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Polynomial Parts: Problem 2

2. Analyze: $-5x^2 + 12 - 3x^5 + x^3$

First rewrite the expression so its powers descend from greatest to least. Then identify every requested part.

What to write	Your analysis
Standard form	
Terms in standard form	
Coefficients, in order	
Degree	
Leading coefficient	
Constant term	

Reminder: When no number is written before a variable term, its coefficient is 1. For example, $x^3 = 1x^3$.

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Polynomial Parts: Problem 3

3. Analyze: $5x^2 - 8x^7 + 3x^4$

Look carefully: this polynomial has no written constant term. Record the constant term that represents this situation.

What to write	Your analysis
Standard form	
Terms in standard form	
Coefficients, in order	
Degree	
Leading coefficient	
Constant term	

Quick check: In one sentence, explain how you found the degree in problem 3.

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Answer Key and Teaching Notes

Answers

1. Standard form: $-4x^3 + 9x + 7$. Terms: $-4x^3$, $9x$, 7. Coefficients in order: -4, 9, 7. Degree: 3. Leading coefficient: -4. Constant term: 7.

2. Standard form: $-3x^5 + x^3 - 5x^2 + 12$. Terms: $-3x^5$, x^3, $-5x^2$, 12. Coefficients in order: -3, 1, -5, 12. Degree: 5. Leading coefficient: -3. Constant term: 12. The coefficient of x^3 is 1 even though 1 is not written. The constant 12 may be written as $12x^0$.

3. Standard form: $-8x^7 + 3x^4 + 5x^2$. Terms: $-8x^7$, $3x^4$, $5x^2$. Coefficients in order: -8, 3, 5. Degree: 7. Leading coefficient: -8. Constant term: 0. Quick-check sample: “The greatest exponent with a nonzero coefficient is 7, so the degree is 7.”

Scoring: Award 1 point for each accurate table entry category per problem (18 points total) and 1 point for a correct quick-check explanation. Equivalent punctuation in lists is acceptable. Standard-form terms must be arranged in descending powers.

Materials

Supplied: student pages 1-3 with structured analysis tables; teacher key. Additionally needed: pencil and a document camera or board for modeling.

Exact setup

Give each student all three student pages, pages 1-3, face down. Display only the word bank. Students work independently after the brief model. Allow about 12 minutes, then review one item at a time.

Teaching script

Say: “Standard form puts the highest power first. A coefficient is the numerical factor of a term, including a constant term. For example, 7 is the coefficient in 7x to the zero power. Keep each coefficient's sign. The constant term has no variable.” Point to $-4x^3$ and say: “Here, -4 is the coefficient.” Then say: “Do not add terms that are not present. If no constant is written, its value is 0.”

Observation method

While students work, check whether each student (1) orders powers from greatest to least, (2) carries negative signs with coefficients, and (3) records 0 for the missing constant in problem 3. Ask a student who writes 8 instead of -8: “What sign is attached to the first term?” Reteach by having the student circle exponents before reordering.

Source credit

Standard provided in task contract: NY Next Generation Mathematics, AI-A.SSE.1.a, https://lessonmakerpro.com/standards/ny-nextgen-math/ai-a-sse-1-a