

Polynomial Skills Diagnostic Assessment

Short pre-test, 25-question unit diagnostic, and targeted score profile

Algebra I & II

Print-friendly

Classroom diagnostic

Name: _____

Date: _____

Class / period: _____

Suggested time: 10 minutes

Directions Complete the short pre-test without notes or a calculator unless your teacher says otherwise. Show enough work to make your method visible. This is a diagnostic, not a grade.

Part 1: Short Polynomial Pre-Test

Use this 10-question check before a unit or tutoring plan. Two questions per skill area is a screen, not a diagnosis, so use the longer assessment when the total is below 7 or the answers are inconsistent.

1. Rewrite $4 - 3x^3 + 2x - x^2$ in standard form. Then state the degree and leading coefficient.

2. Let $p(x) = 2x^2 - 5x + 1$. Find $p(-2)$.

3. Simplify $(3x^2 - 4x + 7) + (2x^2 + x - 5)$.

4. Multiply $(x - 3)(x + 5)$.

5. Factor $6x^3 - 24x$ completely.

Short Polynomial Pre-Test - Continued

6. Factor $2x^2 + 7x + 3$.

7. Divide $x^3 + 2x^2 - 5x - 6$ by $x + 3$.

8. Find the remainder when $p(x) = x^3 - 4x + 1$ is divided by $x - 2$.

9. List the zeros and multiplicities of $f(x) = (x + 1)^2(x - 4)$.

10. For $g(x) = -2(x + 2)(x - 1)^2$, describe the end behavior and what the graph does at each zero.

Pre-Test Quick Score

Foundations 1-2	Operations 3-4	Factoring 5-6	Division 7-8	Graphs 9-10
___ / 2	___ / 2	___ / 2	___ / 2	___ / 2

Use the result 9-10: begin the unit. 7-8: begin with one targeted warm-up. 0-6: use the full diagnostic. A zero in any skill pair is a stronger signal than the total score.

Part 2: Full Polynomial Unit Diagnostic

Name: _____

Date: _____

Class / period: _____

Suggested time: 35-45 minutes

Directions Score one point per question. Show work for subtraction, multiplication, factoring, and division so the teacher can separate arithmetic slips from method gaps.

A. Vocabulary, Standard Form, and Evaluation

1. Rewrite $7 - 2x^4 + 5x^2 - x$ in standard form. State the degree, leading coefficient, and constant term.

2. Classify $3x^5 - x^2 + 4$ by degree and number of terms.

3. Circle the expression that is not a polynomial: $4x^3 - 2x + 1$, $3/x + x^2$, 5, or $2x^4 - 7x^2$.

4. For $-6x^3 + 2x^2 - 9$, state the coefficient of x^2 , the coefficient of x , and the constant term.

5. Let $p(x) = 3x^2 + x - 4$. Find $p(-2)$.

6. Let $q(x) = 4x^2 - 8x + 3$. Find $q(1/2)$.

7. If $f(x) = x^2 - 3x + 2$ and $g(x) = 2x + 1$, find $f(3) + g(-1)$.

B. Adding, Subtracting, and Multiplying

8. Add $(4x^3 - 2x + 5) + (x^3 + 6x^2 + 3x - 8)$.

9. Subtract $(5x^2 - 3x + 7) - (2x^2 + 4x - 1)$.

10. Two regions have areas $3x^2 - 2x + 6$ and $x^2 + 5x - 4$. Write a polynomial for their total area.

11. Multiply $3x(2x^2 - x + 4)$.

12. Multiply $(x + 6)(x - 2)$.

13. Multiply $(2x - 3)(x^2 + x + 4)$.

14. Expand $(3x - 5)^2$.

C. Factoring and Polynomial Division

15. Factor $12x^4 - 18x^3$.

16. Factor $x^2 - x - 20$.

17. Factor $6x^2 + 13x + 6$.

18. Factor $4x^3 - 36x$ completely.

19. Factor $x^3 + 2x^2 - 9x - 18$ completely.

20. Divide $2x^3 + 3x^2 - 11x - 6$ by $x + 3$.

21. Divide $x^3 - 5x + 7$ by $x - 2$. Write the quotient and remainder.

22. Is $x - 4$ a factor of $p(x) = x^3 - 6x^2 + 5x + 12$? Show the quickest check.

D. Zeros and Graphs

23. For $f(x) = (x + 3)(x - 1)^2$, list the zeros and state whether the graph crosses or touches at each one.

24. For $g(x) = -x^3 + 4x$, find the zeros and describe the end behavior.

25. Choose the equation whose graph has a zero at -2 where it touches, a zero at 1 where it crosses, and left-down/right-up end behavior: A. $(x + 2)^2(x - 1)$, B. $-(x + 2)(x - 1)^2$, C. $(x + 2)(x - 1)$, D. $-(x + 2)^2(x - 1)^2$.

Student Score Profile

Score one point per question. Record section totals before looking at the overall score; the section pattern is what determines the next assignment.

Skill area	Questions	Points	Secure	Developing	Needs work
Foundations	1-7	___ / 7	6-7	4-5	0-3
Operations	8-14	___ / 7	6-7	4-5	0-3
Factoring	15-19	___ / 5	4-5	3	0-2
Division	20-22	___ / 3	3	2	0-1
Zeros and graphs	23-25	___ / 3	3	2	0-1

Overall score: ___ / 25

Recommended starting assignment:

Overall bands 22-25: ready for advanced polynomial work. 18-21: generally ready with targeted review. 13-17: use structured remediation. 0-12: reteach prerequisite skills before a full polynomial unit.

Graph-Matching Remediation Activity

Match each graph to one equation from the bank and one feature description. Use zeros, multiplicity, degree, and leading coefficient; do not rely on the picture alone.

Equation bank - use each equation once

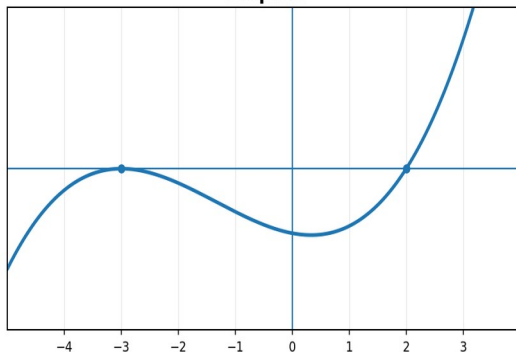
I. $y = -(x - 2)^2(x + 3)^2$

II. $y = (x + 3)(x - 2)$

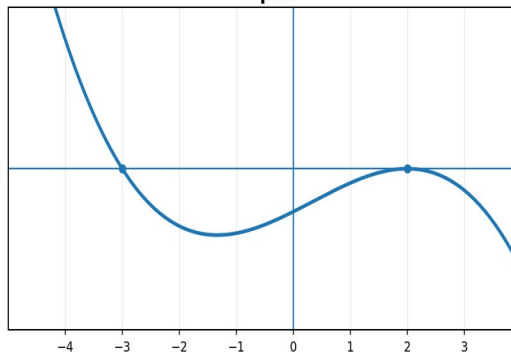
III. $y = (x + 3)^2(x - 2)$

IV. $y = -(x + 3)(x - 2)^2$

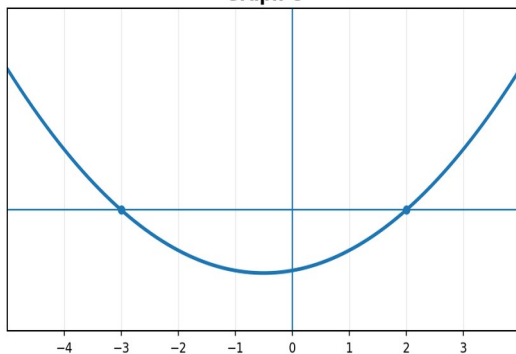
Graph A



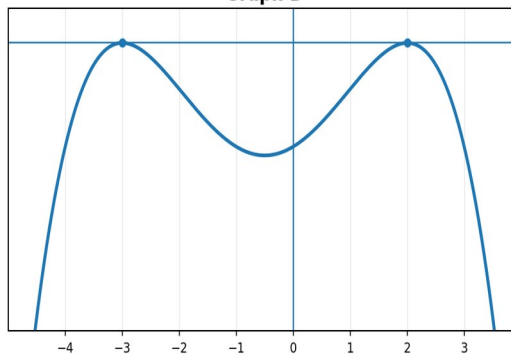
Graph B



Graph C



Graph D



1. Crosses at both $x = -3$ and $x = 2$; both ends rise. Graph: ____ Equation: ____
2. Touches at both $x = -3$ and $x = 2$; both ends fall. Graph: ____ Equation: ____
3. Crosses at $x = -3$, touches at $x = 2$; left up/right down. Graph: ____ Equation: ____
4. Touches at $x = -3$, crosses at $x = 2$; left down/right up. Graph: ____ Equation: ____

Explain one match using a zero, multiplicity, and end-behavior statement:

Polynomial Skills Diagnostic - Teacher Key

Answers, skill coding, scoring bands, and targeted remediation

Algebra I & II

Print-friendly

Classroom diagnostic

Purpose Use section scores to assign the smallest useful next step. This resource is classroom-made and criterion-referenced; it is not standardized or norm-referenced.

Short Pre-Test Answer Key

1. $-3x^3 - x^2 + 2x + 4$; **degree 3; leading coefficient -3**. *Skill: Foundations*. Arrange terms from greatest exponent to least.
2. **19**. *Skill: Foundations*. $2(-2)^2 - 5(-2) + 1 = 8 + 10 + 1$.
3. $5x^2 - 3x + 2$. *Skill: Operations*. Combine like terms.
4. $x^2 + 2x - 15$. *Skill: Operations*. Distribute each term.
5. $6x(x - 2)(x + 2)$. *Skill: Factoring*. Take out $6x$, then factor the difference of squares.
6. $(2x + 1)(x + 3)$. *Skill: Factoring*. The middle terms $6x$ and x add to $7x$.
7. $x^2 - x - 2$. *Skill: Division*. Synthetic division with -3 gives remainder 0.
8. **1**. *Skill: Division*. Use $p(2)$: $8 - 8 + 1 = 1$.
9. **$x = -1$, multiplicity 2; $x = 4$, multiplicity 1**. *Skill: Graphs*. The exponent on each factor gives its multiplicity.
10. **Left end up, right end down; crosses at $x = -2$; touches and turns at $x = 1$** . *Skill: Graphs*. Odd degree with a negative leading coefficient; odd multiplicity crosses and even multiplicity touches.

Pre-test assignment rule $2/2$ = secure, $1/2$ = monitor or give one warm-up, $0/2$ = assign the matching remediation resource. Use the 25-question diagnostic when the total is 0-6.

Full Diagnostic Answer Key

Foundations

1. $-2x^4 + 5x^2 - x + 7$; **degree 4; leading coefficient -2; constant 7**. Order terms by descending exponent.
2. **Fifth-degree trinomial**. The greatest exponent is 5 and there are three nonzero terms.
3. $3/x + x^2$. The term $3/x$ is $3x^{-1}$, which has a negative exponent.
4. **2, 0, and -9**. A missing x-term has coefficient 0.
5. **6**. $3(4) - 2 - 4 = 6$.
6. **0**. $4(1/4) - 8(1/2) + 3 = 1 - 4 + 3$.
7. **1**. $f(3) = 2$ and $g(-1) = -1$.

Operations

8. $5x^3 + 6x^2 + x - 3$. Combine terms with matching exponents.
9. $3x^2 - 7x + 8$. Distribute the subtraction sign through the second polynomial.
10. $4x^2 + 3x + 2$. Add the two area expressions.
11. $6x^3 - 3x^2 + 12x$. Distribute $3x$ to every term.
12. $x^2 + 4x - 12$. The middle terms are $-2x$ and $6x$.
13. $2x^3 - x^2 + 5x - 12$. Distribute both terms, then combine like terms.
14. $9x^2 - 30x + 25$. Use $(a - b)^2 = a^2 - 2ab + b^2$.

Factoring

15. $6x^3(2x - 3)$. The greatest common factor is $6x^3$.
16. $(x - 5)(x + 4)$. The numbers -5 and 4 multiply to -20 and add to -1.
17. $(3x + 2)(2x + 3)$. Split $13x$ as $9x + 4x$, then group.
18. $4x(x - 3)(x + 3)$. Take out $4x$, then factor $x^2 - 9$.
19. $(x + 2)(x - 3)(x + 3)$. Group, then factor the remaining difference of squares.

Division

20. $2x^2 - 3x - 2$. Synthetic division with -3 gives remainder 0.
21. $x^2 + 2x - 1$ **with remainder 5**. Include the missing $0x^2$ term before dividing.
22. **Yes. $p(4) = 0$** . By the Remainder Theorem, remainder 0 means $x - 4$ is a factor.

Graphs

23. $x = -3$, **crosses**; $x = 1$, **touches and turns**. Multiplicity 1 is odd; multiplicity 2 is even.
24. **Zeros: -2, 0, 2. Left end up and right end down**. Factor $-x(x - 2)(x + 2)$; the degree is odd and the leading coefficient is negative.
25. **A. $(x + 2)^2(x - 1)$** . Positive cubic end behavior; even multiplicity at -2 and odd multiplicity at 1.

Student Score Profile

Score one point per question. Record section totals before looking at the overall score; the section pattern is what determines the next assignment.

Skill area	Questions	Points	Secure	Developing	Needs work
Foundations	1-7	___ / 7	6-7	4-5	0-3
Operations	8-14	___ / 7	6-7	4-5	0-3
Factoring	15-19	___ / 5	4-5	3	0-2
Division	20-22	___ / 3	3	2	0-1
Zeros and graphs	23-25	___ / 3	3	2	0-1

Overall score: ___ / 25

Recommended starting assignment:

Overall bands 22-25: ready for advanced polynomial work. 18-21: generally ready with targeted review. 13-17: use structured remediation. 0-12: reteach prerequisite skills before a full polynomial unit.

Remediation Assignment Chart

Score area	Assign when	Recommended resource	What to check next
Foundations	0-3 of 7	Standard form and evaluation refresher	Can the student order terms and substitute negatives accurately?
Operations	0-3 of 7	Polynomial operations guide	Can the student line up like terms and distribute every factor?
Factoring	0-2 of 5	Factoring flowchart and worksheets	Can the student identify a GCF before choosing a pattern?
Division	0-1 of 3	Polynomial division guide	Can the student include missing terms and interpret a remainder?
Zeros and graphs	0-1 of 3	Graph-matching activity	Can the student connect factor, zero, multiplicity, and end behavior?

Graph-Matching Remediation Activity - Teacher Key

Match each graph to one equation from the bank and one feature description. Use zeros, multiplicity, degree, and leading coefficient; do not rely on the picture alone.

Equation bank - use each equation once

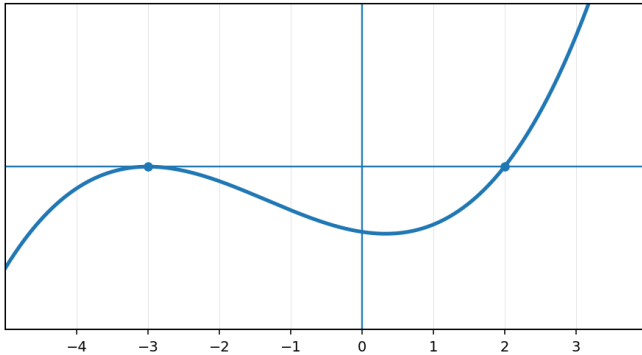
I. $y = -(x - 2)^2(x + 3)^2$

III. $y = (x + 3)^2(x - 2)$

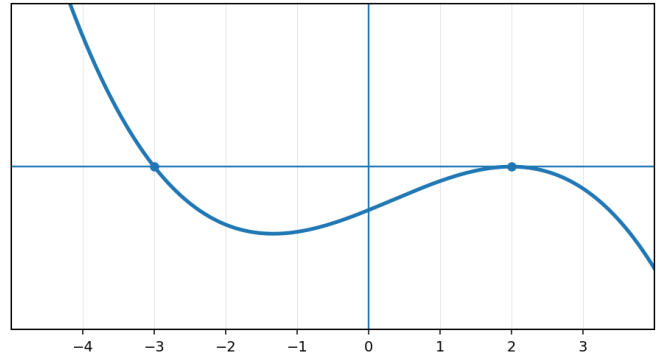
II. $y = (x + 3)(x - 2)$

IV. $y = -(x + 3)(x - 2)^2$

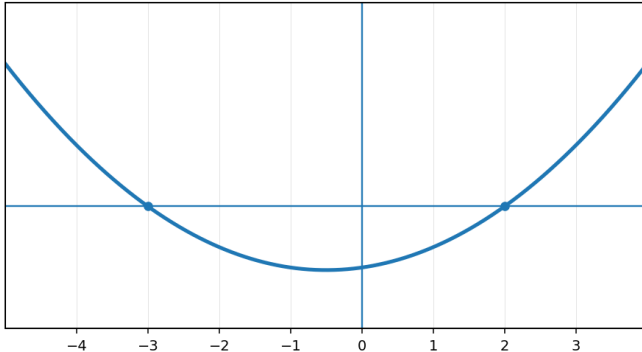
Graph A



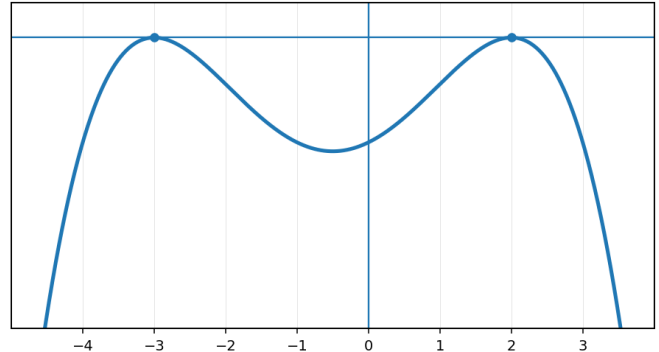
Graph B



Graph C



Graph D



Answer key

1. Graph C, Equation II - two simple zeros; positive even degree, so both ends rise.
2. Graph D, Equation I - both zeros have even multiplicity; negative even degree, so both ends fall.
3. Graph B, Equation IV - odd multiplicity at -3, even multiplicity at 2; negative cubic end behavior.
4. Graph A, Equation III - even multiplicity at -3, odd multiplicity at 2; positive cubic end behavior.

Teacher check: require one multiplicity statement and one end-behavior statement, not a visual guess.

Suggested Follow-Up Checks

Foundations: rewrite one polynomial with a missing term and evaluate at a negative input.

Operations: give one subtraction problem and one binomial-by-tri

burketutoringinfremont.com/polynomial-diagnostic-test/ | Teacher Key - Page 4 of 5

Factoring: Give an expression with a GCF followed by a second pattern. Require a multiply-back check.

Division: Give one divisor $x - a$ and ask for both synthetic division and the Remainder Theorem check.

Zeros and graphs: Give a factored polynomial and ask for zeros, multiplicities, and end behavior before sketching.

Standards Alignment and Review Notes

The assessment samples polynomial arithmetic, zeros and factors, the Remainder Theorem, and graph behavior. It aligns most directly to [CCSS HSA.APR.A.1](#), HSA.APR.B.2-3, HSA.APR.D.6, and HSF.IF.C.7.c. Every item and answer was checked for accuracy before publication on August 2, 2026.