

# 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

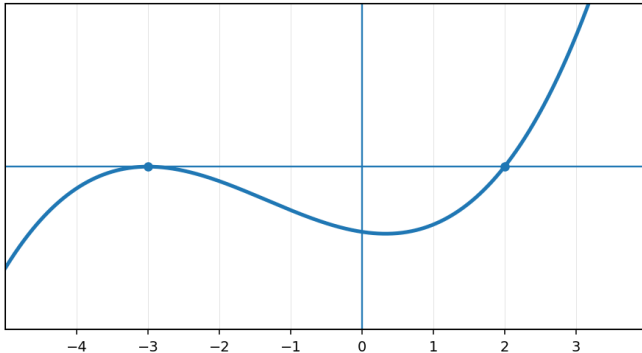
I.  $y = -(x - 2)^2(x + 3)^2$

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

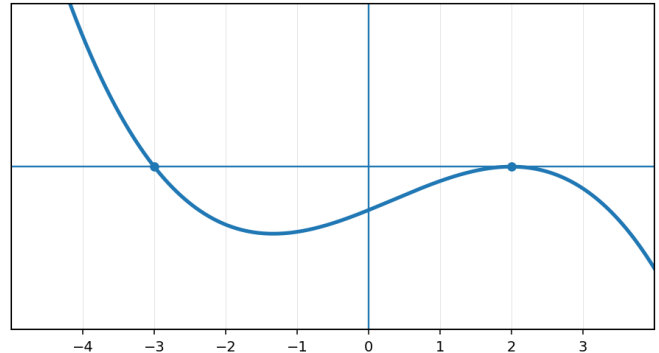
II.  $y = (x + 3)(x - 2)$

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

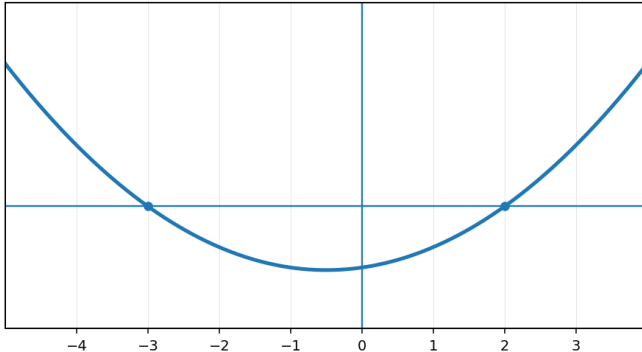
**Graph A**



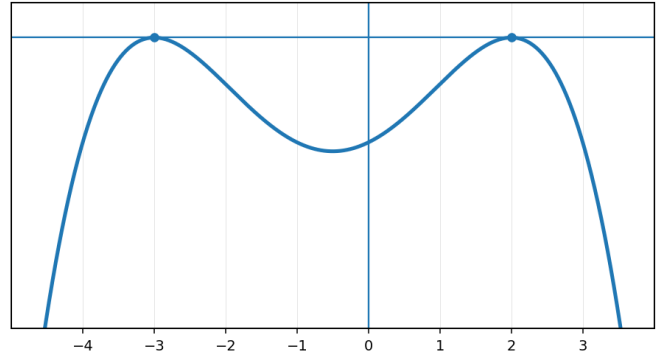
**Graph B**



**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/](http://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.