Zeros, Factors, and Complex Numbers

Real and complex zeros, factor structure, and the fundamental theorem of algebra.

Name _____ Date _____

32 main · 2-up grid · 12 pages · visible side quests

Completion Reward

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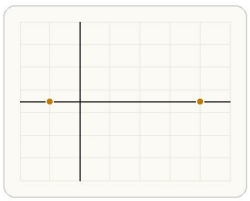
1. If (x - 4)(x + 1) = 0, what values can x take?



A product is zero only when at least one factor is zero, so solve each factor equation.

A. -4 or 1
B. 4 only
C. -1 only
D. 4 or -1

1.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

1.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

1.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

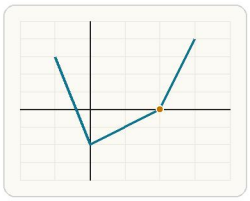
1.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

1.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

2. If f(2) = 0, what must be true?



If f(2) = 0, the polynomial has a zero at x = 2, so x - 2 is a factor.

A. x + 2 is a factor of f(x).
B. x - 2 is a factor of f(x).
C. The polynomial is linear.
D. x = 2 cannot be an x-intercept.

2.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

2.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

2.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

2.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

2.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

3. What is i^2 equal to?

power	value
i^1	i
i^2	-1
i^3	-i
i^4	1

The powers of i cycle because i^2 = -1, i^3 = -i, and i^4 = 1 before the pattern repeats.

A. 1
B. i
C. -i
D. -1

3.1. What is i^3?

A. -1
B. i
C. -i
D. 1

3.2. Which number is in a + bi form?

A. 4i + 3
B. 3 + 4i
C. 3i(4)
D. i / 3

3.3. What is (2 + 3i) + (4 - i)?

A. 6 + 2i
B. 6 + 4i
C. 8 + 3i
D. 8 + 2i

3.4. What is (3 + 2i)(3 - 2i)?

A. 5
B. 9
C. 13
D. 13i

3.5. The Fundamental Theorem of Algebra says a polynomial of degree n has:

A. at most n real zeros only
B. exactly n complex zeros counting multiplicity
C. exactly n positive zeros
D. one zero

4. What does the Fundamental Theorem of Algebra guarantee for a degree-3 polynomial?

degree	complex roots
1	1
2	2
3	3

The Fundamental Theorem of Algebra says a degree-n polynomial has n complex roots when multiplicity is counted.

A. It has 3 complex roots counting multiplicity.
B. It has exactly 3 real roots.
C. It must factor only over integers.
D. It has no repeated roots.

4.1. What is the degree of 7x^5 - 2x + 9?

A. 1
B. 2
C. 5
D. 9

4.2. An expression with exactly one term is called a:

A. binomial
B. trinomial
C. monomial
D. polynomial zero

4.3. An expression with exactly two terms is called a:

A. monomial
B. binomial
C. trinomial
D. factor

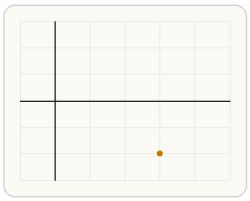
4.4. Which expression is a trinomial?

A. x^2 + 3x + 2
B. 4x
C. x - 7
D. 5

4.5. What is the degree of the term 6x^3?

A. 3
B. 6
C. 9
D. 1

5. Which expression is written in a + bi form?



In a + bi form, the real part is horizontal and the imaginary part is vertical.

A. 3 - 2i
B. sqrt(5)
C. x^2 + 1
D. 1 / 3

5.1. What is i^3?

A. -1
B. i
C. -i
D. 1

5.2. Which number is in a + bi form?

A. 4i + 3
B. 3 + 4i
C. 3i(4)
D. i / 3

5.3. What is (2 + 3i) + (4 - i)?

A. 6 + 2i
B. 6 + 4i
C. 8 + 3i
D. 8 + 2i

5.4. What is (3 + 2i)(3 - 2i)?

A. 5
B. 9
C. 13
D. 13i

5.5. The Fundamental Theorem of Algebra says a polynomial of degree n has:

A. at most n real zeros only
B. exactly n complex zeros counting multiplicity
C. exactly n positive zeros
D. one zero

6. If x = -4 is a zero, which factor must appear?

A. x + 4
B. x - 4
C. 4x
D. x^2 - 4

6.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

6.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

6.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

6.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

6.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

7. For f(x) = x^2 - 9, which value is a zero?

A. 3
B. 2
C. 1
D. 0

7.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

7.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

7.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

7.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

7.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

8. If 5 is a zero, which factor belongs?

A. x + 5
B. 5x
C. x - 5
D. x^2 - 5

8.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

8.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

8.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

8.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

8.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

9. Which expression equals i^5?

A. -i
B. 1
C. i
D. -1

9.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

9.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

9.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

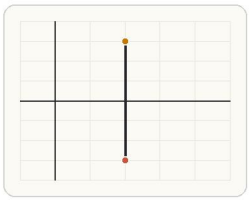
9.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

9.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

10. Which pair are complex conjugates?



Conjugates keep the same real part and mirror across the horizontal axis.

A. 2 + 3i and -2 + 3i
B. 2 + 3i and 3 + 2i
C. 2 + 3i and 2 - 3i
D. 2 + 3i and -2 - 3i

10.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

10.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

10.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

10.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

10.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

11. If you know x = 3 is a zero of a polynomial, what is a useful next step?

A. Write the factor x - 3.
B. Write the factor x + 3.
C. Replace every x with 0.
D. Assume the polynomial is quadratic.

11.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

11.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

11.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

11.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

11.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

12. A student says if (x - 2)(x + 5) = 0, then x = 7. What is the mistake?

A. They should have multiplied 2 and 5 first.
B. They added the factors instead of setting each factor equal to 0.
C. They should square both factors.
D. The equation has no solution.

12.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

12.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

12.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

12.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

12.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

13. For f(x) = x^2 - 5x + 6, find f(2). Answer with a number.

13.1. What is (2x^2 + 3x) + (x^2 - x)?

A. 3x^2 + 2x
B. 2x^4 + 2x
C. x^2 + 4x
D. 3x^2 - 2x

13.2. What is 4x(x + 3)?

A. 4x^2 + 3
B. 4x^2 + 12x
C. 5x + 3
D. 4x^2 + 7x

13.3. What is (x + 2)(x + 5)?

A. x^2 + 7x + 10
B. x^2 + 10x + 7
C. 2x^2 + 7x + 10
D. x^2 + 3x + 10

13.4. If p(x) = x^2 - 3x + 1, what is p(2)?

A. -1
B. 1
C. 3
D. 5

13.5. An area model for (x + 2)(x + 4) helps you find:

A. a factor only
B. the expanded product
C. the slope
D. the degree only

14. For f(x) = x^3 - x, find f(1). Answer with a number.

14.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

14.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

14.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

14.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

14.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

15. Find (3 + 2i) + (4 - 5i). Answer in standard form.

15.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

15.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

15.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

15.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

15.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

16. Find (6 - i) - (2 + 4i). Answer in standard form.

16.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

16.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

16.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

16.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

16.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

17. Find i(4 - 3i). Answer in standard form.

17.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

17.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

17.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

17.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

17.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

18. Find i^7. Answer as a simplified complex number.

18.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

18.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

18.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

18.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

18.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

19. Solve x^2 + 1 = 0. Answer in the form x = ...

19.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

19.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

19.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

19.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

19.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

20. For p(x) = x^2 + x - 6, find p(2). Answer with a number.

20.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

20.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

20.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

20.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

20.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

21. Write a polynomial in factored form with zeros 2 and -3. Answer as an equation.

21.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

21.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

21.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

21.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

21.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

22. Write a polynomial in standard form with zeros 1 and 4. Answer as an equation.

22.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

22.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

22.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

22.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

22.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

23. Solve (x + 2)(x - 7) = 0. Answer with all solution values of x.

23.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

23.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

23.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

23.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

23.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

24. Solve x^2 + 4 = 0. Answer in the form x = ...

24.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

24.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

24.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

24.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

24.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

25. Simplify (3 + i)(3 - i). Answer with a number.

25.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

25.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

25.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

25.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

25.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

26. Simplify -5i^2. Answer with a number.

26.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

26.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

26.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

26.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

26.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

27. Find i^10. Answer as a simplified complex number.

27.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

27.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

27.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

27.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

27.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

28. Write factor form for a polynomial with roots 2 and 2. Answer as an equation.

28.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

28.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

28.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

28.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

28.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

29. Solve x(x - 1)(x + 2) = 0. Answer with all solution values of x.

29.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

29.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

29.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

29.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

29.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros

30. For p(x) = x^3 - 8, find p(2). Answer with a number.

30.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

30.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

30.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

30.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

30.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

31. Write factor form for roots -1, -1, and 3. Answer as an equation.

31.1. Which factors 8x + 12?

A. 4(2x + 3)
B. 2(4x + 12)
C. 8(x + 12)
D. 4(x + 3)

31.2. Which factors x^2 - 25?

A. (x - 5)(x + 5)
B. (x - 25)(x + 1)
C. (x - 5)^2
D. (x + 25)(x - 1)

31.3. Which factors x^2 + 7x + 12?

A. (x + 3)(x + 4)
B. (x + 2)(x + 6)
C. (x - 3)(x - 4)
D. (x + 12)(x + 1)

31.4. Before factoring 6x^2 + 9x, what should you check first?

A. the y-intercept
B. the greatest common factor
C. the degree parity
D. the zeros

31.5. If (x - 4)(x + 1) = 0, one possible x-value is:

A. 5
B. 4
C. 3
D. -4

32. Solve x^2 + 9 = 0. Answer in the form x = ...

32.1. A polynomial of even degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. go opposite directions
D. touch the x-axis only

32.2. A polynomial of odd degree with positive leading coefficient has ends that:

A. both rise
B. both fall
C. left down and right up
D. left up and right down

32.3. If x = -3 is a zero, which factor belongs?

A. x - 3
B. x + 3
C. 3x - 1
D. x^2 + 3

32.4. To test whether 2 is a zero of f(x), you should compute:

A. f(0)
B. f(1)
C. f(2)
D. 2f(x)

32.5. The Fundamental Theorem of Algebra guarantees that a degree-4 polynomial has:

A. exactly 4 complex zeros counting multiplicity
B. at most 2 zeros
C. only real zeros
D. no repeated zeros