

## Unit 3 Test Review

Name: \_\_\_\_\_

1. Simplify  $(-8x^7)(4x^4)$

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

3. Simplify  $(3x^6)(-6x)$

4. Simplify  $\left(\frac{5x^2y^0}{z^3}\right)^2$

5. Simplify  $\left(\frac{4w^5y}{z^8}\right)^3$

6. Simplify  $\left(\frac{2p^6q^2}{z^4}\right)^2$

For each of the following simplify each expression, then give the degree and identify it as a monomial, binomial, trinomial, or none of these.

7.  $(18x^3 + 18x - 7) + (x^3 - 16x + 8)$

8.  $(12x^4 - 4x^2 + 6) - (20x^4 + 6x^2 - 7)$

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

Degree: \_\_\_\_\_ Type: \_\_\_\_\_

Degree: \_\_\_\_\_ Type: \_\_\_\_\_

9.  $(8x + 7)(8x - 7)(x - 2)$

10.  $(2x + 7)(2x - 7)(x + 2)$

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

Degree: \_\_\_\_\_ Type: \_\_\_\_\_

Degree: \_\_\_\_\_ Type: \_\_\_\_\_

11. Factor completely:  $10x^2 + 5x - 30$

12. Factor Completely:  $3m^3 - 27m^2 + 24m$

13. Factor Completely:  $25x^2 - 25$

14. Factor Completely:  $81x^2 - 16$

15. Factor Completely:  $56xy - 35x + 16ry - 10r$

16. Factor Completely:  $16mn - 4m^2 + 28n - 7m$

17. Factor Completely:  $8x^3 - 27y^3$

18. Factor Completely:  $x^3 + 125y^3$

19. Write a polynomial of least degree that satisfies the given conditions: zeros of  $2, 3 + i$ , and  $3 - i$

20. Write a polynomial of least degree that satisfies the given conditions: zeros of  $-4, 1 + i$ , and  $1 - i$

21. Given that the parent function of a cubic function is:  $f(x) = x^3$ . Describe the transformation of

$$g(x) = (x - 3)^3 + 1$$

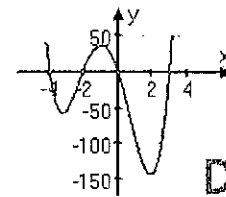
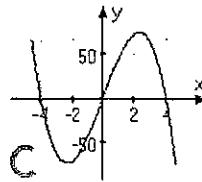
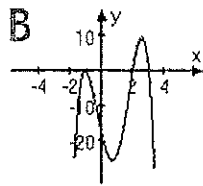
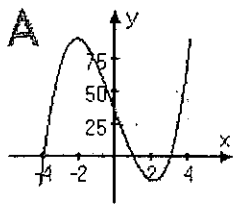
22. Given that the parent function of a cubic function is:  $f(x) = x^2$ . Describe the transformation of

$$g(x) = (x + 5)^2 - 1$$

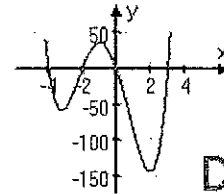
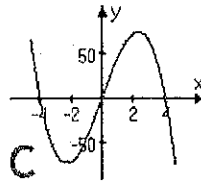
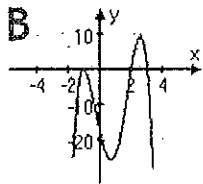
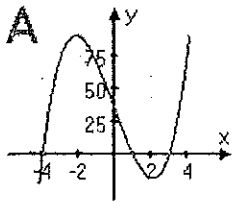
23. Make a sketch of a graph with a positive leading coefficient with an even degree here:

24. Make a sketch of a graph with a positive leading coefficient with an odd degree here:

25. Which of the following sketches could correspond to  $f(x) = -(x+4)(x)(x+4)$



26. Which of the following sketches could correspond to  $f(x) = -(x+1)^2(x-2)(x-3)$



27. Determine whether  $x - 1$  is a factor of

$$x^3 - 5x^2 + 3x + 1$$

28. Determine whether  $x + 3$  is a factor of

$$-2x^3 + x^2 - 63$$

29. What is the remainder when  $-x^4 + 3x^2 - 4x - 5$  is divided by  $x + 3$

30. What is the remainder when  $-3x^4 + 15x^3 - 50x + 25$  is divided by  $x - 4$

31. Divide

$$(x^5 + 3x^4 + 2x^3 + 2x^2 + 3x + 1) \div (x + 2)$$

32. Divide  $(-11x^4 - 2x^3 - 8x^2 - 4) \div (x + 1)$

33. Identify the following key features of the graph  $f(x) = x^2 - 10x + 21$

Vertex: \_\_\_\_\_

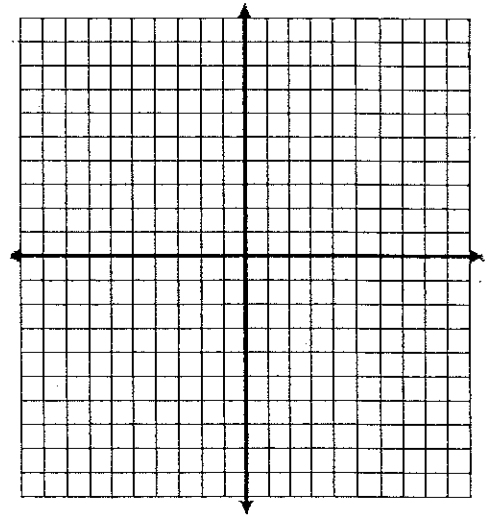
Axis of Symmetry: \_\_\_\_\_

x-intercepts: \_\_\_\_\_

y-intercepts: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



34. Identify the following key features of the graph  $f(x) = x^2 + 12x + 32$

Vertex: \_\_\_\_\_

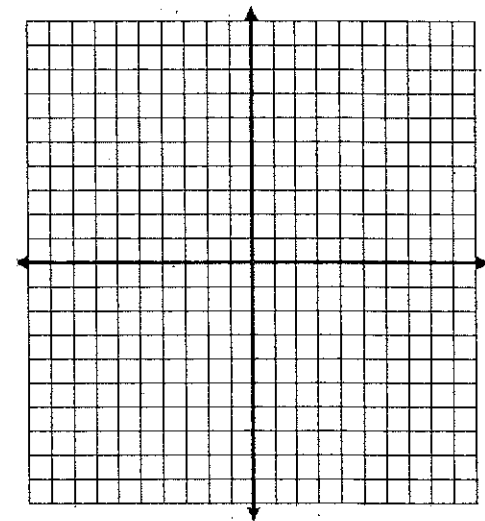
Axis of Symmetry: \_\_\_\_\_

x-intercepts: \_\_\_\_\_

y-intercepts: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



35. Determine the zeros, their multiplicities and behavior of the graph at their zeros of the polynomial function.

$$f(x) = (x - 2)(x + 3)^4(x - 1)^7$$

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

36. Determine the zeros, their multiplicities and behavior of the graph at their zeros of the polynomial function.

$$f(x) = (x + 6)(x + 7)^2(x - 10)^3$$

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

37. Factor  $f(x) = 2x^3 - 3x^2 - 17x + 30$  into linear factors given that 2 is a zero

38. Factor  $f(x) = 6x^3 + 13x^2 - 14x + 3$  into linear factors given that -3 is a zero

39. The polynomial function  $f(x) = \frac{1}{5}x^3 - \frac{1}{5}x^2 - \frac{21}{5}x + 9$  in factored form is  $f(x) = \frac{1}{5}(x - 3)^2(x + 5)$

Identify the following key features of the function and make a comprehensive graph.

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

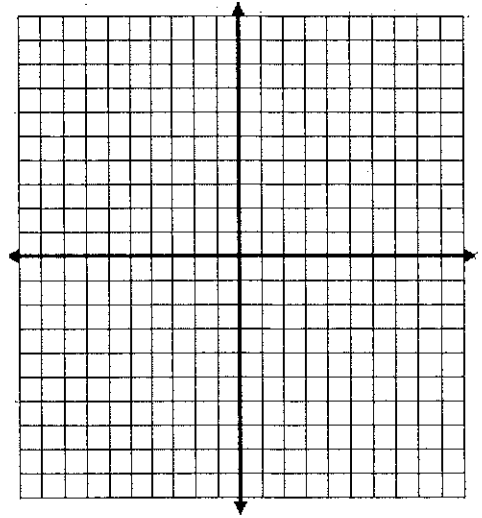
Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

y-intercept: \_\_\_\_\_

End Behavior: (circle)

Odd Degree OR Even Degree

Positive OR Negative



40. The polynomial function  $f(x) = x^4 - 18x^2 + 81$  in factored form is  $f(x) = (x - 3)^2(x + 3)^2$

Identify the following key features of the function and make a comprehensive graph.

Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

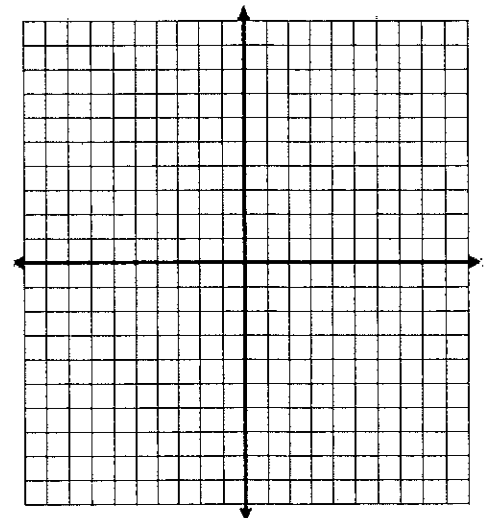
Zero: \_\_\_\_\_ Multiplicity: \_\_\_\_\_ Behavior: \_\_\_\_\_

y-intercept: \_\_\_\_\_

End Behavior: (circle)

Odd Degree OR Even Degree

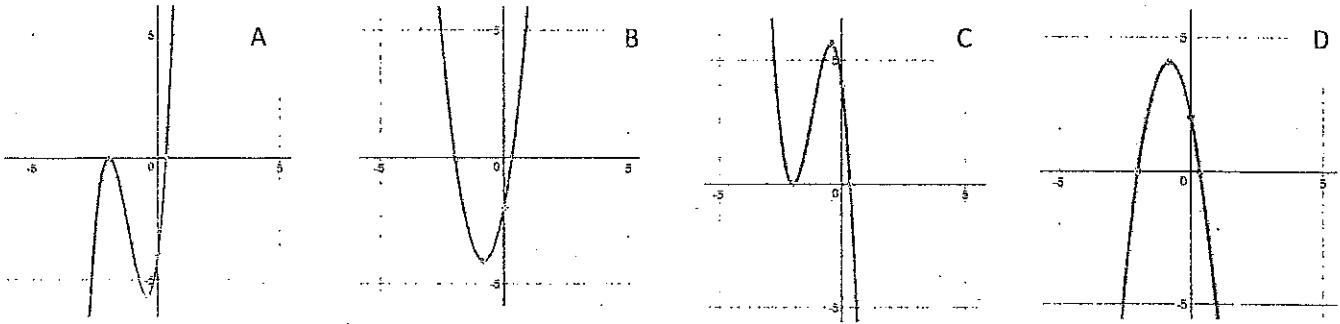
Positive OR Negative



41. The graph  $f(x) = 3x^3 + 11x^2 + 8x - 4$  in factored form is  $f(x) = (3x - 1)(x + 2)^2$  Identify the x-intercepts and determine the end behavior of the function. Match the function to the corresponding graph.

x-intercepts: \_\_\_\_\_

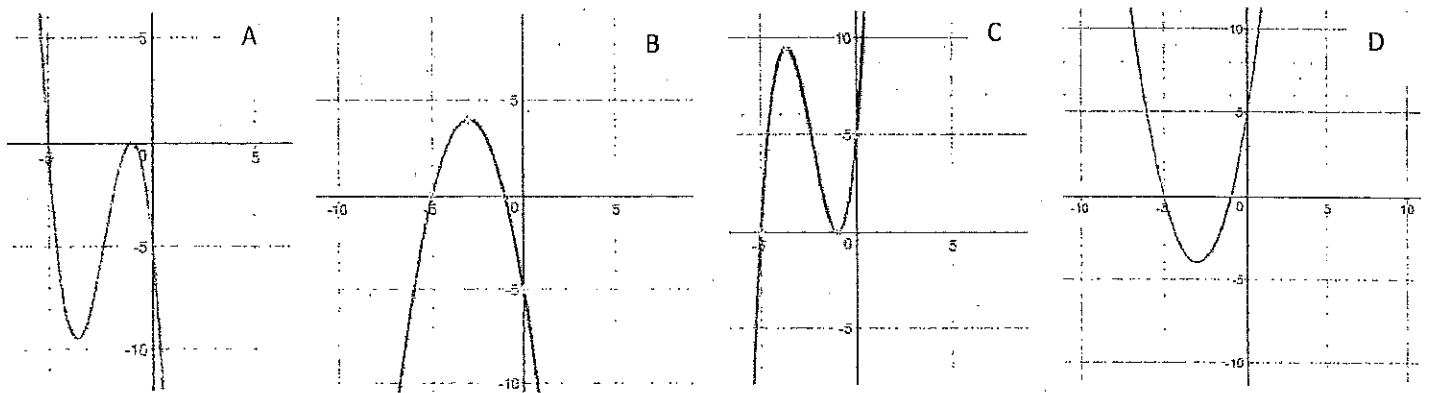
Positive/Negative : \_\_\_\_\_ Odd/Even: \_\_\_\_\_



42. The graph  $f(x) = x^3 + 7x^2 + 11x + 5$  in factored form is  $f(x) = (x + 5)(x + 1)^2$  Identify the x-intercept and determine the end behavior of the function. Match the function to the corresponding graph.

x-intercepts: \_\_\_\_\_

Positive/Negative : \_\_\_\_\_ Odd/Even: \_\_\_\_\_



43. The polynomial  $f(x) = 2x^4 - 5x^2 + 6x + 15$  has zeros of  $x = 1, -2,$  and  $5 - i$ . What is the fourth zero?

44. The polynomial  $f(x) = -x^4 + 3x^2 - 12x + 5$  has zeros of  $x = 1, -2,$  and  $6 + i$ . What is the fourth zero?