4.0

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Name _____ Date _____ Period _____

There are **TWO** ways to find **ZEROS** of a polynomial.

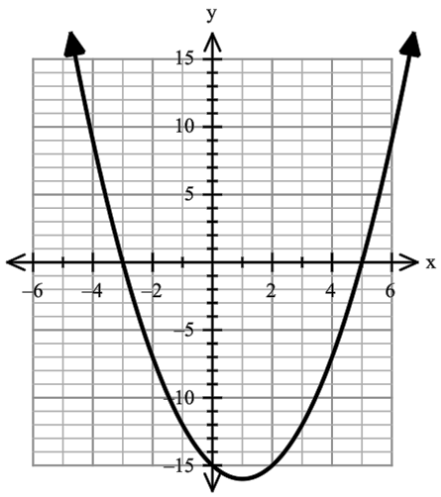
- SOLVING POLYNOMIALS: When solving a polynomial set y=0 and solve for x.
- GRAPHING POYNOMIALS: the zeros are *the x-values when y=0…. (x-intercepts)*

Find the zeros of the polynomials & compare them to the graph.

1. $f(x) = (x-5)(2x+6)$

   - Step1: Set y=0
   - Step 2: Use zero product property and set each factor to zero
   - Step 3: Solve.

   Zeros: _____

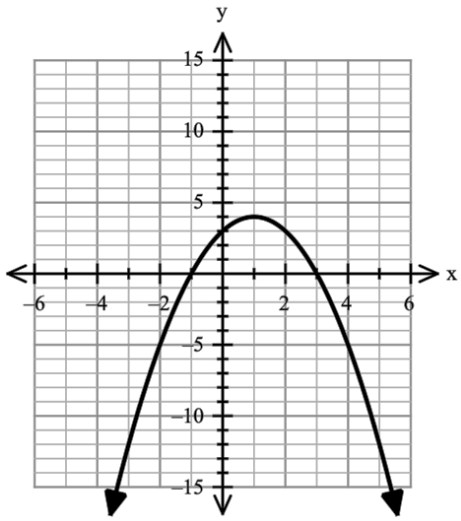


2. How are the zeros related to the graph?

3. $f(x) = -(x+1)(x-3)$

   - Step1: Set y=0
   - Step 2: Use zero product property and set each factor to zero
   - Step 3: Solve.

   Zeros: _____



4. Find the zeros on the graph and circle them.

5. What makes this graph open down?

6. Explain what it means when you are asked to find the zeros of a function.

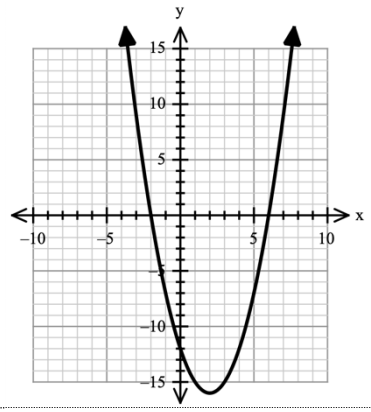
Matching Activity

Factor & solve each equation to find the zeros. Find the matching graph.

7. $y = -x^2 - 4x$ Graph	8. $y = x^2 - 4x - 12$ Graph	9. $y = x^2 + 4x - 12$ Graph
10. $y = 4x^2 - 16$ Graph	11. $y = -2x^3 + 32x$ Graph	12. $y = x^3 + 5x^2 + 4x$ Graph

Circle where the zeros are located on each graph and match them with the equations above.

A.



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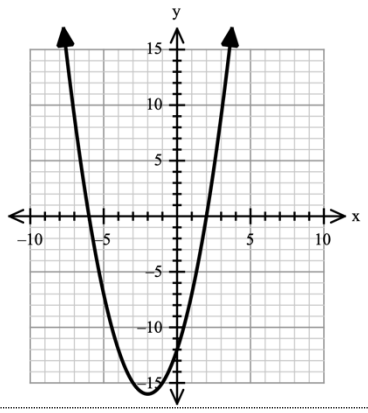
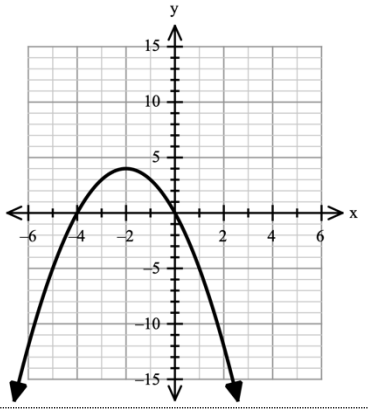
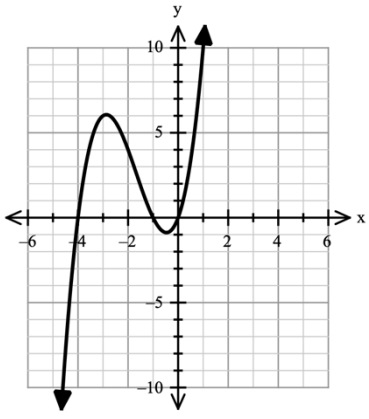


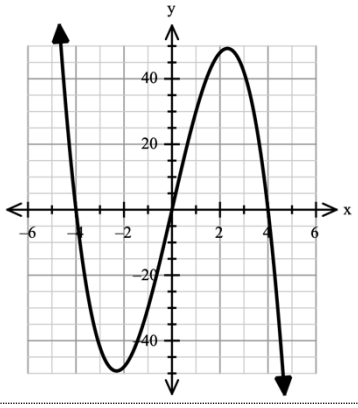
C.



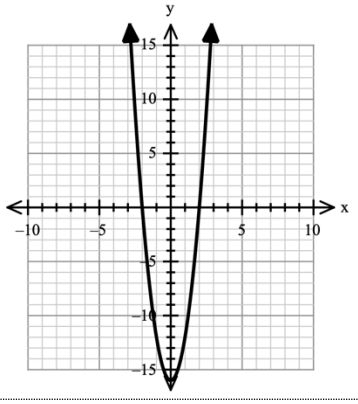
D.



E.



F.



13. How can you tell from the matching equation of graph D that the equation has three zeros?

14. Compare the graphs of D & E. What do you notice about the end behaviors of both graphs?

Zeros

To determine the number of zeros from an equation, you need to identify the degree of the polynomial.

- Standard form: Largest exponent. Ex. $f(x) = 7x^5 - 6x^4 + x^3 - 2x^2 - x + 10$ There are 5 zeros!
- Factored form: add the exponents on the factors. Ex. $f(x) = x(x-2)(x+3)^4$ There are 6 zeros!

$f(x) = x^1(x-2)^1(x+3)^4$ **remember if there is no exponent on a factor, it is a 1

Without graphing, determine the **number** of zeros for each of the following polynomials.

15. $f(x) = 2x^2 - 8x + 6$

16. $f(x) = x^4 - 2x^2 - 5x + 6$

17. $f(x) = 3x(x+2)(5x-4)$

18. $f(x) = -x^3 - x^2 - 5x - 3$

19. $f(x) = (x+1)(2x-3)$

20. $f(x) = x^5 - 3x$

21. $f(x) = 2(x-1)(x-5)^3(x-7)^5$

22. $f(x) = x^2 - 3x + 2$

23. $f(x) = x^3 - 3x + 2$

Write an equation in **factored form** for the function with the given zeros.

Ex. Zeros: $x = 4, 7, -2$

$f(x) = (x-4)(x-7)(x+2)$

24. $x = 5, 4, -8, -6$

Write an equation in **standard form** for the function with the given zeros.

Ex. Zeros: $x = 2, -3$

$f(x) = (x-2)(x+3)$

Multiply: $f(x) = x^2 + 3x - 2x - 6$

Simplify: $f(x) = x^2 + x - 6$

25. $x = -5, -7$