ALBERT

Name _____ Date _____

Graphing Polynomial Functions Worksheet

Algebra 2 · Common Core HSF-IF.C.7c

> Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

Practice

Builds the skill step by step.

1. Describe the end behavior of $f(x) = x^4$.

   A. It falls on both ends.

   B. It falls on the left and rises on the right.

   C. It rises on both ends.

   D. It rises on the left and falls on the right.

2. Describe the end behavior of $f(x) = -x^3$.

   A. It falls on the left and rises on the right.

   B. It rises on both ends.

   C. It falls on both ends.

   D. It rises on the left and falls on the right.

3. What are the zeros of $f(x) = (x - 1)(x + 4)$? List them from least to greatest.

4. What is the degree of $f(x) = 3x^5 - x^2 + 1$?

5. What is the greatest number of turning points the graph of a degree 4 polynomial can have?

6. What is the y-intercept of $f(x) = x^3 - 2x + 7$?

7. Describe the end behavior of $f(x) = 2x^6 - x$.

   A. It rises on both ends.

   B. It falls on both ends.

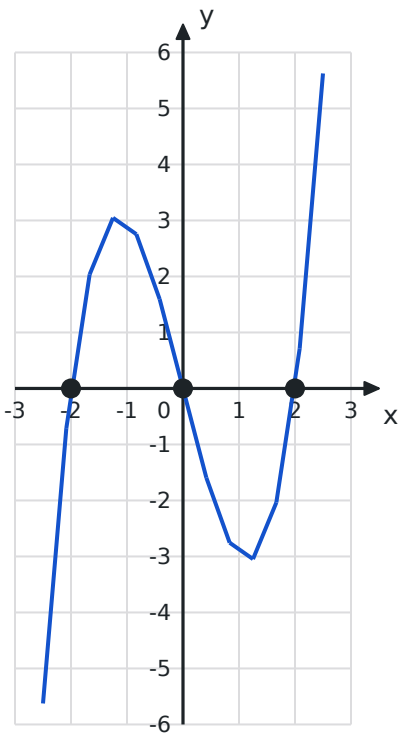
   C. It falls on the left and rises on the right.

   D. It rises on the left and falls on the right.

8. What are the zeros of $f(x) = x^2(x - 3)$? List them from least to greatest.

9. For $f(x) = x^3 - 4x$, what is $f(2)$?

10. How many turning points does the graph show?



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On Level

Grade-level practice.

1. Describe the end behavior of $f(x) = -2x^4 + x$.

   A. It rises on both ends.

   B. It falls on both ends.

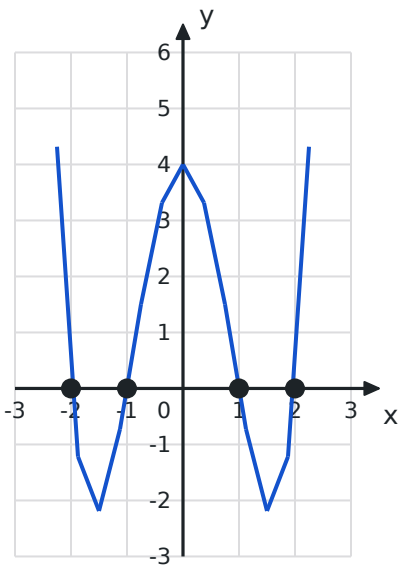
   C. It rises on the left and falls on the right.

   D. It falls on the left and rises on the right.

2. What are the zeros of $f(x) = x^3 + 2x^2 - 3x$? List them from least to greatest.

3. Describe the key features of the graph of $f(x) = -(x - 1)^2(x + 2)$.

4. The graph shows a polynomial function. What is the least degree it can have?



5. How many real zeros does $f(x) = x^3 - x$ have?

6. What is the greatest number of x-intercepts a degree 5 polynomial can have?

7. How does the graph of $f(x) = (x + 1)^3$ behave at $x = -1$?

   A. It touches the x-axis and turns around.

   B. It has a turning point there.

   C. It crosses the x-axis, flattening out like $y = x^3$.

   D. It doesn't reach the x-axis.

8. What is the y-intercept of $f(x) = (x - 2)(x + 3)(x - 1)^2$?

9. For f(x) = x(x − 3)(x + 1), where is the graph between x = 0 and x = 3?

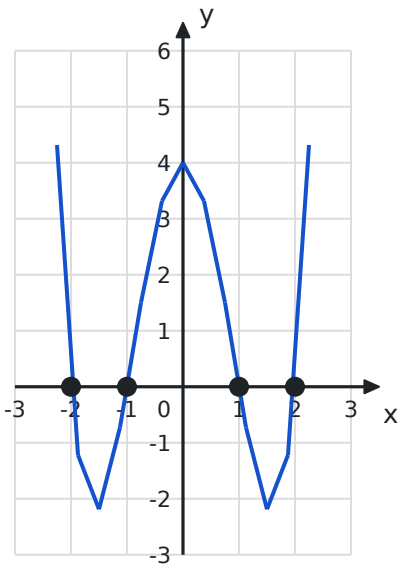
   A. above the x-axis

   B. on the x-axis

   C. it can't be told

   D. below the x-axis

10. What is the y-intercept of the graph?



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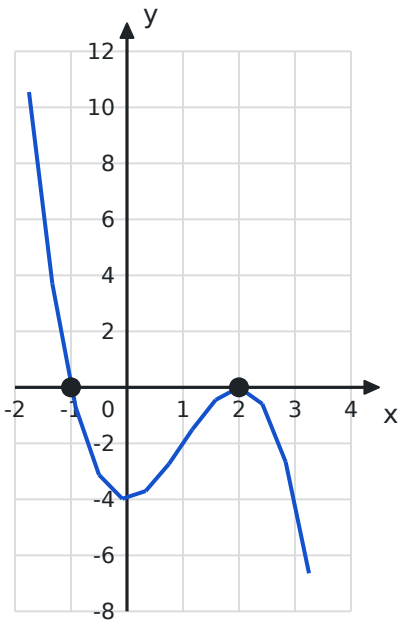
Challenge

Multi-step and word problems that stretch it.

1. A cubic $f(x) = x^3 + bx^2 + cx$ has zeros 0, 2 and -2. What are b and c?

2. What are the zeros of $f(x) = -x^4 + 4x^2$? List them from least to greatest.

3. Which function could match the graph?



A. $y = -(x + 1)(x - 2)^2$

B. $y = (x + 1)(x - 2)^2$

C. $y = -(x - 1)(x + 2)^2$

D. $y = -(x + 1)^2(x - 2)$

4. Describe the end behavior of $f(x) = (x - 1)^2(x + 2)^3$.

   A. It rises on both ends.

   B. It falls on the left and rises on the right.

   C. It falls on both ends.

   D. It rises on the left and falls on the right.

5. How many turning points does the graph of $f(x) = x^3 + x$ have?

6. $f(x) = a(x - 1)(x + 2)(x - 3)$ passes through $(2, 8)$. What is a?

7. $f(x) = x^3 - 6x^2 + 9x$. At which zero does the graph touch the x-axis without crossing?

8. Explain how to sketch a graph of $f(x) = x^3 - 9x$.

9. A polynomial has zeros -1 (multiplicity 2), 3 (multiplicity 1) and 4 (multiplicity 3) and no others. What is its least possible degree?

10. $f(x) = x^3 + bx^2 + cx$ has zeros 0, 1 and 5. What are b and c?