

Algebra 2 - Zeros and Graphs of Polynomial Functions - Worksheet

Common Core A-APR.B.3, F-IF.C.7c · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice zeros and graphs of polynomial functions (Common Core A-APR.B.3 and F-IF.C.7c). The first problems check factoring to find zeros, the middle problems add multiplicity, end behavior, and the Rational Root Theorem, and the last six are word problems and multi-step tasks that need building polynomials from zeros and modeling a box and a roller coaster.

Work in order and show every step. Write each answer in simplest form, and open the answer key only after you have tried the problem yourself.

Algebra 2 · Common Core State Standards: **A-APR.B.3, F-IF.C.7c**

Exercise 1 - Zeros from factored form

Find the zeros of $f(x) = (x-3)(x+5)(2x-1)$.

Exercise 2 - Factor out an x

Find the zeros of $x^3 - 9x$.

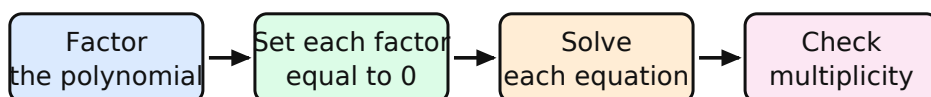
Exercise 3 - Trinomial with a common factor

Find the zeros of $x^3 + 2x^2 - 8x$.

Exercise 4 - Factor by grouping

Find all zeros of $x^3 + 3x^2 - 4x - 12$.

Exercise 5 - Quadratic type



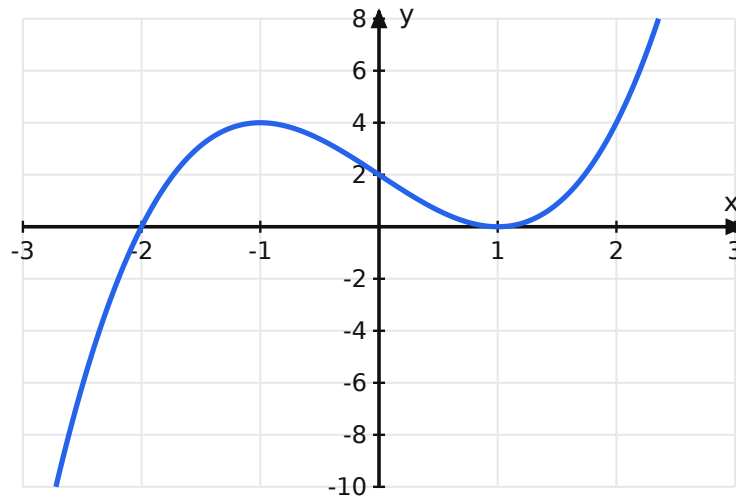
Finding zeros by factoring.

Find all real zeros of $x^4 - 5x^2 + 4$.

Exercise 6 - Multiplicity

List the zeros of $f(x) = (x+1)^2(x-2)^3$ with their multiplicities and say whether the graph crosses or touches the x-axis at each.

Exercise 7 - Read a graph



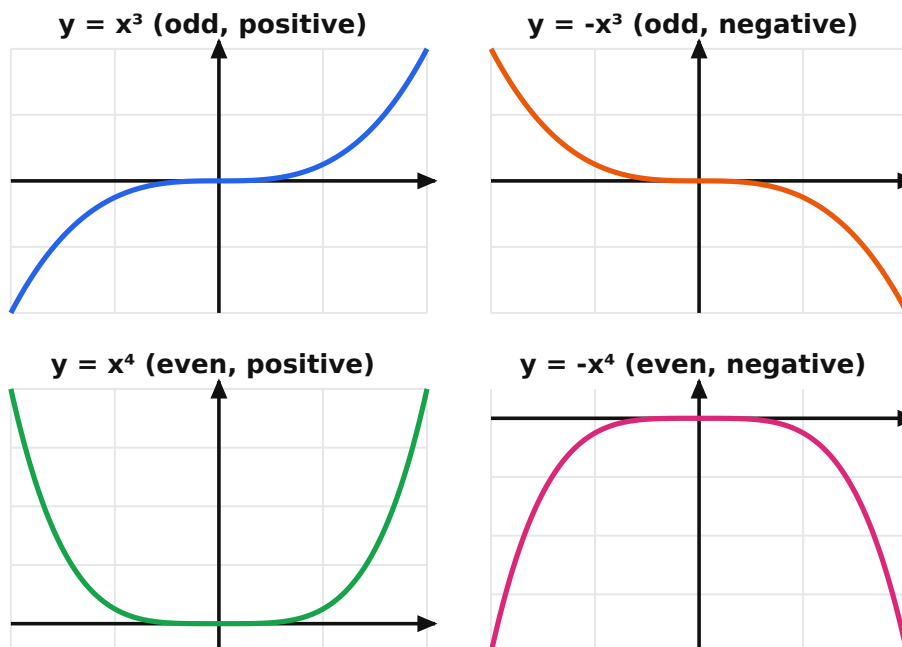
Graph of a cubic polynomial.

The cubic graphed has leading coefficient 1. Identify each zero and its multiplicity, and write the equation in factored form.

Exercise 8 - End behavior, odd

Describe the end behavior of $f(x) = -2x^5 + 3x^2 - 1$.

Exercise 9 - End behavior, even



End behavior depends on the degree (even or odd) and the sign of the leading coefficient.

Describe the end behavior of $g(x) = 3x^4 - x^3 + 2$ using the panels as a guide.

Exercise 10 - Rational root candidates

List the possible rational zeros of $2x^3 - 3x^2 - 11x + 6$.

Exercise 11 - Find all zeros, monic

Find all zeros of $x^3 - 2x^2 - 5x + 6$.

Exercise 12 - Find all zeros, non-monic

Candidate r	$p(r)$	Zero?
1	-6	no
3	0	yes

Testing candidates.

Find all zeros of $2x^3 - 3x^2 - 11x + 6$.

Exercise 13 - Build from zeros

Write a cubic polynomial with leading coefficient 1 and zeros 2, -1 , and 4. Give it in standard form.

Exercise 14 - Double zero and a point

A cubic has a double zero at $x=1$, a zero at $x=-3$, and passes through $(0,6)$. Write its equation in standard form.

Exercise 15 - Sign chart

Interval	$x < -1$	$-1 < x < 2$	$2 < x < 4$	$x > 4$
Sign of f	?	?	?	?

Complete the sign chart.

Find the sign of $f(x)=(x+1)(x-2)(x-4)$ on each interval.

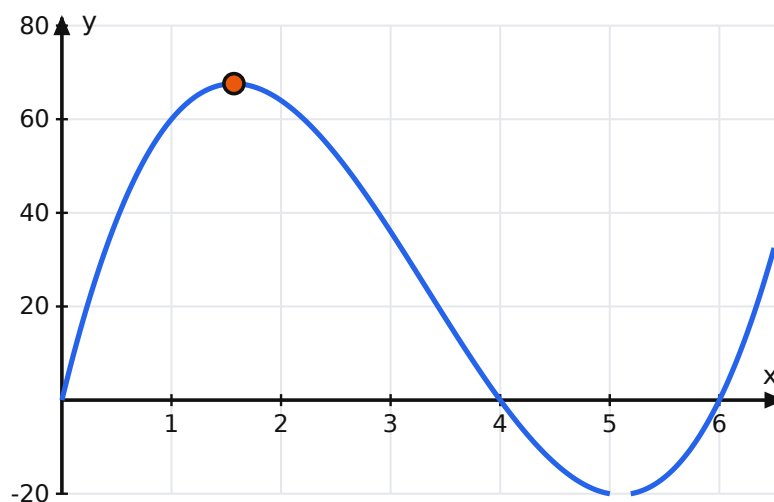
Exercise 16 - Complex zeros

Solve $x^3-1=0$ over the complex numbers.

Exercise 17 - Conjugate zeros

A degree 5 polynomial with real coefficients has zeros 2 (multiplicity 2), -1 , and $3i$. Find the remaining zero.

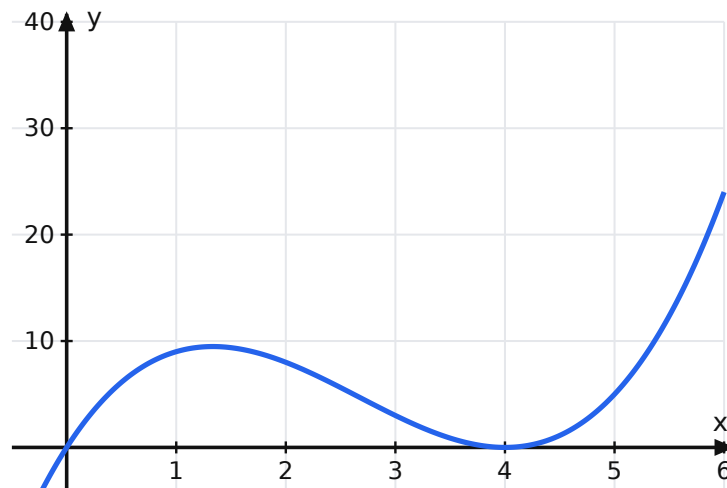
Exercise 18 - Open box



$V(x)$ for the box from an 8 by 12 inch sheet.

A box is made from an 8-inch by 12-inch sheet by cutting a square of side x from each corner. The volume is $V(x)=x(12-2x)(8-2x)=4x^3-40x^2+96x$. Find the zeros of V and explain which values of x make sense.

Exercise 19 - Roller coaster



Height h (in tens of feet) at horizontal distance x (in hundreds of feet).

The height of a roller coaster (in tens of feet) at a horizontal distance of x hundred feet is $h(x) = x(x-4)^2$ for $0 \leq x \leq 6$. Find where the track is at ground level and how the graph behaves there. Find the height at $x=2$.

Exercise 20 - Find the error

Maya says the graph of $f(x) = (x-2)^2(x+1)$ crosses the x -axis at $x=2$. Decide whether she is right and explain.

Exercise 21 - Odd degree always crosses

Explain why every polynomial of odd degree with real coefficients has at least one real zero.