

Precalculus - Polynomial Functions and Their Graphs - Worksheet

Common Core F-IF.C.7c, A-APR.B.3, F-IF.B.4 · maths-pdf.fr/en/

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

These 20 problems practice polynomial functions and their graphs (Common Core F-IF.C.7c, A-APR.B.3 and F-IF.B.4). You will find degree, end behavior, zeros, multiplicity and write equations from graphs.

Precalculus · Common Core State Standards: **F-IF.C.7c, A-APR.B.3, F-IF.B.4**

Exercise 1 - Degree and leading coefficient

State the degree and leading coefficient of $f(x) = 5x^3 - 2x^2 + x - 9$.

Exercise 2 - Expand a product

Write $(x-2)(x+3)(x+1)$ in standard form.

Exercise 3 - End behavior, odd degree

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

Exercise 4 - End behavior, even degree

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

Exercise 5 - Zeros from factors

Find the zeros of $f(x) = x(x-4)(x+5)$.

Exercise 6 - Multiplicity

For $f(x) = (x-1)^2(x+3)^3$, find each zero, its multiplicity and the behavior at the axis. State the degree.

Exercise 7 - Factor out x

Factor $x^3 - 9x$ completely and find its zeros.

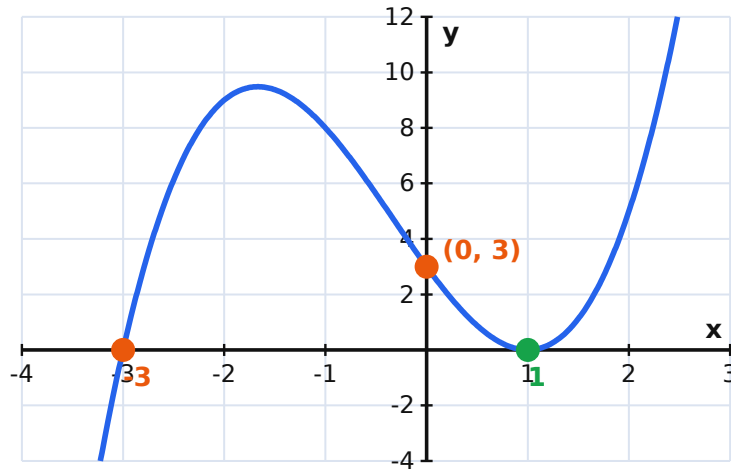
Exercise 8 - Factor by grouping

Factor $x^3 + 2x^2 - 9x - 18$ and find its zeros.

Exercise 9 - Build a polynomial

Write a cubic polynomial with zeros -1 , 2 and 4 and $f(0)=16$.

Exercise 10 - Read a graph



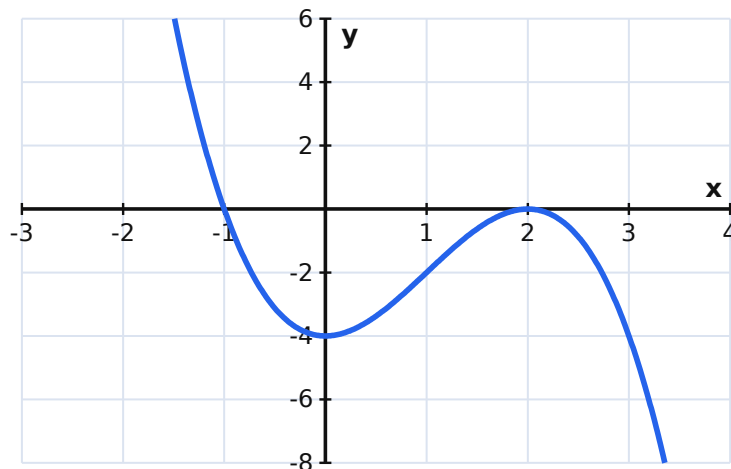
A cubic graph.

The graph crosses at $x = -3$ and touches at $x = 1$. Write a factored equation with the least degree, given that the graph rises to the right.

Exercise 11 - Turning points

(a) What is the greatest number of turning points of a degree-6 polynomial? (b) A graph has 3 turning points. What is the least possible degree?

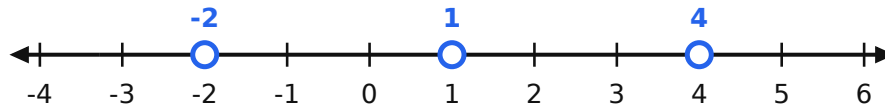
Exercise 12 - Sketch a polynomial



Axes for the sketch.

For $f(x) = -(x+1)(x-2)^2$, find the y -intercept, describe the end behavior, and describe the behavior at each zero.

Exercise 13 - Solve a polynomial inequality



Zeros on a number line.

Solve $(x+2)(x-1)(x-4) > 0$.

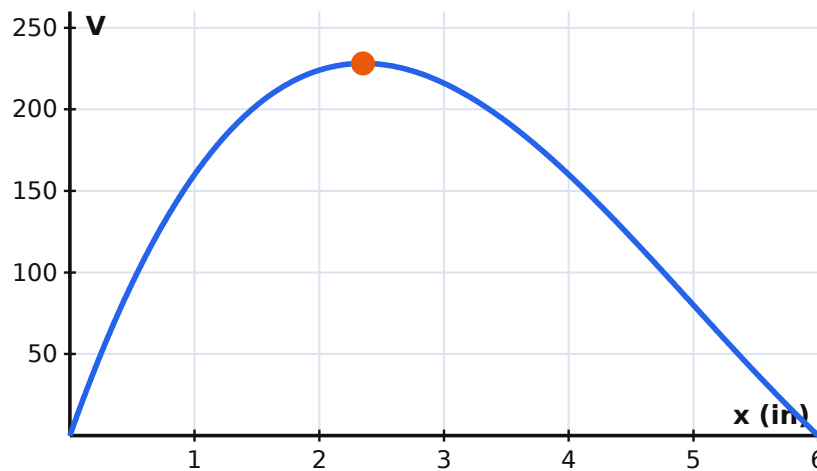
Exercise 14 - Intermediate Value Theorem

Show that $f(x) = x^3 - x - 1$ has a zero between $x = 1$ and $x = 2$.

Exercise 15 - Evaluate a polynomial

Evaluate $p(3)$ for $p(x) = 2x^4 - 3x^3 + x - 5$.

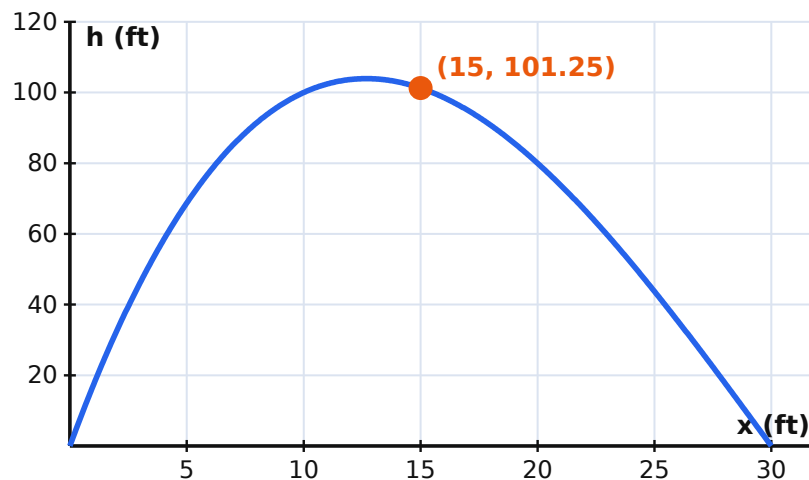
Exercise 16 - Box volume



Volume of Priya's box.

Priya cuts squares with side x inches from the corners of a 12-by-18-inch sheet to fold an open box. The volume is $V(x) = x(12-2x)(18-2x)$. Find $V(1)$, $V(2)$ and $V(3)$, state the realistic domain, and tell which whole-number x gives the greatest volume.

Exercise 17 - Roller coaster



A hill on Noah's coaster.

A coaster hill has height $h(x) = 0.01x(x-30)(x-60)$ feet for $0 \leq x \leq 30$. Find the height at $x = 15$ and at $x = 10$, and explain what the zeros at $x = 0$ and $x = 30$ mean.

Exercise 18 - Zeros with multiplicity

Write a quartic with a double zero at 1, simple zeros at -2 and 3 , and $f(0) = 6$.

Exercise 19 - Least-degree equation

A polynomial of least degree touches the x -axis at -3 , crosses at 2 , has $f(0) = -18$ and rises on the right. Write its equation.

Exercise 20 - Find all zeros

Given that 1 is a zero of $f(x) = x^3 - 6x^2 + 11x - 6$, find all zeros.