LESSON MAKER PRO

Zeros to Graphs

Use factored equations to find intercepts and sketch functions.

HIGH SCHOOL · A-APR.3

A-APR.3 "Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial (limit to 1st-and 2nd-degree polynomials)."

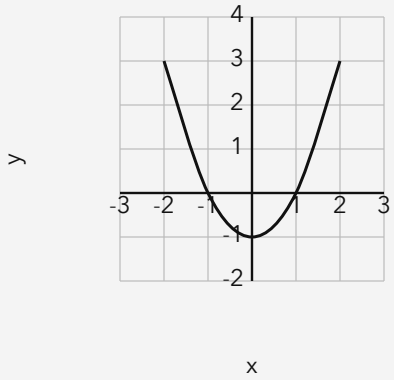
NAME _____ DATE _____

FIND, THEN SKETCH

Set each factor equal to zero to find the x-intercepts. A parabola opens up when its x^2 coefficient is positive and down when it is negative. At a repeated zero, it touches the x-axis instead of crossing.

WORKED EXAMPLE

The graph shows y = (x + 1)(x - 1). Find its zeros. Does the graph cross or touch the x-axis at each zero?



1. Set x + 1 = 0 and x - 1 = 0.
2. Solve to get x = -1 and x = 1.
3. The curve crosses the x-axis at both zeros.

Answer: Zeros: -1 and 1. The graph crosses at each zero.

PRACTICE 4 problems

1 For y = x(x - 3), find the zeros and sketch a rough graph.

ANSWER _____

2 For y = -2(x + 2), find the zero and sketch a rough graph.

ANSWER _____

3 For y = -(x - 2)(x - 4), find the zeros and sketch a rough graph.

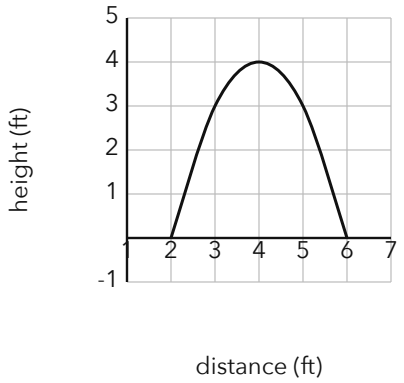
ANSWER _____

4 For $y = (x + 4)^2$, find the zero and sketch a rough graph.

ANSWER _____

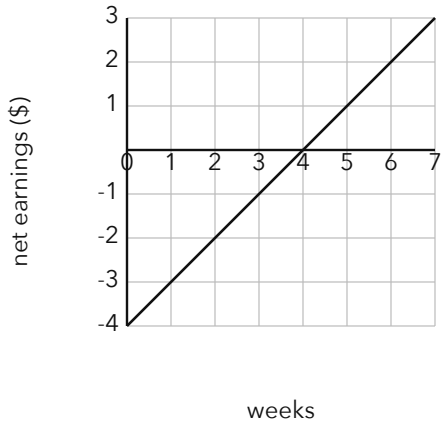
APPLY IT Show your work

1 The graph shows a skate ramp's height y, in feet, at a distance x feet along the floor. Where does the ramp meet the floor? At what distance is it highest?



ANSWER _____

2 You pay $4 for an app, then earn $1 each week by sharing designs. The graph shows your net earnings y after x weeks. When do you break even?



ANSWER _____

CHALLENGE One step up

A parabola has zeros -3 and 5 and passes through (0, 15). Find a in y = a(x + 3)(x - 5). Explain whether it opens up or down.

WORK SPACE AND ANSWER

ANSWER KEY

Zeros to Graphs

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For y = x(x - 3), find the zeros and sketch a rough graph.	**Zeros: 0 and 3. The parabola opens up and crosses at both zeros.**
2	For y = -2(x + 2), find the zero and sketch a rough graph.	**Zero: -2. The line falls from left to right and passes through (-2, 0) and (0, -4).**
3	For y = -(x - 2)(x - 4), find the zeros and sketch a rough graph.	**Zeros: 2 and 4. The parabola opens down and crosses at both zeros.**
4	For $y = (x + 4)^2$, find the zero and sketch a rough graph.	**Zero: -4. The parabola opens up and touches the x-axis at -4.**

PART 2 · APPLY IT

1. **The ramp meets the floor at 2 ft and 6 ft. It is highest 4 ft along the floor.** Read the x-intercepts for the floor locations and the vertex for the highest point.
2. **After 4 weeks.** Break-even means net earnings are $0. The line crosses the x-axis at x = 4.

CHALLENGE

a = -1, so it opens down. Substituting (0, 15) gives 15 = a(3)(-5) = -15a.

Accept rough sketches with the correct intercepts and direction. The challenge explanation may use the negative value of a to justify that the parabola opens down.