

Intercept Equation Lab

Build each quadratic from its zeros and one point.

HIGH SCHOOL • MA.912.AR.3.5

MA.912.AR.3.5 "Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function."

NAME _____

DATE _____

BUILD FROM THE ZEROS

If the x-intercepts are r and s , begin with $y=a(x-r)(x-s)$.
Substitute the other point to find a , then write the equation.

WORKED EXAMPLE

The x-intercepts are $x=-4$ and $x=6$, and the graph passes through $(0,-48)$. Write the equation.

1. Start with $y=a(x+4)(x-6)$.
2. Substitute $(0,-48)$: $-48=a(4)(-6)$.
3. Solve $-48=-24a$, so $a=2$.

Answer: $y=2(x+4)(x-6)$

PRACTICE 6 problems

- 1** The x-intercepts are $x=1$ and $x=3$, and the graph passes through $(5,8)$. Write the equation.

ANSWER _____

- 2** The x-intercepts are $x=-5$ and $x=-1$, and the graph passes through $(-3,12)$. Write the equation.

ANSWER _____

- 3** The x-intercepts are $x=-7$ and $x=-3$, and the graph passes through $(-5,20)$. Write the equation.

ANSWER _____

- 4** The x-intercepts are $x=8$ and $x=11$, and the graph passes through $(9,-10)$. Write the equation.

ANSWER _____

- 5** The x-intercepts are $x=-9$ and $x=-7$, and the graph passes through $(-8,-3)$. Write the equation.

ANSWER _____

- 6** The x-intercepts are $x=13$ and $x=15$, and the graph passes through $(14,-7)$. Write the equation.

ANSWER _____

APPLY IT Show your work

- 1** A drone's height $h(x)$, in feet, is modeled by a quadratic, where x is the number of seconds after recording begins. The drone is on the ground at $x=1$ and $x=9$, and its height is 36 feet at $x=3$. Write $h(x)$.

WORK SPACE

ANSWER _____

- 2** A theme-park design team models a roller coaster's height $H(x)$, in feet relative to a platform. The track is level with the platform at $x=16$ and $x=22$, and $H(18)=-24$. Write $H(x)$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A quadratic has x -intercepts $x=-3$ and $x=8$ and passes through $(1,28)$. Write the equation in factored form and standard form. Explain why the value of a must be negative.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The x-intercepts are $x=1$ and $x=3$, and the graph passes through $(5,8)$. Write the equation.	$y=(x-1)(x-3)$
2	The x-intercepts are $x=-5$ and $x=-1$, and the graph passes through $(-3,12)$. Write the equation.	$y=-3(x+5)(x+1)$
3	The x-intercepts are $x=-7$ and $x=-3$, and the graph passes through $(-5,20)$. Write the equation.	$y=-5(x+7)(x+3)$
4	The x-intercepts are $x=8$ and $x=11$, and the graph passes through $(9,-10)$. Write the equation.	$y=5(x-8)(x-11)$
5	The x-intercepts are $x=-9$ and $x=-7$, and the graph passes through $(-8,-3)$. Write the equation.	$y=3(x+9)(x+7)$
6	The x-intercepts are $x=13$ and $x=15$, and the graph passes through $(14,-7)$. Write the equation.	$y=7(x-13)(x-15)$

PART 2 · APPLY IT

1. $h(x)=-3(x-1)(x-9)$ Use $h(x)=a(x-1)(x-9)$. Substituting $(3,36)$ gives $36=a(2)(-6)$, so $a=-3$.
2. $H(x)=3(x-16)(x-22)$ Use $H(x)=a(x-16)(x-22)$. Substituting $(18,-24)$ gives $-24=a(2)(-4)$, so $a=3$.

CHALLENGE

$y=-(x+3)(x-8)=-x^2+5x+24$. At $x=1$, the factors have opposite signs, so their product is negative. Since the y-value is positive, a must be negative.

Accept equivalent factored or expanded forms. For the challenge, accept any correct explanation that connects the negative factor product at $x=1$ with the positive y-value.