

Parabola Power Practice

Solve, read, and use quadratic models.

HIGH SCHOOL • MA.912.AR.3

MA.912.AR.3 "Write, solve and graph quadratic equations, functions and inequalities in one and two variables."

NAME _____

DATE _____

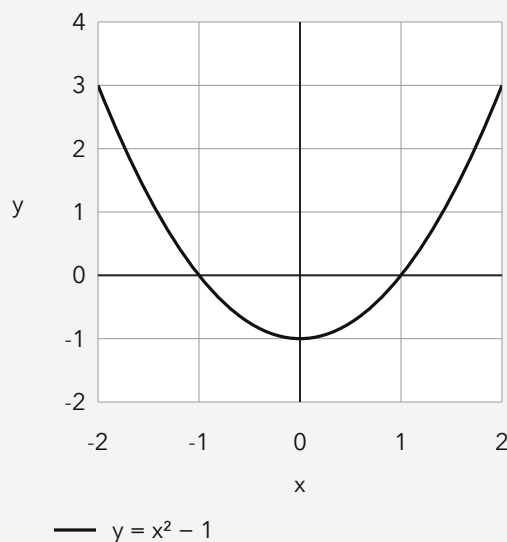
You will need: Pencil; Ruler

ZEROS AND GRAPHS

A solution to $f(x) = 0$ is an x-intercept of the graph. Factor when possible, set each factor equal to 0, and use the graph to check the solutions. For $f(x) \leq 0$, use the x-values where an upward-opening parabola is on or below the x-axis.

WORKED EXAMPLE

Use the graph. What x-values make $y = 0$?



1. Set y equal to 0.
2. Find where the curve crosses the x-axis.
3. The crossings are at $x = -1$ and $x = 1$.

Answer: $x = -1$ or $x = 1$

PRACTICE 4 problems

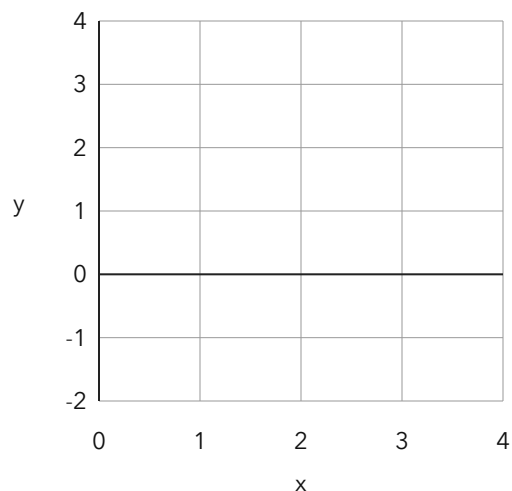
1 Solve $x^2 - 7x + 12 = 0$.

ANSWER _____

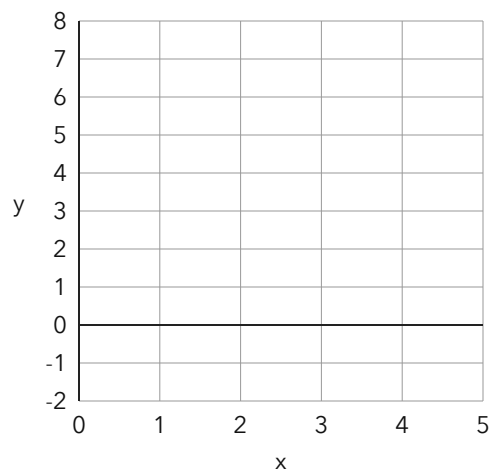
2 Solve $2x^2 - 8x = 0$.

ANSWER _____

3 Graph $f(x) = (x - 2)^2 - 1$. State the vertex and x-intercepts.

**ANSWER** _____

4 Solve $x^2 - 5x + 6 \leq 0$ for x . Then graph the two-variable inequality $y \leq x^2 - 5x + 6$ on the plane.

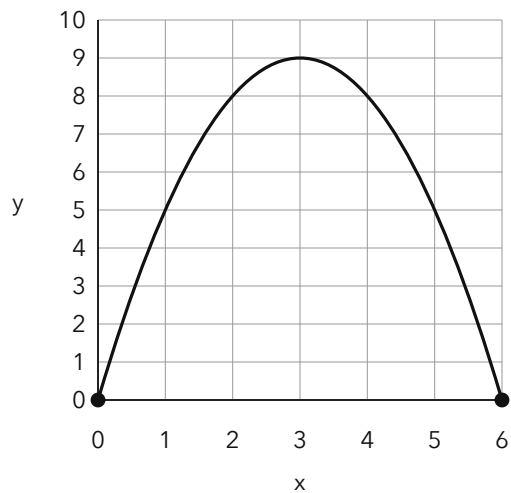
**ANSWER** _____

APPLY IT

Show your work

1

The graph shows a basketball's height h , in feet, t seconds after a shot. When is the ball 5 feet high? The horizontal axis is t (seconds); the vertical axis is h (feet).



REASONING AND ANSWER

2

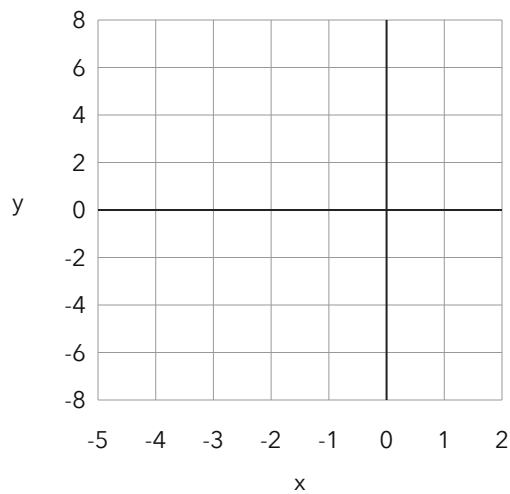
A school music club models profit P , in hundreds of dollars, from x sponsored posts by $P = -x^2 + 14x - 45$. For which whole-number values of x is $P \geq 0$?

WORK SPACE

REASONING AND ANSWER

CHALLENGE One step up

The zeros of an upward-opening quadratic f are -4 and 1 , and its leading coefficient is 1 . Write $f(x)$ in factored form, graph it, then solve $f(x) \leq 0$.



WORK SPACE AND ANSWER

PRACTICE 1

$x = 3 \text{ or } x = 4$

APPLY IT 1

t = 1 second or t = 5 seconds Read the two points where the curve has height 5. Their time coordinates are 1 and 5.

PRACTICE 2

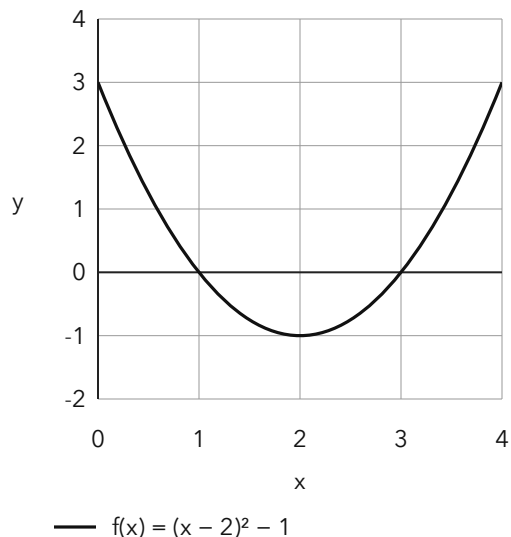
$x = 0 \text{ or } x = 4$

APPLY IT 2

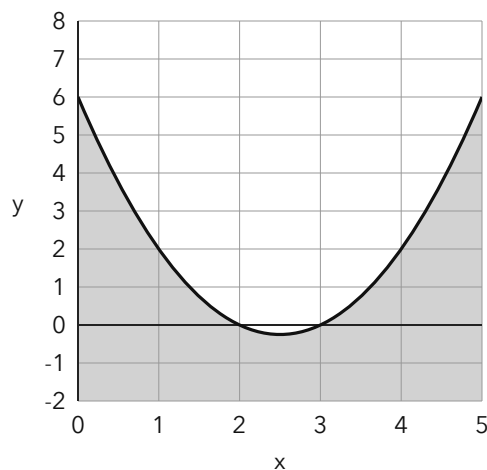
x = 5, 6, 7, 8, or 9 Factor P as $-(x - 5)(x - 9)$. The profit is nonnegative from 5 through 9, inclusive.

PRACTICE 3

Vertex: (2, -1). x-intercepts: (1, 0) and (3, 0).

**PRACTICE 4**

One variable: $2 \leq x \leq 3$. Two variables: draw a solid parabola with vertex $(5/2, -1/4)$ and shade on and below it.



CHALLENGE

$f(x) = (x + 4)(x - 1); -4 \leq x \leq 1$

Accept equivalent factored forms and interval notation. For inequality answers, endpoints are included because the inequality includes equality. Require actual graphs for practice 3, practice 4 and the challenge. Distinguish a one-variable interval from a two-variable shaded region.

