LESSON MAKER PRO

Quadratic Form Finder

Choose the form that makes each answer easiest to find.

HIGH SCHOOL · A2.A.2.4

A2.A.2.4 "Recognize that a quadratic function has different equivalent representations [$f(x) = ax^2 + bx + c$, $f(x) = a(x - h)^2 + k$, and $f(x) = a(x - p)(x - q)$]. Identify and use the mathematical model that is most appropriate to solve problems."

NAME _____ DATE _____

CHOOSE A USEFUL FORM

Standard form, $f(x) = ax^2 + bx + c$, makes $f(0)$ easy to find.
Factored form, $f(x) = a(x - p)(x - q)$, shows where $f(x) = 0$.
Vertex form, $f(x) = a(x - h)^2 + k$, shows the maximum or minimum value.

WORKED EXAMPLE

Rewrite $f(x) = 5(x - 8)(x - 12)$ in standard form. Then find $f(0)$.

1. Multiply the factors: $(x - 8)(x - 12) = x^2 - 20x + 96$.
2. Distribute 5: $f(x) = 5x^2 - 100x + 480$.
3. Set $x = 0$: $f(0) = 480$.

Answer: $f(x) = 5x^2 - 100x + 480$; $f(0) = 480$

PRACTICE 6 problems

1 For $f(x) = 2(x - 1)(x - 4)$, find both values of x for which $f(x) = 0$.

ANSWER _____

2 For $f(x) = -2(x - 4)^2 + 6$, give the vertex and the maximum value.

ANSWER _____

3 For $f(x) = x^2 - 6x + 4$, find $f(0)$.

ANSWER _____

4 Rewrite $f(x) = (x + 4)(x - 6)$ in standard form. Then find $f(0)$.

ANSWER _____

5 Rewrite $f(x) = 2x^2 - 4x - 6$ in factored form. Then find both values of x for which $f(x) = 0$.

ANSWER _____

6 Rewrite $f(x) = -x^2 + 6x + 1$ in vertex form. Then find its maximum value.

ANSWER _____

APPLY IT Show your work

1 A school club models its profit from a ticketed event with $P(x) = -2(x - 6)(x - 22)$, where x is the ticket price in dollars and $P(x)$ is the profit in dollars. What ticket price gives the greatest profit, and what is that profit?

WORK SPACE

ANSWER _____

2 A video game models a drone's height with $h(x) = -x^2 + 6x + 7$, where x is the number of seconds after launch and $h(x)$ is the height in feet. When does the drone reach the ground, and what is its greatest height?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A quadratic function has zeros at $x = -2$ and $x = 6$ and passes through $(0, 24)$. Write the function in factored, standard, and vertex form. Then state its maximum value.

WORK SPACE AND ANSWER

ANSWER KEY

Quadratic Form Finder

HIGH SCHOOL · A2.A.2.4

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $f(x) = 2(x - 1)(x - 4)$, find both values of x for which $f(x) = 0$.	**x = 1 and x = 4**
2	For $f(x) = -2(x - 4)^2 + 6$, give the vertex and the maximum value.	**Vertex: (4, 6); maximum value: 6**
3	For $f(x) = x^2 - 6x + 4$, find f(0).	**4**
4	Rewrite $f(x) = (x + 4)(x - 6)$ in standard form. Then find f(0).	**$f(x) = x^2 - 2x - 24$; f(0) = −24**
5	Rewrite $f(x) = 2x^2 - 4x - 6$ in factored form. Then find both values of x for which $f(x) = 0$.	**$f(x) = 2(x - 3)(x + 1)$; x = 3 and x = −1**
6	Rewrite $f(x) = -x^2 + 6x + 1$ in vertex form. Then find its maximum value.	**$f(x) = -(x - 3)^2 + 10$; maximum value: 10**

PART 2 · APPLY IT

1. **Ticket price: $14; greatest profit: $128** The two zeros are 6 and 22, so the maximum occurs halfway between them, at x = 14. Substitute 14 to get $P(14) = -2(8)(-8) = 128$.
2. **It reaches the ground after 7 seconds; its greatest height is 16 feet.** Factor $h(x) = -(x - 7)(x + 1)$; the nonnegative solution to $h(x) = 0$ is x = 7. The maximum occurs at x = 3, and h(3) = 16.

CHALLENGE

Factored: $f(x) = -2(x + 2)(x - 6)$. Standard: $f(x) = -2x^2 + 8x + 24$. Vertex: $f(x) = -2(x - 2)^2 + 32$. Maximum value: 32.

Accept equivalent ordering of factors and zeros. For the challenge, the maximum occurs at x = 2.