LESSON MAKER PRO

Forms with Purpose

Choose the quadratic form that reveals what you need.

HIGH SCHOOL · MT.CORE.ALG.QUAD.3.a

MT.CORE.ALG.QUAD.3.a "Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by: Choosing the form strategically when writing an expression based on given information and intended use,"

NAME _____ DATE _____

CHOOSE THE USEFUL FORM

Standard form, ax^2+bx+c, makes the value at x=0 easy to read. Factored form, $a(x-r)(x-s)$, shows the zeros r and s. Vertex form, $a(x-h)^2+k$, shows the turning point (h, k), so choose a form based on the feature you need.

WORKED EXAMPLE

A quadratic has vertex (-11, 13) and passes through (-9, 33). Write it in a form that shows its vertex.

1. Start with vertex form: $f(x)=a(x+11)^2+13$.
2. Substitute (-9, 33): $33=a(2)^2+13$.
3. Solve: $20=4a$, so $a=5$.

Answer: $f(x)=5(x+11)^2+13$

PRACTICE 6 problems

1 A quadratic has vertex (-2, 8) and passes through (0, 4). Write it in a form that shows its vertex.

ANSWER _____

2 A quadratic has zeros -3 and 6, and its value at x=0 is -36. Write it in a form that shows its zeros.

ANSWER _____

3 Rewrite $f(x)=2(x-4)(x+3)$ in a form that makes f(0) easy to read.

ANSWER _____

4 Rewrite $f(x)=x^2+6x+2$ in a form that shows its minimum value.

ANSWER _____

5 Rewrite $f(x)=-2x^2+10x+12$ in a form that shows its zeros.

ANSWER _____

6 A quadratic has the same value, 6, at x=1 and x=7. Its value at x=4 is -3. Write it in a form that shows its minimum value.

ANSWER _____

APPLY IT Show your work

1 A school merch shop models its profit, in dollars, from selling x hoodies as $P(x)=-2x^2+40x-72$. Rewrite P in a form that shows the number of hoodies for maximum profit. State that number and the maximum profit.

WORK SPACE

ANSWER _____

2 In a video game, a character's height above the floor, in meters, is $h(x)=-x^2+4x+5$, where x is seconds after a jump begins. Rewrite h in a form that shows when the character reaches the floor. How many seconds after the jump begins does that happen?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A game's score model is quadratic. Its zeros are x=2 and x=8, and its maximum score is 54. Write the model in a form that shows its maximum. Explain in one sentence how the zeros locate the vertex.

WORK SPACE AND ANSWER

Forms with Purpose

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A quadratic has vertex (-2, 8) and passes through (0, 4). Write it in a form that shows its vertex.	**$f(x)=-(x+2)^2+8$**
2	A quadratic has zeros -3 and 6, and its value at x=0 is -36. Write it in a form that shows its zeros.	**$f(x)=2(x+3)(x-6)$**
3	Rewrite $f(x)=2(x-4)(x+3)$ in a form that makes f(0) easy to read.	**$f(x)=2x^2-2x-24$**
4	Rewrite $f(x)=x^2+6x+2$ in a form that shows its minimum value.	**$f(x)=(x+3)^2-7$**
5	Rewrite $f(x)=-2x^2+10x+12$ in a form that shows its zeros.	**$f(x)=-2(x-6)(x+1)$**
6	A quadratic has the same value, 6, at x=1 and x=7. Its value at x=4 is -3. Write it in a form that shows its minimum value.	**$f(x)=(x-4)^2-3$**

PART 2 · APPLY IT

1. **$P(x)=-2(x-10)^2+128$; 10 hoodies; $128 maximum profit** Complete the square to get $P(x)=-2(x-10)^2+128$. The negative leading coefficient makes the vertex a maximum.
2. **$h(x)=-(x-5)(x+1)$; 5 seconds** Factor to find the zeros, x=5 and x=-1. Only x=5 is a time after the jump begins.

CHALLENGE

$f(x)=-6(x-5)^2+54$. The zeros are equally far from x=5, so the vertex occurs at x=5.

Accept equivalent notation when it displays the requested feature in the requested form. In the game-height problem, the negative zero is not a time after the jump begins.