

Zero Factor Quest

Factor quadratics to find where functions equal zero.

HIGH SCHOOL • HSA-SSE.B.3a

CCSS.Math.Content.HSA-SSE.B.3a "Factor a quadratic expression to reveal the zeros of the function it defines."

NAME _____

DATE _____

FACTORS REVEAL ZEROS

For a quadratic that factors over the real numbers, write the expression as a product of factors. Set the function equal to zero, then set each factor equal to zero to find the zeros.

WORKED EXAMPLE

Factor $f(x) = x^2 + 11x + 24$ and reveal its zeros.

1. Set the function equal to zero: $x^2 + 11x + 24 = 0$.
2. Find two numbers that multiply to 24 and add to 11: 3 and 8.
3. Rewrite: $(x + 3)(x + 8) = 0$.
4. Set each factor equal to zero: $x + 3 = 0$ or $x + 8 = 0$.

Answer: $f(x) = (x + 3)(x + 8)$; zeros: $x = -3$ and $x = -8$.

PRACTICE 6 problems

- 1** Factor $f(x) = x^2 + 9x + 14$ and state the zeros.

ANSWER _____

- 2** Factor $g(x) = x^2 - 5x - 36$ and state the zeros.

ANSWER _____

- 3** Factor $h(x) = 2x^2 + 14x + 20$ and state the zeros.

ANSWER _____

- 4** Factor $p(x) = 4x^2 - 20x - 24$ and state the zeros.

ANSWER _____

- 5** Factor $q(x) = 2x^2 - 18x + 28$ and state the zeros.

ANSWER _____

- 6** Factor $r(x) = x^2 - 13x + 42$ and state the zeros.

ANSWER _____

APPLY IT Show your work

- 1** A video game club is testing a jump. The character's height above the ground, in feet, is $h(t) = -t^2 + 12t + 28$, where t is time in seconds. Factor $h(t)$, then use the zeros to determine when the character reaches the ground.

WORK SPACE

ANSWER _____

- 2** The student council models its net earnings $P(x)$, in hundreds of dollars, after selling x dozen event tickets by $P(x) = x^2 - 15x + 50$. Factor $P(x)$ and identify the break-even sale amounts.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Factor $g(x) = 7x^2 + 9x - 10$ and state the zeros. Show how you split the middle term.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Factor $f(x) = x^2 + 9x + 14$ and state the zeros.	$f(x) = (x + 2)(x + 7)$; zeros: $x = -2$ and $x = -7$.
2	Factor $g(x) = x^2 - 5x - 36$ and state the zeros.	$g(x) = (x - 9)(x + 4)$; zeros: $x = 9$ and $x = -4$.
3	Factor $h(x) = 2x^2 + 14x + 20$ and state the zeros.	$h(x) = 2(x + 2)(x + 5)$; zeros: $x = -2$ and $x = -5$.
4	Factor $p(x) = 4x^2 - 20x - 24$ and state the zeros.	$p(x) = 4(x - 6)(x + 1)$; zeros: $x = 6$ and $x = -1$.
5	Factor $q(x) = 2x^2 - 18x + 28$ and state the zeros.	$q(x) = 2(x - 7)(x - 2)$; zeros: $x = 7$ and $x = 2$.
6	Factor $r(x) = x^2 - 13x + 42$ and state the zeros.	$r(x) = (x - 6)(x - 7)$; zeros: $x = 6$ and $x = 7$.

PART 2 • APPLY IT

- $h(t) = -(t - 14)(t + 2)$; zeros: $t = 14$ and $t = -2$. The character reaches the ground at 14 seconds.** Set $h(t)$ equal to zero and factor out -1 . The negative time is not meaningful, so use $t = 14$.
- $P(x) = (x - 5)(x - 10)$; zeros: $x = 5$ and $x = 10$. The break-even amounts are 5 dozen tickets and 10 dozen tickets.** Break-even occurs when net earnings equal zero. Factor the quadratic and interpret each zero in dozens of tickets.

CHALLENGE

$7x^2 + 9x - 10 = (7x - 5)(x + 2)$; zeros: $x = 5/7$ and $x = -2$. One valid middle-term split is $14x - 5x$.

Accept factors in either order and zeros in either order. Accept a factored form with a nonzero constant factor left outside the binomials.