Algebra 1 8.7

Factor trinomials with a leading coefficient

Solve quadratic equations by factoring

coefficient

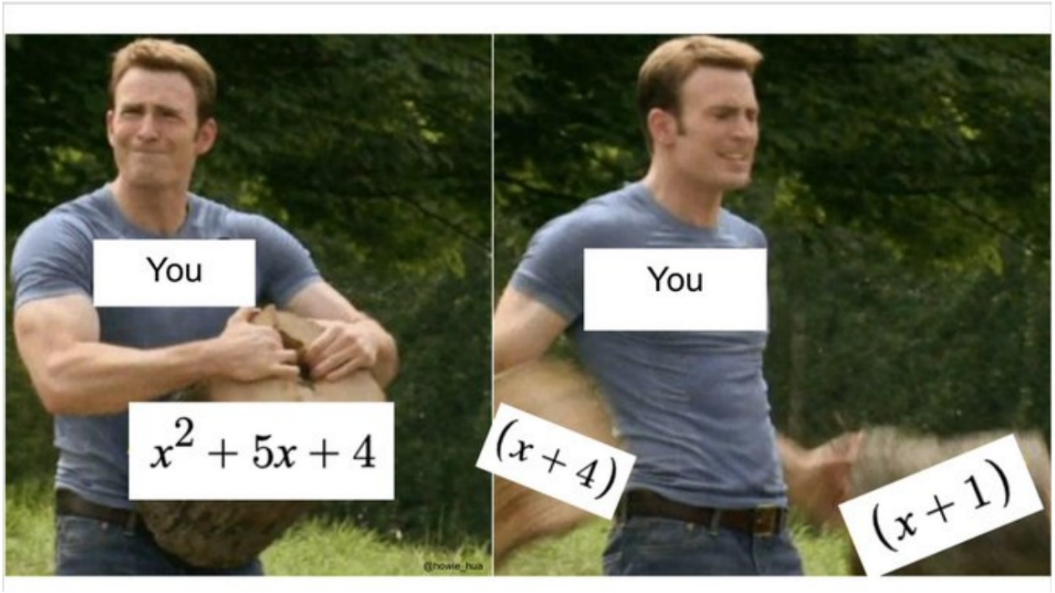
leading coefficient

factoring by grouping

prime polynomial

zero product property

whiteboards


You
$x^2 + 5x + 4$
@howie_hua
You
$(x+4)$
$(x+1)$

1B. $6x^2 + 22x - 8 = 0$

$6x^2 + 24x - 2x - 8$

$6x$ $6x$ -2 -2

$4, 12$

$6 \quad 8$

$6x(x+4) - 2(x+4)$

$(6x-2)(x+4)$

$2(3x-1)(x+4)$

$2x(x-3) = 0$

$\frac{2x}{2} = \frac{0}{2}$ $\quad x-3=0$

$x = 0$ $\quad x = 3$

Whiteboards

$\frac{6x^2}{2} + \frac{22x}{2} - \frac{8}{2}$

$2(3x^2 + 11x - 4)$

-12

$1 \quad 12$

$2 \quad 6$

$3 \quad 4$

$(3x^2 - x)(12x - 4)$

$x \quad x \quad 4 \quad 4$

$x(3x-1) + 4(3x-1)$

$2(3x-1)(x+4) = 0$

$2 = 0$ $\quad 3x-1=0$ $\quad x+4=0$

$+1 \quad +1 \quad -4 \quad -4$

$3x = 1$ $\quad x = -4$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

GuidedPractice

Factor each polynomial, if possible. If the polynomial cannot be factored usin integers, write *prime*.

3A. $4r^2 - r + 7$

prime

28

1 28
2 14
4 7

3B. $2x^2 + 3x - 5$

$(2x^2 + 5x) - 2x - 5$

$x(2x+5) - 1(+2x+5)$

$(x-1)(2x+5)$

-10

1 10
2 5

Solve...
Use zero product property (just like before)

18

1 18

2 9

3 6

5. $2x^2 + 9x = -9$

$+9 \quad +9$

$2x^2+9x+9=0$

$(2x^2+3x)+(6x+9)=0$

$x(2x+3)+3(2x+3)=0$

$(2x+3)(x+3)=0$

$2x+3=0 \qquad x+3=0$

$\frac{2x}{2}=\frac{-3}{2} \qquad x=-3$

6. $3x^2 + 17x + 20 = 0$

$(3x^2+5x)+(12x+20)=0$

$x(3x+5)\ 4(3x+5)=0$

$(3x+5)(x+4)=0$

$+60$

1	60
2	30
3	20
4	15
5	12
6	10

7. $3x^2 - 10x + 8 = 0$

8. $2x^2 - 17x + 30 = 0$

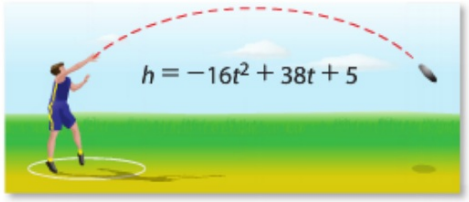
Don't panic…

9. CCSS **MODELING** Ken throws the discus at a school meet.

a. What is the initial height of the discus?

b. After how many seconds does the discus hit the ground?

$h = -16t^2 + vt + h_0$



Real-World Example 4 Solve Equations by Factoring

WILDLIFE Suppose a cheetah pouncing on an antelope leaps with an initial upward velocity of 19 feet per second. How long is the cheetah in the air if it lands on the antelope's hind quarter, 3 feet from the ground?

3 19 0

$h = -16t^2 + vt + h_0$

$3 = -16t^2 + 19t + 0$

$-3 \quad\quad -3$

$0 = -16t^2 + 19t - 3$

$= (-16t^2 + 3t)(16t - 3)$

$t(-16t + 3) - 1(-16t + 3) = 0$

$(t - 1)(+16t + 3) = 0$

$t - 1 = 0 \quad +16t + 3 = 0$

$t = 1 \quad +16t = -3 \quad t = \frac{-3}{16}$

48

1 48

2 24

3 16

4 12

6 8

GuidedPractice $h = -16t^2 + vt + h_0$ (final ht, vel., ht.)

4. PHYSICAL SCIENCE A person throws a ball upward from a 506-foot tall building. The ball's height h in feet after t seconds is given by the equation $h = -16t^2 + 48t + 506$. The ball lands on a balcony that is 218 feet above the ground. How many seconds was it in the air?

$218 = -16t^2 + 48t + 506$

$-218 \qquad -218$

$0 = -16t^2 + 48t + 288$

$0 = 16(-t^2 + 3t + 18)$

$0 = 16((-t^2 + 3t) + (6t + 18))$

$-t \qquad -t$

$-t(t+3)\,6(t+3)$

$0 = 16(t+3)(-t+6)$

$t+3=0 \qquad -t+6=0$

$-3 \qquad -t=-6$

$t=6$

	−18
1	18
2	9
3	6

22. SHOT PUT An athlete throws a shot put with an initial upward velocity of 29 feet per second and from an initial height of 6 feet.

a. Write an equation that models the height of the shot put in feet with respect to time in seconds.

b. After how many seconds will the shot put hit the ground?

29 6

$h = -16t^2 + vt + h_0$

$h = -16t^2 + 29t + 6$

$0 =$