

4.2 Solving Quadratic Equations by Factoring continued

Warm Up: Factor each expression.

a) $3x^2 - 10x + 8$

$-6 \cdot -4 = 24$
 $- + - = -10$

$= 3x^2 - 6x - 4x + 8$
 $= 3x(x-2) - 4(x-2)$
 $= (x-2)(3x-4)$

b) $8x^2 + 18x - 5$

$\frac{20}{-2} \cdot \frac{-2}{-2} = -40$
 $\frac{20}{-2} + \frac{-2}{-2} = 18$

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

	2x	4
4x	8x ²	20x
-1	-2x	-5

Example: Determine the roots of each quadratic equation by factoring.

a) $2x^2 + 14x + 12 = 0$

$2(x^2 + 7x + 6) = 0$
 $2(x+1)(x+6) = 0$

$x = 1, -6$

b) $3x^2 - 2x - 8 = 0$

$3x^2 - 6x + 4x - 8 = 0$
 $3x(x-2) + 4(x-2) = 0$
 $(x-2)(3x+4) = 0$

$x = 2, -4/3$

Check:

$2(-1)^2 + 14(-1) + 12 = 0 \checkmark$

$2(-6)^2 + 14(-6) + 12 = 0 \checkmark$

c) $6x^2 = 4 - 5x$

$6x^2 + 5x - 4 = 0$

	3x	4
2x	$6x^2$	$8x$
-1	$-3x$	-4

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

$x = \frac{1}{2}, -\frac{4}{3}$

d) $5(x^2 - \frac{7}{5}x + \frac{2}{5}) = 0 \cdot 5$

$5x^2 - 7x + 2 = 0$

	x	-1
5x	$5x^2$	$-5x$
-2	$-2x$	2

$(x - 1)(5x - 2) = 0$

$x = 1, \frac{2}{5}$

Example: Factor each expression.

a) $49p^2 - 36m^2$

$= (7p + 6m)(7p - 6m)$

b) $\frac{9}{16}a^2 - 0.25b^2 = \frac{9}{16}a^2 - \frac{b^2}{4}$

$= (\frac{3}{4}a + \frac{b}{2})(\frac{3}{4}a - \frac{b}{2})$

c) $(x+5)^2 + 7(x+5) + 12$

$= n^2 + 7n + 12$

$= (n+3)(n+4)$

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

$= (x+8)(x+9)$

let $n = x + 5$
(called factoring by substitution)