Factoring by Common Factors

March 30/2016

What does it mean to factor?

Represent as a product of prime factors.

(a) Factor the number 40.

$40 = (2)(2)(2)(5)$

$40 = 4 \times 10$

$= (2 \times 2) \times (5 \times 2)$

(b) Factor the term x^3y^2.

$x^3y^2 = x \cdot x \cdot x \cdot y \cdot y$

$x^3 = x \cdot x \cdot x$

$y^2 = y \cdot y$

(c) Factor the term $24x^2$.

$24x^2 = (2)(2)(2)(3)(x)(x)$

$24 = 2 \times 12$

$= 2 \times (6 \times 2)$

$= 2 \times (3 \times 2 \times 2)$

Mar 26-8:24 AM

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1. Using a Model (e.g., alge-tiles)

Model the expression as an area. The lengths of the sides are factors.

Some factors can be reduced further. Repeat this process until no factors can be reduced.

Hint: Try to make your area more like a square, and avoid long or thin shapes (if possible).

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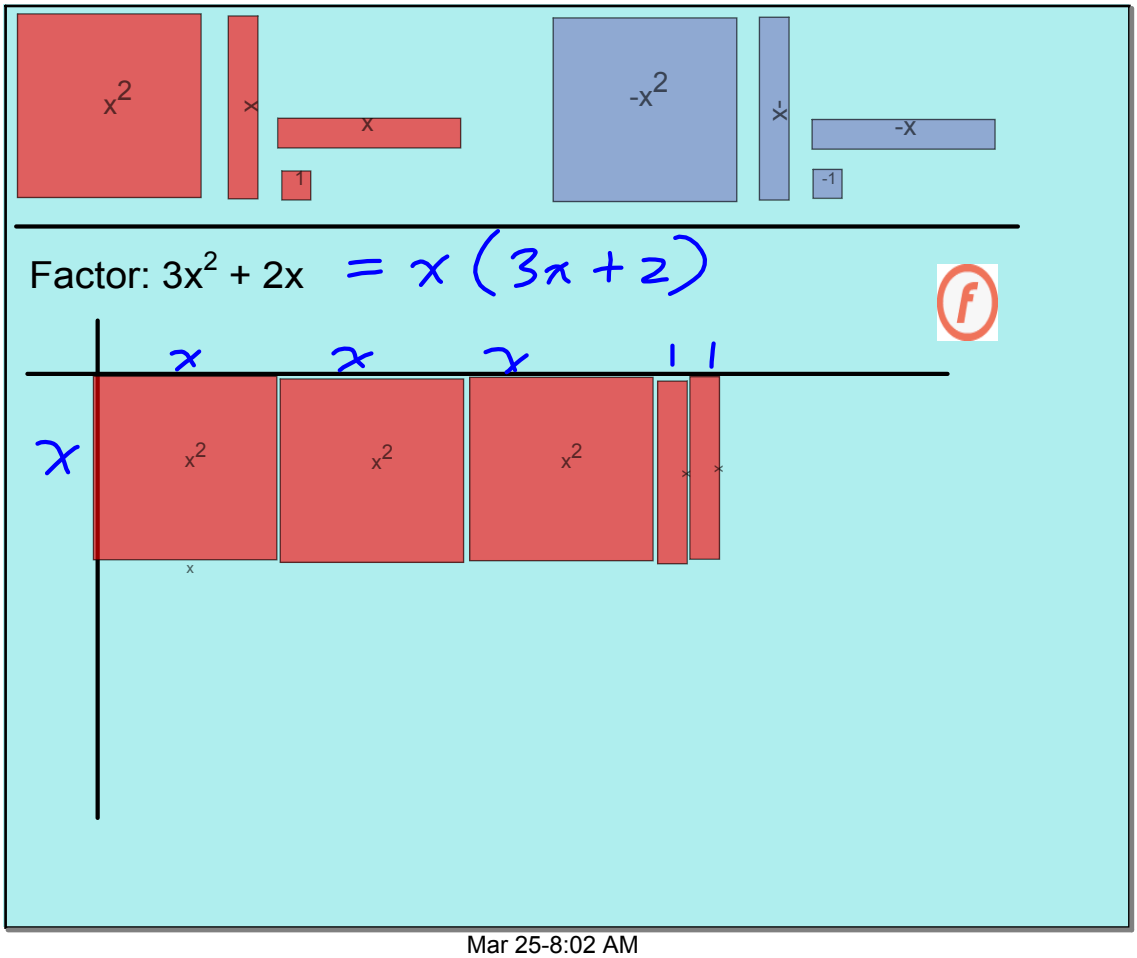

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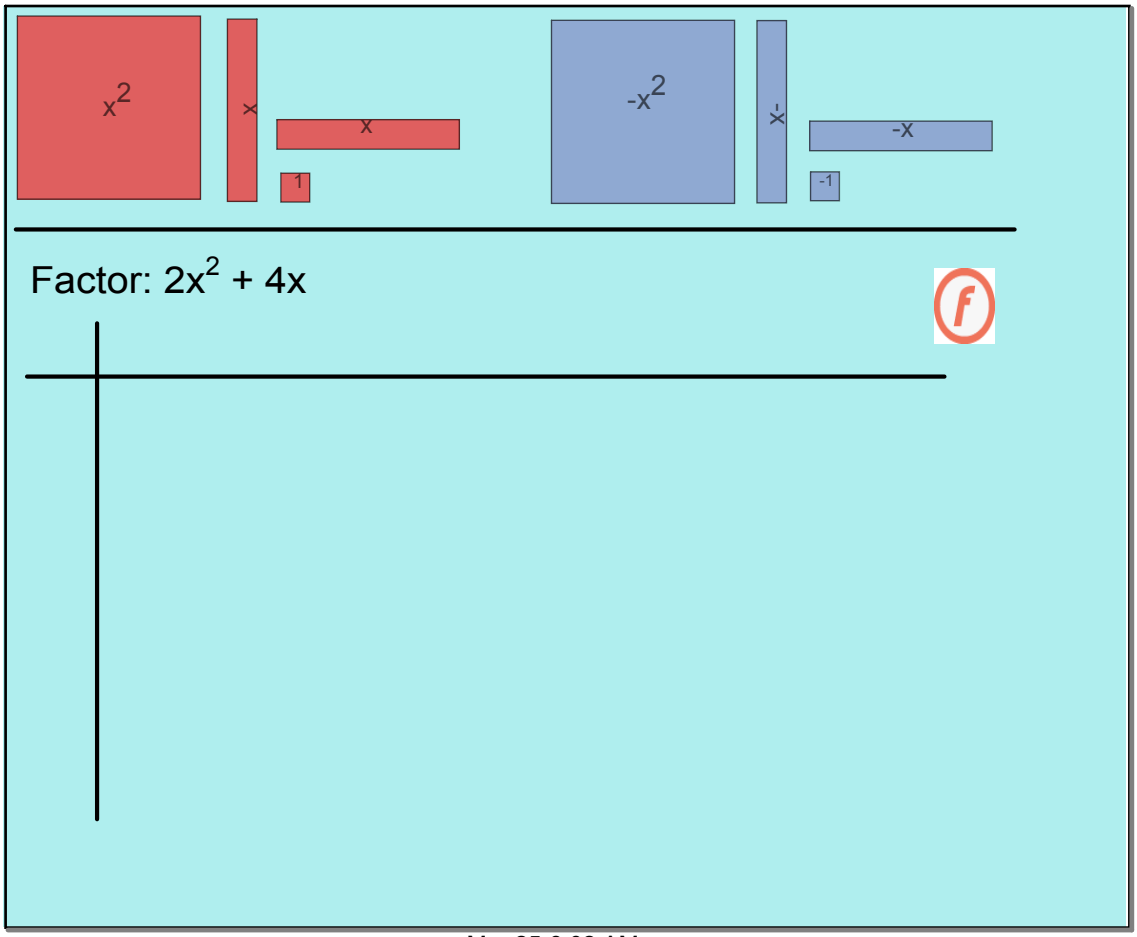

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Ex. Factor: $2x^2 + 4x$ using an area model.

	x	$+2$
$2x$	$2x^2$	$4x$

$x^2 = x \cdot x$

$x = x$

$\frac{x \cdot x^1}{x_1}$

$2x^2 + 4x = 2x(x+2)$

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2. Factor Algebraically

Look for the Greatest Common Factor of the coefficients and the GCF of the variables.

Ex.1 Factor: $8x^3 - 6x^2y^2 + 4x^2y$

$8 = 2 \cdot 2 \cdot 2$

$6 = 2 \cdot 3$

$4 = 2 \cdot 2$

The GCF of 8, 6, and 4 is 2.

The GCF of x^3, x^2y^2, and x^2y is x^2.

GCF = 2 ✓

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

$= 2x^2(4x - 3y^2 + 2y)$ ✓

OR

$= 2x^2\left(\frac{8x^3}{2x^2} - \frac{6x^2y^2}{2x^2} + \frac{4x^2y}{2x^2}\right)$

$= 2x^2(4x - 3y^2 + 2y)$

Mar 26-8:24 AM

3. Factoring by Grouping

Some polynomials do not have common factors in all terms. They can sometimes be factored by grouping terms with common factors.

Ex.2 Factor: ac + bc + ad + bd

$= c(a+b) + d(a+b)$

$= cx + dx$

$= x(c+d)$

$= (a+b)(c+d)$

let $x = (a+b)$

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Assigned Work:

p.202-203 # 1, 3bd, 5bc, 6def, 7, 8, 9, 10

8(a) $9x^2 - 6x + 18$ (1)

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

$9 = 3 \times 3$

$6 = 2 \times 3$

$18 = \cancel{2 \times 9}$

$= 2 \times 3 \times 3$

8(d) $2b(b+4) + 5(b+4)$

$x \qquad x$

$= 2bx + 5x$

$= x(2b + 5)$

$= (b+4)(2b+5)$

Mar 26-9:06 AM