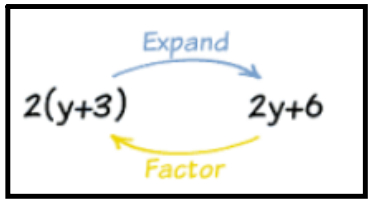
Factors and Products

↳ Section 3.3 to 3.8



Section 3.3: Common Factors of a Polynomial

Grade 9 Review

Polynomial

↳ an algebraic expression that contains on term, or the sum of terms, where all variables will have whole number exponents.

↳ This polynomial $x^2 - 3x - 4$ has ...

terms are separated by + or -

* 3 terms _____
* a variable _____
* a constant term _____
* numerical coefficients _____
* leading numerical coefficient _____

In Grade 9 we discussed 3 types of polynomials:

Monomial: _____ ⟶ Example _____

Binomial: _____ ⟶ Example _____

Trinomial: _____ ⟶ Example _____

Represent Polynomials using Algebra Tiles

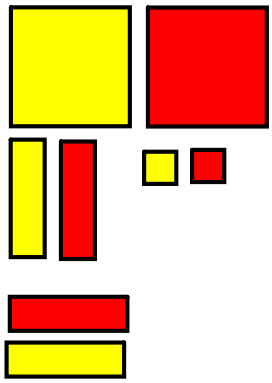
Shaded is positive

Unshaded is negative

In the text,
yellow is positive
and
red is negative.

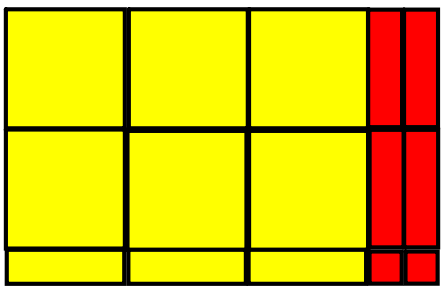
Example 1

(a) Represent the polynomial x^2+3x-4 using algebra tiles.



(b) Could you represent the tiles of the poynomial x^2+3x-4 in a rectangular shape?

(c) Write the polynomial represented by the following tiles. Identify the length and width.



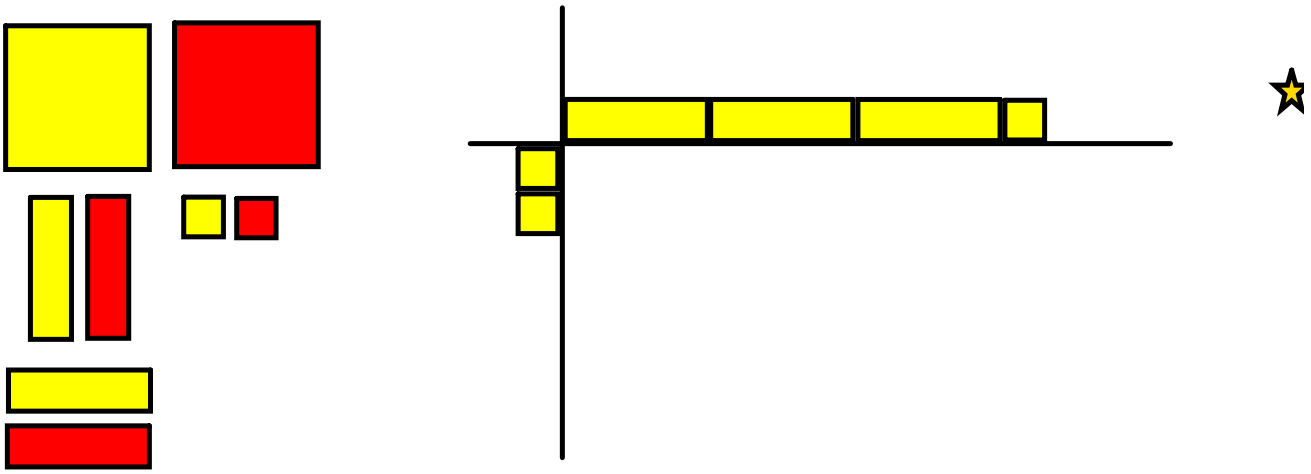
Multiply a Monomial by a Binomial

Example 2 Multiply each monomial by a binomial using:

- (i) algebra tiles
- (ii) the distributive property (algebra)

a) $2(3x+1)$

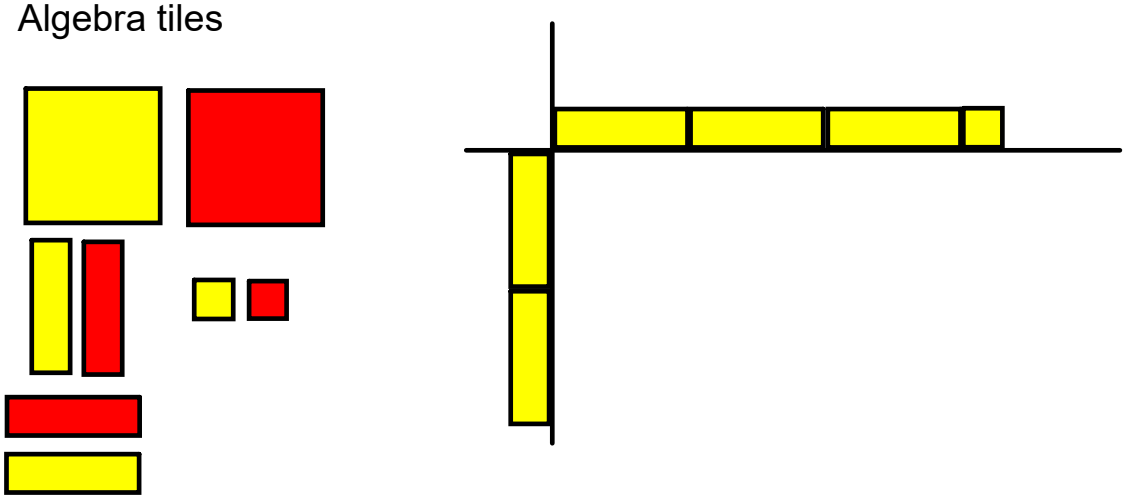
Algebra Tiles



Distributive Property: $2(3x+1)$

b) $2x(3x+1)$

Algebra tiles



Distributive Property: $2x(3x+1)$

Example 3 Your Turn: Algebraically multiply the following:

a) $3x(2x+5)$

b) $-2x(x-7)$

b) $-2y(3x-5y)$

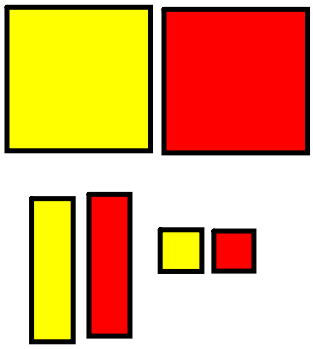
Divide a Binomial by a Monomial

Example 4 Divide each binomial by a monomial using:

- (i) algebra tiles
- (ii) algebra

a) $\frac{4x^2 + 8x}{2}$ ← Idea: arrange the polynomial into 2 equal groups

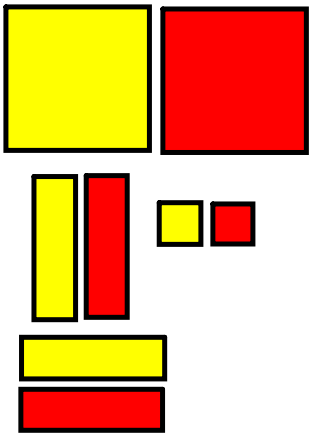
Algebra tiles

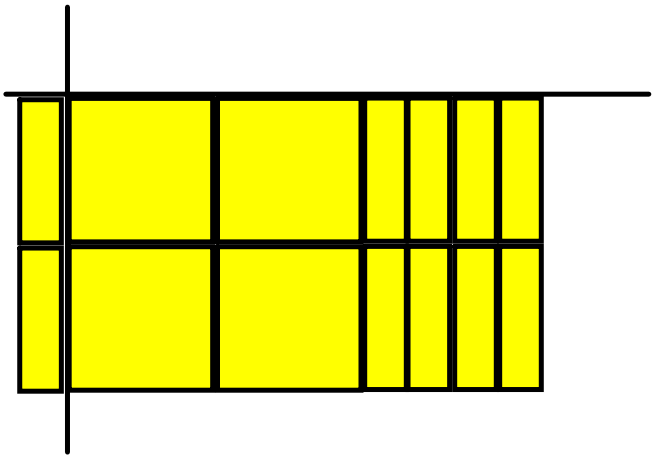


Alegbra: $\frac{4x^2 + 8x}{2}$

b) $\frac{4x^2+8x}{2x}$ ⟵ Idea: create a rectangle with a width of $2x$

Algebra Tiles





Algebra: $\frac{4x^2+8x}{2x}$

Example 5 Your Turn: Algebraically divide the following polynomials:

a) $\frac{20x^2+25x}{5x}$

b) $\frac{16x^3+2x^2}{8x}$

Example 6

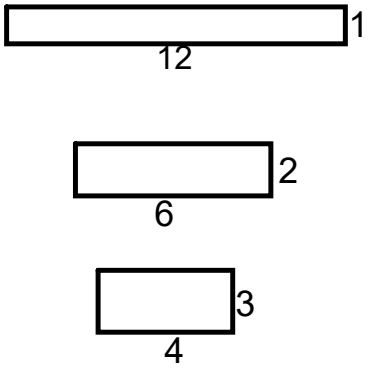
a) Using the algebra tiles 6x + 12, sketch all the ways you can arrange these tiles to form a rectangle.

b) Beside each diagram, label the length and the width of the rectangle.

c) Write the area as a multiplication sentence for each diagram.

Think About:

If the Area of a rectangle is 12 cm^2 what are some possible dimensions of the rectangle?



Even though the area 6x + 12 can be modelled 4 ways, only one of these are factored completely.

Can you tell which one?

It's the length and width that looked most like a square.

Note

Our goal is to always ensure a polynomial is factored completely. Therefore, look for the **greatest common factor** between all the terms.

Example 7 Refer to the polynomial $8x+36$

a) What is the GCF of each term in the polynomial?

b) Factor the polynomial.

c) Verify that the factors are correct.

Example 8 Factor each binomial and verify that the factors are correct.

a) $14n+21$

b) $8m+12m^2$

Example 9 Factor the trinomials.

a) $2m^2 + 6m - 10$

b) $6 - 9x + 3x^2$

c) $-12n^2 - 6 - 10n$

Note
If the expression begins with a negative value factor out the negative with the GCF.

d) $-20x^4y^3 + 15x^3y^2 - 10x^2y$

e) $7x^3y^4 + 14xy^2 - 21x^2y$

Work Book Questions	Extra Practice Questions
p.155 - 156 #4ab, 8abd,10abd, 12, 16abc	p.155 - 156 #7bcd, 8cef, 9bd, 10cef, 14, 16def