

## Curriculum Outcome

- (PR 5) Demonstrate an understanding of polynomials (limited to of degree less than or equal to 2).
- (PR 6) Model, record and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially and symbolically (limited to polynomials of degree less than or equal to 2).
- (PR 7) Model, record and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially and symbolically.

**Student Friendly:**

**"Multiplying & Dividing Polynomials by a monomial "**



# Warm Up



$$3(2x - 6y + 2z)$$

$$(30m - 15a + 9t - 54h) \div (-3)$$

$$\frac{36p + 45q - 81}{9}$$

$$-4(6z - 9)$$

$$(49t^2 - 7) \div (7)$$

$$(11y^2 - 8y + 10)(5)$$



# Warm Up



$$3(2x - 6y + 2z)$$

$$6x - 18y + 6z$$

$$(30m - 15a + 9t - 54h) \div (-3)$$

$$\frac{30m}{(-3)} - \frac{15a}{(-3)} + \frac{9t}{(-3)} - \frac{54h}{(-3)}$$

$$-10m + 5a - 3t + 18h$$



# Warm Up



$$\frac{36p + 45q - 81}{9}$$

$$\frac{36p}{9} + \frac{45q}{9} - \frac{81}{9}$$

$$4p + 5q - 9$$

$$-4(6z - 9)$$

$$-24z + 36$$



# Warm Up



$$(49t^2 - 7) \div (7)$$

$$\frac{49t^2}{(7)} - \frac{7}{(7)}$$

$$7t^2 - 1$$

$$(11y^2 - 8y + 10)(5)$$

Green arrows indicate the distribution of the 5 to each term in the polynomial.

$$55y^2 - 40y + 50$$



## Section 5.6

# Multiplying & Dividing Polynomials by a Monomial



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## SOME REVIEW

### Laws of Exponents

Remember...  $b^x \rightarrow$  "b raised to the power of x" where, b – base  
 $x$  – exponent

#1. PRODUCT - when multiplying...

"if the base is the same, then ADD the exponents."

$$b^m \times b^n = b^{m+n}$$

Example:

$$2^5 \times 2^6 = 2^{11}$$

$$(x^7)(x^3) = x^{10}$$

#2. QUOTIENT - when dividing...

"if the base is the same, then SUBTRACT the exponents."

$$\frac{b^m}{b^n} = b^{m-n}, b \neq 0$$

Example:

$$\frac{2^7}{2^4} = 2^3$$

$$\frac{x^8}{x^6} = x^2$$



# Multiplying a Monomial by a Monomial

Let's think about this:

$$\begin{array}{ccc} (5x^2y^3) & (3xy^2) & \\ / \ \wedge \ \wedge & / \ / \ \wedge & \\ 5 \ x \ x \ y \ y \ y & 3 \ x \ y \ y & \end{array}$$

$$(5x^2y^3)(3xy^2)$$

$$15x^3y^5$$

$$(5)(3) (xxx) (yyyyy)$$

$$15x^3y^5$$

# Multiplying a Monomial by a Monomial

Note:

Multiply coefficients  
with coefficients and  
variables with variables

Follow exponent laws for variable with the same  
base

$$(11)(5y^2) = 55y^2$$

$$(-7n)(5n) = -35n^2$$

$$(8m^5)(4m^2x) = 32m^7x$$

# Multiplying a Monomial by a Binomial

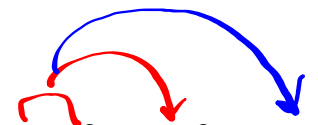
$$(5x^2)(6x + 3)$$

$$= 30x^3 + 15x^2$$


Each term inside the bracket must be multiplied by the monomial outside the brackets.

Still coefficients with coefficients and variables with variables.

**You Try!.**

$$1) (-3t^2)(6t^3 + 3t)$$


$$= -18t^5 - 9t^3$$

$$2) 2f^3k^2(8fk^3 - 7k^5)$$


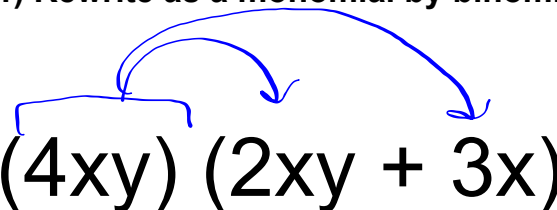
$$= 16f^4k^5 - 14f^3k^7$$

# Multiplying a Binomial by a Monomial

$$(2xy + 3x)(4xy)$$

Two ways to think:

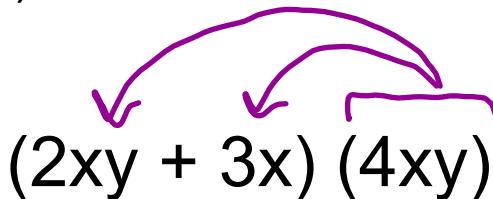
1) Rewrite as a monomial by binomial



$$(4xy)(2xy + 3x)$$

$$8x^2y^2 + 12x^2y$$

2) Draw arrows backwards



$$(2xy + 3x)(4xy)$$

$$8x^2y^2 + 12x^2y$$

## Dividing a Monomial by a Monomial

Let's think about this:

$$\begin{aligned} 1) \quad \frac{14 x^5}{7 x^3} &= \frac{14 x x \cancel{x x x}}{7 \cancel{x x x}} \\ &= 2 x^2 \\ &= 2 x^2 \end{aligned}$$

# Dividing a Monomial by a Monomial

Note:

Divide coefficients with  
coefficients and  
variables with variables

Follow exponent laws for variable with the same base

$$1) \frac{-8 x^2}{2 x}$$

$$= -4 x$$

$$2) \frac{75 y^5}{25 y^2}$$

$$= 3 y^3$$

## *Dividing a Binomial by a Monomial*

$$\frac{24p^2 - 14p}{2p}$$

Each term on the numerator must be divided by the monomial on the denominator.

$$\frac{24p^2}{2p} - \frac{14p}{2p}$$

**Recall:**  
coefficients with  
coefficients and  
variables with  
variables.

$$12p - 7$$



You Try!

$$1) \quad \frac{72x - 48x^2}{12x}$$

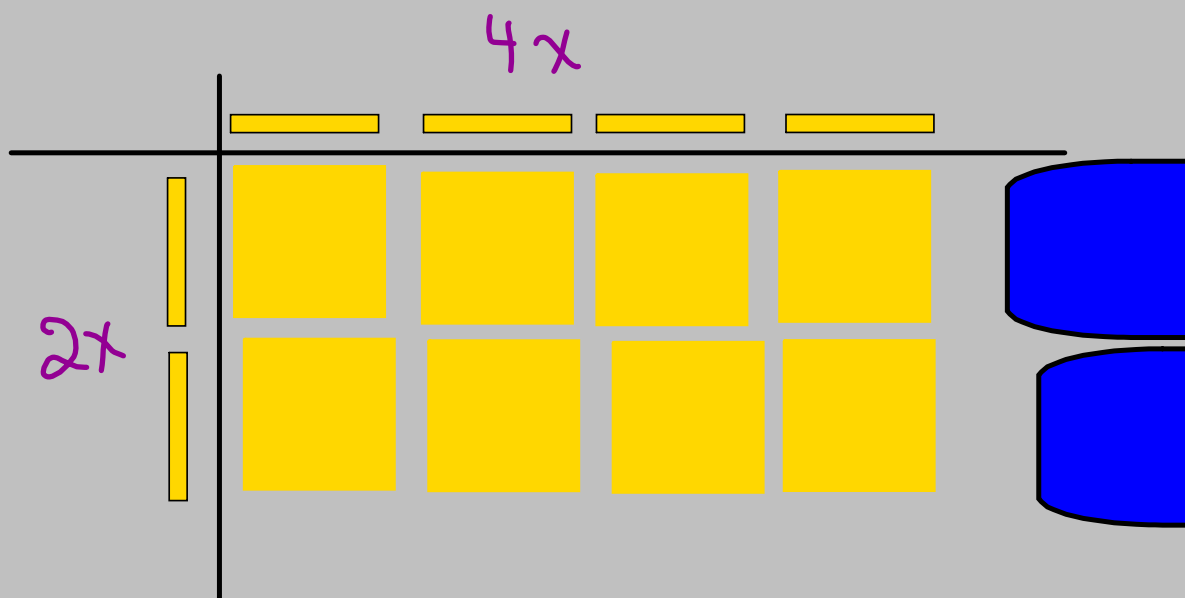
$$\frac{72x}{12x} - \frac{48x^2}{12x}$$

$$6 - 4x$$

# Algebra Tiles

## Multiplication

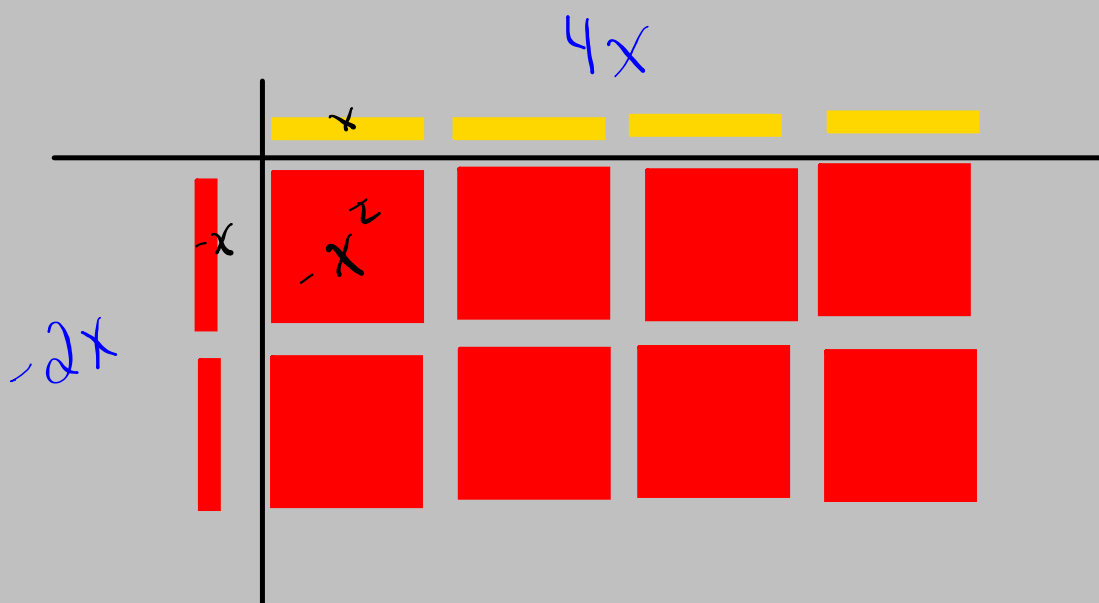
$$(2x)(4x) = 8x^2$$



# Algebra Tiles

## Multiplication

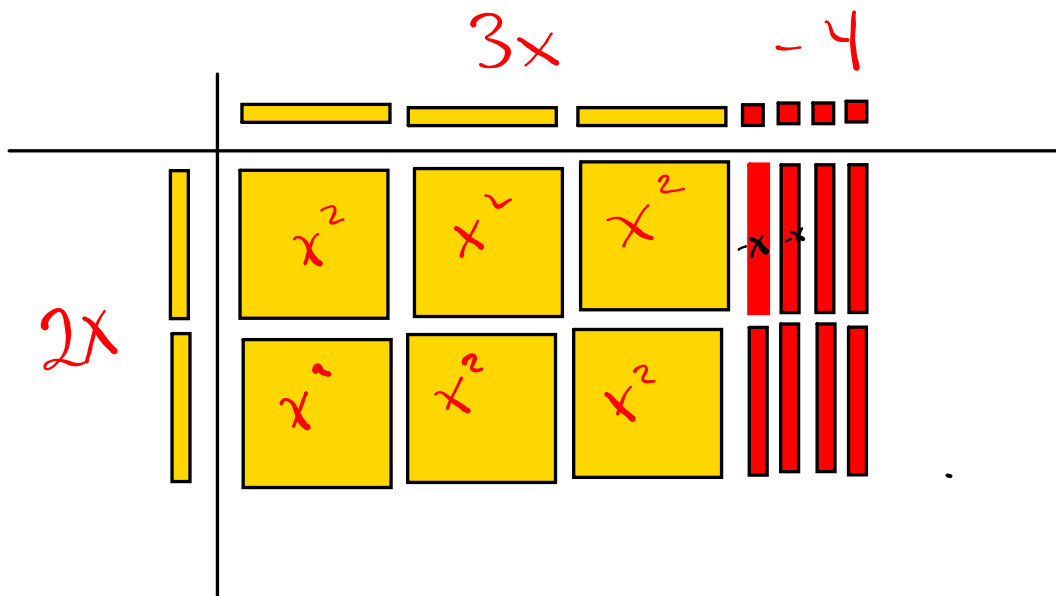
$$(-2x)(4x) = -8x^2$$



# Algebra Tiles

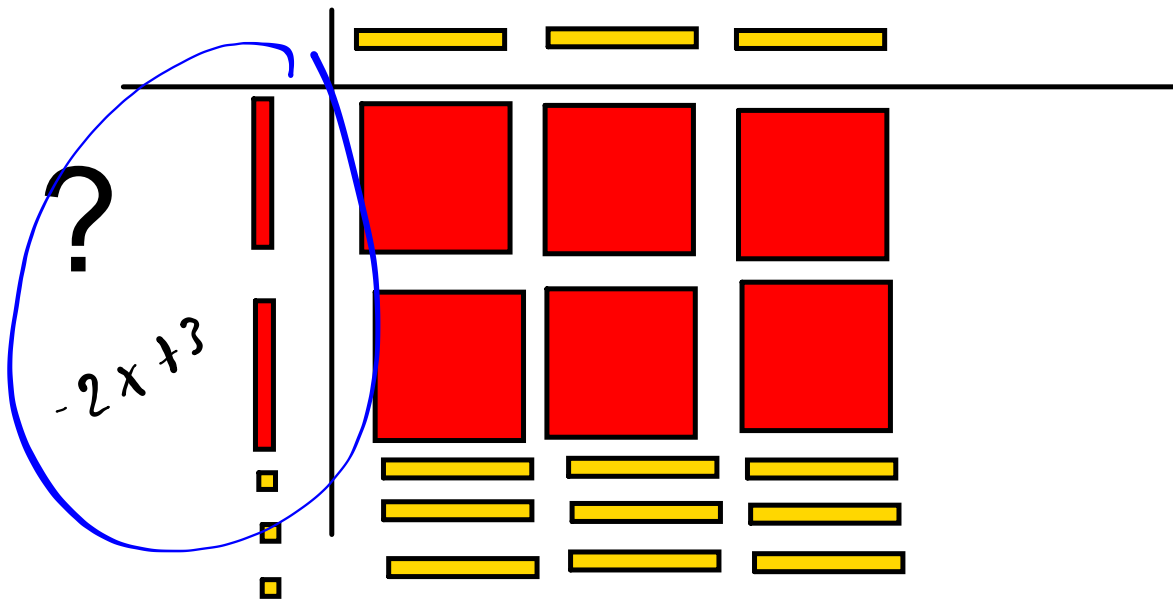
Determine the product of each

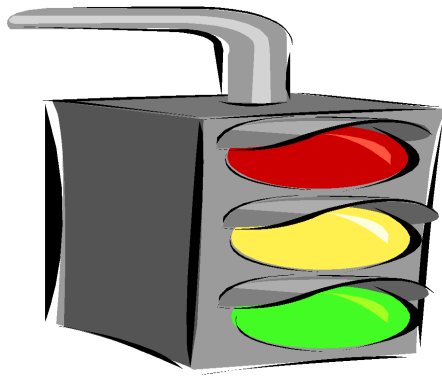
$$(2x)(3x - 4) = 6x^2 - 8x$$



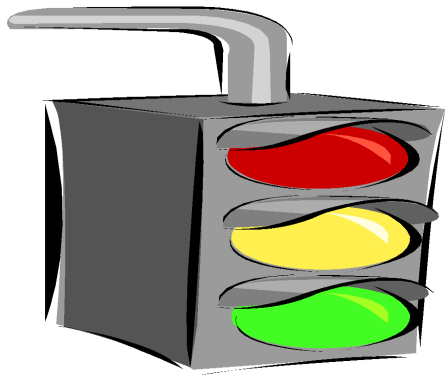
# Algebra Tiles

Division  $\frac{(-6x^2 + 9x)}{(3x)} = \frac{-6x^2}{3x} + \frac{9x}{3x}$   
 $= -2x + 3$





Now it is  
time for  
Home  
Learning



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**QUESTIONS**

4, 6, 7,  
11, 12, 13, 14,  
16, 19, 20, 21,  
22, 25