

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



Quick Review: -

Simplify the following

1) $2x^2 - 5xy + 6x - 8x^2 + 9xy - 4x$

2) $(-5y^2 + 6y - 3) + (4y^2 - 5y - 4)$

3) $(10r^2 - 7p - 6y) - (7r^2 - 2p + 8y)$

4) $-8(-3xy^2 + 6xy + 7x)$

5) $(15r - 45m + 125x - 55p) \div (-5)$



Warm Up



Quick Review:

Simplify the following

1) $2x^2 - 5xy + 6x - 8x^2 + 9xy - 4x$

$$2x^2 - 8x^2 - 5xy + 9xy + 6x - 4x$$

$$-6x^2 + 4xy + 2x$$



Warm Up



Quick Review:

Simplify the following

$$2) (-5y^2 + 6y - 3) + (4y^2 - 5y - 4)$$

$$-5y^2 + 6y - 3 + 4y^2 - 5y - 4$$

$$-5y^2 + 4y^2 + 6y - 5y - 3 - 4$$

$$-y^2 + y - 7$$



Warm Up



Quick Review:

Simplify the following

$$3) (10r^2 - 7p - 6y) - (7r^2 - 2p + 8y)$$

$$10r^2 - 7p - 6y - 7r^2 + 2p - 8y$$

$$10r^2 - 7r^2 - 7p + 2p - 6y - 8y$$

$$3r^2 - 5p - 14y$$



Warm Up



$$4) -8(-3xy^2 + 6xy + 7x)$$

$$24xy^2 - 48xy - 56x$$



Warm Up



5) $(15r - 45m + 125x - 55p) \div (-5)$

$$\begin{array}{cccc} \underline{15r} & - & \underline{45m} & + & \underline{125x} & - & \underline{55p} \\ -5 & & -5 & & -5 & & -5 \end{array}$$

$$-3r + 9m - 25x + 11$$



Section 5.6
Multiplying & Dividing Polynomials
by a Monomial



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:

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

Gather like terms

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

$$15 x^3 y^5$$

Multiplying a Monomial by a Monomial

Note:

Multiply coefficients
with coefficients and
variables with variables

Follow exponent laws for variable with the same
base

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

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

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

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:

$$1) \frac{14 x^5}{7 x^3} = \frac{14 x x x x x}{7 x x x}$$

$$= 2 x x$$

$$= 2 x^2$$

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!

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

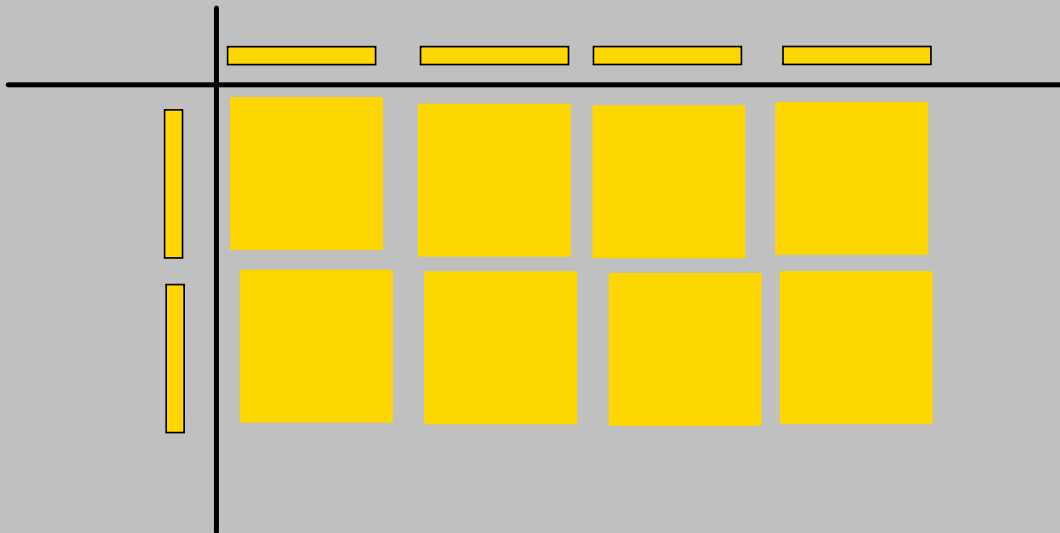
$$\frac{72x}{12x} - \frac{48x^2}{12x}$$

$$6 - 4x$$

Algebra Tiles

Multiplication

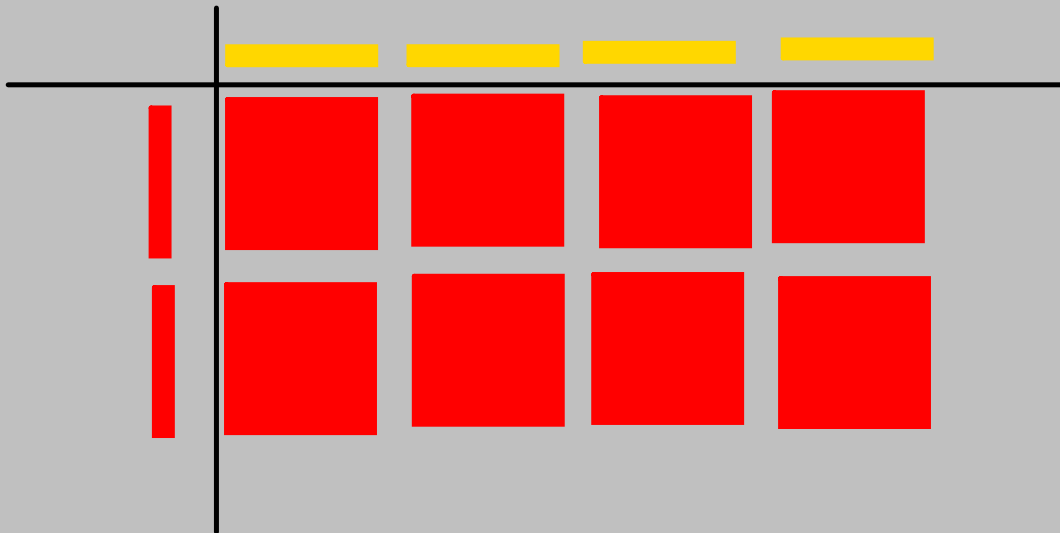
$$(2x)(4x)$$



Algebra Tiles

Multiplication

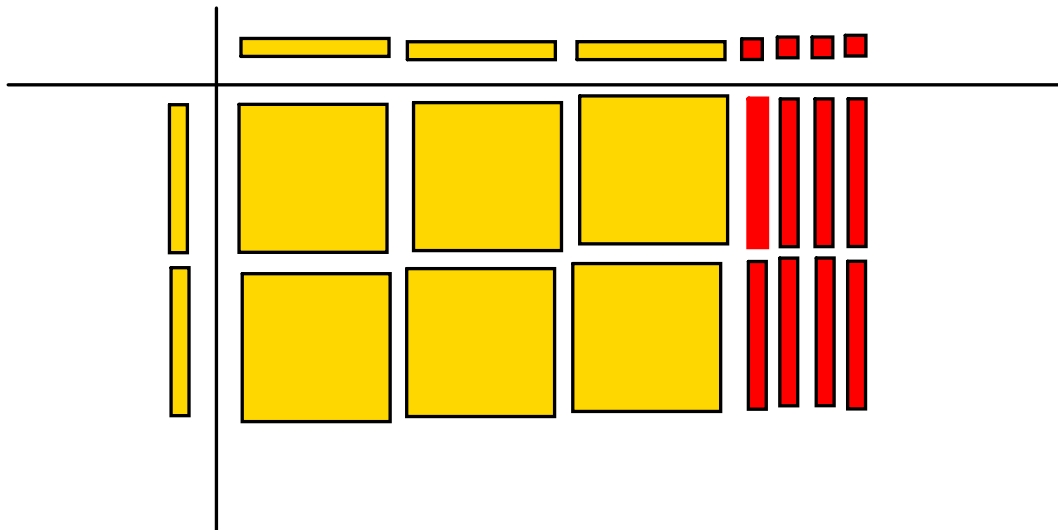
$$(-2x)(4x)$$



Algebra Tiles

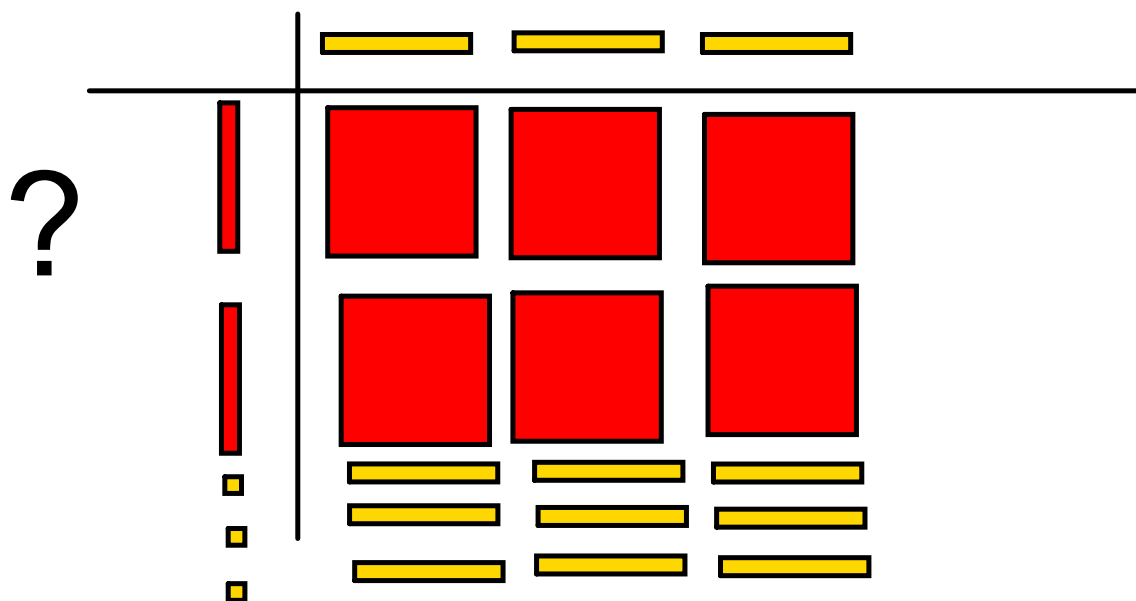
Determine the product of each

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



Algebra Tiles

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



Multiplication Vs Division Statements

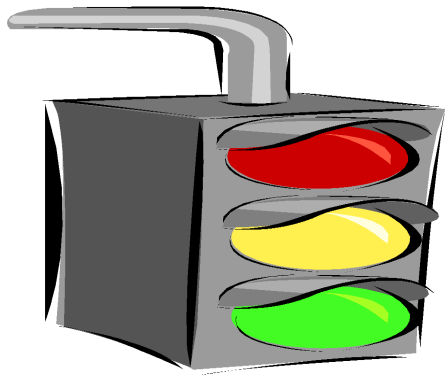
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Multiplication

$$\begin{aligned}
 & \mathbf{5 (4x + 3)} \\
 & \mathbf{= 20x + 15}
 \end{aligned}$$

Division

$$\begin{aligned}
 & \frac{\mathbf{20x + 15}}{\mathbf{5}} \\
 & \mathbf{= 4x + 3}
 \end{aligned}$$



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QUESTIONS

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