

Do Now:

<p>1. Factor $6x^3 + 2x^2$</p> $2x^2(3x + 1)$	<p>2. Multiply $3x(x^2 + 4x - 2)$</p> $3x^3 + 12x^2 - 6x$
<p>3. If $3x$ is one factor of $3x^3 + 12x^2 - 6x$, what is the other factor?</p> <p>a) $3x$</p> <p>b) $x^3 + 4x^2 - 2x$</p> <p>c) $x^2 + 4x - 2$</p> <p>d) $x^3 + 4x^2 - 2x$</p> $3x(x^2 + 4x - 2)$	<p>4. Rewrite using the distributive property: $3x + 3y$</p> $3(x + y)$

Aim: GCF FACTORING-DAY 2

How do I find GCF?:

LADDER METHOD

- 1) Find the smallest prime number that can go into both numbers
- 2) Divide both numbers by the prime number
- 3) Continue factoring until you have reached one on one or both numbers
- 4) To record the GCF, write down all the factors on the left side of the factor ladder
- 5) Write your final answer using exponents

2	$12x^3$	$24x^2$
2	$6x^3$	$12x^2$
3	$3x^3$	$6x^2$
x	$1x^2$	$2x$
x	$1x$	2

GCF = $2 \cdot 2 \cdot 3 \cdot x \cdot x = 12x^2$

EXAMPLES:

(a) x^3 and x^6

$$\begin{array}{r} x^3 \overline{) x^3 \quad x^6} \\ \underline{ } \\ \end{array}$$

(b) $8x^4y^9$ and $20x^4y^6$

$$\begin{array}{r} 4 \overline{) 8x^4y^9 \quad 20x^4y^6} \\ \underline{ } \\ \end{array}$$

$$\begin{array}{r} x^4 \overline{) 2x^4y^9 \quad 5x^4y^6} \\ \underline{ } \\ \end{array}$$

$$\begin{array}{r} y^6 \overline{) 2y^9 \quad 5y^6} \\ \underline{ } \\ \end{array}$$

$$\begin{array}{r} 2y^3 \quad 5 \end{array}$$

Exercise 1: Factor out the greatest common factor (constant only)

1) $3 \overline{) 3x - 12}$

$$\begin{array}{r} x - 4 \\ \hline 3(x-4) \end{array}$$

Check:

$$\begin{array}{r} 3(x-4) \\ \hline 3x-12 \end{array}$$

2) $2 \overline{) 16b + 24}$

$$\begin{array}{r} 8b + 12 \\ \hline 2b + 3 \\ \hline 8(2b+3) \end{array}$$

Check:

$$\begin{array}{r} 8(2b+3) \\ \hline 16b+24 \end{array}$$

3) $7 \overline{) 7y - 7}$

$$\begin{array}{r} y - 1 \\ \hline 7(y-1) \end{array}$$

Check:

$$\begin{array}{r} 7(y-1) \\ \hline 7y-7 \end{array}$$

4) $3 \overline{) 9x^2 + 6x - 15}$

$$\begin{array}{r} 3x^2 + 2x - 5 \\ \hline 3(3x^2 + 2x - 5) \end{array}$$

Check:

$$\begin{array}{r} 3(3x^2 + 2x - 5) \\ \hline 9x^2 + 6x - 15 \end{array}$$

Exercise 2: Factor out the greatest common factor (variable only)

$$1) \quad x \overline{) 2x^2 - x}$$

$$2x - 1$$

$$x(2x - 1)$$

Check:

$$x(2x - 1)$$

$$2x^2 - x$$

$$2) \quad y \overline{) 6y^2 + 11y^5}$$

$$y \overline{) 6y + 11y^4}$$

$$6 + 11y^3$$

$$y^2(6 + 11y^3)$$

Check:

$$y^2(6 + 11y^3)$$

$$6y^2 + 11y^5$$

$$3) \quad w^4 \overline{) w^7 + 4w^4}$$

$$w^3 + 4$$

$$w^4(w^3 + 4)$$

Check:

$$w^4(w^3 + 4)$$

$$w^7 + 4w^4$$

$$4) \quad x^5 \overline{) x^7 + 6x^5 + x^6}$$

$$x^2 + 6 + x$$

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

Check:

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

$$x^7 + 6x^5 + x^6$$

Exercise 3: Factor out the greatest common factor (mixed)

$$1) \begin{array}{r} x \mid x^2y^3 + xy \\ y \mid xy^3 + y \\ \hline xy^2 + 1 \end{array}$$

$$xy(xy^2 + 1)$$

Check:

$$\overbrace{xy(xy^2 + 1)} \\ x^2y^3 + xy$$

$$2) \begin{array}{r} 3 \mid 3x - 6x^2 \\ x \mid x - 2x^2 \\ \hline 1 - 2x \end{array}$$

$$3x(1 - 2x)$$

Check:

$$\overbrace{3x(1 - 2x)} \\ 3x - 6x^2$$

$$3) \begin{array}{r} 3 \mid 3b^3 + 6b^2 - 15b \\ b \mid b^3 + 2b^2 - 5b \\ \hline b^2 + 2b - 5 \end{array}$$

$$3b(b^2 + 2b - 5)$$

Check:

$$\overbrace{3b(b^2 + 2b - 5)} \\ 3b^3 + 6b^2 - 15b$$

$$4) \begin{array}{r} 5 \mid 25a^3bc - 50a^2bc + 105a^3c \\ a^2 \mid 5a^3bc - 10a^2bc + 21a^3c \\ \hline 5abc - 10bc + 21ac \\ c \mid 5ab - 10b + 21a \end{array}$$

$$5a^2c(5ab - 10b + 21a)$$

Check:

$$\overbrace{5a^2c(5ab - 10b + 21a)} \\ 25a^3bc - 50a^2bc + 105a^3c$$

$$7. x(x+8) - 3(x+8)$$

$$(x-3)(x+8)$$

$$6 \mid 24x^2y^6 - 16x^6y^2 + 4xy^2$$

$$x \mid 6x^2y^6 - 4x^6y^2 + xy^2$$

$$y^2 \mid 6xy^6 - 4x^5y^2 + y^2$$

$$6xy^4 - 4x^5 + 1$$

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

$$8. y(y-6) + 11(y-6)$$

$$(y+11)(y-6)$$

$$2 \mid 6x^{14}y^{20} - 8x^5y^6 + 24x^8y^{10}$$

$$x^5 \mid 3x^9y^{20} - 4x^5y^6 + 12x^3y^{10}$$

$$y^6 \mid 3x^9y^{14} - 4 + 12x^3y^4$$

$$3x^9y^{14} - 4 + 12x^3y^4$$

$$2x^5y^6(3x^9y^{14} - 4 + 12x^3y^4)$$

More Practice!

<p>1. What is the greatest common factor of $24a^2b$ and $18abc$?</p> <p>1) 6 2) <u>$6ab$</u> 3) $6a^2b$ 4) $6abc$</p> <div style="margin-left: 100px;"> $\begin{array}{r l} 6 \overline{) 18abc} & 24a^2b \\ \hline a \overline{) 3abc} & 4a^2b \\ \hline b \overline{) 3bc} & 4ab \\ \hline & 3c \\ & 4a \end{array}$ </div>	<p>2. Expressed in factored form, the binomial $2x^2y - 4xy^3$ is equivalent to</p> <p>1) $2xy(x - 2y)$ 2) $2xy(xy - 4y)$ 3) <u>$2xy(x - 2y^2)$</u> 4) $2x^2y^3(y - 2)$</p> <div style="margin-left: 100px;"> $\begin{array}{r l} 2 \overline{) 2x^2y - 4xy^3} & \\ \hline x \overline{) x^2y - 2xy^3} & \\ \hline y \overline{) xy - 2y^3} & \\ \hline & x - 2y^2 \end{array}$ $2xy(x - 2y^2)$ </div>
<p>3. $x(x + 3) + 2(x + 3)$</p> <p>$(x + 3)(x + 2)$</p>	<p>4. $y(y - 5) + 7(y - 5)$</p> <p>$(y + 7)(y - 5)$</p>
<p>5. $x(x - 1) + 4(x - 1)$</p> <p>$(x + 4)(x - 1)$</p>	<p>6. $y(y + 10) - 9(y + 10)$</p> <p>$(y + 10)(y - 9)$</p>