

4.1 Multiplying & Common Factors

A. Multiplying Numbers using Box Method

1. $(7)(28)$

	20	+8
7	140	56

$= 140 + 56$
 $= 196$

2. $(5)(-42)$

	-40	-2
5	-200	-10

$= -200 - 10$
 $= -210$

3. $(-4)(-38)$

	-30	-8
-4	120	32

$= 120 + 32$
 $= 152$

$-4 \overline{) 160} \overline{-8}$
 $= 152$

4. $(21)(35)$

	30	+5
20	600	100
1	30	5

$= 600 + 100 + 30 + 5$
 $= 735$

5. $(-17)(51)$

	50	+1
-10	-500	-10
-7	-350	-7

$= -500 - 350 - 10 - 7$
 $= -867$

6. $(-42)(-25)$

	-20	-5
-40	600	200
-2	40	10

$= 600 + 200 + 40 + 10$
 $= 850$

B. Factoring Numbers Using Box Method

*fill in the missing values to determine the factors of each number**

1. 252

$= (6)(42)$

	40	+2
	?	?

6	240	12
---	-----	----

2. 576

$= (8)(72)$

	70	+2
	?	?

8	560	16
---	-----	----

3. 168

$= (3)(56)$

	50	+6
	?	?

3	150	18
---	-----	----

4. 322

$= (14)(23)$

	20	+3
	?	?

10	200	?
4	?	12

30

5. 903

$= (43)(21)$

	20	+1
	?	?

40	?	40
3	60	?

3

6. 522

$= (18)(\quad)$

	20	+9
	?	?

10	?	?
8	?	72

90

$522 \overline{) 90}$
 $= 360$

C. Multiplying Algebraic Expressions using Box Method

1. $3(x+2)$

$$3 \cdot \begin{array}{|c|c|} \hline x & +2 \\ \hline \hline 3x & 6 \\ \hline \end{array} = 3x+6$$

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

$$-2 \cdot \begin{array}{|c|c|} \hline 3x & -1 \\ \hline \hline -6x & +2 \\ \hline \end{array} = -6x+2$$

3. $4x(3x-5)$

$$4x \cdot \begin{array}{|c|c|} \hline 3x & -5 \\ \hline \hline 12x^2 & -20x \\ \hline \end{array} = 12x^2-20x$$

4. $5x(3x^2-2x-1)$

$$5x \cdot \begin{array}{|c|c|c|} \hline 3x^2 & -2x & -1 \\ \hline \hline 15x^3 & -10x^2 & -5x \\ \hline \end{array} = 15x^3-10x^2-5x$$

5. $-3(4x^5-3x^2y+4)$

$$-3 \cdot \begin{array}{|c|c|c|} \hline 4x^5 & -3x^2y & +4 \\ \hline \hline -12x^5 & 9x^2y & -12 \\ \hline \end{array} = -12x^5+9x^2y-12$$

6. $-2x^3y(5x-2y+3)$

$$-2x^3y \cdot \begin{array}{|c|c|c|} \hline 5x & -2y & +3 \\ \hline \hline -10x^4y & 4x^3y^2 & -6x^3y \\ \hline \end{array} = -10x^4y+4x^3y^2-6x^3y$$

7. $3x^2y^4z(2x-3y+1)$

$$3x^2y^4z \cdot \begin{array}{|c|c|c|} \hline 2x & -3y & +1 \\ \hline \hline 6x^3y^4z & -9x^2y^5z & 3x^2y^4z \\ \hline \end{array} = 6x^3y^4z-9x^2y^5z+3x^2y^4z$$

D. Factoring Algebraic Expressions using Box Method

GCF = greatest common factor

****When we factor algebraic expressions we are dividing out the GCF****

Recall:	Determine the GCF of each set of expressions.		
4,8,12	9x,27x,18x	2x ³ ,10x ² ,12x ⁵	5x ⁵ y ² , -25x ³ y ² , 15x ⁴ y ²
4	9x	2x ²	5x ³ y ²

Factor each expression by removing the GCF.

1. $5x+10 = 5(x+2)$
 GCF \downarrow
 $x + 2$
 5

$5x$	$+10$
------	-------

2. $-4x-12 = -4(x+3)$
 $x + 3$
 -4

$-4x$	-12
-------	-------

3. $5x^3-15x^2y = 5x^2(1-3x^2y)$
 $1 - 3x^2y$
 $5x^2$

$5x^3$	$-15x^2y$
--------	-----------

4. $3x^3+2x^2-x = x(3x^2+2x-1)$
 $3x^2 + 2x - 1$
 x

$3x^3$	$+2x^2$	$-x$
--------	---------	------

5. $12x^2-10x+4 = 2(6x^2-5x+2)$
 $6x^2 - 5x + 2$
 2

$12x^2$	$-10x$	$+4$
---------	--------	------

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

$2x^3$	$-8x^2$	$-6x$
--------	---------	-------

7. $2z^2-3z-2xz = z(2z-3-2xz)$
 $2z - 3 - 2xz$
 z

$2z^2$	$-3z$	$-2xz$
--------	-------	--------

8. $4x^3-12x^2+8x = 4x(x^2-3x+2)$
 $x^2 - 3x + 2$
 $4x$

$4x^3$	$-12x^2$	$+8x$
--------	----------	-------

9. $3x^3y^2-x^2y^2+4xy^3 = xy^2(3x-x+4y)$
 $3x - x + 4y$
 xy^2

$3x^2y^2$	$-x^2y^2$	$+4xy^3$
-----------	-----------	----------