

Worksheet 7-4: Greatest Common Factors**What is the greatest common factor?**

The greatest common factor or GCF is the **largest** number and/or the **highest** variable that can divide **evenly** into all the terms of a polynomial (i.e. the greatest factor that is **common to all the terms**).

Greatest Common Factors for Numbers:**Example 1:**

Find the greatest common factor for each set of numbers.

(a) 14 and 21

$14 = 2 \times 7$

$21 = 3 \times 7$

$GCF = 7$

(b) 24 and 48

$24 = 2 \times 2 \times 2 \times 3$

$48 = 2 \times 2 \times 2 \times 2 \times 3$

$GCF = 2 \times 2 \times 2 \times 3 = 24$

(Hint: Divide the given numbers by prime factors such as 2, 3, 5, 7, 11, 13, 17, 19... evenly until you reach 1.)

(c) 8 and 12

(d) 36 and 42

(e) 14 and 49

(f) 15, and 75

(g) 9, 27, and 36

(h) 15, 45, and 55

Greatest Common Factors for Variables:**Example 2:**

Find the greatest common factor for each set of variables.

(a) x^3 and x^2

$x^3 = (x)(x)(x)$

$x^2 = (x)(x)$

$GCF = (x)(x) = x^2$

(b) y^4 and y^9

$y^4 = (y)(y)(y)(y)$

$y^9 = (y)(y)(y)(y)(y)(y)(y)(y)(y)$

$GCF = (y)(y)(y)(y) = y^4$

(Hint: GCF for variables is the variable with the lowest exponent.)

(c) x and x^3

(d) y^2 and y^5

(e) y^4 , y^2 and y^6

(f) a^5 , a^3 and a

Example 3:

Find the GCF for each set of terms.

(a) $4x$ and $6x^2$

(b) $12y^7$ and $36y^3$

(c) $14x^3$ and $35x^2$

(d) $45y^4$ and $15y^5$

Answers: 2. (c) x , (d) y^2 , (e) y^2 , (f) a ; **3.** (a) $2x$, (b) $12y^3$, (c) $7x^2$, (d), $15y^4$

Worksheet 7-5: Common Factoring

Factoring is writing an expanded polynomial in its factored form.

Compare $3x(2x + 7)$ and $6x^2 + 21x$

Factoring is the **opposite** of expanding.

Expanding is _____, **so factoring is** _____.

** If **every** term of a polynomial can be divided by the same number or variable(s), that number or variable(s) is called a **common factor**.

What is the greatest common factor?

The greatest common factor or GCF is the **largest** number and/or the **highest** variable that can divide **evenly** into all the terms of a polynomial (i.e. the greatest factor that is **common to all the terms**).

Steps for Common Factoring

Step 1: Find the **GCF** for the numerical coefficients of the terms (**the numbers**).

Step 2: Find the **GCF** for the variable parts of the terms (**the variables**).

Step 3: **Divide** the polynomial by the product of the **GCF(s)** from Steps 1 and 2.

Step 4: Write the factored form of the polynomial with **brackets** as the answer.

Example 1: Factor each polynomial.

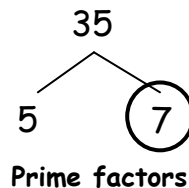
(a) $7x - 35$

$$= 7\left(\frac{7x}{7} - \frac{35}{7}\right)$$

$$= 7(x - 5)$$

GCF for the numbers = 7

GCF for the variables = N/A



No common factors for x

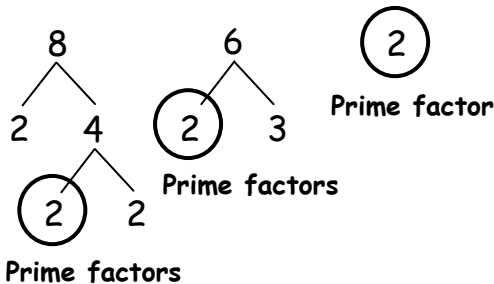
(b) $8a + 6b - 2c$

$$= 2\left(\frac{8a}{2} + \frac{6b}{2} - \frac{2c}{2}\right)$$

$$= 2(4a + 3b - c)$$

GCF for the numbers = 2

GCF for the variables = N/A



No common factors for $a, b,$ and c

2. Factor $9x + 36$. GCF for the numbers = GCF for the variables =

3. Factor $12x - 42y$. GCF for the numbers = GCF for the variables =

4. Factor $9x - 12y + 18z$. GCF for the numbers = GCF for the variables =

5. Factor $4x + 28$. GCF for the numbers = GCF for the variables =

6. Factor $15x^2 - 35x^3$. GCF for the numbers = GCF for the variables =

7. Factor $3a^2 + 12a$. GCF for the numbers = GCF for the variables =

Answers: 2. $9(x + 4)$; 3. $6(2x - 7y)$; 4. $3(3x - 4y + 6z)$; 5. $4(x + 7)$; 6. $5x^2(3 - 7x)$; 7. $3a(a + 4)$

Bingo: Greatest Common Factors

Find the greatest common factor for each set of algebraic terms.

1. $3x$ and $6x^2$

2. $12y^3$ and $8y^2$

3. $15a^5$ and $12a^3$

4. y^4 and $6y^2$

5. 24 and $8x$

6. $5x$ and $20x$

7. $7m^5$ and $21m^2$

8. $2y$, $6y^2$ and $8y^3$

9. $14n^3$, $28n^2$ and $21n^4$
