

Greatest Common Factor (GCF)



GCF: More Examples & Applications

This worksheet will help you see how the Greatest Common Factor (GCF) is used in different kinds of math problems. Remember, GCF is a powerful tool!

Part 1: Finding the GCF of Numbers

Example 1: Find the GCF of 20 and 30.

List Factors of 20: 1, 2, 4, 5, 10, 20

List Factors of 30: 1, 2, 3, 5, 6, 10, 15, 30

Common Factors: 1, 2, 5, 10

Greatest Common Factor (GCF): 10

Example 2: Find the GCF of 14, 21, and 35.

List Factors of 14: 1, 2, 7, 14

List Factors of 21: 1, 3, 7, 21

List Factors of 35: 1, 5, 7, 35

Common Factors: 1, 7

Greatest Common Factor (GCF): 7

Part 2: Finding the GCF of Monomials (Numbers & Variables)

Example 1: Find the GCF of $6x^2$ and $9x$.

1. GCF of Numbers (6 and 9):

- Factors of 6: 1, 2, 3, 6
- Factors of 9: 1, 3, 9
- $\text{GCF}(6, 9) = 3$

2. GCF of Variables (x^2 and x):

Smallest exponent is x .

3. Combine: $\text{GCF}(6x^2, 9x) = 3x$

Example 2: Find the GCF of $10a^3b^2$ and $15a^2b^4c$.

1. GCF of Numbers (10 and 15):

- Factors of 10: 1, 2, 5, 10
- Factors of 15: 1, 3, 5, 15
- $\text{GCF}(10, 15) = 5$

2. GCF of Variables (a^3 and a^2): is a^2 .

3. GCF of Variables (b^2 and b^4): is b^2 .

4. c is only in one term, so it's not common.

5. Combine: $\text{GCF}(10a^3b^2, 15a^2b^4c) = 5a^2b^2$



Part 3: Using GCF to Simplify Fractions

Example 1: Simplify the fraction $\frac{30}{12}$.

1. Find GCF of Numerator (12) and Denominator (30):

- Factors of 12: 1, 2, 3, 4, 6, 12
- Factors of 30: 1, 2, 3, 5, 6, 10, 15, 30
- $\text{GCF}(12, 30) = 6$

2. Divide both numerator and denominator by the GCF:

- $\frac{30 \div 6}{12 \div 6} = \frac{5}{2}$.
- So, $\frac{30}{12}$ simplifies to $\frac{5}{2}$.

Part 4: Using GCF to Factor Expressions

Example 1: Factor the expression $4x + 8$.

1. Find the GCF of the terms ($4x$ and 8):

- GCF of 4 and 8 is 4.
- x is not common to both terms.
- $\text{GCF}(4x, 8) = 4$

2. Divide each term by the GCF:

- $4x \div 4 = x$.
- $8 \div 4 = 2$.

3. Write the GCF outside parentheses, and the results inside:

- $4(x + 2)$.
- So, $4x + 8$ factored is $4(x + 2)$.

Example 2: Factor the expression $12y^3 - 18y^2$.

1. Find the GCF of the terms ($12y^3$ and $-18y^2$):

- GCF of 12 and 18 is 6.
- Smallest exponent for y is y^2 .
- $\text{GCF}(12y^3, 18y^2) = 6y^2$.

2. Divide each term by the GCF:

- $12y^3 \div 6y^2 = 2y$.
- $-18y^2 \div 6y^2 = -3$.

3. Write the GCF outside parentheses, and the results inside:

- $6y^2(2y - 3)$.
- So, $12y^3 - 18y^2$ factored is $6y^2(2y - 3)$.



Part 5: Factoring out -1 to change order

- Rule: $a - b = -(b - a)$
- Example: $6 - x = -(x - 6)$
- Useful when you want terms in specific order

Part 6: Real-Life Problems Using GCF

Example 1: Organizing Books You have 24 math books and 36 science books. You want to arrange them on shelves so that each shelf has the same number of math books and the same number of science books. What is the greatest number of shelves you can use?

1. Find the GCF of 24 and 36:

- Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24
- Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
- $\text{GCF}(24, 36) = 12$

2. Answer: You can use a maximum of 12 shelves. Each shelf will have $24 \div 12 = 2$ math books and $36 \div 12 = 3$ science books.