MATHEMATICS · GRADES 10-12

Greatest common factor

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you find the largest number that divides evenly into two numbers, like splitting two lengths of ribbon into the longest equal pieces with nothing left over. The largest common factor is the biggest size that fits both amounts exactly, so you waste nothing. You use it to cut ribbon or fabric into equal pieces, to split groups into the largest equal teams, or to simplify a fraction to its smallest form.



Rule

Greatest common factor: the largest number that divides both numbers exactly.

List the factors of each number, find the ones they share, and take the greatest.

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Worked examples

EXAMPLE 1

Q Find the GCF of 12 and 18

SOLUTION

List the factors: 12 has 1, 2, 3, 4, 6, 12 and 18 has 1, 2, 3, 6, 9, 18

Circle the factors they share: 1, 2, 3, 6

The greatest shared factor is 6, so the GCF is 6

EXAMPLE 2

Q Find the GCF of $24x^2$ and $36x$

SOLUTION

Find the GCF of the numbers: $24 = 2 \times 2 \times 2 \times 3$, $36 = 2 \times 2 \times 3 \times 3$, $GCF = 2 \times 2 \times 3 = 12$

Take the lowest power of x in both terms: x^2 and x, lowest is x

Put them together: the GCF is 12x

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Practice questions

1. A baker has 15 muffins and 25 cookies. What is the largest number of identical gift boxes she can pack with no leftovers?

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2. Two ropes are 28 m and 42 m long. What is the longest equal piece each rope can be cut into?

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3. A gardener has 36 rose bushes and 54 tulip bulbs. What is the largest number of identical beds she can plant with no plants left over?

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4 A class has 9 red pens and 14 blue pens. What is the largest number of identical packs they can be sorted into?

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5 A floor is 48 cm wide and 72 cm long. What is the largest square tile that fits the floor exactly?

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6 What is the largest factor shared by $20x$ and $30x^2$?

A $10x^2$

B $5x$

C $10x$

D $20x$

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7 What is the greatest common factor of $12x^3$ and $18x$?

- **A** $6x^2$
- **B** $6x$
- **C** $6x^3$
- **D** $3x$

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8 What is the greatest common factor of $8xy$ and $12x^2y$?

- **A** $4x^2y$
- **B** $4x$
- **C** $2xy$
- **D** $4xy$

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9 A ribbon 27 m long and another 81 m long are cut into the longest equal pieces possible. How long is each piece?

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10 What is the greatest common factor of $16x^2$ and $24x^3$?

A $8x$

B $8x^2$

C $8x^3$

D $4x^2$

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ANSWER KEY

1. 5

2. 14

3. 18

4. 1

5. 24

6. 10x

7. 6x

8. 4xy

9. 27

10. $8x^2$

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