Using the Factor Tree to Simplify Fractions

Number Theory & Fractions Worksheet · Grade 4–6

Name: _____ Date: _____

Learning Objectives

- Use factor trees to find the prime factorization of composite numbers
- Apply prime factorization to find the GCF and simplify fractions
- Solve word problems involving prime factors and simplified fractions

Problems

1. Draw a factor tree and write the prime factorization of 12.

12

2. Draw a factor tree and write the prime factorization of 30.

30

3. Use a factor tree to find the prime factorization of 48.

48

4. Simplify the fraction by finding the GCF of the numerator and denominator using factor trees.

$\frac{8}{12}$

5. Use factor trees to simplify the fraction below to its lowest terms.

$\frac{18}{24}$

6. Use factor trees to simplify the fraction to its lowest terms.

$\frac{36}{60}$

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7. Use factor trees to find the prime factorization of both numbers, then determine which fraction is already in its simplest form. Choose from: 15 over 35, or 14 over 21.

$\frac{15}{35}$ or $\frac{14}{21}$

8. A pizza is cut into 48 equal slices. A group of students ate 36 slices. Use a factor tree to simplify the fraction of pizza eaten to its lowest terms.

$\frac{36}{48}$

9. A class of 72 students went on a field trip. Only 45 students brought a packed lunch. Use factor trees to write the fraction of students who brought lunch in its simplest form.

$\frac{45}{72}$

10. A baker used 84 cups of flour out of a 120-cup supply to bake loaves of bread. Use factor trees to find the prime factorization of both numbers, identify the GCF, and write the fraction of flour used in its simplest form. Then determine what fraction of the supply was NOT used.

$\frac{84}{120}$

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Using the Factor Tree to Simplify Fractions — Answer Key

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Answer Key

1. Answer: 2 × 2 × 3

- Step 1: Split 12 into two factors: 12 = 2 × 6
- Step 2: 2 is prime. Split 6 further: 6 = 2 × 3
- Step 3: Both 2 and 3 are prime, so stop.
- Step 4: Prime factorization of 12 = 2 × 2 × 3

2. Answer: 2 × 3 × 5

- Step 1: Split 30 into two factors: 30 = 2 × 15
- Step 2: 2 is prime. Split 15 further: 15 = 3 × 5
- Step 3: Both 3 and 5 are prime, so stop.
- Step 4: Prime factorization of 30 = 2 × 3 × 5

3. Answer: 2 × 2 × 2 × 2 × 3

- Step 1: Split 48 = 2 × 24
- Step 2: Split 24 = 2 × 12
- Step 3: Split 12 = 2 × 6
- Step 4: Split 6 = 2 × 3
- Step 5: All factors are prime. Prime factorization = 2 × 2 × 2 × 2 × 3

4. Answer: 2/3

- Step 1: Factor tree of 8: 8 = 2 × 2 × 2
- Step 2: Factor tree of 12: 12 = 2 × 2 × 3
- Step 3: Common prime factors: 2 × 2 = 4, so GCF = 4
- Step 4: Divide numerator and denominator by 4: 8 ÷ 4 = 2, 12 ÷ 4 = 3
- Step 5: Simplified fraction = 2/3

5. Answer: 3/4

- Step 1: Factor tree of 18: 18 = 2 × 3 × 3
- Step 2: Factor tree of 24: 24 = 2 × 2 × 2 × 3
- Step 3: Common prime factors: 2 × 3 = 6, so GCF = 6
- Step 4: Divide: 18 ÷ 6 = 3, 24 ÷ 6 = 4
- Step 5: Simplified fraction = 3/4

6. Answer: 3/5

- Step 1: Factor tree of 36: 36 = 2 × 2 × 3 × 3
- Step 2: Factor tree of 60: 60 = 2 × 2 × 3 × 5
- Step 3: Common prime factors: 2 × 2 × 3 = 12, so GCF = 12

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- Step 4: Divide: 36 ÷ 12 = 3, 60 ÷ 12 = 5
- Step 5: Simplified fraction = 3/5

7. Answer: Neither is in simplest form. 15/35 = 3/7 and 14/21 = 2/3

- Step 1: Factor 15 = 3 × 5; Factor 35 = 5 × 7. GCF = 5. So 15/35 = 3/7.
- Step 2: Factor 14 = 2 × 7; Factor 21 = 3 × 7. GCF = 7. So 14/21 = 2/3.
- Step 3: Neither fraction was already in simplest form.
- Step 4: Simplified results: 15/35 = 3/7 and 14/21 = 2/3

8. Answer: 3/4

- Step 1: Factor tree of 36: 36 = 2 × 2 × 3 × 3
- Step 2: Factor tree of 48: 48 = 2 × 2 × 2 × 2 × 3
- Step 3: Common prime factors: 2 × 2 × 3 = 12. GCF = 12
- Step 4: Divide: 36 ÷ 12 = 3, 48 ÷ 12 = 4
- Step 5: The students ate 3/4 of the pizza.

9. Answer: 5/8

- Step 1: Factor tree of 45: 45 = 3 × 3 × 5
- Step 2: Factor tree of 72: 72 = 2 × 2 × 2 × 3 × 3
- Step 3: Common prime factors: 3 × 3 = 9. GCF = 9
- Step 4: Divide: 45 ÷ 9 = 5, 72 ÷ 9 = 8
- Step 5: The fraction of students who brought lunch = 5/8

10. Answer: Flour used = 7/10; Flour NOT used = 3/10

- Step 1: Factor tree of 84: 84 = 2 × 2 × 3 × 7
- Step 2: Factor tree of 120: 120 = 2 × 2 × 2 × 3 × 5
- Step 3: Common prime factors: 2 × 2 × 3 = 12. GCF = 12
- Step 4: Divide: 84 ÷ 12 = 7, 120 ÷ 12 = 10. Fraction used = 7/10
- Step 5: Fraction NOT used = 1 – 7/10 = 3/10

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