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Fractions:

1. Addition of Fractions

Here's a solution example for each type of fraction addition:

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1. Like Denominators (Same Denominator)

Example:

$$\frac{2}{7} + \frac{3}{7}$$

Solution: Since the denominators are the same, add the numerators:

$$\frac{2+3}{7} = \frac{5}{7}$$

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2. Unlike Denominators (Different Denominators)

Example:

$$\frac{1}{3} + \frac{1}{4}$$

Solution:

1. Find the Least Common Denominator (LCD) of 3 and 4, which is 12.
2. Rewrite each fraction with a denominator of 12:

$$\frac{1}{3} = \frac{4}{12}, \quad \frac{1}{4} = \frac{3}{12}$$

3. Add the fractions:

$$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

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3. Mixed Numbers

Example:

$$1\frac{2}{3} + 2\frac{1}{6}$$

Solution:

1. Convert the mixed numbers to improper fractions:

$$1\frac{2}{3} = \frac{5}{3}, \quad 2\frac{1}{6} = \frac{13}{6}$$

2. Find the LCD of 3 and 6, which is 6. Rewrite the fractions:

$$\frac{5}{3} = \frac{10}{6}, \quad \frac{13}{6} = \frac{13}{6}$$

3. Add the fractions:

$$\frac{10}{6} + \frac{13}{6} = \frac{23}{6}$$

4. Convert back to a mixed number:

$$\frac{23}{6} = 3\frac{5}{6}$$

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4. Improper Fractions

Example:

$$\frac{9}{4} + \frac{7}{6}$$

Solution:

1. Find the LCD of 4 and 6, which is 12. Rewrite the fractions:

$$\frac{9}{4} = \frac{27}{12}, \quad \frac{7}{6} = \frac{14}{12}$$

2. Add the fractions:

$$\frac{27}{12} + \frac{14}{12} = \frac{41}{12}$$

3. Convert back to a mixed number:

$$\frac{41}{12} = 3\frac{5}{12}$$

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2. Multiplication of Fractions

Example:

$$\frac{2}{3} \times \frac{4}{5}$$

Solution:

1. Multiply the numerators:

$$2 \times 4 = 8$$

2. Multiply the denominators:

$$3 \times 5 = 15$$

3. Combine the results into a fraction:

$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$$

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3. Division of Fractions

Example:

$$\frac{3}{4} \div \frac{2}{5}$$

Solution:

1. Keep the first fraction and take the reciprocal of the second fraction:

$$\frac{3}{4} \div \frac{2}{5} = \frac{3}{4} \times \frac{5}{2}$$

2. Multiply the numerators:

$$3 \times 5 = 15$$

3. Multiply the denominators:

$$4 \times 2 = 8$$

4. Combine the results into a fraction:

$$\frac{3}{4} \div \frac{2}{5} = \frac{15}{8}$$

5. Convert to a mixed number if necessary:

$$\frac{15}{8} = 1\frac{7}{8}$$

Practice Problems: Addition of Fractions

1. Like Denominators (Same Denominator)

$$\frac{2}{7} + \frac{3}{7}$$

$$\frac{5}{9} + \frac{2}{9}$$

$$\frac{7}{12} + \frac{3}{12}$$

$$\frac{4}{8} + \frac{1}{8}$$

$$\frac{11}{15} + \frac{2}{15}$$

2. Unlike Denominators (Different Denominators)

$$\frac{1}{3} + \frac{1}{4}$$

$$\frac{2}{5} + \frac{3}{10}$$

$$\frac{5}{6} + \frac{2}{9}$$

$$\frac{7}{8} + \frac{5}{16}$$

$$\frac{4}{7} + \frac{3}{14}$$

3. Mixed Numbers

$$1\frac{2}{3} + 2\frac{1}{6}$$

$$3\frac{4}{5} + 1\frac{2}{7}$$

$$2\frac{1}{2} + 4\frac{3}{4}$$

$$5\frac{2}{9} + 3\frac{5}{6}$$

$$2\frac{1}{3} + 3\frac{2}{5}$$

4. Improper Fractions

$$\frac{9}{4} + \frac{7}{6}$$

$$\frac{11}{5} + \frac{4}{3}$$

$$\frac{13}{8} + \frac{5}{16}$$

$$\frac{10}{9} + \frac{7}{12}$$

$$\frac{15}{11} + \frac{6}{7}$$

Answers for the Addition of fractions:

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1. Like Denominators (Same Denominator)

$$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$$

$$\frac{5}{9} + \frac{2}{9} = \frac{7}{9}$$

$$\frac{7}{12} + \frac{3}{12} = \frac{10}{12} = \frac{5}{6} \quad \text{(simplified)}$$

$$\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$$

$$\frac{11}{15} + \frac{2}{15} = \frac{13}{15}$$

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2. Unlike Denominators (Different Denominators)

$$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

$$\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$$

$$\frac{5}{6} + \frac{2}{9} = \frac{15}{18} + \frac{4}{18} = \frac{19}{18} = 1\frac{1}{18}$$

$$\frac{7}{8} + \frac{5}{16} = \frac{14}{16} + \frac{5}{16} = \frac{19}{16} = 1\frac{3}{16}$$

$$\frac{4}{7} + \frac{3}{14} = \frac{8}{14} + \frac{3}{14} = \frac{11}{14}$$

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3. Mixed Numbers

$$1\frac{2}{3} + 2\frac{1}{6} = \frac{5}{3} + \frac{13}{6} = \frac{10}{6} + \frac{13}{6} = \frac{23}{6} = 3\frac{5}{6}$$

$$3\frac{4}{5} + 1\frac{2}{7} = \frac{19}{5} + \frac{9}{7} = \frac{133}{35} + \frac{45}{35} = \frac{178}{35} = 5\frac{13}{35}$$

$$2\frac{1}{2} + 4\frac{3}{4} = \frac{5}{2} + \frac{19}{4} = \frac{10}{4} + \frac{19}{4} = \frac{29}{4} = 7\frac{1}{4}$$

$$5\frac{2}{9} + 3\frac{5}{6} = \frac{47}{9} + \frac{23}{6} = \frac{94}{18} + \frac{69}{18} = \frac{163}{18} = 9\frac{1}{18}$$

$$2\frac{1}{3}+3\frac{2}{5}=\frac{7}{3}+\frac{17}{5}=\frac{35}{15}+\frac{51}{15}=\frac{86}{15}=5\frac{11}{15}$$

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4. Improper Fractions

$$\frac{9}{4}+\frac{7}{6}=\frac{27}{12}+\frac{14}{12}=\frac{41}{12}=3\frac{5}{12}$$
$$\frac{11}{5}+\frac{4}{3}=\frac{33}{15}+\frac{20}{15}=\frac{53}{15}=3\frac{8}{15}$$
$$\frac{13}{8}+\frac{5}{16}=\frac{26}{16}+\frac{5}{16}=\frac{31}{16}=1\frac{15}{16}$$
$$\frac{10}{9}+\frac{7}{12}=\frac{40}{36}+\frac{21}{36}=\frac{61}{36}=1\frac{25}{36}$$
$$\frac{15}{11}+\frac{6}{7}=\frac{105}{77}+\frac{66}{77}=\frac{171}{77}=2\frac{17}{77}$$

How to Compare Numbers

1. Comparing Two Decimal Numbers:

To compare two decimal numbers, follow these steps:

Steps:

1. **Align the decimal points** to ensure the numbers are compared correctly.
2. **Compare digit by digit** starting from the leftmost side.
3. If the digits in the decimal places are equal, continue comparing to the right. If one number is longer, treat the shorter number as if it ends with zeros.
4. **Determine the greater number** based on the place value.

Example:

$$3.45 \quad \text{vs.} \quad 3.40 \quad (3.45 \text{ is greater})$$

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2. Comparing Two Fraction Numbers:

To compare two fractions, follow these steps:

Steps:

1. **Find a common denominator** (preferably the least common denominator).
2. **Rewrite the fractions** with the common denominator.
3. **Compare the numerators**—the fraction with the larger numerator is greater.

Example:

$$\frac{3}{5} \quad \text{vs.} \quad \frac{4}{7}$$

To compare:

1. Find the common denominator, which is 35.
2. Rewrite the fractions:

$$\frac{3}{5} = \frac{21}{35}, \quad \frac{4}{7} = \frac{20}{35}$$

3. Compare the numerators:

$$21 > 20 \quad \text{so} \quad \frac{3}{5} > \frac{4}{7}$$

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3. Comparing One Decimal and One Fraction Number:

To compare one decimal number and one fraction number, follow these steps:

Steps:

1. **Convert the fraction to a decimal** (if comparing a fraction to a decimal).
2. Then, compare the two decimal numbers as you would normally compare two decimal numbers.

Example:

$$0.75 \quad \text{vs.} \quad \frac{3}{4}$$

To compare:

1. Convert $\frac{3}{4}$ to a decimal:

$$\frac{3}{4} = 0.75$$

2. Compare the decimal numbers:

$$0.75 \quad \text{is equal to} \quad 0.75$$

Practice Problems with Answers

1. Comparing Two Decimal Numbers:

1. 5.67 vs. 5.78 (5.78 is greater)
2. 3.14 vs. 3.12 (3.14 is greater)
3. 9.34 vs. 9.33 (9.34 is greater)
4. 6.89 vs. 6.9 (6.9 is greater)
5. 2.01 vs. 2.10 (2.10 is greater)

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2. Comparing Two Fraction Numbers:

6. $\frac{3}{4}$ vs. $\frac{2}{3}$ ($\frac{3}{4}$ is greater)
7. $\frac{5}{6}$ vs. $\frac{7}{8}$ ($\frac{7}{8}$ is greater)
8. $\frac{1}{2}$ vs. $\frac{3}{4}$ ($\frac{3}{4}$ is greater)
9. $\frac{9}{10}$ vs. $\frac{8}{9}$ ($\frac{9}{10}$ is greater)
10. $\frac{3}{7}$ vs. $\frac{5}{9}$ ($\frac{5}{9}$ is greater)

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3. Comparing One Decimal and One Fraction Number:

11. 0.75 vs. $\frac{3}{4}$ (equal)
12. 0.6 vs. $\frac{2}{3}$ ($\frac{2}{3}$ is greater)

13. 1.25 vs. $\frac{5}{4}$ (equal)

14. 0.8 vs. $\frac{7}{9}$ ($\frac{7}{9}$ is greater)

15. 0.25 vs. $\frac{1}{5}$ (equal)

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4. Mixed Practice:

16. 4.32 vs. $\frac{3}{4}$ (4.32 is greater)

17. 1.4 vs. $\frac{3}{2}$ ($\frac{3}{2}$ is greater)

18. 2.5 vs. $\frac{5}{2}$ (equal)

19. 3.1 vs. $\frac{7}{2}$ ($\frac{7}{2}$ is greater)

20. 2.75 vs. $\frac{11}{4}$ (equal)
