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Adding and Subtracting Integer Fractions

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To add and subtract integer fractions, make the numerator of any negative fraction negative and the denominator positive.

$$-\frac{3}{4} - (-\frac{1}{3}) = ?$$

$$-\frac{2}{7} + 1\frac{2}{7} =$$

$$-\frac{3}{4} - \frac{-1}{3} = \text{The LCM of 4 and 3 is 12.}$$

$$-\frac{2}{7} + 1\frac{2}{7} = \frac{-(2+9)}{7} = \frac{7}{7} = 1$$

$$\frac{-3}{4} = \frac{-9}{12}$$

$$\frac{-1}{3} = \frac{-4}{12}$$

$$\frac{-9}{12} - \frac{-4}{12} = \frac{-(9-4)}{12} = \frac{-5}{12}$$

Add or subtract.

$$\textcircled{1} \quad -\frac{4}{5} - (-\frac{3}{5}) = -\frac{1}{5} \quad \frac{7}{8} - (-\frac{3}{8}) = \frac{5}{4} \quad -\frac{5}{9} + \frac{2}{9} = -\frac{1}{3} \quad 1\frac{2}{7} - (-\frac{5}{7}) = 2$$

$$\textcircled{2} \quad -\frac{2}{3} - (-\frac{1}{4}) = -\frac{5}{12} \quad -\frac{3}{8} - (-\frac{1}{5}) = -\frac{7}{40} \quad \frac{6}{7} - (-\frac{3}{4}) = \frac{45}{28} \quad -1\frac{7}{8} - (-\frac{4}{5}) = -\frac{43}{40}$$

$$\textcircled{3} \quad \frac{3}{4} + 1\frac{1}{4} = 2 \quad -\frac{6}{7} + 2\frac{2}{7} = \frac{10}{7} \quad -\frac{5}{8} + 1\frac{7}{8} = \frac{5}{4} \quad \frac{3}{16} + 1\frac{7}{16} = \frac{13}{8}$$

$$\textcircled{4} \quad -\frac{2}{9} + 3\frac{1}{9} = \frac{26}{9} \quad -\frac{4}{5} + 2\frac{3}{5} = \frac{9}{5} \quad -\frac{11}{13} + 2\frac{3}{13} = \frac{18}{13} \quad -\frac{3}{35} + 4\frac{10}{35} = \frac{21}{5}$$

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Multiplying Fractions by Whole Numbers

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★ When multiplying fractions by whole numbers, always write the whole number as a fraction with 1 as the denominator. Rewrite the product as a mixed number if necessary.

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

$$\frac{3}{5} \times \frac{6}{1} = \frac{18}{5} = 3\frac{3}{5}$$

Find the product. Reduce to simplest form if necessary.

1 $\frac{3}{5} \times 7 = \frac{21}{5}$

$\frac{2}{3} \times 16 = \frac{32}{3}$

$\frac{8}{9} \times 12 = \frac{32}{3}$

2 $\frac{2}{7} \times 10 = \frac{20}{7}$

$\frac{4}{5} \times 19 = \frac{76}{5}$

$\frac{1}{2} \times 17 = \frac{17}{2}$

3 $\frac{7}{9} \times 13 = \frac{91}{9}$

$\frac{1}{2} \times 12 = 6$

$\frac{1}{4} \times 26 = \frac{13}{2}$

4 $14 \times \frac{5}{9} = \frac{70}{9}$

$\frac{2}{3} \times 17 = \frac{34}{3}$

$18 \times \frac{5}{12} = \frac{15}{2}$

5 $\frac{1}{3} \times 15 = 5$

$19 \times \frac{4}{5} = \frac{76}{5}$

$\frac{1}{8} \times 22 = \frac{11}{4}$

6 $\frac{7}{10} \times 16 = \frac{56}{5}$

$20 \times \frac{4}{9} = \frac{80}{9}$

$\frac{3}{8} \times 24 = 9$

7 Which is greater, the product of $\frac{3}{4} \times 14$ or $\frac{3}{4} \times 4$? Show your work.

$$\frac{3}{4} \times 14 > \frac{3}{4} \times 4$$

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Multiplying Fractions

FACTORS AND FRACTIONS

Simplify fractions, if needed.

Multiply the numerators. Multiply the denominators.

Simplify again, if needed.

$$\frac{2}{10} \times \frac{6}{9} = \frac{1}{5} \times \frac{2}{3} = \frac{1 \times 2}{5 \times 3} = \frac{2}{15}$$

Solve.

① $\frac{3}{9} \times \frac{3}{7} = \frac{1}{7}$

② $\frac{3}{4} \times \frac{7}{8} = \frac{21}{32}$

③ $\frac{2}{5} \times \frac{1}{3} = \frac{2}{15}$

④ $\frac{6}{8} \times \frac{1}{3} = \frac{1}{4}$

⑤ $\frac{4}{6} \times \frac{5}{9} = \frac{10}{27}$

⑥ $\frac{5}{7} \times \frac{1}{5} = \frac{1}{7}$

⑦ $\frac{3}{4} \times \frac{2}{4} = \frac{3}{8}$

⑧ $\frac{4}{7} \times \frac{2}{4} = \frac{2}{7}$

⑨ $\frac{1}{3} \times \frac{4}{7} = \frac{4}{21}$

⑩ $\frac{8}{9} \times \frac{4}{8} = \frac{4}{9}$

⑪ $\frac{1}{3} \times \frac{6}{7} = \frac{2}{7}$

⑫ $\frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$

⑬ $\frac{1}{7} \times \frac{5}{7} = \frac{5}{49}$

⑭ $\frac{3}{5} \times \frac{1}{5} = \frac{3}{25}$

⑮ $\frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$

⑯ $\frac{4}{8} \times \frac{1}{7} = \frac{1}{14}$

⑰ $\frac{1}{3} \times \frac{3}{8} = \frac{1}{8}$

⑱ $\frac{2}{7} \times \frac{7}{8} = \frac{1}{4}$

⑲ $\frac{1}{3} \times \frac{3}{5} \times \frac{5}{7} = \frac{1}{7}$

⑳ $\frac{3}{4} \times \frac{4}{5} \times \frac{1}{3} = \frac{1}{5}$

㉑ $\frac{5}{2} \times \frac{2}{3} \times \frac{3}{10} = \frac{1}{2}$

㉒ $\frac{5}{12} \times \frac{6}{7} \times \frac{2}{3} = \frac{5}{21}$

㉓ $\frac{4}{5} \times \frac{2}{7} \times \frac{3}{10} = \frac{12}{175}$

㉔ $\frac{2}{7} \times \frac{7}{8} \times \frac{1}{8} = \frac{1}{32}$

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Multiplying Fractions

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- ★ To multiply fractions, find the product of the numerators and the product of the denominators. To simplify, reduce products to lowest terms.

$$\frac{1}{2} \times \frac{2}{3} = \frac{1 \times 2}{2 \times 3} = \frac{2}{6}$$

Reduce to lowest terms by dividing by the LCM of the numerator and denominator.

$$\frac{2 \div 2}{6 \div 2} = \frac{1}{3}$$

Multiply.

$$\textcircled{1} \quad \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$$

$$\frac{1}{2} \times \frac{1}{5} = \frac{1}{10}$$

$$\frac{2}{5} \times \frac{1}{6} = \frac{1}{15}$$

$$\frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$$

$$\textcircled{2} \quad \frac{5}{6} \times \frac{3}{4} = \frac{5}{8}$$

$$\frac{1}{8} \times \frac{2}{3} = \frac{1}{12}$$

$$\frac{1}{2} \times \frac{5}{7} = \frac{5}{14}$$

$$\frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$$

$$\textcircled{3} \quad \frac{4}{10} \times \frac{2}{5} = \frac{4}{25}$$

$$\frac{2}{9} \times \frac{3}{5} = \frac{2}{15}$$

$$\frac{3}{12} \times \frac{1}{4} = \frac{1}{16}$$

$$\frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$$

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

$$\frac{8}{9} \times \frac{5}{6} = \frac{20}{27}$$

$$\frac{12}{24} \times \frac{2}{3} = \frac{1}{3}$$

$$\frac{1}{7} \times \frac{8}{10} = \frac{4}{35}$$

$$\textcircled{5} \quad \frac{1}{4} \times \frac{5}{8} = \frac{5}{32}$$

$$\frac{3}{17} \times \frac{2}{3} = \frac{2}{17}$$

$$\frac{5}{9} \times \frac{11}{12} = \frac{55}{108}$$

$$\frac{3}{16} \times \frac{1}{3} = \frac{1}{16}$$

$$\textcircled{6} \quad \frac{5}{6} \times \frac{2}{9} = \frac{5}{27}$$

$$\frac{7}{16} \times \frac{3}{4} = \frac{21}{64}$$

$$\frac{5}{12} \times \frac{4}{7} = \frac{5}{21}$$

$$\frac{10}{32} \times \frac{4}{5} = \frac{1}{4}$$

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Multiplying Fractions

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Change factors that are mixed numbers to improper fractions; then multiply. Reduce products to lowest terms.

$$\frac{7}{8} \times 1\frac{1}{3} = \frac{7}{8} \times \frac{4}{3} = \frac{28}{24} = 1\frac{4}{24} \quad \frac{7}{8} \times \frac{4}{3} = \frac{7 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 3} = \frac{7}{6}$$

$$1\frac{4}{24} = 1\frac{4 \div 4}{24 \div 4} = 1\frac{1}{6}$$

Multiply.

①

$$4\frac{3}{4} \times \frac{2}{3} = \frac{19}{6}$$

$$1\frac{7}{8} \times \frac{2}{3} = \frac{5}{4}$$

$$3\frac{1}{8} \times \frac{3}{4} = \frac{75}{32}$$

②

$$\frac{4}{5} \times 1\frac{7}{8} = \frac{3}{2}$$

$$\frac{2}{3} \times 3\frac{1}{8} = \frac{25}{12}$$

$$\frac{1}{8} \times 2\frac{5}{6} = \frac{17}{48}$$

③

$$\frac{1}{4} \times 3\frac{1}{3} = \frac{5}{6}$$

$$1\frac{1}{2} \times 2\frac{1}{2} = \frac{15}{4}$$

$$5\frac{1}{4} \times \frac{3}{4} = \frac{63}{16}$$

④

$$\frac{4}{5} \times 1\frac{1}{2} = \frac{6}{5}$$

$$\frac{6}{10} \times 2\frac{5}{8} = \frac{63}{40}$$

$$1\frac{1}{6} \times \frac{9}{13} = \frac{21}{26}$$

⑤

$$6\frac{1}{3} \times 4\frac{2}{3} = \frac{266}{9}$$

$$7\frac{4}{9} \times 3\frac{1}{2} = \frac{469}{18}$$

$$12\frac{3}{4} \times 2\frac{7}{8} = \frac{1173}{32}$$

⑥

$$\frac{3}{16} \times 2\frac{7}{8} = \frac{69}{128}$$

$$3\frac{3}{4} \times \frac{1}{9} = \frac{5}{12}$$

$$\frac{3}{16} \times 2\frac{2}{5} = \frac{9}{20}$$

Mental Models of Dividing Fractions

$$\frac{1}{2} \div \frac{1}{4}$$

$\frac{1}{4}$ $\frac{1}{4}$

$\frac{1}{2}$ divided into quarters is two quarters of the whole.

$$\frac{1}{2} \div \frac{1}{3}$$

$\frac{1}{3}$ $\frac{1}{2}$ of $\frac{1}{3}$

$\frac{1}{2}$ divided into thirds is one and one-half third of the whole.

Solve. Then represent each problem with an illustrated model like the ones in the example box.

① $\frac{3}{4} \div \frac{1}{4} = 3$

② $\frac{7}{8} \div \frac{1}{4} = \frac{7}{2}$

③ $3 \div \frac{1}{5} = 15$

④ $4\frac{1}{2} \div \frac{1}{8} = 36$

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Dividing Fractions

FACTORS AND FRACTIONS

Multiply the dividend by the reciprocal of the divisor. Simplify.

$$\frac{3}{4} \div \frac{1}{2} = \frac{3 \times 2}{4 \times 1} = \frac{6}{4} = 1\frac{1}{2}$$

Solve.

$$\textcircled{1} \quad \frac{7}{8} \div \frac{2}{6} = \frac{21}{8}$$

$$\textcircled{2} \quad \frac{1}{9} \div \frac{2}{4} = \frac{2}{9}$$

$$\textcircled{3} \quad \frac{4}{7} \div \frac{4}{5} = \frac{5}{7}$$

$$\textcircled{4} \quad \frac{1}{3} \div \frac{2}{5} = \frac{5}{6}$$

$$\textcircled{5} \quad \frac{3}{5} \div \frac{7}{9} = \frac{27}{35}$$

$$\textcircled{6} \quad \frac{3}{8} \div \frac{4}{7} = \frac{21}{32}$$

$$\textcircled{7} \quad \frac{6}{9} \div \frac{2}{5} = \frac{5}{3}$$

$$\textcircled{8} \quad \frac{4}{8} \div \frac{5}{7} = \frac{7}{10}$$

$$\textcircled{9} \quad \frac{2}{4} \div \frac{5}{6} = \frac{3}{5}$$

$$\textcircled{10} \quad \frac{4}{7} \div \frac{3}{4} = \frac{16}{21}$$

$$\textcircled{11} \quad \frac{4}{6} \div \frac{2}{5} = \frac{5}{3}$$

$$\textcircled{12} \quad \frac{2}{8} \div \frac{1}{3} = \frac{3}{4}$$

$$\textcircled{13} \quad \frac{3}{7} \div \frac{3}{9} = \frac{9}{7}$$

$$\textcircled{14} \quad \frac{2}{8} \div \frac{6}{7} = \frac{7}{24}$$

$$\textcircled{15} \quad \frac{5}{6} \div \frac{6}{5} = \frac{25}{36}$$

$$\textcircled{16} \quad 6 \div \frac{1}{2} = 12$$

$$\textcircled{17} \quad 7 \div \frac{1}{3} = 21$$

$$\textcircled{18} \quad \frac{3}{5} \div \frac{1}{4} = \frac{12}{5}$$

$$\textcircled{19} \quad \frac{1}{3} \div \frac{1}{9} = 3$$

$$\textcircled{20} \quad \frac{3}{8} \div \frac{3}{4} = \frac{1}{2}$$

$$\textcircled{21} \quad 12 \div \frac{3}{4} = 16$$