Adding Mixed Numbers

The Idea

To add mixed numbers, we must find a common denominator. A common denominator is a number which is divisible by all the denominators in the problem.

How to Use the Idea

a. $1\frac{1}{2} = 1\frac{2}{4}$
$+\ 2\frac{1}{4} = 2\frac{1}{4}$
$3\frac{3}{4}$

b. $3\frac{3}{5} = 3\frac{12}{20}$
$+\ 1\frac{3}{4} = 1\frac{15}{20}$
$4\frac{27}{20} = 5\frac{7}{20}$

c. $16\frac{1}{3} = 16\frac{8}{24}$
$+\ 4\frac{1}{8} = 4\frac{3}{24}$
$20\frac{11}{24}$

Find the sums.

① $2\frac{1}{4} = 2\frac{3}{12}$
$+\ 1\frac{1}{6} = 1\frac{2}{12}$
$3\frac{5}{12}$

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

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

④ $5\frac{2}{5} =$
$+\ 6\frac{2}{3} =$

⑤ $6\frac{1}{25} =$
$+\ 9\frac{3}{10} =$

⑥ $18\frac{1}{6} =$
$+\ 7\frac{3}{4} =$

⑦ $21\frac{3}{20} =$
$+\ 14\frac{2}{15} =$

⑧ $16\frac{1}{2} =$
$+\ 31\frac{3}{10} =$

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

⑩ $7\frac{1}{6} =$
$2\frac{2}{5} =$
$+\ 1\frac{1}{3} =$

⑪ $14\frac{1}{7} =$
$2\frac{2}{3} =$
$+\ 8\frac{1}{2} =$

⑫ $4\frac{1}{6} =$
$2\frac{1}{4} =$
$+\ 3\frac{1}{12} =$

⑬ $16\frac{1}{5} =$
$4\frac{2}{7} =$
$5\frac{1}{2} =$
$+\ 3\frac{3}{14} =$

⑭ $7\frac{8}{9} =$
$1\frac{1}{2} =$
$3\frac{3}{4} =$
$+\ 2\frac{1}{6} =$

⑮ $3\frac{1}{10} =$
$2\frac{1}{5} =$
$5\frac{1}{2} =$
$+\ 6\frac{1}{25} =$

⑯ $6\frac{1}{10} =$
$3\frac{1}{4} =$
$5\frac{3}{25} =$
$+\ 12\frac{1}{2} =$

A _____ is a number which is divisible by _____ the denominators in the problem.

Back Page Exercises Create ten problems adding mixed numbers.

MATH YEARBOOK

Key

Adding Mixed Numbers

The Idea

To add mixed numbers, we must find a common denominator. A common denominator is a number which is divisible by all the denominators in the problem.

How to Use the Idea

a. $1\frac{1}{2} = 1\frac{2}{4}$
$+\ 2\frac{1}{4} = 2\frac{1}{4}$
$3\frac{3}{4}$

b. $3\frac{3}{5} = 3\frac{12}{20}$
$+\ 1\frac{3}{4} = 1\frac{15}{20}$
$4\frac{27}{20} = 5\frac{7}{20}$

c. $16\frac{1}{3} = 16\frac{8}{24}$
$+\ 4\frac{1}{8} = 4\frac{3}{24}$
$20\frac{11}{24}$

Find the sums.

① $2\frac{1}{4} = 2\frac{3}{12}$
$+\ 1\frac{1}{6} = 1\frac{2}{12}$
$3\frac{5}{12}$

② $6\frac{1}{5} = 6\frac{2}{10}$
$+\ 3\frac{1}{2} = 3\frac{5}{10}$
$9\frac{7}{10}$

③ $1\frac{1}{6} = 1\frac{5}{30}$
$+\ 2\frac{1}{5} = 2\frac{6}{30}$
$3\frac{11}{30}$

④ $5\frac{2}{5} = 5\frac{6}{15}$
$+\ 6\frac{2}{3} = 6\frac{10}{15}$
$11\frac{16}{15} = 12\frac{1}{15}$

⑤ $6\frac{1}{25} = 6\frac{2}{50}$
$+\ 9\frac{3}{10} = 9\frac{15}{50}$
$15\frac{17}{50}$

⑥ $18\frac{1}{6} = 18\frac{2}{12}$
$+\ 7\frac{3}{4} = 7\frac{9}{12}$
$25\frac{11}{12}$

⑦ $21\frac{3}{20} = 21\frac{9}{60}$
$+\ 14\frac{2}{15} = 14\frac{8}{60}$
$35\frac{17}{60}$

⑧ $16\frac{1}{2} = 16\frac{5}{10}$
$+\ 31\frac{3}{10} = 31\frac{3}{10}$
$47\frac{8}{10} = 47\frac{4}{5}$

⑨ $1\frac{1}{4} = 1\frac{3}{12}$
$2\frac{1}{3} = 2\frac{4}{12}$
$+\ 6\frac{1}{2} = 6\frac{6}{12}$
$9\frac{13}{12} = 10\frac{1}{12}$

⑩ $7\frac{1}{6} = 7\frac{5}{30}$
$2\frac{2}{5} = 2\frac{12}{30}$
$+\ 1\frac{1}{3} = 1\frac{10}{30}$
$10\frac{27}{30} = 10\frac{9}{10}$

⑪ $14\frac{1}{7} = 14\frac{6}{42}$
$2\frac{2}{3} = 2\frac{28}{42}$
$+\ 8\frac{1}{2} = 8\frac{21}{42}$
$24\frac{55}{42} = 25\frac{13}{42}$

⑫ $4\frac{1}{6} = 4\frac{2}{12}$
$2\frac{1}{4} = 2\frac{3}{12}$
$+\ 3\frac{1}{12} = 3\frac{1}{12}$
$9\frac{6}{12} = 9\frac{1}{2}$

⑬ $16\frac{1}{5} = 16\frac{14}{70}$
$4\frac{2}{7} = 4\frac{20}{70}$
$5\frac{1}{2} = 5\frac{35}{70}$
$+\ 3\frac{3}{14} = 3\frac{15}{70}$
$28\frac{84}{70} = 29\frac{1}{5}$

⑭ $7\frac{8}{9} = 7\frac{32}{36}$
$1\frac{1}{2} = 1\frac{18}{36}$
$3\frac{3}{4} = 3\frac{27}{36}$
$+\ 2\frac{1}{6} = 2\frac{6}{36}$
$13\frac{83}{36} = 15\frac{11}{36}$

⑮ $3\frac{1}{10} = 3\frac{5}{50}$
$2\frac{1}{5} = 2\frac{10}{50}$
$5\frac{1}{2} = 5\frac{25}{50}$
$+\ 6\frac{1}{25} = 6\frac{2}{50}$
$16\frac{42}{50} = 16\frac{21}{25}$

⑯ $6\frac{1}{10} = 6\frac{10}{100}$
$3\frac{1}{4} = 3\frac{25}{100}$
$5\frac{3}{25} = 5\frac{12}{100}$
$+\ 12\frac{1}{2} = 12\frac{50}{100}$
$26\frac{97}{100}$

A ___common denominator___ is a number which is divisible by ___all___ the denominators in the problem.

Back Page Exercises Create ten problems adding mixed numbers.

Fraction Subtraction

unlike denominators

Reduce to Lowest Terms when necessary.

1 $15 - 4\frac{2}{5}$

2 $8\frac{7}{10} - \frac{1}{2}$

3 $17\frac{15}{16} - 9$

4 $3\frac{2}{7} - 2\frac{1}{2}$

5 $12\frac{1}{8} - 7\frac{3}{4}$

6 $21 - 17\frac{1}{2}$

7 $9\frac{3}{4} - 6\frac{1}{3}$

8 $14\frac{7}{8} - 7$

9 $10\frac{2}{3} - \frac{7}{8}$

10 $12\frac{5}{6} - 7\frac{5}{12}$

11 $24 - 23\frac{11}{12}$

12 $17\frac{2}{5} - 6$

13 $4\frac{1}{8} - \frac{1}{6}$

14 $8\frac{9}{10} - 2\frac{2}{5}$

15 $11\frac{7}{8} - \frac{3}{4}$

16 $17 - \frac{5}{7}$

17 $14\frac{11}{12} - 7$

18 $5\frac{1}{16} - 4\frac{3}{4}$

19 $23\frac{1}{7} - 15\frac{2}{3}$

20 $7\frac{5}{12} - \frac{2}{3}$

21 $12\frac{7}{12} - 7\frac{5}{8}$

22 $27 - 2\frac{15}{16}$

23 $8\frac{3}{5} - 6\frac{3}{4}$

24 $14\frac{1}{6} - 9\frac{5}{9}$

ADVANCED FRACTIONS KEY

Fraction Frenzy

unlike denominators

Reduce to Lowest Terms when necessary.

1 $15 - 4\frac{2}{5}$ = $10\frac{3}{5}$

2 $8\frac{7}{10} - \frac{1}{2}$ = $8\frac{1}{5}$

3 $17\frac{15}{16} - 9$ = $8\frac{15}{16}$

4 $3\frac{2}{7} - 2\frac{1}{2}$ = $\frac{11}{14}$

5 $12\frac{1}{8} - 7\frac{3}{4}$ = $4\frac{3}{8}$

6 $21 - 17\frac{1}{2}$ = $3\frac{1}{2}$

7 $9\frac{3}{4} - 6\frac{1}{3}$ = $3\frac{5}{12}$

8 $14\frac{7}{8} - 7$ = $7\frac{7}{8}$

9 $10\frac{2}{3} - \frac{7}{8}$ = $9\frac{19}{24}$

10 $12\frac{5}{6} - 7\frac{5}{12}$ = $5\frac{5}{12}$

11 $24 - 23\frac{11}{12}$ = $\frac{1}{12}$

12 $17\frac{2}{5} - 6$ = $11\frac{2}{5}$

13 $4\frac{1}{8} - \frac{1}{6}$ = $3\frac{23}{24}$

14 $8\frac{9}{10} - 2\frac{2}{5}$ = $6\frac{1}{2}$

15 $11\frac{7}{8} - \frac{3}{4}$ = $11\frac{1}{8}$

16 $17 - \frac{5}{7}$ = $16\frac{2}{7}$

17 $14\frac{11}{12} - 7$ = $7\frac{11}{12}$

18 $5\frac{1}{16} - 4\frac{3}{4}$ = $\frac{5}{16}$

19 $23\frac{1}{7} - 15\frac{2}{3}$ = $7\frac{10}{21}$

20 $7\frac{5}{12} - \frac{2}{3}$ = $6\frac{3}{4}$

21 $12\frac{7}{12} - 7\frac{5}{8}$ = $4\frac{23}{24}$

22 $27 - 2\frac{15}{16}$ = $24\frac{1}{16}$

23 $8\frac{3}{5} - 6\frac{3}{4}$ = $1\frac{17}{20}$

24 $14\frac{1}{6} - 9\frac{5}{9}$ = $4\frac{11}{18}$

Multiplying Mixed Numbers

The Idea

A mixed number is made of both a whole number and a fraction.

How to Use the Idea

When we multiply mixed numbers, it is easiest to change mixed numbers to improper fractions. Then we multiply numerator times numerator and denominator times denominator. There is a shortcut to multiplying fractions. If one of the numerators has a factor in common with a denominator, we can divide by that factor.

$1\frac{1}{3} \times 2\frac{2}{5} = \frac{4}{\cancel{3}_{1}} \times \frac{\cancel{12}^{4}}{5} = \frac{16}{5} = 3\frac{1}{5}$

$3\frac{1}{2} \times 1\frac{1}{7} = \frac{\cancel{7}^{1}}{\cancel{2}_{1}} \times \frac{\cancel{8}^{4}}{\cancel{7}_{1}} = 4$

Find the products.

① $5\frac{1}{6} \times 1\frac{2}{3} = \frac{31}{6} \times \frac{5}{3} = \frac{155}{18} = 8\frac{11}{18}$

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

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

④ $6\frac{2}{3} \times 1\frac{1}{10} =$

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

⑥ $1\frac{3}{4} \times 1\frac{1}{7} =$

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

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

⑨ $4\frac{2}{3} \times 3 =$

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

⑪ $2\frac{1}{10} \times 1\frac{2}{3} =$

⑫ $4 \times 2\frac{2}{3} =$

⑬ $3\frac{1}{4} \times 2\frac{1}{2} =$

⑭ $5\frac{1}{4} \times 2 =$

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

⑯ $3\frac{1}{3} \times 1\frac{3}{10} =$

A _____ number is made of both a _____ number and a _____.

Back Page Exercises Create ten problems similar to those above. Work them.

MATH YEARbook KEY

Multiplying Mixed Numbers

The Idea

A mixed number is made of both a whole number and a fraction.

How to Use the Idea

When we multiply mixed numbers, it is easiest to change mixed numbers to improper fractions. Then we multiply numerator times numerator and denominator times denominator. There is a shortcut to multiplying fractions. If one of the numerators has a factor in common with a denominator, we can divide by that factor.

$1\frac{1}{3} \times 2\frac{2}{5} = \frac{4}{\cancel{3}_{1}} \times \frac{\cancel{12}^{4}}{5} = \frac{16}{5} = 3\frac{1}{5}$

$3\frac{1}{2} \times 1\frac{1}{7} = \frac{\cancel{7}^{1}}{\cancel{2}_{1}} \times \frac{\cancel{8}^{4}}{\cancel{7}_{1}} = 4$

Find the products.

① $5\frac{1}{6} \times 1\frac{2}{3} = \frac{31}{6} \times \frac{5}{3} = \frac{155}{18} = 8\frac{11}{18}$

② $2\frac{2}{7} \times 1\frac{1}{4} = \frac{\cancel{16}^{4}}{7} \times \frac{5}{\cancel{4}_{1}} = \frac{20}{7} = 2\frac{6}{7}$

③ $2\frac{2}{5} \times 3\frac{1}{3} = \frac{\cancel{12}^{4}}{\cancel{5}_{1}} \times \frac{\cancel{10}^{2}}{\cancel{3}_{1}} = 8$

④ $6\frac{2}{3} \times 1\frac{1}{10} = \frac{\cancel{20}^{2}}{3} \times \frac{11}{\cancel{10}_{1}} = \frac{22}{3} = 7\frac{1}{3}$

⑤ $4\frac{1}{2} \times 1\frac{1}{5} = \frac{9}{\cancel{2}_{1}} \times \frac{\cancel{6}^{3}}{5} = \frac{27}{5} = 5\frac{2}{5}$

⑥ $1\frac{3}{4} \times 1\frac{1}{7} = \frac{\cancel{7}^{1}}{\cancel{4}_{1}} \times \frac{\cancel{8}^{2}}{\cancel{7}_{1}} = 2$

⑦ $5\frac{1}{3} \times 1\frac{1}{8} = \frac{\cancel{16}^{2}}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{\cancel{8}_{1}} = 6$

⑧ $1\frac{1}{3} \times 1\frac{1}{3} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{9} = 1\frac{7}{9}$

⑨ $4\frac{2}{3} \times 3 = \frac{14}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{1} = 14$

⑩ $1\frac{1}{5} \times 1\frac{1}{5} = \frac{6}{5} \times \frac{6}{5} = \frac{36}{25} = 1\frac{11}{25}$

⑪ $2\frac{1}{10} \times 1\frac{2}{3} = \frac{\cancel{21}^{7}}{\cancel{10}_{2}} \times \frac{\cancel{5}^{1}}{\cancel{3}_{1}} = \frac{7}{2} = 3\frac{1}{2}$

⑫ $4 \times 2\frac{2}{3} = \frac{4}{1} \times \frac{8}{3} = \frac{32}{3} = 10\frac{2}{3}$

⑬ $3\frac{1}{4} \times 2\frac{1}{2} = \frac{13}{4} \times \frac{5}{2} = \frac{65}{8} = 8\frac{1}{8}$

⑭ $5\frac{1}{4} \times 2 = \frac{21}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{1} = \frac{21}{2} = 10\frac{1}{2}$

⑮ $1\frac{1}{2} \times 1\frac{1}{2} = \frac{3}{2} \times \frac{3}{2} = \frac{9}{4} = 2\frac{1}{4}$

⑯ $3\frac{1}{3} \times 1\frac{3}{10} = \frac{\cancel{10}^{1}}{3} \times \frac{13}{\cancel{10}_{1}} = \frac{13}{3} = 4\frac{1}{3}$

A ___mixed___ number is made of both a ___whole___ number and a ___fraction___.

Back Page Exercises Create ten problems similar to those above. Work them.

Dividing Mixed Numbers

The Idea

An improper fraction has a numerator that is larger than its denominator.

How to Use the Idea

To divide with mixed numbers, we change them to improper fractions, then invert the divisor and multiply.

$$1\frac{3}{5} \div 1\frac{1}{10} = \frac{8}{5} \div \frac{11}{10} = \frac{8}{5} \times \frac{10}{11} = \frac{8}{5} \times \frac{2 \times 5}{11} = \frac{8}{1} \times \frac{2}{11} = \frac{16}{11} = 1\frac{5}{11}$$

$$1\frac{2}{3} \div 2\frac{1}{2} = \frac{5}{3} \div \frac{5}{2} = \frac{5}{3} \times \frac{2}{5} = \frac{\overset{1}{\cancel{5}} \times 2}{3 \times \underset{1}{\cancel{5}}} = \frac{2}{3}$$

Find the quotients.

① $4\frac{1}{2} \div 2\frac{2}{5} = \frac{9}{2} \div \frac{12}{5} = \frac{9}{2} \times \frac{5}{12} =$

$\frac{\overset{3}{\cancel{9}} \times 5}{2 \times \underset{4}{\cancel{12}}} = \frac{15}{8} = 1\frac{7}{8}$

② $2\frac{2}{5} \div 4\frac{1}{2} =$

③ $1\frac{1}{2} \div 1\frac{1}{2} =$

④ $2\frac{2}{3} \div 1\frac{3}{5} =$

⑤ $1\frac{3}{5} \div 2\frac{2}{3} =$

⑥ $3\frac{3}{4} \div 1\frac{1}{5} =$

⑦ $2\frac{1}{5} \div 1\frac{1}{3} =$

⑧ $1\frac{1}{3} \div 2\frac{1}{5} =$

⑨ $5\frac{1}{5} \div 1\frac{1}{2} =$

⑩ $1\frac{1}{2} \div 5\frac{1}{5} =$

⑪ $2\frac{2}{3} \div 2\frac{3}{4} =$

⑫ $4\frac{1}{5} \div 3\frac{1}{3} =$

An _____ fraction has a _____ that is larger than its _____.

Back Page Exercises Create ten problems similar to those above. Work them.

KEY

Dividing Mixed Numbers

The Idea

An improper fraction has a numerator that is larger than its denominator.

How to Use the Idea

To divide with mixed numbers, we change them to improper fractions, then invert the divisor and multiply.

$$1\frac{3}{5} \div 1\frac{1}{10} = \frac{8}{5} \div \frac{11}{10} = \frac{8}{5} \times \frac{10}{11} = \frac{8}{5} \times \frac{2 \times 5}{11} = \frac{8}{1} \times \frac{2}{11} = \frac{16}{11} = 1\frac{5}{11}$$

$$1\frac{2}{3} \div 2\frac{1}{2} = \frac{5}{3} \div \frac{5}{2} = \frac{5}{3} \times \frac{2}{5} = \frac{\overset{1}{\cancel{5}} \times 2}{3 \times \underset{1}{\cancel{5}}} = \frac{2}{3}$$

Find the quotients.

① $4\frac{1}{2} \div 2\frac{2}{5} = \frac{9}{2} \div \frac{12}{5} = \frac{9}{2} \times \frac{5}{12} = \frac{\overset{3}{\cancel{9}} \times 5}{2 \times \underset{4}{\cancel{12}}} = \frac{15}{8} = 1\frac{7}{8}$

② $2\frac{2}{5} \div 4\frac{1}{2} = \frac{12}{5} \div \frac{9}{2} = \frac{\overset{4}{\cancel{12}}}{5} \times \frac{2}{\underset{3}{\cancel{9}}} = \frac{8}{15}$

③ $1\frac{1}{2} \div 1\frac{1}{2} = \frac{3}{2} \div \frac{3}{2} = \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{2}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} = 1$

④ $2\frac{2}{3} \div 1\frac{3}{5} = \frac{8}{3} \div \frac{8}{5} = \frac{\overset{1}{\cancel{8}}}{3} \times \frac{5}{\underset{1}{\cancel{8}}} = \frac{5}{3} = 1\frac{2}{3}$

⑤ $1\frac{3}{5} \div 2\frac{2}{3} = \frac{8}{5} \div \frac{8}{3} = \frac{\overset{1}{\cancel{8}}}{5} \times \frac{3}{\underset{1}{\cancel{8}}} = \frac{3}{5}$

⑥ $3\frac{3}{4} \div 1\frac{1}{5} = \frac{15}{4} \div \frac{6}{5} = \frac{\overset{5}{\cancel{15}}}{4} \times \frac{5}{\underset{2}{\cancel{6}}} = \frac{25}{8} = 3\frac{1}{8}$

⑦ $2\frac{1}{5} \div 1\frac{1}{3} = \frac{11}{5} \div \frac{4}{3} = \frac{11}{5} \times \frac{3}{4} = \frac{33}{20} = 1\frac{13}{20}$

⑧ $1\frac{1}{3} \div 2\frac{1}{5} = \frac{4}{3} \div \frac{11}{5} = \frac{4}{3} \times \frac{5}{11} = \frac{20}{33}$

⑨ $5\frac{1}{5} \div 1\frac{1}{2} = \frac{26}{5} \div \frac{3}{2} = \frac{26}{5} \times \frac{2}{3} = \frac{52}{15} = 3\frac{7}{15}$

⑩ $1\frac{1}{2} \div 5\frac{1}{5} = \frac{3}{2} \div \frac{26}{5} = \frac{3}{2} \times \frac{5}{26} = \frac{15}{52}$

⑪ $2\frac{2}{3} \div 2\frac{3}{4} = \frac{8}{3} \div \frac{11}{4} = \frac{8}{3} \times \frac{4}{11} = \frac{32}{33}$

⑫ $4\frac{1}{5} \div 3\frac{1}{3} = \frac{21}{5} \div \frac{10}{3} = \frac{21}{5} \times \frac{3}{10} = \frac{63}{50} = 1\frac{13}{50}$

An ___improper___ fraction has a ___numerator___ that is larger than its ___denominator___.

Back Page Exercises Create ten problems similar to those above. Work them.