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Comparing Fractions

FACTORS AND FRACTIONS

Denominator: The number of equal sections of the whole. Also, the bottom number of the fraction.
Numerator: The number of equal sections that the fraction represents. Also, the top number of the fraction.

$$\frac{8}{24} \quad \frac{1}{3} \quad \frac{1}{8} \quad \frac{3}{24}$$

$$\frac{1}{3} > \frac{1}{8}$$

Compare the fractions. Write the symbol that makes the statement correct.

1 $\frac{1}{8} < \frac{1}{5}$

2 $\frac{2}{3} > \frac{3}{5}$

3 $\frac{1}{4} > \frac{1}{5}$

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

5 $\frac{8}{9} < \frac{9}{8}$

6 $\frac{1}{6} > \frac{4}{25}$

7 $\frac{1}{7} > \frac{71}{500}$

8 $\frac{3}{25} < \frac{1}{8}$

9 $\frac{1}{5} = \frac{5}{25}$

10 $\frac{6}{7} > \frac{428,571}{500,000}$

11 $\frac{75}{150} = \frac{1}{2}$

12 $\frac{12}{24} < \frac{36}{56}$

13 $\frac{5}{6} > \frac{30}{38}$

14 $\frac{48}{72} = \frac{2}{3}$

15 $\frac{7}{8} > \frac{49}{64}$

16 $\frac{22}{44} > \frac{43}{88}$

17 $\frac{52}{63} < \frac{8}{9}$

18 $\frac{1}{4} < \frac{198}{780}$

19 $\frac{3}{4} = \frac{252}{336}$

20 $\frac{11}{12} > \frac{115}{144}$

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Improper Fraction to Mixed Number

FACTORS AND FRACTIONS

Divide the numerator by the denominator. Place the remainder over the denominator. Simplify.

$$\begin{array}{r} \frac{26}{8} \\ 3 \text{ R}2 \\ 8 \overline{)26} \\ \underline{24} \\ 2 \end{array}$$

$$\frac{26}{8} = 3 \frac{2}{8} = 3 \frac{1}{4}$$

Simplify.

$$\textcircled{1} \frac{10}{6} = 1 \frac{2}{3}$$

$$\textcircled{2} \frac{30}{8} = 3 \frac{3}{4}$$

$$\textcircled{3} \frac{28}{9} = 3 \frac{1}{9}$$

$$\textcircled{4} \frac{17}{7} = 2 \frac{3}{7}$$

$$\textcircled{5} \frac{13}{2} = 6 \frac{1}{2}$$

$$\textcircled{6} \frac{34}{5} = 6 \frac{4}{5}$$

$$\textcircled{7} \frac{59}{11} =$$

$$\textcircled{8} \frac{14}{3} = 4 \frac{2}{3}$$

$$\textcircled{9} \frac{68}{12} = 5 \frac{2}{3}$$

$$\textcircled{10} \frac{30}{19} = 1 \frac{11}{19}$$

$$\textcircled{11} \frac{127}{19} = 6 \frac{13}{19}$$

$$\textcircled{12} \frac{23}{4} = 5 \frac{3}{4}$$

$$\textcircled{13} \frac{44}{10} = 4 \frac{2}{5}$$

$$\textcircled{14} \frac{13}{6} = 2 \frac{1}{6}$$

$$\textcircled{15} \frac{48}{10} = 4 \frac{4}{5}$$

$$\textcircled{16} \frac{49}{11} = 4 \frac{5}{11}$$

$$\textcircled{17} \frac{29}{8} = 3 \frac{5}{8}$$

$$\textcircled{18} \frac{31}{6} = 5 \frac{1}{6}$$

$$\textcircled{19} \frac{98}{12} = 8 \frac{1}{6}$$

$$\textcircled{20} \frac{168}{15} = 11 \frac{1}{5}$$

$$\textcircled{21} \frac{215}{25} = 8 \frac{3}{5}$$

$$\textcircled{22} \frac{444}{5} =$$

$$\textcircled{23} \frac{77}{15} = 5 \frac{2}{15}$$

$$\textcircled{24} \frac{252}{10} = 25 \frac{1}{5}$$

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Mixed Number to Improper Fraction

FACTORS AND FRACTIONS

Multiply the denominator by the whole number. Add the product to the numerator. Place the sum over the denominator.

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

$$5 \times 4 = 20 + 3 = 23$$

$$4\frac{3}{5} = \frac{23}{5}$$

Convert to an improper fraction.

1 $7\frac{5}{7} = \frac{54}{7}$

2 $4\frac{1}{11} = \frac{45}{11}$

3 $11\frac{2}{5} = \frac{57}{5}$

4 $8\frac{2}{9} = \frac{74}{9}$

5 $6\frac{3}{10} = \frac{63}{10}$

6 $8\frac{2}{8} = \frac{33}{4}$

7 $12\frac{5}{6} = \frac{77}{6}$

8 $12\frac{3}{6} = \frac{25}{2}$

9 $8\frac{6}{9} = \frac{26}{3}$

10 $9\frac{1}{8} = \frac{73}{8}$

11 $6\frac{4}{12} = \frac{19}{3}$

12 $12\frac{4}{5} = \frac{64}{5}$

13 $8\frac{3}{8} = \frac{67}{8}$

14 $9\frac{1}{6} = \frac{55}{6}$

15 $9\frac{1}{5} = \frac{46}{5}$

16 $11\frac{1}{5} = \frac{56}{5}$

17 $7\frac{2}{11} = \frac{79}{11}$

18 $10\frac{5}{6} = \frac{65}{6}$

19 $3\frac{7}{8} = \frac{31}{8}$

20 $12\frac{2}{3} = \frac{38}{3}$

21 $9\frac{3}{6} = \frac{19}{2}$

22 $14\frac{1}{2} = \frac{29}{2}$

23 $20\frac{3}{4} = \frac{83}{4}$

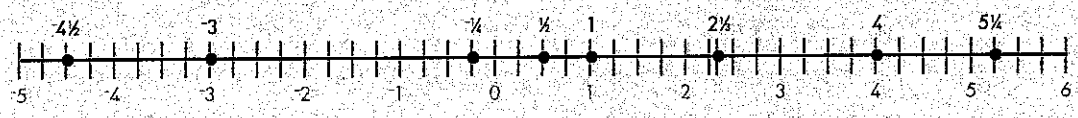
24 $15\frac{7}{8} = \frac{127}{8}$

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Comparing and Ordering Fractions and Integers

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★ Fractions and integers may be compared and ordered using a number line. Remember that as we move from left to right on the number line, numbers are ordered from least to greatest. Fractions and mixed numbers fall between whole numbers.



Order these fractions and integers from least to greatest.

① $2\frac{1}{5}$, -3 , 0 , $-\frac{1}{9}$, $2\frac{1}{2}$, -6

4 , 5 , 1 , 2 , 6 , 3
 $\frac{3}{4}$, 1 , $-4\frac{1}{5}$, -1 , 3 , $-\frac{7}{8}$

② -4 , -2 , 2 , $-3\frac{1}{8}$, $3\frac{1}{5}$, 4

2 , 6 , 3 , 4 , 1 , 5
 -2 , 9 , $-\frac{1}{4}$, $\frac{1}{6}$, -4 , $\frac{3}{5}$

③ 6 , 4 , 2 , 3 , 5 , 1
 7 , 2 , -3 , $-\frac{1}{9}$, $2\frac{1}{2}$, -6

4 , 1 , 2 , 5 , 3
 6 , 1 , $-4\frac{1}{5}$, -1 , 3 , $-\frac{7}{8}$

④ 3 , 2 , 1 , 4
 $-1\frac{1}{2}$, -3 , $-6\frac{1}{5}$, $-\frac{1}{9}$

5 , 4 , 1 , 2 , 6 , 3
 $2\frac{1}{2}$, 1 , $-4\frac{1}{5}$, -1 , 3 , $-\frac{7}{8}$

⑤ 3 , 4 , 1 , 5 , 2
 0 , $\frac{1}{8}$, $-5\frac{1}{5}$, $3\frac{1}{3}$, $-\frac{1}{2}$

1 , 3 , 4 , 2 , 5
 7 , -7 , 0 , $\frac{5}{6}$, $-\frac{5}{6}$, $3\frac{1}{2}$

⑥ 5 , 1 , 3 , 2 , 4
 10 , -10 , $\frac{3}{4}$, $-\frac{3}{4}$, $1\frac{3}{5}$

3 , 6 , 1 , 2 , 4 , 5
 0 , 8 , -8 , $-\frac{5}{6}$, $\frac{5}{6}$, $2\frac{7}{8}$

⑦ An airplane is flying $2\frac{1}{2}$ miles above the ocean's surface. A submarine is $1\frac{3}{4}$ miles beneath the surface. Which craft is closer to the ocean's surface? Explain your answer.



∴ the submarine is closer to the surface

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Adding and Subtracting Like Fractions

$$\frac{3}{8} + \frac{1}{8} = \frac{4}{8} = \frac{1}{2}$$

$$\frac{3}{8} - \frac{1}{8} = \frac{2}{8} = \frac{1}{4}$$

Solve. Write the answer in lowest terms. Show your work with an illustrated model.

① $\frac{3}{8} - \frac{2}{8} = \frac{1}{8}$

② $\frac{7}{10} + \frac{8}{10} = 1\frac{1}{2}$ or $\frac{3}{2}$

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

④ $\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$

⑤ $\frac{1}{3} + \frac{2}{3} = 1$

⑥ $\frac{3}{5} + \frac{4}{5} = 1\frac{2}{5}$ or $\frac{7}{5}$

⑦ $\frac{5}{9} - \frac{2}{9} = \frac{1}{3}$

⑧ $\frac{3}{12} + \frac{5}{12} = \frac{2}{3}$

⑨ $\frac{13}{36} + \frac{5}{36} = \frac{1}{2}$

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Adding and Subtracting Fractions

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★ To add or subtract fractions with like denominators, just add or subtract the numerators. To simplify, reduce the sum or difference to lowest terms.

$$\frac{3}{5} + \frac{4}{5} = ?$$

$$\frac{3}{5} + \frac{4}{5} = \frac{(3+4)}{5} = \frac{7}{5}$$

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

$$\frac{7}{8} - \frac{5}{8} = ?$$

$$\frac{7}{8} - \frac{5}{8} = \frac{(7-5)}{8} = \frac{2}{8}$$

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

Add or subtract.

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

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

$\frac{1}{8} + \frac{6}{8} = \frac{7}{8}$

$\frac{3}{13} + \frac{7}{13} = \frac{10}{13}$

② $\frac{8}{9} - \frac{4}{9} = \frac{4}{9}$

$\frac{7}{8} - \frac{3}{8} = \frac{1}{2}$

$\frac{7}{10} - \frac{6}{10} = \frac{1}{10}$

$\frac{15}{32} - \frac{8}{32} = \frac{7}{32}$

③ $\frac{19}{26} - \frac{3}{26} = \frac{8}{13}$

$\frac{18}{35} + \frac{6}{35} = \frac{24}{35}$

$\frac{15}{72} - \frac{7}{72} = \frac{1}{9}$

$\frac{16}{113} + \frac{24}{113} = \frac{40}{113}$

④ $\frac{19}{64} + \frac{6}{64} = \frac{25}{64}$

$\frac{17}{168} - \frac{3}{168} = \frac{1}{12}$

$\frac{16}{19} + \frac{2}{19} = \frac{18}{19}$

$\frac{14}{31} - \frac{12}{31} = \frac{2}{31}$

Adding and Subtracting Unlike Fractions

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

$$\frac{5}{12} - \frac{3}{8} = \frac{10}{24} - \frac{9}{24} = \frac{1}{24}$$

Rewrite the fractions in like terms. Solve. Simplify if needed.

1 $\frac{3}{8} + \frac{2}{3} = \frac{25}{24}$ or $1\frac{1}{24}$

2 $\frac{7}{8} - \frac{8}{10} = \frac{3}{40}$

3 $\frac{1}{5} - \frac{1}{6} = \frac{1}{30}$

4 $\frac{1}{8} + \frac{1}{3} = \frac{11}{24}$

5 $\frac{1}{3} + \frac{2}{5} = \frac{11}{15}$

6 $\frac{1}{4} + \frac{4}{5} = \frac{21}{20}$ or $1\frac{1}{20}$

7 $\frac{5}{8} - \frac{1}{3} = \frac{7}{24}$

8 $\frac{2}{7} - \frac{2}{9} = \frac{4}{63}$

9 $\frac{9}{14} + \frac{6}{28} = \frac{6}{7}$

10 $\frac{11}{18} + \frac{5}{54} = \frac{19}{27}$

11 $\frac{5}{7} - \frac{3}{5} = \frac{4}{35}$

12 $\frac{31}{72} - \frac{3}{8} = \frac{1}{18}$

13 $\frac{7}{6} + \frac{2}{3} = \frac{11}{6}$ or $1\frac{5}{6}$

14 $\frac{2}{3} - \frac{8}{27} = \frac{10}{27}$

15 $\frac{13}{16} - \frac{1}{8} = \frac{11}{16}$

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Adding and Subtracting Fractions

FACTORS AND FRACTIONS

Use the least common multiple to put fractions in the same terms. Add or subtract numerators. Reduce to simplest terms using the greatest common factor.

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

$$\frac{2}{3} - \frac{1}{6} = \frac{4}{6} - \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

Solve.

$$\textcircled{1} \quad \frac{2}{3} + \frac{1}{4} = \frac{11}{12}$$

$$\textcircled{3} \quad \frac{31}{72} - \frac{3}{8} = \frac{1}{18}$$

$$\textcircled{5} \quad \frac{10}{15} + \frac{2}{15} = \frac{4}{5}$$

$$\textcircled{7} \quad \frac{1}{5} + \frac{3}{4} = \text{skip}$$

$$\textcircled{9} \quad \frac{2}{3} - \frac{8}{27} = \frac{10}{27}$$

$$\textcircled{11} \quad \frac{13}{24} + \frac{5}{12} = \frac{23}{24}$$

$$\textcircled{13} \quad \frac{4}{15} + \frac{3}{5} = \frac{13}{15}$$

$$\textcircled{15} \quad \frac{1}{5} - \frac{1}{6} = \frac{1}{30}$$

$$\textcircled{17} \quad \frac{9}{12} + \frac{1}{8} = \frac{7}{8}$$

$$\textcircled{19} \quad \frac{3}{8} + \frac{1}{24} = \frac{5}{12}$$

$$\textcircled{21} \quad \frac{2}{3} + \frac{1}{6} + \frac{1}{12} = \frac{11}{12}$$

$$\textcircled{23} \quad \frac{1}{2} + \frac{3}{8} + \frac{1}{12} = \text{skip}$$

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

$$\textcircled{4} \quad \frac{7}{11} - \frac{2}{11} = \frac{5}{11}$$

$$\textcircled{6} \quad \frac{11}{18} + \frac{5}{54} = \frac{19}{27}$$

$$\textcircled{8} \quad \frac{5}{6} - \frac{3}{4} = \frac{1}{12}$$

$$\textcircled{10} \quad \frac{6}{11} - \frac{4}{22} = \frac{4}{11}$$

$$\textcircled{12} \quad \frac{5}{8} - \frac{1}{3} = \frac{7}{24}$$

$$\textcircled{14} \quad \frac{3}{5} - \frac{4}{15} = \frac{1}{3}$$

$$\textcircled{16} \quad \frac{7}{10} - \frac{3}{15} = \frac{1}{2}$$

$$\textcircled{18} \quad \frac{7}{8} - \frac{8}{10} = \frac{3}{40}$$

$$\textcircled{20} \quad \frac{3}{8} + \frac{2}{3} = \frac{25}{24} \text{ or } 1\frac{1}{24}$$

$$\textcircled{22} \quad \frac{2}{15} - \frac{1}{30} - \frac{1}{45} = \frac{7}{90}$$

$$\textcircled{24} \quad \frac{1}{2} - \frac{1}{3} - \frac{1}{12} = \frac{1}{12}$$

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Adding Fractions with Unlike Denominators

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★ To add fractions with unlike denominators, rewrite each of the fractions by finding the least common denominator. Convert the sum to a mixed number if necessary.

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

$$\frac{4}{6} + \frac{5}{6} = \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$$

Find the sum. Reduce to simplest form if necessary.

① $\frac{5}{6} + \frac{4}{5} = \frac{49}{30}$ or $1\frac{19}{30}$ $\frac{1}{5} + \frac{1}{3} + \frac{1}{2} = \frac{31}{30}$ or $1\frac{1}{30}$ $\frac{2}{9} + \frac{2}{3} + \frac{1}{6} = \frac{19}{18}$ or $1\frac{1}{18}$

② $\frac{4}{7} + \frac{3}{4} = \frac{31}{28}$ or $1\frac{3}{28}$ $\frac{3}{5} + \frac{1}{2} + \frac{4}{9} = \frac{139}{90}$ or $1\frac{49}{90}$ $\frac{5}{8} + \frac{1}{3} + \frac{2}{7} = \frac{209}{168}$ or $1\frac{41}{168}$

③ $\frac{2}{3} + \frac{1}{6} = \frac{5}{6}$ $\frac{1}{4} + \frac{2}{3} + \frac{3}{5} = \frac{91}{60}$ or $1\frac{31}{60}$ $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$ or $1\frac{1}{12}$

④ $\frac{5}{9} + \frac{2}{7} = \frac{53}{63}$ $\frac{1}{6} + \frac{2}{9} + \frac{3}{8} = \frac{55}{72}$ $\frac{2}{5} + \frac{1}{6} + \frac{3}{7} = \frac{209}{210}$

⑤ $\frac{7}{8} + \frac{1}{5} = \frac{43}{40}$ or $1\frac{3}{40}$ $\frac{3}{7} + \frac{1}{2} + \frac{1}{6} = \frac{23}{21}$ or $1\frac{2}{21}$ $\frac{1}{8} + \frac{2}{9} + \frac{3}{10} = \frac{233}{360}$

⑥ $\frac{1}{4} + \frac{5}{6} = \frac{13}{12}$ or $1\frac{1}{12}$ $\frac{7}{10} + \frac{2}{3} + \frac{1}{5} = \frac{47}{30}$ or $1\frac{17}{30}$ $\frac{7}{10} + \frac{3}{8} + \frac{5}{6} = \frac{229}{120}$ or $1\frac{109}{120}$

⑦ Barry is tying up three packages with string. He needs pieces that are $\frac{3}{4}$ yard, $\frac{1}{2}$ yard, and $\frac{3}{5}$ yard. How much string does Barry need to tie up the packages?

$$\left(\frac{3}{4} + \frac{1}{2} + \frac{3}{5}\right) \text{ yd} = \frac{37}{20} \text{ yd} \text{ or } 1\frac{17}{20} \text{ yd}$$

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Subtracting Fractions with Unlike Denominators

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★ To subtract fractions with unlike denominators, follow the same process as addition. Find the least common denominator of each fraction, and then subtract.

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

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

Find the difference. Reduce to simplest form if necessary.

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

$\frac{3}{5} - \frac{1}{4} = \frac{7}{20}$

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

② $\frac{6}{7} - \frac{2}{3} = \frac{4}{21}$

$\frac{7}{8} - \frac{2}{9} = \frac{47}{72}$

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

③ $\frac{5}{6} - \frac{3}{7} = \frac{17}{42}$

$\frac{9}{10} - \frac{2}{3} = \frac{7}{30}$

$\frac{3}{4} - \frac{3}{5} = \frac{3}{20}$

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

$\frac{5}{7} - \frac{4}{9} = \frac{17}{63}$

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

⑤ $\frac{3}{4} - \frac{2}{7} = \frac{13}{28}$

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

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

⑥ $\frac{3}{10} - \frac{1}{8} = \frac{7}{40}$

$\frac{4}{5} - \frac{1}{10} = \frac{7}{10}$

$\frac{8}{9} - \frac{2}{3} = \frac{2}{9}$

⑦ On Saturday, Joan painted $\frac{3}{8}$ of her bedroom. Her sister, Wendy, painted $\frac{5}{12}$ of her bedroom. How much more of her bedroom did Wendy paint than Joan?

Wendy painted $\frac{1}{12}$ more than Joan.

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Adding and Subtracting Fractions

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★ To add or subtract fractions with unlike denominators, convert to equivalent fractions using the least common multiple (LCM) as the denominator.

$$\frac{3}{4} + \frac{5}{6} = ? \text{ The LCM of 4 and 6 is 12.}$$

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

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

$$\frac{9}{12} + \frac{10}{12} = \frac{19}{12} = 1\frac{7}{12}$$

$$\frac{5}{6} - \frac{1}{3} = ? \text{ The LCM of 6 and 3 is 6.}$$

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

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

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

Add or subtract.

$$\textcircled{1} \quad \frac{1}{6} + \frac{2}{5} = \frac{17}{30}$$

$$\frac{1}{5} + \frac{2}{8} = \frac{9}{20}$$

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

$$\frac{3}{5} + \frac{1}{7} = \frac{26}{35}$$

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

$$\frac{2}{7} + \frac{1}{21} = \frac{1}{3}$$

$$\frac{3}{16} + \frac{5}{8} = \frac{13}{16}$$

$$\frac{6}{7} + \frac{1}{2} = \frac{19}{14} \text{ or } 1\frac{5}{14}$$

$$\textcircled{3} \quad \frac{2}{3} - \frac{1}{5} = \frac{7}{15}$$

$$\frac{6}{7} - \frac{1}{2} = \frac{5}{14}$$

$$\frac{3}{8} - \frac{1}{4} = \frac{1}{8}$$

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

$$\textcircled{4} \quad \frac{4}{5} - \frac{1}{4} = \frac{11}{20}$$

$$\frac{4}{7} - \frac{1}{3} = \frac{5}{21}$$

$$\frac{7}{12} - \frac{1}{8} = \frac{11}{24}$$

$$\frac{5}{6} - \frac{2}{7} = \frac{23}{42}$$