Fraction Arithmetic

Add, Subtract, Multiply & Divide Fractions

Vocabulary

Integer
A whole number.

Numerator
The number on top of a fraction.
It should always be an integer.

Denominator
The number on the bottom of a fraction.
It should always be an integer.

Review of fractions

1. Simplify these fractions as far as possible:

a. $\frac{5}{25}$ b. $\frac{21}{49}$

c. $\frac{108}{132}$

2. Convert to mixed numbers.

a. $\frac{3}{2}$ b. $\frac{37}{5}$

3. Convert to improper fractions:

a. $2\frac{1}{2}$ b. $11\frac{4}{7}$

4. Convert these fractions to decimals and percentages.

a. $\frac{7}{10}$ b. $\frac{23}{100}$

c. $\frac{5}{8}$ d. $\frac{9}{5}$

5. Find $\frac{4}{5}$. of 45

4. Put these numbers in ascending order.

$\frac{2}{3}$, 0.62 , $\frac{3}{5}$, 61%

Solutions

1. Simplify these fractions as far as possible:

a. $\frac{5}{25} = \mathbf{\frac{1}{5}}$ b. $\frac{21}{49} = \mathbf{\frac{3}{7}}$

c. $\frac{108}{132} = \mathbf{\frac{9}{11}}$

2. Convert to mixed numbers.

a. $\frac{3}{2} = \mathbf{1\frac{1}{2}}$ b. $\frac{37}{5} = \mathbf{7\frac{2}{5}}$

3. Convert to improper fractions:

a. $2\frac{1}{2} = \mathbf{\frac{5}{2}}$ b. $11\frac{4}{7} = \mathbf{\frac{81}{7}}$

4. Convert these fractions to decimals and percentages.

a. $\frac{7}{10}$ $\mathbf{0.7\ ,70\%}$ b. $\frac{23}{100}$ $\mathbf{0.23\ ,23\%}$

c. $\frac{5}{8}$ $\mathbf{0.625\ ,62.5\%}$ d. $\frac{9}{5}$ $\mathbf{1.8\ ,180\%}$

5. Find $\frac{4}{5}$ of 45 $\mathbf{36}$

4. Put these numbers in ascending order.

$\frac{2}{3}\ , 0.62\ , \frac{3}{5}\ , 61\%$

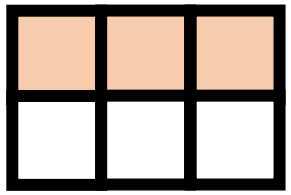
$\mathbf{\frac{3}{5}\ , 61\%\ , 0.62\ , \frac{2}{3}}$

Example

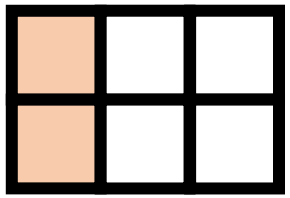
What is the answer to the calculation below?

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

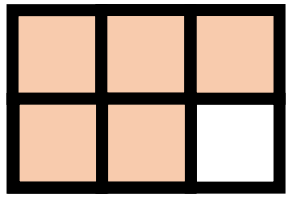
Solution



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



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



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

Examples

Work out:

a) $\frac{4}{9} + \frac{3}{9}$

b) $\frac{2}{5} + \frac{2}{3}$

c) $1\frac{2}{7} + 3\frac{1}{3}$

Solutions

Work out:

a) $\frac{4}{9} + \frac{3}{9}$

$= \frac{7}{9}$

b) $\frac{2}{5} + \frac{2}{3}$

$= \frac{6}{15} + \frac{10}{15}$

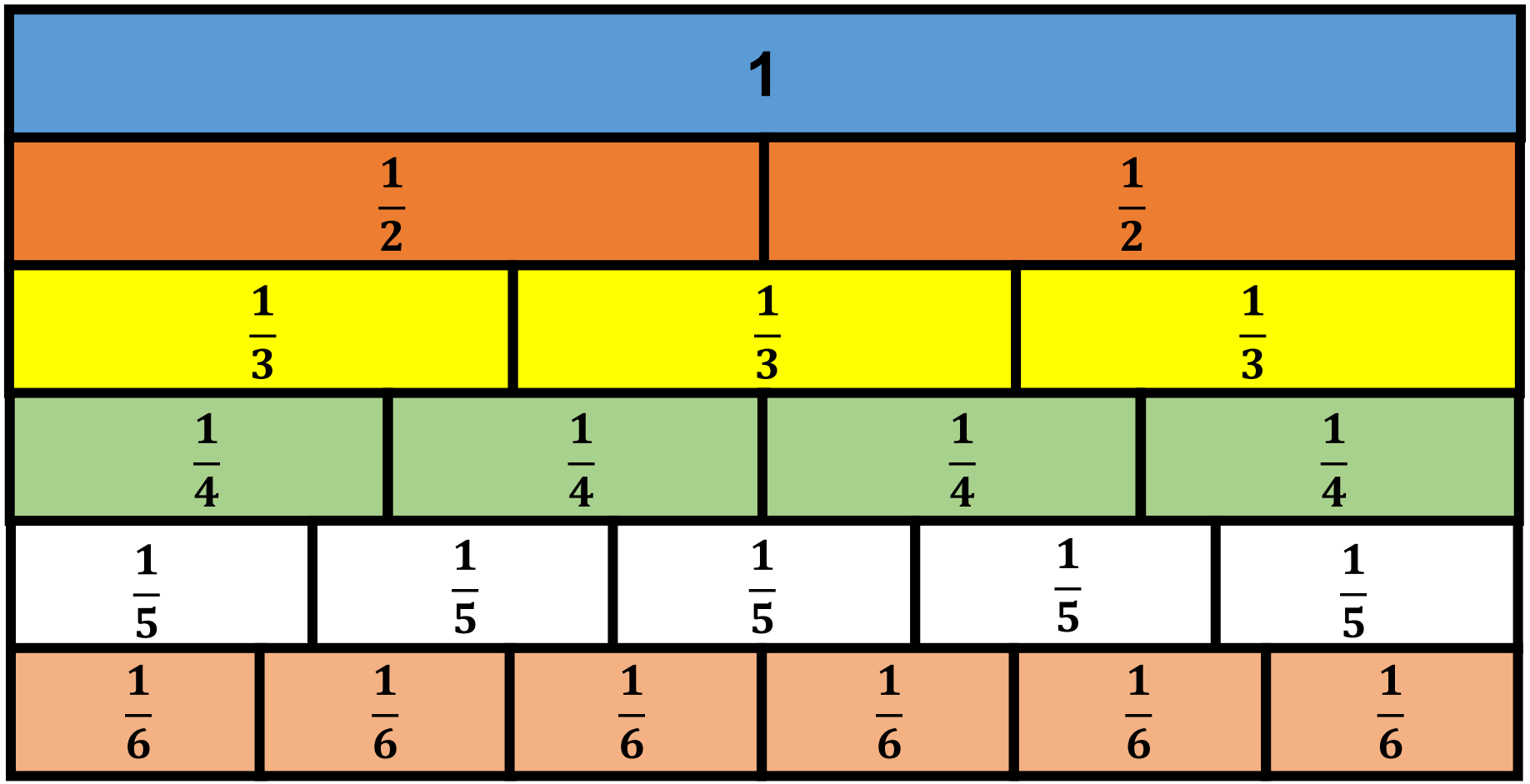
$= \frac{16}{15}$

c) $1\frac{2}{7} + 3\frac{1}{3}$

$= \frac{9}{7} + \frac{10}{3}$

$= \frac{27}{21} + \frac{70}{21}$

$= \frac{97}{21}$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Exercise

Evaluate

a) $\frac{1}{3} + \frac{1}{2}$

b) $\frac{1}{4} + \frac{1}{5}$

c) $\frac{1}{8} + \frac{1}{8}$

d) $\frac{1}{10} + \frac{1}{5}$

e) $\frac{1}{7} + \frac{1}{3}$

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

Evaluate

a) $\frac{2}{5} + \frac{2}{5}$

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

c) $\frac{3}{7} + \frac{5}{8}$

d) $\frac{3}{10} + \frac{1}{5}$

e) $\frac{8}{9} + \frac{9}{8}$

Evaluate

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

b) $2\frac{1}{5} + 0.7$

c) $\frac{1}{2} + \frac{3}{4} + \frac{4}{5}$

Solutions

Evaluate

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

b) $\frac{1}{4} + \frac{1}{5} = \mathbf{\frac{9}{20}}$

c) $\frac{1}{8} + \frac{1}{8} = \mathbf{\frac{1}{4}}$

d) $\frac{1}{10} + \frac{1}{5} = \mathbf{\frac{3}{10}}$

e) $\frac{1}{7} + \frac{1}{3} = \mathbf{\frac{10}{21}}$

f) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \mathbf{\frac{13}{12}}$

Evaluate

a) $\frac{2}{5} + \frac{2}{5} = \mathbf{\frac{4}{5}}$

b) $\frac{1}{2} + \frac{3}{4} = \mathbf{\frac{5}{4}}$

c) $\frac{3}{7} + \frac{5}{8} = \mathbf{\frac{59}{56}}$

d) $\frac{3}{10} + \frac{1}{5} = \mathbf{\frac{1}{2}}$

e) $\frac{8}{9} + \frac{9}{8} = \mathbf{\frac{145}{72}}$

Evaluate

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

b) $2\frac{1}{5} + 0.7 = \mathbf{2\frac{9}{10}}$

c) $\frac{1}{2} + \frac{3}{4} + \frac{4}{5} = \mathbf{\frac{41}{20}}$

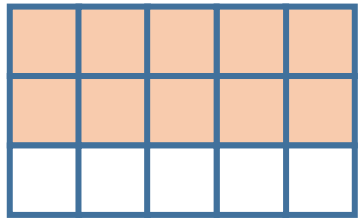
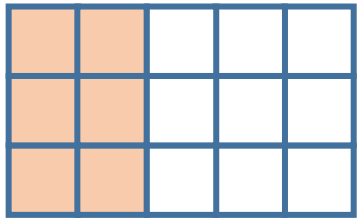
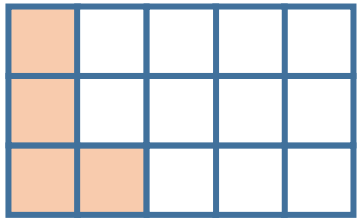
Example

What is the answer to the question below?

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

Solution

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

 $-$  $=$ 

$\frac{10}{15}$ $-$ $\frac{6}{15}$ $=$ $\frac{\mathbf{4}}{\mathbf{15}}$

Exercise

Evaluate

a) $\frac{1}{2} - \frac{1}{4}$

b) $\frac{3}{4} - \frac{1}{4}$

c) $\frac{1}{2} - \frac{1}{3}$

d) $\frac{3}{4} - \frac{1}{12}$

e) $\frac{2}{5} - \frac{1}{7}$

f) $\frac{1}{5} - \frac{1}{10}$

Evaluate

a) $\frac{7}{8} - \frac{7}{9}$

b) $\frac{7}{9} - \frac{7}{8}$

c) $2\frac{3}{4} - \frac{2}{3}$

d) $4\frac{1}{3} - 2\frac{2}{5}$

e) $1\frac{3}{7} - 2\frac{2}{3}$

Evaluate

a) $\frac{1}{2} - \frac{1}{3} - \frac{1}{4}$

b) $\frac{1}{2} - \left(\frac{1}{3} - \frac{1}{4}\right)$

c) $\frac{1}{4} - 0.1$

Solutions

Evaluate

a) $\frac{1}{2} - \frac{1}{4} = \mathbf{\frac{1}{4}}$

b) $\frac{3}{4} - \frac{1}{4} = \mathbf{\frac{1}{2}}$

c) $\frac{1}{2} - \frac{1}{3} = \mathbf{\frac{1}{6}}$

d) $\frac{3}{4} - \frac{1}{12} = \mathbf{\frac{2}{3}}$

e) $\frac{2}{5} - \frac{1}{7} = \mathbf{\frac{9}{35}}$

f) $\frac{1}{5} - \frac{1}{10} = \mathbf{\frac{1}{10}}$

Evaluate

a) $\frac{7}{8} - \frac{7}{9} = \mathbf{\frac{7}{72}}$

b) $\frac{7}{9} - \frac{7}{8} = \mathbf{-\frac{7}{72}}$

c) $2\frac{3}{4} - \frac{2}{3} = \mathbf{2\frac{1}{12}}$

d) $4\frac{1}{3} - 2\frac{2}{5} = \mathbf{1\frac{14}{15}}$

e) $1\frac{3}{7} - 2\frac{2}{3} = \mathbf{-1\frac{5}{21}}$

Evaluate

a) $\frac{1}{2} - \frac{1}{3} - \frac{1}{4} = \mathbf{-\frac{1}{12}}$

b) $\frac{1}{2} - \left(\frac{1}{3} - \frac{1}{4}\right) = \mathbf{\frac{5}{12}}$

c) $\frac{1}{4} - 0.1 = \mathbf{\frac{3}{20}}$

Mixed Addition and Subtraction

a) $\frac{4}{7} + \frac{3}{7}$

b) $\frac{2}{5} - \frac{1}{5}$

c) $\frac{1}{5} + \frac{1}{4}$

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

e) $\frac{1}{6} - \frac{1}{5}$

f) $\frac{1}{3} + \frac{3}{9}$

g) $\frac{5}{6} - \frac{1}{3}$

h) $5 - \frac{4}{5}$

i) $\frac{3}{5} + \frac{3}{4}$

j) $1\frac{5}{6} - \frac{3}{4}$

k) $2\frac{1}{2} + 3\frac{3}{7}$

l) $4\frac{1}{5} - 2\frac{2}{3}$

m) $\frac{1}{2} + \frac{3}{4} + \frac{4}{5}$

n) $\frac{a}{b} + \frac{c}{d}$

Solutions

a) $\frac{4}{7} + \frac{3}{7} = \mathbf{1}$ b) $\frac{2}{5} - \frac{1}{5} = \mathbf{\frac{1}{5}}$ c) $\frac{1}{5} + \frac{1}{4} = \mathbf{\frac{9}{20}}$ d) $\frac{1}{2} + \frac{3}{4} = \mathbf{1\frac{1}{4}}$ e) $\frac{1}{6} - \frac{1}{5} = \mathbf{\frac{1}{30}}$

f) $\frac{1}{3} + \frac{3}{9} = \mathbf{\frac{2}{3}}$ g) $\frac{5}{6} - \frac{1}{3} = \mathbf{\frac{1}{2}}$ h) $5 - \frac{4}{5} = \mathbf{4\frac{1}{5}}$ i) $\frac{3}{5} + \frac{3}{4} = \mathbf{\frac{27}{20}}$ j) $1\frac{5}{6} - \frac{3}{4} = \mathbf{\frac{13}{12}}$

k) $2\frac{1}{2} + 3\frac{3}{7} = \mathbf{5\frac{13}{14}}$ l) $4\frac{1}{5} - 2\frac{2}{3} = \mathbf{1\frac{8}{15}}$ m) $\frac{1}{2} + \frac{3}{4} + \frac{4}{5} = \mathbf{2\frac{1}{20}}$ n) $\frac{a}{b} + \frac{c}{d} = \mathbf{\frac{ad + bc}{bd}}$

Example

Evaluate the multiplication. $\frac{3}{4} \times \frac{2}{3}$

Multiplication : Example

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

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

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

Multiplication Exercise

Evaluate

a) $\frac{1}{2} \times \frac{1}{5}$

b) $\frac{2}{3} \times \frac{4}{7}$

c) $\frac{2}{3} \times \frac{4}{1}$

d) $\frac{2}{3} \times 4$

e) $9 \times \frac{1}{3}$

f) $\frac{1}{5} \times \frac{5}{1}$

Evaluate

a) $1\frac{1}{4} \times 3\frac{1}{2}$

b) $3\frac{1}{3} \times \frac{3}{10}$

c) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$

d) $\left(\frac{1}{2}\right)^3$

Evaluate

a) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6}$

b) $\frac{2}{a} \times \frac{a}{4}$

c) $\frac{x}{y} \times \frac{y}{x}$

Solutions

Evaluate

a) $\frac{1}{2} \times \frac{1}{5} = \mathbf{\frac{1}{10}}$

b) $\frac{2}{3} \times \frac{4}{7} = \mathbf{\frac{8}{21}}$

c) $\frac{2}{3} \times \frac{4}{1} = \mathbf{\frac{8}{3}}$

d) $\frac{2}{3} \times 4 = \mathbf{\frac{8}{3}}$

e) $9 \times \frac{1}{3} = \mathbf{3}$

f) $\frac{1}{5} \times \frac{5}{1} = \mathbf{1}$

Evaluate

a) $1\frac{1}{4} \times 3\frac{1}{2} = \mathbf{\frac{35}{8}}$

b) $3\frac{1}{3} \times \frac{3}{10} = \mathbf{1}$

c) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} = \mathbf{\frac{1}{4}}$

d) $\left(\frac{1}{2}\right)^3 = \mathbf{\frac{1}{8}}$

Evaluate

a) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} = \mathbf{\frac{1}{6}}$

b) $\frac{2}{a} \times \frac{a}{4} = \mathbf{\frac{1}{2}}$

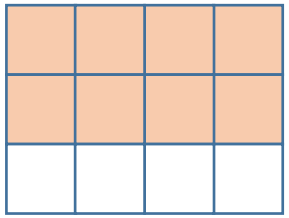
c) $\frac{x}{y} \times \frac{y}{x} = \mathbf{1}$

Extra

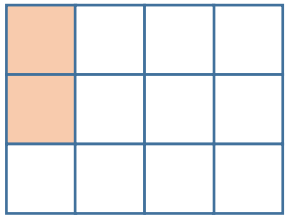
Work out: $\frac{3}{4}\ of\ \frac{2}{3}$

Solution

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

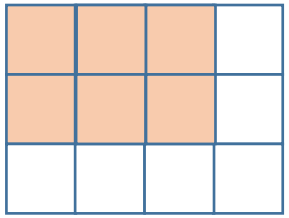


$$\frac{1}{4} \; of \; \frac{2}{3} = \frac{2}{12}$$



$$\frac{3}{4} \; of \; \frac{2}{3} = \frac{6}{12}$$

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



Exercise

Evaluate:

$a)\ \frac{1}{4}\ of\ \frac{1}{2}$

$b)\ \frac{2}{3}\ of\ \frac{2}{3}$

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

$d)\ \frac{1}{10}\ of\ \frac{1}{2}$

$e)\ \frac{5}{6}\ of\ 0.1$

$\frac{5}{7}\ of\ \frac{14}{15}$

$g)\ \frac{1}{2}\ of\ \frac{1}{3}\ of\ \frac{1}{4}$

$h)\ \frac{3}{5}\ of\ \frac{2}{3} \times \frac{4}{9}$

$\frac{1}{2}\ of\ \frac{2}{3}\ of\ \frac{3}{4}\ of\ \frac{4}{5}$

Solutions

Evaluate:

a) $\frac{1}{4}\ of\ \frac{1}{2} = \mathbf{\frac{1}{8}}$

b) $\frac{2}{3}\ of\ \frac{2}{3} = \mathbf{\frac{4}{9}}$

c) $\frac{1}{2}\ of\ \frac{2}{3} = \mathbf{\frac{1}{3}}$

d) $\frac{1}{10}\ of\ \frac{1}{2} = \mathbf{\frac{1}{20}}$

e) $\frac{5}{6}\ of\ 0.1 = \mathbf{\frac{5}{60}}$

f) $\frac{5}{7}\ of\ \frac{14}{15} = \mathbf{\frac{2}{3}}$

g) $\frac{1}{2}\ of\ \frac{1}{3}\ of\ \frac{1}{4} = \mathbf{\frac{1}{24}}$

h) $\frac{3}{5}\ of\ \frac{2}{3} \times \frac{4}{9} = \mathbf{\frac{8}{45}}$

i) $\frac{1}{2}\ of\ \frac{2}{3}\ of\ \frac{3}{4}\ of\ \frac{4}{5} = \mathbf{\frac{1}{5}}$

Reciprocals

The **reciprocal** of a fraction is the opposite or ‘inverse’ fraction.

The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

When we multiply any number by its reciprocal, the result is 1.

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

Examples

Find the reciprocals of these numbers:

a) $\frac{4}{9}$

b) $\frac{3}{11}$

c) $\frac{11}{3}$

d) $\frac{1}{5}$

e) $-\frac{3}{8}$

f) 6

Can you find a number that has no reciprocal?

Solutions

Find the reciprocals of these numbers:

a) $\frac{4}{9}$ $\mathbf{\frac{9}{4}}$

b) $\frac{3}{11}$ $\mathbf{\frac{11}{3}}$

c) $\frac{11}{3}$ $\mathbf{\frac{3}{11}}$

d) $\frac{1}{5}$ $\mathbf{5}$

e) $-\frac{3}{8}$ $\mathbf{-\frac{8}{3}}$

f) 6 $\mathbf{\frac{1}{6}}$

Can you find a number that has no reciprocal? **0**

Key Fact

To divide by a fraction, we multiply by the reciprocal.

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

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

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

Examples

Evaluate.

a) $\frac{3}{5} \div \frac{7}{8}$

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

Solutions

Evaluate.

a) $\frac{3}{5} \div \frac{7}{8} = \frac{3}{5} \times \frac{8}{7} = \frac{24}{35}$

b) $2\frac{1}{2} \div \frac{1}{4} = \frac{5}{2} \div \frac{1}{4} = \frac{5}{2} \times \frac{4}{1} = 10$

You try...

a) $\frac{3}{4} \div \frac{5}{9}$

b) $\frac{5}{8} \div \frac{5}{6}$

c) $7 \div \frac{1}{4}$

Solutions

a) $\frac{3}{4} \div \frac{5}{9}$

$= \frac{27}{20}$

b) $\frac{5}{8} \div \frac{5}{6}$

$= \frac{3}{4}$

c) $7 \div \frac{1}{4}$

$= 28$

Exercise

Evaluate

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

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

c) $\frac{3}{7} \div \frac{5}{6}$

d) $\frac{1}{5} \div \frac{2}{10}$

e) $\frac{1}{3} \div 3$

f) $10 \div \frac{1}{3}$

Evaluate

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

b) $\frac{4}{9} \div \frac{2}{3}$

c) $4 \div \frac{1}{4}$

d) $\frac{6}{10} \div \frac{1}{10}$

Evaluate

a) $1.5 \div 0.\dot{6}$

b) $\sqrt{2} \div \frac{1}{\sqrt{2}}$

c) $\frac{a}{b} \div \frac{b}{a}$

Solutions

Evaluate

a) $\frac{1}{2} \div \frac{1}{4} = \mathbf{2}$

b) $\frac{1}{4} \div \frac{1}{2} = \mathbf{\frac{1}{2}}$

c) $\frac{3}{7} \div \frac{5}{6} = \mathbf{\frac{18}{35}}$

d) $\frac{1}{5} \div \frac{2}{10} = \mathbf{1}$

e) $\frac{1}{3} \div 3 = \mathbf{\frac{1}{9}}$

f) $10 \div \frac{1}{3} = \mathbf{30}$

Evaluate

a) $2\frac{1}{3} \div 1\frac{1}{2} = \mathbf{\frac{14}{9}}$

b) $\frac{4}{9} \div \frac{2}{3} = \mathbf{\frac{2}{3}}$

c) $4 \div \frac{1}{4} = \mathbf{16}$

d) $\frac{6}{10} \div \frac{1}{10} = \mathbf{6}$

Evaluate

a) $1.5 \div 0.\dot{6} = \mathbf{\frac{9}{4}}$

b) $\sqrt{2} \div \frac{1}{\sqrt{2}} = \mathbf{2}$

c) $\frac{a}{b} \div \frac{b}{a} = \mathbf{\frac{a^2}{b^2}}$

Mixed multiplying and dividing

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

b) $\frac{3}{8} \div \frac{1}{4}$

c) $\frac{3}{4} \times \frac{4}{3}$

d) $\frac{4}{9} \div \frac{1}{9}$

e) $1\frac{2}{3} \times 3\frac{1}{2}$

f) $9\frac{3}{4} \div 2\frac{2}{5}$

g) $4 \times \frac{3}{4}$

h) $\frac{7}{8} \div 4$

i) $\left(1\frac{1}{3}\right)^3$

j) $\frac{2}{5} \div 0.35$

k) $\frac{\left(\frac{6}{10}\right)}{\left(\frac{5}{8}\right)}$

Solutions

a) $\frac{2}{5} \times \frac{3}{4} = \mathbf{\frac{3}{10}}$

b) $\frac{3}{8} \div \frac{1}{4} = \mathbf{\frac{3}{2}}$

c) $\frac{3}{4} \times \frac{4}{3} = \mathbf{1}$

d) $\frac{4}{9} \div \frac{1}{9} = \mathbf{4}$

e) $1\frac{2}{3} \times 3\frac{1}{2} = \mathbf{\frac{35}{6}}$

f) $9\frac{3}{4} \div 2\frac{2}{5} = \mathbf{\frac{65}{16}}$

g) $4 \times \frac{3}{4} = \mathbf{3}$

h) $\frac{7}{8} \div 4 = \mathbf{\frac{7}{32}}$

i) $\left(1\frac{1}{3}\right)^3 = \mathbf{\frac{64}{27}}$

j) $\frac{2}{5} \div 0.35 = \mathbf{\frac{8}{7}}$

k) $\frac{\left(\frac{6}{10}\right)}{\left(\frac{5}{8}\right)} = \mathbf{\frac{24}{25}}$

Example

$\frac{3}{5}$ *of a number is* $\frac{2}{3}$

Find the number

Solution

$\frac{3}{5}$ *of a number is* $\frac{2}{3}$

Find the number

$$\frac{1}{5} \text{ of the number} = \frac{2}{3} \div 3 = \frac{2}{9}$$

$$\frac{5}{5} \text{ of the number} = \frac{2}{9} \times 5 = \frac{10}{9}$$

Exercise

In each question, find x.

a) $\frac{1}{4}\ of\ x = 7$

b) $\frac{1}{3}\ of\ x = 0.6$

c) $\frac{3}{4}\ of\ x = 9$

d) $\frac{2}{5}\ of\ x = 16$

e) $\frac{5}{8} of\ x = 4$

f) $\frac{1}{3}\ of\ x = \frac{1}{2}$

In each question, find y.

a) $\frac{1}{10}\ of\ y = \frac{1}{10}$

b) $\frac{5}{6}\ of\ y = -3$

c) $\frac{7}{5}\ of\ y = 8.4$

d) $\frac{2}{3}\ of\ y = \frac{1}{2}$

e) $\frac{2}{7}\ of\ y = \frac{4}{5}$

Evaluate

a) $\frac{5}{6}\ of\ \frac{3}{5}\ of\ m = 180$

b) $\frac{2}{3}\ of\ \frac{3}{2}\ of\ n = 1$

Solutions

In each question, find x.

a) $\frac{1}{4}\ of\ x = 7$ $x = 28$

b) $\frac{1}{3}\ of\ x = 0.6$ $x = 1.8$

c) $\frac{3}{4}\ of\ x = 9$ $x = 12$

d) $\frac{2}{5}\ of\ x = 16$ $x = 40$

e) $\frac{5}{8}\ of\ x = 45$ $x = 72$

f) $\frac{1}{3}\ of\ x = \frac{1}{2}$ $x = \frac{3}{2}$

In each question, find y.

a) $\frac{1}{10}\ of\ y = \frac{1}{10}$ $y = 1$

b) $\frac{5}{6}\ of\ y = -3$ $y = -3.6$

c) $\frac{7}{5}\ of\ y = 8.4$ $y = 6$

d) $\frac{2}{3}\ of\ y = \frac{1}{2}$ $y = \frac{3}{4}$

e) $\frac{2}{7}\ of\ y = \frac{4}{5}$ $y = \frac{14}{5}$

Find each letter.

a) $\frac{5}{6}\ of\ \frac{3}{5}\ of\ m = 180$ $m = 360$

b) $\frac{2}{3}\ of\ \frac{3}{2}\ of\ n = 1$ $n = 1$

Multiplying & Dividing Check up

Evaluate:

a) $\frac{1}{2} \times 4$

b) $2 \times \frac{1}{4}$

c) $\frac{1}{2} \times \frac{1}{4}$

Evaluate:

a) $4 \div \frac{1}{6}$

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

c) $\frac{2}{3} \div 4$

d) $\frac{1}{2} \div \frac{1}{6}$

$Work\ out\ \frac{2}{5}\ of\ 8$

$Work\ out\ \frac{7}{3}\ of\ 12$

True or false

$6 \times \frac{3}{8} > 6$

$7 \div \frac{2}{5} > 7$

Evaluate:

a) $3\frac{2}{3} \times 4\frac{1}{5}$

b) $2\frac{3}{4} \times 2\frac{1}{3}$

Write down the reciprocal of:

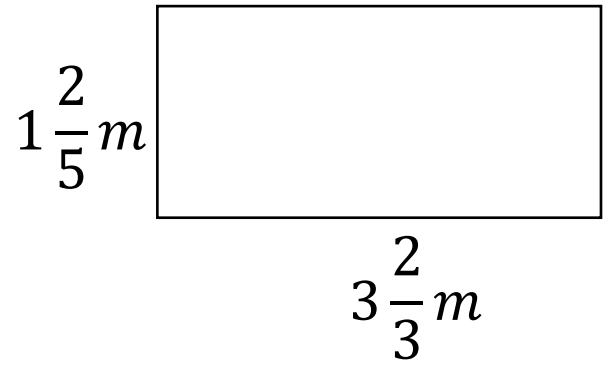
a) $\frac{2}{3}$

c) $\frac{1}{7}$

b) $5\frac{1}{2}$

d) 0.8

Find the area of this rectangle:



Solutions

Evaluate:

a) $\frac{1}{2} \times 4$ **= 2**

b) $2 \times \frac{1}{4}$ **= $\frac{1}{2}$**

c) $\frac{1}{2} \times \frac{1}{4}$ **= $\frac{1}{8}$**

Evaluate:

a) $4 \div \frac{1}{6}$ **= 24**

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

c) $\frac{2}{3} \div 4$ **= $\frac{1}{6}$**

d) $\frac{1}{2} \div \frac{1}{6}$ **= 3**

$Work\ out\ \frac{2}{5}\ of\ 8$ **= 3.2**

$Work\ out\ \frac{7}{3}\ of\ 12$ **= 28**

True or false

$6 \times \frac{3}{8} > 6$ **False**

$7 \div \frac{2}{5} > 7$ **True**

Evaluate:

a) $3\frac{2}{3} \times 4\frac{1}{5}$ **= $15\frac{2}{5}$**

b) $2\frac{3}{4} \times 2\frac{1}{3}$ **= $6\frac{5}{12}$**

Write down the reciprocal of:

a) $\frac{2}{3}$ **$\frac{3}{2}$**

b) $5\frac{1}{2}$ **$\frac{2}{11}$**

c) $\frac{1}{7}$ **7**

d) 0.8 **$\frac{10}{8}$**

Find the area of this rectangle:

Area = $5\frac{2}{15}m^2$

Extra

Solve these equations, leaving your answers in fraction form:

$2x = 3$

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

$\frac{4}{5}x = 6$

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

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

$\frac{8}{7}x = \frac{7}{8}$

$10x = 0.1$

$43x = 1$

$\frac{2}{3}x = -\frac{2}{3}$

Solutions

Solve these equations, leaving your answers in fraction form:

$2x = 3$ $\boldsymbol{x = \frac{3}{2}}$

$\frac{1}{2}x = 7$ $\boldsymbol{x = 14}$

$\frac{4}{5}x = 6$ $\boldsymbol{x = \frac{15}{2}}$

$5x = \frac{1}{2}$ $\boldsymbol{x = \frac{1}{10}}$

$\frac{1}{4}x = \frac{3}{4}$ $\boldsymbol{x = 3}$

$\frac{8}{7}x = \frac{7}{8}$ $\boldsymbol{x = \frac{49}{64}}$

$10x = 0.1$ $\boldsymbol{x = \frac{1}{100}}$

$43x = 1$ $\boldsymbol{x = \frac{1}{43}}$

$\frac{2}{3}x = -\frac{2}{3}$ $\boldsymbol{x = -1}$

Mixed Exercise

1. $\frac{1}{3} + \frac{1}{4}$
2. $\frac{1}{3} - \frac{1}{4}$
3. $\frac{1}{3} \times \frac{1}{4}$
4. $\frac{1}{3} \div \frac{1}{4}$

5. $\frac{3}{4} + \frac{2}{5}$
6. $\frac{5}{12} - \frac{3}{4}$
7. $\frac{2}{3} \times \frac{3}{2}$
8. $\frac{2}{3} \div \frac{1}{6}$

9. $2\frac{3}{4} \div \frac{4}{3}$
10. $\frac{1}{2} - \frac{1}{3} - \frac{1}{4}$
11. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$
12. $\frac{2}{3} + \frac{3}{4} \div \frac{4}{3}$

13. $\frac{1}{3} + \frac{1}{4} \times \frac{1}{2}$
14. $\left(\frac{2}{3}\right)^3$
15. $\frac{5}{12} - \frac{3}{4} \times \frac{4}{3}$
16. $\frac{1}{x} \div \frac{1}{y}$

Challenge: What is $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \cdots$ ... ...

Solutions

1. $\frac{1}{3}+\frac{1}{4}=\mathbf{\frac{7}{12}}$ 2. $\frac{1}{3}-\frac{1}{4}=\mathbf{\frac{1}{12}}$ 3. $\frac{1}{3}\times\frac{1}{4}=\mathbf{\frac{1}{12}}$ 4. $\frac{1}{3}\div\frac{1}{4}=\mathbf{\frac{4}{3}}$

5. $\frac{3}{4}+\frac{2}{5}=\mathbf{\frac{23}{20}}$ 6. $\frac{5}{12}-\frac{3}{4}=\mathbf{-\frac{1}{3}}$ 7. $\frac{2}{3}\times\frac{3}{2}=\mathbf{1}$ 8. $\frac{2}{3}\div\frac{1}{6}=\mathbf{4}$

9. $2\frac{3}{4}\div\frac{4}{3}=\mathbf{\frac{33}{16}}$ 10. $\frac{1}{2}-\frac{1}{3}-\frac{1}{4}=\mathbf{-\frac{1}{12}}$ 11. $\frac{1}{2}\times\frac{2}{3}\times\frac{3}{4}=\mathbf{\frac{1}{24}}$ 12. $\frac{2}{3}+\frac{3}{4}\div\frac{4}{3}=\mathbf{\frac{59}{48}}$

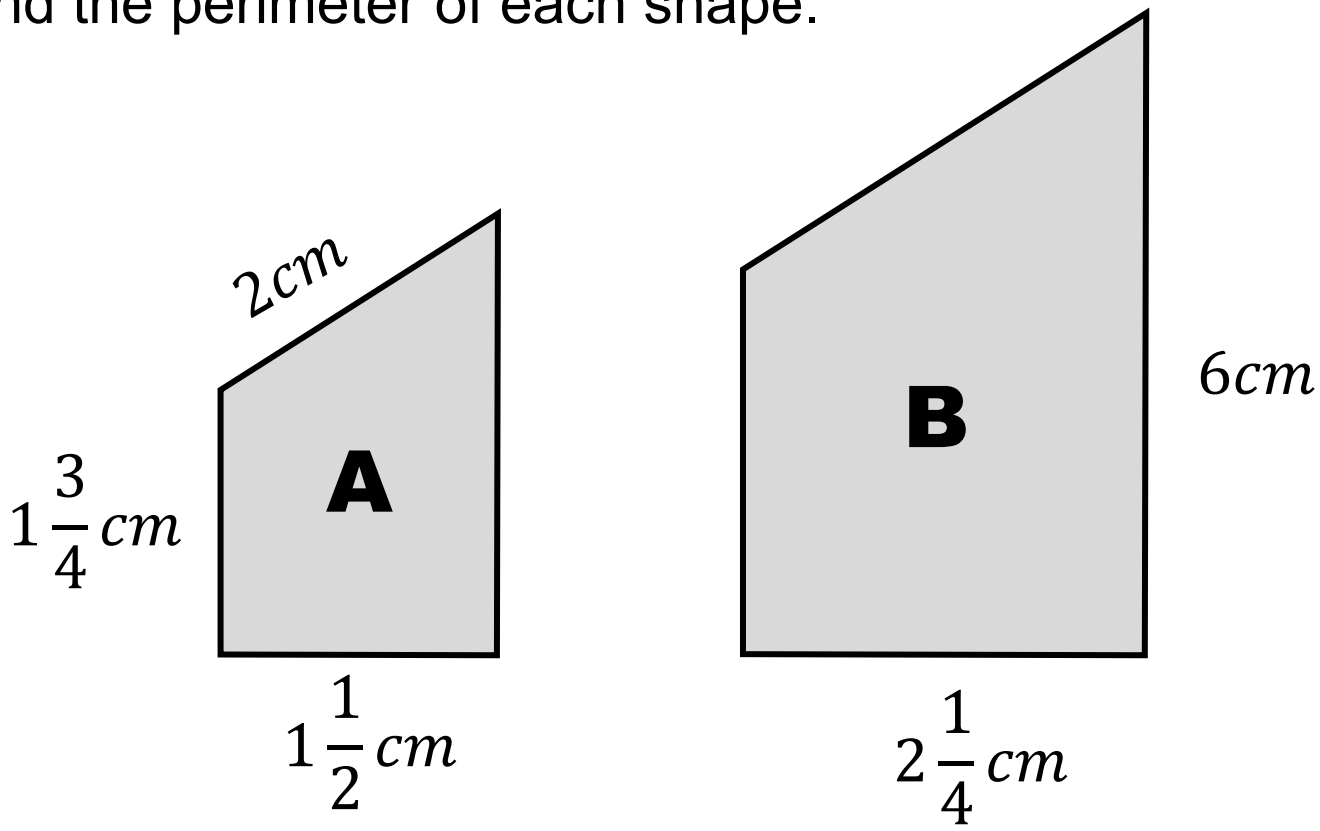
13. $\frac{1}{3}+\frac{1}{4}\times\frac{1}{2}=\mathbf{\frac{11}{24}}$ 14. $\left(\frac{2}{3}\right)^3=\mathbf{\frac{8}{27}}$ 15. $\frac{5}{12}-\frac{3}{4}\times\frac{4}{3}=\mathbf{-\frac{7}{12}}$ 16. $\frac{1}{x}\div\frac{1}{y}=\mathbf{\frac{y}{x}}$

Challenge: $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\cdots=\mathbf{2}$

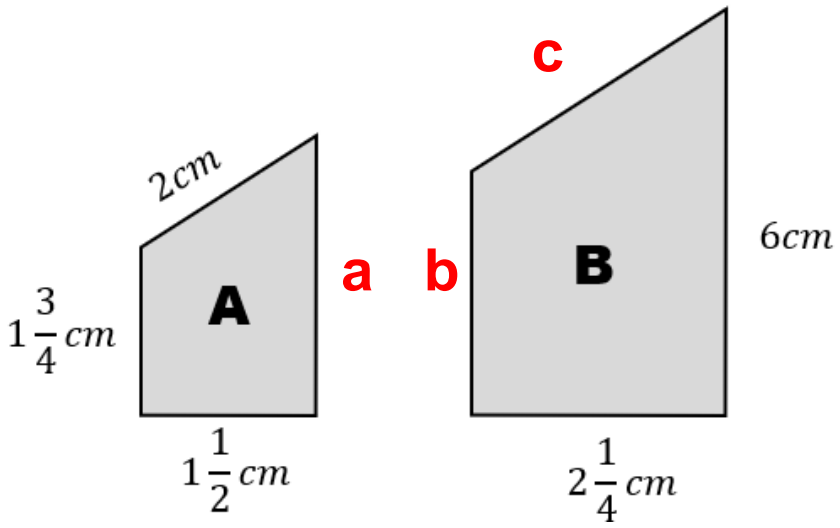
Extension

A and B are similar shapes.

Find the perimeter of each shape.



Solution



Scale factor from A to B .

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

$$a = 6 \div \frac{3}{2} = 4\,cm$$

$$b = 1\frac{3}{4} \times \frac{3}{2} = \frac{21}{8}\,cm$$

$$c = 2 \times \frac{3}{2} = 3\,cm$$

Perimeter of shape A $= 1\frac{3}{4} + 1\frac{1}{2} + 4 + 2$

$= 9\frac{1}{4}$ cm

Perimeter of shape B $= \frac{21}{8} + 2\frac{1}{4} + 6 + 3.$

$= 13\frac{7}{8}$ cm

Exam Style Question

Emmanuel has to work out the exact value of $64 \div \frac{1}{4}$

He writes $64 \div \frac{1}{4} = 16$

Emmanuel's explains

"There are 4 quarters in 1, so there will be 16 quarters in 64."

a) Explain what is wrong with Emmanuel's reason.

b) Work out the correct value of the calculation.

Solution

Emmanuel has to work out the exact value of $64 \div \frac{1}{4}$

He writes $64 \div \frac{1}{4} = 16$

Emmanuel's explains

"There are 4 quarters in 1, so there will be 16 quarters in 64."

a) Explain what is wrong with Emmanuel's reason.

There are 4 quarters in 1 and 16 x 4 = 64 so he should have worked out 4 x 64.

b) Work out the correct value of the calculation.

4 x 64 = 256