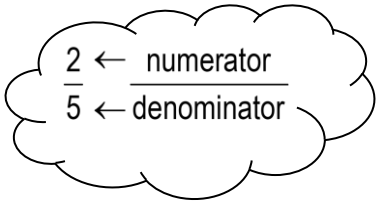
LEARNING GUIDE 9 / 10: FRACTIONS

Watch the following instructional video. In your handout:

i) Copy down the given notes and examples

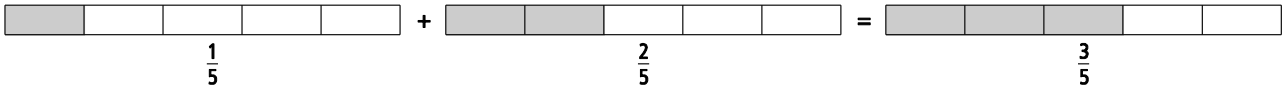
ii) Complete the assigned questions

https://youtu.be/o922Yo7E_TU



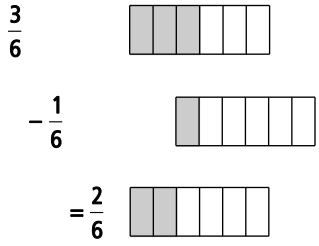
Add and Subtract Fractions

To add fractions with the same denominators, add the numerators.



To subtract fractions with different denominators, use a common denominator.

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



a common multiple of each denominator

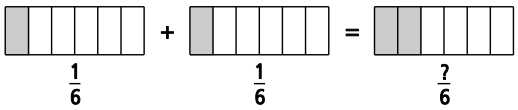
Write the answer in lowest terms.

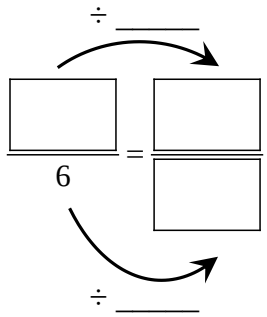
$\frac{2}{6} = \frac{1}{3}$ (÷ 2 / ÷ 2)

Multiples of 2: 2, 4, 6, 8, …
Factors of 6: 2, 3, 6

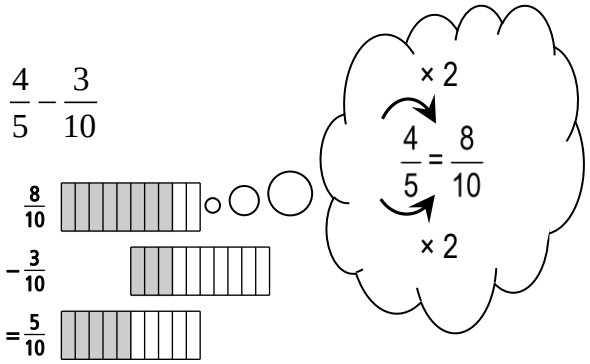
1. Add or subtract. Write your answers in lowest terms.

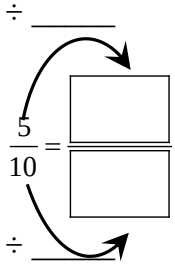
a) $\frac{1}{6} + \frac{1}{6} = \frac{\square}{6}$





b) $\frac{4}{5} - \frac{3}{10}$





Add and Subtract Mixed Numbers

mixed number

- includes a whole number and a proper fraction $\left(\text{e.g., } 1\frac{1}{2}, 2\frac{3}{5}\right)$

improper fraction

- a fraction in which the numerator is greater than the denominator $\left(\text{e.g., } \frac{10}{8}\right)$

Use Improper Fractions:

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

$$= \frac{9}{2} - \frac{11}{4}$$

$$= \frac{18}{4} - \frac{11}{4}$$

=

Practice

1. Add or subtract. Write your answers in lowest terms.

a) $\mathbf{3\frac{1}{2} - 1\frac{2}{5}}$

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

c) $\mathbf{3\frac{1}{5} - 1\frac{2}{3}}$

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

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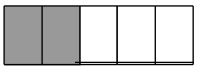
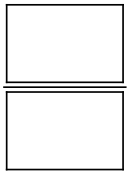
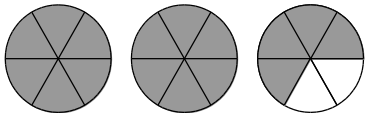
https://youtu.be/LST0IvxC2Bg

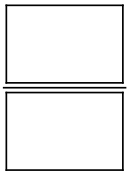
Warm Up

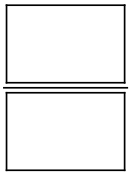
1. Write each fraction.

a) 



b) 

improper fraction: 

mixed number: _____ 

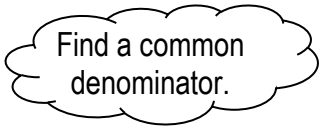
2. Draw fraction strips to solve.

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

b) $\frac{1}{8}+\frac{1}{2}$

3. Solve. Write your answers in lowest terms.

a) $\frac{1}{12}+\frac{2}{3}$



b) $\frac{3}{5}-\frac{1}{2}$

4. Out of a class of 150, one-third opted for German, two-fifth for Italian and rest for French. Find how many opted for French?

Practice

Add or subtract the following fractions. Write your answers in reduced form.

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

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

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

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

5. $\frac{5}{8} + \frac{1}{3}$

6. $\frac{9}{4} - \frac{1}{5}$

7. $\frac{11}{4} + 2$

8. Ron and two of his friends ate one-fourth each of an eight- slice pizza. Find the remaining slice of the pizza.

9. Rachel spends 1/4 of her pocket money on chocolates, 1/8 on pizza. She had $40 to spend. How much money did she have left?

Multiplying Proper Fractions

Example 1: Multiply Using a Rule

Calculate $\frac{8}{15} \times \frac{5}{6}$.

Solution

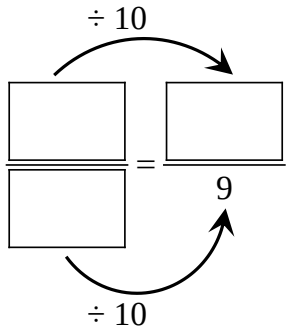
Calculate:

$$\frac{8}{15} \times \frac{5}{6}$$

$$= \frac{8 \times 5}{15 \times 6} \begin{array}{l} \leftarrow \text{Multiply the numerators} \\ \leftarrow \text{Multiply the denominators} \end{array}$$

$$= \frac{\square}{90}$$

Write in lowest terms.



Show You Know

Calculate. Write your answers in lowest terms.

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

Calculate:

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

$= \frac{\square \times \square}{\square \times \square}$ ← Multiply the numerators / ← Multiply the denominators

$= \frac{\square}{\square}$

÷ 3

$\frac{\square}{\square} = \frac{\square}{\square}$

÷ 3

Write in lowest terms.

Practice

1. Calculate $\frac{3}{8} \times \frac{2}{3}$. Write your answers in lowest terms.

2. Calculate. Write your answers in lowest terms.

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

b) $\frac{5}{6} \times \frac{3}{8}$

3. Tamar had $\frac{1}{2}$ of an apple pie in her fridge. She ate $\frac{1}{4}$ of it.
What fraction of the whole pie did she eat?

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

Sentence: _____

4. About $\frac{1}{20}$ of the people in the world live in Canada or the United States.
Of the people who live in Canada or the United States, about $\frac{1}{10}$ live in Canada.
What fraction of people in the world live in Canada? Show your work.

$\frac{\square}{\square} \times \frac{\square}{\square}$

Sentence: _____

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https://youtu.be/lUjMSGg0xCQ

Warm Up

1. Change the improper fraction to a mixed fraction **(Please make sure you watch this video. I do this a different way on the video)**

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

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

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

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

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

c) $\frac{5}{3}$

d) $\frac{6}{4}$

2. Change the mixed number to an improper fraction.

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

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

$= \frac{\square}{3}$

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

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

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

Multiplying Improper Fractions and Mixed Numbers

Example: Multiply Mixed Numbers Using a Rule

Calculate $4\frac{1}{2} \times 2\frac{1}{3}$. Write the product in lowest terms.

Solution

Calculate:

Write the mixed numbers as improper fractions.

Multiply the improper fractions.

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

$$= \frac{\square \times \square}{2 \times 3} \leftarrow \text{Multiply the numerators} \leftarrow \text{Multiply the denominators}$$

$$= \frac{\square}{6}$$

Write in lowest terms: _____

Practise

1. Write each improper fraction as a mixed number.

a) $\frac{11}{3}$ **b)** $\frac{17}{6}$

2. Write each mixed number as an improper fraction.

a) $4\frac{3}{4}$ **b)** $2\frac{7}{8}$

3. Find each product.

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

4. Calculate. Write your answers in lowest terms.

a) $\frac{4}{5} \times \frac{10}{7}$ **b)** $2\frac{1}{5} \times 1\frac{2}{3}$

5. Two and a half laps of a running track equal 1 km.
How many laps equal 3 km?

$3 \times \square\frac{\square}{\square}$

Write the mixed number as an improper fraction.

Multiply the improper fractions.

Write in lowest terms.

Sentence: _____

6 Andreas has $18.

a) Bonnie has $1\frac{2}{3}$ times as much as Andreas.
How much money does Bonnie have?

b) Cheryl has $1\frac{3}{5}$ times as much as Bonnie.
How much money does Cheryl have?

c) How much money do they have altogether?

Sentence: _____

Warm Up

1. Write each fraction as a mixed number.

a) $\frac{18}{5}$

b) $\frac{23}{3}$

2. Write each mixed number as an improper fraction.

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

b) $1\frac{3}{11}$

3. Write each set of fractions with a common denominator.

a) $\frac{12}{15}, \frac{1}{3} = \frac{\square}{\square}, \frac{\square}{\square}$

b) $\frac{5}{2}, \frac{7}{8} = \frac{\square}{\square}, \frac{\square}{\square}$

Multiples of 15: (15), 30, 45, 60, …

Multiples of 3: 3, 6, 9, 12, (15), 18, …

The lowest common multiple is _____.

c) $\frac{3}{4}, \frac{1}{6} = \frac{\square}{\square}, \frac{\square}{\square}$

d) $\frac{12}{9}, \frac{9}{6} = \frac{\square}{\square}, \frac{\square}{\square}$

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https://youtu.be/8zxhqWu4q08

Dividing Fractions and Mixed Numbers

Example : Divide Using a Rule

Calculate.

a) $\frac{7}{8} \div \frac{1}{4}$

Reciprocal

- **flip the fraction to switch the numerator and denominator**
- **example: the reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$**

Divide Using Multiplication

To divide by a fraction, multiply by its reciprocal.

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

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

$$= \frac{\square}{8}$$

$$\frac{28}{8} = \frac{7}{2} \quad (\div 4 \text{ on both})$$

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

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

Calculate:

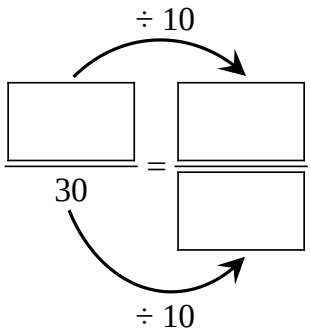
Divide Using Multiplication

$2\frac{1}{2} \div 3\frac{3}{4}$ Write as improper fractions.

$= \frac{\square}{2} \div \frac{15}{4}.$

$= \frac{5}{2} \times \frac{4}{15}$ Write as a reciprocal.

$= \frac{\square}{30}$ Write in lowest terms.



Example: Apply Division With Fractions

Baby teeth are replaced by adult teeth as people get older.

Children have $\frac{5}{8}$ as many teeth as adults do. Children have 20 teeth.

How many teeth do adults have?

Solution

Divide 20 by $\frac{5}{8}$ to find the number of adult teeth.

$20 \div \frac{5}{8}$ Multiply by the reciprocal.

$= \frac{20}{1} \times \frac{8}{\square}$

$= \frac{160}{\square}$

$= 32$

Adults have _____ teeth.

Check:

Use multiplication to check the division.

$\frac{5}{8} \times 32$

$= \frac{5}{8} \times \frac{32}{1}$ ← Multiply the numerators / ← Multiply the denominators

$= \frac{\square}{8}$

$= 20$

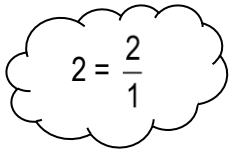
Practise

1. Divide using multiplication.

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

b) $1\frac{2}{3} \div 2\frac{5}{6}$

2. In a comedy show, each performer has $\frac{1}{4}$ of an hour to perform. How many performers are there in a 2-h show?



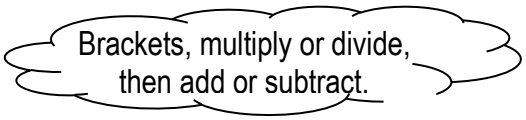
$2 \div \frac{\square}{4}$

There are _____ performers in 2 h.

3. It takes $2\frac{1}{2}$ cups of flour to make 1 cake. How many cakes can you make with 15 cups of flour?

Sentence: _____

Warm Up



1. **a)** $8 \times (3 - 1)$

$= 8 \times$ _____ Brackets.

$=$ _____ Multiply.

b) $10 - (2 + 6) \div 2$

$= 10 -$ _____ $\div 2$ Brackets.

$= 10 -$ _____ Divide.

$=$ _____

2. **a)** Divide $\frac{1}{5} \div 2$

3. Change mixed numbers to improper fractions.

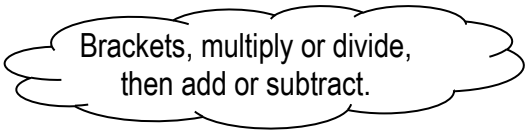
a) $3\frac{1}{3}$

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

Applying Fraction Operations

Example: Use the Order of Operations

Calculate using the order of operations.



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

Solution

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

$= \frac{2}{1} \times \frac{4}{1} \times \frac{1}{2}$ Divide by multiplying the reciprocal.

$= \frac{\square}{\square} \times \frac{1}{2}$ Multiply.

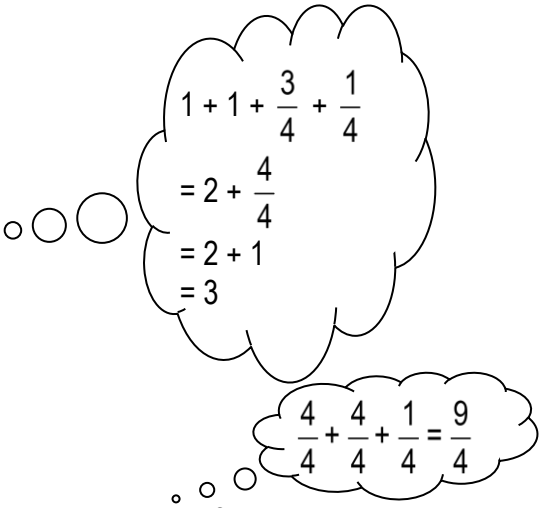
$= \frac{8}{2}$

$=$ _____ Write in lowest terms.

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

Solution

$2\frac{1}{4} \div \left(1\frac{3}{4} + 1\frac{1}{4}\right)$ Add the whole numbers.
Add the fractions.



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

$= \frac{\square}{4} \div \frac{\square}{1}$ Write the mixed number as an improper fraction.

$= \frac{\square}{4} \times \frac{1}{3}$ Multiply by the reciprocal.

$= \frac{\square}{12}$ Write in lowest terms.

Practice

1. a) $4 - 2 \div \frac{3}{5}$

$= 4 - \frac{2}{1} \times \frac{\square}{\square}$ Multiply by the reciprocal.

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

$= \frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square}$

b) $2\frac{1}{4} \times \frac{1}{2} - \frac{5}{8}$

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https://youtu.be/-c56Qc4VAOY

Example: Apply Fraction Operations

Bev earns $25/h as a machine operator.
When she works more than 40 h in a week, she earns time-and-a-half.
How much does Bev earn for working 46 h in a week?

To earn *time-and-a-half* means to be paid for $1\frac{1}{2}$ h when you work for 1 h.

Solution

Method 1: Calculate in Stages

Bev works 40 h at her regular pay of $25/h.

Amount earned at regular rate: 40 × 25 = _____

How many hours does she work at time-and-a-half? 46 – 40 = _____

6 hours at time-and-a-half = ? hours at regular rate

time-and-a-half = $1\frac{1}{2}$

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

$= 6 \times \frac{\square}{\square}$

Write as an improper fraction:
$\frac{2}{2} + \frac{1}{2} = \frac{3}{2}$

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

$= \frac{\square}{2}$

$= 9$

6 hours at time-and-a-half = 9 hours at regular rate

Amount earned at time-and-a-half: 9 × 25 = _____
Total earnings = amount earned at regular rate + amount earned at time-and-a-half

= _____ + 225

= _____

Bev earns $_____ for working 46 h in a week.

Practise

1. Calculate.

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

$= \frac{3}{4} - \frac{\square}{\square}$ Find a common denominator.

$= \frac{\square}{\square} - \frac{\square}{\square}$

$= \frac{\square}{\square}$

b) $3\frac{1}{2} \div \left(1\frac{1}{4} - \frac{3}{4}\right)$ Write as an improper fraction.

$= 3\frac{1}{2} \div \left(\frac{\square}{\square} - \frac{\square}{\square}\right)$ Brackets first.

$= \left(\frac{\square}{\square}\right) \div \left(\frac{\square}{\square}\right)$ Write as an improper fraction.

$= \frac{\square}{\square} \times \frac{\square}{\square}$ Multiply by the reciprocal.

$= \frac{\square}{\square}$

$= \_\_\_\_\_$

2. Calculate.

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

Multiply.

Find a common denominator.

Subtract.

b) $3\frac{1}{2} \div \frac{3}{4} - \frac{5}{6}$

Change to improper fraction.

Divide.

Subtract.

3. Leo earns $16/h as a gardener.
When he works more than 35 h in 1 week, he earns time-and-a-half.
How much does he earn for working 36 h in a week?

Hours worked at regular pay = _____

Amount earned at regular pay: 35 × _____ = _____

Hours worked at time-and-a-half: 36 – 35 = _____

Overtime hourly rate: $1\frac{1}{2} \times 16 = \$$_____

Total overtime pay = 1 hour × _____ = $ _____

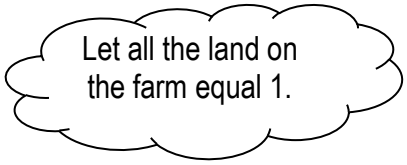
Total earnings = _____ + _____

= _____

Sentence: _____

4. Two thirds of the land on a farm is used for beef cattle.
The rest of the land is used to grow crops.

a) How much land is used to grow crops?
Draw a diagram to help you.



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

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

$= \frac{\square}{\square}$

Sentence: _____

_____

b) Half of the land for crops is used to grow corn. What fraction of the land is used to grow corn?

$\frac{\square}{\square} \times \frac{1}{2}$

Sentence:
_____

_____