



Review of Fractions

Fractions describe parts of a whole.

The top of a fraction tells you how many parts you have.

The bottom tells you how many parts the whole was divided into.

$$\frac{\textit{part}}{\textit{whole}}$$

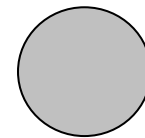
The simplest type of fraction is a whole that hasn't been divided into any parts.



Example 1: Express the circle to the right as a fraction.

Answer: The top of the fraction is the number of shaded parts.

There is one part.



The bottom of the fraction is the number of parts that the whole is divided into.

The whole is also one part for the circle above.

We express the fraction as one part divided by one whole: $\frac{1}{1}$

Fractions are more commonly used to describe something that's been broken up into parts.

Example 2: Express the shaded boxes in the rectangle below as a fraction.



Answer: Three boxes (parts) are shaded.

The rectangle (the whole) is divided into 5 boxes (parts),

so the fraction is: $\frac{3}{5}$

The same fraction can be expressed in different ways that are all equal – by either expanding or reducing.



Expanding Fractions

In the example above, each square in the rectangle could have been split in two, making ten parts from the same whole:



Now $\frac{6}{10}$ of the rectangle is shaded. We can continue dividing the rectangle into smaller pieces without changing the ratio of shaded boxes to unshaded boxes:

$$\frac{9}{15}$$



$$\frac{12}{20}$$



When we expand a fraction, we rewrite the fraction with a larger numerator (top number) and a larger denominator (bottom number), **but** the new fraction still has the same value as the one we started with. If we wanted to expand a fraction, we would multiply both the top and bottom of the fraction by the same number.

Example 3: Expand the fraction $\frac{3}{7}$ to a fraction with a bottom number of 21.

Answer: Set up an equation with the known fraction and the unknown fraction.

$$\frac{3}{7} = \frac{\quad}{21}$$

Can 21 be divided by 7?

$$21 \div 7 = 3$$

Yes.

This means we want to multiply the top number (3) by 3 to expand the fraction.

$$3 \times 3 = 9$$

Now we can fill in the unknown number in the missing fraction.

$$\frac{3}{7} = \frac{9}{21}$$



Reducing Fractions

The same process works in reverse.

A whole that is divided into many small parts can be reduced into fewer parts if both the top and bottom of the fraction are divisible by the same number.

Example 4: Reduce the fraction $\frac{2}{10}$

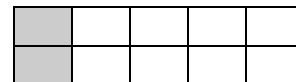
Answer: Is there a number that divides into both the top and the bottom numbers?

Yes.

Both 2 and 10 can be divided by 2.

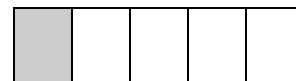
Perform the divisions and write the answer as a fraction.

The picture confirms that $\frac{2}{10}$ and $\frac{1}{5}$ are two equal amounts.



$$\begin{aligned} 2 \div 2 &= 1 \\ 10 \div 2 &= 5 \end{aligned}$$

$$\frac{1}{5}$$



Improper Fractions and Mixed Fractions

Improper fractions are fractions where the top number is larger than the bottom number. This means we have some quantity greater than one. For example $\frac{3}{2}$ would be more than $\frac{2}{2}$ (a whole). Mixed fractions are numbers that have both a whole number AND a fraction, like $1 \frac{1}{2}$.

To change a fraction from a mixed to an improper fraction:

Take the bottom number of the fraction, multiply it by the whole number, and then add to the top number of the fraction.

Then put that number over the original bottom number of the fraction.

$$\begin{array}{c}
 + \quad \curvearrowright \quad 12 + 1 = 13 \\
 3 \frac{1}{4} = \frac{13}{4} \\
 \quad \quad \quad \curvearrowleft \\
 \times \quad 3 \times 4 = 12
 \end{array}$$

Example 5: Convert $2 \frac{1}{5}$ to an improper fraction.



Answer: Multiply the bottom number of the fraction by the whole number.

$$5 \times 2 = 10$$

Add to the top number of the fraction.

$$10 + 1 = 11$$

Put that number over the original bottom number of the fraction (5).

$$\frac{11}{5}$$

To change a fraction from an improper fraction to a mixed fraction:

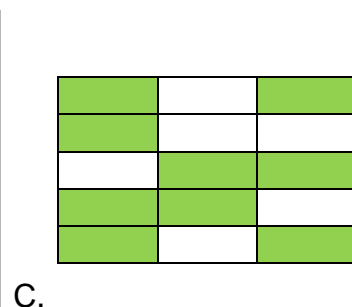
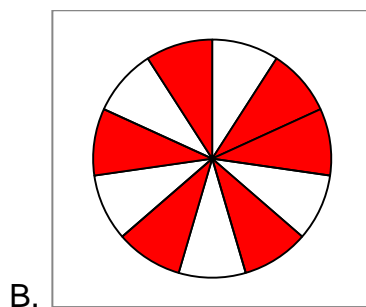
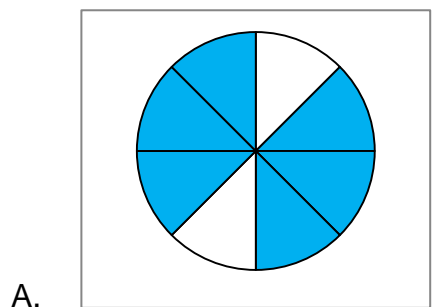
Divide the top number of the fraction by the bottom number. The number of times the bottom number goes into the top number completely is the whole number of the mixed fraction. Write it to the side.

Find the remainder (if any) of the division and put that number over the original bottom number in the improper fraction.

$$\begin{array}{l} \div \quad \frac{15}{4} = 3 \frac{3}{4} \\ 15 \div 4 = 3,75 \\ 15 - 3(4) = 3 \text{ (remainder)} \end{array}$$

Practice Problems

Express the shaded portion of each of these shapes as a fraction. Reduce to the smallest numbers possible.



Practice reducing and expanding (figuring out what the fraction was before it was reduced) these fractions. Fill in the missing numbers.



	$\frac{9}{12}$	=	$\frac{3}{4}$
1.	$\frac{6}{18}$	=	$\frac{2}{/}$
2.	$\frac{35}{50}$	=	$\frac{/}{10}$
3.	$\frac{4}{12}$	=	$\frac{/}{/}$
4.	$\frac{/}{36}$	=	$\frac{1}{4}$
5.	$\frac{4}{20}$	=	$\frac{/}{/}$
6.	$\frac{11}{/}$	=	$\frac{1}{3}$
7.	$\frac{8}{/}$	=	$\frac{2}{5}$
8.	$\frac{10}{70}$	=	$\frac{/}{/}$
9.	$\frac{22}{/}$	=	$\frac{11}{8}$
10.	$\frac{10}{14}$	=	$\frac{/}{/}$
11.	$\frac{20}{22}$	=	$\frac{/}{/}$
12.	$\frac{/}{30}$	=	$\frac{5}{6}$
13.	$\frac{/}{48}$	=	$\frac{3}{4}$
14.	$\frac{18}{42}$		$\frac{/}{/}$

Practice converting these fractions from improper to mixed or mixed to improper. Fill in the missing numbers.

	$2 \frac{4}{5}$	=	$\frac{14}{5}$
15.	$\frac{9}{2}$	=	
16.	$1 \frac{5}{7}$	=	$\frac{/}{/}$
17.	$\frac{11}{3}$	=	
18.	$\frac{18}{5}$	=	
19.	$2 \frac{3}{4}$	=	$\frac{/}{/}$
20.	$\frac{9}{5}$	=	
21.	$4 \frac{2}{3}$	=	$\frac{/}{/}$
22.	$2 \frac{7}{8}$	=	$\frac{/}{/}$
23.	$\frac{17}{6}$	=	
24.	$\frac{5}{2}$	=	
25.	$3 \frac{1}{7}$	=	$\frac{/}{/}$
26.	$6 \frac{2}{5}$	=	$\frac{/}{/}$
27.	$5 \frac{7}{9}$	=	$\frac{/}{/}$
28.	$\frac{53}{12}$	=	



Answers

A. 2/3 B. 6/11 C. 3/5

1.	$\frac{6}{18}$	=	$\frac{2}{9}$
2.	$\frac{35}{50}$	=	$\frac{7}{10}$
3.	$\frac{4}{12}$	=	$\frac{1}{3}$
4.	$\frac{9}{36}$	=	$\frac{1}{4}$
5.	$\frac{4}{20}$	=	$\frac{1}{5}$
6.	$\frac{11}{33}$	=	$\frac{1}{3}$
7.	$\frac{8}{10}$	=	$\frac{2}{5}$
8.	$\frac{10}{70}$	=	$\frac{1}{7}$
9.	$\frac{22}{16}$	=	$\frac{11}{8}$
10.	$\frac{10}{14}$	=	$\frac{5}{7}$
11.	$\frac{20}{22}$	=	$\frac{10}{11}$
12.	$\frac{25}{30}$	=	$\frac{5}{6}$
13.	$\frac{36}{48}$	=	$\frac{3}{4}$
14.	$\frac{18}{42}$		$\frac{3}{7}$
15.	$\frac{9}{2}$	=	$4\frac{1}{2}$
16.	$1\frac{5}{7}$	=	$\frac{12}{7}$
17.	$\frac{11}{3}$	=	$3\frac{2}{11}$
18.	$\frac{18}{5}$	=	$3\frac{3}{5}$
19.	$2\frac{3}{4}$	=	$\frac{11}{4}$
20.	$\frac{9}{5}$	=	$1\frac{4}{5}$
21.	$4\frac{2}{3}$	=	$\frac{14}{3}$
22.	$2\frac{7}{8}$	=	$\frac{23}{8}$
23.	$\frac{17}{6}$	=	$2\frac{5}{6}$
24.	$\frac{5}{2}$	=	$2\frac{1}{2}$
25.	$3\frac{1}{7}$	=	$\frac{22}{7}$
26.	$6\frac{2}{5}$	=	$\frac{32}{5}$
27.	$5\frac{7}{9}$	=	$\frac{52}{9}$
28.	$\frac{53}{12}$	=	$4\frac{5}{12}$

