## WALT: multiply and divide fractions

WILF

1. Use knowledge of times tables
2. Multiply the numerators together then multiply the denominators together
3. Keep, change, flip for division

## Can you name the parts of a fraction?

## numepator


denorpinator

$$
4
$$

What sort of fractions / numbers are these:
proper fracion $\frac{7}{8}$
mixed ntiviber $2 \frac{3}{8}$
improper fration $\frac{9}{7}$

## Multiplying Fractions

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

1. Multiply the numerators.
2. Multiply the denominators.
3. Cancel down.

$$
\begin{array}{ll}
\frac{2}{5} \times \frac{3}{4}=\frac{6}{20}=\frac{3}{10} & \frac{1}{6} \times \frac{2}{5}=\frac{2}{30}=\frac{1}{15} \\
\frac{1}{4} \times \frac{1}{2}=\frac{1}{8} & \frac{5}{12} \times \frac{2}{5}=\frac{10}{60}=\frac{1}{6} \\
\frac{3}{4} \times \frac{4}{5}=\frac{12}{20}=\frac{3}{5} & \frac{5}{9} \times \frac{2}{3}=\frac{10}{27} \\
\frac{4}{7} \times \frac{2}{5}=\frac{8}{35} & \frac{3}{8} \times \frac{4}{9}=\frac{12}{72}=\frac{1}{6}
\end{array}
$$

## Multiplying mixed numbers.

$2 \frac{2}{5} \times \frac{1}{2}=\frac{12}{5} \times \frac{1}{2}=\frac{12}{10}=\frac{6}{5}=1 \frac{1}{5}$

1. Change the mixed number to an improper fraction.
2. Multiply as before.
3. Cancel down and change to mixed number if necessary.

$$
\begin{aligned}
& 1 \frac{1}{4} \times \frac{2}{7}=\frac{5}{4} \times \frac{2}{7}=\frac{10}{28}=\frac{5}{14} \\
& 2 \frac{1}{3} \times \frac{1}{2}=\frac{7}{3} \times \frac{1}{2}=\frac{7}{6}=1 \frac{1}{6} \\
& \frac{3}{4} \times 1 \frac{4}{5}=\frac{3}{4} \times \frac{9}{5}=\frac{27}{20}=1 \frac{7}{20} \\
& 1 \frac{4}{7} \times 1 \frac{2}{5}=\frac{11}{7} \times \frac{7}{5}=\frac{77}{35}=\frac{11}{5}=2 \frac{1}{5}
\end{aligned}
$$

Multiplying fractions and whole numbers


1. Whole numbers have a denominator of 1.
2. Multiply numerators and denominators.
3. Cancel down and change to a mixed number if necessary.

$$
\begin{aligned}
& \frac{3}{4} \times 6=\frac{3}{4} \times \frac{6}{1}=\frac{18}{4}=4 \frac{1}{2} \\
& \frac{7}{8} \times 12=\frac{7}{8} \times \frac{12}{1}=\frac{84}{8}=10 \frac{1}{2}
\end{aligned}
$$

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

$$
\frac{5}{7} \times 4=\frac{5}{7} \times \frac{4}{1}=\frac{20}{7}=2 \frac{6}{7}
$$

$$
7 \times \frac{2}{5}=\frac{7}{1} \times \frac{2}{5}=\frac{14}{5}=2 \frac{4}{5}
$$

## Cancelling down.

It is often easier to cancel down before you multiply. When you are multiplying fractions, any numerator can be cancelled against any denominator. After multiplication
$\frac{5}{8} \times \frac{16}{25}=\frac{80}{200}=\frac{2}{5}$

Before multiplication


## Cancelling after multiplication

$\frac{7}{12} \times \frac{16}{49}=\frac{112}{588}=\frac{4}{21}$

Cancelling before multiplication
$\frac{1}{1 / 2} \times \frac{4}{1 / 7}=\frac{4}{21}$
Which is easier?

Multiplying always makes things bigger:

$$
2 \times 3=6
$$

6 is bigger than both 2 and 3


Is he correct?

If you multiply a number by 1 ,
it does not increase or decrease.
$3 \times 1=3$
If you multiply a number by 0 , you get 0
$3 \times 0=0$
If you multiply a number larger than 1 by a proper fraction, the product is less than the original number.
$4 \times \frac{1}{2}=2(2<4)$

If you multiply two proper fractions together, the product is less than either of them:

$$
\begin{aligned}
& \frac{3}{4} \times \frac{1}{2}=\frac{3}{8} \\
& \frac{3}{2} \text { of } \frac{3}{4}=\frac{3}{8} \text { of } \frac{1}{2}=\frac{3}{8} \\
& \text { of means } x
\end{aligned}
$$

## Dividing Fractions

$$
\frac{3}{4} \div \frac{1}{3}=\frac{3}{4} \div \frac{3}{B}=\frac{9}{4}=2 \frac{1}{4}
$$

1. Turn the dividing fraction upside down and change $\div$ to $\times$.
2. Multiply numerators and denominators.
3. If necessary cancel down and change to a mixed number.

$$
\begin{aligned}
& \frac{2}{5} \div \frac{1}{4}=\frac{2}{5} \div \frac{4}{4}=\frac{8}{5}=1 \frac{3}{5} \\
& \frac{3}{7} \div \frac{2}{5}=\frac{3}{7} \div \frac{8}{8}=\frac{15}{14}=1 \frac{1}{14} \\
& \frac{3}{4} \div \frac{1}{8}=\frac{3}{4} \div \frac{8}{8}=\frac{24}{4}=6 \\
& \frac{5}{6} \div \frac{1}{3}=\frac{5}{6} \div \frac{3}{3}=\frac{15}{6}=2 \frac{1}{2} \\
& \frac{4}{9} \div \frac{1}{2}=\frac{4}{9} \div \frac{2}{2}=\frac{8}{9}
\end{aligned}
$$

## Dividing mixed numbers.

$2 \frac{2}{5} \div \frac{1}{2}=\frac{12}{5} \div \frac{1}{2}=\frac{12}{5} \times \frac{2}{1}=\frac{24}{5}=4 \frac{4}{5}$

1. Change the mixed number to an improper fraction.
2. Divide as before:
3. Cancel down and change to a mixed number if necessary.
$1 \frac{4}{5} \div \frac{1}{3}=\frac{9}{5} \div \frac{1}{3}=\frac{9}{5} \times \frac{3}{1}=\frac{27}{5}=5 \frac{2}{5}$
$2 \frac{1}{3} \div \frac{7}{9}=\frac{7}{3} \div \frac{7}{9}=\frac{7}{3} \times \frac{9}{7}=\frac{63}{21}=3$
$3 \frac{1}{2} \div \frac{3}{8}=\frac{7}{2} \div \frac{3}{8}=\frac{7}{2} \times \frac{8}{3}=\frac{56}{6}=9 \frac{1}{3}$
$3 \frac{2}{3} \div 1 \frac{1}{6}=\frac{11}{3} \div \frac{7}{6}=\frac{11}{3} \times \frac{6}{7}=\frac{66}{21}=3 \frac{1}{7}$
$\frac{9}{10} \div 1 \frac{1}{5}=\frac{9}{10} \div \frac{6}{5}=\frac{9}{10} \times \frac{5}{6}=\frac{45}{60}=\frac{3}{4}$

Dividing fractions and whole numbers
$8 \div \frac{3}{5}=\frac{8}{1} \div \frac{5}{5}=\frac{40}{3}=13 \frac{1}{3}$

1. Whole numbers have a denominator of 1 .
2. Turn dividing fraction upside down and multiply numerators and denominators.
3. Cancel down and change to a mixed number if necessary.

$$
\begin{aligned}
& 6 \div \frac{2}{3}=\frac{6}{1} \div \frac{2}{3}=\frac{6}{1} \times \frac{3}{2}=\frac{18}{2}=9 \\
& 4 \div \frac{2}{5}=\frac{4}{1} \div \frac{2}{5}=\frac{4}{1} \times \frac{5}{2}=\frac{20}{2}=10 \\
& 7 \div \frac{5}{6}=\frac{7}{1} \div \frac{5}{6}=\frac{7}{1} \times \frac{6}{5}=\frac{42}{5}=8 \frac{2}{5} \\
& 5 \div \frac{6}{7}=\frac{5}{1} \div \frac{6}{7}=\frac{5}{1} \times \frac{7}{6}=\frac{35}{6}=5 \frac{5}{6} \\
& 8 \div \frac{7}{9}=\frac{8}{1} \div \frac{7}{9}=\frac{8}{1} \times \frac{9}{7}=\frac{72}{7}=10 \frac{2}{7} \\
& \frac{3}{4} \div 6=\frac{3}{4} \div \frac{6}{1}=\frac{3}{4} \times \frac{1}{6}=\frac{3}{24}=\frac{1}{8}
\end{aligned}
$$

Division always makes things smaller. If I divide up a rich, tasty chocolate cake, I always get a smaller piece than the whole cake.

$$
12 \div 4=3
$$

3 is less than 12

## Is she

correct?

If you divide a number by 1 ,
it does not increase or decrease.
$3 \div 1=3$
If you divide 1, or a number larger than 1, by a proper fraction, the answer is greater than the original number.
$4 \div \frac{1}{2}=8(8>4)$

If you divide a larger fraction by a smaller one, the answer will be more than 1.
$\frac{3}{4} \div \frac{1}{8}=6$


How many $\frac{1}{8}$ are there in $\frac{3}{4} ? 6$

1) $\frac{1}{3} \times \frac{1}{3}=$
2) $\frac{1}{2} \div \frac{1}{4}=$
3) $\frac{1}{5} \times \frac{1}{5}=$
4) $\frac{1}{5} \div \frac{3}{10}=$
5) $\frac{1}{6} \times \frac{1}{6}=$
6) $\frac{2}{7} \times \frac{4}{5}=$
7) $\frac{1}{6} \div \frac{1}{12}=$
8) $\frac{7}{2} \div \frac{5}{4}=$
9) $\frac{1}{2} \times \frac{2}{5}=$
10) $\frac{9}{7} \div \frac{1}{14}=$
11) $\frac{7}{9} \times \frac{4}{5}=$
12) $7 \quad 4$

$$
\overline{9} \div \frac{1}{7}=
$$

2) $\frac{6}{7} \times \frac{11}{12}=$
3) $\frac{6}{7} \div \frac{11}{12}=$
4) $\frac{10}{11} \times \frac{12}{15}=$
5) $\frac{14}{15} \div \frac{8}{9}=$
6) $2 \frac{1}{3} \times \frac{1}{2}=$
7) $\frac{16}{17} \div \frac{21}{23}=$
8) $4 \frac{1}{5} \times \frac{1}{4}=$
9) $4 \frac{1}{3} \div \frac{1}{2}=$
