M8 - 6.1 - Simplifying Expanding Fractions Notes

Simplification

$\frac{2}{4} =$

$\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$ Divide the top and bottom by the GCF

$\frac{6}{9} =$

$\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$ Divide the top and bottom by the GCF

Rule: Do to the top as you did to the bottom.

Expansion

$\frac{1}{2} =$

$\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$ Multiply the top and bottom by an integer.

$\frac{1}{2} =$

$\frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ Multiply the top and bottom by an integer.

M8 - 6.2 - Multiplying Dividing Fractions Notes

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

$\frac{2 \times 4}{3 \times 5} = \frac{8}{15}$

Multiply tops: $2 \times 4 = 8$
Multiply bottoms: $3 \times 5 = 15$

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

To multiply fractions just multiply tops and multiply bottoms.

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

$$a \times \frac{b}{c} = \frac{a}{1} \times \frac{b}{c} = \frac{ab}{c}$$

$\frac{1}{2} \div \frac{4}{7} =$

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

Flip second fraction, change to multiplication.

$\frac{1 \times 7}{2 \times 4} = \frac{7}{8}$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

To divide fractions just flip the second fraction, and change divided by to multiplication and follow steps above.

$$\frac{\left(\frac{1}{2}\right)}{\left(\frac{4}{7}\right)} = \frac{1}{2} \div \frac{4}{7} = \frac{1}{2} \times \frac{7}{4} = \frac{7}{8}$$

$$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

$$\frac{3}{\left(\frac{5}{7}\right)} = 3 \div \frac{5}{7} = 3 \times \frac{7}{5} = \frac{ac}{b}$$

$$\frac{a}{\left(\frac{b}{c}\right)} = a \div \frac{b}{c} = a \times \frac{c}{b} = \frac{ac}{b}$$

$$\frac{\left(\frac{2}{3}\right)}{5} = \frac{2}{3} \div 5 = \frac{2}{3} \div \frac{5}{1} = \frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$$

$$\frac{\left(\frac{a}{b}\right)}{c} = \frac{a}{b} \div c = \frac{a}{b} \times \frac{1}{c} = \frac{a}{bc}$$

M8 - 6.3 - Mixed Numbers Improper Fractions Notes

Mixed fraction $\longleftrightarrow$ **Fraction**

$$2\frac{3}{5} \longleftrightarrow \frac{13}{5}$$

Mixed fraction $\longrightarrow$ Fraction

$$2\frac{3}{5} = \frac{bottom \times left + top}{bottom}$$

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

$$= \frac{13}{5}$$

Fraction $\longrightarrow$ Mixed fraction

$$\frac{13}{5} = 2\frac{3}{5}$$

remainder

bottom

Bottom goes into top

$5 \times 2 = 10$

$13 - 10 = 3$

$remainder = 3$

M8 - 6.4 - Adding Subtracting Fractions Notes

Steps: Get the same bottom (LCD), do to top, do to bottom, add or subtract tops.

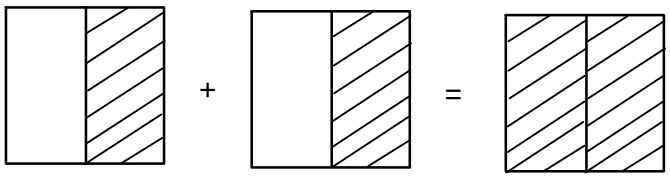
Lowest common denominator (LCD): the lowest common multiple of the denominators

1.

$\frac{1}{2} + \frac{1}{2} =$ If the denominators are the same, we already have the LCD. $LCD = 2$

$\frac{1+1}{2} =$ Add numerators: 1 + 1 = 2

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

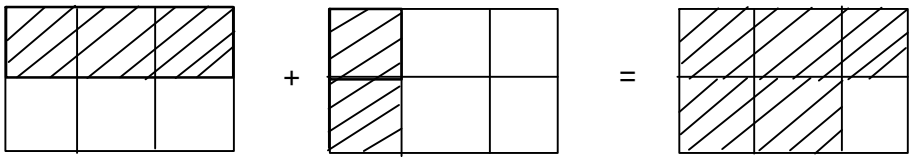


2.

$\frac{1}{2} + \frac{1}{3} =$ Multiply the top and bottom of each fraction by the denominator of the other fraction. $LCD = 6$

$\frac{3 \times 1}{3 \times 2} + \frac{1 \times 2}{3 \times 2} =$ This will always give you a common denominator (not necessarily the LCD).

$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ Add the numerators.



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

Multiples of **4**: 4, 8, (12), 16, 20

$LCD = 12$

Multiples of **6**: 6, (12), 18, 24

$\frac{3 \times 3}{3 \times 4} - \frac{1 \times 2}{6 \times 2} =$ Multiply top and bottom of first fraction by 3 to get 12 in the denominator.
Multiply top and bottom of second fraction by 2 to get 12 in the denominator.

$\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$ Subtract the numerators.

M8 - 6.5 - Cross Simplification notes

Sometimes, cross simplification takes fewer steps.

Multiplying top and bottom	**Cross-simplification**
$4 \times \frac{7}{4} \longrightarrow \frac{4}{1} \times \frac{7}{4} = \frac{28}{4} = 7$	$4 \times \frac{7}{4} \longrightarrow \frac{\cancel{4}}{1} \times \frac{7}{\cancel{4}} = 7$
$4 \times \frac{7}{2} \longrightarrow \frac{4}{1} \times \frac{7}{2} = \frac{28}{2} = 14$	$4 \times \frac{7}{2} \longrightarrow \frac{\overset{2}{\cancel{4}}}{1} \times \frac{7}{\cancel{2}_{1}} = 14$
$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$	$\frac{1}{2} \times \frac{2}{3} = \frac{1}{\cancel{2}} \times \frac{\cancel{2}}{3} = \frac{1}{3}$
$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12} = \frac{1}{6}$	$\frac{1}{4} \times \frac{2}{3} = \frac{1}{\cancel{4}_{2}} \times \frac{\overset{1}{\cancel{2}}}{3} = \frac{1}{6}$
$\frac{1}{2} \times \frac{2^2}{3} = \frac{1}{2} \times \frac{4}{3} = \frac{4}{6} = \frac{2}{3}$	$\frac{1}{\cancel{2}} \times \frac{\cancel{2^2}}{3} = \frac{2}{3}$