

M8 - 6.0 - LCM GCF Notes

Lowest common multiple (LCM): the lowest number both numbers go into
 Greatest common factor (GCF): the biggest number that goes into two numbers

8 and 12?

Lowest Common Multiple (LCM):

8 and 12 = 24	8 : 8, 16, <u>24</u> , 32
	12 : 12, <u>24</u> , 36

$8 = 2^3$ Index Form
 $12 = 2^2 \times 3^1$ LCD = $2^3 \times 3^1 = 24$

LCM: All the numbers to the highest exponent

Greatest Common Factor (GCF):

8 and 12 = 4	8 : 1, 2, <u>4</u> , 8
	12 : 1, 2, 3, <u>4</u> , 6, 12

$8 = 2^3$ Index form:
 $12 = 2^2 \times 3^1$ GCF = $2^2 = 4$

GCF: Common numbers to the lowest exponent

72 and 60?

$72 = 2 \times 2 \times 2 \times 3 \times 3$
 $60 = 2 \times 2 \times 3 \times 5$

$LCM = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$
 $LCM = 2^3 \times 3^2 \times 5^1 = 360$

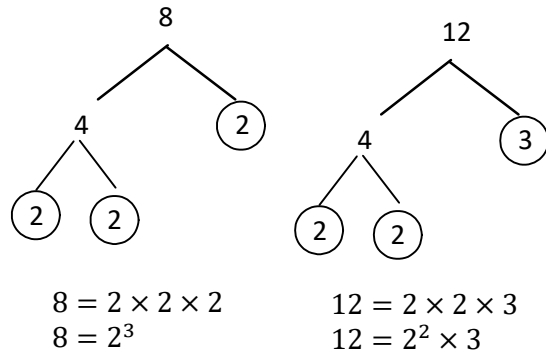
LCM: All the numbers to the highest exponent

$72 = 2 \times 2 \times 2 \times 3 \times 3$
 $60 = 2 \times 2 \times 3 \times 5$
 $GCF = 2 \times 2 \times 3 = 12$
 $GCF = 2^2 \times 3^1 = 12$

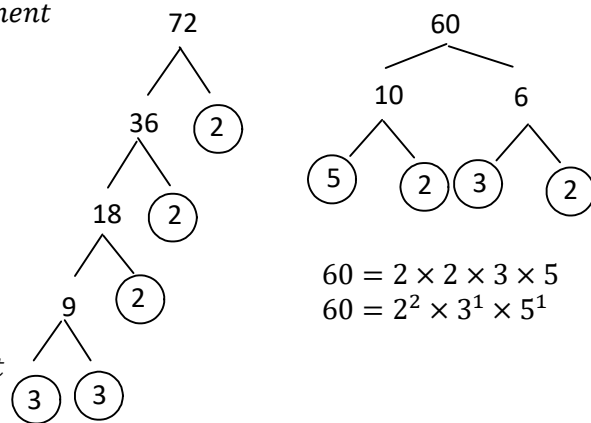
GCF: Common numbers to the lowest exponent

Prime Factorization Tree

8 and 12:



72 and 60:



$72 = 2 \times 2 \times 2 \times 3 \times 3$
 $72 = 2^3 \times 3^2$

OR

LCM:
72: 72, 144, 216, 288, <u>360</u>
60: 60, 120, 180, 240, 300, <u>360</u>
GCF:
72: 1, 2, 3, 4, 6, 8, 9, <u>12</u> , 18, 24, 36, 72
60: 1, 2, 3, 4, 5, 6, 10, <u>12</u> , 15, 20, 30, 60

2 goes into even numbers ending in 0, 2, 4, 6, or 8 3 goes into numbers whose digits add to multiples of 3. 369? 3+6+9=18. 3 goes into 18! 3 goes into 369. 5 goes into numbers ending in 5 or 0 Or do Long Division or use calculator

M8 - 6.1 - Simplifying Expanding Fractions Notes

Simplification

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

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

Divide the top and bottom by the GCF

$$\frac{6}{9} =$$

$$\frac{6 \div 3}{9 \div 3} = \left(\frac{2}{3}\right)$$

Divide the top and bottom by the GCF

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

Expansion

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

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

Multiply the top and bottom by an integer.

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

$$\frac{1 \times 3}{2 \times 3} = \left(\frac{3}{6}\right)$$

Multiply the top and bottom by an integer.

M8 - 6.2 - Multiplying/Cross Cancelling/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.

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

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

Cross Cancelling

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

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

Cross a 2 off from the top and bottom

OR

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

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

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

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

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

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

Flip second fraction, change to multiplication.

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

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

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

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

$$\frac{3}{\left(\frac{5}{7}\right)} = 3 \div \frac{5}{7} = 3 \times \frac{7}{5} = \frac{21}{5}$$

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

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

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

M8 - 6.3 - Mixed Numbers Improper Fractions Notes

Mixed fraction

Fraction

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

Mixed fraction \longrightarrow Fraction

$$\begin{aligned} 2\frac{3}{5} &= \frac{\text{bottom} \times \text{left} + \text{top}}{\text{bottom}} \\ &= \frac{5 \times 2 + 3}{5} \\ &= \left(\frac{13}{5} \right) \end{aligned}$$

Fraction \longrightarrow Mixed fraction

$$\frac{13}{5} = \left(2\frac{3}{5} \right)$$

remainder

bottom

Bottom goes into top

$$\begin{aligned} 5 \times 2 &= 10 \\ 13 - 10 &= 3 \\ \text{remainder} &= 3 \end{aligned}$$

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

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

If the denominators are the same, we already have the LCD.

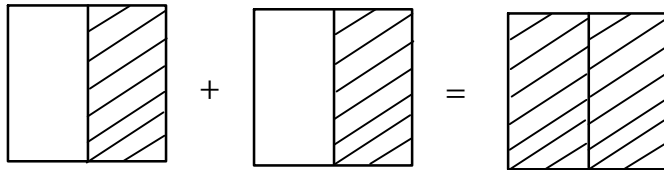
$$LCD = 2$$

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

Add numerators: $1 + 1 = 2$

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

Simplify.



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

Multiply the top and bottom of each fraction by the denominator of the other fraction.

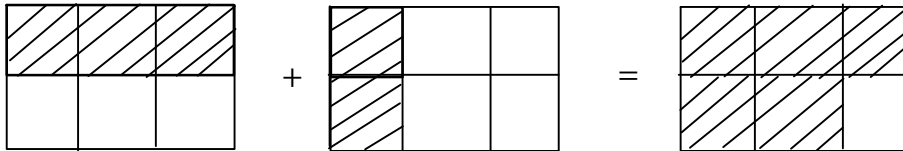
$$LCD = 6$$

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

This will always give you a common denominator (not necessarily the LCD).

$$\frac{3}{6} + \frac{2}{6} = \textcircled{\frac{5}{6}}$$

Add the numerators.



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

$$LCD = 6$$

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

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

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

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

Multiples of 4: 4, 8, $\textcircled{12}$, 16, 20

$$LCD = 12$$

Multiples of 6: 6, $\textcircled{12}$, 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.

$$\frac{9}{12} - \frac{2}{12} = \textcircled{\frac{7}{12}}$$

Subtract the numerators.