

Topic 6-1: Greatest Common Factor

- Greatest Common Factor (GCF) - the greatest number that is a factor of two or more numbers

★ How to find the GCF: List all factors

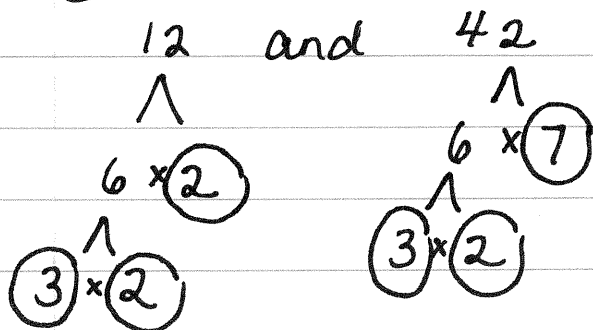
① 12 and 42

12: 1, 2, 3, 4, 6, 12

42: 1, 2, 3, 6, 7, 14, 21, 42

The greatest number they have in common is 6, so the GCF is 6.

② How to find the GCF: Factor Tree:



~~2 × 2 × 3~~
~~2 × 3 × 7~~

2 × 3 = 6

GCF = 6

Prime Factorization

★ Circle the Prime Numbers

★ List the Prime Numbers

★ Circle the Prime Numbers they share

★ Multiply

Topic 6-1: GCF Continued

* Using GCF and the Distributive Property to find the sum of two whole numbers.

① $18 + 24$

• Step 1: Find the GCF

• Step 2: Write each number as a product using the GCF as a factor

$$\begin{array}{cc} 18 & 24 \\ \wedge & \wedge \\ 9 \times 2 & 6 \times 4 \\ \uparrow & \uparrow \quad \uparrow \\ 3 \times 3 & 3 \times 2 \quad 2 \times 2 \end{array}$$

$$\begin{array}{c} 2 \times 3 \times 3 \\ 2 \times 2 \times 2 \times 3 \end{array}$$

$$2 \times 3 = 6 \quad 6 = \text{GCF}$$

$$\begin{array}{l} 18 + 24 \\ 6 \times 3 + 6 \times 4 \\ 6(3+4) \end{array}$$

$$\begin{array}{l} \text{check: } 6(3+4) \\ 6(7) \\ 42 \checkmark \end{array}$$

Topic 6-2: Least Common Multiple

- Least Common Multiple (LCM) - the common multiple with the least value.

★ One Way: List the multiples

6 and 8

6: 6, 12, 18, ~~24~~, 30, 36, 42, 48 ...

8: 8, 16, ~~24~~, 32, 40, 48 ...

24 and 48 are common multiples

BUT 24 is the least common multiple

★ Another way: Prime Factorization

$$\begin{array}{c} 6 \\ \wedge \\ (2) \times (3) \end{array}$$

$$\begin{array}{c} 8 \\ \wedge \\ (2) \times 4 \\ \wedge \\ (2) \times (2) \end{array}$$

$$\begin{array}{c} 2 \times (3) \\ (2 \times 2 \times 2) \end{array}$$

$$3 \times 2 \times 2 \times 2 = \boxed{24}$$

- Factor Tree
- Circle prime numbers
- List prime #'s
- circle the factor in the row where it occurs most
- Multiply

Topic 6-3: Understanding Division of Fractions

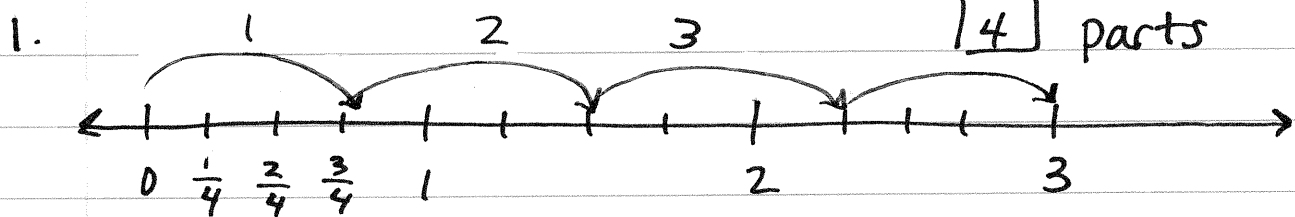
• How can you model division of fractions?

1. Use a number line.

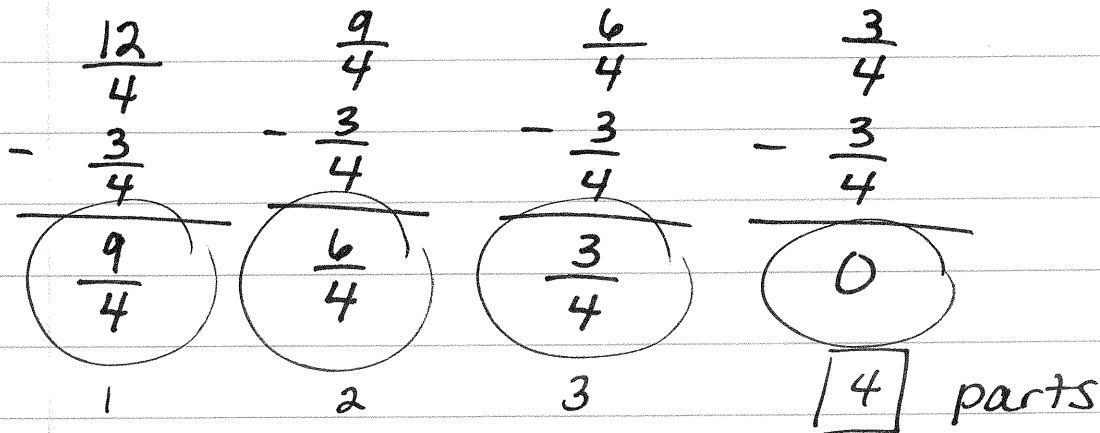
2. Think of division as repeated subtraction.

$$3 \div \frac{3}{4}$$

★ When the divisor is less than 1, the quotient is larger than the dividend.



2. $3 \div \frac{3}{4}$ $3 = \frac{12}{4}$ (improper fraction)



Topic 6-4: Dividing Whole Numbers by Fractions

★ Dividing by a fraction is the same as multiplying by its reciprocal.

ex: $\frac{2}{3}$ is the reciprocal of $\frac{3}{2}$ or $\frac{5}{3} \rightarrow \frac{3}{5}$

Steps:

- ① $4 \div \frac{2}{3}$
 $\frac{4}{1} \times \frac{3}{2} = \frac{12}{2} = \boxed{6}$
- 6 ↙
- $2 \overline{)12}$
 $\underline{-12}$
0
- Rewrite the whole number 4 as a fraction ($\frac{4}{1}$)
 - Change to multiplication
 - "flip" the second fraction (multiply by the reciprocal)
 - Change to a mixed number.

② $4 \div \frac{4}{7}$
 $\frac{4}{1} \times \frac{7}{4} = \frac{28}{4} = \boxed{7}$

7 ↙

$4 \overline{)28}$

③ $2 \div \frac{3}{8}$
 $\frac{2}{1} \times \frac{8}{3} = \frac{16}{3} = \boxed{5\frac{1}{3}}$

5 ↙

$3 \overline{)16}$
 $\underline{-15}$
1

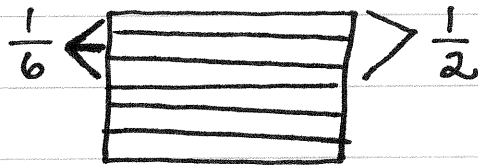
④ $5 \div \frac{2}{3}$
 $\frac{5}{1} \times \frac{3}{2} = \frac{15}{2} = \boxed{7\frac{1}{2}}$

7 ↙

$2 \overline{)15}$
 $\underline{-14}$
1

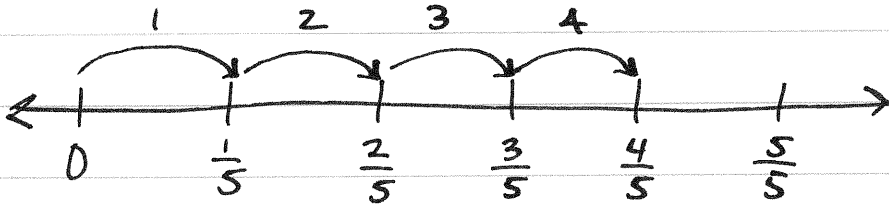
Topic 6-5 Modeling Division of Fractions

★ Draw a model

① $\frac{1}{2} \div \frac{1}{6} =$ 

★ There are 3 $\frac{1}{6}$ pieces in $\frac{1}{2}$.
so $\frac{1}{2} \div \frac{1}{6} = 3$

② $\frac{4}{5} \div \frac{1}{5} =$



so $\frac{4}{5} \div \frac{1}{5} = 4$

Topic 6-6: Dividing Fractions

Steps:

• The first fraction

stays the same

• Change \div to \times

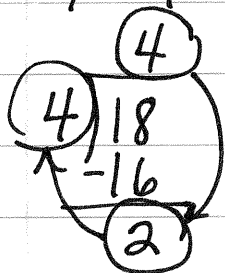
• "Flip" the second fraction (reciprocal)

• Multiply across and simplify OR use the butterfly method to simplify before you multiply.

1. $\frac{3}{4} \div \frac{1}{6}$

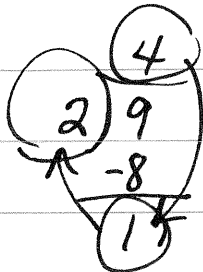


$$\frac{3}{4} \times \frac{6}{1} = \frac{18}{4} = 4\frac{2}{4} = \boxed{4\frac{1}{2}}$$



OR

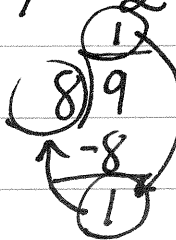
$$\frac{3}{4} \times \frac{6}{1} = \frac{9}{2} = \boxed{4\frac{1}{2}}$$



2. $\frac{3}{4} \div \frac{2}{3}$



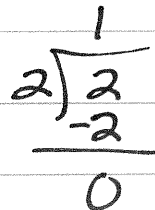
$$\frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = \boxed{1\frac{1}{8}}$$



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



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



Topic 6-7: Estimating Mixed-Number Quotients

★ Round to the nearest whole number.

★ Use compatible OR numbers.

$$\begin{array}{l} \textcircled{1} \quad 15\frac{5}{6} \div 3\frac{5}{8} \approx 4 \\ \quad \downarrow \quad \downarrow \\ \quad 16 \div 4 = \boxed{4} \end{array}$$

$$\begin{array}{l} \textcircled{2} \quad 55\frac{1}{3} \div 6\frac{1}{4} \approx 9 \\ \quad \downarrow \quad \downarrow \\ \quad 54 \div 6 = \boxed{9} \end{array}$$

$$\begin{array}{l} \textcircled{3} \quad 7\frac{3}{4} \div 1\frac{7}{8} \approx 4 \\ \quad \downarrow \quad \downarrow \\ \quad 8 \div 2 = \boxed{4} \end{array}$$

$$\begin{array}{l} \textcircled{4} \quad 26\frac{3}{4} \div 5\frac{1}{4} \approx 5 \\ \quad \downarrow \quad \downarrow \\ \quad 25 \div 5 = \boxed{5} \end{array}$$

Topic 6-8: Dividing Mixed Numbers

① $37\frac{1}{2} \div 6\frac{1}{4}$

$$\frac{75}{2} \div \frac{25}{4}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$3 \frac{75}{2} \times \frac{4}{25} = \frac{12}{2} = \boxed{6}$$

$$\begin{array}{r} 6 \\ 2 \overline{) 12} \\ \underline{-12} \\ 0 \end{array}$$

Steps:

- Write each mixed number as an improper fraction.
- Keep the first fraction the same.
- Multiply by the reciprocal ("flip")
- Simplify using the butterfly method or multiply across and write in simplest form.

② $4\frac{1}{3} \div 2\frac{4}{5}$

$$\frac{13}{3} \div \frac{14}{5}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$\frac{13}{3} \times \frac{5}{14} = \frac{65}{42} = \boxed{1\frac{23}{42}}$$

$$\begin{array}{r} 1 \\ 42 \overline{) 65} \\ \underline{-42} \\ 23 \end{array}$$

Topic 6-9: Evaluating Expressions With Fractions

★ Use substitution to solve.

$$\begin{aligned} \textcircled{1} \quad X &\div \frac{1}{3}; \quad X = \frac{2}{3} \\ \frac{2}{3} &\div \frac{1}{3} \\ \frac{2}{3} \times \frac{3}{1} &= \frac{2}{1} = \boxed{2} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad K &\div 5; \quad K = 4\frac{1}{6} \\ 4\frac{1}{6} &\div 5 \\ \frac{25}{6} &\div \frac{5}{1} \\ 5\frac{25}{6} \times \frac{1}{5} &= \boxed{\frac{5}{6}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 4y &\div 3; \quad y = 1\frac{1}{2} \\ 4(1\frac{1}{2}) &\div 3 \\ \frac{4}{1}(\frac{3}{2}) &\div 3 \\ \frac{12}{2} &\div 3 \\ 6 &\div 3 \\ \boxed{2} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad | \frac{3}{8} + 2m; \quad m = \frac{3}{4} \\ | \frac{3}{8} + 2(\frac{3}{4}) \\ | \frac{3}{8} + \frac{2}{1}(\frac{3}{4}) \\ | \frac{3}{8} + \frac{6}{4} \end{aligned}$$

$$\begin{array}{r} | \frac{3}{8} \\ + \frac{6 \cdot 2}{4 \cdot 2} \frac{12}{8} \\ \hline | \frac{15}{8} \end{array}$$

$$\begin{aligned} \textcircled{3} \quad X &\div 12; \quad X = \frac{2}{3} \\ \frac{2}{3} &\div 12 \\ \frac{2}{3} &\div \frac{12}{1} \\ \frac{2}{3} \times \frac{1}{12} &= \boxed{\frac{1}{18}} \end{aligned}$$

$$\begin{array}{r} \textcircled{1} \\ \textcircled{8} \overline{) 15} \\ \underline{-8} \\ \textcircled{7} \end{array}$$

$$\begin{array}{r} | + \frac{7}{8} \\ \boxed{2\frac{7}{8}} \end{array}$$

Topic 6-10: Solving Equations With Fractions

★ Use the inverse operation to solve.

$$\textcircled{1} \quad \frac{4}{7}m = 10 \div \frac{4}{7}$$

$$m = \frac{10}{1} \div \frac{4}{7}$$

$$m = \frac{10}{1} \times \frac{7}{4} = \frac{35}{2}$$

$$\boxed{m = 17\frac{1}{2}}$$

$$\begin{array}{r} 17 \\ 2 \overline{) 35} \\ \underline{-20} \\ 15 \\ \underline{-14} \\ 1 \end{array}$$

$$\textcircled{2} \quad z \div \frac{4}{9} = \frac{3}{8} \times \frac{4}{9}$$

$$\times \frac{4}{9}$$

$$z = \frac{3}{8} \times \frac{4}{9} = \frac{3}{18} \div 3 = \frac{1}{6}$$

$$\boxed{z = \frac{1}{6}}$$

$$\textcircled{3} \quad n + 2\frac{3}{4} = 4\frac{3}{8} + \frac{8}{8} \frac{11}{8}$$

$$\underline{-2\frac{3}{4} \quad -2\frac{3 \cdot 2}{4 \cdot 2} \quad \frac{6}{8}}$$

$$n =$$

$$1\frac{5}{8}$$

$$\boxed{n = 1\frac{5}{8}}$$

★ $\left(\frac{8}{8} = 1 \text{ whole}\right)$
that you
must borrow
from the 4.)

Topic 6-11: Problem Solving:
Look for a Pattern

★ Find the pattern and continue it.

① $0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}$
"add $\frac{1}{4}$ " $\downarrow \frac{4}{4} \quad \downarrow \frac{5}{4} \quad \downarrow \frac{6}{4} \quad \downarrow \frac{7}{4}$

② $0, \frac{2}{3}, \frac{4}{3}, \frac{6}{3}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}$
"add $\frac{2}{3}$ " $\downarrow \frac{8}{3} \quad \downarrow \frac{10}{3} \quad \downarrow \frac{12}{3} \quad \downarrow \frac{14}{3}$

③ $2, 6, 8, \underline{\quad}, \underline{\quad}, \underline{\quad}$
"multiply by 3" $\downarrow 24 \quad \downarrow 72 \quad \downarrow 216$