MULTIPLYING AND DIVIDING FRACTIONS

VA SOL 6.5
IWCS 6th Grade Math Packet pages 25-28

Can you name the parts of a fraction?

numerator ? $\longrightarrow$

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

denominator ? $\longrightarrow$

What sort of fractions / numbers are these:

proper fraction ? → $\dfrac{7}{8}$

mixed number ? → $2\dfrac{3}{8}$

improper fraction ? → $\dfrac{9}{7}$

Multiplying Fractions

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

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

## Visual Method of Multiplying Fractions
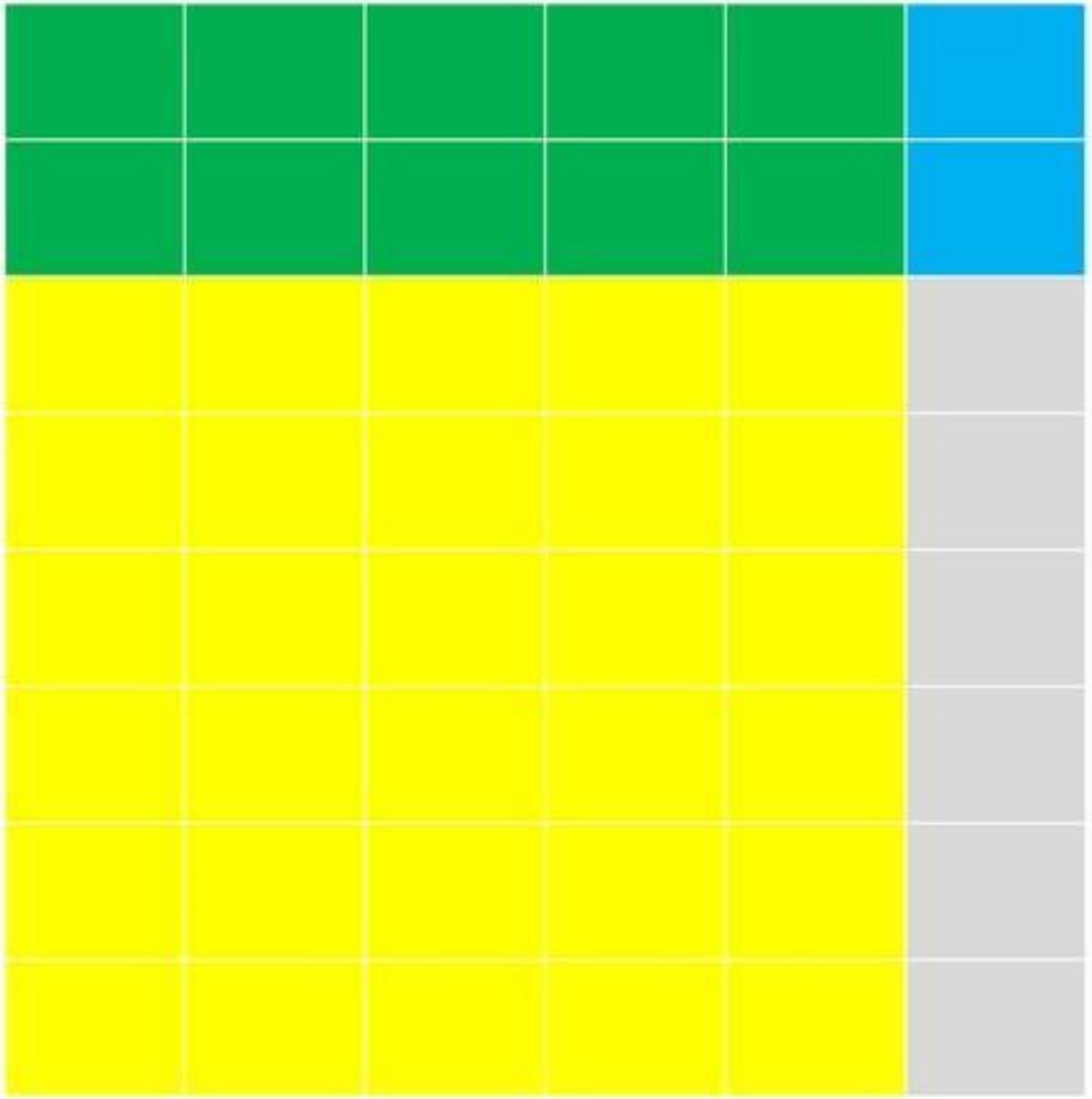
We are going to represent the problem:

$$\frac{5}{6} \times \frac{2}{8} =$$

Visual Method of Multiplying Fractions

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Visual Method of Multiplying Fractions

We are going to represent the problem:

$$\frac{5}{6} \times \frac{2}{8} = \frac{10}{48}$$

Simplified:

$$\frac{5}{24}$$

$$\frac{2}{5} \times \frac{3}{4} = \frac{6}{20} = \frac{3}{10}$$

$$\frac{1}{6} \times \frac{2}{5} = \frac{2}{30} = \frac{1}{15}$$

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

$$\frac{5}{12} \times \frac{2}{5} = \frac{10}{60} = \frac{1}{6}$$

$$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$$

$$\frac{5}{9} \times \frac{2}{3} = \frac{10}{27}$$

$$\frac{4}{7} \times \frac{2}{5} = \frac{8}{35}$$

$$\frac{3}{8} \times \frac{4}{9} = \frac{12}{72} = \frac{1}{6}$$

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.

$$1\frac{1}{4} \times \frac{2}{7} = \frac{5}{4} \times \frac{2}{7} = \frac{10}{28} = \frac{5}{14}$$

$$2\frac{1}{3} \times \frac{1}{2} = \frac{7}{3} \times \frac{1}{2} = \frac{7}{6} = 1\frac{1}{6}$$

$$\frac{3}{4} \times 1\frac{4}{5} = \frac{3}{4} \times \frac{9}{5} = \frac{27}{20} = 1\frac{7}{20}$$

$$1\frac{4}{7} \times 1\frac{2}{5} = \frac{11}{7} \times \frac{7}{5} = \frac{77}{35} = \frac{11}{5} = 2\frac{1}{5}$$

Multiplying fractions and whole numbers

$$12 \times \frac{5}{6} = \frac{12}{1} \times \frac{5}{6} = \frac{60}{6} = 10$$

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

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

$$\frac{7}{8} \times 12 \frac{7}{8} = \times \frac{12}{1} = \frac{84}{8} = 10\frac{1}{2}$$

$$5 \times \frac{3}{101} \frac{5}{1} = \times \frac{3}{10} = \frac{15}{10} = 1\frac{1}{2}$$

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

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

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

$$\frac{\cancel{5}}{\cancel{8}_1} \times \frac{\cancel{16}^2}{\cancel{25}_5} = \frac{2}{5}$$

Cancelling after multiplication

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

Cancelling before multiplication

$$\frac{\overset{1}{\cancel{7}}}{\underset{}{\cancel{12}}} \times \frac{\overset{4}{\cancel{16}}}{\underset{7}{\cancel{49}}} = \frac{4}{21}$$

Which is easier?

If you multiply a number by 1,
it does not increase or decrease.

3 x 1 = 3

If you multiply a number by 0, you get 0
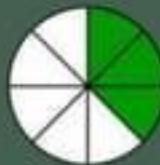
3 x 0 = 0

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:

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$
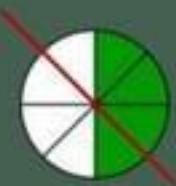
of means ×

$$\frac{1}{2} \text{ of } \frac{3}{4} = \frac{3}{8}$$

$$\frac{3}{4} \text{ of } \frac{1}{2} = \frac{3}{8}$$

Dividing Fractions

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

1. Turn the dividing fraction upside down and change ÷ to ×.
2. Multiply numerators and denominators.
3. If necessary cancel down and change to a mixed number.

$$\frac{2}{5} \div \frac{1}{4} = \frac{2}{5} \times \frac{4}{1} = \frac{8}{5} = 1\frac{3}{5}$$

$$\frac{3}{7} \div \frac{2}{5} = \frac{3}{7} \times \frac{5}{2} = \frac{15}{14} = 1\frac{1}{14}$$

$$\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1} = \frac{24}{4} = 6$$

$$\frac{5}{6} \div \frac{1}{3} = \frac{5}{6} \times \frac{3}{1} = \frac{15}{6} = 2\frac{1}{2}$$

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

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

$$8 \div \frac{3}{5} = \frac{8}{1} \times \frac{5}{3} = \frac{40}{3} = 13\frac{1}{3}$$

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.

$$6 \div \frac{2}{3} = \frac{6}{1} \div \frac{2}{3} = \frac{6}{1} \times \frac{3}{2} = \frac{18}{2} = 9$$

$$4 \div \frac{2}{5} = \frac{4}{1} \div \frac{2}{5} = \frac{4}{1} \times \frac{5}{2} = \frac{20}{2} = 10$$

$$7 \div \frac{5}{6} = \frac{7}{1} \div \frac{5}{6} = \frac{7}{1} \times \frac{6}{5} = \frac{42}{5} = 8\frac{2}{5}$$

$$5 \div \frac{6}{7} = \frac{5}{1} \div \frac{6}{7} = \frac{5}{1} \times \frac{7}{6} = \frac{35}{6} = 5\frac{5}{6}$$

$$8 \div \frac{7}{9} = \frac{8}{1} \div \frac{7}{9} = \frac{8}{1} \times \frac{9}{7} = \frac{72}{7} = 10\frac{2}{7}$$

$$\frac{3}{4} \div 6 = \frac{3}{4} \div \frac{6}{1} = \frac{3}{4} \times \frac{1}{6} = \frac{3}{24} = \frac{1}{8}$$

If you divide a number by 1,
it does not increase or decrease.
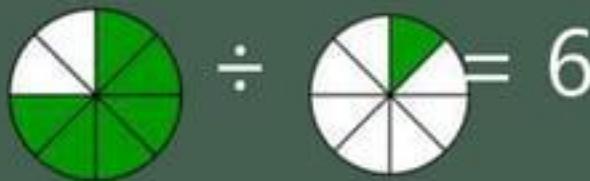
$3 \div 1 = 3$

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.

$$\frac{3}{4} \div \frac{1}{8} = 6$$

 ÷ = 6

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

The end