

Date: _____

6.3 Notes: Multiplying Proper Fractions

Multiplying without a Diagram

Remember, a fraction is really a division question, so $\frac{3}{7}$ really means $3 \div 7$

This means that $\frac{2}{5} \times \frac{3}{7}$ really means $(2 \div 5) \times (3 \div 7)$

Recall the shortcuts for multiplying and dividing by a whole number:

Multiplying $\frac{2}{5} \times 2 = \frac{4}{5}$
Multiply numerators by the whole number, denominator stays the same.

Dividing $\frac{2}{5} \div 2 = \frac{2}{5} \times \frac{1}{2} = \frac{2}{10} = \frac{1}{5}$
Multiply the denominator by the whole number, numerator stays the same.

Multiply

$$\frac{2}{5} \times \frac{3}{7} = \frac{2 \times 3}{5 \times 7} = \frac{6}{35}$$

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

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

Look at the numerators and denominators for the fractions in the question and the answer. What do you notice about them? Multiply straight across.

Summary:

When multiplying two proper fractions:

- ① multiply the numerators
- ② multiply the denominators

Remember to reduce to lowest terms

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

$$= \frac{6 \div 3}{21 \div 3}$$

$$= \frac{2}{7}$$

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

$$= \frac{6}{20}$$

$$= \frac{3}{10}$$

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

$$= \frac{12}{108}$$

$$= \frac{1}{9}$$

How hard do you think it might be to reduce the answer to $\frac{15}{16} \times \frac{8}{35}$?

Note: It is actually possible to cross reduce before you multiply!

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

$$= \frac{2}{7}$$

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

$$= \frac{3}{10}$$

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

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

When can you cross reduce?

When you are reducing the numerator of one fraction and the denominator of another

Eg: $\frac{2}{4} \times \frac{5}{4}$

$$= \frac{1 \times 5}{4 \times 4}$$

$$= \frac{5}{16}$$

Eg: $\frac{2}{4} \times \frac{4}{7} \times \frac{8}{7}$

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

$$= \frac{8}{49}$$

Eg. In Jaycee's Pet store, three-eighths of the animals are fish, and two-fifteenths of the fish are tropical fish. What fraction of the animals in the store are tropical fish?

$$\frac{3}{8} \text{ fish}$$

$$\frac{2}{15} \text{ of the fish} = \text{tropical}$$

$$\frac{2}{15} \text{ of } \frac{3}{8}$$

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

$$= \frac{1 \times 1}{5 \times 4}$$

$$= \frac{1}{20}$$

$\frac{1}{20}$ of the animals in the store are tropical fish.