

5.1 Multiply a Fraction and a Whole Number

What does it mean to multiply? *repeated addition*

$$4 \times 3 = 3 + 3 + 3 + 3$$

$$= 12$$

$$\text{OR } 3 \times 4 = 4 + 4 + 4$$

$$= 12$$

Multiplication is **commutative**: true either order (like addition)

Similarly for fractions

$$3 \times \frac{1}{5}$$

$$= \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$$

$$= \boxed{\frac{3}{5}}$$

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

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

$$= \boxed{\frac{8}{3}} \text{ or } 2\frac{2}{3}$$

$$\frac{3}{4} \times \frac{6}{1}$$

$$= \frac{18}{4}$$

$$= \boxed{\frac{9}{2}} \text{ or } 4\frac{1}{2}$$

Rule for multiplying fractions:

- Whole numbers have a denominator of 1
- Multiply straight across (numerator x numerator, denominator x denominator)

ex. $\frac{5}{1} \times \frac{4}{7}$

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

$$\frac{2}{15} \times \frac{7}{1}$$

$$= \boxed{\frac{2 \times 7}{15 \times 1}} = \boxed{\frac{14}{15}}$$

Sometimes we can reduce/cancel a numerator-denominator pair before multiplying:

ex. $\frac{2}{1} \times \frac{4}{3} \times \frac{5}{6}$

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

or $3\frac{1}{3}$

$$\frac{3}{5} \times \frac{10}{1}$$

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

$$= \boxed{6}$$

$$\frac{1}{1} \times \frac{5}{18}$$

$$= \boxed{\frac{5}{2}}$$

or $2\frac{1}{2}$

ex. A spider has 8 legs. An ant has $\frac{3}{4}$ as many legs as a spider. How many legs does an ant have?

Find $\frac{3}{4}$ of 8...

$\uparrow$
x

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

$= 6 \text{ legs}$