10.6 Rates and Unit Rates

A rate is a special ratio that compares two quantities with different units of measure.

If you simplify a rate so it has a denominator of 1 unit, it is called a unit rate.

Divide to find an equivalent ratio that is a unit rate with a denominator of 1.

Example: Write a rate to represent the situation. Then find the unit rate.

1. A store charges $30 for every 6 books.

$$\frac{\$30 \div 6}{6 \text{ books} \div 6} = \frac{\$5}{1 \text{ book}}$$

2. There are 120 pencils in 4 boxes.

$$\frac{120 \text{ pencils} \div 4}{4 \text{ boxes} \div 4} = \frac{30 \text{ pencils}}{1 \text{ box}}$$

3. Tino spends $12 for every 3 yards of fabric.

$$\frac{\$12 \div 3}{3 \text{ yrds} \div 3} = \frac{\$4}{1 \text{ yrd.}}$$

Example: Explain what the ratio means in the given context. Then find the unit rate.

4. The ratio of <u>strawberries</u> to <u>grapes</u> in a fruit cup is <u>4</u>:<u>2</u>.

* For every 4 strawberries in the fruit cup, there are 2 grapes.

$$\frac{4 \text{ strawberries} \div 2}{2 \text{ grapes} \div 2} = \frac{2 \text{ strawberries}}{1 \text{ grape}}$$

5. A computer screen has a <u>width</u> to <u>height</u> aspect ratio of <u>8</u>:<u>5</u>

* For every computer screen that has a width of 8, it has a height of 5.

$$\frac{8 \text{ width} \div 5}{5 \text{ height} \div 5} = \frac{1.6 \text{ width}}{1 \text{ height}}$$

$$5\overline{)8.0} = 1.6$$

Example: Explain what the ratio means in the given context. Then find the unit rate.

6. In a class, the ratio of right-handed students to left-handed students is 18 to 2.

* For every 18 right-handed students, there are 2 left-handed students.

$$\frac{18 \text{ right-handed} \div 2}{2 \text{ left-handed} \div 2} = \frac{9 \text{ right-handed}}{1 \text{ left-handed}}$$

What makes a <u>rate</u> different from a <u>ratio</u>?

Ratio compares two numbers.

Rate is a ratio with units.