## Lesson 16: Two Related Quantities, Part 1

Let’s use equations and graphs to describe relationships with ratios.

### 16.1: Which One Would You Choose?

Which one would you choose? Be prepared to explain your reasoning.

* A 5-pound jug of honey for $15.35
* Three 1.5-pound jars of honey for $13.05



### 16.2: Painting the Set

Lin needs to mix a specific shade of orange paint for the set of the school play. The color uses 3 parts yellow for every 2 parts red.

1. Complete the table to show different combinations of red and yellow paint that will make the shade of orange Lin needs.

| * cups of red paint $\left(r\right)$
 | * cups of yellow paint $\left(y\right)$
 | * total cups of paint $\left(t\right)$
 |
| --- | --- | --- |
| * 2
 | * 3
 |  |
| * 6
 |  |  |
|  |  | * 20
 |
|  | * 18
 |  |
| * 14
 |  |  |
| * 16
 |  |  |
|  |  | * 50
 |
|  | * 42
 |  |

1. Lin notices that the number of cups of red paint is always $\frac{2}{5}$ of the total number of cups. She writes the equation $r=\frac{2}{5}t$ to describe the relationship. Which is the **independent variable**? Which is the **dependent variable**? Explain how you know.
2. Write an equation that describes the relationship between $r$ and $y$ where $y$ is the independent variable.
3. Write an equation that describes the relationship between $y$ and $r$ where $r$ is the independent variable.
4. Use the points in the table to create two graphs that show the relationship between $r$ and $y$. Match each relationship to one of the equations you wrote.



#### Are you ready for more?

A fruit stand sells apples, peaches, and tomatoes. Today, they sold 4 apples for every 5 peaches. They sold 2 peaches for every 3 tomatoes. They sold 132 pieces of fruit in total. How many of each fruit did they sell?

### Lesson 16 Summary

Equations are very useful for describing sets of equivalent ratios. Here is an example.

A pie recipe calls for 3 green apples for every 5 red apples. We can create a table to show some equivalent ratios.

We can see from the table that $r$ is always $\frac{5}{3}$ as large as $g$ and that $g$ is always $\frac{3}{5}$ as large as $r$.

| green apples ($g$) | red apples ($r$) |
| --- | --- |
| 3 | 5 |
| 6 | 10 |
| 9 | 15 |
| 12 | 20 |

We can write equations to describe the relationship between $g$ and $r$.

* When we know the number of green apples and want to find the number of red apples, we can write:
* $r=\frac{5}{3}g$
* In this equation, if $g$ changes, $r$ is affected by the change, so we refer to $g$ as the **independent variable** and $r$ as the **dependent variable**.
* We can use this equation with any value of $g$ to find $r$. If 270 green apples are used, then $\frac{5}{3}⋅\left(270\right)$ or 450 red apples are used.
* When we know the number of red apples and want to find the number of green apples, we can write:
* $g=\frac{3}{5}r$
* In this equation, if $r$ changes, $g$ is affected by the change, so we refer to $r$ as the independent variable and $g$ as the dependent variable.
* We can use this equation with any value of $r$ to find $g$. If 275 red apples are used, then $\frac{3}{5}⋅\left(275\right)$ or 165 green apples are used.

We can also graph the two equations we wrote to get a visual picture of the relationship between the two quantities.





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