4-12: Learning Goals

- Let's learn what a system of equations is.

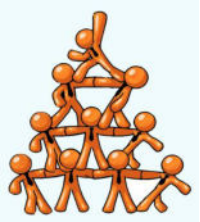
4-12-1: Milkshakes

Diego and Lin are drinking milkshakes. Lin starts with 12 ounces and drinks $\frac{1}{4}$ an ounce per second. Diego starts with 20 ounces and drinks $\frac{2}{3}$ an ounce per second.

1. How long will it take Lin and Diego to finish their milkshakes?

2. Without graphing, explain what the graphs in this situation would look like. Think about slope, intercepts, axis labels, units, and intersection points to guide your thinking.

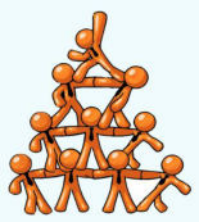
3. Discuss your description with your partner. If you disagree, work to reach an agreement.



4-12-2: Passing on the Trail

There is a hiking trail near the town where Han and Jada live that starts at a parking lot and ends at a lake. Han and Jada both decide to hike from the parking lot to the lake and back, but they start their hikes at different times.

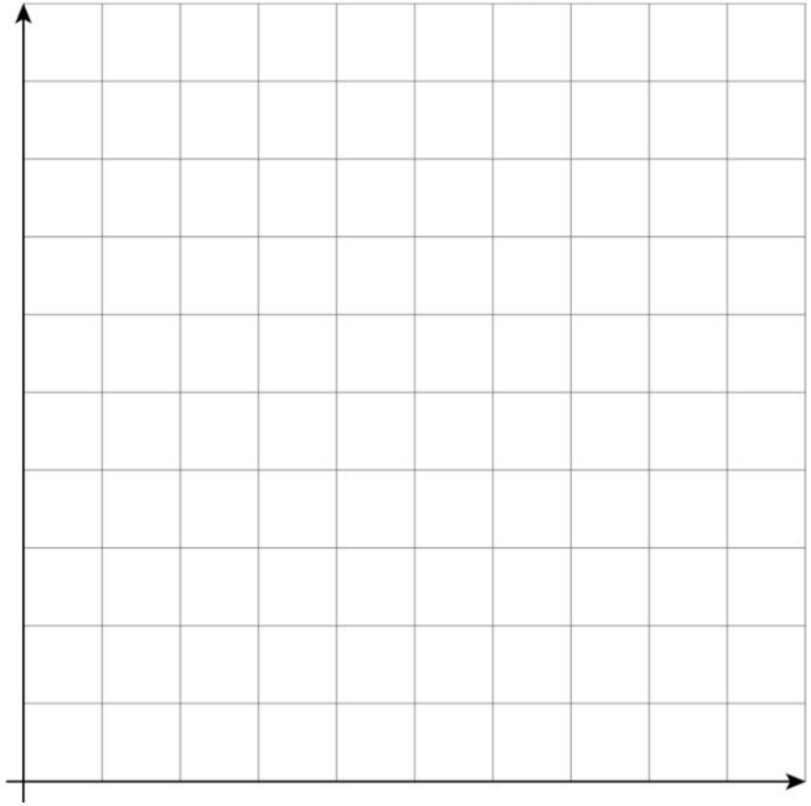
At the time that Han reaches the lake and starts to turn back, Jada is 0.6 miles away from the parking lot and hiking at a constant speed of 3.2 miles per hour towards the lake. Han's distance, d, from the parking lot can be expressed as $d = -2.4t + 4.8$, where t represents the time in hours since he left the lake.



4-12-3: Stacks of Cups

A stack of n small cups has a height, h, in centimeters of $h = 1.5n + 6$. A stack of n large cups has a height, h, in centimeters of $h = 1.5n + 9$.

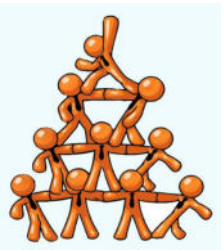
1. Graph the equations for each cup on the same set of axes. Make sure to label the axes and decide on an appropriate scale.



2. For what number of cups will the two stacks have the same height?

4-12: Lesson Synthesis

- Suppose Jada and Han had met up with another person at the exact same time they met each other along their hikes.
    - What might the graph look like that represents that person's distance from the parking lot over time?
    - What information is known and what information might you need to write an equation representing their distance from the parking lot?
- What is a system of equations?
- What does the solution to a system of equations represent?



4-12: system of equations

A system of equations is a set of equations where you want to find a solution that makes all the equations true at the same time. In these materials it is a pair of two linear equations in two variables.

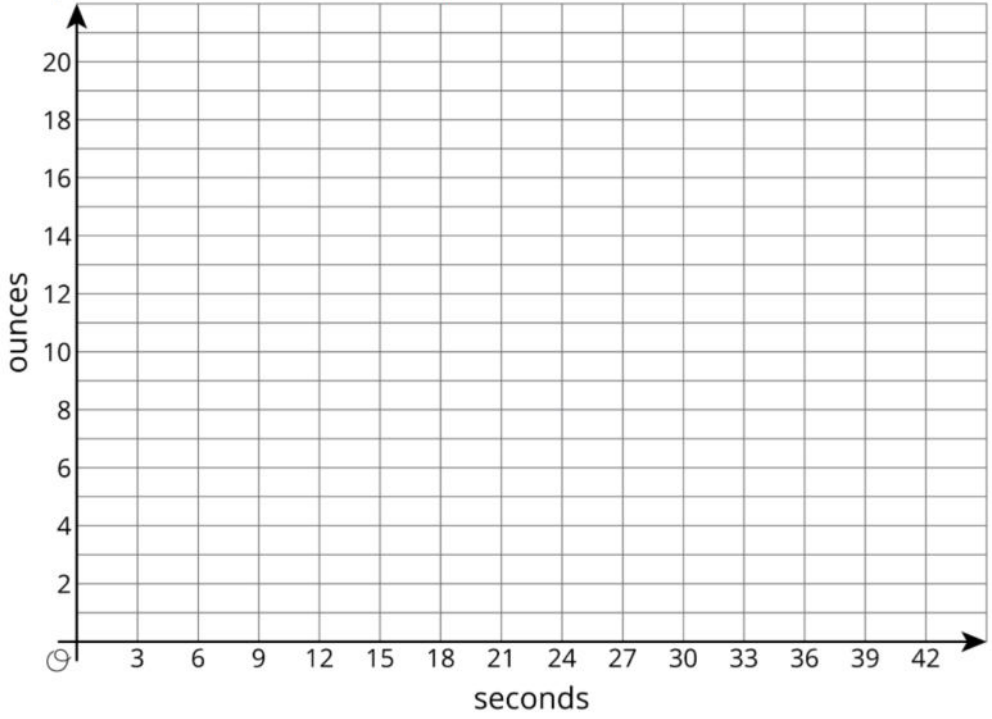
4-12: Learning Targets

- I can make graphs to find an ordered pair that two real-world situations have in common.
- I can explain what a system of equations is.
- I can explain the solution to a system of equations in a real-world context.

4-12-4: Milkshakes, Revisited

Determined to finish her milkshake before Diego, Lin now drinks her 12 ounce milkshake at a rate of $\frac{1}{3}$ an ounce per second. Diego starts with his usual 20 ounce milkshake and drinks at the same rate as before, $\frac{2}{3}$ an ounce per second.

1. Graph this situation on the axes provided.



2. What does the graph tell you about the situation and how many solutions there are?