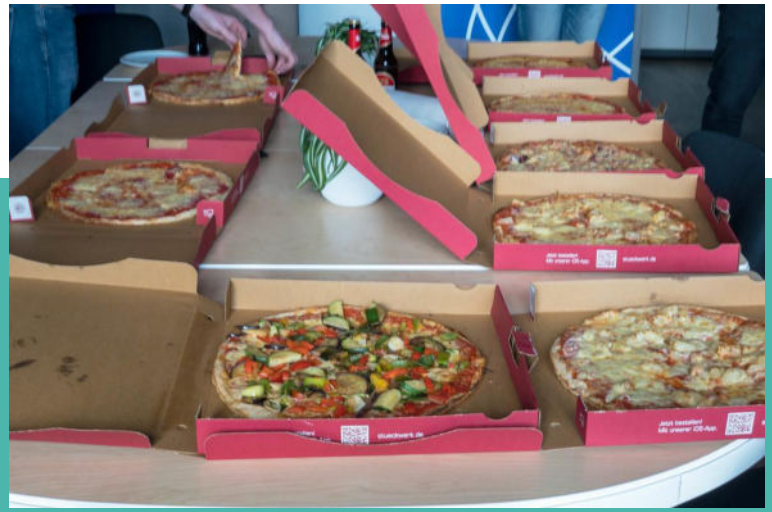
Let's write expressions to estimate the cost of a pizza party.



1. I can explain the meaning of the term "constraints".
2. I can tell which quantities in a situation can vary and which ones cannot.
3. I can use letters and numbers to write expressions representing the quantities in a situation.

Activity 1: Here are some letters and what they represent. All costs are in dollars.

- m represents the cost of a main dish.
- n represents the number of side dishes.
- s represents the cost of a side dish.
- t represents the total cost of a meal.

1. Discuss with a partner: What does each equation mean in this situation?
   a. $m = 7.50$
   b. $m = s + 4.50$
   c. $ns = 6$
   d. $m + ns = t$
2. Write a new equation that could be true in this situation.

Activity 1 Synthesis

What is an equation? What does it tell us?

Can equations contain only numbers? Only letters? A mix of numbers & letters?

The last question asked you to write an equation that could be true. Could this equation be true: m + 5 = t? How do you know?

One equation tells us that a main dish is $7.50. Another equation tells us that it is equal to the expression. Could both be true? Are they both appropriate for expressing the cost of a main dish?

Activity 2: How much will it cost?

Has anyone ever planned a party?

What types of things do you have to think about?

Activity 2: How much will it cost?

Imagine being in charge of class pizza party.

Your job is to work with your group to present a plan and cost estimate for the party.

Activity 2: How much will it cost?

Record your group's plan and cost estimate.

What would it take to convince the class to go with your group's plan? Be prepared to explain your reasoning.

Activity 2: How much will it cost?

Share your plan with another group.

Activity 2: How much will it cost?

Class share-out.

Activity 2: How much will it cost?

Write down one or more expressions that show how your group's cost estimate was calculated.

*In your expression(s), are there quantities that might change on the day of the party? Which ones?

*Rewrite your expression(s), replacing the quantities that might change with letters. Be sure to specify what the letters represent.

Activity 2 Synthesis

What at are some of the expressions you wrote?

Activity 2 Synthesis

These expressions are examples of mathematical **models**. They are mathematical representations of a situation in life that can be used to make sense of problems and solve them. We will look more closely at how expressions could represent the quantities in a situation like party planning, which involves certain conditions or requirements.

Activity 3: What Are the Constraints?

A **constraint** is something that limits what is possible or reasonable in a situation.

For example, one constraint in a pizza party might be the number of slices of pizza each person could have, s. We can write $s < 4$ to say that each person gets fewer than 4 slices.

Activity 3: What Are the Constraints?

1. Look at the expressions you wrote when planning the pizza party earlier.
   a. Choose an expression that uses one or more letters.
   b. For each letter, determine what values would be reasonable. (For instance, could the value be a non-whole number? A number greater than 50? A negative number? Exactly 2?)
2. Write equations or inequalities that represent some constraints in your pizza party plan. If a quantity must be an exact value, use the = symbol. If it must be greater or less than a certain value to be reasonable, use the > or < symbol.

Activity 3 Synthesis

What constraints make sense in your plan?

Lesson 1 Synthesis

In planning a pizza party, what were some ways we gathered information to estimate the cost?

What were some assumptions we made?

Suppose we had gathered information differently, for instance, by asking every student the exact pizza toppings and number of slices. Would that have been a reasonable approach? How would that have changed the cost estimate?

Lesson 1 Synthesis

Suppose we had made a different set of assumptions, for instance, assuming that everyone loved pepperoni and would like only 1 slice. How would that have changed the cost estimate?

In planning the party, we saw some examples of constraints. Can you think of some constraints in other situations? What might be some constraints in, say, planning a field trip, or in organizing a community service event?

Lesson 1 Synthesis

Expressions, equations, and inequalities are mathematical models. A **model** is a mathematical representation of a real-life situation. When people create models, they rely on the information they have, but they also make assumptions and decisions which affect the models. If the information or assumptions change, the model would also change.

Lesson 1 Cool Down

As a reward for achieving their goals, all students in the ninth grade are invited to an ice cream party.

1. Write an expression that could represent an estimated cost for the party. Use at least one letter. State what each part of the expression represents.
2. Choose a letter in your expression. Describe the values that would be reasonable for the quantity that the letter represents.