Invest Systematically

Linear Systems of Equations

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Grade Level	10th – 11th Grade	**Time Frame**	100 minutes
Subject	Mathematics	**Duration**	2 class periods
Course	Algebra 2, Precalculus		

Essential Question

How can we use systems of equations to solve real-world problems?

Summary

In this lesson, students will investigate how to use systems of equations to solve real-world problems. This is a great lesson to wrap up a unit on systems of equations, after students have become familiar with solving systems using any method. This lesson will connect solving systems to real-world applications using various strategies.

Snapshot

Engage

Students view a variety of images, each representing a real-world situation, and create a system of equations to match each situation.

Explore

Students individually match real-world situations to the correct system of equations.

Explain

Students discuss how and why they matched real-world situations to systems of equations.

Extend

Students investigate the best possible way to invest money in different accounts using a system of equations.

Evaluate

Students complete an exit ticket based on a real-world situation that requires them to create and solve a system of equations. Evaluation may also occur throughout the lesson through informal observations.

Standards

Oklahoma Academic Standards Mathematics (Algebra 2)

A2.A.1.7: Represent and evaluate mathematical models using systems of linear equations with a maximum of three variables. Graphing calculators or other appropriate technology may be used.

Attachments

- IS Exit Ticket Question.pdf
- Invest Systematically Card Sort - Spanish.docx
- Invest Systematically Card Sort.docx
- Invest Systematically Engage Images - Spanish.docx
- Invest Systematically Engage Images.docx
- Invest Systematically Handout - Spanish.docx
- Invest Systematically Handout.docx

Materials

- Engage images (attached)
- Card Sort (attached)
- Invest Systematically handout (attached)
- Exit Ticket question (attached)
- Index cards
- Projector

Engage

Teacher's Note: Lesson Preparation

Print out the attached Card Sort for each student. Cut up the cards, shuffle them, and keep them together with a paper clip, in an envelope, or in some other way. Also print out the attached "Invest Systematically Handout" for each student, and be prepared to display the attached "Invest Systematically Engage Images" and "IS Exit Ticket Question" in some fashion.

Begin the lesson by placing all students in pairs. Pass out an index card, or something similar, to each student. Students will write their names on the index cards and label one side "Engage" and the other side "Exit Ticket."

Using a projection screen, document camera, or paper copies, and the "Invest Systematically Engage Images," display one picture at a time to the class. After displaying an image, have students work in pairs to create a system of equations for that image and write it on the "Engage" side of their index cards. Give students ample time to complete each system of equations before moving on to the next image. Continue until students have written a system of equations for all three images.

After student pairs have written a system of equations for all three images, they will share a system for one of the images with the class. Ask students to explain the reasoning behind their choice of variables, coefficients, and operations. Have several student pairs share systems for each image to demonstrate that there may be multiple systems of equations for each.

Teacher's Note: Guiding Class Discussion

There are no wrong answers, as long as students can give justification for their choices. This is a great opportunity for the class to discuss whether certain values and operations are reasonable in a given situation. This is also a great time to stress the importance of defining variables and labeling what each variable represents on paper.

Explore

Distribute the attached Card Sort to each student and ask the class to work individually to match each real-world situation card to a system of equations card.

Using only the first portion of the instructional strategy I Think/We Think, have the students write a justification statement for each pair of cards they match. The second portion of this instructional strategy will be completed in the next step of this lesson, "Explain."

Explain

Students will finish the second half of the I Think/We Think strategy and discuss with partners why they matched the real-world situations and system of equations cards the way they did. Each student will give justification to the other student in the pair for each matched choice.

After this discussion, partners will choose and record a consensus justification for each match. Student pairs will share out the justification for their choices with the entire class.

Be sure to facilitate conversations about correct values for coefficients, defining variables, and using correct operations. Some questions to pose to the class include:

- What is the relationship between coefficients and variables?
- What is the purpose of a variable?
- What does it mean to define a variable?
- Will using incorrect operations have an impact on a system?
- What does the equal sign really mean?

Extend

Distribute the attached "Invest Systematically Handout" to each student. Students will work in groups of two or three to complete the activity. Monitor each group and ask guiding questions. Examples of guiding questions include:

- What are the variables and what do they represent?
- What are the coefficients and which variables should they be attached to?
- What operations should be placed between these variables?
- What do these expressions or variables equal?

After students have completed the handout, they will share out their investment strategies with the whole class, describe what they found challenging, and explain how they dealt with obstacles.

Evaluate

Students will refer back to the index card that they used at the beginning of class. Project, copy, or display on a board the attached "IS Exit Ticket Question," and have students write their answers individually on the side of the card that says "Exit Ticket."

Resources

- K20 Center. (n.d.). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (n.d.). Card sort. Strategies. https://learn.k20center.ou.edu/strategy/147
- K20 Center. (n.d.). I think/we think. Strategies. https://learn.k20center.ou.edu/strategy/141