Special Systems (6-4)

Grade Level and Content

8th Grade Algebra

Big Idea

Students consider the vocabulary—consistent, inconsistent, independent, and dependent—and the graphical relationship between the lines in each type of system. They solve several systems and discover the characteristics of each type of system.

Objectives

Students will be able to …

1. Correctly solve special cases of linear systems 8 out of 10 times.
2. Correctly classify a system based on its number of solutions 8 out of 10 times.

PA State Standards

Anchor Descriptor - A1.1.2.2: Write, solve and/or graph systems of linear equations using various methods.

A1.1.2.2.1: Write and/or solve a system of linear equations (including problem situations) using graphing, substitution and/or elimination (limit systems to 2 linear equations).

A1.1.2.2.2: Interpret solutions to problems in the context of the problem situation (systems of 2 linear equations only).

Rationale for Students

The graphics and color will promote interest and motivation. Students need to know this technique for future classes and for future standardized tests. It is required by the standards.

Materials

- 1 promethean board with computer
- 22 copies: Graphic Organizer

Adaptations for Special Needs

No adaptations were recommended by the special education teacher. I approach this lesson first by presenting new properties and questioning in a way that guides students to put the pieces together on their own. I then summarize or have students summarize the steps required to solve the problem. For this lesson, I use a graphic organizer to help students remember the vocabulary needed to classify systems. ST7, the ELL student, will benefit from this organizer.

Technology

The promethean board will be used to present the lesson and enables the teacher and the students to work out solutions together. Students have access to online tutorials for each section so they can review concepts and have guided practice at home. All assignments will be posted on the class website so students who miss class won't fall behind.

Homework Check

As a warm-up, students consider two equations, one that has no solution and one that has infinite solutions. This exercise brings back prior knowledge of equations that are contradictions and never true and equations that are identities and always true.

1.) contradiction: 0 = 1
2.) identity: $2x + 2 = 2x + 2$
Recall: a false equation is a contradiction - there are no solutions - zero never equals one - never true

Recall: an equation that is always true is an identity - there are infinitely many solutions

Procedure   33 minutes, 40 minutes

Homework   10 minutes, 17 minutes

Go over the homework.

Interactive Presentation and Guided Practice   15 minutes, 32 minutes

Vocabulary slide

Can you have a consistent independent system?
Can you have a consistent dependent system?
Can you have an inconsistent independent system?
Can you have an inconsistent dependent system?
What type of lines are inconsistent?
     Parallel - Why? On a graph, what is the solution to a system of linear equations? (The point where the lines
     intersect.) Parallel lines have no solution because they do not interesect.
Students write down the vocabulary under "Number of Solutions."

We are going to learn all of the characteristics of the three types today so you know how to identify them.

Example 1 slide

Solve the system using any method.
How many solutions?
Exactly one solution
All of the systems that we've looked at so far have had exactly one solution.
We're not going to officially graph example 1 because you know what is going to happen.
What is the "exactly one" solution in terms of the lines on a graph?
GRAPHIC ORGANIZER
GRAPH: intersecting lines
When two lines intersect, how do their slopes compare? y-intercepts?
Could the y-intercepts be the same? (YES - the y-int. would be the solution then.)
GRAPHIC ORGANIZER
DESCRIPTION: different slopes

Example 2 and 3 slides

Solve using any method.
How many solutions?
No solution - contradiction - never true
NO points make both equations true.

What do you think the "no solution" will look like in terms of the lines on a graph?

Graph the system.

GRAPHIC ORGANIZER

GRAPH: parallel lines

When two lines are parallel, how do their slopes compare? y-intercepts?

GRAPHIC ORGANIZER

DESCRIPTION: same slopes, different y-intercepts

Example 4 slide

Solve using any method.

How many solutions?

Infinitely many - identity - always true

What do you think the "infinitely many solutions" will look like in terms of the lines on a graph?

EVERY point that makes one equation true also makes the other one true.

Graph the system.

GRAPHIC ORGANIZER

GRAPH: coincident lines/the same line

When two lines are the same, how do their slopes compare? y-intercepts?

GRAPHIC ORGANIZER

DESCRIPTION: same slopes, same y-intercepts

Closing/Homework   5 minutes, 45 minutes

How many ways are there to determine the number of solutions? You can solve the system or compare slopes and y-intercepts.

In what type of system do the equations have different slopes? How many solutions does this system have?

In what type of system do the equations have the same slopes with different y-intercepts? How many solutions does this system have?

In what type of system do the equations have the same slopes and the same y-intercepts? How many solutions does this system have?

🏠 Homework

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