Unit 6
World Records: Graphing and Systems of Linear Equations

Standards

1.4 Use appropriate mathematical symbols to translate word phrases into variable expressions and word sentences into equations or inequalities.
6.2. Add and subtract polynomials.
6.3. Multiply polynomials.
7.4 Graph sets of ordered pairs, linear equations in two variables by using intercepts, slope and a point, and point-plotting.
10.1 Solve systems of linear equations by graphing, substitution, and linear combinations.

Day 1
Interpreting Graphs, Part 1

Connections

Prior Work	Current Big Idea	Future Work
• Graphing linear equations. • Graphing equations that are not linear.	• Review relationships between equations and their graphs.	• Solving systems of equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-15 minutes	• Complete WR-1 with teacher and study team.	• Complete WR-1 with students. • Guide students in recognizing the relationship between equations and their graphs.	• Students are NOT expected to recognize several of the equations and graphs.
Explore 20-30 minutes	• Complete WR-2 and WR-3 with study team.	• Suggest that teams work closely together to determine a strategy of attack matching the graphs to the equations. • Students will not recognize several of the equations or the graphs. • Encourage the students with questions such as "**How do you start any graphing problem?" "Start with something you know."** • Do not give hints. The purpose of the	• The purpose of the problems is to have students apply what they know about graphs and equations.

Steps	Student Activity	Teacher Support	Comment/Evaluation
		problems is to have students apply what they know about graphs and equations. • The graph interpretation for WR-3 is complicated with “messy” data.	• Both of the problems WR-1 and WR-3 will be revisited later in the unit.
Summary 10-15 minutes	• Share strategies used for WR-1, WR-2, and WR-3.	• Have students discuss the different methods teams used to solve WR-3.	
Homework	• Read PZL-20 • WR-5 – WR-9.		

Day 2
Writing Equations to Solve Problems

Connections

Prior Work	Current Big Idea	Future Work
• Solve equations by "Guess and Check."	• Translate word sentences into equations. • Find solutions for word problems.	• Find solutions for systems of linear equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	• Complete WR-11 with teacher and study team.	• Complete WR-11 with students. • A "Guess and check" table, listing all steps, might be used before starting the translation of the problems into an equations. • Monitor students' progress and supply guidance in the steps of the process.	
Explore 20-25 minutes	• Complete WR-10, WR-12, and WR-13 with study team.	• WR-10 is a revisit of WR-1. • Students may need manipulatives, such as tiles for WR-12.	• Stress the fact that finding the solution to an equations means finding the elements that make the open sentence true. • WR-10 reinforces the fact that points on a graph represent ordered pairs that

Steps	Student Activity	Teacher Support	Comment/Evaluation
			make the open sentence true.
Summary 10-15 minutes	• Share solutions to WR-12 and WR-13.	• Select study teams to discuss WR-11 through WR-13 with class.	
Homework	• WR-14 –WR-19.		

Day 3
Interpreting Graphs, Part 2

Connections

Prior Work	Current Big Idea	Future Work
• Graphing linear equations.	• Interpreting rate of change.	• Slope for given lines.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-15 minutes	• Complete WR-20 with teacher and team.	• Complete WR-20 with class. • The rate of change is used as a way to focus on the steepness of the lines.	• Students should produce logical explanations for interpretations of graph.
Explore 20-25 minutes	• Complete WR-21 and WR-22 with study team.	• Guide students in their interpretations for the graph. • Ask questions such as: **"Who is going** faster?" "What is speed?' to help teams focus on the interpretation of the graph. • WR-22 reinforces the idea that the graph of an given equation contains the solutions to the given equation.	
Summary	• Share interpretations for WR-21 and WR-22 with class.	• Select study teams to share interpretations for WR-21 and WR-22	

Steps	Student Activity	Teacher Support	Comment/Evaluation
8-10 minutes		with class.	
Homework	WR-23 –WR-27.		

Day 4
Graphing Lines Using Two Points

Connections

Prior Work	Current Big Idea	Future Work
• Graphing linear equations.	• Two-points determine a line.	• Graphing systems of equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-10 minutes	• Follow teacher led discussion.	• Lead discussion on how many points determine a line. • Ask students to draw one point on their paper. • **"How many lines can be drawn through the point?"** • Put a point on the blackboard or overhead. • Invite volunteers to draw the line you are 'thinking' of. • After several attempt ask students if it would help if you gave them another point on your line. • Draw another point. • Have student draw the line that is your special line. • Demonstrate the use of the point where the line crosses the y-axis.	• Guide students in understanding that two points are sufficient to sketch the graph of a linear equation. • A third points is usually used for the sake of checking. • The y-intercept is a single number.

Steps	Student Activity	Teacher Support	Comment/Evaluation
			• The point where the line intersects the y-axis is an ordered pair.
Explore 20-25 minutes	• Complete WR-28, WR-29, WR-30, WR-31and WR-32 with study team.	• Students should notice as they proceed that the x-coordinate for the point where the line crosses the y-axis is always 0.	• The text is in error on part b0 of WR-29. The y-intercept is a single number not an ordered pair.
Summary 8-10 minutes	• Add the "Two Point Graphing Method" in the toolkit. • Share solutions for WR-28 through WR-32 with class.	• Select study teams to share WR-28 through WR-32 with class.	•
Homework	WR-33 – WR37.		

Day 5
Solving Linear Systems by Graphing and Substitution

Connections

Prior Work	Current Big Ideas	Future Work
• Graphing linear equations.	• Solve systems of linear equations by graphing. • Solve systems of linear equations by substitution.	• Solve systems of equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-15 minutes	• Complete WR-39 and WR40 with teacher and team.	• Demonstrate finding point of intersection of system of linear equations by graphing. • Demonstrate finding point of intersection of system of linear equations by using the substitution method.	• Reinforce the idea that the ordered pair for the point of intersection will make true sentences for each equation in the system.
Explore 20-25 minutes	• Complete WR-42, WR-43, and WR-44 with study team.	• Emphasis that sometimes it is difficult to find the point of intersection for systems of linear equations just by graphing. • Guide students in adding the substitution method for solving systems of equations in the toolkit.	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Summary 8-10 minutes	• Add substitution method for solving systems of equations in toolkit.	• Select study teams to present solutions for WR-42, WR-43, and WR-44.	
Homework	WR-46 – WR-50.		

Day 6
Applying Linear Systems of Equations

Connections

Prior Work	Current Big Ideas	Future Work
• Translate word sentences into equations. • Solve systems of linear equations.	• Solve word problems using systems of equations.	Solve systems of equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 15-20 minutes	• Complete portions of WR-51 with teacher and class.	• Complete parts a) through e) with students.	• Students should be able to find equations for WR-51 without using a Guess and Check table. • Use Guess and Check table only is necessary.
Explore 20-25 minutes	• Complete WR-51 and WR-52 with study team.	• Guide students in completing WR-51. • Students may not have time to complete WR-52. Portions may need to be completed for homework.	
Summary	• Complete WR-52 with study team.	• Students may need the time to complete WR-52.	

Steps	Student Activity	Teacher Support	Comment/Evaluation
6-8 minutes			
Homework	WR-53 – WR-58.		

Day 7
More Application of Linear Systems

Connections

Prior Work	Current Big Idea	Future Work
• Translate work sentences into equations. • Solve systems of linear equations.	• Solve word problems using systems of equations.	• Solve systems of equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-15 minutes	• Share solutions to WR-52 with class.	• Discuss solutions for WR-52 with class.	• Continuation of development between writing equations, graphing, and solving systems of equations.
Explore 20-25 minutes	• Complete WR-59, WR-60, and WR-61 with study team.	• Guide students in analysis and interpretation of graphs. • Reinforce the idea that the point of intersection for the system of equations is an ordered pair that makes each equation in the system true.	
Summary 8-10 minutes	• Discuss WR-59, WR-60, and WR-61 with class.	• Select study teams to discuss WR-59, WR-60, and WR-61 with class.	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Homework	WR-63 – WR-69.		

Day 8
Multiplying Binomials

Connections

Prior Work	Current Big Idea	Future Work
• Use the distributive property to multiply monomials. • Use the distributive property to multiply monomials and binomials.	• Use the distributive property to multiply binomials.	• Use the distributive property to factoring quadratic trinomials.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	• Follow teacher demonstration in multiplying binomials using Algebra Tiles.	• Review using the Algebra Tiles for multiplication of monomials. • Review the names of the Algebra Tiles pieces. • Demonstrate multiplication of binomials using Algebra Tiles using example from WR-70.	• Some students may be familiar with multiplication of binomials.
Explore 20-25 minutes	• Complete WR-70, WR-71, WR-72, and WR-73 with study team.	• Complete all parts of WR-70 with class. • Some students may see multiplication of binomials as using the distributive property twice.	• Avoid using the FOIL method. It does not lead to understanding.

Steps	Student Activity	Teacher Support	Comment/Evaluation
Summary 8-10 minutes	• Add WR-72 in toolkit.	• Discuss the idea that area may be written as a product or as a sum.	
Homework	WR-74 – WR-80.		

Day 9
Binomial Squares

Connections

Prior Work	Current Big Idea	Future Work
• Find products of binomials.	• Find patterns created by squaring binomials.	Factoring trinomials.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	• Complete WR-81 with teacher and team.	• Complete WR-81 with class.	
Explore 20-25 minutes	• Complete WR-82, WR-83, and WR-84 with study team.	• Use Algebra Tiles in investigating the patterns created in squaring the binomials.	
Summary 15-20 minutes	• Complete WR-85 with study team.	• Monitor study team selections and the explanations.	• Good assessment on students' perception of concepts used in unit.
Homework	WR-87 – WR-89, WR-94.		

Day 10
Unit Review

Connections

Prior Work	Current Big Idea	Future Work
• Interpret graphs. • Translate word sentences to equations. • Solve systems of linear equations.	• Review of unit: Interpret graphs. Translate word sentences to equations. Solve systems of linear equations.	• Solve systems of equations. Factor trinomials.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	• Discuss WR-87 and WR-88 from homework.	• Facilitate discussion on WR-87 and WR-88.	
Explore 20-25 minutes	• Complete WR-95, WR-96, WR-97, and WR-98 with study team.	• Guide students in review process for the unit.	
Summary 10-15 minutes	• Complete WR-106 Toolkit Clean-Up.	• Remind students that the consolidated toolkit should represent the needed tools for the first semester of Algebra I.	
Homework	• Review for Unit 6 assessment.		