

Unit 4

Choosing a Phone Plan: Writing and Solving Equations

Standards

- 1.4 Use appropriate mathematical symbols to translate word phrases into variable expressions and word sentences into equations or inequalities.
- 3.3 Use the distributive property to combine similar terms.
- 4.1 Solve equations using the addition property of equality or subtraction property of equality.
- 4.2 Solve equations using the multiplication property of equality or division property of equality.
- 4.3 Solve first-degree literal equations or formulas for specified variable.

Day 1

Writing Equations From Guess and Check Tables

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Use Guess and Check tables to find solutions to given problems. 	<ul style="list-style-type: none"> Write equations from Guess and Check tables. 	<ul style="list-style-type: none"> Use appropriate mathematical symbols to translate word sentences into equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-15 minutes	<ul style="list-style-type: none"> Read PZL-16. 	<ul style="list-style-type: none"> Read PZL-16 with class. Demonstrate and model CP-1 for the class. 	<ul style="list-style-type: none"> Keep demonstration of CP-1 under 10 minutes.
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete CP-2 and one problem from CP-4 through CP 8 with study team. 	<ul style="list-style-type: none"> Model CP-2 using Guess and Check tables. Guide students in writing the in-between steps in words or symbols. Students need to understand the process of each step. 	<ul style="list-style-type: none"> Many students intuitively guess at the correct answer but are unable to describe the steps involved. Guess and Check tables help students identify the steps involved in finding solutions.
Summarize 5-8 minutes	<ul style="list-style-type: none"> Share solutions from CP-4 through CP-8 with class. 	<ul style="list-style-type: none"> Select teams to share solutions of CP-4 through CP-8 with class. If time is limited, use portion of Launch time tomorrow. 	<ul style="list-style-type: none"> Students need to understand that the equations may be written in a variety of ways.

Steps	Student Activity	Teacher Support	Comment/Evaluation
Homework	<ul style="list-style-type: none">• Cp-9 through CP-14.	<ul style="list-style-type: none">• Assign CP-14 for “Choosing A Phone Plan.”	

Day 2
More Writing Equations

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Use Guess and Check tables to find solutions to given problems. 	<ul style="list-style-type: none"> Write equations from Guess and Check tables. 	<ul style="list-style-type: none"> Use appropriate mathematical symbols to translate word sentences into equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 8-10 minutes		<ul style="list-style-type: none"> Have study team present solutions to CP-4 through CP-8 if time did not permit this yesterday. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete CP-15 through CP-18 with student team. 	<ul style="list-style-type: none"> Model Guess and Check table for CP-15 with class. Student may have difficulty in seeing x and $105 - x$ as two numbers whose sum is 105. CP-19 may be assigned. There are two answers go CP-19 which should generate discussions when solutions are presented. 	<ul style="list-style-type: none"> Discussion may be necessary for entire class in the writing "whole and part" with the same variable.
Summarize	<ul style="list-style-type: none"> Students present solutions to class. 	<ul style="list-style-type: none"> Select study teams to present solutions to class. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
10-12 minutes			
Homework	<ul style="list-style-type: none">• CP-20 throughCP-26.	<ul style="list-style-type: none">• Assign CP-26 for “Choosing A Phone Plan.”	

Day 3

Solving Equations With Cups and Tiles

Connections

Prior Work	Current Bid Idea	Future Work
<ul style="list-style-type: none"> Write equations using Guess and Check tables. 	<ul style="list-style-type: none"> Use manipulatives to demonstrate the algebraic steps involved in solving equations. 	<ul style="list-style-type: none"> Use properties of equality to solve equations.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	<ul style="list-style-type: none"> Follow teacher in demonstration of using Cups and Tiles for solving equations. 	<ul style="list-style-type: none"> Demonstrate solving equations using cups and tiles (or algebra tiles) while students follow along. Use teaching examples in Teacher Guide Unit 4, page 13. You may want to use a two-pan balance. 	<ul style="list-style-type: none"> The use of Cups and Tiles become awkward when it comes to dividing and getting fractions. The purpose of using Cups and Tiles, etc. is to demonstrate the algebraic properties of equality. The manipulatives are used to show that the equations need always to be balanced.
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete CP-27 and CP-28 with study team. 	<ul style="list-style-type: none"> State part a) of CP-27 using manipulatives. Show the algebraic steps of using subtraction property of equality and 	<ul style="list-style-type: none"> Some students may already know how to use the algebraic properties of equality to write equivalent

Steps	Student Activity	Teacher Support	Comment/Evaluation
		division property of equality to write equivalent equations. <ul style="list-style-type: none"> • Do not insist that students use manipulatives to solve equations.. 	equations.
Summarize 8-10 minutes	<ul style="list-style-type: none"> • Share solutions with class. 	<ul style="list-style-type: none"> • Select study teams to share solutions with class. 	
Homework	<ul style="list-style-type: none"> • CP-30 throughCP-36. 	<ul style="list-style-type: none"> • Assign CP-36 for “Choosing A Phone Plan.” 	

Day 4
Solving Simple Equations With Cups and Tiles

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Solve simple equations using manipulatives to demonstrate the algebraic properties of equality. 	<ul style="list-style-type: none"> Write equivalent equations using addition and/or multiplication properties of equality. Solve simple equations using addition and/or multiplication properties of equality. 	<ul style="list-style-type: none"> Solve equations and inequalities using properties of equality and properties of order.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch 10-15 minutes</p>	<ul style="list-style-type: none"> Follow teacher's demonstration. 	<ul style="list-style-type: none"> Provide demonstration or modeling of the steps involved in writing equivalent equations using addition and/or multiplication properties of equality. 	<ul style="list-style-type: none"> Emphasize that equivalent equations are equations that have the same solution set.
<p>Explore 20-15 minutes</p>	<ul style="list-style-type: none"> Complete CP-38-Cp-40 with study team. 	<ul style="list-style-type: none"> Encourage study teams to try the problems without using tiles. Check to make sure students understand the algebraic justification for each equivalent equation. Remind students to check the solution set. 	<ul style="list-style-type: none"> Encourage students to see why each new sentence obtained by application of the property of equality remain equivalent to the original.

Steps	Student Activity	Teacher Support	Comment/Evaluation
		<ul style="list-style-type: none"> The solution sets include elements that make the open sentence true. 	
Summarize 8-10 minutes	<ul style="list-style-type: none"> Share solutions and justifications of each transformation to equivalent sentence. 	<ul style="list-style-type: none"> Select students to share solutions and justifications of transformation of equivalent sentences to class. 	<ul style="list-style-type: none"> Students may need help in stating the justifications.
Homework	<ul style="list-style-type: none"> CP-41 through CP-47. 	<ul style="list-style-type: none"> Assign CP-47 for "Choosing a Phone Plan." 	

Day 5
Common Terms Factoring and More Equations

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Solve simple equations using properties of equality. 	<ul style="list-style-type: none"> Solve simple equations with fractional and negative coefficients for the variable. 	<ul style="list-style-type: none"> Solve equations and inequalities.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>10-15 minutes</p>	<ul style="list-style-type: none"> Follow teacher in solving equations given by teacher. 	<ul style="list-style-type: none"> Write equations 10 through 3) from Teacher Guide Unit 4, page 20 on overhead. Invite students to solve equations. Ask students what they would do with $-4x = 8$ Lead students in seeing patterns for writing equivalent equations in the form of $x = \text{something}$. 	
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> Complete CP-48 with study team. Complete CP-49 with study team. 	<ul style="list-style-type: none"> Have student complete CP-48 with study team. Guide students in finding the patterns for writing equivalent equations using properties of equality. Guide students in using the same 	<ul style="list-style-type: none"> Discuss CP-48 with class before proceeding with CP-49.

Steps	Student Activity	Teacher Support	Comment/Evaluation
	<ul style="list-style-type: none"> Complete Cp-51 and CP-52 with teacher and study team. 	<p>pattern in solving equations with fractional coefficients for the variable.</p> <ul style="list-style-type: none"> Model multiplication using the distributive property followed by the modeling of factoring using the distributive property. 	<ul style="list-style-type: none"> Explain and demonstrate that multiplication and factoring the inverse processes.
<p>Summarize 8-12 minutes</p>	<ul style="list-style-type: none"> Share solutions and justifications with class. 	<ul style="list-style-type: none"> Select students to share solutions and justifications with class. 	<ul style="list-style-type: none"> Student should find that solving equations with negative or fractional coefficients for the variable
<p>Homework</p>	<ul style="list-style-type: none"> CP-56 through CP-60, CP-62. 	<ul style="list-style-type: none"> Assign CP-62 for “Choosing A Phone Plan.” 	

Day 6
Solving Equations as Inverse Operations

Connections

Prior Work	Current Bid Idea	Future Work
<ul style="list-style-type: none"> Solve simple equations using properties of equality. 	<ul style="list-style-type: none"> Solve equations by working backwards. 	Solve equations and inequalities.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>10-15 minutes</p>	<ul style="list-style-type: none"> Read CP-64. 	<ul style="list-style-type: none"> Read CP-64 with class. 	<ul style="list-style-type: none"> Students have followed 'patterns' in applying properties of equality to write equivalent equations. Students are led into seeing the patterns as working backwards or using the inverse.
<p>Explore</p> <p>2-25 minute</p>	<ul style="list-style-type: none"> Complete CP65 through CP 67 with study team. 	<ul style="list-style-type: none"> Guide student through part a0 of CP-65. Demonstrate or model the 'undoing' of what has been done to get the variables to be the only term on one side of the equations. Remind the students that the 	<ul style="list-style-type: none"> The mathematical idea for "undoing" is finding the inverse.

Steps	Student Activity	Teacher Support	Comment/Evaluation
		<p>properties of equality are still being used to write equivalent equations.</p> <ul style="list-style-type: none"> The patterns for writing equivalent equations can be stated as “undoing” the original equations. 	
<p>Summarize 8-10 minutes</p>	<ul style="list-style-type: none"> Present solutions and justifications to class. 	<ul style="list-style-type: none"> Select students to present solutions together with justifications to class. 	
<p>Homework</p>	<ul style="list-style-type: none"> CP-69 through CP-72, CP-73, CP-76. 	<ul style="list-style-type: none"> Assign CP-76 for “Choosing A Phone Plan.” 	

Day 7
Equations With Parenthesis

Connections

Prior Work	Current Big Idea	Future Work
Solve equations by working backwards.	Solve equations containing parenthesis.	Solve equations and inequalities.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	<ul style="list-style-type: none"> Add information relating to solving equations containing parenthesis to tool kit. 	<ul style="list-style-type: none"> Quick review of using the distributive property. Model solving equations containing parenthesis. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete CP-78 and CP-79. Complete CP-80 through CP83 with study team. 	<ul style="list-style-type: none"> After CP-78 and CP-79 discuss question concerning which solution method is "correct." 	
Summarize 8-10 minutes	<ul style="list-style-type: none"> Share solutions and justifications with class. 	<ul style="list-style-type: none"> Select students to share solutions and justifications with class. 	
Homework	<ul style="list-style-type: none"> CP-85 through CP-87, CP-89. CP-91. 	<ul style="list-style-type: none"> Assign CP-91 for "Choosing A Phone Plan." 	

Day 8
Choosing the Phone Plan

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Solve simple equations. 	<ul style="list-style-type: none"> Graph systems of equations. Write equations. 	<ul style="list-style-type: none"> Solve equations and inequalities.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>10-15 minutes</p>	<ul style="list-style-type: none"> Read CP-92 with study team. 	<ul style="list-style-type: none"> The information for the two phone plans is imbedded in the advertisements. 	<ul style="list-style-type: none"> This lesson may be optional.
<p>Explore Summarize</p> <p>30-40 minutes</p>	<ul style="list-style-type: none"> Complete CP-92 with study team. Share process and results with class. 	<ul style="list-style-type: none"> CP-92 will take the entire class period. Allow teams to struggle but allow teams to share their process and results with class. 	
<p>Homework</p>	<ul style="list-style-type: none"> CP-93 through CP-98. 		

Day 9
Literal Equations

Connections

Prior Work	Current Big Idea	Future Work
<ul style="list-style-type: none"> Solve simple equations. 	<ul style="list-style-type: none"> Solve literal equations for specified variable. 	<ul style="list-style-type: none"> Solve equations and inequalities for specified variable.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
Launch 10-15 minutes	<ul style="list-style-type: none"> Complete CP-99 with teacher. 	<ul style="list-style-type: none"> Complete CP-99 with class. Stress process used in getting “x” as a single term on one side of the equation. 	
Explore 20-25 minutes	<ul style="list-style-type: none"> Complete CP-100 through CP-103 with study team. 	<ul style="list-style-type: none"> Guide students in solving for the specified variable. 	
Summarize 10-15 minutes	<ul style="list-style-type: none"> Share solutions and process with class. 	<ul style="list-style-type: none"> Select students to share solutions and process with class. Students may want to start homework. 	
Homework	<ul style="list-style-type: none"> CP-104 through CP-110. 		

Day 10
Unit Summary

Connections

Prior Work	Current Big Idea	Future Work
Solve simple equations.	<ul style="list-style-type: none"> • Translate word sentences into algebraic equations. • Solve simple equations. • Solve literal equations for specified variables. • Use the distributive property for multiplying and factoring. 	<ul style="list-style-type: none"> • Solve equations and inequalities.

Lesson Process

Steps	Student Activity	Teacher Support	Comment/Evaluation
<p>Launch</p> <p>5-10 minutes</p>	<ul style="list-style-type: none"> • List mathematics ideas or topics from Unit 4. • Complete CP-111 as directed by teacher. 	<ul style="list-style-type: none"> • Students list mathematics ideas or topics from Unit 4. • Guide students in selecting a problem that demonstrate each main idea. • Solve problems and show all work. • Explain the strategies or methods used for arriving at the solution. 	<ul style="list-style-type: none"> • Students have difficulties in knowing what or how to study or review for mathematics.
<p>Explore</p> <p>20-25 minutes</p>	<ul style="list-style-type: none"> • Complete CP-112 through CP-116 with study team. 	<ul style="list-style-type: none"> • Guide students in identification of main concepts and skills. 	

Steps	Student Activity	Teacher Support	Comment/Evaluation
Summarize 8-10 minutes	<ul style="list-style-type: none"> • Share solutions and strategies used. • Complete tool kit check-up. 	<ul style="list-style-type: none"> • Select students to share solutions and strategies used. 	
Homework	<ul style="list-style-type: none"> • CP-117 through CP-122. 		