Name _____ Date _____

LESSON 4.3

Problem Solving Workshop: Using Alternative Methods

For use with the lesson "Write Linear Equations in Point-Slope Form"

Another Way to Solve Example 5

Multiple Representations In Example 5, you saw how to solve a problem about cost using rate of change. You can also solve the problem by *working backwards*.

PROBLEM **Working Ranch** The table shows the cost of visiting a working ranch for one day and night for different numbers of people. Can the situation be modeled by a linear equation? *Explain.* If possible, write an equation that gives the cost as a function of the number of people in the group.

Number of people	4	6	8	10	12
Cost (dollars)	250	350	450	550	650

METHOD **Work Backwards** You can solve the problem by working backwards.

STEP 1 **Find** the rate of change of the line connecting the points (4, 250) and (12, 650).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{650 - 250}{12 - 4} = \frac{400}{8} = 50$$

Using (4, 250) and (12, 650), the cost increases at a rate of \$50 per person.

STEP 2 **Write** an equation in point-slope form using the slope and the point (4, 250). Let C be the cost (in dollars) and p be the number of people.

$C - C_1 = m(p - p_1)$ Write point-slope form.

$C - 250 = 50(p - 4)$ Substitute 50 for m, 4 for p_1, and 250 for C_1.

$C = 50p + 50$ Solve for C.

An equation connecting the points (4, 250) and (12, 650) is $C = 50p + 50$.

STEP 3 **Substitute** the other values in the table to see if they fall on the same line.

$350 \stackrel{?}{=} 50(6) + 50$ $\quad$ $450 \stackrel{?}{=} 50(8) + 50$ $\quad$ $550 \stackrel{?}{=} 50(10) + 50$

$350 = 350$ ✓ $\quad$ $450 = 450$ ✓ $\quad$ $550 = 550$ ✓

All of the points fall on the same line, so the situation can be modeled by a linear equation. An equation for the cost as a function of the number of people in the group is $C = 50p + 50$.

PRACTICE

1. **Oranges** The table shows the prices of different weights of oranges. Can the situation be modeled by a linear equation? *Explain.* If possible, write an equation that gives the total cost as a function of the pounds of oranges.

Oranges (pounds)	4	6	8
Cost (dollars)	4.60	6.90	9.20

2. **Fabric** The table shows the prices of different lengths of fabric. Can the situation be modeled by a linear equation? *Explain.* If possible, write an equation that gives the total cost as a function of the yards of fabric.

Fabric (yards)	3	5	9
Cost (dollars)	22.25	33.75	45.25

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Problem Solving Workshop: Mixed Problem Solving

For use with the lessons "Write Linear Equations in Slope-Intercept Form", "Use Linear Equations in Slope-Intercept Form", "Write Linear Equations in Point-Slope Form", and "Write Linear Equations in Standard Form"

1. **Multi-Step Problem** Ben jogs 6 miles in his first week. He runs 3 more miles every week for the next 8 weeks.
   - **a.** Write an equation that gives the total distance Ben jogged (in miles) as a function of weeks after the first week.
   - **b.** Find the distance that Ben runs 5 weeks after the first week.

2. **Multi-Step Problem** A carpet store charges $20 per square yard of carpet after an initial installation fee. A customer paid a total of $800 for 30 square yards.
   - **a.** Write an equation that gives the total cost of buying and installing a carpet as a function of the area of the room (in square yards).
   - **b.** Find the total cost of buying and installing 42 yards of carpet.

3. **Multi-Step Problem** The weekly cost of food for a family of four using the moderate cost plan in the United States increased at a relatively constant rate of $4.83 per year from 1997 to 2004. In 2004, the weekly cost of food for a family of four was $186.90.
   - **a.** What was the weekly cost of food for a family of four in 1997?
   - **b.** Write an equation that gives the weekly cost of food for a family of four as a function of the number of years since 1997.
   - **c.** Find the weekly cost of food for a family of four in 2010 assuming the same rate of increase.

4. **Gridded Answer** A website charges $12 to buy a hat and a shipping charge of $5 per order. Find the cost of buying 7 hats.

5. **Open-Ended** Describe a real-world situation that can be modeled by the function $y = 2x - 3$.

6. **Short Response** One pound of chicken costs $3.50 and one pound of ground beef costs $2.50. Write an equation in standard form that models the possible combinations of pounds of chicken and pounds of ground beef that you can buy for $35. Graph the equation. *Explain* what the intercepts of the graph mean in this situation.

7. **Extended Response** You are comparing the costs of moving companies for a truck rental. Company A charges $40 to rent the truck plus $.08 per mile. Company B charges a flat fee of $50 to rent the truck.
   - **a.** Write an equation in slope-intercept form that models the cost of renting a truck from each moving company.
   - **b.** Graph the two equations from part (a) on the same coordinate plane.
   - **c.** Under what conditions would the cost of renting a truck from either moving company be the same?
   - **d.** Under what conditions would the cost of renting a truck from Company A be the best deal? Under what conditions would it be cheaper for you to rent a truck from Company B?

8. **Short Response** A bowling alley has a shoe rental fee and a per game fee. The table shows the total cost (in dollars) of bowling for different numbers of games. *Explain* why this situation can be modeled by a linear equation. What is the shoe rental fee? What is the per game fee?

Games	2	4	6	8
Total Cost	6.50	10.50	14.50	18.50

9. **Open-Ended** Bananas cost $.40 per pound and pears cost $1 per pound. Write an equation in standard form that models the possible combinations of bananas and pears that you can buy with a certain amount of money (in dollars). List three possible combinations.

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Problem Solving Workshop: Gridded Answer Sheet

For use with Mixed Problem Solving