NAME _____ DATE _____ PERIOD _____

Lesson 4 Reteach

Proportional and Nonproportional Relationships

Two related quantities are **proportional** if they have a constant ratio between them. If two related quantities do not have a constant ratio, then they are **nonproportional.**

Example 1

The cost of one CD at a record store is $12. Create a table to show the total cost for different numbers of CDs. Is the total cost proportional to the number of CDs purchased?

Number of CDs	1	2	3	4
Total Cost	$12	$24	$36	$48

$\frac{\text{Total Cost}}{\text{Number of CDs}} = \frac{12}{1} = \frac{24}{2} = \frac{36}{3} = \frac{48}{4} = \$12 \text{ per CD}$

Divide the total cost for each by the number of CDs to find a ratio. Compare the ratios.

Since the ratios are the same, the total cost is proportional to the number of CDs purchased.

Example 2

The cost to rent a lane at a bowling alley is $9 per hour plus $4 for shoe rental. Create a table to show the total cost for each hour a bowling lane is rented if one person rents shoes. Is the total cost proportional to the number of hours rented?

Number of Hours	1	2	3	4
Total Cost	$13	$22	$31	$40

$\frac{\text{Total Cost}}{\text{Number of Hours}} \rightarrow \frac{13}{1}$ or 13 $\frac{22}{2}$ or 11 $\frac{31}{3}$ or 10.34 $\frac{40}{4}$ or 10

Divide each cost by the number of hours.

Since the ratios are not the same, the total cost is nonproportional to the number of hours rented with shoes.

Exercises

1. **PICTURES** A photo developer charges $0.25 per photo developed. Is the total cost proportional to the number of photos developed? **Yes**

Number of Photos	1	2	3	4
Total Cost ($)	0.25	0.50	0.75	1.00

$\frac{\text{Total Cost}}{\text{Number of Hours}} \rightarrow \frac{0.25}{1} = \frac{0.50}{2} = \frac{0.75}{3} = \frac{1.00}{4} = \$0.25 \text{ per photo}$

2. **SOCCER** A soccer club has 15 players for every team, with the exception of two teams that have 16 players each. Is the number of players proportional to the number of teams? **no**

Number of Teams	1	2	3	4
Number of Players	16	32	47	62

$\frac{\text{Number of Teams}}{\text{Number of Players}} \rightarrow \frac{16}{1} = \frac{32}{2} \neq \frac{47}{3} \neq \frac{62}{4}$

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Lesson 4 Skills Practice

Proportional and Nonproportional Relationships

For Exercises 1–3, use the table of values. Write the ratios in the table to show the relationship between each set of values.

1.

Number of Hours	1	2	3	4
Total Amount Earned	$15	$30	$45	$60
Ratios	$\frac{15}{1}$ or 15	$\frac{30}{2}$ or 15	$\frac{45}{3}$ or 15	$\frac{60}{4}$ or 15

2.

Number of Packages	1	2	3	4
Total Cost	$11	$20	$29	$38
Ratios	$\frac{11}{1}$ or 11	$\frac{20}{2}$ or 10	$\frac{29}{3}$ or 9.67	$\frac{38}{4}$ or 9.5

3.

Number of Classrooms	1	2	3	4
Total Students	24	48	72	92
Ratios	$\frac{24}{1}$ or 24	$\frac{48}{2}$ or 24	$\frac{72}{3}$ or 24	$\frac{92}{4}$ or 23

For Exercises 4–8 use the table of values. Write *proportional* or *nonproportional*.

4.

Number of Hours	1	2	3	4
Total Amount Earned	$0.99	$1.98	$2.97	$3.96

proportional

5.

Number of Hours	1	2	3	4
Total Amount Earned	$17.25	$35.50	$50.75	$70

nonproportional

6.

Number of Hours	1	2	3	4
Number of Pages Read in Book	37	73	109	145

nonproportional

7.

Number of Lunches	1	2	3	4
Total Cost	$2.75	$5.50	$8.25	$11

proportional

8. Fred is ordering pies for a family reunion. Each pie costs $4.50. For orders smaller than a dozen pies, there is a $5 delivery charge. Is the cost proportional to the number of pies ordered? Use a table of values to explain your reasoning.

Number of Pies	**1**	**2**	**3**	**4**
Total Cost	**$9.50**	**$14.00**	**$18.50**	**$23.00**

$\frac{\text{Total Cost}}{\text{Number of Pies}} \rightarrow \frac{9.50}{1} \neq \frac{14.00}{2}$ **nonproportional**