LESSON MAKER PRO

Pair Patterns

Study a whole set of pairs to find its rule.

GRADE 8 · 8A.AF.F

8A.AF.F "Functions shift the emphasis from a point-by-point relationship between two variables (input/output) to considering an entire set of ordered pairs (where each first element is paired with exactly one second element) as an entity with its..."

NAME _____ DATE _____

LOOK AT THE WHOLE SET

A set of ordered pairs is a function when each input has exactly one output. Check every pair, especially when an input repeats. If the rate of change is constant, divide the change in output by the change in input, then use one pair to find a rule.

WORKED EXAMPLE

Does the table show a function? If it does, write a rule for the output y from the input x.

INPUT AND OUTPUT

x	y
11	29
14	35
17	41

1. Each input has exactly one output, so the set is a function.
2. From the first row to the second, x increases by 3 and y increases by 6. The rate is 6/3 = 2.
3. Use (11, 29) to find the starting value: 29 - 2(11) = 7.
4. Write the rule: y = 2x + 7.

Answer: It is a function. The rule is y = 2x + 7.

PRACTICE 6 problems

1 Does the table show a function? If it does, write a rule for y.

PAIR SET A

x	y
1	4
3	10
5	16

ANSWER _____

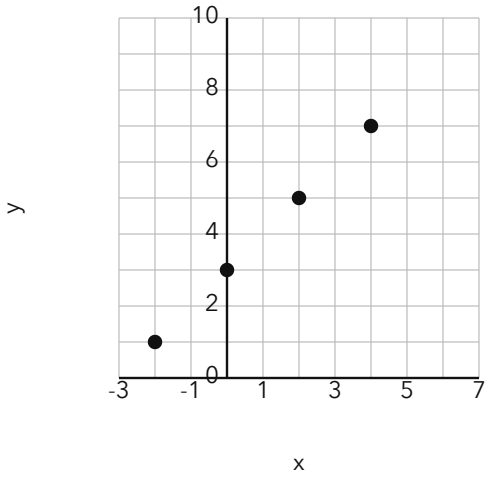
2 Does the table show a function? Name the input that proves your answer.

PAIR SET B

x	y
-3	5
-1	9
-3	7

ANSWER _____

3 The plotted points belong to a function with a constant rate of change. What is the rate? What is the output when x = 6?



ANSWER _____

4 Does the table show a function? If it does, write a rule for y.

PAIR SET C

x	y
-4	12
-2	8
0	4
2	0

ANSWER _____

5 Does the table show a function? Does it have a constant rate of change? Explain briefly.

PAIR SET D

x	y
-2	4
-1	1
0	0
1	1

ANSWER _____

6 Consider the set {(1, 8), (2, 8), (3, 8), (4, 8)}. Is it a function? Write a rule for y.

ANSWER _____

APPLY IT Show your work

1 A game's reward tracker gives a sign-up bonus and then the same number of coins for every hour played. The table shows total coins y after x hours. Write a rule for y. How many coins does the tracker show after 9 hours?

GAME REWARDS

Hours, x	Coins, y
0	30
2	50
4	70
6	90

ANSWER _____

2 Two movie rental plans charge a starting fee plus the same amount for each rental. The table shows each plan's total cost y, in dollars, for x rentals. Write a rule for each plan. Which plan costs less for 8 rentals, and by how much?

MOVIE RENTAL PLANS

Rentals, x	Plan A	Plan B
0	5	9
2	11	13
4	17	17

ANSWER _____

CHALLENGE One step up

The set {(-3, 11), (-1, 7), (1, 3), (1, 8), (3, -1)} is not a function. Change only the output in (1, 8) so the set becomes a function with a constant rate of change. Give the new ordered pair and a rule for y. Explain why the repeated input is now allowed.

WORK SPACE AND ANSWER

ANSWER KEY

Pair Patterns

GRADE 8 · 8A.AF.F

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Does the table show a function? If it does, write a rule for y.	**Yes. y = 3x + 1.**
2	Does the table show a function? Name the input that proves your answer.	**No. The input -3 has two different outputs, 5 and 7.**
3	The plotted points belong to a function with a constant rate of change. What is the rate? What is the output when x = 6?	**The rate is 1. When x = 6, the output is 9.**
4	Does the table show a function? If it does, write a rule for y.	**Yes. y = -2x + 4.**
5	Does the table show a function? Does it have a constant rate of change? Explain briefly.	**It is a function because each input has one output. Its rate is not constant because y changes by -3, then -1, then 1 as x increases by 1 each time.**
6	Consider the set {(1, 8), (2, 8), (3, 8), (4, 8)}. Is it a function? Write a rule for y.	**Yes. y = 8.**

PART 2 · APPLY IT

1. **y = 10x + 30; 120 coins after 9 hours.** The coins increase by 20 over 2 hours, so the rate is 10 coins per hour. The table shows 30 coins at 0 hours, and 10(9) + 30 = 120.
2. **Plan A: y = 3x + 5. Plan B: y = 2x + 9. For 8 rentals, Plan B costs $4 less.** Plan A increases by $6 per 2 rentals, while Plan B increases by $4 per 2 rentals. At 8 rentals, the costs are $29 and $25, so Plan B costs $4 less.

CHALLENGE

Change (1, 8) to (1, 3). The rule is y = -2x + 5. Both pairs with input 1 now have the same output, so that input has exactly one output.

Accept equivalent rules and explanations. In the challenge, the two identical (1, 3) pairs do not prevent the set from being a function.