

Rule Detective Sort

Check whether every pair matches the machine rule.

4.PAR.3.2 "Use input-output rules, tables, and charts to represent and describe patterns, find relationships, and solve problems."

NAME _____

DATE _____

FOLLOWS THE RULE

Every output has the change named by the rule.
Check each input-output pair.

A machine takes away 19. 40 goes in and 21 comes out. 52 goes in and 33 comes out.

BREAKS THE RULE

At least one output does not have the change named by the rule. Find the pair that does not match.

A machine adds 25. 41 goes in and 66 comes out. 53 goes in and 77 comes out.

1 SORT _____ 8 items

Circle FOLLOWS or BREAKS for each item, then, for PROVE IT, choose two items and explain how each input-output pair does or does not match the rule.

1. Rule: Add 6. $2 \rightarrow 8$; $10 \rightarrow 16$.

FOLLOWS

BREAKS

2. Rule: Multiply by 5. $3 \rightarrow 15$; $6 \rightarrow 30$.

FOLLOWS

BREAKS

3. Rule: Add 9. $4 \rightarrow 13$; $12 \rightarrow 20$.

FOLLOWS

BREAKS

4. Rule: Multiply by 2. $7 \rightarrow 14$; $11 \rightarrow 22$.

FOLLOWS

BREAKS

5. Rule: Add 8. $6 \rightarrow 14$; $15 \rightarrow 22$.

FOLLOWS

BREAKS

6. Rule: Multiply by 4. $2 \rightarrow 8$; $9 \rightarrow 35$.

FOLLOWS

BREAKS

7. Rule: Add 12. $1 \rightarrow 13$; $8 \rightarrow 20$.

FOLLOWS

BREAKS

8. Rule: Multiply by 3. $4 \rightarrow 12$; $10 \rightarrow 30$.

FOLLOWS

BREAKS

2 PROVE IT Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ HOW I KNEW _____

ITEM # _____ HOW I KNEW _____

3 MAKE YOUR OWN One of each

Write one new input-output example that FOLLOWS a rule and one new example that BREAKS a rule.

FOLLOWS _____

BREAKS _____

CHALLENGE

Write a rule and three input-output pairs with exactly one wrong output, then name the output that breaks the rule.

PART 1 • SORT

#	ITEM	CATEGORY	WHY
1	Rule: Add 6. $2 \rightarrow 8$; $10 \rightarrow 16$.	FOLLOWS	Both outputs are 6 more than their inputs.
2	Rule: Multiply by 5. $3 \rightarrow 15$; $6 \rightarrow 30$.	FOLLOWS	Both outputs equal the input multiplied by 5.
3	Rule: Add 9. $4 \rightarrow 13$; $12 \rightarrow 20$.	BREAKS	12 plus 9 equals 21, not 20.
4	Rule: Multiply by 2. $7 \rightarrow 14$; $11 \rightarrow 22$.	FOLLOWS	Both outputs equal the input multiplied by 2.
5	Rule: Add 8. $6 \rightarrow 14$; $15 \rightarrow 22$.	BREAKS	15 plus 8 equals 23, not 22.
6	Rule: Multiply by 4. $2 \rightarrow 8$; $9 \rightarrow 35$.	BREAKS	9 multiplied by 4 equals 36, not 35.
7	Rule: Add 12. $1 \rightarrow 13$; $8 \rightarrow 20$.	FOLLOWS	Both outputs are 12 more than their inputs.
8	Rule: Multiply by 3. $4 \rightarrow 12$; $10 \rightarrow 30$.	FOLLOWS	Both outputs equal the input multiplied by 3.

PART 2 • PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 • MAKE YOUR OWN (SAMPLE ANSWERS)

- **FOLLOWS:** Rule: Add 11. $26 \rightarrow 37$; $32 \rightarrow 43$.
- **BREAKS:** Rule: Multiply by 8. $27 \rightarrow 216$; $34 \rightarrow 270$.

Challenge: Rule: Add 14. $3 \rightarrow 17$; $7 \rightarrow 21$; $12 \rightarrow 25$. The output 25 breaks the rule. It should be 26.

Items 1, 2, 4, 7, and 8 are **FOLLOWS**. Items 3, 5, and 6 are **BREAKS**. For a **BREAKS** item, one incorrect pair makes the whole item **BREAKS**.