Pg. 130

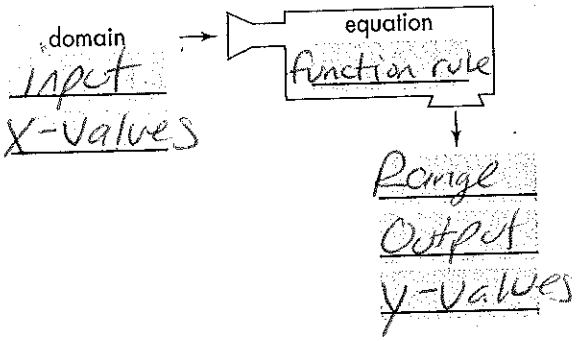
4-6 Formalizing Relations and Functions

Vocabulary

Review

1. Use the words below to label the function machine at the right. Use each word once.

~~function rule~~	*y*-values	output
~~*x*-values~~	~~input~~	range



Vocabulary Builder

reasonable (adjective) **ree zun uh bul**

Definition: Something is **reasonable** if it makes sense or is sensible.

Example: It is **reasonable** to expect warm weather in Miami in July.

Nonexample: It is *not* **reasonable** to expect snow in Miami in July.

Other Word Forms: reasonableness (noun); reasonably (adverb)

Opposite: unreasonable (adjective)

Use Your Vocabulary

Complete each sentence with the appropriate word from the list.

reasonable reasonableness unreasonable

2. The student estimated to check the ? of her answer.

3. Sales tax of $32 on an $85 item is ?.

4. A price of $14 is ? for a pizza.

reasonableness
unreasonable
reasonable

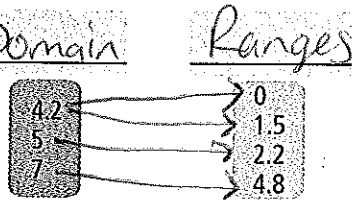
Problem 1 Identifying Functions Using Mapping Diagrams

Got It? Identify the domain and range of the following relation:

{(4.2, 1.5), (5, 2.2), (7, 4.8), (4.2, 0)}

Represent the relation with a mapping diagram. Is the relation a function?

5. Use the words *domain* and *range* to label the mapping diagram. Then draw arrows to represent the relation.



6. Does the relation map each domain value to exactly one range value?

Yes (No)

7. Is the relation a function?

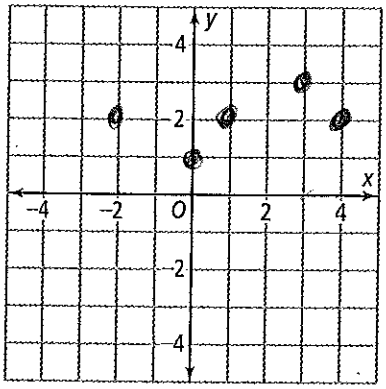
Yes (No)

You can use the **vertical line test** to decide whether a relation is a function. If any vertical line passes through more than one point of the graph, then the relation is *not* a function.

Problem 2 Identifying Functions Using the Vertical Line Test

Got It? Is the relation {(4, 2), (1, 2), (0, 1), (−2, 2), (3, 3)} a function? Use the vertical line test.

8. Begin by graphing the points from the relation on the coordinate plane.

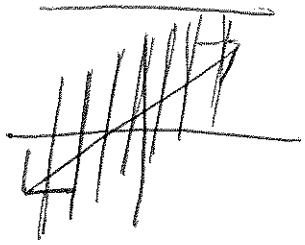


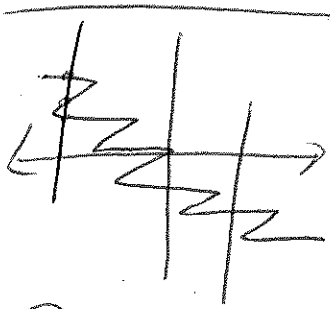
9. Can you draw a vertical line that intersects more than one point? If so, draw it.

Yes (No)

10. Is the relation a function?

Yes (No)





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Problem 3 Evaluating a Function

Got It? The function $w(x) = 250x$ represents the number of words $w(x)$ you can read in x minutes. How many words can you read in 6 min?

11. You should substitute 6 for x.

12. The function is evaluated below. Write the justification for each step.

$w(x) = 250x$ Function Rule

$w(6) = 250 \cdot 6$ Substituted 6 for x.

$w(6) = 1500$ Simplified.

13. You can read 1,500 words in 6 minutes.

Problem 4 Finding the Range of a Function

Range = Output = y

Got It? The domain of $g(x) = 4x - 12$ is $\{1, 3, 5, 7\}$. What is the range?

14. Underline the correct word to complete each sentence.

The domain range is the set of input values.

The domain range is the set of output values.

15. Use the function $g(x) = 4x - 12$ with domain $\{1, 3, 5, 7\}$. Find each output.

$g(1) = 4(1) - 12$
$= 4 + -12$
$g(1) = -8$

$g(3) = 4(3) - 12$
$= 12 - 12$
$g(3) = 0$

$g(5) = 4(5) - 12$
$= 20 - 12$
$g(5) = 8$

$g(7) = 4(7) - 12$
$= 28 - 12$
$g(7) = 16$

16. The range of $g(x) = 4x - 12$ with domain $\{1, 3, 5, 7\}$ is $\{-8, 0, 8, 16\}$.

★ Summary

Problem 5 Identifying a Reasonable Domain and Range

Got It? You have 7 qt of paint to paint the trim in your house. A quart of paint covers 100 ft^2. The function $A(q) = 100q$ represents the area $A(q)$, in square feet, that q quarts of paint cover. What domain and range are reasonable for the function?

17. Complete the reasoning model below.

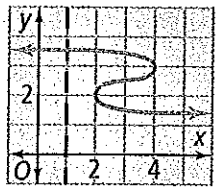
Words	Write
The least amount of paint I can use is 0 qt. So, that is the least domain value.	$A(\quad) = 100 \cdot \quad$ $A(\quad) =$
The greatest amount of paint I can use is 7 qt. So, that is the greatest domain value.	$A(\quad) = 100 \cdot \quad$ $A(\quad) =$

18. A reasonable domain is $\quad \leq q \leq \quad$.

19. A reasonable range is $\quad \leq A(q) \leq \quad$.

Lesson Check • Do you UNDERSTAND?

Error Analysis **A student drew the dashed line on the graph shown and concluded that the graph represented a function. Is the student correct? Explain.**



20. Describe how the vertical line test helps you decide whether a relation is a function.

21. Underline the correct word or words to complete each sentence about the graph.

I can draw a vertical line that passes through only one point / more than one point.

Therefore the graph does / does not represent a function.

22. Describe the student's error.

Math Success

Check off the vocabulary words that you understand.

☐ relation ☐ domain ☐ range ☐ vertical line test ☐ function notation

Rate how well you *understand functions.*

Need to review 0 2 4 6 8 10 Now I get it

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