Alg 1 Week 10 Monday Warm-Up

Skill 3: Solve and Graph Compound Inequalities on a Number Line

$2n + 7 \geq 27$ **or** $3n + 3 \leq 30$

Skill 4: Solve and Graph Absolute Value Inequalities and Equations

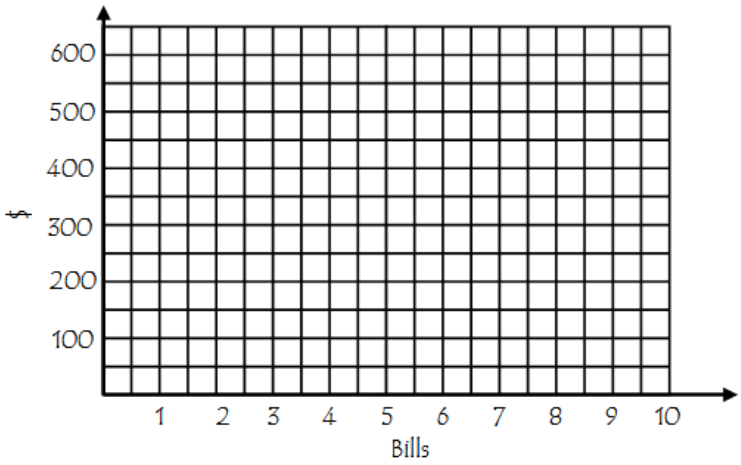
$2|8 + 4x| + 2 < 28$

Skill 5: Evaluate and Graph a Function

Lucy has $500 in her banking account and she needs to pay her bills. On average, each bill is $40. The function that represents this situation is M(b)=500-40b, where M represents the money left in her account and b represents the number of bills paid. Draw a graph using the function above that shows how much money she has after paying 10 bills.

b	M(b)=500-40b	M
0		
2		
4		
6		
8		
10		

Use your graph to find out how many bills Lucy paid if she has $400 in her account.



4-6 Formalizing Relations and Functions

A **relation** is a pairing of numbers in one set, called the **domain,** with numbers in another set, called the **range.** A relation is often represented as a set of ordered pairs (x, y). In this case, the domain is the set of x-values and the range is the set of y-values.

Essential Understanding A function is a special type of relation in which each value in the domain is paired with exactly one value in the range.

Problem 1 Identifying Functions Using Mapping Diagrams

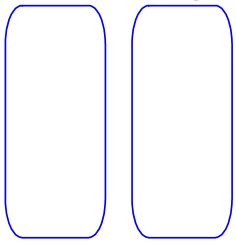
Identify the domain and range of each relation. Represent the relation with a mapping diagram. Is the relation a function?

A $\{(-2, 0.5), (0, 2.5), (4, 6.5), (5, 2.5)\}$

The domain is $\{-2, 0, 4, 5\}$.

The range is $\{0.5, 2.5, 6.5\}$.

domain range

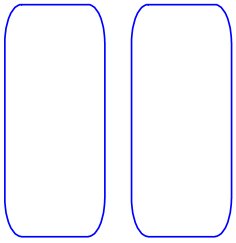


B $\{(6, 5), (4, 3), (6, 4), (5, 8)\}$

The domain is $\{4, 5, 6\}$.

The range is $\{3, 4, 5, 8\}$.

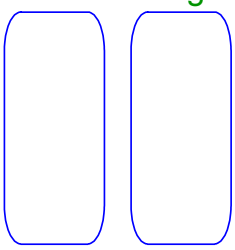
domain range



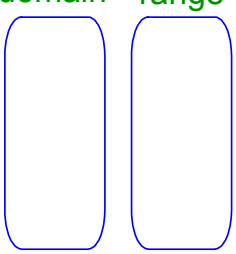
Got It? **1.** Identify the domain and range of each relation. Represent the relation with a mapping diagram. Is the relation a function?

a. $\{(4.2, 1.5), (5, 2.2), (7, 4.8), (4.2, 0)\}$ **b.** $\{(-1, 1), (-2, 2), (4, -4), (7, -7)\}$

domain range



domain range

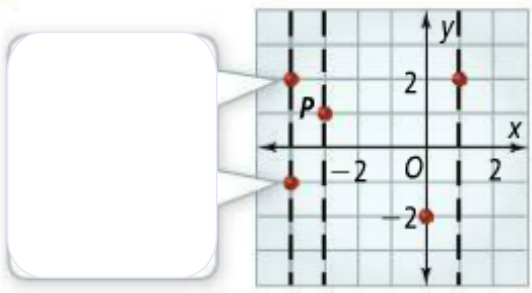


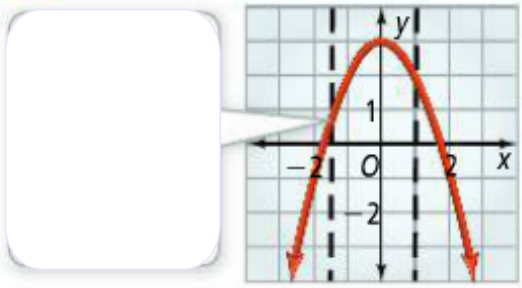
Another way to decide if a relation is a function is to analyze the graph of the relation using the **vertical line test.** If any vertical line passes through more than one point of the graph, then for some domain value there is more than one range value. So the relation is not a function.

Problem 2 Identifying Functions Using the Vertical Line Test

Is the relation a function? Use the vertical line test.

A $\{(-4, 2), (-3, 1), (0, -2), (-4, -1), (1, 2)\}$ **B** $y = -x^2 + 3$





You have seen functions represented as equations involving x and y, such as $y = -3x + 1$. Below is the same equation written using **function notation.**

$$f(x) = -3x + 1$$

Notice that $f(x)$ replaces y. It is read "f of x." The letter f is the name of the function, not a variable. Function notation is used to emphasize that the function value $f(x)$ depends on the independent variable x. Other letters besides f can also be used, such as g and h.

Problem 3 Evaluating a Function

Reading **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 8 min?**

Problem 4 Finding the Range of a Function

Multiple Choice **The domain of $f(x) = -1.5x + 4$ is $\{1, 2, 3, 4\}$. What is the range?**

HW: p 271: 9, 11-16, 19, 21

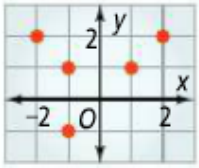
Identify the domain and range of each relation. Use a mapping diagram to determine whether the relation is a function. See Problem 1.

9. $\{(6, -7), (5, -8), (1, 4), (7, 5)\}$

11. $\{(4, 2), (1, 1), (0, 0), (1, -1), (4, -2)\}$

Use the vertical line test to determine whether the relation is a function. See Problem 2.

12.



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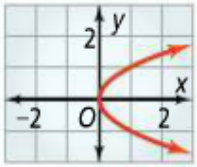

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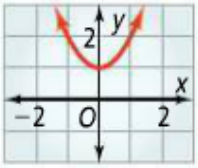

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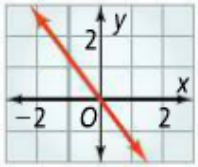

16. Physics Light travels about 186,000 mi/s. The function $d(t) = 186{,}000t$ gives the distance $d(t)$, in miles, that light travels in t seconds. How far does light travel in 30 s? See Problem 3.

Find the range of each function for the given domain. See Problem 4.

19. $g(x) = -4x + 1; \{-5, -1, 0, 2, 10\}$

21. $f(x) = 8x - 3; \left\{-\frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{8}\right\}$