A. Lesson Context

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BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • mastery with working with basics & applications of linear systems • understanding basics of function concepts and apply them to lines & linear systems
CONTEXT of this LESSON:	**Where we've been** In Lesson 1, you reviewed linear relations and reviewed some basic function ideas	**Where we are** Working with basic function concepts of domain and range and notations	**Where we are heading** Mastery of working with multiple representations of f(x) = mx + b

B. Lesson Objectives

    a. Find the domain and range of a relation.
    b. Identify if a relation is a function or not.
    c. Work with function notation & evaluating functions.
    d. Work with function notation in application based problems.

C. Fast Five (Skills Review Focus)

a. Solve $2x - 6 + 3x = 3(x + 1) - 5$

b. State the slope and y-intercept of the line $y = -2x + 5$

c. Write the equation of the line graphed below.
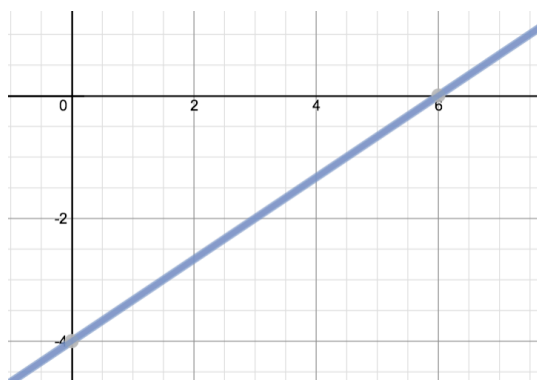
d. Evaluate $f(2)$ if $f(x) = -\frac{1}{4}x + 1$

e. Evaluate $f(6) = 2^{3-x}$.

f. Solve $4 = f(x)$ if $f(x) = -2x + 10$ for x.

g. Write an equation that takes the value of x as 3 and produces a y value of 7.

D. NEW CONCEPT: Function Basics (Review from Videos)

a. Relations:

    i. A "relation" is just a relationship between sets of information;

    ii. A relation refers to a set of input and output values, usually represented in ordered pairs

b. Functions:

    i. A function is a "well-behaved" relation ➔ When we say that a function is "a well-behaved relation", we mean that, given an x value, we get only one y value.

    ii. A function is a set of ordered pairs in which each x-element has only ONE y-element associated with it.

c. Understanding Domain and Range:

    i. The domain is what you start with (INPUT); the range is what you end up with (OUTPUT).

    ii. The domain is the x's; the range is the y's

d. Notations:

    i. Rather than writing linear equations in the typical $y = mx + b$ format, we will now write them in function notation ➔ as $f(x) = mx + b$ where "f" simply refers to the function name and the x refers to the input

e. Understanding the Notation

So the symbols that make up this notation of **f(3) = 7** communicate INFORMATION

f	3	7

The information being communicated by these "symbols" can also be PRESENTED in ALTERNATE WAYS:

(i) op	(ii) m	(iii) g

E. Working with Functions and Relations

    a. Example 1

The scatter plot shows a relation. The marks on each axis indicate single units.

(a) State the domain and range of this relation.

(b) Draw an arrow diagram to illustrate the relation.

(c) Is this relation a function? Explain.

    b. Example 2

For each of the following, state
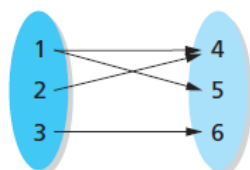
    i. the domain and range
    ii. whether it defines a function or not, and justify your answer

(a) $\{(1, 2), (3, 1), (4, 2), (7, 2)\}$
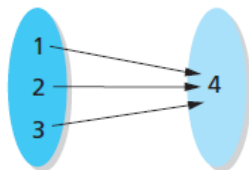
(b) $\{(1, 2), (1, 3), (4, 5), (6, 1)\}$

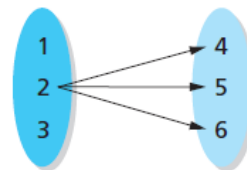(c) $\{(1, 0), (0, 1), (2, 3), (3, 2)\}$

(d)   (e)   (f)

F. Further Examples

For Exercises 86–95, refer to the functions $y = f(x)$ and $y = g(x)$, defined as follows:

$$f = \{(-3, 5), (-7, -3), (-\tfrac{3}{2}, 4), (1.2, 5)\}$$
$$g = \{(0, 6), (2, 6), (6, 0), (1, 0)\}$$

86. Identify the domain of f.

87. Identify the range of f.

88. Identify the range of g.

89. Identify the domain of g.

90. For what value(s) of x is $f(x) = 5$?

91. For what value(s) of x is $f(x) = -3$?

92. For what value(s) of x is $g(x) = 0$?

93. For what value(s) of x is $g(x) = 6$?

94. Find $f(-7)$.

95. Find $g(0)$.

60. The graph of $y = K(x)$ is given.

    a. Find $K(0)$.

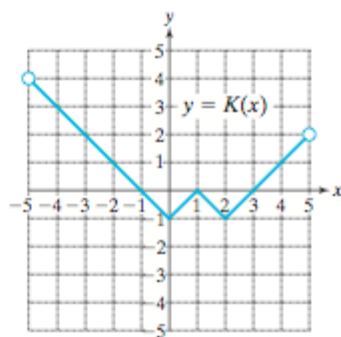   **b.** Find $K(-5)$.

    c. Find $K(1)$.

    d. For what value(s) of x is $K(x) = 0$?

    e. For what value(s) of x is $K(x) = 3$?

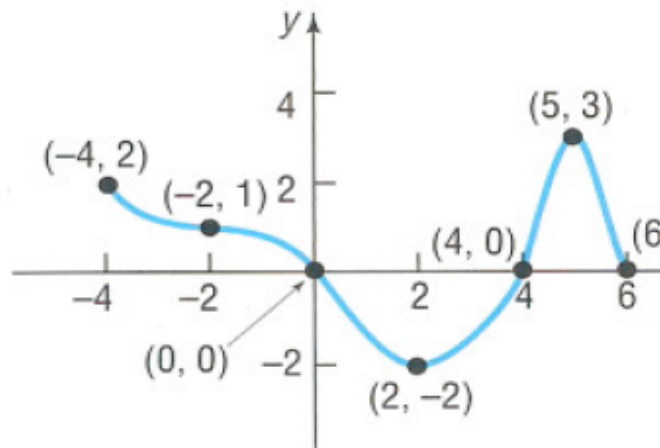   **f.** Write the domain of K.

    g. Write the range of K.

G. Further Examples:

10. Use the given graph of the function f to answ

(a) Find $f(0)$ and $f(6)$.
(b) Find $f(2)$ and $f(-2)$.
(c) Is $f(3)$ positive or negative?
(d) Is $f(-1)$ positive or negative?
(e) For what values of x is $f(x) = 0$?
(f) For what values of x is $f(x) < 0$?
(g) What is the domain of f?
(h) What is the range of f?
(i) What are the x-intercepts?
(j) What is the y-intercept?
(k) How often does the line $y = -1$ inter
(l) How often does the line $x = 1$ intersec
(m) For what value of x does $f(x) = 3$?
(n) For what value of x does $f(x) = -2$?

H. Application of Functions

Mr. S. went on a two day hiking and camping adventure with his son Alexander. Here is a function y = d(t) which represents a Distance-Time graph for Mr. S's and Alexander's hike. The x axis (the independent variable) is time in hours since we left our campsite and the y-axis represents the distance from our campsite.
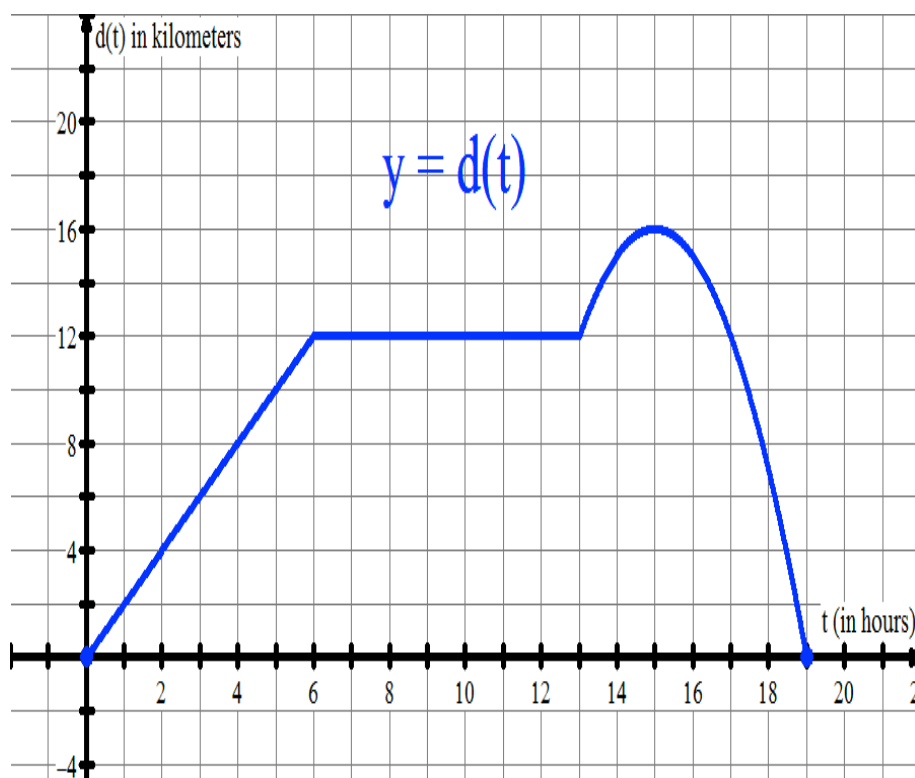
c. Evaluate **d**(0) and interpret what this point represents.

d. Evaluate **d**(5) and interpret what this point represents.

e. Evaluate **d**(15) and interpret what this point represents.

f. For what values of **t** does **d(t)** = 8? Interpret your answer in the context of the problem.

g. For what values of **t** does **d(t)** = 12? Interpret your answer in the context of the problem.

h. For what values of **t** does **d(t)** = 0? Interpret your answer in the context of the problem.

i.   For what values of t does $d(t) \geq 10$? Interpret your answer in the context of the problem.

j.   For what values of t does $d(t) \leq 2$? Interpret your answer in the context of the problem.

k.   What is the domain of the function $y = d(t)$? Interpret your answer in the context of the problem.

l.   What is the range of the function $y = d(t)$? Interpret your answer in the context of the problem.

m. What is the slope of the function on the interval $0 < t < 6$? Interpret your answer in the context of the problem.

n.   What is the slope of the function on the interval $6 < t < 13$? Interpret your answer in the context of the problem.

o.   What is our average speed in the first 12 hours of our hike?

p.   What is our average speed in the final 6 hours of our hike?

q.   How far did we hike?

r.   Write an equation that represents the first 13 hours of our hike .

s.   Write an equation that represents the complete hiking trip.

I.   **HOMEWORK/Classwork** ➔ From Pearson, Math 1 Common Core, Chap 2.6, p135 – 143, complete the checked problems