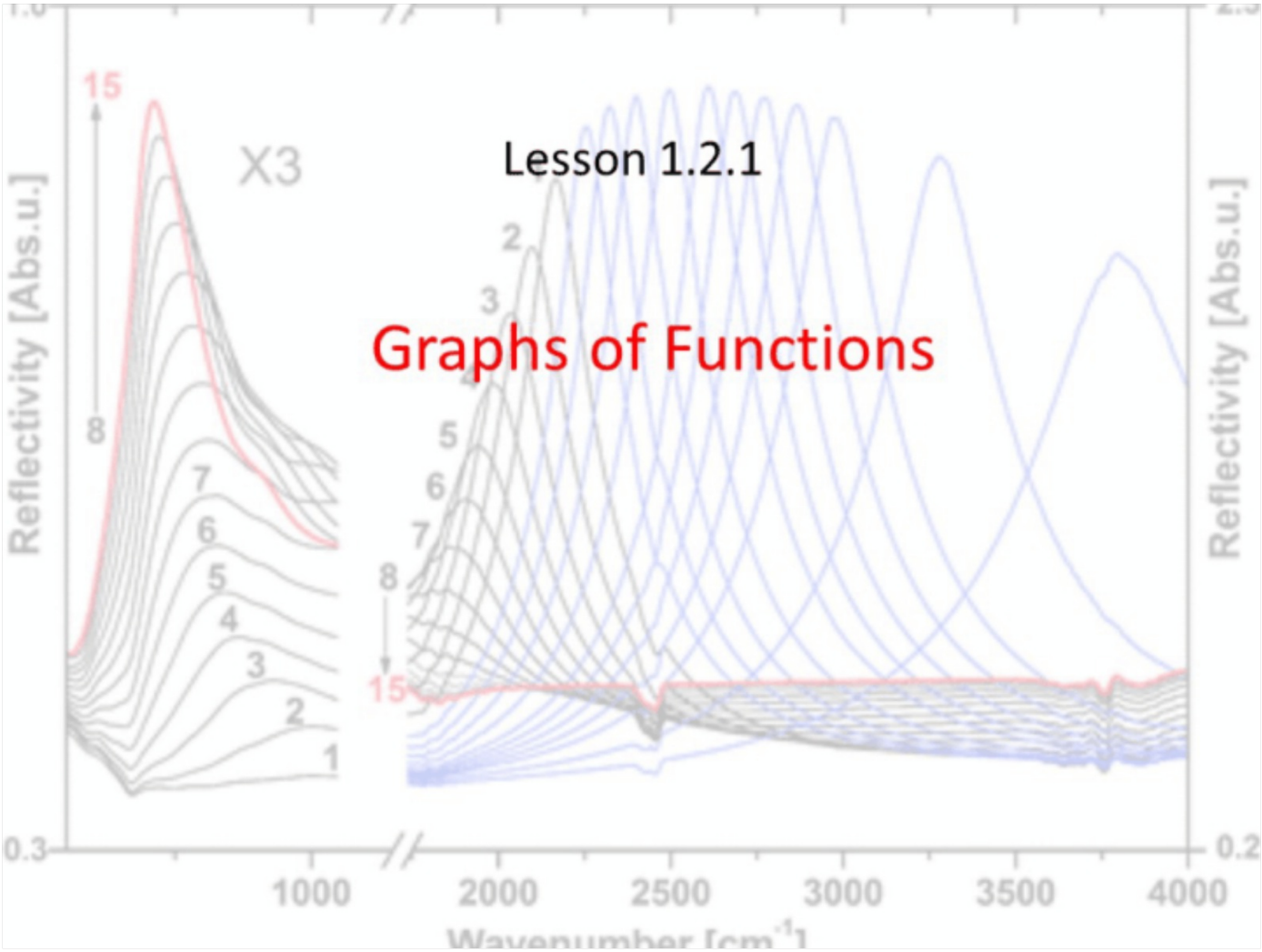
Lesson 1.2.1

Graphs of Functions



Objective

Students will…

- Be able to make a table of values for a given function.
- Be able to graph each function using its table of values.
- Be able to gather and explain functional relationship represented by the graph.

Four Ways of Representing a Function

To help us understand what a function is, we have used machine and arrow diagrams. We can represent a functional relationship in following ways:

1. Verbally (by a description in words)

2. Algebraically (by an explicit formula)

3. Visually (by a graph)

4. Numerically (by a table of values)

Four Ways to Represent a Function

Four Ways to Represent a Function

Verbal

Using words:

$P(t)$ is "the population of the world at time t"

Relation of population P and time t

Algebraic

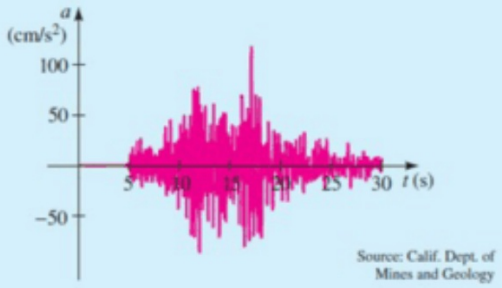
Using a formula:

$$A(r) = \pi r^2$$

Area of a circle

Visual

Using a graph:



Vertical acceleration during an earthquake

Numerical

Using a table of values:

w (ounces)	$C(w)$ (dollars)
$0 < w \le 1$	0.37
$1 < w \le 2$	0.60
$2 < w \le 3$	0.83
$3 < w \le 4$	1.06
$4 < w \le 5$	1.29
⋮	⋮

Cost of mailing a first-class letter

Functions and their Graphs

If f is a function with domain A, then the graph of f is the set of ordered pairs: $\{(x, f(x)) \mid x \in A\}$

(x, y)

In other words, the graph of f is the set of all points (x, y) such that $y = f(x)$; that is, the graph of f is the graph of the equation $y = f(x)$.

Hence, we can place each input and output as an ordered pair, namely, $(input, output)$.

x, y

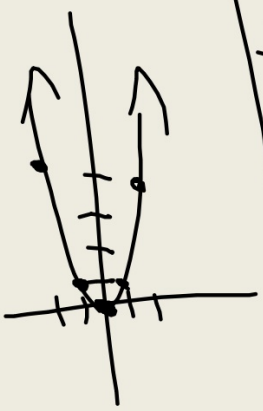
$-x^2$

Table of Values

Thus, we can graph every function the way we first learned how to graph- by making a table of values. Consider the following functions:

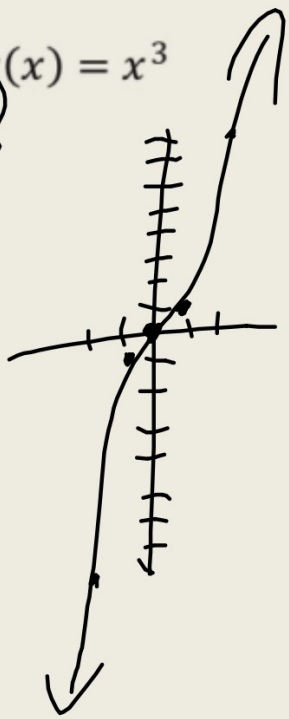
(x, y) $f(x) = x^2$

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4



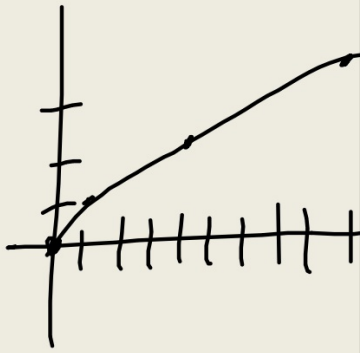
$g(x) = x^3$

x	$f(x)$
-2	-8
-1	-1
0	0
1	1
2	8



$h(x) = \sqrt{x}$

x	$f(x)$
0	0
1	1
4	2
9	3



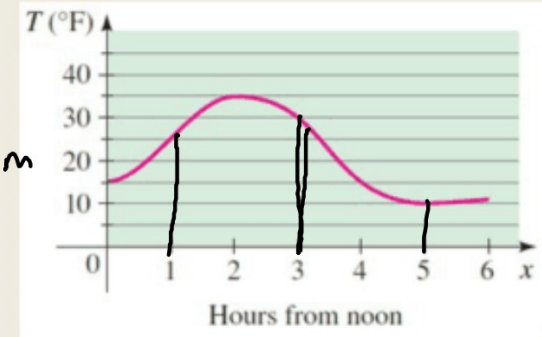
Getting Information from the Graph

The values of a function are represented by the y-coordinates of its graph. So, we can read off the values of a function from its graph.

Ex. Let T be temperature in degrees Fahrenheit.

a. Describe in words the relationship represented in the graph.

Temperature @ given hour from 12 pm



b. Find $T(1)$, $T(3)$, $T(5)$.

y = output at x=1

$T(1)=26°$, $T(3)=30°$, $T(5)=10°$

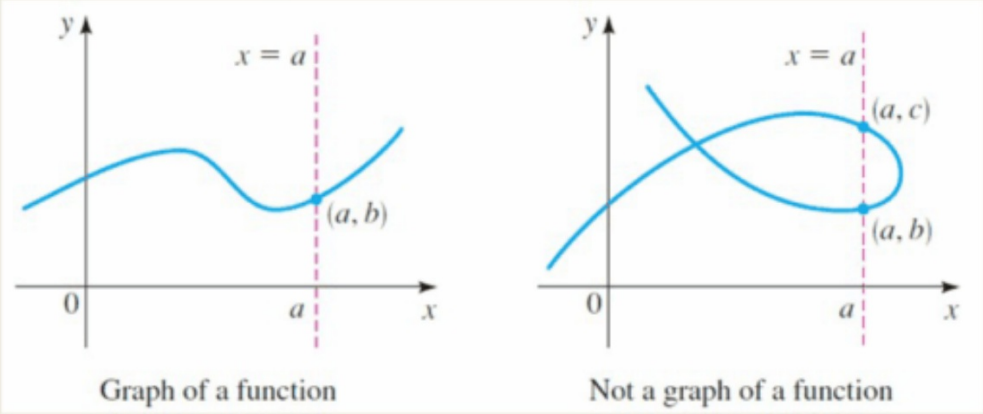
c. Which is larger, $T(2)$ or $T(4)$?

Vertical Line Test

Remember that in a function, for every input there is exactly one output. Graphically this means that for every x-value there must be only one y-value. Thus, a **vertical line test** can be used on a graph of any given expression to determine whether it is a function.

Vertical Line Test- A curve in the coordinate plane is the graph of a function if and only if no vertical line intersects the curve **more than once**.

Ex.



Homework 8/19

Graphs of a Function WKSHT