

$(a+h)(a+h)$   
h)  $(a+h)$ .  $(2a+2h)^2$ . Warm Up 9/8

Let  $f(x) = 2x^2 + 4x - 1$ . Evaluate  $f(a)$ ,  $f(a+h)$ ,  $f' = \frac{f(a+h)-f(a)}{h}$

$$f(a) = 2a^2 + 4a - 1$$

$$f(a+h) = 2(a+h)^2 + 4(a+h) - 1$$

$$= 2(a^2 + 2ah + h^2) + 4a + 4h - 1$$

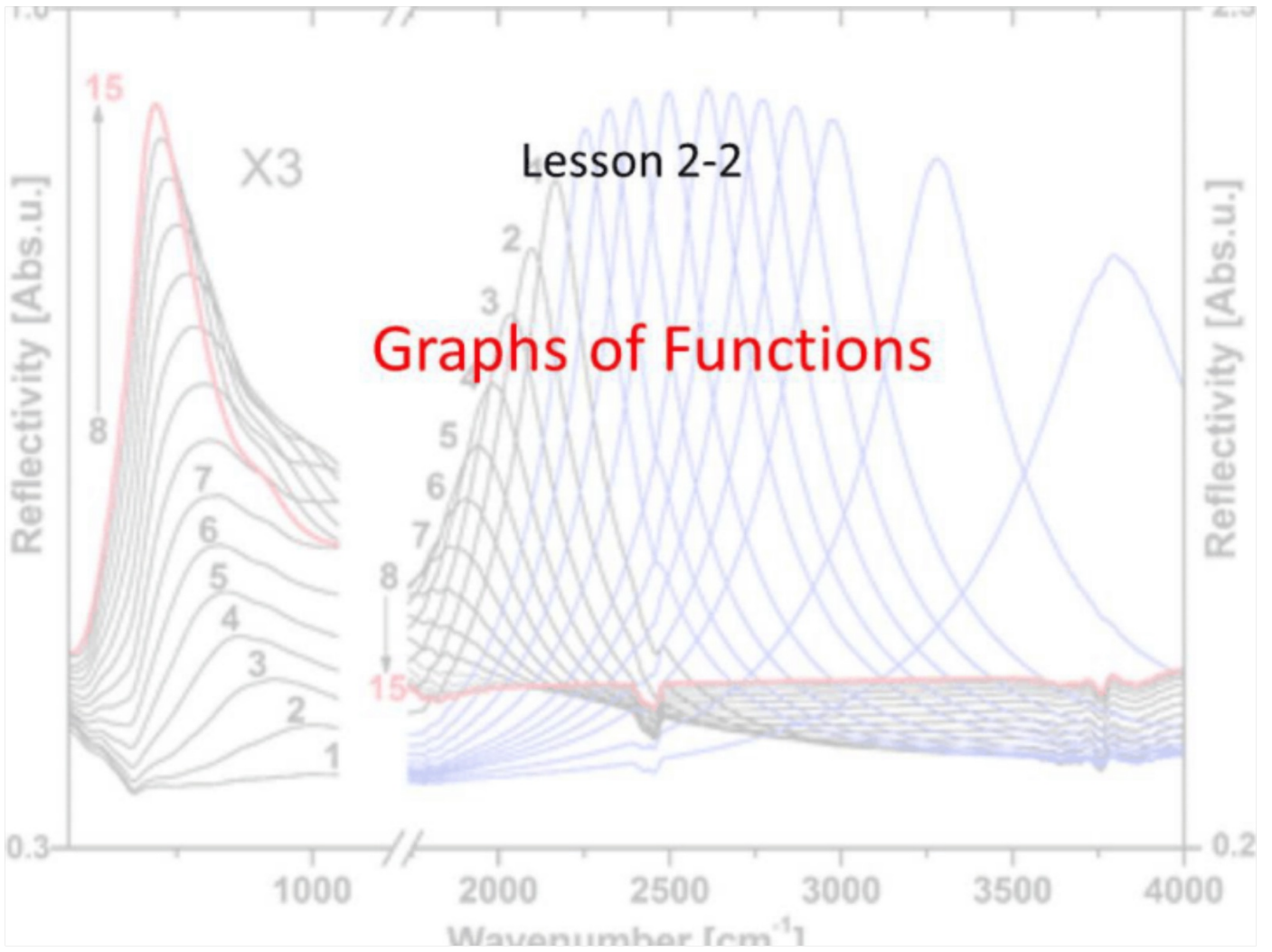
$$2a^2 + 4ah + 2h^2 + 4a + 4h - 1$$

$$\frac{\cancel{2a^2} + 4ah + 2h^2 + 4a + 4h - \cancel{1} - \cancel{2a^2} - \cancel{4a} + \cancel{1}}{h}$$

$$= \frac{4ah + 2h^2 + 4h}{h}$$

$$= \cancel{h} \frac{(4a + 2h + 4)}{\cancel{h}}$$

$$4a + 2h + 4 = 2(2a + h + 2)$$



## Objective

Students will...

- Be able to sketch the graph of the Greatest Integer Function (Step Function).
- Be able to solve word problems involving a step function.
- Be able to use graphing device to graph functions.

## Greatest Integer

The greatest integer simply means the greatest integer within a range of numbers. The key here is that the negative signs almost have no effect. You can also think of it as the greatest absolute value.

Ex. Find the greatest integer.

Between -6 and -5:

Between -1 and 0:

Between 0 and 1:

Between 4 and 5:

## The Greatest Integer Function

That being said, there is a function involving the greatest integer and it is known as **The Greatest Integer Function**:  $f(x) = \llbracket x \rrbracket$ .

between 2, 3

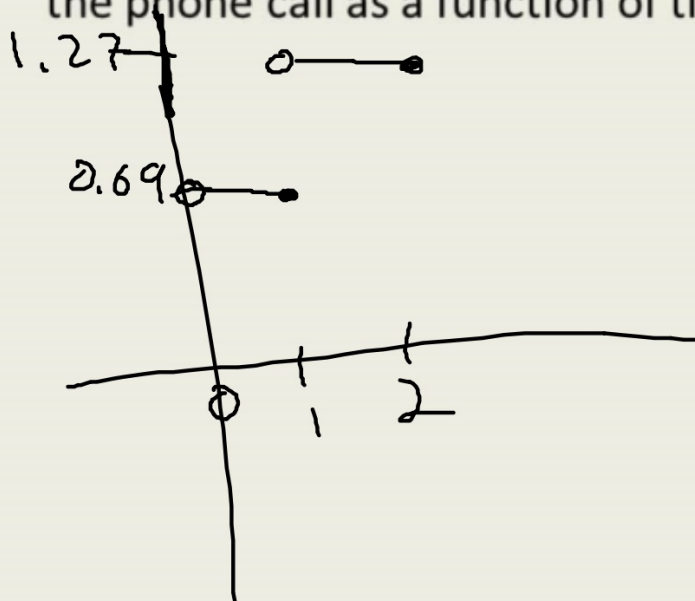
$$f(2.4) = \llbracket 2.4 \rrbracket = \textcircled{2}$$

$$f(2.001) = \llbracket 2.001 \rrbracket = \textcircled{2}$$

$$f(-2.49) = \llbracket -2.49 \rrbracket = \textcircled{-3}$$

*ceiling*  
Application of the Greatest Integer Function

The cost of a long-distance daytime phone call from Toronto to Mumbai, India, is 69 cents for the first minute and 58 cents for each additional minute (or part of a minute). Draw the graph of the cost  $C$  (in dollars) of the phone call as a function of time  $t$  (in minutes).



Step Functions.

## Using Graphing Device

Graph the function  $f(x) = x^n$  for  $n = 2, 4,$  and  $6$  in the viewing rectangle  $[-2, 2]$  by  $[-1, 3]$ .

## Using Graphing Device

Graph the function  $f(x) = x^n$  for  $n = 1, 3,$  and  $5$  in the viewing rectangle  $[-2, 2]$  by  $[-2, 2]$ .

$\times$   $\int$





## Piecewise Function using a Graphing Device

Draw the graph of the piecewise function using a graphing device.

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ 2x + 1 & \text{if } x > 1 \end{cases}$$

## Example

For the following function, use a graphing device to sketch its graph, and find its domain and range:  $f(x) = -\sqrt{25 - x^2}$

## Homework 9/8

TB pg. 167-169 #27, 31, 35