

Graphical Features and Terminology

Do Now: Graph the step function

$$f(x) = \begin{cases} 5, & -2 \leq x < 0 \\ 3, & 0 \leq x < 2 \\ 1, & 2 \leq x < 4 \end{cases}$$

Jan 8-12:52 PM

HW ANSWERS

1. (a) It is a step function because you pay a constant amount for each hour or part of an hour of parking

(b)  $3 + 3 + 3 + 3 + 3 + 3$  OR  $3(6) = \$18$

(c) you will hit the maximum after 10 hours  $3x = 30$

2. (a)

(b)  $250(5) + 600(7) = 5,450$  gallons

(c)  $8,250 - 250(5) = 7,000$  gallons

(d) No because  $8,250 - 5,450 = 2,800$  gallons so there will be more than 2,000 gallons left in the reservoir

Jan 12-7:28 AM

There is a lot of terminology associated with the graph of a function. Many of the terms have names that are descriptive, but still, work is needed to master the ideas.

Exercise #1: The function  $y = f(x)$  is shown graphed below over the interval  $-7 \leq x \leq 7$ .

(a) Find the minimum and maximum values of the function. State the values of  $x$  where they occur as well.  
 Minimum:  $(-5, -1)$   
 Maximum:  $(-1, 7)$

(b) What is the  $y$ -intercept of the function? Explain why a function cannot have more than one  $y$ -intercept.  
 $y$ -int:  $(0, 6)$

(c) Give the  $x$ -intercepts of the functions. These are also known as the function's zeros because they are where  $f(x) = 0$ .  
 $(-4, 0)$  +  $(-6, 0)$

Jan 8-12:58 PM

(d) Would you characterize the function as increasing or decreasing on the domain interval  $-5 \leq x \leq -1$ ? Explain your choice.  
Increasing

(e) One additional interval over which the function is increasing:  
 Increasing:  $-2 \leq x \leq 5$   
 Decreasing:  $-7 \leq x \leq -5$   
 $-7 \leq x \leq -5$   
 $5 \leq x \leq 7$

(f) The following points are known as turning points. Each can be classified as a relative maximum or a relative minimum. State which you think each is.

$(-5, -1)$	$(-1, 7)$	$(2, 2)$	$(5, 3)$
relative minimum	relative maximum	relative maximum	relative maximum

Jan 9-9:08 AM

Let's get some more practice with piecewise defined functions and mix in our function terminology while we are at it.

Exercise #2: Consider the piecewise linear function given the equation  $f(x) = \begin{cases} x+3 & x \leq 1 \\ 6-2x & x \geq 1 \end{cases}$ .

(a) Create a table of values for this function below over the interval  $-4 \leq x \leq 4$ . Then create a graph on the axes for this function.

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

(b) State the zeros of the function.

(c) State the function's  $y$ -intercept.

Jan 9-9:08 AM

(d) Give the interval over which the function is increasing. Give the interval over which it is decreasing.

Increasing: \_\_\_\_\_

Decreasing: \_\_\_\_\_

(e) Give the coordinates of the turning point and classify it as either a relative minimum or relative maximum.

(f) Use your graph to find all solutions to the equation  $f(x) = 2$ . Illustrate your solution graphically and find evidence in the table you created.

(g) State the interval over which this function is positive. How can you tell this quickly from the graph?

Jan 9-9:17 AM