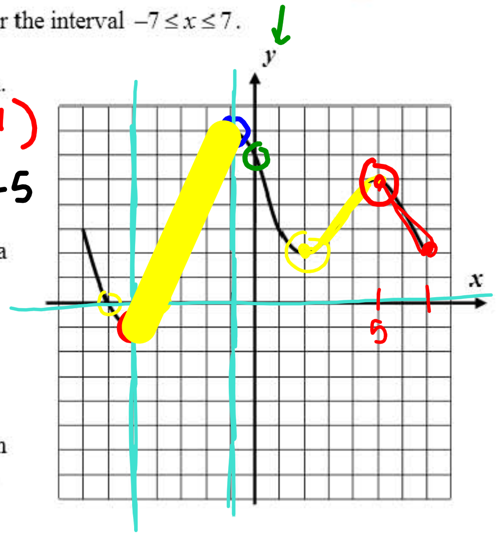
Name: ______________________ Date: ______________

GRAPHICAL FEATURES AND TERMINOLOGY

There is a lot of terminology associated with the **graph of a function**. Let's investigate!

Do Now: The function $y = f(x)$ is shown graphed below over the interval $-7 \le x \le 7$.



(a) Find the maximum and minimum values of the function. State the values of x where they occur as well.

(-1,7) y=7 @ x= -1   (-5,-1)   y=-1 @ x=-5

(b) What is the y-intercept of the function? Explain why a function cannot have more than one y-intercept.

(0,6)

(c) Give the x-intercepts of the function. These are also known as the function's **zeroes** because they are where $f(x)=0$.

(-4,0) and (-6,0)

Exercise #1:

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

INCREASING

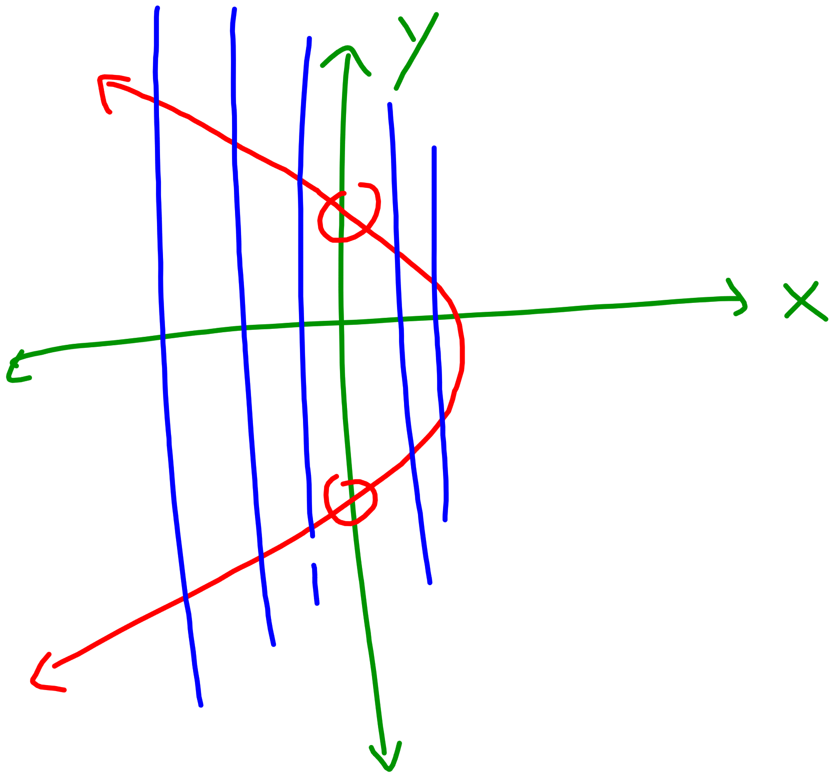
(e) one additional interval over which the function is increasing and one over which it is decreasing.

Increasing: $2 \le x \le 5$ [2,5]

Decreasing: $5 \le x \le 7$ [5,7]

(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.

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


y
x

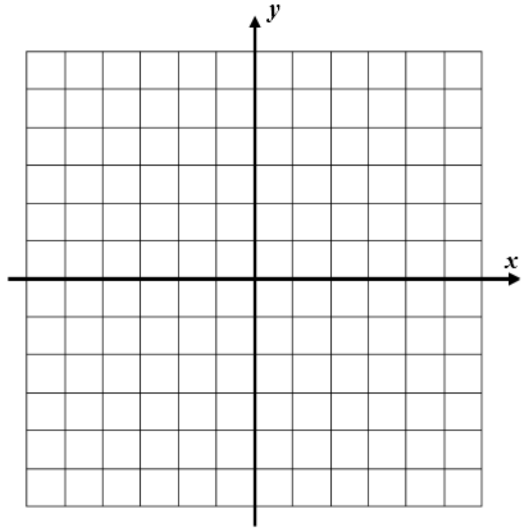
x	y
0	6
1	7
2	8
3	9
3	10
4	8

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 $f(x)=\begin{cases} x+3 & x\le 1 \\ 6-2x & x\ge 1 \end{cases}$.

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

x	Rule/Calculation	(x, y)
-4		
-3		
-2		
-1		
0		
1		
2		
3		
4		



(b) State the **zeroes of the function**.

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

(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 one turning point and classify it as either a relative maximum or relative minimum.

(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.

Name: ______________________________ Date: ______________

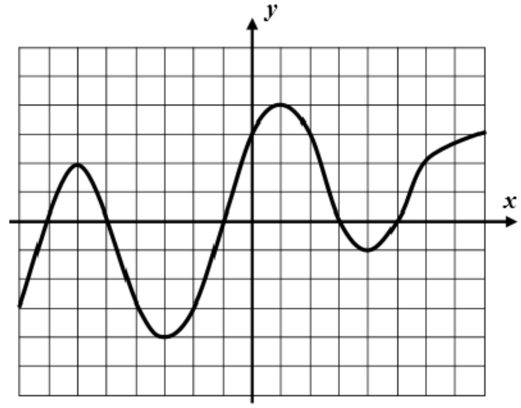
Graphical Features – Practice. Hw.

1. The function $y = f(x)$ is shown graphed below over the interval $-8 \le x \le 8$.

(a) Evaluate each of the following;

$f(-2) =$ $f(8) =$

$f(-8) =$ $f(4) =$



(b) Find all the relative maximum and minimum values of the function. State the values of x where they occur as well.

(c) We talked about relative maximums and relative minimums, but what about **absolute** maximums and minimums. What do you think those are? What are the absolute maximum and absolute minimum values of the function? At what x-values do they occur?

(d) What are the x and y-intercept(s) of the function? List each of the following as an ordered pair (x, y).

x-intercept(s): ______________________ y-intercept(s): ______________________
(zeroes)

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

Increasing: ____________________

Decreasing: ____________________

(f) Use your graph to find all solutions to the equation $f(x) = 3$. Illustrate your solution graphically.

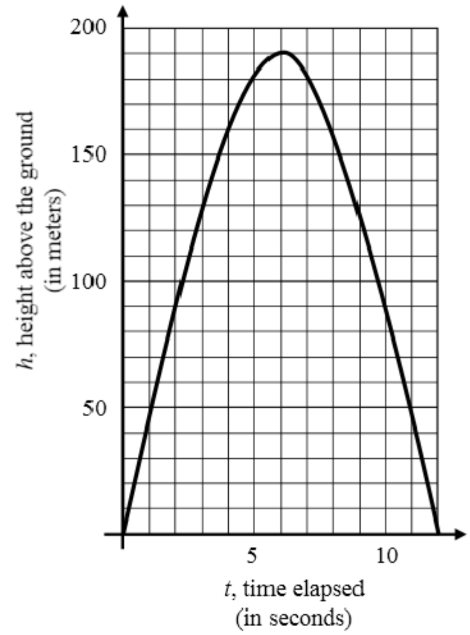
2. The following graph shows the height, h, above the ground of a toy rocket t seconds after it was fired. Use the graph of $h(t)$ to answer the following questions.

(a) What was the maximum height the rocket reached? After how many seconds?

(b) How many seconds was the rocket in flight?

(c) Interpret $h(2) = 90$.

(d) Give the interval for t over which the height of the rocket is decreasing.



3. On the following set of axis, create the graph of a function $f(x)$ with the following characteristics:

Passes through the points,

$(-8,0)$, $(5,-2)$ and $(8,3)$

Has an absolute maximum at $f(-4) = 5$

Has an absolute minimum at $f(2) = -6$

Decreasing on the interval on the interval $-4 \le x \le 2$