



Introducing Interval Notation

Objective:

Students will become familiar with interval notation and be able to use it to represent sets of numbers given graphically and in inequality form.

Connections to Previous Learning:

Students should be familiar with inequalities, number line graphs, and the terms “increasing,” “decreasing,” and “constant.”

Connections to AP*:

AP Calculus Topic: Analysis of Functions

Materials:

Student Activity pages

Teacher Notes:

This lesson is relatively short and should not be difficult for most students. It is important for the teacher to point out to students the potential for confusion between an interval that is open on both ends and the coordinates of a point. If the context of the situation does not make clear which it is, then students should use the word “interval” or choose the inequality version instead.

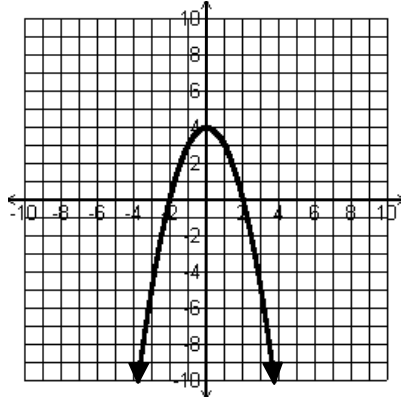
Students should never have an = with ∞ or $-\infty$, and must always use open parentheses with ∞ and $-\infty$.

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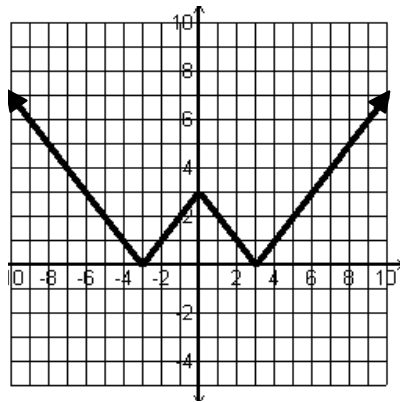
Instructions: Fill in the missing parts in the chart below.

	Inequality	Interval Notation	Graph
Ex.	$-3 \leq x < 5$	$[-3, 5)$	
Ex.	$x > 2$	$(2, \infty)$	
1.	$x \leq 3$		
2.		$(-\infty, 4)$	
3.			
4.		$[5, \infty)$	
5.			
6.	$x < 1$ or $x \geq 5$		
7.			
8.	x is any real #		
9.			
10.		$(1, 4)$	
11.	$x > 7$		
12.		$[-2, 2]$	

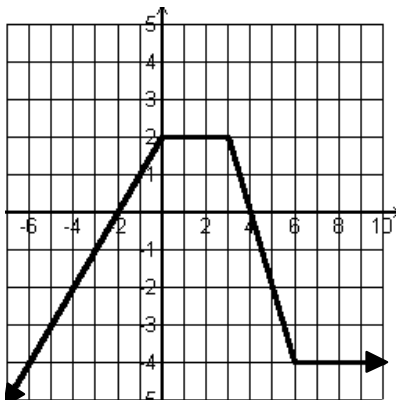
13. Given the graph of $f(x)$ below find:
 On what intervals of x is $f(x)$ increasing?
 On what intervals of x is $f(x)$ positive?

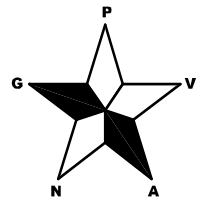


14. Given the graph of $f(x)$ below find:
 On what intervals of x is $f(x)$ decreasing?
 On what intervals of x is $f(x)$ positive?



15. Given the graph of $f(x)$ below find:
 On what intervals of x is $f(x)$ constant?
 On what intervals of x is $f(x)$ negative?





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Answers:

	Inequality	Interval Notation	Graph
Ex.	$-3 \leq x < 5$	$[-3, 5)$	
Ex.	$x > 2$	$(2, \infty)$	
1.	$x \leq 3$	$(-\infty, 3]$	
2.	$x < 4$	$(-\infty, 4)$	
3.	$2 \leq x \leq 6$	$[2, 6]$	
4.	$x \geq 5$	$[5, \infty)$	
5.	$x \leq 1$	$(-\infty, 1]$	
6.	$x < 1$ or $x \geq 5$	$(-\infty, 1) \cup [5, \infty)$	
7.	$-5 < x < -1$	$(-5, -1)$	
8.	x is any real #	$(-\infty, \infty)$	
9.	$x \leq -1$ or $x > 2$	$(-\infty, -1] \cup (2, \infty)$	
10.	$1 < x < 4$	$(1, 4)$	
11.	$x > 7$	$(7, \infty)$	
12.	$-2 \leq x \leq 2$	$[-2, 2]$	

13. $f(x)$ is increasing on the interval $(-\infty, 0]$ or $x \leq 0$
 $f(x)$ is positive on the interval $(-2, 2)$ or $-2 < x < 2$
14. $f(x)$ is decreasing on the intervals $(-\infty, -3]$ and $[0, 3]$ or $x \leq -3$ and $0 \leq x \leq 3$
 $f(x)$ is positive for all real numbers x or $(-\infty, \infty)$
15. $f(x)$ is constant on the intervals $[0, 3]$ and $[6, \infty)$ or $0 \leq x \leq 3$ and $x \geq 6$
 $f(x)$ is negative on the intervals $(-\infty, -2)$ and $(4, \infty)$ or $x < -2$ and $x > 4$