

Name:

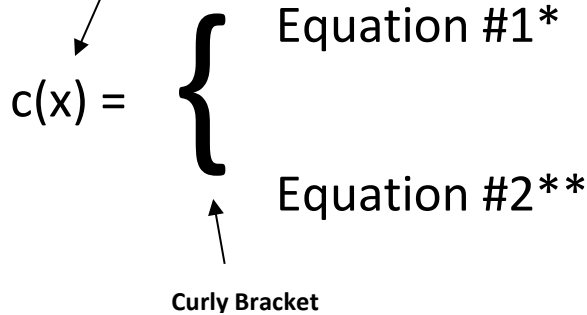
Date:

Period:

Function Notation:

Best to use a letter related to the problem.

For example: If problem talks about the cost of something, use $c(x)$ for the function.



Intervals:

These provide domain restrictions
Use Inequality Signs
Usually start with $0 \leq x \leq \#$ (not always)

if _____

if _____

These **boundaries** determine open circle or closed circle on the graph.

*Equation #1: Use the information given.

Either:

1. Find the slope (you may have to use the slope formula and substitute 2 points).
2. Find the y-intercept.
3. Use $y = mx + b$

OR:

1. If there is a situation described in the word problem, convert the situation into $y = mx + b$ format.

**Equation #2:

To write Equation #2, you **MUST** take into consideration what happened **first**. In order to get to the second interval, you HAD to **complete** the first interval. If there are more than 2 equations, you must ALWAYS use the previous equation to start the next PIECE.

1: Substitute the maximum boundary from the previous equation to find the starting point.

2: Multiply the "additional charge" by ("x" minus "# from previous boundary"). Remember: You are only being charged this amount for anything **OVER** the initial boundary, so you must subtract.

Example:

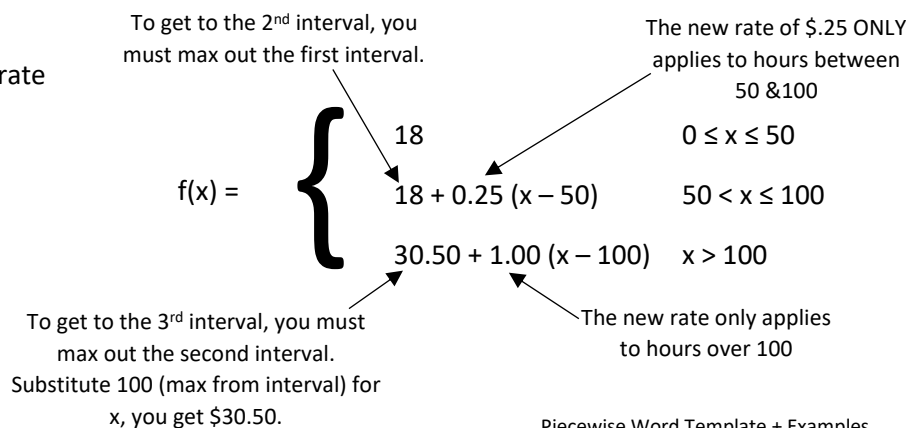
An Internet Service Provider has the following rate schedule for high-speed internet service:

Monthly Service Charge - \$18.00

First 50 Hours of Usage – Free

Next 50 hours of Usage - \$0.25/hour

Over 100 hours of Usage - \$1.00/hour



1. You have a summer job that pays time and a half for overtime. That is, if you work more than 40 hours per week, your hourly wage for the extra hours is 1.5 times your normal hourly wage of \$7. Write a piecewise function that gives your weekly pay P in terms of the number h of hours you work. How much will you get paid if you work 45 hours?

<p style="text-align: center;">Non-Simplified</p> $P(h) = \begin{cases} 7h & \text{if } 0 < h \leq 40 \\ 280 + 10.5(h - 40) & \text{if } h > 40 \end{cases}$ <p>Max out the first interval to start the second equation. Substitute 40 (max from interval) for x, you get \$280.</p> <p style="margin-left: 100px;">The new rate of \$10.50 ($7 \times 1.5$) ONLY applies to hours OVER 40</p>	OR	<p style="text-align: center;">Simplified</p> $h(t) = \begin{cases} 7h & \text{if } 0 < h \leq 40 \\ 10.5h - 140 & \text{if } h > 40 \end{cases}$ <p style="text-align: center;">These are the same equations, just simplified</p>
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If you work 45 hours, you substitute 45 into second equations since $45 > 40$. So, $280 + 10.5(45 - 40) = 280 + 10.5(5) = 332.50$. You will earn \$332.50 if you work 45 hours.

2. You plan to sell **I Love Math** t-shirts as a fundraiser. The wholesale t-shirt company charges you \$10 a shirt for the first 75 shirts. After the first 75 shirts you purchase up to 150 shirts, the company will lower its price to \$7.50 per shirt. After you purchase 150 shirts, the price will decrease to \$5 per shirt. Write a function that models this situation.

Max out the first interval to **start** the second equation. Substitute 75 (max from interval) for x , you get \$750.

The new rate of \$7.50 ONLY applies to shirts OVER 75

<p style="text-align: center;">Non-Simplified</p> $f(x) = \begin{cases} 10x & \text{if } 0 < x \leq 75 \\ 750 + 7.5(x - 75) & \text{if } 75 < x \leq 150 \\ 1312.50 + 5(x - 150) & \text{if } x > 150 \end{cases}$ <p>Max out the first interval to start the second equation. Substitute 150 (max from interval) for x, you get \$1312.50, which is what you must pay before you get the NEW rate</p> <p style="margin-left: 100px;">The NEW new rate of \$5 ONLY applies to shirts OVER 150</p>	OR	<p style="text-align: center;">Simplified</p> $f(x) = \begin{cases} 10x & \text{if } 0 < x \leq 75 \\ 187.50 + 7.5x & \text{if } 75 < x \leq 150 \\ 562.50 + 5x & \text{if } x > 150 \end{cases}$ <p style="text-align: center;">These are the same equations, just simplified</p>
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Try these:

3. Southeast Electric charges \$0.09 per kilowatt-hour for the first 200 kWh. The company charges \$0.11 per kilowatt-hour for all electrical usage in excess of 200 kWh.
- [a] Write a non-simplified piecewise function and a simplified function.
- [b] How many kilowatt-hours were used if a monthly electric bill was \$57.05?
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4. A construction worker earned \$17 per hour for the first 40 hours of work and \$25.50 per hour for work in excess of 40 hours.
- [a] Write a non-simplified piecewise function and a simplified function.
- [b] One week he earned \$896.75. How much overtime did he work?