Total Recall (Warm-up) (5 minutes approx.)

Total Recall: Exercise from yesterday's lesson.

Table of data for the cost of a personal music storage device over time.

Year	Cost
2/2005	$149.00
7/2005	$129.00
2/2006	$99.00
6/2006	$99.00
9/2006	$79.00
2/2008	$49.00

1. Is this data linear? A: plot it, yes

2. Does this data display good correlation for linear 'best fit?' A: plot it, yes

3. If a new personal music storage device is introduced to the public currently for $200.00, base on this data trend, when would you expect the price to drop to $100.00? A: 2 yrs.

Direct Instruction (10 minutes approx.)

Absolute Value: A couple weeks ago we talked about using absolute value for tolerance and measurements: | actual value – ideal value | ≤ tolerance. We talked about having a calorie intake of 2000 with exercise included. Trying to keep your intake right at 2000 can be overwhelming, so I would want to know what kind of range I can work with and use the tolerance formula : |Actual calories taken in per day – 2000| ≤ 300. This means that I want to be within 300 calories of 2000 for my daily intake with the amount of exercise I estimate I can perform.

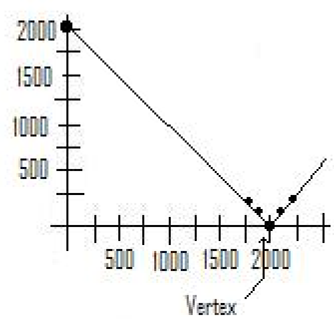
The 300 tolerance could be changed, based on the amount of exercise I was doing or if I wanted to loose or gain weight. I wanted to analyze this further, so I will let both the Actual and the tolerance be variables and then plot the results to see what I could work with. I will use equal sign for this exercise, later we will analyze inequalities.

$|x-2000| = y$ Making a table with some easily calculated values and then plotting them:

x	y
0	2000
2000	0
2100	100
1900	100
2200	200
1800	200

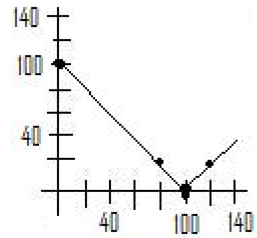
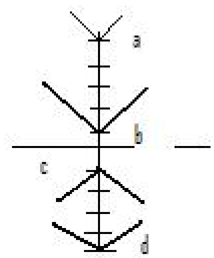
The data is plotted to the right.

This is a classic 'V' absolute value graph.



Notice that all 'y' values are positive.

Another example: When people count calories, people weigh their food. Use the absolute value, tolerance inequality to plot different variations from 100 grams. $|x-100| \leq y$

<table>
<tr><td></td><td><u>x</u> <u>y</u>
0 100
100 0
120 20
80 20</td><td>
</td></tr>
<tr><td rowspan="4">Practice
(10 minutes approx.)</td><td colspan="2">1. Compare equations and solutions with the two examples. Notice how they shift or transform with the target value being the vertex. What would be the absolute value equation for a ‘v’ graph with a vertex at (0,0)? A: |x|=0
2. What is the equation for a ‘v’ absolute value graph shifted 10 units to the left of x=0 on the y-axis? |x+10|=y
a.</td></tr>
<tr><td>3. What are the equations for these graphs? Assume all have slope = 1.
a. Answer: |x| = y + 5
b. A: |x| = y + 1
c. A: |x| = -y
d. A: |x| = y - 5</td><td>
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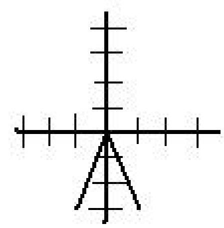
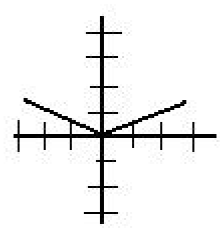
<tr><td>4. Graph y = -3|x| What happens to the opening of the ‘v’ compared to c in number 3?

The opening gets narrower.</td><td>
A:</td></tr>
<tr><td>5. Graph the equation: y = (1/2)|x|. What happens to this opening?
The opening gets wider.
Note: for y = a|x|
if |a| < 1 then opening is wider
if |a| > 1 then opening is narrower</td><td>
A:</td></tr>
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<td>Direct Instruction; practice and assessment: (15 minutes approx.)</td>
<td>Ted's at-rest heart rate is 50 beats per minute (bpm). At a moderate workout, it is 120 bpm. There is a one minute transition going from rest to workout. A graph of Ted's heartbeat rate would look like the plot to the right. It can be described by the piecewise function shown under it.

It is called a piecewise function because it has to be broken down into pieces of x values and lines. This particular piecewise function is continuous, because it does not have any gaps.</td>
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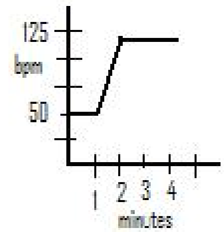

$$g(x) = \begin{cases} y = 50 & x < 1 \\ y = 70x + 50 & 1 \le x \le 2 \\ y = 120 & x > 2 \end{cases}$$
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<td rowspan="2">Exercise: (10 minutes approx.)</td>
<td colspan="3">1. Carla likes to watch scary movies, because of the shock factor. At 5 minutes into the movie, instantaneously, her heart rate jumps from 60 bpm to 100 bpm and stays there for 15 seconds. Then it ramps back down to 60 bpm for 45 seconds and stays there for some time after that. Draw a graph and write a piecewise function to represent her heart rate. Is this a continuous or discontinuous function?</td>
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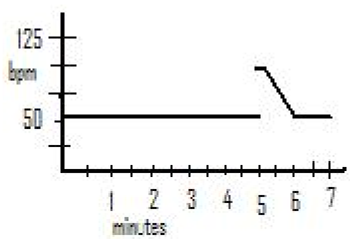
<td colspan="2">


</td>
<td>
$$f(x) = \begin{array}{ll} y = 60 & x \le 5 \\ y = 100 & 5 \le x \le 5.25 \\ y = -53.5x + 379.8 & 5 \le x \le 6 \\ y = 120 & x > 6 \end{array}$$

Not continuous. Use 2 points and point slope form to find linear equation.
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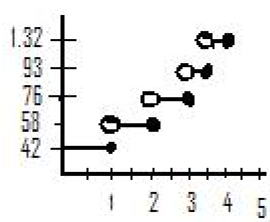
<td>Wrap-up (5 minutes approx.)</td>
<td colspan="3">Wrap up closing comments and housekeeping.

Special functions: Absolute value (v shape); piecewise and step. Below is the step function, showing the postage rate for various weights of mail. Just know that this is what a step function looks like.



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