Sorting Out the Change
A Solidify Understanding Task

A. Identify the pattern of change in each of the relations and sort each relation into the following categories:
   • Equal differences over equal intervals
   • Equal factors over equal intervals
   • Neither

B. Be prepared to describe the pattern of change and to tell how you found it.

1. 

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>-57</td>
</tr>
<tr>
<td>-25</td>
<td>-47</td>
</tr>
<tr>
<td>-20</td>
<td>-37</td>
</tr>
<tr>
<td>-15</td>
<td>-27</td>
</tr>
<tr>
<td>-10</td>
<td>-17</td>
</tr>
<tr>
<td>-5</td>
<td>-7</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Type of pattern of change ________________________________
How I found the pattern of change:
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

2. 

\[ f(0) = -3, \ f(n + 1) = \frac{5}{3} f(n) \]

Type of pattern of change ________________________________
How I found the pattern of change:
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
3. The pattern of change in the perimeter of the figures from one step to the next.

   Type of pattern of change __________________________  
   How I found the pattern of change:                   
   ____________________________________________________________________  
   ____________________________________________________________________  
   ____________________________________________________________________

4. The pattern of change in the area of the figures from one step to the next.

   Type of pattern of change __________________________  
   How I found the pattern of change:                   
   ____________________________________________________________________  
   ____________________________________________________________________  
   ____________________________________________________________________

5. $y = ax - 3$

   Type of pattern of change __________________________  
   How I found the pattern of change:                   
   ____________________________________________________________________  
   ____________________________________________________________________  
   ____________________________________________________________________
6. 

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>7</td>
</tr>
<tr>
<td>-5</td>
<td>7</td>
</tr>
<tr>
<td>-0</td>
<td>7</td>
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<tr>
<td>5</td>
<td>7</td>
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<tr>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

Type of pattern of change ____________________________

How I found the pattern of change:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

7. The height from the ground of a person on a ferris wheel that is rotating at a constant speed.

Type of pattern of change ____________________________

How I found the pattern of change:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

8. $y = x$

Type of pattern of change ____________________________

How I found the pattern of change:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
9.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>4</td>
<td>-2</td>
</tr>
<tr>
<td>-4</td>
<td>-8</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>-8</td>
<td>-11</td>
</tr>
</tbody>
</table>

Type of pattern of change ____________________________

How I found the pattern of change:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

10. The algae population in a pond increases by 3% each year until it depletes its food supply and then maintains a constant population.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>238</td>
</tr>
<tr>
<td>-4</td>
<td>76</td>
</tr>
<tr>
<td>-3</td>
<td>22</td>
</tr>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>0</td>
<td>-4</td>
</tr>
</tbody>
</table>

Type of pattern of change ____________________________

How I found the pattern of change:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

11. The algae population in a pond increases by 3% each year until it depletes its food supply and then maintains a constant population.
12. The change in the height of the ball from one bounce to the next if the ball is dropped from a height of 8 feet and the ball bounces to 80% of its previous height with each bounce.

<table>
<thead>
<tr>
<th>Type of pattern of change</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How I found the pattern of change:</td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>-5</td>
</tr>
<tr>
<td>3</td>
<td>-10</td>
</tr>
<tr>
<td>3</td>
<td>-20</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How I found the pattern of change:</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ready, Set, Go!

Ready

Topic: Rates of change in linear models

Which situation has the greatest rate of change?

1. The amount of stretch in a short bungee cord or the amount of stretch in a slinky when each is pulled by a 3 pound weight.

2. A sunflower that grows 2 inches every day or an amaryllis that grows 18 inches in one week.

3. Pumping 25 gallons of gas into a truck in 3 minutes or filling a bathtub with 40 gallons of water in 5 minutes.

4. Riding a bike 10 miles in 1 hour or jogging 3 miles in 24 minutes.

Set

Topic: linear rates of change

Determine the rate of change in each table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-13</td>
</tr>
<tr>
<td>-1</td>
<td>-5</td>
</tr>
<tr>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-4</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>-14</td>
</tr>
<tr>
<td>5</td>
<td>-8</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
</tr>
</tbody>
</table>
Go

Topic: Graphing linear equations in slope-intercept form.

Graph the following equations:

8. \( y = 3x - 1 \)

9. \( y = -5x + 4 \)

10. \( y = x \)

11. \( y = -4 \)

12. \( y = \frac{1}{2}x - 6 \)

13. \( x = 3 \)

Need Help? Check out these related videos:

http://www.algebra-class.com/rate-of-change.html

Where’s My Change?
*A Solidify Understanding Task*

Look through the problems that you worked with in the “Sorting Out the Change” task.

Choose two problems from your linear category (equal differences over equal intervals) and two problems from your exponential category (equal factors over equal intervals).

Add as many representations as you can to the problem you selected. For instance, if you choose problem #1 which is a table, you should try to represent the function with a graph, an explicit equation, a recursive equation, and a story context.

Identify the rate of change in the function. If the function is linear, identify the constant rate of change. If the function is exponential, identify the factor of change.

How does the rate of change appear in each of your representations?
Ready, Set, Go!

Ready

Topic: Recognizing the greater rate of change when comparing 2 linear functions or 2 exponential functions.

Which graph is growing faster?

1. 

2. 

3. 

4.