

Arithmetic  $\rightarrow$  Linear  $\leftrightarrow$  or  $\leftrightarrow$   
 Geometric  $\rightarrow$  Exponential  $\leftrightarrow$  or  $\leftrightarrow$

## 2.3 Linear, Exponential or Neither?

### A Practice Understanding Task

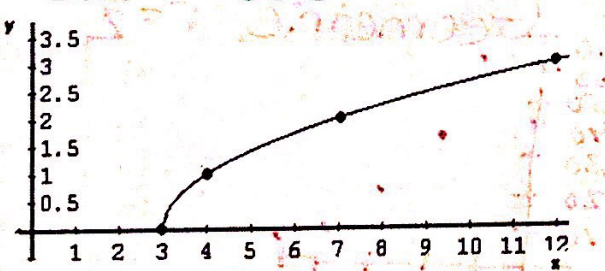


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<https://flic.kr/p/a8uzeA>

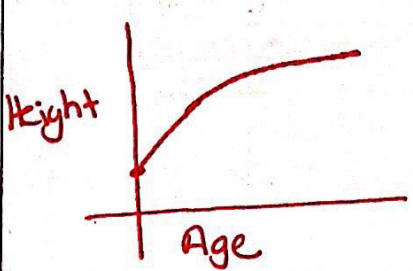
For each representation of a function, decide if the function is linear, exponential, or neither.  
 Give at least 2 reasons for your answer.

<p>1. Continuous</p>	<p style="text-align: center;"> <span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Linear</span>      Exponential      Neither                 </p> <p>Why? <span style="color: red;">Line</span>  <span style="color: red;">Constant Rate of Change</span></p>												
<p>2. Tennis Tournament</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Rounds</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Number of Players left</td> <td>64</td> <td>32</td> <td>16</td> <td>8</td> <td>4</td> </tr> </tbody> </table> <p>There are 4 players remaining after 5 rounds</p> <p>Discrete  <span style="color: red;">* You have a half of a player.</span></p>	Rounds	1	2	3	4	5	Number of Players left	64	32	16	8	4	<p style="text-align: center;"> <span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Exponential</span>      Linear      Neither                 </p> <p>Why? <span style="color: red;">Geometric</span> <math>r = \frac{1}{2}</math></p>
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Number of Players left	64	32	16	8	4								



<p>3. Continuous</p> <p><math>y = 4x</math></p> <p><math>\frac{4}{1}x</math></p> <p>↑ rate of change</p>	<p>Linear Exponential Neither</p> <p>Why? Line ↗ Constant Rate of Change</p>
<p>4. This function is decreasing at a <u>constant rate</u></p>	<p>Linear Exponential Neither</p> <p>Why? Constant Rate of Change</p>
<p>5. Continuous</p> 	<p>Linear Exponential Neither</p> <p>Why? Curve is not exponential</p> <p>↙</p>



<p>6.                  A person's height as a function of a person's age                  (from age 0 to 100)</p> <p>Continuous</p>	<p>Linear      Exponential      <u>Neither</u></p> <p>Why?</p> 																								
<p>7.                  Continuous</p> $-3x = 4y + 7$ $\frac{-3x - 7}{4} = y$ $y = -\frac{3}{4}x - \frac{7}{4}$ <p>← start</p>	<p><u>Linear</u>      Exponential      Neither</p> <p>Why? Arithmetic Line</p> $f(n) = -\frac{7}{4} - \frac{3}{4}n$																								
<p>8. Discrete</p> <table border="1"> <tbody> <tr> <td></td> <td>x</td> <td>y</td> <td></td> </tr> <tr> <td>+2</td> <td>-2</td> <td>23</td> <td>+18</td> </tr> <tr> <td>+2</td> <td>0</td> <td>5</td> <td>-18</td> </tr> <tr> <td>+2</td> <td>2</td> <td>-13</td> <td>-18</td> </tr> <tr> <td>+2</td> <td>4</td> <td>-31</td> <td>-18</td> </tr> <tr> <td>+2</td> <td>6</td> <td>-49</td> <td>-18</td> </tr> </tbody> </table> <p>Constant Rate of Change = <math>\frac{-18}{2} = -9</math></p>		x	y		+2	-2	23	+18	+2	0	5	-18	+2	2	-13	-18	+2	4	-31	-18	+2	6	-49	-18	<p><u>Linear</u>      Exponential      Neither</p> <p>Why? Constant rate of Change</p>
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9.

Height in Inches	Shoe Size
62	6
74	13
70	9
67	11
53	4
58	7

Discrete

Linear      Exponential      Neither

Why? Points are scattered and do not form a line or a curve.

10.

The number of cell phone users in Centerville as a function of years, if the number of users is increasing by 75% each year.

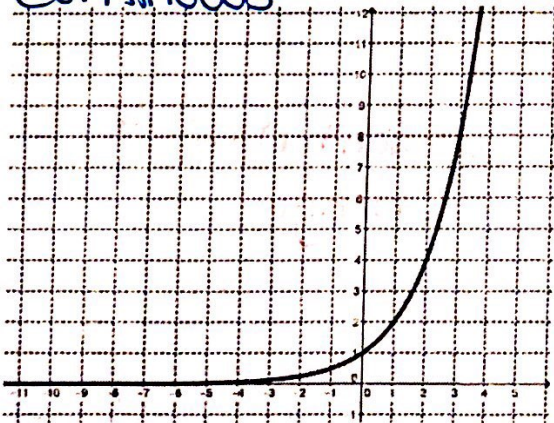
n	f(n)
1	
2	
3	
4	

↓ 1.75

Linear      Exponential      Neither

Why? Geometric  $r = 1.75$


11. Continuous



Linear      Exponential      Neither

Why? Curve  
Geometric



<p>12.                  The time it takes you to get to work as a function the speed at which you drive</p> <p><i>Is constant no table                  slope = 0                  2018 yr?</i></p>	<p>Linear      Exponential      <u>Neither</u></p> <p>Why? <i>Drivers change speed as they drive to work</i></p>
<p>13.                  Continuous      <math>y = 7x^2</math></p> <p><i>Exponential</i></p>	<p>Linear      Exponential      <u>Neither</u></p> <p>Why? <i>Shape of graph</i></p> 
<p>14.                  Each point on the graph is exactly <math>\frac{1}{3}</math> of the previous point.</p> <p><i>Discrete</i></p> <p><i>↑</i></p>	<p>Linear      <u>Exponential</u>      Neither</p> <p>Why? <i>Geometric <math>r = \frac{1}{3}</math></i></p>



<p>15.  <math>f(1) = 7, f(2) = 7, f(n) = f(n-1) + f(n-2)</math>                  Discrete  <math>7, 7, 14, 21, 35</math></p>	<p>Linear      Exponential      <u>Neither</u></p> <p>Why? Not an arithmetic or geometric sequence</p>
<p>16. Discrete  <math>f(1) = 1, f(n) = \frac{2}{3}f(n-1)</math>  <math>f(n) = 1\left(\frac{2}{3}\right)^{n-1}</math></p>	<p>Linear      <u>Exponential</u>      Neither</p> <p>Why? Geometric</p>