

## Linear versus Exponential card sort

Sort them by Linear, Exponential Growth, and Exponential Decay. There are 2 graphs, 2 tables, 2 function rules, and 2 real world situations for each type. \*The graphs, tables, rules, and story problems are ***not related***. For example, the rule  $y = 4x - 8$  will not have a matching table – you must decide if this rule is linear, exponential growth, or exponential decay.

**Record answers here:**

	Graphs	Tables	Rules	Story Problems
<b>Linear</b>				
<b>Exponential Growth</b>				
<b>Exponential Decay</b>				

**Summary:**

How do you determine if something is linear or exponential by the:

- A. Graph \_\_\_\_\_
- B. Table \_\_\_\_\_
- C. Rule \_\_\_\_\_
- D. Story problem (key words)

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How do you determine if a situation is exponential growth or decay by the:

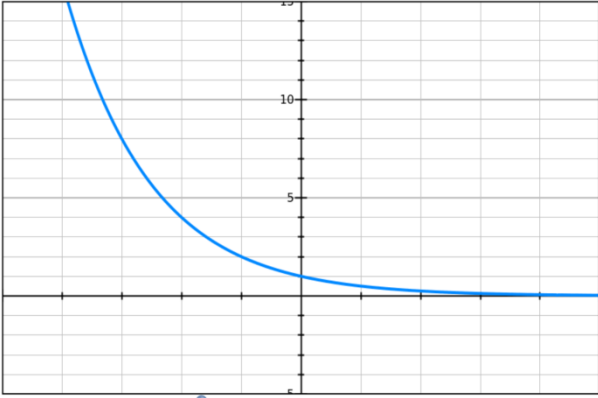
- A. Graph \_\_\_\_\_
- B. Table \_\_\_\_\_
- C. Rule \_\_\_\_\_
- D. Story problem (key words)

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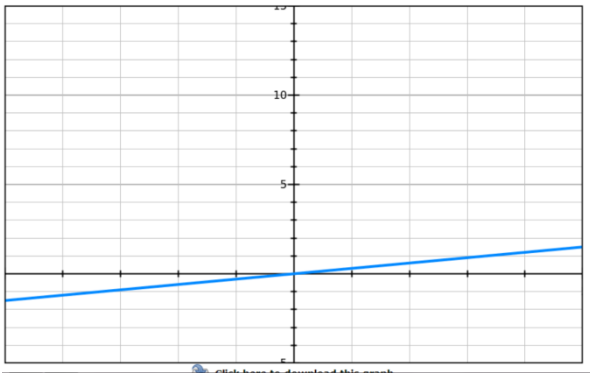
A



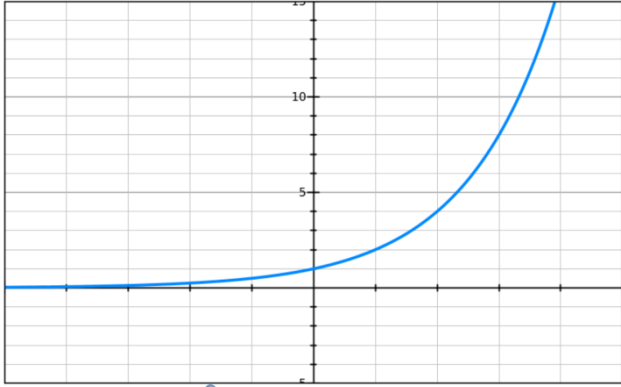
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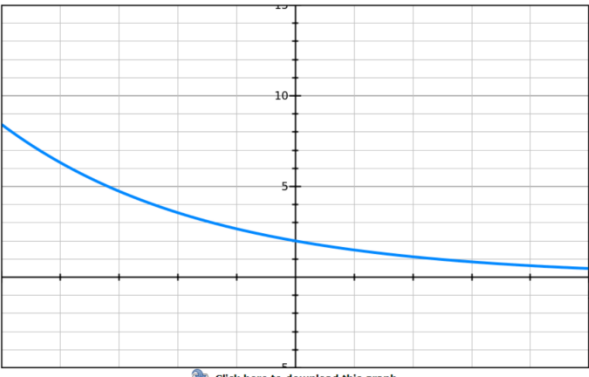
C



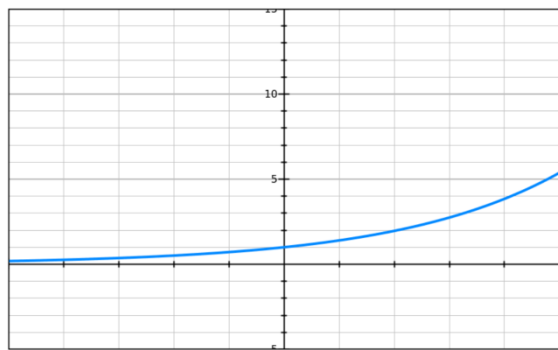
D



E



F



G

X	-2	-1	0	1	2
Y	3	1.5	0	-1.5	-3

H

X	-2	-1	0	1	2
Y	0.25	0.5	1	2	4

I

X	-2	-1	0	1	2
Y	16	4	1	0.25	0.0625

J

X	-2	-1	0	1	2
Y	2.08	2.5	3	3.6	4.32

K

X	-2	-1	0	1	2
Y	2.47	2.22	2	1.8	1.62

L

X	-2	-1	0	1	2
Y	-4	-4.5	-5	-5.5	-6

M

$$y = 4x - 8$$

N

$$y = 0.4(3.2)^x$$

O

$$y = 3(0.7)^x$$

P

$$y = -2(4)^x$$

Q

$$y = -2(0.75)^x$$

R

$$y = \frac{1}{2}x + 5$$

<p>S</p> <p>The Martins bought a house for \$85,000. Assuming that the value of the house will appreciate at approximately 5% per year, how much will the house be worth in 5 years?</p>	<p>T</p> <p>Phil keeps his money in a piggy bank. He has \$60 now, and he is adding \$5 per week. How much money will he have in 7 weeks?</p>
<p>U</p> <p>A certain medicine has a half life of 3 hours for a 4 mg dose. If Kelly takes a 4 mg pill, how much is left in her system after 9 hours?</p>	<p>V</p> <p>Jeff is starting an exercise program. He will do 5 push ups on the first day of the program and then he will add 3 push ups each day. How many push ups will he have to do after 3 weeks on this program?</p>
<p>W</p> <p>One kind of bacteria in a lab culture triples in number every 30 minutes. Suppose a culture started with 30 bacteria cells. How many will there be after 2 hours?</p>	<p>X</p> <p>Cars depreciate at approximately 15% per year. If a new car costs \$24,000, how much will it be worth in 3 years?</p>

Name **ANSWER KEY**

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**Record answers here:**

	<b>Graphs</b>	<b>Tables</b>	<b>Rules</b>	<b>Story Problems</b>
<b>Linear</b>	<b>B, C</b>	<b>G, L</b>	<b>M, R</b>	<b>T, V</b>
<b>Exponential Growth</b>	<b>D, F</b>	<b>H, J</b>	<b>N, P</b>	<b>S, W</b>
<b>Exponential Decay</b>	<b>A, E</b>	<b>I, K</b>	<b>O, Q</b>	<b>U, X</b>

### Summary:

How do you determine if something is linear or exponential by the:

- E. Graph **LINEAR: STRAIGHT LINE. EXP: CONTAINS AN ASYMPTOTE, GROWS/DECAYS QUICKLY**
- F. Table **LINEAR: CONSTANT 1<sup>ST</sup> DIFFERENCE. EXP: COMMON RATIO.**
- G. Function **LINEAR:  $Y=MX+B$ . EXP:  $Y=A(B)^X$**
- H. Story problem (key words) **LINEAR: PER WEEK, EACH DAY... EXP: APPRECIATE, DEPRECIATE, HALF-LIFE, TRIPLES...**

How do you determine if a situation is exponential growth or decay by the:

- A. Graph **GROWTH: LOW LEFT TO HIGH RIGHT, DECAY: HIGH LEFT TO LOW RIGHT**
- B. Table **GROWTH: DO THE Y-VALUES INCREASE OR DECREASE**
- C. Function **GROWTH: IF  $B>1$  DECAY: IF  $0<B<1$**
- D. Story problem (key words) **GROWTH: APPRECIATE, TRIPLE, DOUBLE, ETC. DECAY: DEPRECIATE, HALF-LIFE**