

7.2 Exponential Decay

Name: _____

Write your questions
and thoughts here!**Notes****Recall:**

12, 24, 48, 96, ...

12, 6, 3, 1.5, 0.75 ...

Exponential DECAY

$$y = a(b)^x$$

Identify if the function is exponential growth or decay and justify your response.

1.

Exponential
Growth or Decay

2.

Exponential
Growth or Decay

3.

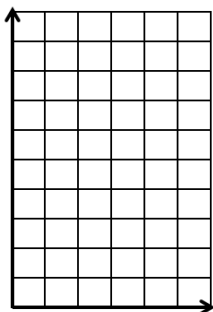
Exponential
Growth or Decay

4.

Exponential
Growth or Decay**Sketch the graph by filling out a T-chart. Find AT LEAST THREE points.**

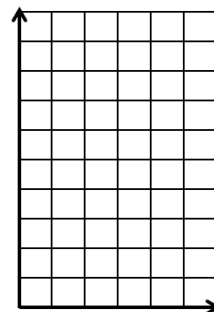
5. $y = 15\left(\frac{1}{3}\right)^x$

x	y



6. $y = 10(0.45)^x$

x	y

**Given the following table of values, create an equation that fits these points.**

7.

x	0	1	2	3
y	4	2.4	1.44	0.864

Recall:Percent Increase: $y = a(1 + \% \text{ increase})^x$

8. $y = 5(1.138)^x$

9. $y = 2(2.65)^x$

Write your questions and thoughts here!

Percent Decrease:

Start with “ a ” amount and decay with a % decrease. Convert to decimals!

$$y = a(\quad)^x$$

For each equation, identify the initial value and the percent increase or decrease.

10.

Initial Value: _____ % Inc/Dec: _____

11.

Initial Value: _____ % Inc/Dec: _____

12.

Initial Value: _____ % Inc/Dec: _____

13.

Initial Value: _____ % Inc/Dec: _____

For each problem, create an equation to model the scenario.

14. Mr. Bean’s yard is getting overrun with weeds. The first year he bought his home, there was 1800 square feet of grass g . It is decreasing by 28.1% per year t .

15. The value V of a new car purchased for \$20,000 decreases by 10% per year t . Write an exponential decay model for the value of the car. Use the model to estimate the value after 4 years.

16. The value V of a new motorcycle purchased for \$11,000 decreases by 15.7% per year t . Write an exponential decay **model** for the value of the motorcycle. Use the model to estimate the value after 5 years.

Now summarize what you learned!

7.2 Exponential Decay

Algebra 1

Practice

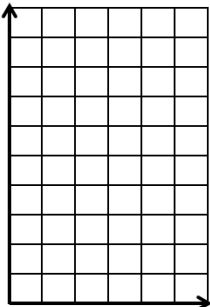
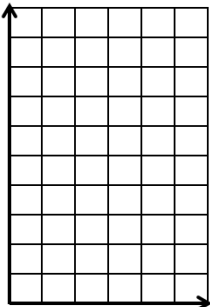
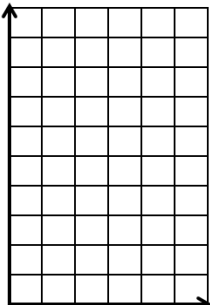
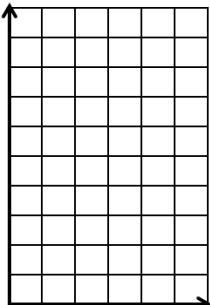
Identify if the function is exponential growth or decay and justify your response.

1. $f(x) = 2.5\left(\frac{2}{3}\right)^x$ Exponential Growth or Decay	2. $f(x) = \frac{5}{3}\left(\frac{3}{5}\right)^x$ Exponential Growth or Decay	3. $f(x) = 5.7(0.2)^x$ Exponential Growth or Decay	4. $f(x) = 8(2.1)^x$ Exponential Growth or Decay
5. $f(x) = 20(3.6)^x$ Exponential Growth or Decay	6. $f(x) = 7\left(\frac{12}{7}\right)^x$ Exponential Growth or Decay	7. $f(x) = \frac{11}{15}\left(\frac{15}{11}\right)^x$ Exponential Growth or Decay	8. $f(x) = 1.1(0.05)^x$ Exponential Growth or Decay

Create a model (equation) for each scenario. Use function notation to answer the question.

9. 700 grams g of radioactive material decays at a rate of 2.4% per year t . How much material will there be after 100 years?	10. The new tires on a truck have a tread depth d of 0.5 inches and decays at a rate of 1.6% per week w . How deep will the tread be after 52 weeks?
11. A car that is worth \$25,000, decreases in value v by 15% per year t . How much will the car be worth after 5 years?	12. Mr. Brust's IQ, B , is currently 173, but it is decaying at a rate of 4.5% every year t . What will Mr. Brust's IQ be in 20 years?

Sketch the graph by filling out a T-chart. Find AT LEAST THREE points. You choose the scale.

13. $y = 20\left(\frac{1}{2}\right)^x$ <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><th>x</th><th>y</th></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> 	x	y																					14. $y = 18\left(\frac{1}{3}\right)^x$ <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><th>x</th><th>y</th></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> 	x	y																				
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Given the following table of values, create an equation that fits these points.

17.

x	0	1	2	3
y	150	60	24	9.6

18.

x	0	1	2	3
y	6	5.1	4.335	3.68475

For each equation, identify the initial value (I.V.) and the percent increase or decrease.

19. $f(x) = 100(1.75)^x$

I.V. _____
% Inc/Dec: _____

20. $f(x) = 0.7(3.106)^x$

I.V. _____
% Inc/Dec: _____

21. $f(x) = 506(0.9)^x$

I.V. _____
% Inc/Dec: _____

22. $f(x) = 0.565(0.871)^x$

I.V. _____
% Inc/Dec: _____

23. $f(x) = 8(0.75)^x$

I.V. _____
% Inc/Dec: _____

24. $f(x) = 65(1.851)^x$

I.V. _____
% Inc/Dec: _____

25. $f(x) = 0.2(0.155)^x$

I.V. _____
% Inc/Dec: _____

26. $f(x) = 0.89(1.3)^x$

I.V. _____
% Inc/Dec: _____

27. Find the product of
 $(4p + 3)(3p - 9)$

30. Solve: $-4 + \frac{n+4}{5} = -6$

28.

x	y
20	140
18	121
15	107
22	158
25	172
28	194
13	92
31	201

Find the LINEAR regression equation for the data above.

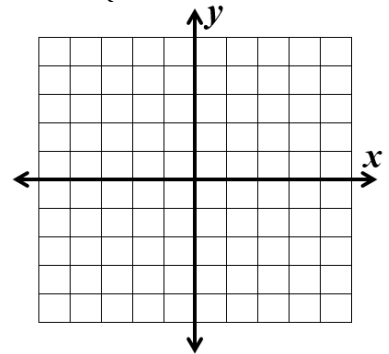
Equation: _____

Correlation Coefficient:

Explain the meaning of the correlation coefficient.

29. Graph the following:

$$\begin{cases} y < \frac{3}{2}x + 2 \\ y > -\frac{1}{2}x - 2 \end{cases}$$



7.2 Exponential Decay

Practice check: The next two questions are just like the practice, but we provide no answers. If you can't do these problems, then you're definitely not ready for a Mastery Check!

31. A bicycle that is worth \$500, decreases in value v by 7.8% per year t . Set up a function to model this situation, then show how much will the bike will be worth after 5 years?

32. Identify the initial value and the percent increase or decrease.

$$f(x) = 1.76(0.921)^x$$

33. According to the International Basketball Association (FIBA), a basketball must be inflated to a pressure such that when it is dropped from a height of 1,800 millimeters (mm), it rebounds to a height of 1,300 mm. Coach Sullivan decides to test the rebound-ability of his new basketball. He assumes that the ratio of each rebound height to the previous rebound height remains the same at $\frac{1300}{1800}$. Let $f(n)$ be the height of the basketball after n bounces. Complete the chart on the right to reflect the heights Coach Sullivan expects to measure.

n	$f(n)$
0	1,800
1	
2	
3	
4	

- a. Write the **explicit** formula for the sequence that models the height of Coach Sullivan's basketball after any number of bounces.
- b. Label the axes of the graph on the right.
- c. Plot the points from the table.
- d. Connect the points with a smooth curve.
- e. Use the curve to estimate the bounce number at which the rebound height drops below 200 mm.

