

7.2 Exponential Decay

Algebra 1

Solutions

Practice

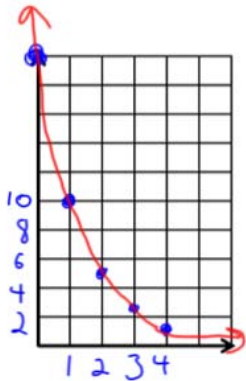
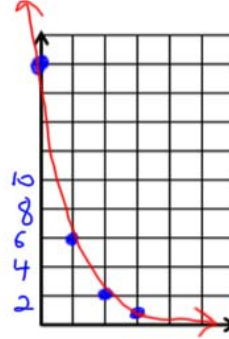
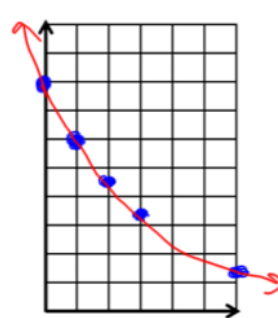
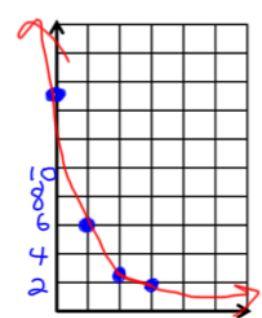
Identify if the function is exponential growth or decay and justify your response.

1. $f(x) = 2.5\left(\frac{2}{3}\right)^x$ Exponential Growth or <u>Decay</u> $0 < b < 1$	2. $f(x) = \frac{5}{3}\left(\frac{3}{5}\right)^x$ Exponential Growth or <u>Decay</u> $0 < b < 1$	3. $f(x) = 5.7(0.2)^x$ Exponential Growth or <u>Decay</u> $0 < b < 1$	4. $f(x) = 8(2.1)^x$ Exponential <u>Growth</u> or Decay $b > 1$
5. $f(x) = 20(3.6)^x$ Exponential <u>Growth</u> or Decay $b > 1$	6. $f(x) = 7\left(\frac{12}{7}\right)^x$ Exponential <u>Growth</u> or Decay $b > 1$	7. $f(x) = \frac{11}{15}\left(\frac{15}{11}\right)^x$ Exponential <u>Growth</u> or Decay $b > 1$	8. $f(x) = 1.1(0.05)^x$ Exponential Growth or <u>Decay</u> $0 < b < 1$

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

9. 700 grams of radioactive material decays at a rate of 2.4% per year. How much material will there be after 100 years? $G(t) = 700(1 - 0.024)^t$ $G(t) = 700(0.976)^t$ $G(100) = 61.67$ grams	10. The new tires on a truck have a tread depth of 0.5 inches and decays at a rate of 1.6% per week. How deep will the tread be after 52 weeks? $d(w) = 0.5(1 - 0.016)^w$ $d(w) = 0.5(0.984)^w$ $d(52) = 0.22$ inches
11. A car that is worth \$25,000, decreases in value by 15% per year. How much will the car be worth after 5 years? $V(t) = 25,000(1 - 0.15)^t$ $V(t) = 25,000(0.85)^t$ $V(5) = \$11,092.63$	12. Mr. Brust's IQ is currently 173, but it is decaying at a rate of 4.5% every year. What will Mr. Brust's IQ be in 20 years? $B(t) = 173(1 - 0.045)^t$ $B(t) = 173(0.955)^t$ $B(20) = 68.88$

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"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>20</td></tr> <tr><td>1</td><td>10</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>2.5</td></tr> <tr><td>4</td><td>1.25</td></tr> </tbody> </table> 	x	y	0	20	1	10	2	5	3	2.5	4	1.25	14. $y = 18\left(\frac{1}{3}\right)^x$ <table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>18</td></tr> <tr><td>1</td><td>6</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>0.67</td></tr> </tbody> </table> 	x	y	0	18	1	6	2	2	3	0.67
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15. $y = 8\left(\frac{3}{4}\right)^x$ <table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>8</td></tr> <tr><td>1</td><td>6</td></tr> <tr><td>2</td><td>4.5</td></tr> <tr><td>3</td><td>3.38</td></tr> <tr><td>6</td><td>1.43</td></tr> </tbody> </table> 	x	y	0	8	1	6	2	4.5	3	3.38	6	1.43	16. $y = 15\left(\frac{2}{5}\right)^x$ <table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>15</td></tr> <tr><td>1</td><td>6</td></tr> <tr><td>2</td><td>2.4</td></tr> <tr><td>3</td><td>0.96</td></tr> </tbody> </table> 	x	y	0	15	1	6	2	2.4	3	0.96
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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

$$60 \div 150 = 0.4$$

$$24 \div 60 = 0.4$$

$$y = 150(0.4)^x$$

18.

x	0	1	2	3
y	6	5.1	4.335	3.68475

$$5.1 \div 6 = 0.85$$

$$4.335 \div 5.1 = 0.85$$

$$y = 6(0.85)^x$$

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

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

$$1+r = 1.75$$

$$r = 0.75$$

I.V. 100

% Inc/Dec: 75%

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

$$1+r = 3.106$$

$$r = 2.106$$

I.V. 0.7

% Inc/Dec: 210.6%

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

$$1-r = 0.9$$

$$-r = -0.1$$

$$r = 0.1$$

I.V. 506

% Inc/Dec: 10%

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

$$1-r = 0.871$$

$$-r = -0.129$$

$$r = 0.129$$

I.V. 0.565

% Inc/Dec: 12.9%

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

$$1-r = 0.75$$

$$-r = -0.25$$

$$r = 0.25$$

I.V. 8

% Inc/Dec: 25%

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

$$1+r = 1.851$$

$$r = 0.851$$

I.V. 65

% Inc/Dec: 85.1%

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

$$1-r = 0.155$$

$$-r = -0.845$$

$$r = 0.845$$

I.I.V. 0.2

% Inc/Dec: 84.5%

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

$$1+r = 1.3$$

$$r = 0.3$$

I.V. 0.89

% Inc/Dec: 30%

27. Find the product of

$$(4p + 3)(3p - 9)$$

$$12p^2 - 36p + 9p - 27$$

$$12p^2 - 27p - 27$$

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: $y = 6.35x + 11.55$

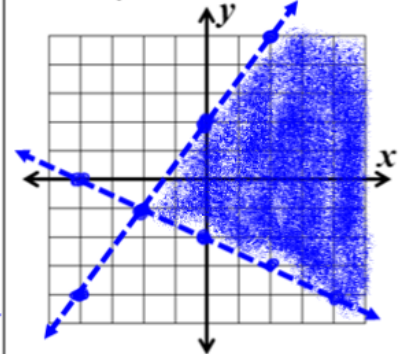
Correlation Coefficient: 0.99

Explain the meaning of the correlation coefficient.

Strong linear correlation

29. Graph the following:

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



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

$$5 \cdot \frac{n+4}{5} = -2 \cdot 5$$

$$n+4 = -10$$

$$-4 \quad -4$$

$$n = -14$$