

# 7.1 – Exponential Functions

## PRACTICE 7.1

Solve each equation for the unknown variable.

1.  $(27)^{3x} = 9$

$(3^3)^{3x} = 3^2$   
 $3^{9x} = 3^2$

$9x = 2$

$x = \frac{2}{9}$

2.  $25^{-k} \cdot 5^3 = 625$

$(5^2)^{-k} \cdot 5^3 = 5^4$   
 $5^{-2k} \cdot 5^3 = 5^4$   
 $5^{-2k+3} = 5^4$   
 $-2k+3 = 4$   
 $-2k = 1$   
 $k = -\frac{1}{2}$

3.  $\left(\frac{1}{3}\right)^{-3x+3} = 27^x$

$(3^{-1})^{-3x+3} = (3^3)^x$   
 $3^{3x-3} = 3^{3x}$

$3x-3 = 3x$

$-3 = 0$  No Solution

4.  $(5^{2x})(x+2) = 1$

$5^{2x+4x} = 5^0$

$2x^2 + 4x = 0$

$2x(x+2) = 0$

$2x = 0 \quad x+2 = 0$   
 $x = 0 \quad x = -2$

$x = -2, 0$

5.  $\frac{(7)^{4x^2}}{7^8} = 7$

$7^{4x^2-8} = 7^1$

$4x^2 - 8 = 1$

$4x^2 = 9$

$x^2 = \frac{9}{4}$

$x = \pm \frac{3}{2}$

6.  $32^{-3a-2} = 64^{a-1}$

$(2^5)^{-3a-2} = (2^6)^{a-1}$

$2^{-15a-10} = 2^{6a-6}$

$-15a-10 = 6a-6$

$-10 = 21a-6$

$-4 = 21a$

$-\frac{4}{21} = a$

7. The website Bankrate.com publishes a weekly list of the top savings deposit yields. In the category of 3-year certificates of deposit, the following were listed. Which bank should you choose for a \$5000 investment? Decide by completing the table. **The Brust Price Bank is the best.**

$A = P(1 + \frac{r}{n})^{nt}$

Bank	APR	Compounded	Initial Investment	Value after 3 Yrs
The Brust Price Bank	3.12% <small>.0312</small>	Quarterly <small>n=4</small>	\$5000	\$5488.61
Sully.com	3.00% <small>.03</small>	Daily <small>n=365</small>	\$5000	\$5470.85
Kelly-Green\$ Bank	2.96% <small>.0296</small>	Monthly <small>n=12</small>	\$5000	\$5463.71
BeanCounters.com	2.75% <small>.0275</small>	Continuously	\$5000	\$5429.99

$A = Pe^{rt}$

8. Find each missing value in the table.

Initial Value	% Change	Growth or Decay?	Equation
1.25	Loss of 25%	Decay	$y = 1.25(1 - 0.25)^x$
1.25	GAIN 25%	GROWTH	$y = 1.25(1.25)^x$
0.75	GAIN 25%	GROWTH	$y = 0.75(1.25)^x$
0.75	LOSS 25%	DECAY	$y = 0.75(0.75)^x$
3	GAIN 100%	GROWTH	$y = 3(2)^x$
-5	Loss of 94%	Decay	$y = -5(.06)^x$
2.45	Gain of 415%	Growth	$y = 2.45(5.15)^x$
a	Loss of r%	Decay	$y = a(1 - .01r)^x$

# 7.1 – Exponential Functions

9. The equation  $y = 25,000(1 + 0.04)^x$  models the salary of an employee who receives an annual raise.

Give the meaning of each number and variable in this equation.

25,000: Starting salary      0.04: 4% raise      1: 100% of initial salary

A ball is dropped from a height of 12 feet and is allowed to bounce over and over. The height of each bounce is modeled in the exponential DECAY model below.

Bounce	0	1	2	3	4	...	8	...	100
Height (ft)	12	7.8	5.07	3.2955	2.142075	...	???	...	???

10. Function:  $y = 12(.65)^x$       11. 8<sup>th</sup> Bounce: 0.3824 ft      12. 100<sup>th</sup> Bounce:  $2.3 \times 10^{-18}$  ft

$$y = 12\left(\frac{7.8}{12}\right)^x$$

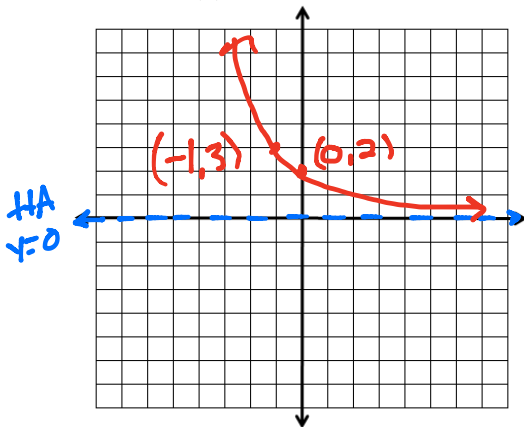
$$y = 12(.65)^x$$

$$y = 12(.65)^8$$

$$y = 12(.65)^{100}$$

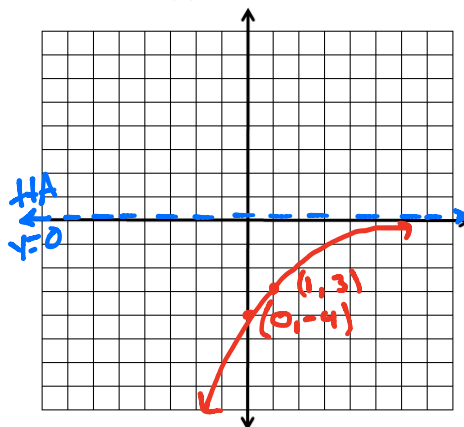
For 13 -15, sketch the graph of each exponential function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points** on each graph, and write the domain and range of each function.

13.  $y = 2\left(\frac{3}{2}\right)^{-x} = 2\left(\frac{2}{3}\right)^x$  Growth or Decay?



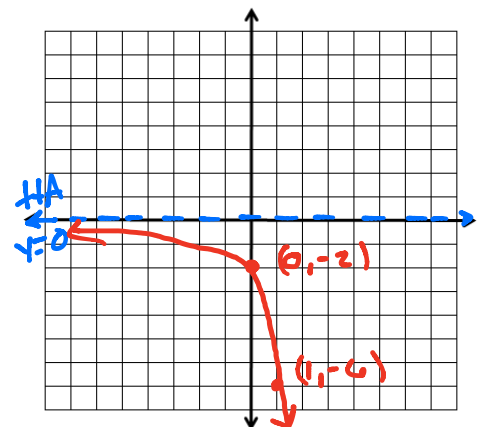
Domain:  $\mathbb{R}$       Range:  $(0, \infty)$

14.  $y = -4\left(\frac{3}{4}\right)^x$  Growth or Decay?



Domain:  $\mathbb{R}$       Range:  $(-\infty, 0)$

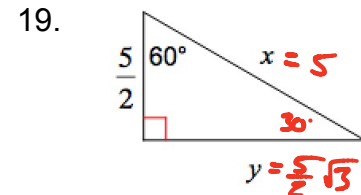
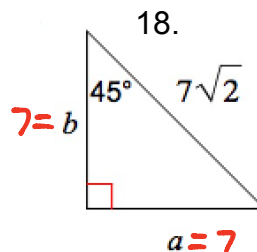
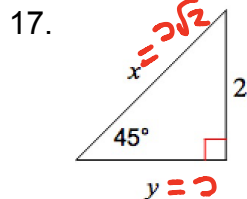
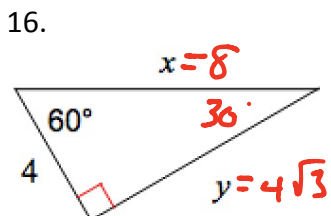
15.  $y = -2(3)^x$  Growth or Decay?



Domain:  $\mathbb{R}$       Range:  $(-\infty, 0)$

Need Help? Watch the Unit 7 Review Skillz Video!

**Change Up!** Solve for the missing side lengths. Leave your answers in simplest radical form.



QUICK REVIEW!!!