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

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

$5^{-2k} \cdot 5^3 = 5^4$

$5^{-2k+3} = 5^4$

$-2k+3 = 4$

$k = -\frac{1}{2}$

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

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

$3^{3x-3} = 3^{3x}$

$3x-3 = 3x$

$-3x \quad -3x$

$-3 = 0$

NO Solution.

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

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

$2x^2+4x = 0$

$2x(x+2) = 0$

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

$x = 0$ OR $x = -2$

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

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

$4x^2-8 = 1$

$4x^2-9 = 0$

$(2x-3)(2x+3) = 0$

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

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

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

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

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

$-4 = 21a$

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

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 chose for a $5000 investment? Decide by completing the table. BEAN COUNTERS ARE THE CHEAPEST!

Bank	APR	Compounded	Initial Investment	Value after 3 Yrs
The Brust Price Bank	3.12%	Quarterly $n=4$	$5000	5488.61
$ully.com	3.00%	Daily $n=365$	$5000	5470.85
Kelly-Green$ Bank	2.96%	Monthly $n=12$	$5000	5463.71
BeanCounters.com	2.75%	Continuously	$5000	5429.99

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

$A = Pe^{rt}$

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	$y = a(1-r)^x$

100% - 94% = 6%

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 CURRENT SALARY

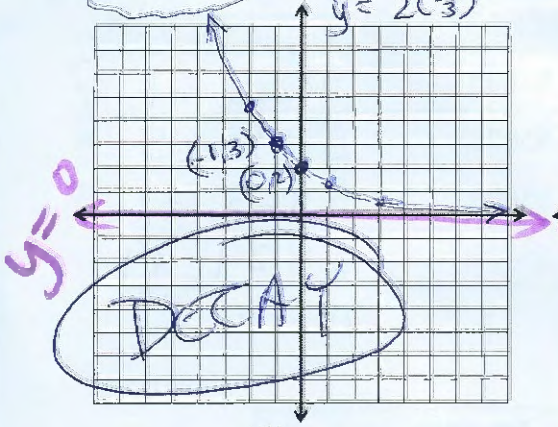
A ball is dropped from a height of 12 feet and is allowed to bounce over and over. The height of each bounce is modeled in the exponential DECAY model below.

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

10. Function: $y = 12(.65)^x$ $\frac{7.8}{12} = .65$ 11. 8th Bounce: .3824 ft 12. 100th Bounce 2.3×10^{-18}

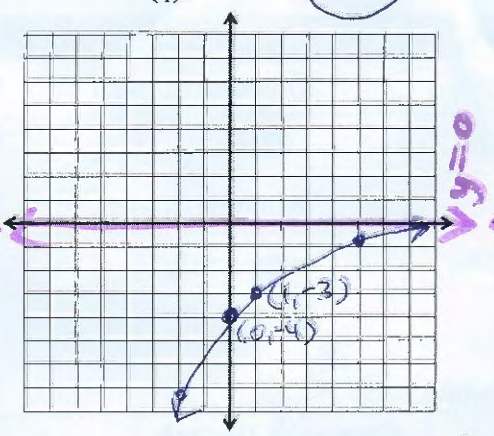
For 13 -15, sketch the graph of each exponential function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points** on each graph, and write the domain and range of each function.

13. $y = 2\left(\frac{3}{2}\right)^{-x}$ $y = 2\left(\frac{3}{2}\right)^{-1x}$ $y = 2\left(\frac{2}{3}\right)^x$ Growth or Decay?



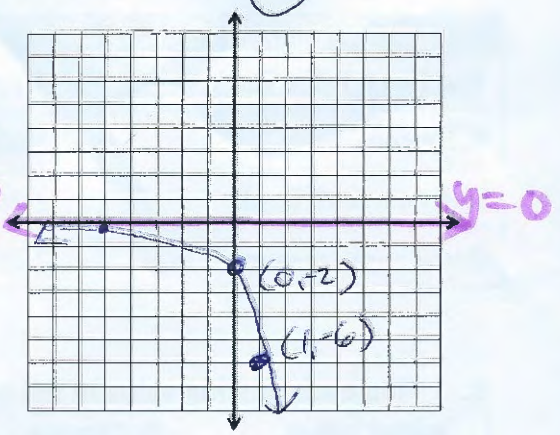
Domain: ℝ Range: $y > 0$

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



Domain: ℝ Range: $y < 0$

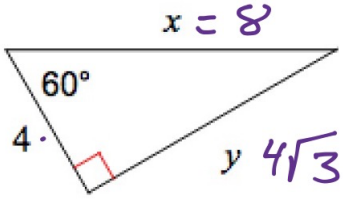
15. $y = -2(3)^x$ Growth or Decay?



Domain: ℝ Range: $y < 0$

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

16.



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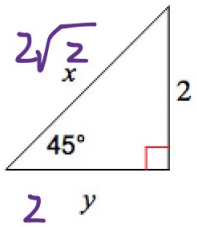

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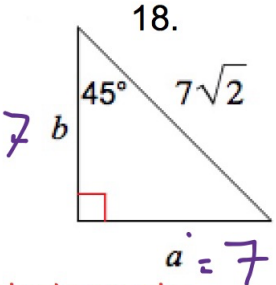

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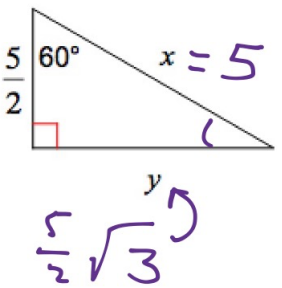

Watch the UNIT 7 SKILLS REVIEW video help on these special right triangles....