| 3.1 | I can demonstrate understanding about exponential functions and compare situations and equations for exponential functions to those for linear functions. |
| 3.4 | I can demonstrate understanding of the significant features of a graph of an exponential function and their relationship to real-world situations. |

Level 1:

For the following problems identify the type of change as linear or exponential, and explain your reasoning.

1.

x	y
−12	-2
−7	2
−2	6
3	10
8	14

Circle one: ~Linear~ / Exponential
Reason:

Add 4
each time

2.

x	y
0	1
2	3
4	9
6	27
8	81

Circle one: Linear / ~Exponential~
Reason:

Common Ratio
×3

3. $f(x) = 4 \cdot 3^x$
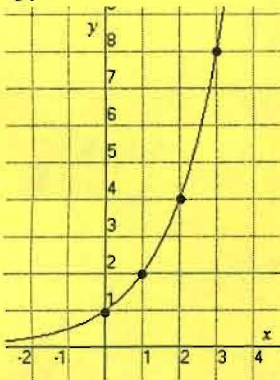
Circle One: Linear / ~Exponential~
Reason: x is exponent

4. $g(x) = 3x + 4$

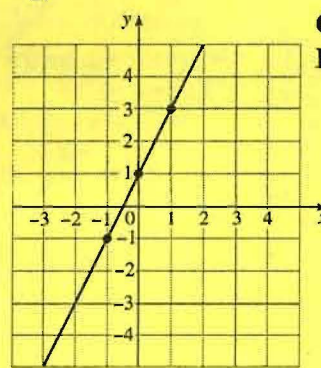Circle One: ~Linear~ / Exponential
Reason:

5.

Circle one: Linear / ~Exponential~
Reason:

6.

Circle one: ~Linear~ / Exponential
Reason:

7. The deer population decreases 5% each day during hunting season.

Circle One: Linear / ~Exponential~
Reason:

8. You deposit $1 into your checking account every day for 1 year and do not make any withdrawals.
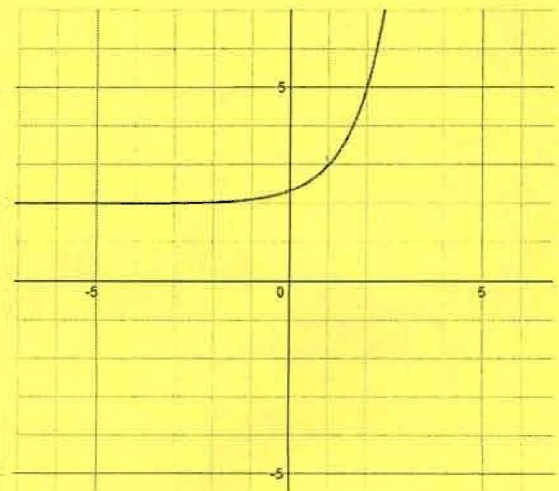
Circle One: ~Linear~ / Exponential
Reason:

9. To the right is the graph of the function $f(x) = 3^{2x-3} + 2$. Draw and label the asymptote on the graph and identify the domain and range.

Domain: ℝ ls

Range: $y > 2$

Asymptote: $y = 2$

Level 2-3:

Fill in the blanks of the table to create each type of function. Explain your reasoning.

9. linear function

x	y
1	2
2	6
3	10
4	14
5	18

Pattern and Reason:

$+4$

10. exponential function

x	y
1	2
2	6
3	18
4	54
5	162

Pattern and Reason:

$\times 3$

11. What is the equation for the asymptote for the function $f(x) = 2 \cdot 4^{x-2} - 5$

$y = -5$

3.2 *I can use tables and graphs to solve exponential equations including real-world situations and translate between representations.*

3.3 *I can evaluate exponential functions in the form $y = ab^x$ and relate the meaning of the context of a real-world situation.*

Level 1:

Use the following exponential functions to answer questions 12-15.

$$f(x) = 3^x \qquad g(x) = 2 \cdot 5^{x+2} \qquad h(x) = 4\left(\frac{1}{3}\right)^x$$

12. Find $f(9)$

19.683

13. Find $h(5)$

.01646

14. Find x when $f(x) = 81$

$X = 3$

15. Find x when $g(x) = 1250$

$X = 2$

16. The table below represents a car's value over time. The car's value depreciates 13% each year. Use the table below to answer the following questions:

| Years	Car Value
0	$30,000
2	$22,707
4	$17,187
6	$13,009
8	$9,846

a) How much was the car worth when it was brand new?

30,000

b) After approximately how many years will the car be worth half of its original value? about 5 years

c) If you wait 4 years and purchase the used version, how much money would you save? 30,000 − 17,107 = 12,813

you save $12,813

17. Use the graph to find the solution to $(\frac{1}{3})^{x-3} = 3^{x+1}$

Solution: __X = 1__

Check:
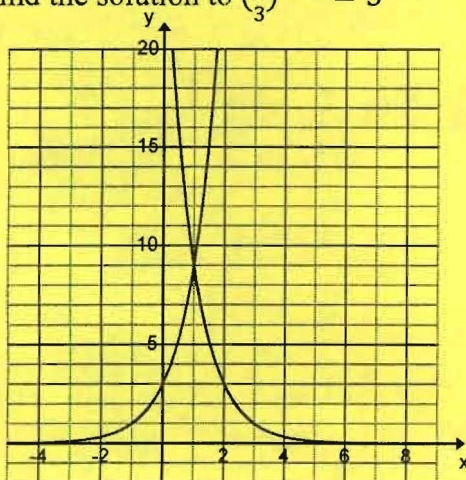
18. Use your graphing calculator to solve the following problems:

a) $(\frac{1}{2})^{2x-5} = 3^x$ Solution: __1.4__

Check:

b) $5^x = 8$ Solution: __1.3__

Check:

Level 2-3:

19. A colony of Bacteria type A begins with a population of 2 cells and triples in size every day. Complete the table below and use it to answer the following questions.

Days	Bacteria Population
1	
2	
3	
4	
5	
6	
7	

a) How long will it take for the population to be 10 times the starting amount? about 3 years

b) How many new cells are created between days 5 and 6?

324

c) A colony of Bacteria type B begins with 3 cells and doubles every day. After one week will there be more of Bacteria A or B? **Explain and show all work**

Less − 384

20. Your dream house costs $500,000. However, you don't have enough money to make a down payment on the house right now so the bank has turned your offer down. The houses depreciation rate is 19%. The houses value can be model by $f(x) = 500000(1 - 0.19)^x$ where x is the number of years.

    b. What is the value of the house after 4 years?

        215,234

    c. You only have $18,000 to spend on a house. Use your graphing calculator to find what year you would finally be able to afford your dream house?

        16 years

21. Alex just put $2000 into a savings account that pays 4% interest each year. The savings account can be model by $f(x) = 2000(1 + 0.04)^x$ where x is the number of years.

    d. How much does Alex have in his account after 10 years?

        2960.5

    e. Alex needs $9,000 in his account before he buys a new car. Use your graphing calculator to find how long Alex needs to wait in order to buy a new car.

        38 years