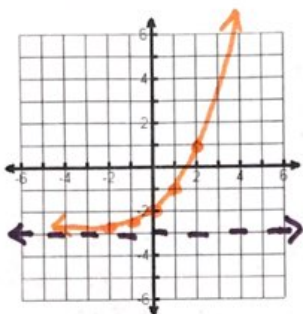


Name: _____ Date: _____

For each of the functions find the following information.

1. Graph the function $f(x) = (2)^x - 3$

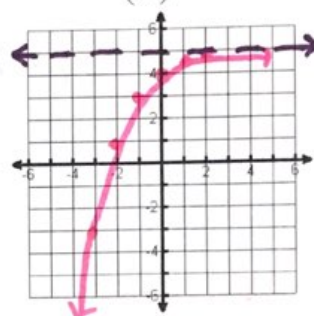
x	y
-2	-2.75
-1	-2.5
0	-2
1	-1
2	1



Asymptote $y = -3$

2. Graph the function $f(x) = -\left(\frac{1}{2}\right)^x + 5$

x	y
-2	1
-1	3
0	4
1	4.5
2	4.75



Asymptote $y = 5$

Sequence	Common Difference (d)	Formula	Given Term (n^{th})
-28, -34, -40, -46, ...	-6	$a_n = -28 - 6(n-1)$ $-28 - 6n + 6$ $a_n = -6n - 22$	$-6(10) - 22$ $a_{10} = -82$
10, 13, 16, 19, ...	+3	$a_n = 10 + 3(n-1)$ $10 + 3n - 3$ $a_n = 3n + 7$	$3(12) + 7$ $a_{12} = 43$
-14, -24, -34, -44, ...	-10	$a_n = -14 - 10(n-1)$ $-14 - 10n + 10$ $a_n = -10n - 4$	$-10(38) - 4$ $a_{38} = -384$

Sequence	Common Ratio (r)	Formula	Given Term (n^{th})
2, 12, 72, 431 ...	6	$a_n = 2(6)^{n-1}$	$2(6)^{8-1}$ $a_8 = 559,872$
128, 32, 8, 2, ...	$\frac{1}{4}$	$a_n = 128\left(\frac{1}{4}\right)^{n-1}$	$128\left(\frac{1}{4}\right)^{6-1}$ $a_6 = \frac{1}{8}$
3, 12, 48, 192, ...	4	$a_n = 3(4)^{n-1}$	$3(4)^{38-1}$ $a_{38} = 5.67 \times 10^{22}$

↑
567 and 20 0's

Exponential Models

3. Write an explicit formula to model the number of dots per day.

$a_1 = 2$
 $r = 3$

$a_n = 2(3)^{n-1}$



Day 1



Day 2



Day 3

How many dots will there be on day 7?

$a_n = 2(3)^{7-1} = \boxed{1458}$

4. Taylor is training for a marathon. He decides to begin by running 3 miles and increase by 1.5 miles each day.

Write an equation to represent the scenario.

$a_1 = 3$ $d = 1.5$

$a_n = 3 + 1.5(n-1)$

$= 3 + 1.5n - 1.5$

$a_n = 1.5n + 1.5$

How long will it take him to run 26.2 miles?

$26.2 = 1.5n + 1.5$ | $24.7 = 1.5n$ | $n \approx 17$ days

5. You bought a Boston Whaler in 2004 for \$12,500. The boat's value depreciates by 7% a year. How much is the boat worth now? How much is it worth in 2020?

$P = 12,500$
 $r = 0.07$

$y = 12,500(1 - 0.07)^n$

$y = 12,500(0.93)^{15} = \boxed{\$4,208.76}$

$y = 12,500(0.93)^{16} = \boxed{\$3914.15}$

6. The population of a large city increases by a rate of 3% a year. When the 2000 census was taken, the population was 1.2 million. $r = 0.03$ $P = 1.2$

a) Write a model for this population growth. $y = 1.2(1.03)^x$ (in millions)

b) What should the population be now? What is the projected population for 2020?

$y = 1.2(1.03)^{19} = 2.10$ million $y = 1.2(1.03)^{20} = 2.17$ mill

Solve the following exponential equations. Show all work!

11. $3^{-3x+1} = 3^{x-9}$ * Bases already match

$-3x + 1 = x - 9$

$-4x = -10$
 $-4 \quad -4$

$x = 5/2$

12. $25^{x-4} = 5^{3x+1}$ * Create common base

$(5^2)^{x-4} = 5^{3x+1}$

$2(x-4) = 3x+1$

$-2x - 8 = 3x + 1$

$-8 = x + 1$

$-9 = x$

13. $8^{x-1} = \left(\frac{1}{2}\right)^{2x-1}$ * Negative exp

$(2^3)^{x-1} = (2^{-1})^{2x-1}$

$3(x-1) = -1(2x-1)$

$3x - 3 = -2x + 1$

$5x - 3 = 1$

$+3 \quad +3$

$5x = 4$

$x = 4/5$

14. $4^{3-x} + 2 = 18$ * Isolate base first

$4^{3-x} = 16$

$4^{3-x} = 4^2$

$3 - x = 2$

$-3 \quad -3$

$-x = -1$

$-1 \quad -1$

$x = 1$