Algebra 1
Unit 4 Test Review

Name:_____

Solve each equation.

1) $81^{-v+2} = 27^{-2v-3}$

$(3^4)^{-v+2} = (3^3)^{-2v-3}$

$3^{-4v+8} = 3^{-6v-9}$

$-4v+8 = -6v-9$

$2v+8 = -9$

$2v = -17$

$v = -17/2$

2) $6^{-2b} = 6^2$

$-2b = 2$

$b = -1$

3) $64^{2x} = 16^{2x+1}$

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

$4^{6x} = 4^{4x+2}$

$6x = 4x+2$

$2x = 2$

$x = 1$

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

$x-1 = -3x+3$

$4x-1 = 3$

$4x = 4$

$x = 1$

5) $16^{-v} = 64$

$(4^2)^{-v} = 4^3$

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

$-2v = 3$

$v = -3/2$

6) $3^{1-v} = 3^{2v}$

$1-v = 2v$

$1 = 3v$

$\frac{1}{3} = v$

7) $125^{b} = 625^{b}$

$(5^3)^b = (5^4)^b$

$3b = 4b$

$0 = b$

8) $9^{2x} = 81$

$9^{2x} = 9^2$

$2x = 2$

$x = 1$

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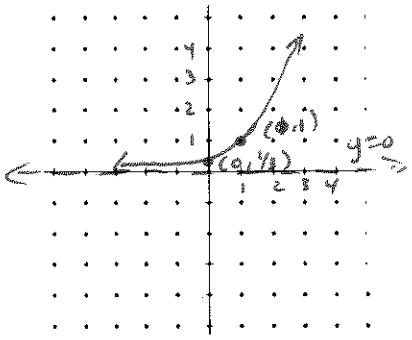
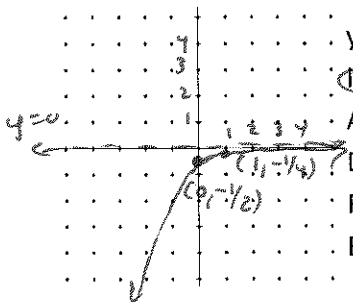
Graph the following Exponential Functions. Fill in the chart with the characteristics.

9) $f(x) = \frac{1}{3}3^x$



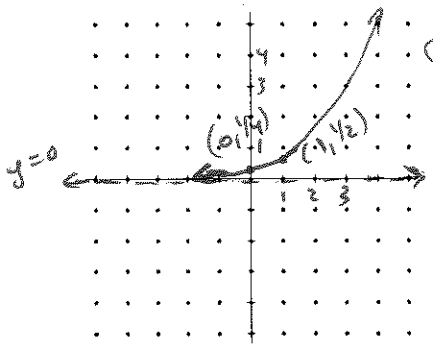
y – Intercept (0, 1/3)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (0, ∞)

10) $f(x) = -\frac{1}{2}\left(\frac{1}{2}\right)^x$



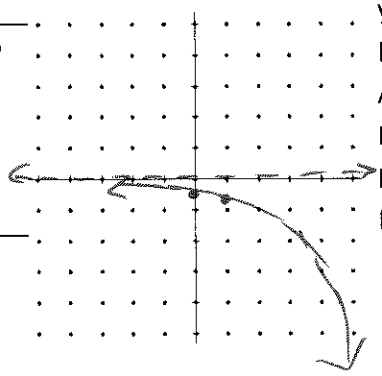
y – Intercept (0, −1/2)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (−∞, 0)
End Behavior
as $x \to -\infty$ $y \to -\infty$
as $x \to \infty$ $y \to 0$

11) $f(x) = \frac{1}{4}2^x$



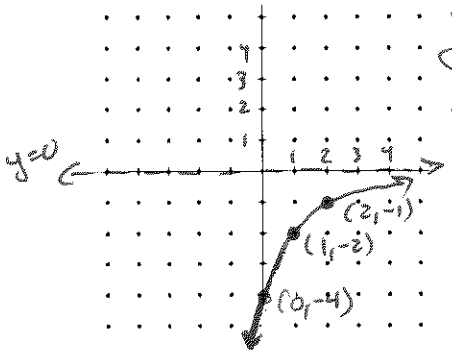
y – Intercept (0, 1/4)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (0, ∞)
End Behavior
as $x \to -\infty$ $y \to 0$
as $x \to \infty$ $y \to \infty$

12) $f(x) = -\frac{1}{4}2^x$



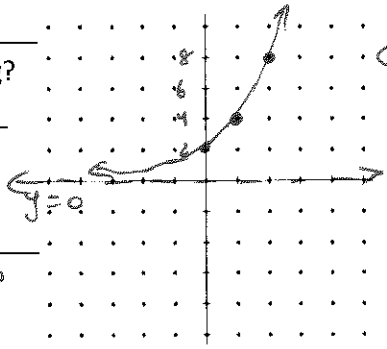
y – Intercept (0, −1/4)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (−∞, 0)
End Behavior
as $x \to -\infty$ $y \to 0$
as $x \to \infty$ $y \to -\infty$

13) $f(x) = -2 \cdot \left(\frac{1}{2}\right)^{x-1}$



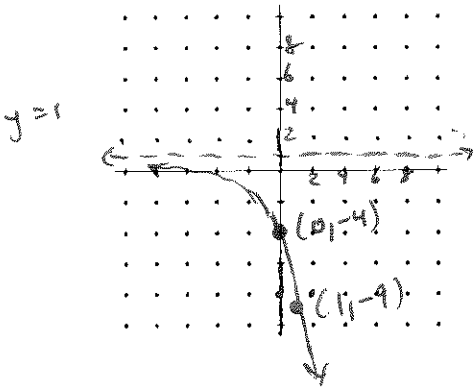
y – Intercept (0, −4)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (−∞, 0)
End Behavior
as $x \to -\infty$ $y \to -\infty$
as $x \to \infty$ $y \to 0$

14) $f(x) = 4 \cdot 2^{x-1}$



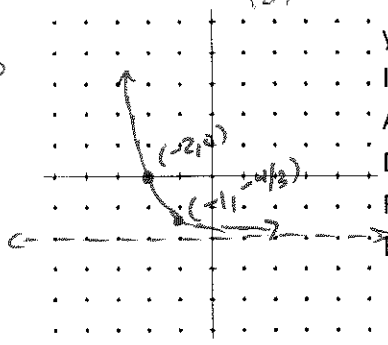
y – Intercept (0, 2)
Increasing or Decreasing?
Asymptote? y = 0
Domain (−∞, ∞)
Range (0, ∞)
End Behavior
as $x \to -\infty$ $y \to 0$
as $x \to \infty$ $y \to \infty$

15) $f(x) = -5 \cdot 2^x + 1$



y – Intercept (0, −4)
Increasing or Decreasing?
Asymptote? y = 1
Domain (−∞, ∞)
Range (−∞, 1)
End Behavior
as $x \to -\infty$ $y \to 1$
as $x \to \infty$ $y \to -\infty$

16) $y = 2 \cdot \left(\frac{1}{3}\right)^{x+2} - 2$



y – Intercept (0, −16/9)
Increasing or Decreasing?
Asymptote? y = −2
Domain (−∞, ∞)
Range (−2, ∞)
End Behavior
as $x \to -\infty$ $y \to \infty$
as $x \to \infty$ $y \to -2$

Algebra 1
Unit 4 Test Review

Name:_____

Set up an exponential model for each situation. Use the model to answer the questions.

17) A computer depreciates 25% annually. If the computer is valued at $3000 today, how much will it be worth in 2 years?

$P_t = 3000(1-.25)^t$

$P_2 = 3000(1-.25)^2 = \$1,687.50$

18) The value of land in a certain town increases by 6.75% each year. If you bought a parcel of this land in 1995 for $150,000, what was the land worth in 2003?

$P_t = 150{,}000(1+.0675)^t$

2003 : $t=8$ $\quad P_8 = 150{,}000(1+.0675)^8 = \$252{,}949.79$

19) The population in a city in 1990 was 213,426. The population increased at a rate of 3.1% each year. What was the approximate population in the city in 2000?

$P_t = 213{,}426(1+.031)^t$

2000 : $t=10$ $\quad P_{10} = 213{,}426(1+.031)^{10} = \$289{,}623.62 = 289{,}624$

20) You deposited $11,000 into a savings account that compounds quarterly. The account has an interest rate of 3.7%. What would be the current principle after 3 years and 6 months?

$n=4$ $\quad P_t = 11{,}000\left(1+\frac{.037}{4}\right)^{4t}$

$P_{3.5} = 11{,}000\left(1+\frac{.037}{4}\right)^{4(3.5)} = \$12{,}513.40$

21) An investment of $1248 earns 10.9% interest. Compare the value of the investment after 5 years, 10 years, and 20 years between simple interest and interest compounded semi-annually.

Simple

$P_t = 1{,}248 + 1{,}248(.109)(t)$

$P_5 = 1248 + 1248(.109)(5) = \$1928.16$

$P_{10} = 1248 + 1248(.109)(10) = \$2608.32$

$P_{20} = 1248 + 1248(.109)(20) = \$3968.64$

Compound

$n=2$ $\quad P_t = 1248\left(1+\frac{.109}{2}\right)^{2t}$

$P_5 = 1{,}248\left(1+\frac{.109}{2}\right)^{2\cdot5} = \$2121.68$

$P_{10} = 1{,}248\left(1+\frac{.109}{2}\right)^{2\cdot10} = \$3607$

$P_{20} = 1{,}248\left(1+\frac{.109}{2}\right)^{2\cdot20} = \$10{,}425.05$

Algebra 1 Name:_____

Unit 4 Test Review

Identify whether each of the following sequence are arithmetic or geometric. Identify the common difference/ratio and find the 6th and 15th term of each sequence.

22) 12, 3, 3/4, 3/16 ,...

Geometric

$r = 1/4$

$a_n = 12(1/4)^{n-1}$

$a_6 = 12(1/4)^{6-1} = 3/256$

$a_{15} = 12(1/4)^{15-1} \approx 4.47 \times 10^{-8}$

23) 4, -24, 144, -864,...

Geometric

$r = -6$

$a_n = 4(-6)^{n-1}$

$a_6 = 4(-6)^{6-1} = -31104$

$a_{15} = 4(-6)^{15-1} = 3.13 \times 10^{11}$

Use what you know about sequence to answer the following questions.

24) The seventh term in a geometric sequence is -3645. If the common ratio is -3, what is the explicit formula for the sequence?

$-5, -15, -45, -135, -405, -1215, -3645$ (÷3 between each)

$a_n = -5(-3)^{n-1}$

25) Write the recursive and explicit formula for the following geometric sequence. Then find the 9th term. 200, 100, 50, ...

recursive

$\begin{cases} a_1 = 200 \\ a_n = a_{n-1} \times 1/2 \end{cases}$

explicit

$a_n = 200(1/2)^{n-1}$

$a_9 = 200(1/2)^{9-1} = 25/32$

Write the explicit formula and use it to solve this situation.

26) Bradley makes two phone calls to his friends to tell them school is cancelled because of snow. Each of those friends makes two calls to tell their friends the same news. Each of those friends makes two calls to tell their friends the same news, and so on. Find the number of calls made for the first 10 terms. How many people will be called after this continues for 12 terms?

1 (0 term), 2 (1st), 4 (2nd), 8 (3rd), 16 (4th), 32 (5th), 64 (6th), 128 (7th), 256 (8th), 512 (9th), 1024 (10th)

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

$a_{12} = 2(2)^{12-1} = 4096$