Secondary II-Unit 4.1 Comparing Functions Notes Name_____

Day 1: Exponential Functions

Date_____ Period____

1) An exponential function looks like _____

a is the _____ and

b is the _____ and *t* is the _____

If $b > 1$, then *b* is a _____ factor.

If $0 < b < 1$, then *b* is a _____ factor.

Identify the initial value (*a*) and the growth or decay factor (*b*). State whether it is growth or decay.

2) $y = 2 \cdot 1.32^t$

a:

b:

Growth or Decay?

3) $y = 5 \cdot 1.16^t$

a:

b:

Growth or Decay?

4) $y = 3 \cdot 0.94^t$

a:

b:

Growth or Decay?

5) $y = 8 \cdot 0.64^t$

a:

b:

Growth or Decay?

6) $y = 4 \cdot 1.64^t$

a:

b:

Growth or Decay?

7) $y = \frac{1}{2} \cdot 0.78^t$

a:

b:

Growth or Decay?

FACTOR vs. RATE

8) Now that we can identify the GROWTH OR DECAY FACTOR, let's learn how to recognize the GROWTH OR DECAY RATE.

In both cases (growth or decay), the RATE is the _____ of growth or decay.

You can determine the RATE by finding how far the growth or decay factor is from 1 and turning it into a percentage.

Identify the Growth/Decay RATE and state whether it is growth or decay.

9) $y = 6 \cdot 1.54^t$

Rate:

Grow or Decay?

10) $y = \frac{1}{3} \cdot 0.98^t$

Rate:

Grow or Decay?

11) $y = 3 \cdot 1.24^t$

Rate:

Grow or Decay?

12) $y = \frac{1}{2} \cdot 0.89^t$

Rate:

Grow or Decay?

13) $y = 2 \cdot 1.08^t$

Rate:

Grow or Decay?

14) $y = 7 \cdot 0.76^t$

Rate:

Grow or Decay?

15) $y = 4 \cdot 1.21^t$

Rate:

Grow or Decay?

16) $y = 5 \cdot 0.45^t$

Rate:

Grow or Decay?

A school tracks the total number of students enrolled each year. The school uses the change in the total number of students to estimate how many students have been enrolled in the school each year since 2000.
If t is the number of years after 2000, the total number of students, S, can be estimated using the function $S = 3500 \cdot 0.98^t$.

17) What was the initial population of this school?

18) What year did they start measuring the population at this school?

19) What is the rate at which the number of students changing each year?

20) Is the total number of students growing or decaying?

21) How many students would have been expected to be enrolled in the year 2009?

A number of bacteria, b, at any time t, in hours, can be estimated using the function $b = 3000 \cdot 1.24^t$.

22) What was the initial size of the bacteria colony?

23) Is the bacteria population exponentially decaying or growing?

24) What is the size of the bacteria colony after 5 hours?

25) What is the size of the bacteria colony after 12 hours?

How do we find the growth or decay rate with an equation like this:

26) $y = 3 \cdot 1.13^{3t}$

The additional number in the exponent tells you _____

_____.

First take the growth/decay factor and raise it to the power of the coefficient of *t* (*remember that a coefficient is the number infront of a variable).

$1.13^3 =$

Now the equation is _____

Which means, the YEARLY rate is _____ and it is _____.

Identify the YEARLY growth or decay RATE and state whether is it growth or decay.

27) $y = 30 \cdot 1.23^{4t}$

Rate:

Grow or Decay?

28) $y = 1300 \cdot 0.87^{9t}$

Rate:

Grow or Decay?

29) $y = 17 \cdot 1.09^{11t}$

Rate:

Grow or Decay?

30) $y = 59 \cdot 0.68^{7t}$

Rate:

Grow or Decay?

A bank offers a savings account with interest that is compounded monthly. In other words, the interest earned is added to the account every month instead of once a year.
Dillon opened a savings account with $500. If *t* is the time in years the account has been open, then the balance in his account, *b*, is $b = 500 \cdot 1.004^{12t}$.

31) What is the estimated yearly exponential growth rate? (nearest hundredth)

Describe how this rate relates to the yearly change of the balance in Dillon's account.

32) How much money will Dillon have in his account in 7 years?

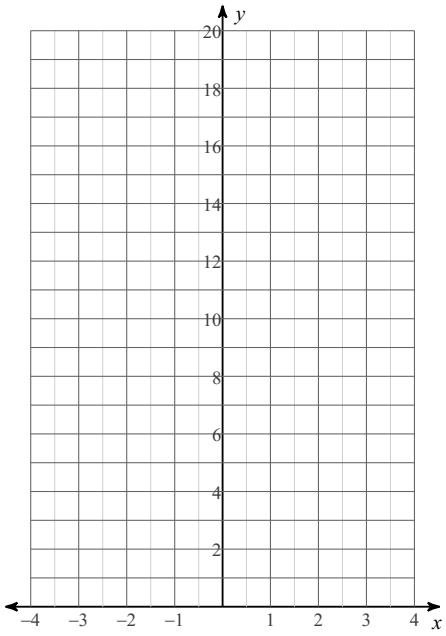
What do the graphs of exponential functions look like? We learned this in Secondary I, so let's review.

33) When graphing an exponential function, the initial value a is the _____.

The growth or decay factor is how much we multiply the initial value by to get the next value. Then multiply the next value by the growth or decay factor and so on.

Graph each exponential function. State whether it is a growth or decay function.

34) $y = 2 \cdot 4^x$



35) $y = 4 \cdot \left(\frac{1}{3}\right)^x$