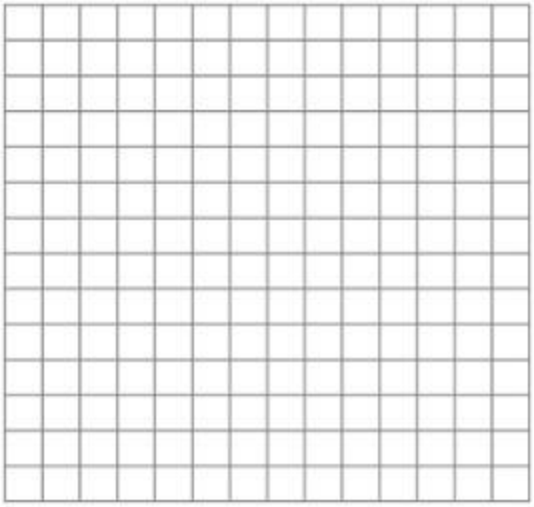
Exponential Functions Algebra 2 Name _____
Worksheet #1 Date _____ Period _____

1) A car that was purchased for $30,000 depreciates about 15% per year.

a. Is this an exponential growth or decay function? Explain.

Exponential decay because the price of the car depreciates – meaning decays- at a constant ratio of 15%.



b. Write the formula of the function.

x → number of years after purchased $f(x) = 30{,}000(1 - .15)^x$

Or

$f(x) = 30{,}000(.85)^x$

c. Graph the function.

d. What is the x-intercept for this function? What does it mean in the context of this problem?

NONE – The x-intercept would represent the number of years after purchased that the car would be worth $0.

e. What is the y-intercept for this function? What does it mean in the context of this problem?

30, 000 – The y-intercept represents the initial amount the car was purchased.

f. What is the domain for this function? What does it mean in the context of this problem?

$x \geq 0 \; or \; [0, \infty)$

The domain represents the number of years after the car is purchased.

g. What is the range for this function? What does it mean in the context of this problem?

$0 < y \leq 30{,}000 \; or \; (0, 30000]$

The range represents how much the car is worth each year after it was originally purchased.

h. Describe the end behavior of the function using infinity notation.

$x \to \infty \; f(x) \to 0$

$x \to -\infty \; f(x) \to \infty$

i. Find the value of the car after 5 years.

After 5 years the car's value would be $13,311.20 .

2) Radon-222 is a gas that escapes from rocks and soil and can be dangerous for people who breathe it. In a building, 500 mg of Radon-222 seeped into the air. Radon-222 decays 17% each day.

a. Is this an exponential growth or decay function? Explain.

Exponential decay because the Radon-222 decays at a constant ratio of 17% each day.

b. Write the formula of the function.

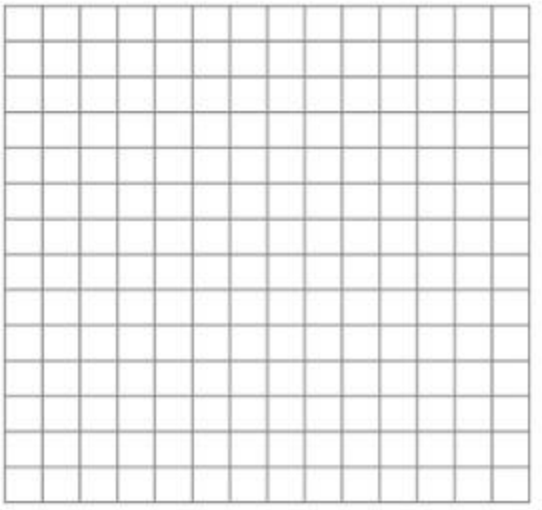
x → number of days

$f(x) = 500(1 - .17)^x$

Or

$f(x) = 500(.83)^x$

c. Graph the function.



d. What is the x-intercept for this function? What does it mean in the context of this problem?

NONE – The x-intercept would represent how many days it took for the air of the building to be completely Radon-222 free.

e. What is the y-intercept for this function? What does it mean in the context of this problem?

500 – The y-intercept represents the initial amount of Radon-222 in the air of the building.

f. What is the domain for this function? What does it mean in the context of this problem?

$x \geq 0$ *or* $[0, \infty)$

The domain represents the number of days after the initial leak of Radon-222 into the air of the building.

g. What is the range for this function? What does it mean in the context of this problem?

$0 < y \leq 500$ *or* $(0, 500]$

The range represents how many milligrams of Radon-222 on in the air each day after the initial leak of Radon-22.

h. Describe the end behavior of the function using infinity notation.

$x \to \infty \; f(x) \to 0$

$x \to -\infty \; f(x) \to \infty$

i. Find the number of days it takes for 500 mg of Radon-222 to decay to under 40 mg.

It would take 14 days for the amount of Radon-222 to decay to under 40 mg.

3) John invested $9000 at 5.5% interest compounded quarterly (4 times per year) for 12 years.

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

r = interest rate in decimal form,
n = number of compounding periods per year
t = number of years the money is invested.

a. Is this an exponential growth or decay function? Explain.

Exponential growth because John's money is increasing at a constant ratio of 5.5%

b. Write the formula of the function.

$$A(t) = 9000\left(1 + \frac{.055}{4}\right)^{4t}$$

c. Graph the function.

d. What is the x-intercept for this function? What does it mean in the context of this problem?

NONE – The x-intercept represents the year John's account has $0.

e. What is the y-intercept for this function? What does it mean in the context of this problem?

9,000 – The y-intercept represents the initial amount of money in the account.

f. What is the domain for this function? What does it mean in the context of this problem?

$t \geq 0$ *or* $(0, \infty)$

The domain represents the number of years John's money has been in the account.

g. What is the range for this function? What does it mean in the context of this problem?

$9000 \geq A(t) > \infty$ *or* $[9000, \infty)$

The range represents the amount in John's account after t years.

h. Describe the end behavior of the function using infinity notation.

$x \to \infty\ f(x) \to \infty$
$x \to -\infty\ f(x) \to 0$

i. Find the amount he will have at the end of 12 years.

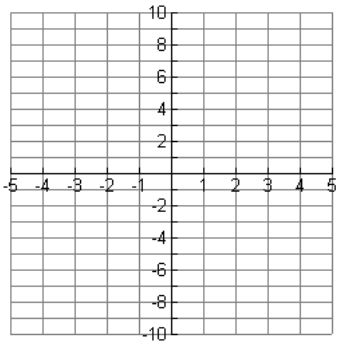
At the end of 12 years John will have $17,335 in his account.

j. How many years will John have to wait until his investment is worth at least $80,000?

John will have to wait at least 40 years for his investment to be worth at least $80,000.

4) Fill in the function values in the table, then graph the function $f(x) = .6(2)^x$

x	-3	-2	-1	0	1	2	3
f(x)	0.075	0.15	0.3	0.6	1.2	2.4	4.8



A) What is the x-intercept? ____NONE_____

B) What is the y-intercept? ____(0, 0.6)_____

C) Is this function exponential growth, exponential decay, or neither? _____growth_____

D) What is the domain of this function? _____(-∞,∞)_____

E) What is the range of this function? _____(0,∞)_____

F) Describe the end behavior using infinity notation.

$x \to \infty, f(x) \to$ ____∞____ $x \to -\infty, f(x) \to$ _____0____

Tell whether the function is exponential growth, exponential decay, or neither.

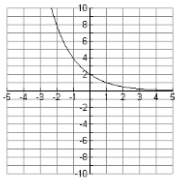
5. $f(x) = 24(0.2)^x$ _____decay_____

6. $f(x) = .5(1.2)^x$ _____growth_____

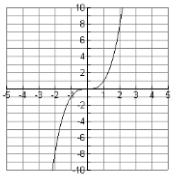
7. $f(x) = 0.4\left(\frac{2}{3}\right)^x$ _____decay_____

8. $f(x) = 2x^5$ ____neither_____

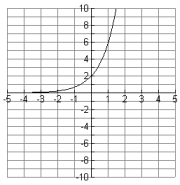
9. Label which graph is exponential growth, which graph is exponential decay, and which graph is neither.



_____ decay _____



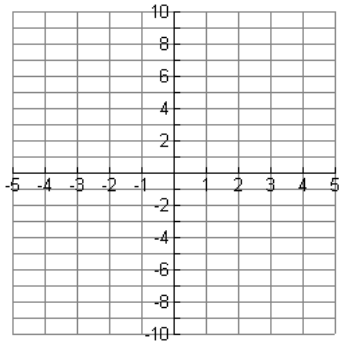
____ neither ___



____ growth____

10. Fill in the function values in the table, then graph the function $f(x) = e^x - 4$

x	-3	-2	-1	0	1	2	3
f(x)	-3.98	-3.95	-3.63	-3	-1.28	3.39	16.09



What is the x-intercept? ____(1.39, 0)_____

What is the y-intercept? ____(0, -3)_____

What is the domain of this function? _____(-∞,∞)_____

What is the range of this function? _____[-4, ∞)_____

Describe the end behavior using infinity notation.

$x \to \infty, f(x) \to$ ___∞___ $x \to -\infty, f(x) \to$ ___4_____