5/9 Objective: Use the properties of exponents to interpret expressions for exponential functions and to graph exponential functions.

**Bellwork: Copy the following; fill in the chart.**

The half –life of a radioactive material is the amount of time it takes half of the material to decay, leaving half the material remaining. The Amount A, of radioactive material vanadium-48 that remains is represented by the equation A(t)=A0(2)-.0626t where A0 is the initial amount and t is the time, in days. What is the half-life of vanadium 48?

Step 1: Convert words to formula. A0 is initial amount. half the material remaining: A=1/2(A0).

Step 2: ½=(2)-.0626t

Step 3: Use graphing calculator to find t.

|  |  |
| --- | --- |
| t | (2)-.0626t |
| 1 | .96 |
| 2 | .91 |
| 10 | .65 |
| 15 | .52 |
| 16 | **.50** |
| 20 | .42 |

**Cellphone Assignment: Complete By End of Period**

**Journal Entry: Copy the following into your notebook.**

Lesson: Word Problems.

1. Will the account value grow over time?

Grow A(t)=250(1.08)t

Decline A(t)=250(.8)t/2

Decline A(t)=250(.91)3t

Grow A(t)=250(1.3).25t

2. What is the difference in annual interest rates for the two investments?

Investment 1 V=50(1.015)t

Investment 2 V=50(1.015)4t

Step 1: Formula V=P(1+r/n)nt n is # of compounding periods

Step 2: Plug in: r/n=.015 nt=1t so n=1 and r=.015

Plug in: r/n=.015 nt=4t so n=4 and r=.06 (4 compounding periods)

Step 3: Simplify and Solve--difference=.045

3. What is the initial value and the annual growth rate for the following investments?

Investment 1 V=500(1.21)t/2

Investment 2 V=450(1.15)t

The initial value is $500 and $450 for the two investments.

The annual growth rate for investment 1 is (1.211/2-1)/1\*100=10%.

The annual growth rate for investment 2 is (1.15-1)/1\*100=15%.

4. Cindy invested $200 in an account that earns compound interest annually. Select the function that would accurately describe this investment.

No Y=200(1-.02)x

Yes Y=200(1+.05)x

No Y=.04(200)x

No Y=(1+.001)(200)x

Yes Y=200(1.03)x

5. The number of bacteria in colony 1 can be modeled as N1(t)=1250(2).04t and the number of bacteria in colony 2 can be modeled as N2(t)=a(2)bt. The number of bacteria in colony 2 is initially twice as high as the # in colony 1; it takes twice as many minutes for the # of bacteria to double than in the colony 1. What are a and b?

Step 1: words to math

The number of bacteria in colony 2 is initially twice as high as the # in colony 1

N1(0)=1250

N2(0)=2500=a

Step 1b: words to math

it takes twice as many minutes for the # of bacteria to double than in the colony 1.

N2=2N1 t2=2t1

Step 2: Plug in/substitute into following formula: N2(t)=a(2)bt2

2N1=2500(2)b\*2t1.

Step 3: Simplify by comparing formulas

2N1=2500(2)b\*2t1

N1(t)=1250(2).04t1

Step 4: Solve by comparison

2b=.04 so b=.02.

**Independent Practice/Review: identify as growth or decay**

1. f(x)=420(.96)x

2. f(x)=3026(1-.04)x

3. f(x)=24,058(1+.012)2x

4. f(x)=8391(1.23)x

5. f(x)=16(7/5)1.5x

6. f(x)=3/2(12)x

7. f(x)=1.53(4.8)x-4

8. f(x)=6(.5)3x

9. f(x)=4/3(1/8)x

**Closure: What is the percent rate of change for the function g(x)=1.19(6.23)x?**