Sec I – Term 3 Name_____ ID: 1

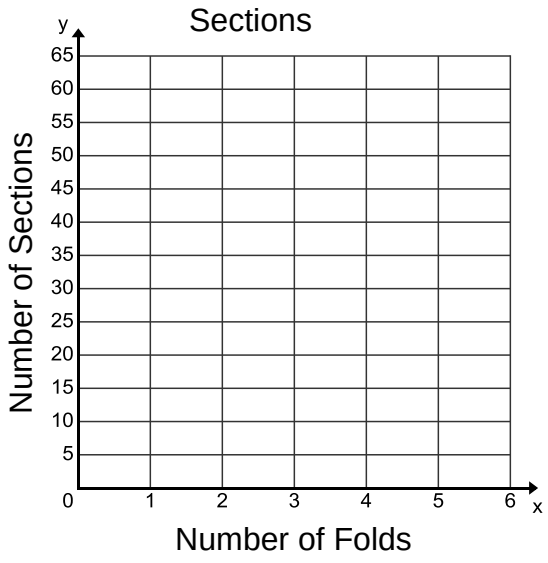
Notes: T3-49 Exponential Growth and Decay Date_____ Period_____

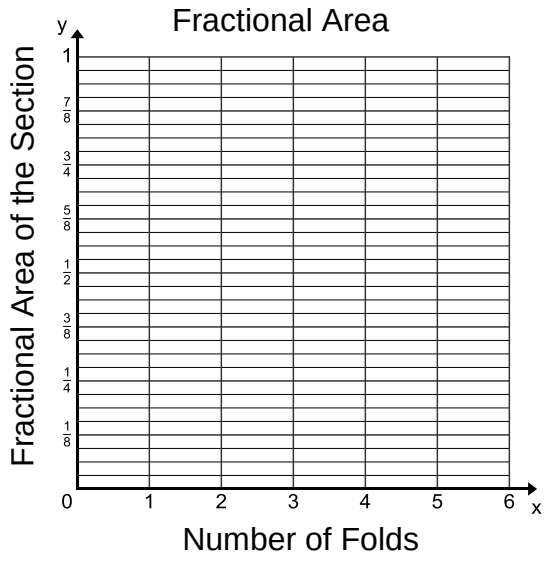
Investigation

1. Take a piece of paper and fold it in half. You now have two equal sized sections each with the area of half the original area.
2. Fold the paper in half again. How many sections of paper do you have? What is the area of each section compared to the area of the original piece of paper?
3. Continue this process until you cannot fold the paper anymore. Fill in the table below as you go.

Number of Folds	0	1	2	3	4	5	6
Number of Sections							
Fractional Area of the Section							

4. Graph each situation below.





5. Write an equation that will allow you to determine the number of sections of paper for any number of folds.

6. Write an equation that will allow you to determine the fractional area of each section for any number of folds.

7. Use your equations to determine the number of sections of a piece of paper after 15 folds (assume it is possible to fold the paper 15 times) and the fractional area of those sections.

Exponential Growth Vs Exponential Decay (Notes: Page 2)

Exponential Growth	Exponential Decay
$f(t)=a(1+r)^t$ or $f(t)=P(1+r)^t$	$f(t)=a(1-r)^t$ or $f(t)=P(1-r)^t$

a or P - represents the principal amount
r - represents the rate of change (percentage written as a decimal)
t - represents time

1. Determine the multiplier for each growth rate or decay rate.

a) 15% growth

b) doubling

c) 6% decay

d) 0.5% growth

e) cut by one third

f) 3.8% decay

2. State whether the formula models growth or decay.

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

b) $f(t)=1.5^t$

c) $f(x)=\frac{1}{3}\cdot 4^x$

d) $f(t)=100(0.85)^t$

3. Simple growth and decay problems.

a) The population of a town is 50,000 and is increasing at a rate of 3% each year. Write the equation to model this situation, **and** find the population after 10 years.

b) You borrow $1,000 from the bank and pay off the loan at 5% per month. Write the equation to model this situation, **and** find how much debt you still have after a year.

c) A fully inflated child's raft for a pool is losing 6.1% of its air every day. The raft originally contained 4,500 cubic inches of air. Write the equation to model this situation, **and** find the amount of air left in the raft after 2 weeks.

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Determine the multiplier for each growth or decay rate.

1. 5% growth
2. 12% decay
3. 30% growth
4. 98% decay
5. 1% decay
6. 300% growth
7. 0.85% growth
8. 2.5% decay
9. tripling
10. halving

State whether the formula models growth or decay. State the y-intercept and factor of change.

11. $f(x) = 3^x$:
    a =
    b =
12. $f(x) = 0.25^x$:
    a =
    b =
13. $f(x) = 1.01^x$:
    a =
    b =
14. $f(t) = 2(0.033)^t$:
    a =
    b =
15. $f(t) = 6(1.75)^t$:
    a =
    b =
16. $f(x) = 2\left(\frac{1}{2}\right)^x$:
    a =
    b =

For problems 17-20, Write the equation to model each situation. Then use the equation to answer the questions. State the **Domain** and the **Range** for each problem:

17. E. coli bacteria double in population every thirty minutes. If the initial population is 85, what's the population of bacteria after 3 hours? After one day?

18. Trevin purchases a car for $19,000. The car depreciates at a rate of 18% annually. After 6 years, Keaton offers to buy the car for $4,500. Should Trevin sell the car to Keaton? Explain.

19. The number of people who own computers has increased 23.2% annually since 1990. If 500,000 people owned a computer in 1990, predict how many people will own a computer in 2015.

20. You apply for and receive a credit card. You spend $2,000 at an interest rate of 22% per month. How much debt will you have in one month? After 2 years?

Challenge! – Write a linear equation given the following information.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$ $y = mx + b$

21. A line has a slope of 3 and passes through the point (-2, 5).

22. The lines $f(x)$ and $g(x)$ are parallel. If $f(x) = \frac{1}{2}x + 3$, what is the equation of $g(x)$ that passes through the point (4, 1).

23. The lines $f(x)$ and $h(x)$ are perpendicular. If $f(x) = \frac{1}{2}x + 3$, what is the equation of $h(x)$ that passes through the point (4, 1).

24. A line that passes through the points (0, -6) and (4, 0).

25. A line that passes through the points (-5, 9) and (6, -2)