NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

For each problem below, determine what type of model could best help you find the answer. Some models to consider are: tables, graphs, equations, or diagrams. Then solve each problem.


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1. A bucket is put under a leaking ceiling. The amount of water in the bucket doubles every minute. After 8 minutes, the bucket is full. After how many minutes is the bucket half-full?

At 7 min the bucket is ½ full.

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2. A three-bedroom house in Burbville sold for $190,000. If housing prices are expected to increase 1.8% annually in that town, what is the price of the house in 5 years?

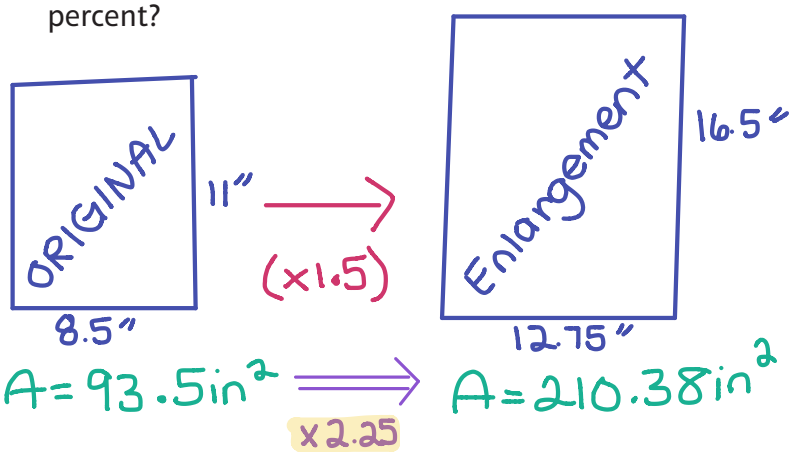
GROWTH 1.8% = 01.8

$f(t) = 190{,}000\,(1.018)^t$

$f(5) = 190{,}000\,(1.018)^5$

$f(5) = \$207{,}726.78$

3. Mrs. Davis is making a poster of math formulas for her students. She takes the 8.5 in. × 11 in. paper she printed the formulas on to the photocopy machine and enlarges the image so that the length and the width are both 150% of the original. She enlarges the image a total of 3 times before she is satisfied with the size of the poster. Write an explicit formula for the sequence that models the area of the poster, A, after n enlargements. What is the area of the final image compared to the area of the original, expressed as a percent increase and rounded to the nearest percent?



Area was increased by a scale factor of 2.25

Explicit Equation

$A(n) = 93.5(2.25)^n$

$A(3) = 93.5(2.25)^3$

$A(3) = 1065\text{in}^2$

percent increase

$\frac{1065 - 93.5}{93.5} \times 100 =$

1039% increase in size

4. Two band mates have only 7 days to spread the word about their next performance. Jack thinks they can each pass out 100 fliers a day for 7 days, and they will have done a good job in getting the news out. Meg has a different strategy. She tells 10 of her friends about the performance on the first day and asks each of her 10 friends to tell a friend on the second day and then everyone who has heard about the concert to tell a friend on the third day, and so on, for 7 days. Make an assumption that students are not telling someone who has already been told.

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A. Over the first 7 days, Meg's strategy will reach fewer people than Jack's. Show that this is true.

Jack's strategy: $100 \times 7 = 700$
$700 \times 2 = 1400$ flyers (bandmates)

Meg's strategy $m(T) = 10(2)^{t-1}$ $M(7) = 640$ flyers

B. If they had been given more than 7 days, would there be a day on which Meg's strategy would begin to inform more people than Jack's strategy? If not, explain why not. If so, on which day would this occur?

	DAY 8	DAY 9
Jack's strategy	1600	1800
Meg's strategy	1280	2560

* On the 9th day Meg's strategy will reach more people.

C. Knowing that she has only 7 days, how can Meg alter her strategy to reach more people than Jack does?

Meg can ask her 10 initial friends to tell two people each and let them tell two other people on the next day etc.

5. On June 1, a fast-growing species of algae is accidentally introduced into a lake in a city park. It starts to grow and cover the surface of the lake in such a way that the area it covers doubles every day. If it continues to grow unabated, the lake will be totally covered, and the fish in the lake will suffocate. At the rate it is growing, this will happen on June 30.

A. When will the lake be covered halfway?

June 29.

B. On June 26, a pedestrian who walks by the lake every day warns that the lake will be completely covered soon. Her friend just laughs. Why might her friend be skeptical of the warning?

On June 26, the lake will only be 6.25% covered. It is hard to imagine it will jump from a small percentage to 100% in merely 4 days.

June 30 100%
June 29 50%
June 28 25%
June 27 12.5%
June 26 6.25%

C. On June 29, a cleanup crew arrives at the lake and removes almost all of the algae. When they are done, only 1% of the surface is covered with algae. How well does this solve the problem of the algae in the lake?

It only takes care of the problem for a week.

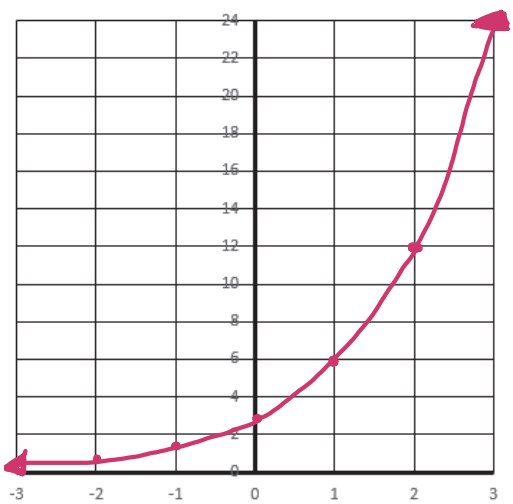
June 29 → 1%
June 30 → 2%
July 1 → 4%
July 2 → 8%
July 3 → 16%
July 4 → 32%
July 5 → 64%
July 6 → 128%

Spiral REVIEW

Use a table of values to graph each equation below.

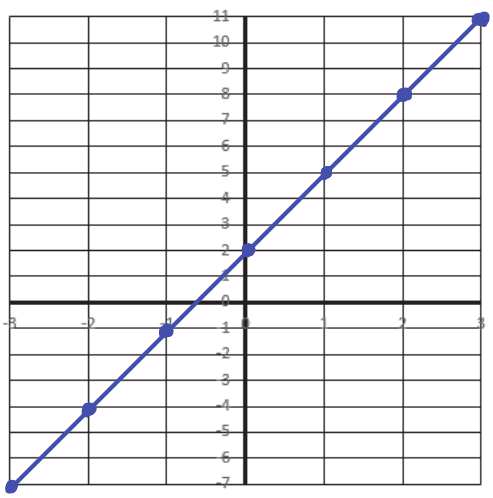
6. $f(x) = 3 \cdot 2^x$

x	-3	-2	-1	0	1	2	3
$f(x)$	.375	.75	1.5	3	6	12	24



7. $f(x) = 3x + 2$

x	-3	-2	-1	0	1	2	3
$f(x)$	-7	-4	-1	2	5	8	11



8. $f(x) = 3\sqrt{x} + 2$

x	$f(x)$
0	2
1	5
4	8
9	11
16	14

x	$f(x)$
25	17
36	20