Worksheet Level 2:

Goals:

Write an exponential equation with a whole number growth factor

Concept # _____

Practice #1

Zak's wealthy uncle wants to donate money to Zak's school for new computers. He suggests three possible plans for his donations.

Plan 1: He will continue the pattern in this table until day 12.

Day	1	2	3	4	5	6	7	8	9	10	11	12
Donation	$1	$2	$4	$8	16	32	64	128	256	512	1024	2048

$d = \frac{1}{2}(2)^n$

Plan 2: He will continue the pattern in this table until day 10.

Day	1	2	3	4	5	6	7	8	9	10
Donation	$1	$3	$9	$27	81	243	729	2187	6561	19683

$d = \frac{1}{3}(3)^n$

Plan 3: He will continue the pattern in this table until day 7.

Day	1	2	3	4	5	6	7
Donation	$1	$4	$16	$64	256	1024	4096

$d = \frac{1}{4}(4)^n$

a. Copy and extend each table to show how much money the school would receive each day.

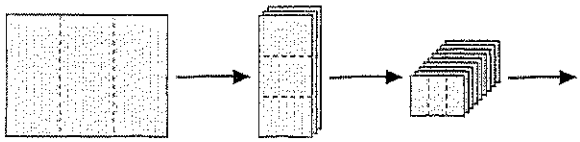
b. For each plan, write an equation for the relationship between the day number n and the number of dollars donated d.

c. Which plan would give the school the greatest total amount of money? Plan 2

d. Zak says there is more than one equation for the relationship in Plan 1. He says that $d = 2^{n-1}$ and $d = \frac{1}{2}(2^n)$ both work. Is he correct? Are there two equations for each of the other plans?

yes. 2^{n-1} means "one less multiplication" which is the same as $\frac{1}{2} \cdot 2^n$

Practice #2



a. Copy and complete this table to show the number of ballots after each of the first five cuts.

Number of Cuts	Number of Ballots
1	3
2	9
3	27
4	81
5	243

b. Suppose you continued this process. How many ballots would you have after 10 cuts? How many would you have after n cuts?

$1(3)^{10} = 59049$

c. How many cuts would it take to make at least one million ballots?

$1(3)^x > 1000000$

$x > 13$

Practice #3

For Exercises 9–12, find the growth factor and the *y*-intercept of the equation's graph.

9. $y = 300(3^x)$ growth = 3, y-int = 300

10. $y = 300(3)^x$ $m = 3$, $b = 300$

11. $y = 6{,}500(2)^x$ $m = 2$, $b = 6500$

12. $y = 2(7)^x$ $m = 7$, $b = 2$

Practice #4

Fido did not have fleas when his owners took him to the kennel. The number of fleas on Fido after he returned from the kennel grew according to the equation $f = 8(3^n)$, where f is the number of fleas and n is the number of weeks since he returned from the kennel. (Fido left the kennel at week 0.)

a. How many fleas did Fido pick up at the kennel? $8(3)^0 = 8$.

b. What is the growth factor for the number of fleas? 3

c. How many fleas will Fido have after 10 weeks if he is not treated?

$8(3)^{10} = 472392$

Practice #5

An experimental plant has an unusual growth pattern. On each day, the plant doubles its height of the previous day. On the first day of the experiment, the plant grows to twice, or 2 times, its original height. On the second day, the plant grows to 4 times its original height. On the third day, the plant grows to 8 times its original height.

a. How many times its original height does the plant reach on the sixth day? On the *n*th day?

$2^6 = 32$ times, 2^n times

b. If the plant is 128 cm tall on the ninth day, how tall was it just before the experiment began?

$b(2)^9 = 128$, $b \cdot 512 = 128$, $b = 0.25$ cm.

c. Is the relationship described linear, inverse, exponential, or neither? Write an equation relating the variables.

Exponential $y = \frac{1}{4}(2)^x$.