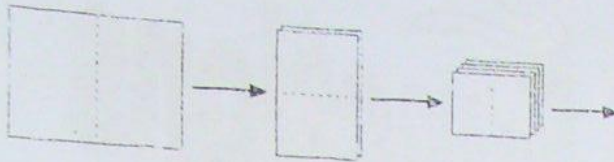


Growing, Growing, Growing: Investigation 1

Chen, the secretary of the Student Government Association, is making ballots for tonight's meeting. He starts by cutting a sheet of paper in half. He then stacks the two pieces and cuts them in half. He repeats this process, creating smaller and smaller pieces of paper.



After each cut, Chen counts the ballots and records the results in a table.

Number of Cuts	Number of Ballots
0	1
1	2
2	4
3	<u>8</u>
4	<u>16</u>

Chen wants to predict the number of ballots after any number of cuts

- Predict how many ballots will result from 3 cuts 8
- Predict how many ballots will result from 4 cuts 16
- Predict how many ballots will result from 10 cuts _____

4. Complete the 2nd column in the table to show the number of ballots after each of the cuts.

Number of Cuts (n)	Number of Ballots (b)		Shortcut Form for Number of Ballots using Exponents (b)
0	1		1
1	2	x2	1 · 2 ¹
2	4	x2	1 · 2 ²
3	8	x2	1 · 2 ³
4	16	x2	1 · 2 ⁴
5	32	x2	1 · 2 ⁵
6	64		1 · 2 ⁶
7	128		1 · 2 ⁷
8	256		1 · 2 ⁸
9	512		1 · 2 ⁹
10	1024		1 · 2 ¹⁰

5. How did you find your entries in the table? Multiply by 2

6. Fully complete the table above.

the relationship between the number of cuts and the number of ballots? (In other words, how can you use the number of cuts to figure out the number of ballots?)

of ballots = $1 * 2$ to the # of cuts

8. Write a rule (equation) to explain the relationship between the number of cuts (n) and the number of ballots (b).
 $b = 1 \cdot 2^n$

9. Use your rule (equation) to determine how many ballots Chen would have if he made 20 cuts?
 $1 \cdot 2^{20} = 1,048,576$

$5^2 \stackrel{?}{=} 2^5$
 $25 \neq 32$

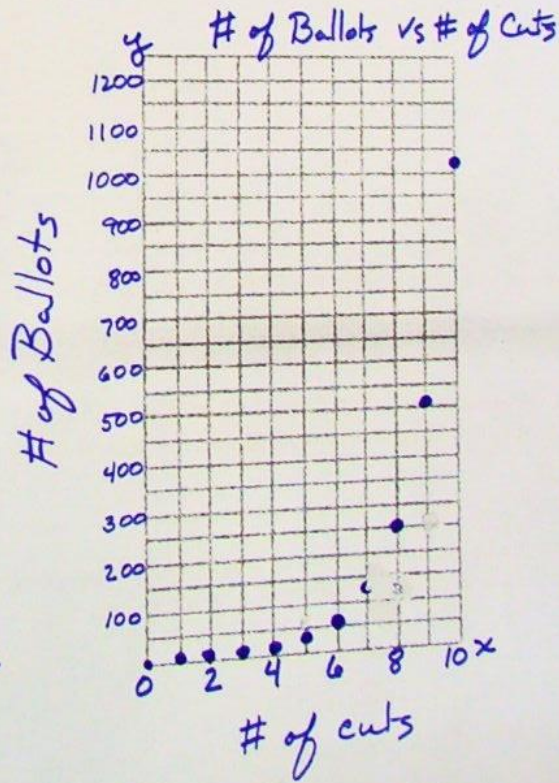
10. Use your rule (equation) to determine how many ballots Chen would have if he made 30 cuts?
 $1 \cdot 2^{30} = 1,073,741,824$

11. How many cuts would it take to make enough ballots for all 500 students in Chen's school? 9 cuts

Explain how you determined this answer. Look in the table for the # of cuts just more than 500 ballots

12. Graph the relationship using an interval of 1 on the x-axis and 50 on the y-axis

Number of Cuts	Number of Ballots
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024



Discrete data
 (do not connect points)

Bacteria Growth



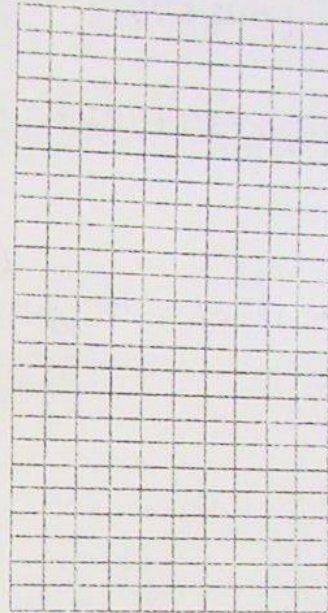
If you don't brush your teeth regularly, it won't take long for large colonies of bacteria to grow in your mouth. Suppose that a single bacterium lands on one of your teeth and starts reproducing by a factor of four every hour. (multiplies by four every hour)

b = the number of bacteria
 t = the number of hours

Equation: $b = 1 * 4^t$
 ↑ start ← Growth Factor

1. Complete the table and graph for the relationship.
 Use an interval of 1 on the x-axis and 50 on the y-axis.

# Hours	# Bacteria
0	1
1	4
2	



2. Use the equation to find how many bacteria will be in the new colony after 12 hours?

3. How many bacteria will be in the new colony after 13 hours? _____
 Explain how you can use your answer from #2 instead of using your equation.

4. After how many hours will there be at least 1 million bacteria in the colony? _____
 (Use guess and check to find your answer.)

Similar to the quiz!

• page 4

Name: _____

Simplify. Put rectangles around answers. Topic 6, Sections A-G

1) $-5h^6h^3$

2) $(-2x^2)(-4x)(-4x^3)$

3) $(c^3d^4)(c^2d)(c^2d^3)$

4) $(4x^5y^3)^2$

5) $(-6a^4b)^2$

6) $8v(v - 5)$

7) $xy^2(3x^2 - 4xy - y^2)$

8) 5^{-3}

9) y^{-8}

10) $\frac{x^{-2}z^{-8}}{y^{-4}}$

11) $(3x - 9)(-5x + 6)$

12) $(y + 6)(y^2 + 3y + 4)$

Solve.

13) $(x + 2)(x - 1) = (x + 1)(x - 4)$