Name Gabby Butcher 5th Hour 3-30-15

Chapter 8 **Performance Task**

## Integrated Circuits and Moore's Law

In April of 1965, an engineer named Gordon Moore noticed how quickly the size of electronics was shrinking. He predicted how the number of transistors that could fit on a 1-inch diameter circuit would increase over time. In 1965, 50 transistors could fit on the circuit. A decade later, about 65,000 transistors could fit on the circuit. Moore's prediction was accurate and is now known as Moore's Law. What was his prediction? How many transistors will be able to fit on a 1-inch circuit when you graduate from high school?

***These questions must be addressed and answered as part of your project:***

1. Using the given information and the *regression* feature on your graphing calculator, create a linear and an exponential model for Moore's Law. Let 1965 represent the initial time, $t = 0$. Round to the nearest hundredth, if necessary.

   a. linear model $y = ax + b$

   b. exponential model $y = a \cdot b^x$

| $L_1$ | $L_2$ |
|---|---|
| 0 | 50 |
| 10 | 65000 |

$a = 6.495$ $b = 50$

$a = 50$ $b = 2.05$

2. In 1970, about 1800 transistors could fit on the semiconductor. Given this information, which model for Moore's Law is correct? Explain. Linear = $a = 350$ $b = 2.05$ Exponential model
   exponential = $a = 50$ $b = 50$

3. Write a sequence of terms representing the number of transistors that could fit on a one-inch diameter circuit from 1965 to 1975. Is the sequence arithmetic or geometric? Why?
   +10 Geometric because it doubles (x2) every year

4. Write a rule for the *n*th term of the sequence.
   $a_n = a \cdot r^{n-1}$ $r = 2$ $a_n = a \cdot 2^{n-1}$

5. This sequence is known as "Moore's Law." Summarize Moore's Law in your own words. The # of transistors per square inch doubled every year.

6. In the 1970s, Moore revised his prediction to say that the number of transistors would double every two years. How does this affect the rule for your sequence?
   It would have a smaller growth than it doubles every year.

7. Write a rule for a sequence that represents the number of transistors that could fit on a 1-inch diameter circuit from 1975 on using Moore's revised prediction. Using that rule, predict how many transistors will be able to fit on a circuit in the year that you graduate.

$$a_n = a \cdot 1/2^{n-1}$$

| | |
|---|---|
| **CCSSM Content Standards** | HSF-LE.1, HSF-LE.2, HSF-LE.3, HSA-SSE.3c |
| **CCSSM Mathematical Practices** | **1. Make sense of problems and persevere in solving them.**<br>**2. Reason abstractly and quantitatively.**<br>**3. Construct viable arguments and critique the reasoning of others.**<br>**4 Model with mathematics.**<br>**5 Use appropriate tools strategically.**<br>**6. Attend to precision.** |