



*Drexel-SDP GK-12 ACTIVITY*

## Activity

**Subject Area(s):** Technology, Processing, Graphing, Analysis, Comparison

**Associated Unit:** *Nanotechnology and Electricity*

**Associated Lesson:** *Powered by Fruit, Battery Charge, Ohm's, Binary*

**Activity Title:** *Moore's Law: Double the graphing, double the fun!*

**Grade Level:** (6-8)

**Time Required:** 60-90 minutes

**Group Size:** Classroom

**Summary:** *Students are placed into small teams of 2-3 which comprise a faux electronics company "BetterNano Inc." Using Moore's Law, students must be able to calculate the number of chips needed to make computers faster by a given year. This is then graphed onto a chart and recorded for assessment.*

**Engineering Connections:** Moore's Law has been the standard by which computer chip manufacturers achieve their goals of speed and performance each given year. Ever notice how computer company's always are telling consumers how the chip is now 4GHz and not 3GHz, and the numbers keep going up and up? That's because of Moore's Law, and its impact on designing computer circuitry.

**Keywords:** Technology, Processing, Graphing, Analysis, Comparison

**Educational Standards:** [PA] 2.1.8G, 2.2.8ABF, 2.4.8ABCD, 2.7.8BC, 2.8.8B, 2.11.8A, 3.6.7C

**Materials List:** Calculator, Moore's Law Worksheet, Colored Pencil

**Introduction/Motivation:** *Computers dominate society in a very strong way. In order for these great machines to become faster, smaller, and cheaper for all people, scientist and engineers must set forth goals to meet. One such goal is called Moore's Law, which asks that the amount of transistor wires on a chip double every 18-24 months. The students then comprise this small company BetterNano Inc. to take on the large company Intel to see if they can grow these chips faster.*

**Methods and Procedure:**

1. Once the students are split into smaller 2-3 person groups, the objective of the lesson is explained. This should take 5-10 minutes to explain the concept of the computer chip companies need for increasing their chip production every 1-2 years. This is an important concept so they realize that this math is necessary for all engineers in order for them to meet their deadlines.

2. Students then may complete the charts on the second page of the handouts, followed by graphing their values into the box below.

3. Students then are required to complete the assessment questions found on the back sheet of the handouts.

**Assessment:** There are 4 assessment questions on the last page to evaluate their ability to graph and interpret their own plots, as well as make logical estimations and conclusions.

**Attachments:** Moore's Worksheet

**References:** [en.wikipedia.org/wiki/Moore's\\_law](http://en.wikipedia.org/wiki/Moore's_law)

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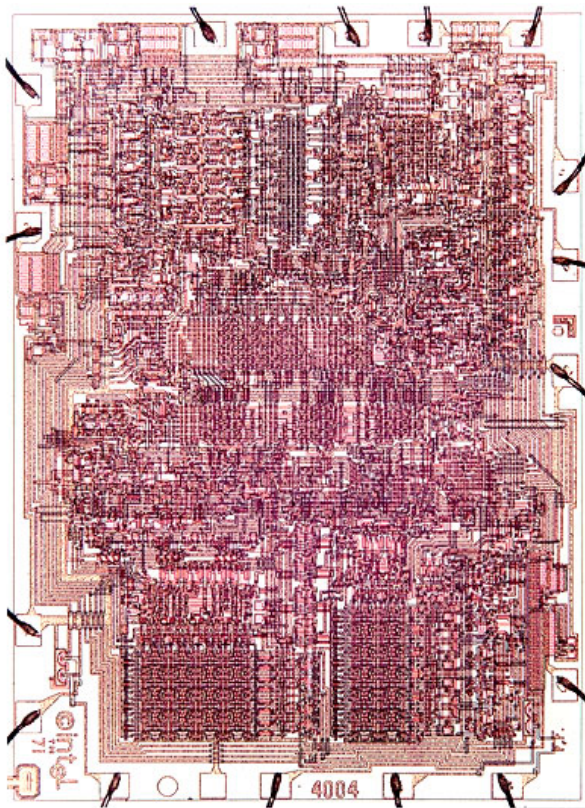
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# Betternano INC.

Name : \_\_\_\_\_

All right, so now you guys manage your own company, developing next generation processing chips for faster computing and storage needs. If you want to get rich and stay rich, you'll need to make sure your engineers are working hard to keep up with the other companies. Below are some pictures of chips made by a rival company, Intel®.



**1971 - 2,300 transistors**



**2006 - 1,000,000,000 transistors**

As you can see, they did a lot of work between 1971 and 2000. They went from only 2,300 transistors on a chip to over 42,000,000. This allows them to create the same processing power in a much smaller area or a much higher processing speed in the same area.

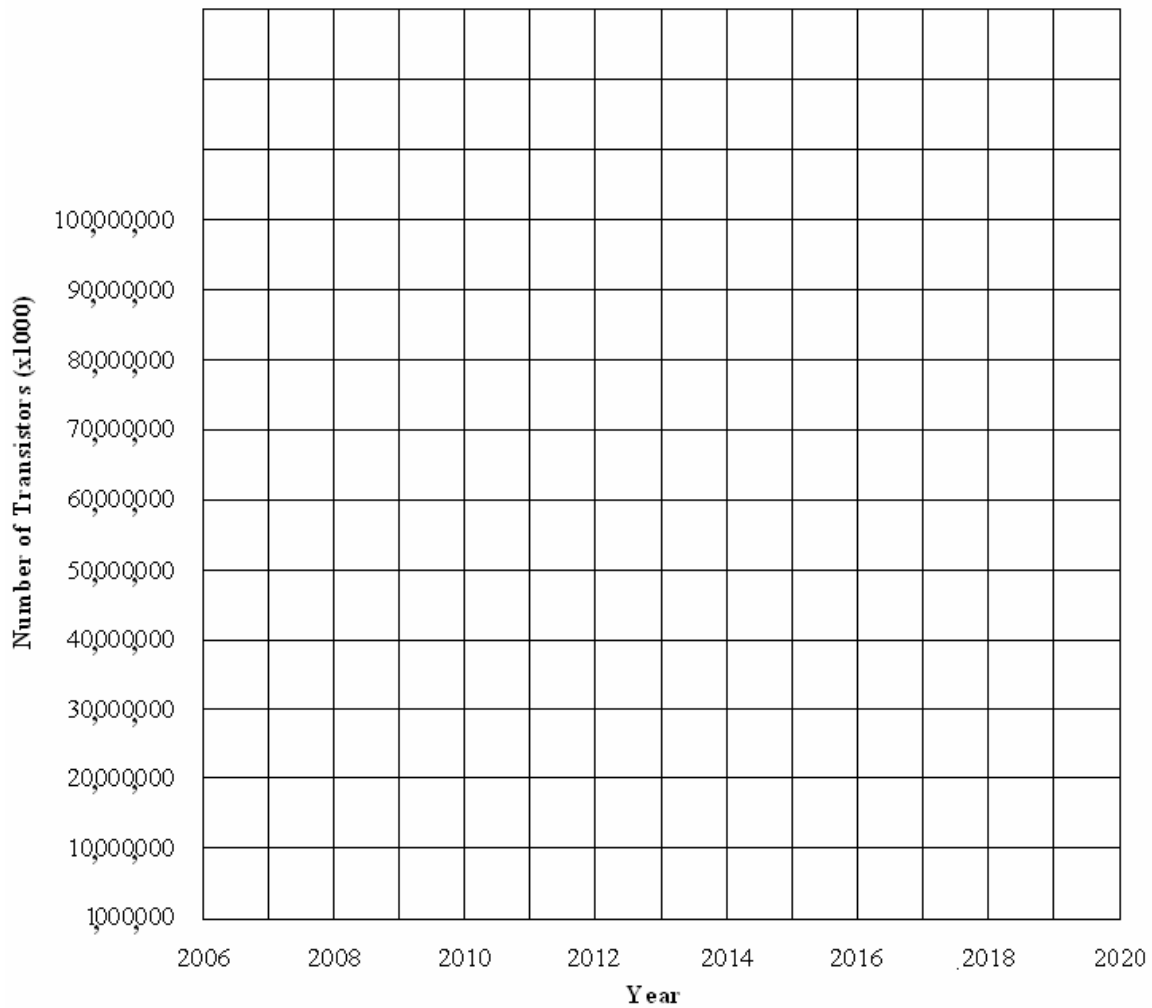
***The race to 100,000,000,000 transistors***

Doubles every 24 months  
(Intel Corporation)

Doubles every 18 months  
(Blankenburg Inc.)

Date	Transistors (x1000)
2006	1,000,000
2008	
2010	
2012	
2014	
2016	
2018	
2020	

Date	Transistors (x1000)
2006	1,000,000
2009	
2012	
2015	
2018	





betternano INC.

Name : \_\_\_\_\_

Questions :

1. Around what year did Intel Corporation reach 100,000,000 (x1000) transistors? When did Blankenburg Inc.?

2. How many transistors will Blankenburg Inc. produce in the year 2011? What is the percent less that Intel Corporation makes in the same year?

3. How much money do you think Blankenburg Inc should charge per transistor? In 2016 there are two Blankenburg chips in one computer. If each transistor cost .000000001 dollars, how much will the computer be?

4. Now that you beat Intel Corporation, how would you spend the money your company made?