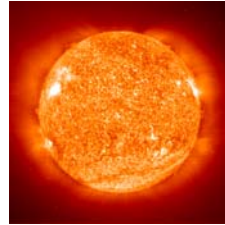


Definition and Scale Cards

Kilo

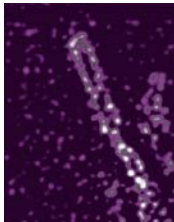


The Diameter of  
the sun.

Giga

From the Greek word  
*mikros*, meaning small.

Is 1/1,000,000 or  $10^{-6}$



Iodine atoms in a  
carbon nanotube.

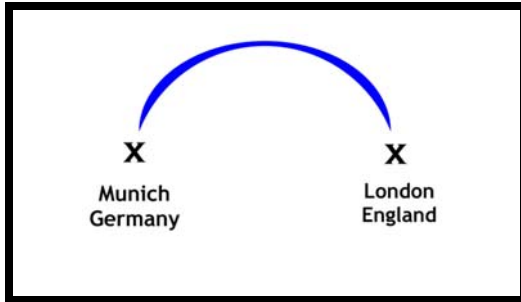
Mega

From the Latin word  
*nanus*, meaning dwarf.

Is 1/1,000,000,000  
or  $10^{-9}$

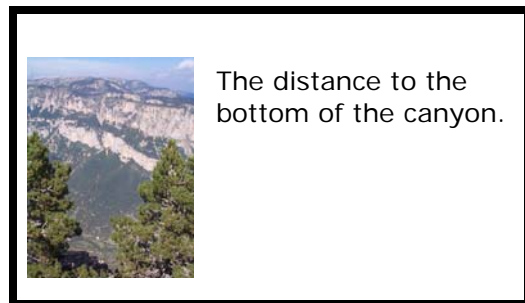
From the Greek word  
*chiloi*, meaning  
thousand.

Is 1,000 or  $10^3$



Milli

Micro



From the Greek word *me-gas*, meaning great.

Is 1,000,000 or  $10^6$

From the Greek word *gigas*, meaning giant.

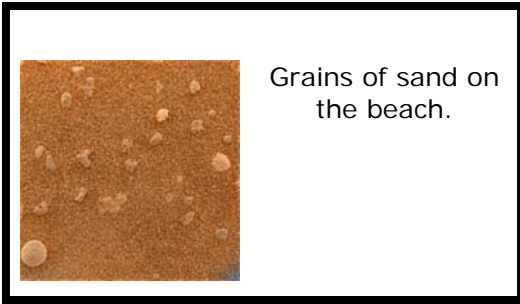
Is 1,000,000,000 or  $10^9$

From the Latin word *milli*, meaning thousand.

Is 1/1,000 or  $10^{-3}$

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Grains of sand on the beach.

Nano



Science vs. Technology Resource Cards

Mobile Phones

DNA

Huygen's Probe that travelled to Titan, one of the moons of Saturn.

The data the Huygen's probe picked up on Saturn's moon.

Satellites

Artificial Limbs

Natural Selection.



Genetic Engineering

Vacuum Cleaner

Examining what the stars  
are made of.

Telescopes

Heart surgery

Predicting the Weather



## Future vs. Fact Resource Cards

### **Application: Drug Delivery**

Nanosized capsules, containing drugs, can be used to explode cancer cells. The capsules move, within the body, to the right place where the cancer cells are. A laser releases the drugs from within the capsules so they are delivered to the cells directly.

### **Application: Pen Trackers**

Nanosized sensors can be implanted in pens and pencils. If the sensor detects it is more than 500 m from the owner of the pen, a computer tracking system is activated.

### **Application: Carbon nano-tubes**

Hollow tubes of carbon can be created that have a diameter of only nanometres. Particles of iron help the carbon to form a tube, and if done very carefully the tube can grow to a few centimetres long.

**Application: Light Paint**

Adding nanoparticles into paint can make it a lighter substance. This is especially important where weight is a major issue, for example on aircrafts.

**Application: Computer Chips**

Designing and manufacturing computer chips uses nanotechnology to create smaller circuits. This allows computers to be smaller, faster and have more memory.

**Application: Sensors**

Nano-sized sensors can be created from the same technology as computer chips. These sensors would add to security by being very small and hard to see, and would contain the technology to be very accurate.

**Application: Disease Diagnosis**

Nanotechnology can be used to detect diseases by using small and safe equipment inside the body, or examining the smallest particles in body substances such as an exhaled breath or a drop of blood.

**Application: Tools**

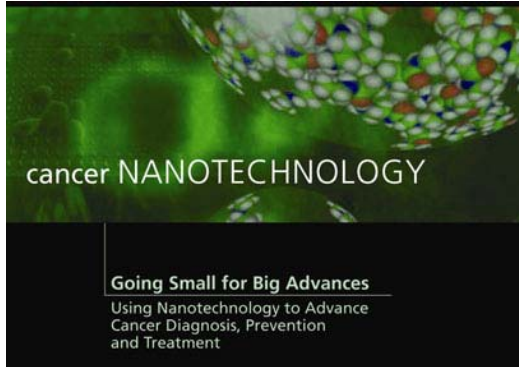
Nano sized crystals are used on the ends of cutting tools to make them sharper and less likely to be broken or dulled. The tools are used for repetitive jobs that are hard on tools such as drilling holes in circuit boards.

**Application: Robot Dentists**

Nano-sized robots can be used to promote healthy teeth and gums. A very small robot is kept in the mouth throughout the day, which constantly works to remove damaging plaque and dirt from the teeth.



## Viewpoint Cards



<http://otir.nci.nih.gov/images/coversmall.jpg>



<http://www.researchmatters.harvard.edu/photos/641.jpg>



<http://www.ipt.arc.nasa.gov/Graphics/spacetransport.gif>



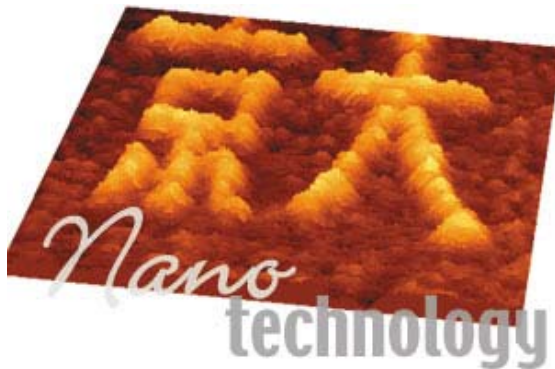
***US Signed Nanotech R&D Act***

President Bush on December of 2003 signed the 21st Century Nanotechnology Research and Development Act, which passed the House (H.R. 766) and the Senate (S. 189) with overwhelming support. The legislation puts into law programs and activities supported by the National Nanotechnology Initiative (NNI), one of the President's highest multi-agency research and development (R&D) priorities. The authorization bill calls for US\$3.7 billion for nanotechnology R&D for FY 2005-2008.

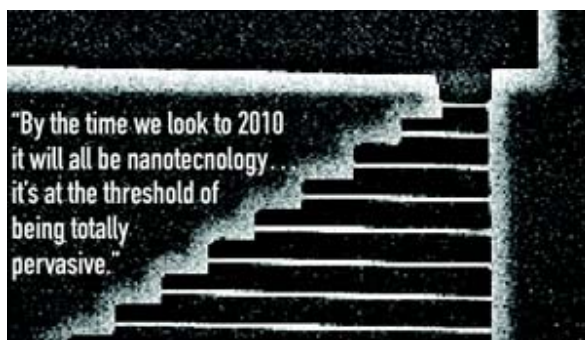
For more information, visit

[www.nano.gov](http://www.nano.gov)

<http://nr.stic.gov.tw/ejournal/SciTechFocus/v5n6.files/image001.gif>



<http://www.vbl.kyoto-u.ac.jp/Nanotech/image/index3.jpg>



<http://www.fazeteen.com/summer2001/summerimages/nano4.jpg>



## Nanotechnology will not solve our problems!

- How can you get millions of molecules to arrange themselves into exact arrangements?
- How do you test the billion molecule electronic circuit?
- Nanoscale computing is amorphous
- The "price of programmability"

<http://www.cs.bham.ac.uk/~jfm/eh2002/img010.gif>



[http://www.boingboing.net/Smoky\\_The\\_Nanobot%20SMALL-tm.jpg](http://www.boingboing.net/Smoky_The_Nanobot%20SMALL-tm.jpg)