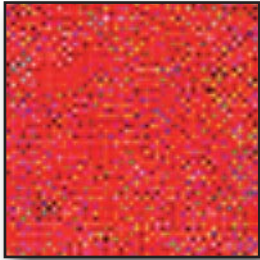


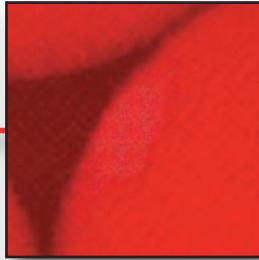
## Powers of Ten

**What to do:** Look at the screen and use the buttons to zoom in or out.

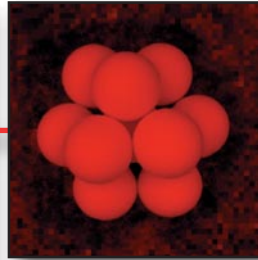
**What happens:** You can zoom from inside the nucleus of an atom to beyond the Milky Way.



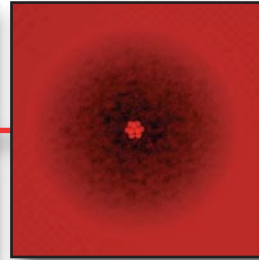
$10^{-16}$  Quarks cannot be visualised, they form an interacting cloud



$10^{-15}$  Three quarks in a proton or neutron inside an atomic nucleus



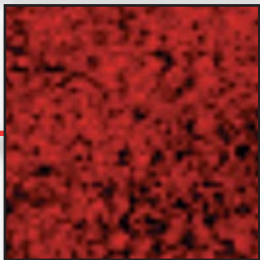
$10^{-14}$  Six protons and six neutrons form the nucleus of a carbon atom



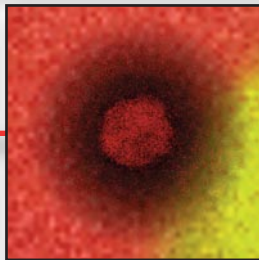
$10^{-13}$  The atom's nucleus



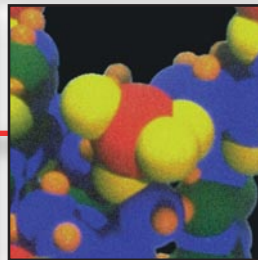
$10^{-12}$  The two innermost electrons appear as a probability cloud



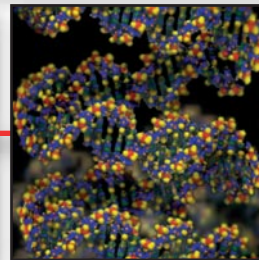
$10^{-11}$  The outer electrons form the chemical bonds with other atoms



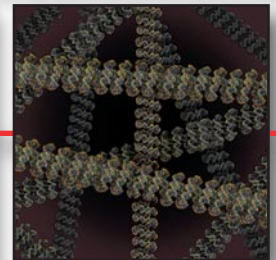
$10^{-10}$  The carbon atom



$10^{-9}$  Carbon atoms form the basis of most molecules in living things



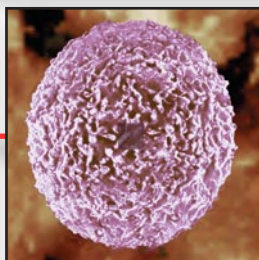
$10^{-8}$  Part of the double helix of DNA. Genes are made of this



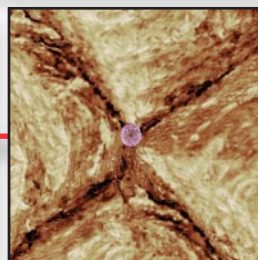
$10^{-7}$  Coiled coils of DNA made up of chromosomes in the nuclei of cells



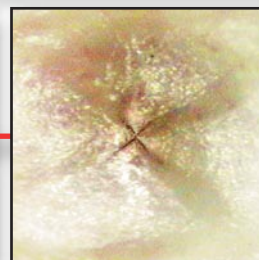
$10^{-6}$  The nucleus of the cell - small molecules can pass through the pores



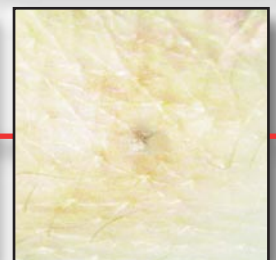
$10^{-5}$  A white blood cell



$10^{-4}$  A small blood vessel



$10^{-3}$  One millimetre from the skin



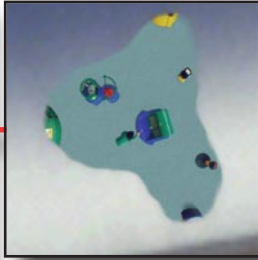
$10^{-2}$  One centimetre from the skin



$10^{-1}$  Your skin



**$10^0$**  One metre across  
- real size!



**$10^1$**  Out through  
Techniquest's roof



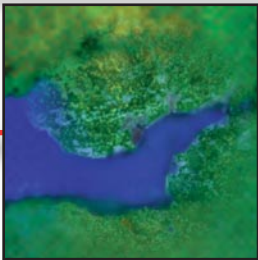
**$10^2$**  One hundred  
metres above Techniquest



**$10^3$**  One kilometre  
above Cardiff



**$10^4$**  Cardiff



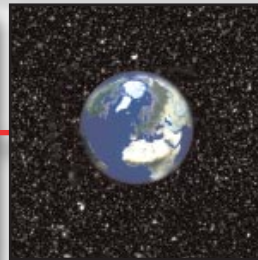
**$10^5$**  South Wales



**$10^6$**  The UK



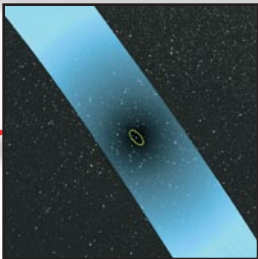
**$10^7$**  The Earth



**$10^8$**  The Earth from orbit



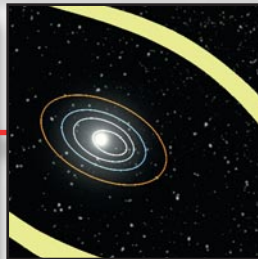
**$10^9$**  The moon's orbit  
around the Earth



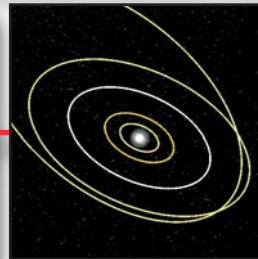
**$10^{10}$**  Ten million  
kilometres from the Earth



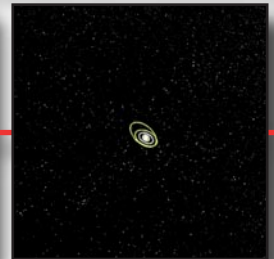
**$10^{11}$**  The orbits of  
Venus and Mars



**$10^{12}$**  The orbits of the  
inner planets (Mercury,  
Venus, Earth, Mars)  
around the Sun



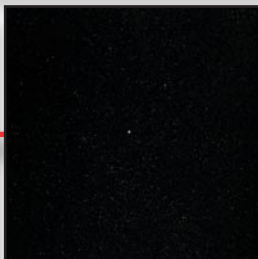
**$10^{13}$**  The orbits of the  
outer planets Jupiter,  
Saturn, Uranus, Neptune  
and Pluto



**$10^{14}$**  Out beyond the  
planets where only comets  
go



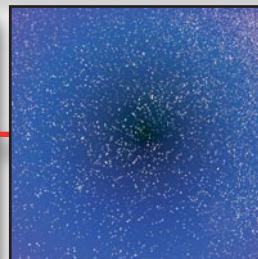
**$10^{15}$**  The Sun is another  
bright star now



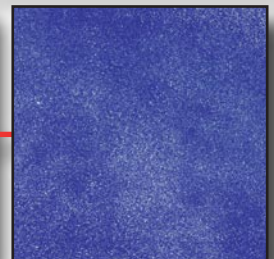
**$10^{16}$**  One light year  
from the Sun - the icy  
limit of the solar system



**$10^{17}$**  The Sun is one of  
many faint stars



**$10^{18}$**  A hundred light  
years, the Sun is not  
visible



**$10^{19}$**  The Sun is hidden  
by dust clouds in the  
outer arm of the Milky  
Way

## ACKNOWLEDGEMENT

The sequence of images is based on a film, Powers of Ten, produced by C & R Eames in 1962, and a book of the same name by Philip & Phyllis Morrison in 1982.