# THE NANOTECHNOLOGY SCALE

BIO-NANO

EXERCISE 1

Nanotechnology Reading





## Exercise 1: Intro to Nanotechnology

The word ‘nanotechnology’ comes from putting together two words – nano and technology.

Nano is a Greek word meaning ‘dwarf’. It is used to describe very, very small objects. These objects are measured in nanometres which is 0.000000001 of a metre. Scientists write this as 10-9(count the number of digits to the right of the decimal point). Nano particles are too small to be seen with the naked eye. You need powerful microscopes to see them.

To put that scale in another context, the comparative size of a nanometre to a metre is the same as that of a marble to the size of the earth.

Molecules and atoms are nano particles. They are the basic building blocks that make up matter. These building blocks are arranged in many ways to create all living and non-living things.

Technology is more difficult to define. It is about how humans use knowledge to control their environment. This knowledge is practical. Often it means using tools to make things or to solve problems.

Nanotechnology, then, is about making things or solving problems using atoms and molecules.

Scientists are now able to manipulate atoms and molecules to make new and exciting shapes. They do this one atom or molecule at a time. They have noticed that materials have different properties at the nano scale when compared with larger scales. The colour and strength of the material can be quite different. One example is a carbon nanotube. Scientist created a carbon nanotube by rolling a sheet of graphite molecules into a tube. The carbon nanotube is hundreds of times stronger than steel but only one-sixth the weight.

Nano particles are now found in many products including sunscreen, paint and inkjet paper. The use of nano particles in sunscreen makes it rub on clear.

Nanotechnology promises big things. Scientists are predicting that it will be used in many ways in the future. In computers, memory chips and the circuitry could be made using nano particles. This could make computers smaller than the head of a pin. Small machines could be made with nano particles. In medicine, robots could be made out of nano particles. These ‘nanobots’ could be used to perform surgery within the human body by travelling through blood vessels. They could look for and kill cancer cells. Nano particles could also be used to clean up pollution in oceans.

On the other hand, nanotechnology raises many issues. The potential dangers of nano particles are not well understood. Some people are concerned about the danger to human health. They fear that nano particles, because they are so small, could avoid the body’s immune systems and move into cells creating a detrimental effect. Others are concerned about the effect of releasing nano particles into the environment.

## Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Reading Review

As you read the article on nanotechnology:

* Underline new words or ones you don’t understand. Write these words on the back of this paper along with a guess of what that word means based on what you’ve read.
* Answer the questions below.

| Questions about the article | Your notes |
| --- | --- |
| In your own words describe nanotechnology. |  |
| How big is a nano particle? |  |
| Name two nano particles. |  |
| Give examples of products that contain nano particles. |  |
| How can particles at a nano scale be different from the same material at a larger scale? |  |
| How may nanotechnology be used in the future? |  |
| What concerns do some people have about using nano particles in products? |  |
| Briefly describe below the main ideas in this article: | |