



MONTHLY ACTIVITY 2

NANOTECHNOLOGY

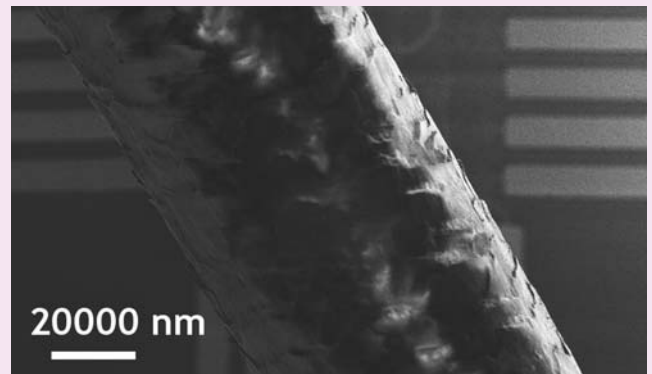
Definition

The word nano comes from the ancient Greek word for 'dwarf' and nanotechnology is the technology used to control this tiny nano-world and make it useful to us.

In nanotechnology centimetres and even millimetres are too big for measuring so scientists use a unit called a nanometre which is one billionth (1,000,000,000) of a metre!

Because a nanometre is so small we cannot see it with our eyes or even through a traditional microscope.

A human hair is about 50,000 nanometres wide which is about the smallest thing we can see with our eyes.



$$1\text{nm (nanometre)} = \frac{1 \text{ metre}}{1,000,000,000}$$

Why nanotechnology?

Everything in the world is made up of atoms, the tiny building blocks which build molecules and form materials.

Scientists have long been able to combine these atoms in ways that create new and useful materials like medicines.

Scientists and engineers want to study nanotechnology because materials behave differently at a very small scale and working at this scale allows them to make new materials and devices which could improve our lives.

In nanotechnology engineers, physicists, chemists and biologists all work together to help create these new materials and devices.

Did you know?

- A nanometre compared to the size of a football is like a football compared to the size of the earth!
- A comma in a newspaper is half a million nanometres!
- Nano-scale materials have very different properties than at a larger scale – for example, nano-particles of gold actually appear red!



Gold



Nano-gold

What can nanotechnology do for us?

- Smaller and faster computers
- Faster medical testing devices to check for diseases
- Smart medicine which could be delivered to the exact area where it is needed
- New light and strong materials for sports gear
- New renewable energy materials and devices

EXPERIENCE ENGINEERING

Why study Nanotechnology?

"Nanotechnology is an exciting research field where scientists and engineers work together to develop new materials, devices and products which will help improve all our lives. The researchers of the future have the potential to harvest more energy from renewable sources like the sun and to create faster and smaller medical tests, computers and mobile phones."

*Aidan Quinn, Head of Nanotechnology Group,
Tyndall National Institute*

ACTIVITIES

Nanotechnology: It's big—on a really small scale!

Nano Ruler

– make your own nano ruler from the cut-out supplied with this worksheet.

Measured in nanometres:

- What is the length of a pencil?
- What is the width of your copy book?
- What length is your little finger?

A fingernail grows about 1 nanometre in one second.

How far does it grow in?:

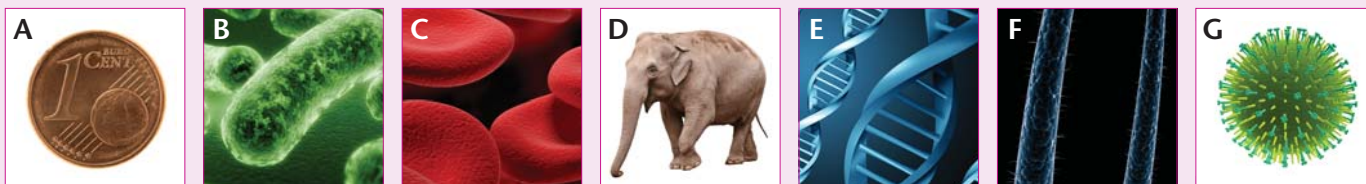
- one minute 60 nanometres
- one hour

Fill in the missing word:

Example:

- The word nano comes from the ancient Greek word for D W A R F.
- A is one billionth of a metre.
- are the tiny building blocks of everything around us.
- Materials behave at a very small scale.
- In nanotechnology , physicist, chemists and biologists all work together to help create new materials and devices.

Arrange these objects in order from smallest to biggest:



A. 1 Cent –
1.5 centimetres
across
(15,000,000
nanometres)

B. Bacteria –
5,000
nanometres

C. Red blood
Cell – 8,000
nanometres

D. Elephant –
2.6 metres long
(2,600,000,000
nanometres)

E. DNA –
2 nanometres

F. Hair –
50,000
nanometres

G. Flu virus –
120 nanometres

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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Nanometre

Centimetre

Metre

INSTRUCTIONS

Fold the pages along the dotted line.

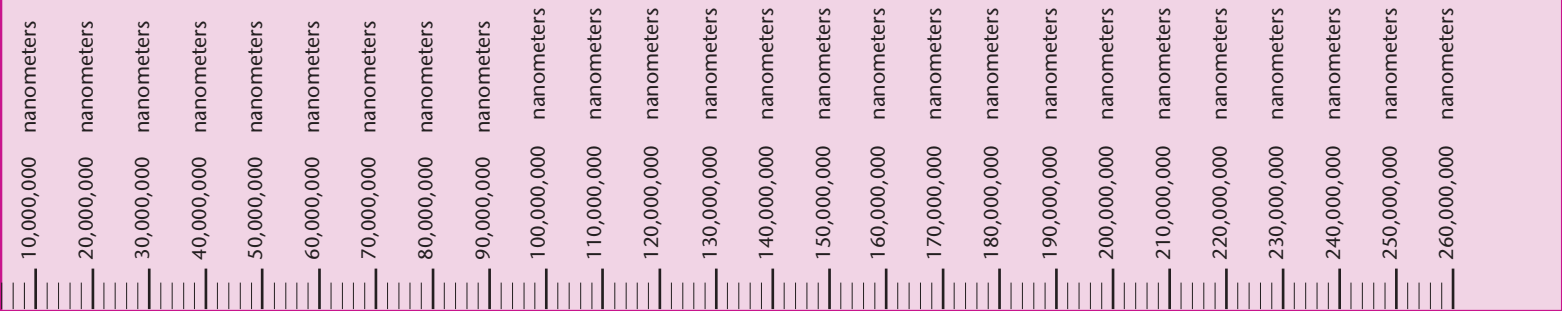
Line up A & B having A on top and tape the pages together.

Now you can use the Nanotechnology ruler to measure objects.

A

Fold on line

Nanotechnology Ruler



B

Fold on line

