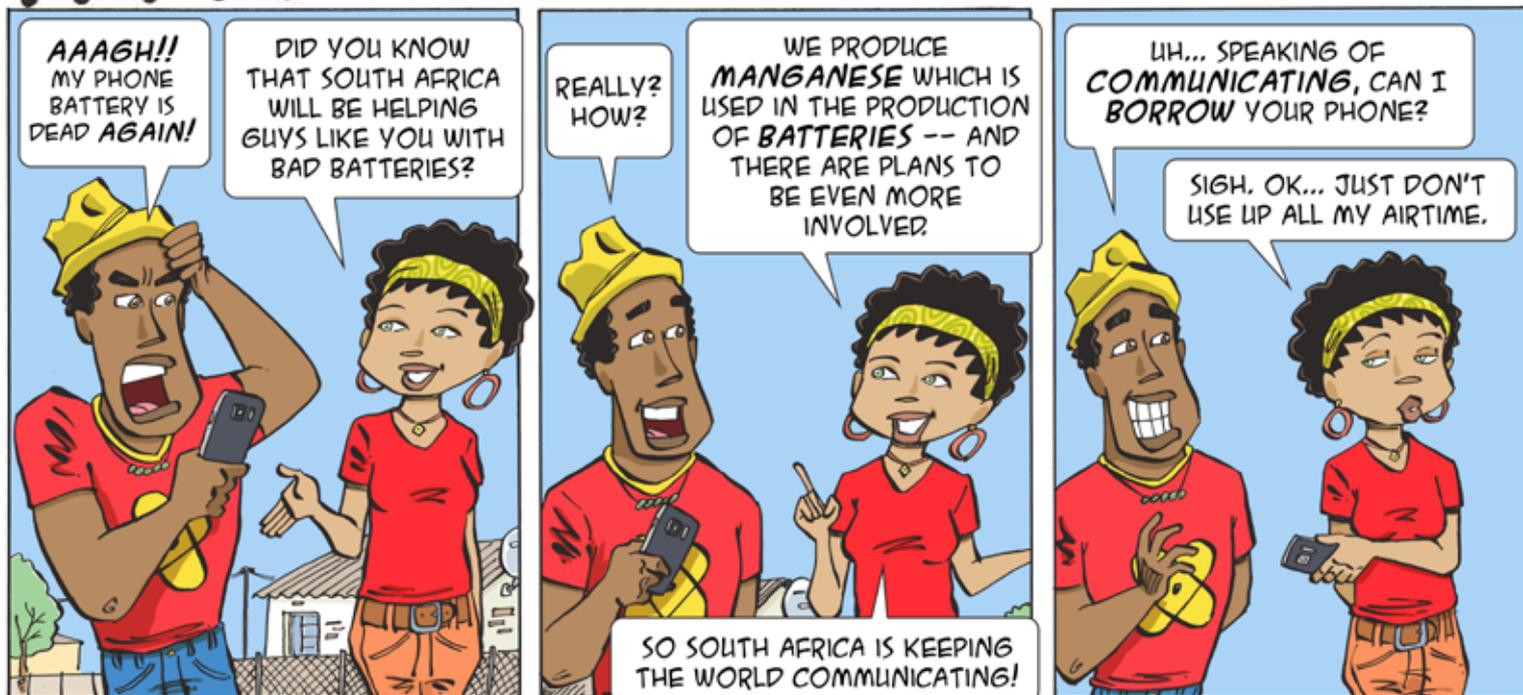




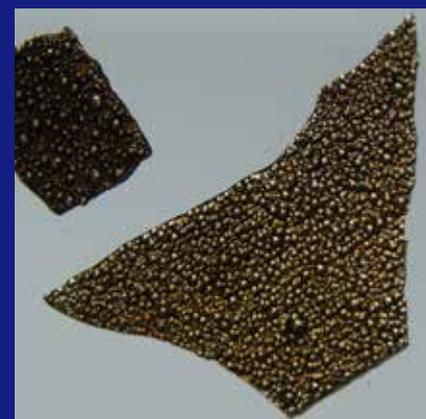
## INNOVATING POWER



### ADDING VALUE

South Africa is one of the biggest supplier of *manganese*.

At the moment South Africa just sells the manganese, but if we were to do some of the *processing* of it towards making a battery, it could be sold for *20 times more!*



Right: A piece of manganese

Below: A lithium-ion battery, which is made with the help of manganese



Public Domain, <https://commons.wikimedia.org>

The rock from where manganese is extracted (taken out of) is called *manganese ore*.



Eugene Varnavsky, via Wikimedia Commons - public domain.

Taking something like manganese and changing it into something else that is useful to someone is called *adding value*.



## MAKE A MINI-GARDEN

IN THIS ACTIVITY YOU ARE GOING TO TAKE SOME **ORDINARY THINGS** THAT ARE NOT WORTH MUCH BY THEMSELVES, AND ADD VALUE TO THEM.



1

FIND AN EMPTY PLASTIC COKE OR MILK BOTTLE. WITH THE BOTTLE ON ITS SIDE, USING A KNIFE OR SCISSORS CUT A LONG HOLE IN THE TOP PART OF THE BOTTLE - SEE THE PHOTO (WARNING - BE CAREFUL YOU DON'T CUT YOURSELF).



2

CUT SOME HOLES IN THE BOTTLE AND ATTACH SOME STRING OR WIRE SO THAT THE BOTTLE CAN HANG ON ITS SIDE.



3

FILL THE BOTTLE WITH SOME SOIL.



4

FIND SOME SEEDS OR SMALL PLANTS (FLOWERS OR VEGETABLES) AND PLANT THEM IN THE SOIL. THIS IS YOUR PRODUCT - A MINI GARDEN.



5

FIND OUT BY ASKING SOME FRIENDS HOW MUCH THEY THINK YOUR PRODUCT IS WORTH. USING THE FORMULA, WORK OUT HOW MUCH VALUE YOU HAVE ADDED TO THE PLASTIC BOTTLE.

**FORMULA:**  
Percentage increase in value =  $100 \times ((\text{price of new product} / \text{cost to make}) - 1)$

Fill in how much you think each of these is worth to find out your "cost to make":

Bottle	
Soil	
String/wire	
Seeds/plants	
TOTAL (Cost to make)	

## WHAT'S HAPPENING HERE?

The plastic bottle, soil, string/wire and seeds/plants are called **raw materials**. Raw materials are used to make a useful product.

The mini garden can be sold for more than all the raw materials added together. This is called **adding value**.

The **value chain** is a way of looking at businesses to see where the most value can be added.

Raw materials

Something is done to add value  
In the activity you made the mini garden. This normally means that someone has to work and put in effort to add the value.

Product with added value

## SA REFERENCE

The University of Limpopo is working on making *manganese precursors*. Precursors are used in chemical reactions to make other products, in this case *Lithium-ion batteries* - which will be used in products that run on batteries.

So they are taking magnesium and adding value to it. They are doing this through the value chain.



The Tesla car is an electric car that runs on Lithium-ion batteries.



Lithium-ion batteries are used in cell phones and computers.



## CAREERS:

An **Entrepreneur** makes money by finding ways to take something (either products or services) and add value to it using the value chain before selling it.



**Dr. Noko Ngoepe** holds a PhD in Chemical Engineering and has experience working in research and development. Noko is currently involved in the University of Limpopo project to develop manganese-based precursors which are used to make lithium ion batteries. He develops manganese based materials, working closely with other scientists, suppliers and project managers. His job excites him because he gets to work with talented people and at the same time help develop others. He also says that this project could put South Africa on the map in a world that is moving more and more towards renewable energy sources.

**Manufacturers** make products to sell. They may need large machinery and high tech equipment to put the products together, but not all the time. Anyone can take raw materials and use what they have to make them into something of value.

## CURRICULUM LINKS

- **Grade 7, 8, 9: Natural Science** – Matter and Materials  
**Technology** – Design Process Skills, Design Skills Investigation Skills, Evaluation Skills, Processing
- **Economic and Management Sciences** – Entrepreneurship  
**Mathematics** – Whole numbers, Integers, Common Fractions, Algebraic Equations
- **Grade 10, 11, 12: Physical Science** – Matter and Materials

## STRETCH YOUR MIND

IN YOUR CLUB, SEE IF YOU CAN COME UP WITH WAYS TO ADD VALUE TO THE FOLLOWING THINGS. THINK OUT OF THE BOX, CRAZY IDEAS ARE OFTEN THE BEST!



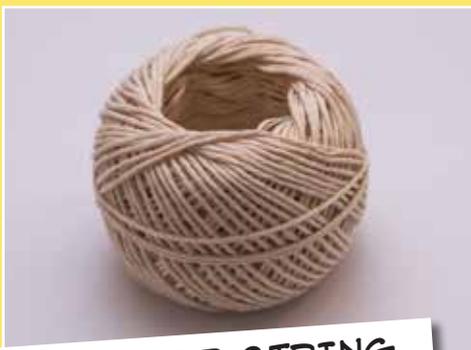
OLD NEWSPAPER



A TEA BAG



A BALL OF STRING



AN OLD T-SHIRT



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Visit [www.sciencespaza.org](http://www.sciencespaza.org), email [info@sciencespaza.org](mailto:info@sciencespaza.org), sms or WhatsApp us on 076 173 7130 or write to us at PO Box 22106, Mayor's Walk, 3208.

## WE WANT YOUR FEEDBACK!

TELL US SOME OF YOUR IDEAS YOU HAD FOR ADDING VALUE TO THE ITEMS IN THE "STRETCH YOU MIND" SECTION.



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