Croda STEM Learning and Activity Book

SCIENCE FOR SCHOOLS

Smart Science to Improve Lives™

Learn about Croda's manufacturing process in Hull, East Yorkshire and try to have some fun along the way!

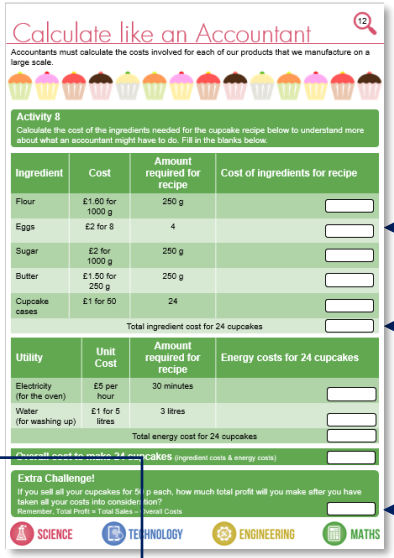
Ages 7 to 11 years old

SCIENCE TECHNOLOGY ENGINEERING MATHS

About This Book

This activity book is aimed at children aged 7-11 years old and gives a brief introduction to the manufacturing process involved at Croda's site in Hull, East Yorkshire. Throughout this book you will find many activities themed around **S**cience, **T**echnology, **E**ngineering and **M**aths. You can see how to use this book in the pictures below.

Meanings of words in bold can be found in the glossary at the bottom of each page.



Activities on most pages include spaces to perform calculations and write out answers.

Answers for all questions are included in an answer section at the back of the book.

Colour-coded activities & pages based on **S**cience, **T**echnology, **E**ngineering and **M**aths (STEM).

Opportunities to tweet and interact with us at various points throughout the book.

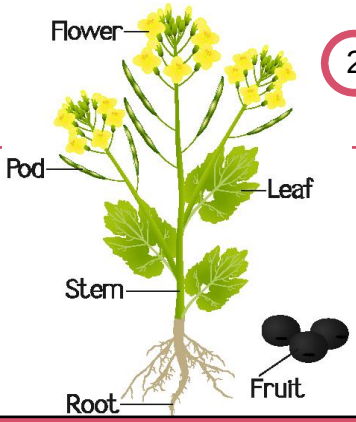
Index

About This Book	1	Think Like A Scientist	10
Crop Growing	2	Design Like An Engineer	11
Seed Processing	3	Calculate Like An Accountant	12
Oil Extraction	4	Get Creative!	13
Oil Processing	5	STEM Job Roles	14
Finishing	6	Wordsearch	15
Applications	7	Get Arty With Our Colouring In Page	16
Plastic Materials	8	Answers	17
Plastic Recycling	9		

SCIENCE TECHNOLOGY ENGINEERING MATHS

Crop Growing

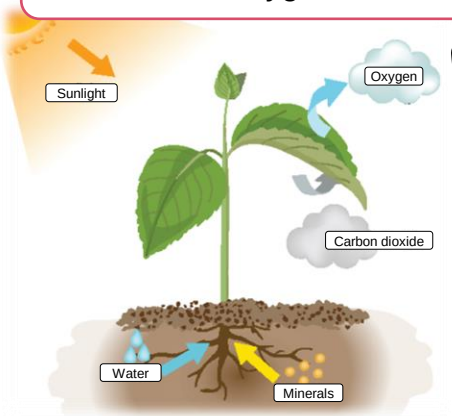
At Croda we use a crop which is a special type of rapeseed as one of our **raw materials**. You may have seen rapeseed growing in fields, as their flowers are bright yellow in colour making them stand out easily. Rapeseed is an example of a raw material that is from a **natural source**. The diagram to the right shows you the different parts of the rapeseed plant.



Activity 1

Match the statements with the labels below to understand how the different parts of the plant help the rapeseed to grow. Draw a line to the words when you are happy with your answers.

Statements	Labels
1. These help the plant to move towards the sunlight. They also help to carry water and **minerals** to the top of the plant.	Leaves
2. These stop the plant from blowing away. They also help to soak up water and minerals from the soil for **nutrition**.	Stems
3. These are needed for reproduction. They have a nice smell and a bright colour to attract insects.	Roots
4. These are needed by the plant to absorb sunlight and for **excretion** of oxygen.	Flowers



Did you know?

Plants need food to breathe, grow and reproduce. Unlike animals, plants are able to make their own food by a process known as **photosynthesis**. Photosynthesis is a chemical reaction that takes place inside plant leaves, producing food for plants to survive. Carbon dioxide, water and sunlight are all needed for photosynthesis to take place. These are used to form glucose, food for the plants and oxygen, which is released from the leaves into the atmosphere.*

Extension Activity

Why not find a plant to draw yourself, you can even use the labels above to explain the different parts to it.

Tweet us your plant drawing! #CrodaActivityBook

Glossary

Raw materials: Ingredients.
Natural source: Not man-made, for example from plants or animals.
Minerals: Natural substances found in soil which keeps plants healthy.
Nutrition: The process of taking in food.
Excretion: Removal of waste.
Photosynthesis: A chemical reaction that takes place inside plant leaves.

SCIENCE TECHNOLOGY ENGINEERING MATHS

* Source: BBC Bitesize

Seed Processing

The flowers very quickly yield or produce the rapeseed. The rapeseed is harvested in July and August.

The picture shows a farmer harvesting the rapeseed plants.

After harvesting, the seeds are stored in tall storage towers called silos until they are required for use.

The picture shows large silos used by farmers to store the seeds.

In the first part of the seed processing, the seeds are cleaned by **sieving** and **filtering**. This process removes the chaff, which is the dry protective casing of the seed.

Activity 2

Can you think of some ideas of where you might sieve or filter something in the kitchen?
Think about when baking a cake, cooking pasta or making a proper coffee.

After sieving and filtering the seeds, they are then cooked. Cooking the seeds changes many things. For example, it helps to remove some of the water and makes the oil more available in the seeds. It also **de-natures enzymes** that could **corrode** or react with the **steel**, which is the type of metal material used to make the equipment at the **processing plant**. The seeds are then made into tiny flakes and cooked again using **steam**.

Extension Activity

Solids, liquids and gases are called **the three states of matter**. Can you fill in the blanks below to describe the three states in which water exists?

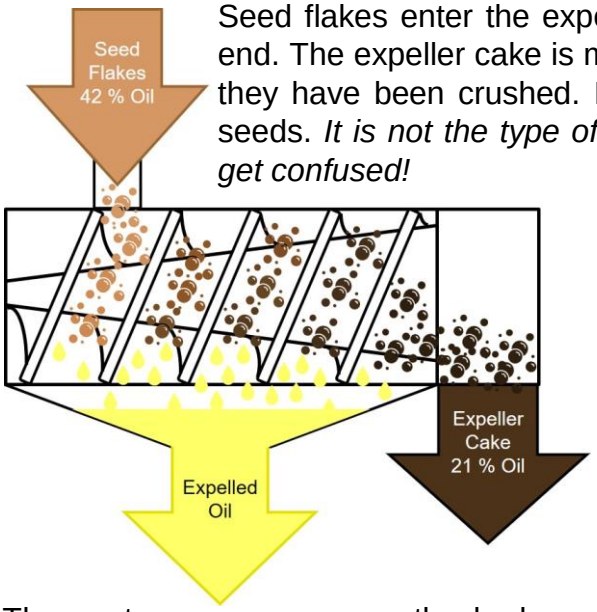
1. Water running from the tap is in a _ _ _ _ _ _ state.
2. Water frozen in an ice cube is in a _ _ _ _ _ state.
3. Water coming out of the spout of a boiling kettle is in a _ _ _ state.

Glossary

Sieving: A process to separate mixtures of solids, like sand and dried peas.
Filtering: A process to separate solids that have not dissolved in water, like sand and water.
De-natures: To break down or destroy, when describing enzymes.
Enzymes: Substances found in plants and animals that can build up or break down other materials.
Corrode: A chemical reaction that causes metals to rust.
Steel: Most metals are from natural sources, but steel is a mixture of metals making it man-made.
Processing plant: Another name for a factory, do not get this confused with the other type of plants that you find in the garden!
Steam: Very hot water above it's boiling point, making it very dangerous.

Oil Extraction

The seed crushing and oil **extraction** takes place in a machine called an expeller. The expeller "squeezes" the cooked flakes which releases the oil. An expeller is a piece of equipment that a **Process Engineer** might design to make the oil extraction step more **efficient**. For example, to get the highest amount of oil out of the seeds in the quickest amount of time.



Seed flakes enter the expeller, but the oil and expeller cake come out at the other end. The expeller cake is made up of the left-over solid material from the seeds after they have been crushed. It also contains any oil that is left behind in the crushed seeds. *It is not the type of cake you would want to eat at a birthday party, so don't get confused!*

Activity 3

1. If 42 % of the seed flakes are made up of oil and the rest is solid, what percentage is made up of solid seed material?

100 – 42 = %

2. After the extraction process, if half of the oil is remaining in the expeller cake, what percentage of the oil was expelled?

42 ÷ 2 = %

The next process removes the broken seeds from the oil in the expeller cake. Again, like the filtration we mentioned on page 3, this separates a mixture of solids and liquids. Finally, all the oil is sent to the oil refinery or directly to Croda. We can then turn the oil into more useful ingredients to use to manufacture our products from.

Did you know?

Have you noticed how the purpose of a tea bag is to hold the solid tea leaves inside the bag? When you add hot water to it, the tea flavour and colour is **extracted** by the water as they **dissolve** in it. The waste solid material which is **insoluble** in the water is left behind in the tea bag. This avoids the need for a filtration step - what a great invention for speeding up making a cup of tea!

This picture shows an oil refinery, where most of the tall towers and equipment are made from a mixture of metals known as steel.

Glossary

Extraction / Extracted: To remove or take out.
Process Engineer: An engineer that performs lots of calculations to find equipment for a particular process design
Efficient: To complete a task without wasting time or energy.
Dissolves: When a solid is soluble in a liquid creating a transparent liquid called a solution.
Insoluble: When something doesn't dissolve, usually in water.

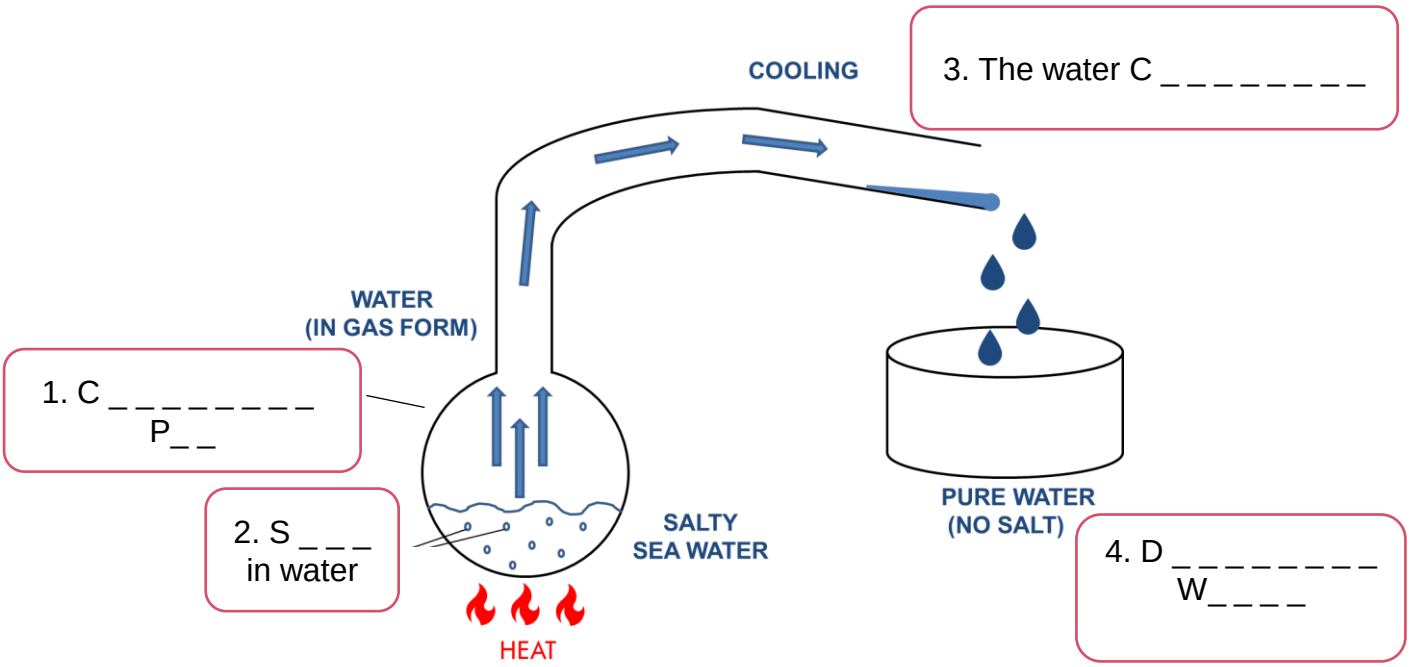
Oil Processing

Very high temperature steam is combined with the liquid rapeseed oil in a reaction process to break down the oil into smaller liquid **components**. A process known as **distillation** is then used to separate the mixture of smaller components. The different liquid components have different **boiling points**. Heating the mixture to different temperatures can change the liquid state of each chemical component to a gas state when the temperature is above its boiling point. The distillation process can then separate the gases formed from the mixture of components. The separated gases can then be cooled down so that they return to a liquid state, this process is called **condensation**. The condensed or cooled gasses can then be collected in a different pot, allowing them to separate, away from the original pot containing the mixture of components,

Activity 4

Below is an example of a distillation process. The example looks at separating **SALT** and water from salty sea water leaving the salt behind in the **COMPONENT POT**. Salt is **soluble** in water, and therefore a distillation process is needed to boil the water away from the salt. The water **CONDENSES** in another pot and is known as **DISTILLED WATER**.

Using the words in capital letters and applying what you have learnt about the distillation process, fill in the blanks below.



Extension Activity

You may have seen the word distilled in the supermarket, for example, distilled white vinegar. Have a look for this the next time you are visiting the supermarket.

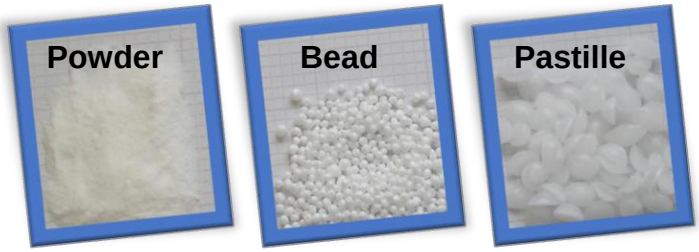
Tweet us what you find!
#CrodaActivityBook

Glossary

Components: Individual chemicals in the oil in the above example.
Boiling point: The point at which a liquid boils and turns into a gas.
Condensation: When a gas cools and turns into a liquid.
Distillation: A process for separating mixtures, these can be different liquids, or liquids and soluble solids like in the salt water example above.
Soluble: When something is able to dissolve, usually in water.

Finishing

Once our raw materials like rapeseed oil have been reacted into different chemical products and purified (either by filtration, distillation or both), we are then ready to finish the material. We sell our material in different **physical forms** such as powder, bead and pastille.



It doesn't change their chemicals or components; it just changes their shape and the way they look. For some of our customers, the physical form can make a big difference as they can handle certain forms easier than others with the specific technology that they use.

You can think of some of Croda's solid product materials as behaving like chocolate, as they have a low **melting point** like chocolate. If chocolate is gently heated, it melts, going through a **physical change**. This means the chocolate changes how it looks and feels, without changing the ingredients that it is made up of. To turn melted chocolate back into its solid form, it needs to be cooled down. Chocolate must be cooled enough before it can be handled again. This is the same for some of Croda's products. We need to make sure we do not pack the products into bags until they are completely cooled and **solidified**.

Activity 5

1. Name three different forms or shapes of chocolate?

2. Name three other things that melt as you heat them?

3. Can you reverse the changes of your three examples by cooling them down after they melt?

Yes / No	Yes / No	Yes / No

At Croda we use special technology to pack our products into bags in the exact weight that is needed. We then move the bags on a conveyor belt and use robotic machines to pick up each bag and stack them onto pallets. Using robots, means that we don't need our workers to carry each heavy bag. This picture shows one of our robots moving the heavy bags off the end of the conveyor belt and putting them on to a pallet, ready to leave the factory or processing plant.

Glossary

Physical forms: The appearance of things, how things look.
Melting point : The temperature at which a solid turns into a liquid.
Physical change: When a substance changes how it looks but the chemical or components remain the same.
Solidified: When a substance becomes hard or solid.

Applications

The word application means how the product is applied or used. At Croda, we have many different applications for all our products. Below is a list of some of the application areas with examples of the types of products our ingredients are used in and the benefits our ingredients bring.

Personal Care

- In shower gels and bubble baths to produce lots of foam
- In moisturisers to help the skin feel smooth and soft
- In sun creams to protect the skin from the sun's harmful rays

Lubricants

- In car engine oils to help keep them running smoothly

Home Care

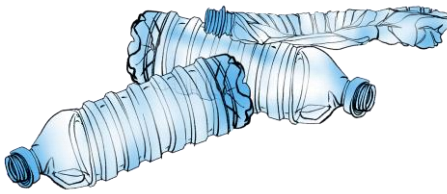
- In washing powders to help keep the clothes clean and fresh and colours bright

Health Care

- In toothpaste to help gently clean teeth
- In Omega-3 fish oil supplements for additional nutrients (chemicals that are good for the body)

Polymer Additives

- In plastic carrier bags to provide slip to open them easily
- In plastic bottle caps to help when loosening the caps
- In plastic food packaging to stop fogging (making them difficult to see through)



Activity 6

Can you think of some application examples for the materials used in building a house, along with the benefits they provide? Read the examples below and try to fill in the blanks.

Application	Material	Natural or Man-made	Benefit
Windows	Glass	Man-made	Allows daylight and fresh air in when opened.
Window frame	Plastic	Man-made	Easily moulded into shape, long lasting and does not rust like metal, or rot like wood.
Door			
Door handle			
Roof tiles			
Bricks			

Plastic Materials

Plastics can be made from both oil-based sources or from natural, renewable sources. These sources can be chemically transformed to make the chemical ingredients needed, known as synthetic materials; this means that they are man-made. Plastics have certain properties which make them very useful. For example, they are strong, long lasting, easy to shape and they can be cheaper than other natural materials like wood, metal or stone. It is possible to enhance, or improve, the properties of plastics with the use of additives. Plastic Additives or Polymer Additives as we call them at Croda, are the types of chemicals that we make, all from natural sources! Plastics can also be referred to as polymers. Below are some examples of additives and the benefits they give to plastics. The ones with a star next to them are the additives we make.

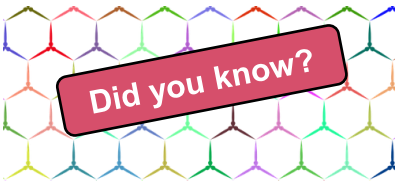
Light Stabilisers: these additives help to reduce the amount of colour fade or colour change in plastics when they are exposed to sunlight. Have you noticed how plastic swings and slides kept outside in the sun can often fade in colour?

Flame Retardants: these additives reduce the chances of plastics burning as easily. They are usually used in furniture and children's toys to make them safer.

Anti-Statics: these additives reduce the build-up of static electricity or electrical charges in plastic materials. Have you noticed how sometimes when you touch plastic objects, you can get a static shock?

Heat Stabilisers: these additives help to reduce degradation of plastic when it is being manufactured and moulded at high temperatures.

Slip Additives: these additives help to reduce the amount of friction on the surface of plastics. This makes opening plastic bags and getting the tops off plastic bottles much easier!



Polymers are large **molecules** made up of small, repeating molecular building blocks called **monomers**. When these monomers link together over and over to form a large polymer, the process is known as polymerisation. The word polymer is Greek for *many parts*.

Activity 7

You will need some Lego™ or building blocks for the activity below.

- Take 10 red blocks and imagine each one is a repeating unit; we will call them component R. Joining these blocks together is like building a polymer.
- Other types of polymers have different repeating units. Imagine having a red block, component R and a blue block, component B joined as the repeating unit R-B. Joining more red and blue blocks to this can make an **alternating co-polymer**.
- A **random co-polymer** has many components of R and B in no order. Why not design and build your own random co-polymer with your bricks?

Tweet us your creations!
#CrodaActivityBook

Glossary

Molecules: The smallest unit of a substance that has all the properties of that substance. For instance, a water molecule, also known as H_2O is the smallest unit that makes up the water.
Monomers: A single atom or molecule which joins with other monomers to make new substances called polymers.

Plastic Recycling

As plastics are popular and very useful materials of modern life, handling the waste plastics is a very important task. Plastics are difficult to **degrade** unlike other **compostable** materials that can naturally breakdown. We can re-use and recycle plastics to make the most of them and avoid plastic waste building up in **landfill**. Recycling plastics is better for the **environment** because it reduces the need to make new plastics which would build up more and more waste.

The image on the right-hand side shows the recycling symbol that lets you know if a plastic can be recycled. Unfortunately, there are still a lot of plastics which are difficult to recycle. Sometimes this symbol has a percentage sign (%) in the middle to explain the amount of plastic that can be recycled. Remember, 100 % means all of it can be recycled!

Activity 8

Have you got a recycling bin at home and do your family use it?

Write down a list of all the different materials you recycle at home.

_____

_____

_____

_____

Recycling plastics includes the steps below:

- Waste plastic is collected
- It is sorted into different grades (like type and colour)
- The plastic is shredded into flakes and then washed
- The plastic flakes are heated until they melt
- The melted product is formed into pellets called nurdles
- Nurdles are sold again and used to make other plastic products*

Glossary

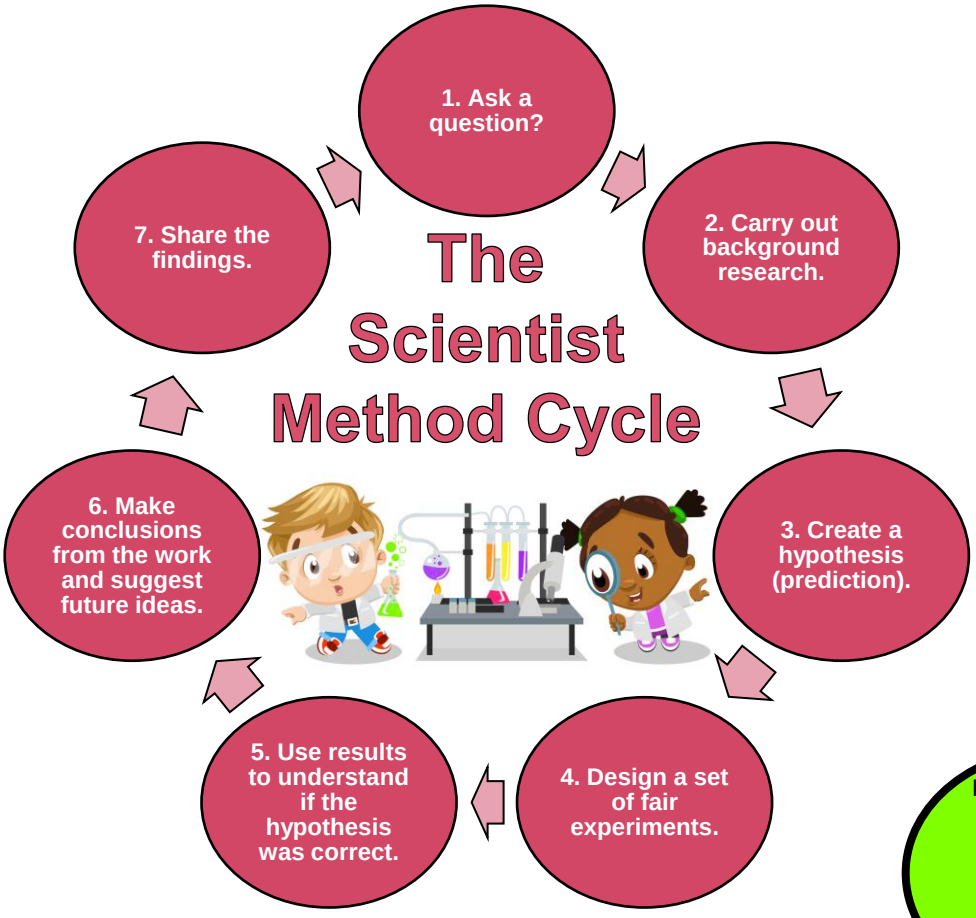
Degrade: When a substance breaks down.
Compostable: A material which can break down on its own and create useful nutrients.
Landfill: When waste is buried in the ground.
Environment: The world around us.

SCIENCE TECHNOLOGY ENGINEERING MATHS

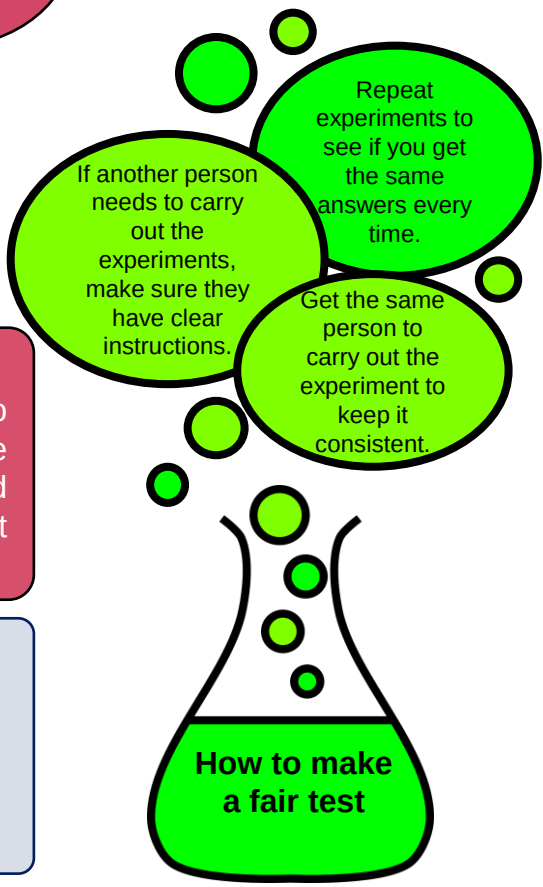
* Source: Twinkl.co.uk

Think Like A Scientist

Scientists usually ask a question and then do some **research** to find out what is already known and what is still unknown. They use this information to create a **hypothesis** which is an educated guess or a prediction on what they believe will happen. They then design a set of experiments, making sure that they are fair, to test their hypothesis. The results from their experiments allow them to learn and improve their hypothesis in more detail or to **conclude** whether it was correct. Usually scientists share their results, allowing other people to learn from them and develop their own predictions and experiments. This thought process is a cycle, as shown in the diagram below.



Scientists usually develop their problem-solving skills by trying to **think outside the box** and by being **innovative** or **creative**. They do this by trying to think of solutions to common problems. A trial and error method can sometimes be very useful. A trial and error method involves testing different things to understand what works best and learning from it.



Extended Activity

Do you play chess or draughts? These games help you to think about your next moves to try and win the game. The more you play, the more you use the trial and error method to see what works best for you to win. Why not have a go at learning to play these games?

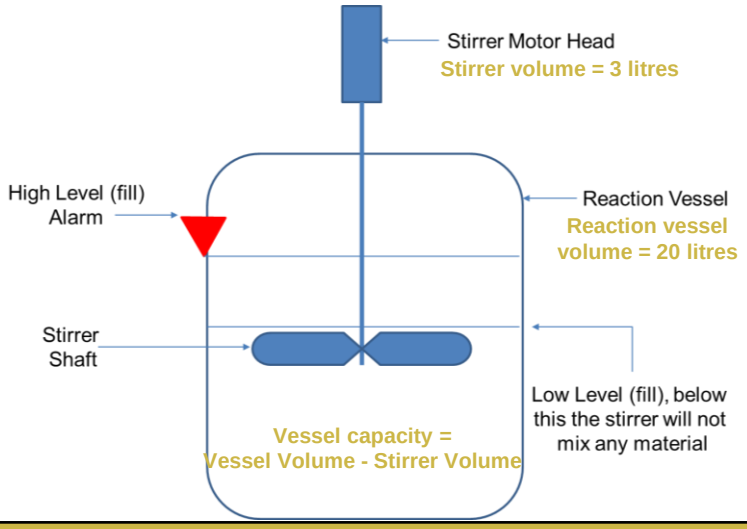
Glossary

Research: To find out facts.
Hypothesis: A prediction on what you believe will happen.
Conclude: To come to a summary from your findings.
Think outside the box: To think in a creative way.
Innovative: To introduce something new or do something in a new way.
Creative: To create new and original ideas.

Design Like An Engineer

Below is a diagram that shows the type of large **vessels** that are used to carry out **plant** sized reactions. These vessels are like large pots with big stirrers inside to help mix the chemicals together, imagine a large version of your electrical food mixer at home! An **Engineer** needs to understand how much material is required in a vessel for the reaction to mix well with the stirrer. If the vessels aren't full enough, the stirrers do not reach down into the chemicals. These are called **low-level limits**.

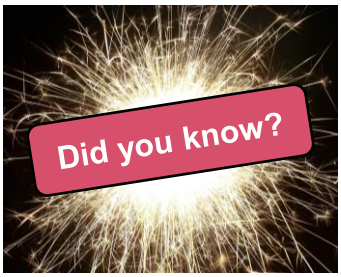
It is also important to understand if *too much* material has been added to the vessel, as it is not possible to see inside them. These are called a **high-level alarm limits** to notify the operators if it fills over a certain limit. This gives the Engineers enough time to stop adding more material before the vessel overfills, which could cause a spillage on a very large scale! An Engineer might help to work out the **capacity** of the vessel by calculating how much room the stirrer would take up.



Activity 9

Using the facts in the diagram above, calculate the answers to the questions below.

1. If the reaction vessel volume is 20 litres and the stirrer occupies a volume of 3 litres, what is the reaction vessel capacity in litres? _____ Litres
2. If the high-level alarm limit is 2 litres below the vessel capacity, at what volume would this be? _____ Litres
3. If the minimum level needed for the stirrer to work is 10 litres below the high-level alarm limit, at what volume would this be? _____ Litres
4. Using your answers above, what is a good volume range to fill the vessel to? *Remember, you need to make sure it is below the high-level alarm limit, but above the low-level limit.* _____ Litres



A Process Safety Engineer understands all the different ways in which a process can go wrong. They will ensure that there are safety features in place to prevent or minimise any process becoming out of control. An example of a safety feature for a reaction that is known to get hot quickly, is to make sure there is an available cooling supply. Cooling the material down can stop any liquids overheating and boiling into a gas state, which if not cooled could cause a build-up of high pressure leading to an explosion!

Glossary

Vessel: A large container used to carry out chemical reactions on a huge scale.
Plant: Another word for factory.
Engineer: A person who designs and constructs equipment for processes.
Low-level limit: The lowest level of material the vessel must contain for the stirrer to mix properly.
High-level alarm limit: The highest level of material the vessel can contain before the safety alarm sounds to indicate overflowing could occur.
Capacity: The maximum amount that something can contain.

Calculate Like An Accountant

Accountants must calculate the costs involved for each of our products that we manufacture on a large scale.

Activity 10

Calculate the cost of the ingredients needed for the cupcake recipe below to understand more about what an accountant might have to do for our products at Croda. Fill in the blanks below.

Ingredient	Cost	Amount required for recipe	Cost of ingredients for recipe
Flour	£1.60 for 1000 g	250 g	£
Eggs	£2 for 8	4	£
Sugar	£2 for 1000 g	250 g	£
Butter	£1.50 for 250 g	250 g	£
Cupcake cases	£1 for 48	24	£
Total ingredient cost for 24 cupcakes			£

Utility	Unit Cost	Amount required for recipe	Energy costs for 24 cupcakes
Electricity (for the oven)	£0.70 per hour	30 minutes	£
Water (for washing up)	£3 for 1000 litres	10 litres	£
Total energy cost for 24 cupcakes			£

Overall cost to make 24 cupcakes (ingredient costs & energy costs) £

Extra Challenge!

If you sell all your cupcakes for 50 p each, how much total profit will you make after you have taken all your costs into consideration?

Remember, Total Profit = Total Sales – Overall Costs

£

SCIENCE TECHNOLOGY ENGINEERING MATHS

Get Creative!

Can you spot our wind turbine in the image of our processing plant or factory below?

Next time you are in Hull, why not look out for our wind turbine on Clough Road. Our wind turbine allows us to produce energy, making it affordable, **clean** and **sustainable**. It is sustainable because wind can be converted into a source of energy which is **renewable**. The wind turbine creates power without using **fossil fuels** that can produce **greenhouse gases** or **toxic waste**.

Activity 11

Why not have a go at building a wind turbine model using things from your recycling bin as a fun, creative activity? Used ice-lolly sticks and empty toilet rolls might help. Can you think of a way to make it spin around in the wind? *You can paint it with different colours, patterns and even use glitter & stickers if you like!*

Glossary

Clean: Something that is not harmful to the environment for example, without creating any pollution.
Sustainable: Causing little or no damage to the environment and therefore being able to continue for a long time.
Renewable: A resource that can be reused repeatedly because it is replaced naturally, like the wind.
Fossil fuels: Natural fuels like coal, natural gas and petroleum that are formed from the remains of buried animals and plants.
Greenhouse gases: Gases in the air that trap energy from the sun. The most common greenhouse gases are water vapour, carbon dioxide and methane.
Toxic waste: Unwanted chemical material which is harmful to the public and can cause major health issues.

STEM Job Roles

Tweet us your favourites!
#CrodaActivityBook

We have many different job roles at Croda. Below are some examples related to **S**cience, **T**echnology, **E**ngineering and **M**aths (**STEM**) which are required to run our business.

Which job roles do you find interesting? Colour in the hearts next to your favourites.

Quality Control Analyst: Carries out tests to ensure that the products meet the customer requirements. The tests are usually designed to be quick but accurate. Product colour, moisture (water) content and melting point tests are some examples of the types of tests they might perform.

Process Scientist: Helps with problem solving to overcome problems encountered on the plant. They also help to introduce newly developed products onto the large plant scale production.

Application Scientist: Checks that products work well for the use they are designed for. This could involve performing panel studies where they ask volunteers to test new products, like soaps and creams and give us feedback on how well they think they work.

Research & Development Scientist: Works on projects on the laboratory scale to research and develop new product ideas.

Engineer: Keeps the plant equipment in good working order and performs calculations to better understand the manufacturing process capabilities.

Process Operator: Involves running the plant vessels and processes. It is a very "hands on" job ensuring that the products are made correctly on the big plant scale.

Information & Technology Specialist: Helps to ensure all computers, laptops and software are up to date and provides IT support when the other workers have difficulties.

Health & Safety Officer: Makes sure factories, laboratories and offices are safe places to work.

Sales Assistant: Works with customers to find out what they need in order to supply them with the correct products. Having knowledge about the science of the products is also very helpful in this role.

Marketing Assistant: Helps to design resources and advertise the benefits of the products and their potential applications. Having knowledge about the science of the products is very helpful here too.

Accountants: Ensures that the product costings (raw materials and energy used) are calculated and up to date. They also make sure the customers have paid for the products that they have ordered; this is very important to ensure the money is coming in and everyone can get paid!

SCIENCE TECHNOLOGY ENGINEERING MATHS

Wordsearch

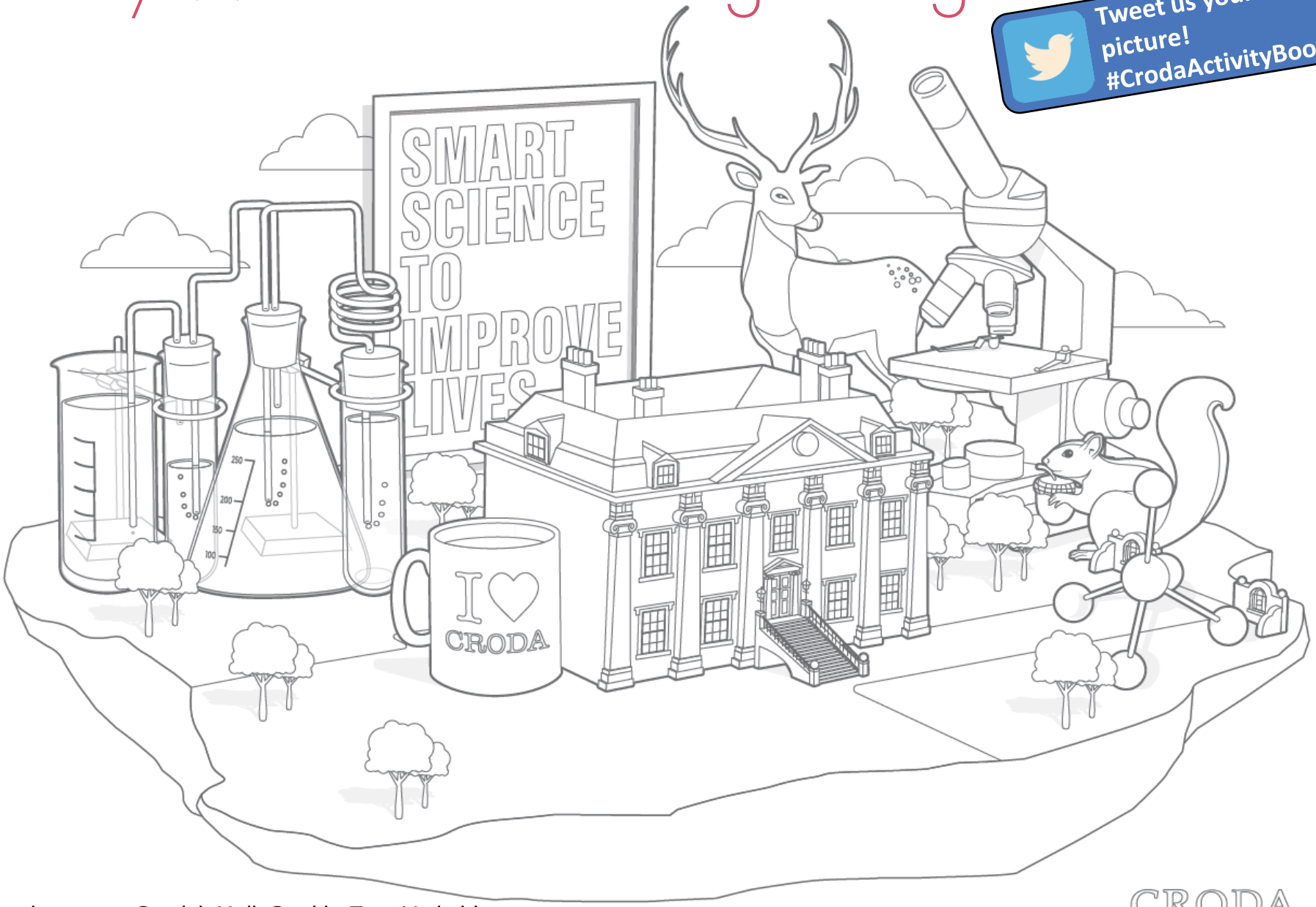
Hopefully you have learned some new words during these activities! Why not see if you can find the following words in the wordsearch below?

RAPESEED
FILTERING
APPLICATIONS
RECYCLING
VESSEL
SILOS
DISTILLATION
POLYMERS
HYPOTHESIS
NUTRIENTS

L	H	J	N	P	O	L	Y	M	E	R	S	G	A	X	H	W	M	H	I
N	A	O	U	Q	L	V	T	S	J	C	P	U	Q	B	L	Y	S	V	P
L	T	R	O	F	P	H	F	S	N	L	S	E	C	N	N	F	R	L	N
R	S	K	F	N	B	W	O	J	M	N	R	D	A	O	H	P	V	W	M
A	G	L	A	I	E	F	X	D	O	Q	O	E	G	I	P	B	E	U	I
P	S	B	R	S	L	Y	B	I	E	U	P	N	Z	T	J	V	S	L	T
E	K	Z	F	P	T	T	T	N	Q	E	I	J	M	A	I	L	S	P	G
S	H	I	I	D	M	A	E	C	C	L	J	E	E	L	D	J	E	R	C
E	L	Q	R	P	C	N	D	R	C	X	P	N	O	L	L	K	L	X	L
E	H	H	N	I	J	F	O	Y	I	M	A	D	R	I	M	C	I	U	M
D	M	F	L	S	C	Q	C	W	T	N	H	E	Y	T	K	P	H	J	N
O	T	P	E	K	G	E	M	B	O	V	G	M	G	S	V	I	G	M	B
A	P	R	K	P	R	H	G	L	Q	H	D	O	E	I	T	L	I	P	T
A	L	L	B	G	J	P	P	F	J	W	F	S	Y	D	M	W	J	X	D
R	V	K	F	I	P	K	S	G	O	K	B	L	J	U	I	X	P	J	Y
U	L	N	N	U	T	R	I	E	N	T	S	L	X	F	V	Z	G	W	N
P	I	S	O	Q	I	L	T	H	O	N	H	R	O	A	L	Q	S	Y	A
O	F	S	I	L	O	S	P	L	R	K	F	Q	R	J	T	I	P	U	E
R	T	N	R	R	L	N	M	Q	H	Y	P	O	T	H	E	S	I	S	P
K	L	U	F	I	S	O	V	G	F	O	P	R	W	I	N	H	F	G	Z

Get Arty With Our Colouring In Page

Tweet us your finished picture! #CrodaActivityBook



Croda headquarters, Cowick Hall, Snaith, East Yorkshire

Answers

Tweet us your feedback on what activity you enjoyed the most and why? #CrodaActivityBook

Page 2
1. Stem
2. Roots
3. Flowers
4. Leaves

Page 3
Sieving flour
Filtering cooked pasta and water, or ground coffee and water
1. Liquid
2. Solid
3. Gas

Page 4
1. 58 %
2. 21 %

Page 5
1. Component
2. Salt
3. Condenses
4. Distilled

Page 6
1. Examples include bar, flakes, buttons, powder, eggs, bunny etc
2. Examples include butter, ice cream, ice lolly, candle etc
3. Yes, the examples above can all be changed back by cooling

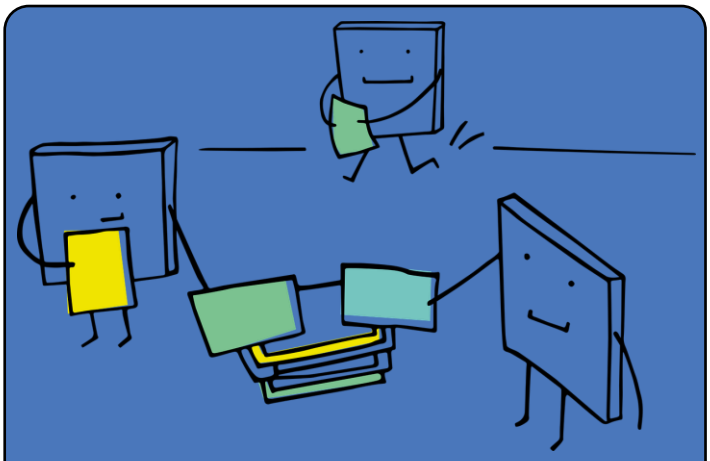
Page 7
- **Door**, wood, natural, solid and long lasting, easy to carve (fit to shape). Keeps the heat in (thermal insulator). Keeps the house safe.
- **Door handle**, plastic or metal alloys such as brass / steel, manmade, easy to mould and kill germs naturally if brass. Cheap to make if plastic.
- **Roof tiles**, slate, natural rock, hard-wearing (durable), attractive appearance, mould and fire resistant, low water absorption so moves the water off the surface and avoids frost damage causing breaking during freezing.
- **Bricks**, concrete block (man-made), stone (natural), brick (man-made), hard durable and strong during compression and not damaged by water so can hold the building upright without water affecting it.

Page 11
1. 20 - 3 = 17 Litres
2. 17 - 2 = 15 Litres
3. 15 - 10 = 5 Litres
4. Any number between 5 and 15 Litres

Page 12
Flour 40 p
Eggs £1
Sugar 50 p
Butter £1.50
Cupcake cases 50 p
Total ingredient cost for 24 cupcakes = £3.90
Electricity 35 p
Water 3 p
Total energy costs for 24 cupcakes = 38 p
Overall costs to make 24 cupcakes = £4.28
Total profit = £12 - £4.28 = £7.72

Page 15

L	H	J	N	P	O	L	Y	M	E	R	S	G	A	X	H	W	M	H	I
N	A	O	U	Q	L	V	T	S	J	C	P	U	Q	B	L	Y	S	V	P
L	T	R	O	F	P	H	F	S	N	L	S	E	C	N	N	F	R	L	N
R	S	K	F	N	B	W	O	J	M	N	R	D	A	O	H	P	V	W	M
A	G	L	A	I	E	F	X	D	O	Q	O	E	G	I	P	B	E	U	I
P	S	B	R	S	L	Y	B	I	E	U	P	N	Z	T	J	V	S	L	T
E	K	Z	F	P	T	T	T	N	Q	E	I	J	M	A	I	L	S	P	G
S	H	I	I	D	M	A	E	C	C	L	J	E	E	L	D	J	E	R	C
E	L	Q	R	P	C	N	D	R	C	X	P	N	O	L	L	K	L	X	L
E	H	H	N	I	J	F	O	Y	I	M	A	D	R	I	M	C	I	U	M
D	M	F	L	S	C	Q	C	W	T	N	H	E	Y	T	K	P	H	J	N
O	T	P	E	K	G	E	M	B	O	V	G	M	G	S	V	I	G	M	B
A	P	R	K	P	R	H	G	L	Q	H	D	O	E	I	T	L	I	P	T
A	L	L	B	G	J	P	P	F	J	W	F	S	Y	D	M	W	J	X	D
R	V	K	F	I	P	K	S	G	O	K	B	L	J	U	I	X	P	J	Y
U	L	N	N	U	T	R	I	E	N	T	S	L	X	F	V	Z	G	W	N
P	I	S	O	Q	I	L	T	H	O	N	H	R	O	A	L	Q	S	Y	A
O	F	S	I	L	O	S	P	L	R	K	F	Q	R	J	T	I	P	U	E
R	T	N	R	R	L	N	M	Q	H	Y	P	O	T	H	E	S	I	S	P
K	L	U	F	I	S	O	V	G	F	O	P	R	W	I	N	H	F	G	Z



Teachers and parents, for further information and resources, please visit our website at **www.crodascienceforschools.com** & follow us on Twitter **@CrodaSTEM**

SCIENCE TECHNOLOGY ENGINEERING MATHS