Science of Survival

TY Science Module

Student Handout

Written by: Rebecca Moran

Revised by: Dr. Maeve Liston

Series editor: Dr. Peter Childs

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Safety Note.

Please take note of the following:

- Personal protection must be worn at all times i.e. white coat, goggles and gloves, when doing experiments.
- All long hair must be tied back.
- No eating or drinking is allowed in the laboratory.
- Report accidents (however small) and breakages immediately to teacher.
- Clean up spills immediately.
- Wash hands before leaving the laboratory.
- Follow all safety instructions carefully.

TY Science

Science of Survival

Introduction for students.

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."
Charles Darwin 1809- 1882.

There are lots of television shows at the moment which deal with how well people could cope if lost or stranded in the wilderness.

Imagine you have gone on a camping trip with friends. You have become separated from the group and can't find your way back. Would you be able to survive?

Imagine your plane has crashed in the ocean and you are stranded on a desert island. Do you have the skills to survive until you are rescued…if you are rescued?

You may not have realised it before but **science** is the key to your survival in a situation like this. Your knowledge of science will help you find food and water, build a fire, signal for help and will help you to adapt to your surroundings in order to survive.

Science can help you to find a way to survive in these new surroundings and even ensure that you are comfortable while waiting to be rescued!!! You are never completely lost if you have some science knowledge!

Unit 1

Survival in the Wild

Unit 1. Survival in the Wild.

Lesson 1. What you need to survive (single lesson)

Survival Scenario

You are on a camping trip with your family. You have been hiking up a mountain range somewhere in Ireland. You have become separated from the group. You are now lost and cannot find your way back to the camping site.

1. What is the most important thing you need to survive?

_____

Why is this thing the most important requirement to survive?

_____

_____

How much water does a person need per day to survive?

_____

Where might you find a water source if you are trapped in the mountains?

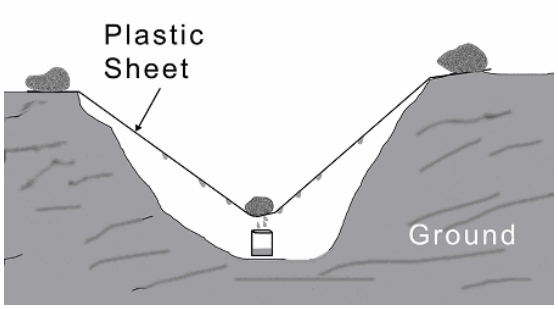
_____

_____

_____

A solar still will work in sunny weather. You can make a simple solar still and find out if it will work in Ireland.

To create a solar still



Materials Needed:

Container
Stones
Sheet of plastic

Procedure:

1. Dig a hole in the soil with your hands.
2. Place the container in the hole. (Note: Leaves could be placed in the hole around the container…why?)
   _____
   _____)
3. Place the sheet of plastic across the top, covering the hole. Hold the sheet in place using stones.
4. Place a stone in the middle of the plastic sheet so that the sheet forms a 'v' shape directly over the cup.
5. Leave it during the day and come back and check after a few hours.

How does a solar still work?

_____
_____
_____

Why would your solar still purify the water?

_____
_____
_____

What can you do to ensure that the water you find is safe to drink?

_____

_____

2. Why would you need a fire to survive? (3 reasons)

a)_____

b)_____

c)_____

Where should you light the fire?

_____

_____

What precautions must you take when dealing with fire?

_____

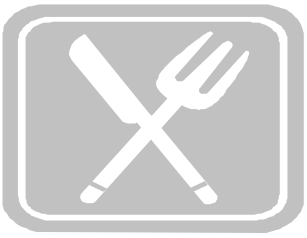
_____

_____

3. Where can you find food on a mountain?

_____

_____



Proteins use more water to digest than carbohydrates. Why might this cause you problems?

_____

_____

If you recognise a plant and you know it is edible then you can eat it, however caution must be taken as some fruits or plants may be poisonous!

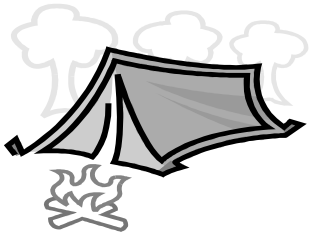
Plants with poisonous foliage: Buttercup, delphinium, foxglove, iris, potato, rhubarb, and tomato

Plants with poisonous fruits: holly, ivy, lupine, mayapple, and yew

Plants with all poisonous parts: Crocus, chrysanthemum, daffodil, hydrangea, lily-of-the-valley, mountain laurel, rhododendron, sweet pea

4. Where can you find shelter on a mountain?

_____
_____
_____



Question:

You have been climbing mountains in France as part of a school trip. There was suddenly a snow storm and you have become separated from the group. Outline a plan of action so that you can survive until you are rescued.

True story:

In April 2003, Aron Ralston was climbing mountains in America, when a large rock fell on him trapping his arm underneath. He lay there for 6 days. Realising he would not survive much longer without water, he used his pocketknife to amputate his arm! He then hiked down the mountain and was found and rushed to hospital. Would you go this far to survive? An interview with Aron can be found on the National Geographic website.

http://news.nationalgeographic.com/news/2004/08/0830_040830_aronralston.html

Unit 1. Survival in the Wild.

Lesson 2. Testing Water (double lesson)

You have found what looks to be a water source. How can you tell if it is drinkable?
If cobalt chloride paper is not available to you, find another way to see if this colorless liquid is water. *Hint: water boils at 100°C at sea level.*

To test if a colourless liquid is water

Safety Note:

Care must be taken while working with Bunsen burners and flames. Take care in handling boiling water.

Materials Needed:

_____
_____
_____
_____

Procedure:

_____
_____
_____
_____
_____
_____

Results:

	Temp. at which liquid turns to steam:
Sample 1	
Sample 2	
Sample 3	

Conclusions:

Which sample do you think is water? Why?

_____

_____

What is the pH of water?_____

When in the wild, water may be slightly acidic or slightly basic. Suggest reasons for this.

_____

_____

Rainwater has a pH of 5.6. Can you remember from Junior Cert. Science how you can test the pH of the water you have found?

_____

_____

What is an indicator?

_____

_____

To make your own pH indicator

Diagram:

Materials Needed:

_____

_____

_____

_____

Procedure:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Results:

	Colour before:	**Colour after:**
Sample 1		
Sample 2		
Sample 3		

Conclusions:

Which samples are acidic?

_____

Which samples are alkaline?

_____

Draw and label a diagram of the pH scale.

How could you neutralise an acidic substance in a lab?

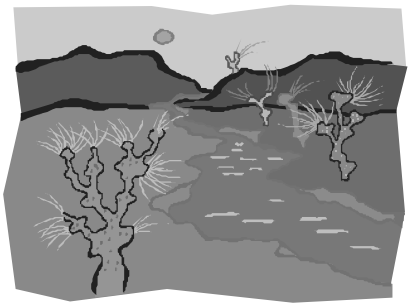
_____
_____
_____

What could you use to do this in the wild?

_____
_____

Unit 1. Survival in the Wild.

Lesson 3. Finding a Water Source (single lesson)



Water is the most important requirement to survive.
What is water?

_____

_____

Draw the water molecule.

Why does the human body need water?

_____

_____

What can cause fluid levels to drop in the body? (3 things)

a)_____

b)_____

c)_____

How much water does the body need per day?

_____

To check if you are getting enough water

You can test your skin to see if you are getting enough water in your diet:

Pinch the skin on the back of your hand while resting it on a flat surface.

Result:
What happens?

_____
_____

If it is slow to fall back into place then you probably need to drink more water.

What other ways can you tell if you are getting enough water?

_____
_____

If you do not get enough water what will happen?

_____
This is called _____.

Symptoms include:

_____
_____
_____
_____

Discussion:

How would you find a water source?

_____
_____
_____
_____
_____
_____

Question:
You find what looks to be water.

How can you be sure that the clear colorless liquid you find is in fact water? Can you remember from you Junior Cert. Science what is used to test for the presence of water? _____.
Describe how you would carry out this test.

To test for presence of water

Diagram

Materials needed:

_____
_____
_____
_____
_____
_____

Procedure:

_____
_____
_____
_____
_____
_____
_____

Why is one of the test tubes labeled as a control?

_____
_____

Results:

	Sample A	**Sample B**	**Control**
Colour:			
Smell:			
Cobalt chloride paper:			

Conclusions:

Which sample do you think is most likely to be water? _____
Explain why:

_____
_____

Question:

If you cannot find a water source, suggest other ways you can include water in your diet.

_____
_____
_____
_____
_____

Unit 2

Water Purification

Unit 2. Water Purification

Lesson 1 ~ Filtering Water (single lesson)

We have looked at how to find a water source. Even if you do manage to find a water source, there is no guarantee that it will be drinkable.
Why might it be dangerous to drink from these water sources?
a.) Stagnant lake: _____
b.) Muddy puddle: _____

How can you clean the water?
_____
_____
_____

It is very dangerous to drink dirty water. The following can result from drinking unsafe water:
Dysentery: Dysentery is a disease involving the inflammation of the lining of the large intestines.
Symptoms include severe, prolonged diarrhea with bloody stools, weakness and fever.

Cholera and typhoid: Cholera is an acute, diarrhea illness caused by infection of the intestine with the bacterium *Vibrio cholerae*. Rapid loss of body fluids through diarrhea and vomiting leads to dehydration and shock. Without treatment, death can occur within hours.
Typhoid fever is an infectious feverish disease passed from human to human through bad sanitation and hygiene.

Flukes: Stagnant, polluted water often contains blood flukes. If you swallow flukes, they will get into the bloodstream, living as parasites, and causing disease.

Leeches: If you swallow a leech, it can hook onto the throat passage or inside the nose. It will suck blood, creating a wound, and then it will move to another area and do the same. Each wound may become infected.

The earth acts as a natural filter to purify water!

To use sand/gravel model to filter water

Materials Needed:

_____
_____
_____
_____

Sketch of the apparatus:

Procedure:

_____
_____
_____
_____

Results:

Compare the water before entering funnel to water that comes out of funnel.

_____
_____
_____

Conclusions:

From what you have learned suggest materials and methods you could use to clean water if you were lost in the wilderness. Do you think the water your produced would be safe to drink?

_____
_____
_____
_____
_____

Unit 2. Water Purification

Lesson 2. Purifying Seawater (double lesson)

Drinking seawater is not recommended as this will make you more dehydrated as it contains a lot of dissolved salt. It is estimated that 2 liters of your body's own fluid must be used to rid the waste from 1 liter of seawater. What must you do to the seawater before you can drink it?

_____

To purify seawater

Materials needed:

Beakers
Evaporation dish or beaker
Seawater
Glass to collect steam
Bunsen burner
Tripod stand
Tongs

Safety

Use tongs to lift off evaporating dish or beaker from tripod stand - allow to cool down before lifting it off. Always have hair tied back when using the Bunsen burner. When the Bunsen is not in use turn to the orange flame so it that it can be seen.

Procedure

1. Pour some seawater into evaporation dish or beaker and set up as shown. Sketch your experimental set-up.
2. Allow to boil until most of the water is evaporated.
3. Place a cold surface such as a watch glass over the steam.
4. Collect the run-off from the glass.

Sketch:

Results

What do you see in the evaporating dish now?_____

What has happened to the seawater?

_____

_____

What processes occurred in this experiment?

_____

_____

Conclusions.

_____

_____

_____

_____

Discussion:

1. What materials might you use to remove the salt from seawater if you were stranded in the wild?

   _____

   _____

   _____

   _____

2. What could you use to collect the now de-salted water?

   _____

   _____

   _____

3. Salt water is converted to fresh water in countries where freshwater supplies are scarce. Can you think how this might be done?

   _____

   _____

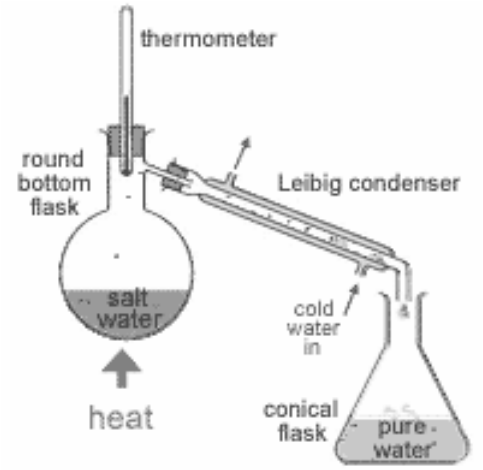
   _____

   _____

Another method to purify seawater

This method uses a condenser to change the steam back to water. This process is called _____.

Diagram:



Materials Needed:

Round-bottomed flask
Thermometer
Hot plate
Conical flask
Liebig condenser
Salt water
Egg
Stands and clamps

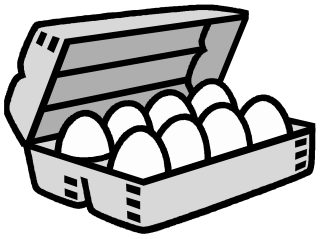
Procedure:

1. Set up apparatus as shown. Both the flask and the condenser must be clamped securely.
2. Turn up the heat.
3. Turn on the tap connected to the Liebig condenser.
4. Continue until most of the water has been evaporated and condensed back to fresh water.

Results:

_____
_____
_____

To test to see if the water is salt free:



A fresh raw egg will float in salt water and sink in fresh water!

1. Place the salt-water in a bowl. Place a raw egg in the salt water. The egg will float.
2. Place some of the product in a bowl. Place a raw egg in the water. Does it sink or float?

Conclusions:

Which of the two methods worked best?

_____

Why do you think this method works best?

_____

_____

Which method do you think is more realistic in that you might be able to use it in a survival situation? Why?

_____

_____

_____

How might you be able to get the other method to work in a survival situation? What materials could you use to condense the steam back into liquid?

_____

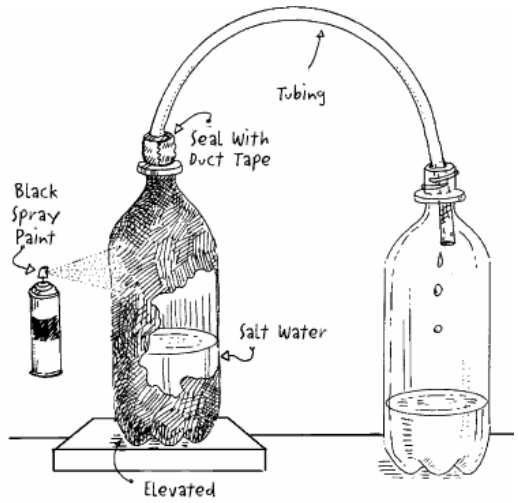
_____

_____

To remove salt from salt-water (another method)

This is another method to remove the salt from salt-water. But remember you also used a method in Unit 1 - do you remember what this was?

Diagram.



Materials Needed:

Two 2 L plastic soft drinks bottles
Black paint or black plastic
Clear plastic tubing
Sellotape or duct tape
Salt
Water
Bowl
Egg

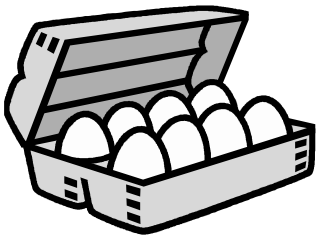
Procedure:

1. Pour 250 ml of the salt water into black bottle.
2. Attach the plastic tubing to both bottles. Secure using cello-tape.
4. Place at the window in sunlight for a few days.
5. Observe over a few days.

Results:

_____
_____
_____

To test to see if the water in clear bottle is salt free:



A raw egg will float in salt water and sink in fresh water!

1. Place the salt-water from the black bottle in a bowl. Place a raw egg in the salt water. The egg will float.
2. Place some water from the clear bottle in a bowl. Place a raw egg in the water from the clear bottle. It sinks.

The idea for this experiment came from:
http://www.swfwmd.state.fl.us/education/splash/desal_worldii.html

Can you find some other ways to remove salt from salt-water? Try to find out how it is done on a large scale e.g. in the Middle East.

_____
_____
_____
_____

Unit 2. Water Purification

Lesson 3. ~ Other ways of purifying water (Single lesson)

This is an extension lesson in which you will research and desribe the science behind other methods of purifiying water, and compare the different methods e.g. cost.

Several methods are available for turning contaminated water or sea water into water suitable for drinking. Some of these are:

- Distillation
- Ion exchange
- Reverse Osmosis
- Freezing
- Water filters
- UV treatment

You will be divided into small groups and given one of these methods to research and then write a short description of how it works, where it is used, and if possible how much the water costs i.e. its economics. Use a diagram to explain how it works. A spokesperson for your group will then explain briefly to the class how your method works and what scientific principle it uses.

Your method:

Pure water doesn't come cheap!

Purifying water costs money and in Ireland we are lucky to have an abundance of fresh water that requires minimal purification. Making fresh water from sea water or brackish water is very expensive mainly because of the energy costs involved. Poor countries need simple, cheap, low-tech solutions to the problem of purifying water.

Which of the methods you have covered would be most suitable in developing countries and why?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Do you think Ireland should get into the water exporting business?

Unit 3

Fire

Unit 3. Fire

Lesson 1. How to build a fire

Why should you have a fire burning at all times in the wild? (3 reasons)

_____
_____
_____

Three things are needed for a fire to burn: these are represented in the fire triangle. If you take away one of these then the fire will go out. They are: a) _____, b) _____, and c) _____.

Where should you decide to build your fire? Why?

_____
_____
_____

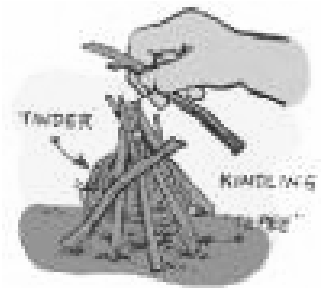
A fire needs 3 types of material to burn:
Tinder: readily combustible material.
Kindling: easily ignited material.
Fuel: Something that is consumed to produce energy.

Fill in the table showing materials that could be used for each.

Tinder	Kindling	Fuel

Note: *Dense dry wood will burn slow and hot.*
Damp wood will create dark smoke which could be used to attract attention.

To build a fire (teepee-shaped)



Safety note:

- **Care should be taken when working with fire.**
- **Keep anything flammable away from the fire.**
- **Tie back hair.**
- **Have a fire extinguisher nearby in case of an accident.**
- **This experiment should only be done outside the school building.**

Materials Needed:

Tinder
Kindling
Fuel
Matches or lighter

Procedure:

1. Arrange the tinder and a few sticks of kindling in the shape of a teepee.
2. Light the center. As the teepee burns, the outside logs will fall inward, feeding the fire.

Why is the fire built this way instead of just putting a few sticks together and trying to light them?

_____
_____
_____

Methods of lighting a fire

Suggest the easiest ways to light a fire.

_____
_____
_____

How matches work:

There are 2 types of matches: “Safety Matches” and “Strike Anywhere” matches. A safety match will only light when you use the striking surface on the box, whereas a strike anywhere match can be lit on anything rough surface.

Safety Matches:
Why do you think safety matches are given this name?

_____

The striking surface is made up of sand, powdered glass, and the chemical called red phosphorus. The head of the safety match is made up of sulphur, glass powder and an oxidising agent such as potassium chlorate. What is an oxidising agent?

_____
_____

The oxidizing agent provides oxygen to keep the flame alight.

When you strike the match on the striking surface there is a chemical reaction. The friction caused by the glass powder rubbing together causes enough heat to start a chemical reaction between the phosphorus and the oxidising agent. The heat and oxygen produced cause the sulphur to ignite and light the wood of the match. The head of the safety match is all one colour.

Strike Anywhere Matches:
These matches do not have a striking surface as they can be lit using any rough solid surface. As there is no phosphorus on a striking surface, instead the phosphorus is located on the head of the match with the other chemicals. The head of the strike anywhere matches has 2 colours: one contains the phosphorus, the other is the oxidising agent.

Unit 3. Fire

Lesson 2. Fire-starters (double lesson)

Matches are a great way to light a fire, however, if your matches get wet they cannot be lit. When going camping you are advised to take matches or some other lighter with you so that you can start a fire. It is advised that you make your matches waterproof before going on your trip and keep them in a waterproof container.

To waterproof matches

Materials needed:

Kitchen matches (these are longer and stronger than ordinary matches)
Candle

Safety:

- **Always work with care when dealing with fire.**
- **Liquid wax is very hot and may cause severe burns. Handle it carefully.**
- **Tie back hair.**

Procedure:

1. Light a candle, and let it burn down until there is a good amount of hot liquid wax (about a 1/2 inch).
2. Extinguish the flame on the candle.
3. Using tongs, dip the round end of the matches into the wax.
4. Cover about a centimeter onto the matchstick.
5. Hang the matches over the edge of a flat surface until the wax is almost solid.
6. Pinch the end of the wax coating (onto the wooden stick), forming a tight seal.
7. Repeat a few times.

Matches can also be waterproofed by coating them in nail polish. Which do you think is better? Why?

_____

Suggest ways to light a fire if you had no matches or lighters.

_____
_____
_____

How to make your own fire starter

When going on a camping trip, it is best to be prepared. There are several things you can do to ensure you have everything you need to be able to survive in the outdoors. You can take enough water and food to last a few days, bring waterproof matches and also bring a fire-starter which will help to start a fire.
Why might you need to have a fire-starter with you?

_____
_____

Here are some examples of home-made fire-starters.

- Lint from dryer.
- Toilet paper roll stuffed with paper.
- Newspaper crumpled into a ball.
- 100% cotton balls coated with vaseline.

Make up some of these and see which is easiest to light.
Record your results in the table below.

Which works better:

Method:	How long it took to start to light?	Easy or difficult to light?	Did it stay alight?
1.			
2.			
3.			
4.			

Safety note:

- **Care should be taken when working with fire.**
- **Keep anything flammable away from the fire.**
- **Tie back hair.**
- **Have a fire extinguisher nearby in case of an accident.**

Conclusions:

Which firestarter do you think you would take with you on a camping trip? Why?

_____
_____

Can you think of any other ways you can create a fire-starter to take with you on a camping trip?

_____
_____
_____

Unit 3. Fire

Lesson 3. History of fire making (single lesson)

We have thought about how to start a fire, but how have people solved this problem down the centuries? In this lesson you will research the history of making fire and produce a poster or time-line showing the major developments.

Your aim is to find out people made fires before there were matches and lighters. We take instant fire for granted but it wasn't always as easy. In groups research the topic in an encyclopedia or on the internet and collect you information together. Try to find out the scientific principles involved in starting a fire in each case.

From your findings devise a poster or a time-line, with pictures, and a description of the science involved in making fire at different periods in history. Try and answer the question: how did people start a fire 2,000, 1,500, 1,000, 500 and 100 years ago, compared to today.

You might try to find out when matches were invented; what a tinder box was; and how a burning glass works.

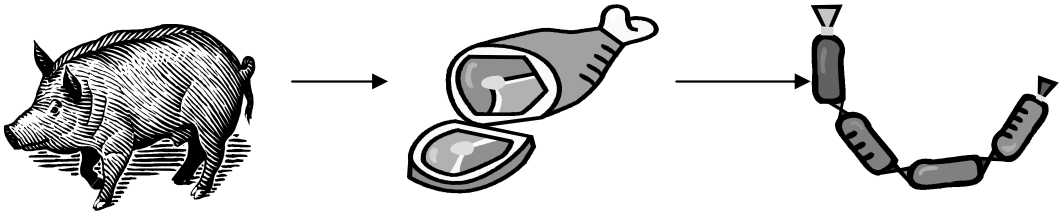
Unit 4

Food

Unit 4. Food

Lesson 1. ~ Preparing and Preserving food (single lesson)

Introduction:



Think about how you would go about killing an animal for food. How difficult would it be? Could you do it to survive? There are various things that you must do to prepare the food before you can eat it. What are these things? Would you be able to do this?

_____
_____
_____
_____
_____
_____
_____
_____

Suggest three methods of preserving food.

a)_____
b)_____
c)_____

How can you preserve fruit?

_____
_____

The salt that was separated from seawater could now be used to preserve food e.g. meat. How does adding salt to the meat help to preserve it?

_____
_____
_____

To show the difference between preserved and un-preserved fruit

Materials needed:

Fruit (apples, pears etc.)
Salt
Sugar
Water
Container
Canned fruit
Frozen fruit
Knife **(care!)**

Procedure

1. Dice the fruit and remove any pitts or stones.
2. Place pieces of fruit in 3 containers.
3. To one container add water and sugar, to another add water and salt and to the last add just water. Label the containers.
4. Close the containers.
5. Also have some canned and frozen fruit to compare.
6. Observe over a few days and then compare with fruit that has been canned or frozen.

Results:

	Appearance of salted fruit	Appearance of fruit in sugar	Appearance of fruit in water
Day 1			
Day 2			
Day 3			
Day 4			

Look at fruit that has been canned or frozen for comparison.

Conclusions:

How did adding salt and sugar affect the fruit?

_____
_____
_____
_____

Meat can be preserved by soaking it thoroughly in a saltwater solution. (The solution must cover the meat). You can also use salt on its own. As a preservative.

To show the effects of salt and sugar solutions on plant cells

Materials needed:

Rhubarb
Microscope Slide
Cover slip
Water
Concentrated Salt solution
Concentrated Sugar solution
Microscope
Dropper

Procedure:

1. Take a young stick of rhubarb. Peel off a little of the pink skin and place on a slide.
2. Make up 3 slides:
a.) add a drop of water.
b.) add a drop of salt solution.

c.) add a drop of sugar solution.
3. Cover each with a cover slip. View under the microscope. Record what you observe.

Results:

Slide A_____
Slide B_____
Slide C_____

Discussion:

1. Make some safety guidelines for carefully tasting unknown food.

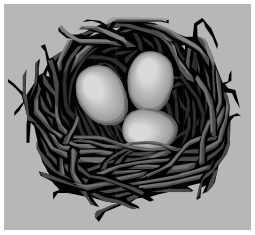
_____
_____
_____
_____
_____
_____

2. Make some guidelines on which plants are safe to eat.

_____
_____
_____
_____
_____
_____
_____

Unit 4. Food

Lesson 2. Finding Food (double lesson)



If you have little or no water you should not eat. Why do you think this is? _____

Suggest ways of finding food in the wild.

_____

_____

What types of food will you require to survive?

_____

_____

What types of nutrients do these foods contain?

_____

_____

_____

What are the functions of these nutrients in the body?

_____

_____

_____

What foods do you think you might be able to find if lost in the wilderness? (give 4 examples)

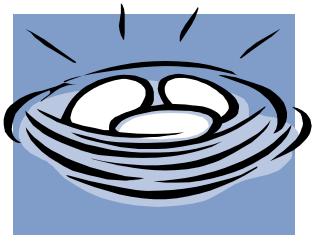
1._____

2._____

3._____

4._____

Eggs:



Eggs are the most complete foods known to humans. Why do you think they are such a complete food source?

_____

_____

You can remove eggs from a nest when the bird is absent. Leave 2 eggs to remain in the nest. Mark these eggs. The bird will lay more eggs to fill the nest. Remove these eggs leaving the two that you marked!
Warning: Some birds/plants/animals are protected and it is illegal to interfere with them. This should only be done in an extreme survival situation.

Animals:

All animals are potentially edible, however, polar bear, bearded seal and platypus should be avoided as they contain poisonous chemicals.

How might you trap mammals?

_____

_____

_____

Warning: Some animals are protected so it is illegal to kill them. This should only be done in an extreme survival situation.
It is said that you can eat anything that crawls, walks, swims or flies (with a few exceptions). However you must overcome your feelings of fear or disgust to do this.

Insects:

Insects are a big source of protein. Insects can be more nutritious than vegetables!
Why do you think the following should be avoided?
Insects that sting or bite:

_____

Hairy or brightly coloured insects:

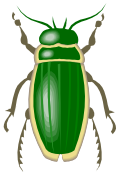
_____

Those that have a bad smell:

_____

Spiders:

_____



Insects with a hard outer shell, such as Beetles, contain parasites so what must you do to these before you can eat them?

_____

How can you make a simple pooter to collect these insects? What materials could you use?

_____

_____

_____

To make a pooter

Materials Needed:

Container and lid
2 straws (perhaps bamboo shoots or other hollow stems could be used in the wild)
Plasticine
Piece of cloth (nylon)
String

Diagram:

Procedure:

1. Make 2 holes in the lid (the diameter of a straw).
2. Place the straws in the holes as per diagram.
3. Seal the holes using plasticine or gum.
4. Place some cloth over the straw that you will be sucking from as shown in diagram. Tie in place using string.
5. Put the lid on the jar (tightly).
6. Test using small pieces of paper as insects to see if it works.

Vegetarian Diet versus Omnivorous Diet

It is difficult and time-consuming to prepare meat for eating. It is easier to prepare plants for consumption, but would eating plants on their own provide enough nutrition to stay healthy?

Iron: Meat is a good source of iron. How can you ensure there is iron in a vegetarian diet?

_____
_____
_____
_____

What is a deficiency disease of Iron?

_____

What are the symptoms?

_____
_____

Eggs, leafy green vegetables, peas, beans, nuts and pulses are good sources of iron. However, iron from plant sources is less easily absorbed than that from meat sources. Vitamin C can improve the absorption so a vitamin C source such as _____ should be included in the diet.

Vitamins:
Vitamin D can be found in dairy products and fish. It is also obtained from the action of sunlight on the skin. What is the function of vitamin D?

_____

Name the deficiency disease associated with vitamin D.

_____

Vitamin B12 is found in dairy products so this can be a problem if there are no dairy products in the diet. What are the functions of vitamin B12?

_____

Minerals:
Calcium can be found in non-dairy sources such as peas, beans and lentils. What is the function of calcium?

_____

Copper, zinc and selenium may be very low in a vegetarians diet.

Proteins:
What are the functions of proteins?

_____

_____

Vegetable proteins are often low in certain essential amino acids. Protein can be added to the diet by consuming nuts, seeds and grains.

Meat is a good source of protein, iron and B-group vitamins. If these things cannot be found in plant sources, then it is necessary to include some meat in the diet.

Note:

- ***Avoid eating plants unless you are positive that they are not poisonous.***
- ***Avoid mushrooms as it is extremely difficult to tell the safe ones from the poisonous type.***

Imagine you are stranded in a woodland area of Ireland. Using the food triangle and your knowledge of the functions of food, suggest what foods might be available to you and which you will need to consume to stay healthy if stranded for several days. Identify the nutrients present in the food.

Unit 4. Food

Lesson 3. Why cook food? (single lesson)

Why is it a good idea to cook food?

_____
_____
_____

Give 2 reasons why we cook food.
a)_____
b)_____

Discussion:
Outline the physical changes of food when cooked:

_____
_____
_____
_____
_____

Outline the chemical changes that occur:

_____
_____
_____
_____
_____

Principles underlying cooking methods
Explain each using a diagram and give an example of where they occur.

Conduction.

Convection.

Radiation.

A combination of these principles is usually used e.g. boiling. Explain how a combination of principles is used in boiling food.

_____
_____
_____

Bacteria can grow rapidly between 4°C and 60°C so food must be kept either above or below these temperatures to prevent bacteria growing to dangerous level. In optimum conditions bacteria can double in number every 20 minutes. What can you do to prevent this?

_____
_____
_____

What does refrigeration and freezing do to bacteria?

_____

Name 3 things that cause food spoilage.

a)_____
b)_____
c)_____

What are the conditions needed for the growth of bacteria and fungi?

_____

_____

Did you know:
In the right conditions, bacteria can multiply from 1 to 4 million cells in just 8 hours!!

Some common causes of food poisoning:

Campylobacter can be found in raw poultry and meat. *Campylobacter* is the most common identified cause of food poisoning. Thorough cooking will destroy it.
Symptoms: include fever, headache, a feeling of being unwell, followed by severe abdominal pain. Symptoms usually take 2-5 days to appear but it can be as long as 10 days and can return over a number of weeks.

Salmonella can be found in raw meat, poultry and eggs, raw unwashed vegetables. It is found in the gut and faeces of animals and humans. *Salmonella* can survive when refrigerated although it is unable to multiply through cooking.
Symptoms: These may include fever, diarrhea, vomiting and abdominal pain. Infection may be very severe, and in some cases may even be fatal. It normally takes 12 to 48 hours for symptoms to develop.

Cooking controls these two common causes of food poisoning.

Cooking:

Cooking turns food a brown colour. All foods turn brown above 154°C. This is called the "Maillard Reaction". This happens when sugar molecules and amino acids are heated together.
Foods do not turn brown when boiled or steamed. Why not?

_____

Fish:

Fish from slow-moving rivers are more likely to have parasites.
Fish can be impaled on a stick and cooked over an open fire. Boiling the fish (in its skin) is the best way to get the most nutritional value from the fish. Fish can be packed into a ball of clay and buried under the hot coals. You know that fish is cooked when the meat flakes off.

Birds:
Scavenger birds must be boiled for about 20 minutes before cooking to kill parasites.
Meat can be boiled, however it is important to consume the water it was boiled in as this contains a lot of the nutritional value from the meat.

Plants:
What happens to plants when heated?

_____
_____

Raw Foods versus Cooked Foods

Can you think of some advantages and disadvantages of each?

Raw food **Cooked food**

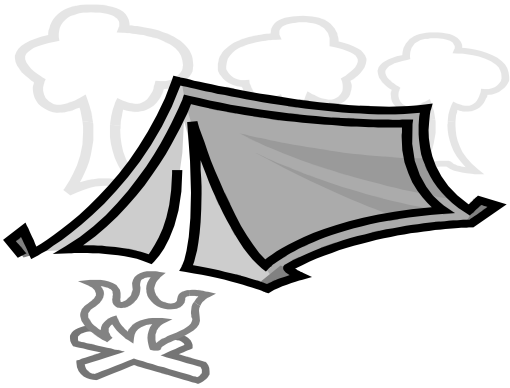
_____
_____
_____
_____
_____

Discussion:
How difficult do you think it would be to cook food in the wild? What materials would you need to cook the food? What could you use as containers?

_____
_____
_____
_____
_____

Unit 5

Shelter and Protection



Unit 5. Shelter and Protection

Lesson 1. Shelter (single lesson)

What are the functions of a shelter?

_____

_____

In some situations a shelter is extremely important and you must find or build a shelter immediately. Can you think when this might be?

_____

_____

_____

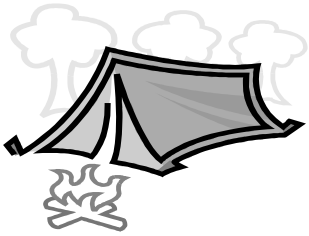
What size should the shelter be?

_____

Why? _____

Site Selection:

Does it matter where you put your shelter?



Where will you place your shelter?

_____

_____

What must you consider when selecting the site?

_____

_____

_____

Discussion:
Can you think of methods of creating shelter?

Where might you find a natural shelter?
_____
_____

Can you think of materials you could use to build your own shelter?
_____
_____
_____

There are different types of shelters that you can build, depending on your situation.
Using wood and leaves, you could build a single opening shelter. How would you go about doing this?
_____
_____
_____
_____
_____
The back of the shelter should face the prevailing winds!

If you have survived a plane crash you should try to stay by the plane.
Why? _____

You should not however remain inside the plane for shelter in both a) hot and b) cold weather. Can you give a reason for each type of weather?
a)_____
b)_____

If you use a cave for shelter, do not build your fire in front of the cave. Why not? _____

Hypothermia:

This happens when the body is unable to maintain its correct temperature in the face of processes that lose heat

Hypothermia is heat loss at the body core, and it results from exposure to cold with the addition of other heat loss mechanisms. Name some heat loss mechanisms of the body.

_____
_____
_____

The body reacts by trying to reduce heat loss. This is first done by restricting the circulation in the surface of the skin. When this happens you begin to feel the cold. Later, with continued heat loss, the body will show other symptoms. Blood flow to the extremities will be reduced, giving you a sort of numbness.

Continued exposure closes down more systems, the blood temperature throughout the body is reduced and the brain is affected.

- Wind can assist the cooling effect of cold (the wind chill factor).
- Wetness increases heat loss through evaporation.
- When the body is wet it loses heat much more rapidly.

It is recommended that you take a rubbish bag with you for survival. Can you think of some ways that a simple rubbish bag can help you to survive?

_____
_____
_____
_____
_____

You were on a skiing trip with your family. There was an avalanche and you got lost. What will you do for shelter?

_____
_____
_____

You are getting dehydrated. How will you find water?

_____
_____
_____

How can you protect yourself from the cold?

_____
_____
_____
_____

Taking simple precautions early on could save your life!

Unit 5. Shelter and Protection

Lesson 2. ~ Insulation (double lesson)

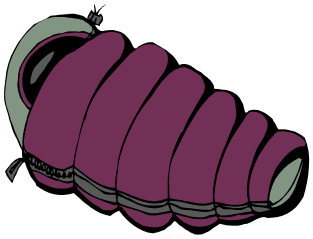
Keeping warn is a key part of survival as we have seen already.
What does insulation mean?

_____
_____

How can you insulate your shelter?

_____
_____
_____

Tips for sleeping outdoors at night.



Always cover the head and neck when out in the cold because

_____

Can you think of any other tips for sleeping outdoors?

_____
_____
_____
_____

You can create your own homemade hot water bottle. Can you think of a way?

_____
_____

Clothes

Clothes are your primary shelter. Clothing provides insulation and protection from the elements.
It is important to layer clothes when in cold weather. The layer closest to the skin should always be kept dry.
You should have 3 layers of clothing. The first is closest to the skin and must be dry and able to keep water away from the skin. The second layer is for warmth and comfort e.g. a fleece. The third layer is for protection from wind, water and temperature.

How do clothes insulate?

_____
_____

What is a "breathable material"?

_____
_____

When clothes are not kept clean it affects their insulating power. How?

_____
_____

You should try to avoid overheating when wearing layers of clothes. Why?

_____
_____

When clothes or a sleeping bag get wet, they lose their insulation power. Why?

_____
_____

To test insulating ability of different materials

Materials Needed:

Metal can e.g. an empty soft drinks can
Thermometer
Elastic band
Water
Fabrics - 3 or 4 different fabrics
Kettle

Procedure:

1. Fill a metal can with hot water.
2. Measure and record the temperature of the water using a thermometer.

3. Wrap a fixed length of cotton fabric around the can. Hold fabric in place using an elastic band.
4. Record the temperature every minute up to 6 minutes and then every 2 minutes until 14 minutes.
5. Repeat using at least two more materials.

Results:

Materials: ►				
Temp at start:				
After 1 min:				
2 mins				
3 mins				
4 mins				
5 mins				
6 mins				
8 mins				
10 mins				
12 mins				
14 mins				

Conclusions:

Which material that you tested was the best insulator?

_____
_____
_____

Discussion:

How could you put this knowledge to use when trying to survive outdoors?

_____
_____
_____
_____
_____

Question:

Research different types of clothes, sleeping bags and insulation materials that are available which be brought on a camping trip. Investigate their functions and why they insulate.

Unit 5. Shelter and Protection

Lesson 3. Fabrics (single lesson)

When going on a camping trip it is recommended that you take enough different pieces of clothing to be prepared for all types of weather changes. Clothing can be made from different types of materials.

Can you think of some of these types of materials.
State their advantages and disadvantages.

Material Advantages Disadvantages

_____
_____
_____
_____
_____
_____

If it is raining you will require clothes that can repel water.

To compare water repellency of fabrics

Materials Needed:

Measuring cylinder
Water
Beaker
Fabric samples
Scissors
Elastic band
Balance

Procedure:

1. Cut a number of different pieces of fabric to the same size, large enough to fit over the top of your beaker.
2. Place the fabric across the top of the beaker. Secure using an elastic band.
3. Find the mass of the beaker and fabric.

4. Hold the jar at an angle of 45° over a sink.
5. Pour 250 mL water slowly onto the fabric.
6. Allow the jar to drain for 1 minute. Reweigh it.
7. Calculate the increase in mass of the jar and fabric.
8. Repeat for different types of fabrics.

Results:

Type of fabric:	Mass of beaker + fabric	Mass of beaker + wet fabric	Increase in mass

Discussion:

Which of the fabrics tested would you use on a rainy camping trip? Why?

_____
_____
_____

To compare the absorbency of different fabrics

Materials Needed:

Samples of fabric
Balance
Water
Dish

Procedure:

1. Cut a number of different types of fabrics to the same size, small enough to fit inside your dish.
2. Measure the mass of the sample.
3. Put the sample in a dish of water and allow to soak for 5 minutes.
4. Remove the sample and allow to dry hanging on a line for 1 minute.
5. Reweigh the sample and calculate the increase in mass.
6. Repeat for each fabric.

Results:

Type of fabric:	Mass of sample	Mass of wet sample	Increase in mass

Discussion:

Which fabric is the most absorbent?

_____

_____

What use might you find for this type of fabric outdoors?

_____

_____

Unit 6

Food Hygiene

Unit 6. Food Hygiene

Lesson 1. Food hygiene (single lesson)

In this unit we will look at some of the invisible things that live in our food and our environment and which can cause us health problems.

Can you think of some tips on how to make sure you are hygienic, when surviving outdoors?

_____
_____
_____
_____
_____
_____

Why is hygiene so important?

_____
_____
_____

Name 3 ways in which infection/bacteria can spread when you are living outdoors.

a)_____
b)_____
c)_____

Microbiology

Microbiology is the study of micro-organisms. They can be found almost everywhere but cannot be seen with the naked eye. Some micro-organisms are beneficial in supplying us with vitamins, breaking down decaying matter and are required when producing food such as yogurt, cheese, alcohol and vinegar. Others are harmful, causing illness and sometimes death when ingested.

Fungi, Moulds and Yeasts

Plants use chlorophyll to produce their own food using sunlight in a process known as _____. Fungi are simple plants which lack chlorophyll. This means that they do not have their own food source so they must absorb nutrients from an external source. How do they acquire the nutrients that they need to grow?

_____
_____

How can fungi be beneficial?

_____
_____
_____

How can fungi be harmful?

_____
_____
_____

What are the environmental factors which influence micro-organisms?

_____
_____
_____
_____
_____

Moulds

I am sure you have seen moulds grow, even in the fridge, on old food. Moulds begin as a single cell called a spore. Under favourable conditions a thread-like filament called a hypha is sent out. It grows down into food and absorbs nutrients. Some of the waste excreted by moulds can be toxic.
Some moulds have antibiotic properties. Can you name one?
_____.

Common food spoilage moulds:
Write in what foods they affect and their colour!
Mucor: _____
Rhizopus: _____
Penicillium: _____
Aspergillus:._____

Yeasts

Yeats are single-celled fungi. *Saccharomycetes cerevisiae* is the yeast used in brewing and bread making.
They are known as facultative organisms. What does this mean?

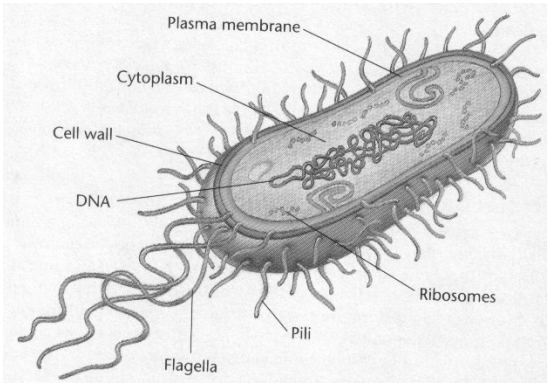
_____

Yeasts can ferment sugar. What does this mean?

_____

Give one example where this is used.

_____



Bacteria

Bacteria consist of a single cell. Their structure is shown in the diagram above. In the right conditions they can multiply every 20 minutes.
Many bacteria are useful to humans. Can you think of ways that bacteria are beneficial?

_____
_____
_____
_____

Other bacteria are harmful to humans. Why?

_____
_____
_____

Name 3 things that can cause the death of bacteria.

a)_____
b)_____
c)_____

Enzymes

What are enzymes?

_____
_____

Some enzymes cause food spoilage. Can you think how they spoil the food?

_____

What do enzymes do in the human body?

_____
_____
_____

How do enzymes turn an apple brown?

_____
_____
_____

How can spoilage be controlled?

_____
_____
_____

Foods containing micro-organisms can be preserved to prevent spoilage. Can you think of some preservation methods?

_____
_____
_____

There's definitely more things in food than meet the eye and in the next lesson we will look at the effects of micro-organisms.

Unit 6. Food Hygiene

Lesson 2. The effects of micro-organisms (double lesson)

High standards of hygiene are needed when dealing with food. There are strict regulations for restaurants and other places that prepare and serve food to the public. In this lesson we will look at the effects of micro-organisms on food.

To show the effects of micro-organisms on food

Safety Note:

- **Care must be taken when working with flames.**
- **Keep anything flammable away from the flame.**
- **Tie back hair.**
- **Do not touch the growth on the food.**
- **Do not taste or eat anything.**

Materials Needed:

Petri dish with sterile agar solution
Food samples: bread, milk, fruit etc.
Inoculating loop
Bunsen burner

Procedure:

1. Prepare a number of petri dishes with sterile nutrient agar.
2. Light the Bunsen burner.
3. Sterilise the inoculation loop by passing it through a blue flame until it is red hot.
4. Transfer the food sample to the petri dish using the loop. Seal the dish and label (type of food, date and your name.)
5. Repeat the process for each type of food.
6. Place dishes upside down in an incubator at 20°C for 5 days.

Results:

Study each type of food carefully in the petri dishes. What did you observe?

_____
_____
_____

Bacterial food poisoning is the most serious type of food poisoning. It may occur in 2 ways. Write in a short statement about each type.

Toxic Food Poisoning:

_____
_____
_____

Infectious food poisoning:

_____
_____
_____

Most common types of pathogenic bacteria

You will probably have heard of some of these bacteria as they feature quite often in the media when there are cases of food poisoning.

E. coli.

Where is this found? _____
Foods usually affected: _____
It causes _____ food poisoning.
It can produce a heat stable toxin. What does this mean?

_____
It can go unaffected in a pH as low as 5.

In Scotland 1997 there were 20 reported E. coli food poisoning cases from meat gravy!

Clostridium botulinium.

Optimum temperature is 30-37°C.
Minimum pH for growth: 4.6-4.8.
Growth is limited by _____.
Foods at risk: _____
Produces a toxin that has a very low lethal dose. What does this mean?

_____

In 1989 a person in England died after eating contaminated hazelnut yogurt!

Salmonella.
Optimum temperature: 37°C.
Optimum pH: 6.5-7.5.
Inhibited by _____.
Survives well during freezing.
Destroyed by _____.
Mainly affects _____.

Discussion

From what you have learnt in this lesson, how do you think you can control microbial food spoilage?

_____
_____
_____
_____
_____

Unit 6. Food Hygiene

Lesson 3. ~ Discovery of micro-organisms (single lesson)

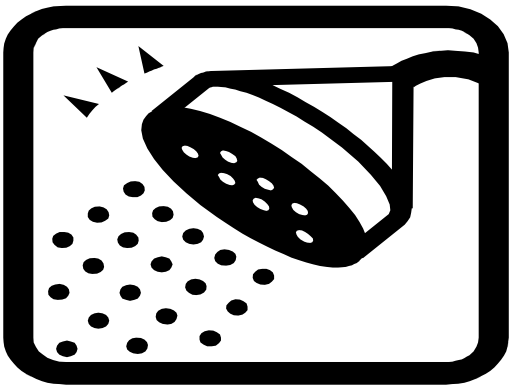
In this lesson we will look at the history of the germ theory and the discovery of micro-organisms. Do you know who first discovered 'germs' and thus laid the foundation for modern health care as well as for those industries that use micro-organisms?
Can you name one person who is important in the history of germs?
_____
Can you name two important industries in Ireland that depend on micro-organisms?
a)_____
b)_____

Using an encyclopedia or the internet, research the history of germs and their uses. Make notes of what you find out.

Write an article
Use these notes to write a short (500 words) newspaper article to explain the how we found out about germs and why this knowledge is important in everyday life. Use illustrations and diagrams in your article and choose a catchy headline.
Or
Design a poster
Alternatively, or as homework, devise a catchy poster to remind people why knowing about germs and keeping clean are important in everyday life.

Unit 7

Personal Hygiene



Unit 7. Personal Hygiene

Lesson 1. Keeping clean! (single lesson)

Hygiene doesn't just keep a person clean, it can also:

- Help keep the skin intact to fight infection and prevent injuries.
- Remove substances from the skin in which bacteria can grow to reduce the risk of infection.
- Keep the mouth and gums healthy.

Fill in the reasons for keeping the following clean.

Hair care.

_____

_____

Hand care.

_____

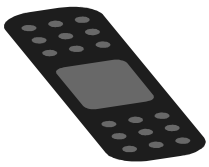
_____

_____

_____

_____

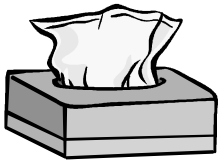
Cuts and sores.



_____

_____

Nose, mouth and ears.



_____

_____

Clothes.

_____

_____

If personal hygiene is not maintained, germs will spread to food and water. When ingested, they will cause illness or even death.

Food-borne illness

Describe some food-borne diseases.

_____

_____

_____

_____

_____

Food-borne disease is caused by consuming contaminated foods or beverages. After they are swallowed, there is a delay, called the incubation period, before the symptoms of illness begin.
During the incubation period, the microbes pass through the stomach into the intestine. They then attach to the cells lining the intestine walls, and begin to multiply there.

If there is more than one person present then infection can spread.

Infectious diseases

Typhoid is transmitted by food or water contaminated with faeces (waste matter) from an infected person.

The case of Typhoid Mary

Mary Mallon was born in Co. Tyrone in 1869. She emigrated to America. In the beginning of the 20th century Mary Mallon was identified as the source of several typhoid fever outbreaks in New York City. She was treated but she remained a carrier of Typhoid Fever because the bacteria *Salmonella typhi* infected her gall bladder. She is the first known healthy carrier of Typhoid fever. The medicines of the time did not have an effect on the bacteria

because it was in the gall bladder. Some of the bacteria would pass into her faeces which would then start a new outbreak of the disease.

Mary was a cook in New York City between 1900 and 1907. In this time she infected 22 people of which one died. When it was found that she was a carrier she was told that she was not allowed to work as a cook any longer. Mary did not believe that she was making other people ill so she refused to have her gall bladder removed (which would have made her harmless). The health authorities arrested her and isolated her in a hospital so as to protect the people of New York City.

Three years later she was released but not allowed to work as a cook. She disappeared and changed her name. She began working as a cook in a hospital under a false name. She caused a typhoid outbreak. 25 people were infected, of whom two died, before she was captured (5 years later) and put in prison for the rest of her life. She did not die of typhoid fever but of pneumonia.

Today, a **Typhoid Mary** is a term for a carrier of a dangerous disease, who is a danger to the public because they refuse to take appropriate precautions to minimise the risk of infecting others.

Discussion:

There are several ways that you can come into contact with an infectious disease. How?

_____
_____
_____
_____

How can you prevent disease from spreading?

_____
_____
_____
_____

The spread of infectious disease:

Results:

_____
_____
_____

Conclusions:

_____
_____
_____

Unit 7. Personal Hygiene

Lesson 2. Soap and detergents (double lesson)

Personal hygiene is very important so as to avoid infection and illness. Water alone cannot remove oils, grease or pigments, so soap or detergents are used.

Soap:

Soap is made from a chemical reaction between an acid and a base that causes saponification (soap formation) to occur. Saponification is what happens to fats when they are reacted with a base such as sodium hydroxide. Soap acts as an emulsifier to allow water and oil to mix so that oily grime can be washed away.
Usually the acid part comes from either vegetable or animal fat.
The base can be made from wood ashes in the form of Lye water. Lye water is made from pouring soft water e.g. rainwater on the ashes. This creates a soft soap rather than a hard soap. This is how people used to make soap at home before it was made in factories.
Sodium hydroxide (hard soap) or potassium hydroxide (soft soap) can also be used as the base.

To make Soap in the laboratory

Soaps can be formed by boiling a fat (ester) in potassium hydroxide. Ethanol is used as a solvent to dissolve the fat.
Note: Potassium Hydroxide is used instead of sodium hydroxide as it is more soluble in ethanol.

Safety Note: Safety goggles should be worn as Potassium Hydroxide and Sodium Hydroxide can harm eyes. Wear gloves. Do not allow chemicals to touch skin.

Materials Needed:

Quick-fit distillation apparatus
Heating mantle (or Bunsen Burner)
Thermometer
Filter funnel
Filter paper
Glass rod
Lard or castor oil
Potassium hydroxide
Ethanol
Saturated sodium chloride solution
Deionised water

Procedure:

1. Set up the apparatus for reflux.
2. Place 4g of the fat, 4g of the potassium hydroxide pellets (CARE!) and approx. 50 mL of ethanol in the round bottomed flask.
3. Boil under reflux for 30 mins.
4. Rearrange the apparatus for distillation. Distill the ethanol off until the temperature of the distilling vapour is greater than 80°C.
5. Add the contents of the flask to the saturated sodium chloride solution. This is to dissolve the excess alkali and precipitate the soap.
6. Filter and wash with saturated sodium chloride solution, then with deionised water.

Question:

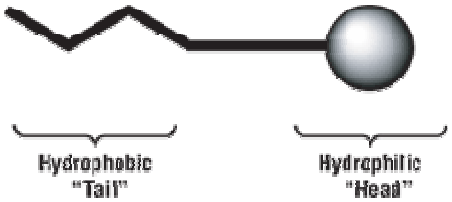
How can you test the soap?

_____
_____
_____

Detergents

Are a synthetic version of soap. Detergents do not combine with natural mineral salts in hard water and thus do not form scum. Detergents are surfactants which clean by lowering the surface tension of water i.e. they make the water interact better with oil and grease. Some detergents contain enzymes and bleaches and to help boost their cleaning power. Can you think how these would help when cleaning?

Enzyme:_____
Bleach:_____



Detergents have a hydrophobic end. What does this mean?

_____

_____

They also have a hydrophilic end. What does this mean?

_____

_____

Discussion:

How do detergents clean?

_____

_____

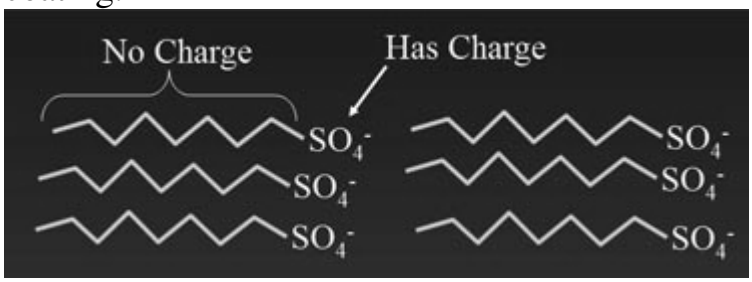
_____

_____

_____

_____

Draw a diagram to show how the detergent molecules, shown below, help to bring small oil drops into solution by giving them a hydrophilic coating.



Unit 7. Personal Hygiene

Lesson 3. What's in a cleaner (single lesson)

Soap is a very simple cleaning agent and has been made since Roman times. Today we use many different types of cleaning agents for different purposes. Most of them are complex mixtures of chemicals designed to do a particular job. The range and variety of cleaning agents in shops is far greater today than it was even 20 years ago.

Make a survey at home of how many different types of cleaning agents are in use for different purposes and bring in labels from some of them, showing their chemical composition.

In the lesson we will draw a list of all the different cleaning agents and their uses. Use the table below. Can you find products with 10 different uses? Two different brands of soap count as one use!

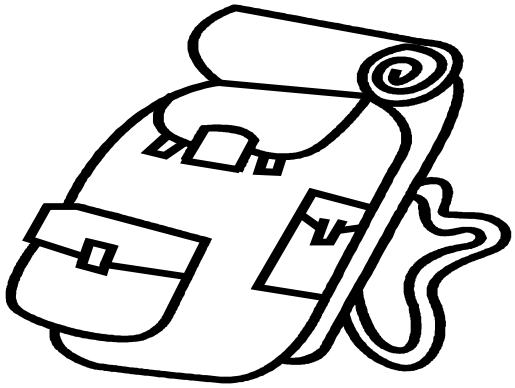
Product and brand name	Purpose
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Take the labels from two products from your home and write down their chemical compositions below or stick the labels in your book. Are there any chemicals in common? Which is the major chemical in each product? How many cleaning products contain surfactants (another name for detergents)? Discuss in class how you think these products are made.

Product 1: **Product 2:**

Unit 8

Preparedness



Unit 8. Preparedness

Lesson 1. Survival Aids (single lesson)

To survive in the wild, you don't just need survival skills. You must also have the will to survive. You also need a basic survival kit. This lesson brings together some of the ideas you have covered in previous units.

When surviving in the outdoors, one may face many problems with regards to health. Having an illness, an injury or even a toothache can hamper your ability to plan your survival. It can have a hugely negative effect on your will power.

Lack of water is one of the most common causes of illness. Your body loses fluid through normal body processes. Your body loses 2-3 litres of water a day through normal exertions and so 2-3 litres must then be replaced.
If this does not happen, a person will become dehydrated.
What are the symptoms of dehydration?

_____
_____
_____
_____

2-3 Litres is the amount recommended, however in certain situations this must be adjusted. Can you think why?

_____
_____
_____

Why does this amount have to be increased if there is very low food intake?

_____
_____

To prevent dehydration

Always drink water when eating. Why?

_____
_____

"Conserve sweat, not water." What do you think this means?

_____
_____

Lack of food

A person can last weeks without food, however this is very difficult to do. Without food your physical and mental capacities decrease and you feel weak. This can be detrimental, as you need a strong will in order to survive. Food replenishes the substances that your body burns and provides energy. Your brain doesn't operate properly without water or food.

Where can you find food?

_____
_____
_____

To prevent illness due to poor hygiene

Wash regularly, do not cross-contaminate raw and cooked foods, cover cuts and wounds, wash hair regularly as it can be a breeding ground for bacteria, wash and boil foods before consuming, purify water by boiling. If you do not do these things what can happen?

_____
_____
_____
_____
_____

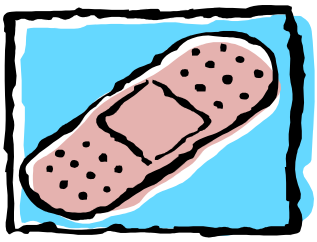
To prevent illness due to cold

Frostbite can occur when the temperature is at or near freezing or colder. Trench foot results from prolonged exposure to a wet, cold condition. How can you prevent these from happening?

_____
_____
_____
_____

Imagine you got sick while out in the wilderness? What can you do? Do you think it would be easy to make your own medicine? It would be impossible! So the only thing that can help you is to be prepared! What would you put in a basic first aid kit?

First Aid Kit



You are going on a hiking trip and you know that you will be several hours away from medical help. You decide to put together a homemade first aid kit just in case.

What are the requirements for the kit itself?

_____

_____

All medications should be stored in separate airtight containers. Why?

_____

Medications should be clearly labeled with name, dosage and expiration date.

Make a list of some useful medications that you might take with you. State why you chose these particular medications.

Medication **Reasons for choosing it**

_____

_____

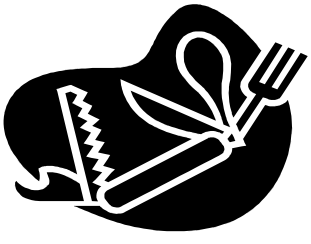
_____

_____

_____

Other items to include in the kit:

To create a survival kit

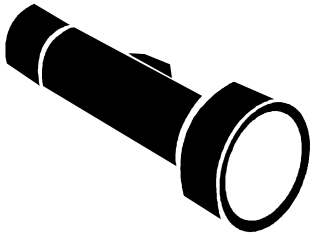


What could you use as a container? _____

What things will you include in your survival kit? Explain their significance.

Unit 8. Preparedness

Lesson 2. Showing a Light (double lesson)



You may be stranded for a few days before rescue. A light would be very useful in this situation during darkness and it can also be used to signal for help.
What else can light be used for?

_____
_____

What is light?

_____
_____

Light travels in straight lines. How can you prove this?

_____
_____
_____
_____

What is reflection?_____
_____

Can you think of how reflection can be used to survive?

_____

What is refraction?

_____
_____

When could this information be useful when you are trying to survive outdoors?

_____
_____

How does a candle work?

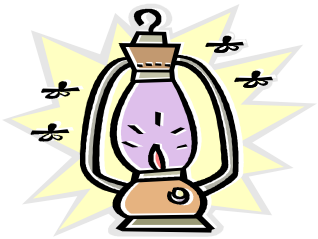
_____
_____
_____
_____
_____
_____
_____

How can you prove that it is the wax vapour and not the wax itself that burns in a candle?

_____
_____
_____

How to make your own lantern

Safety Note: Care must be taken as flammable materials are used in the lantern. Have a fire extinguisher nearby in case of an accident. Tie back hair.



Think what you might need to make a simple lantern.

Materials Needed:

_____
_____
_____

How would you make a simple lantern?

Procedure:

_____
_____
_____
_____
_____
_____
_____

Signalling

You will have to find some way of alerting people to your location if you stand a chance to survive. When creating a signal you must first make sure it will be seen, and second make sure it is understood.

How can you signal using a fire? (during day and night)

_____
_____
_____

How can you attract attention from planes?

_____
_____
_____

How would you use a mirror or shiny object?

_____

How does a mirror or shiny object work? Use a diagram to explain.

Is there anything else you can use to attract attention?

_____
_____

How can you send an SOS message?

_____
_____

What can you include in your survival kit to make sure you have ways to attract attention?

_____
_____
_____

Discussion:

Can you think of any other methods to create a useful light source?

_____
_____
_____

Unit 8. Preparedness

Lesson 3. How to survive in the wild (single lesson)

Now it is time to put all this information together! Use diagrams and explanations to explain what you would do in this situation.

You were in a plane crash. You have woken up on a desert island. There is nobody else around, but there is a lot of debris from the plane. Outline your plan of action that will help you to survive.

1. What are your first actions going to be?

2. How will you go about finding water?

3. How can you purify the water?

4. How might you find food?

5. How will you prepare the food for consumption?

7. How will you build a fire?

8. What materials will you use?

9. How can you make sure that you stay healthy until you are rescued?

10. How will you signal for help?