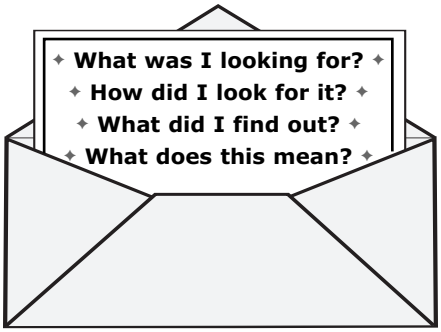
OHT 1

Creating a Narrative Lab Report



Activity title: _____

1. What was I looking for?
[Write 2–3 sentences that state the question you answered and the prediction you made.]

_____

_____

_____

2. How did I look for it?
[Write 3–4 sentences that explain what you did in the activity. Identify all variables.]

_____

_____

_____

3. What did I find out?
[Write 3–4 sentences that describe your observations.]

_____

_____

_____

4. What does this mean?
[Write 3–4 sentences that describe what you learned and how you could use it in your daily life.]

_____

_____

_____

OHT 2

Writing an Opinion Paragraph

This is my opinion about _____

_____

I think _____

_____

_____

I think this way because _____

_____

_____

_____

Other people think _____

_____

_____

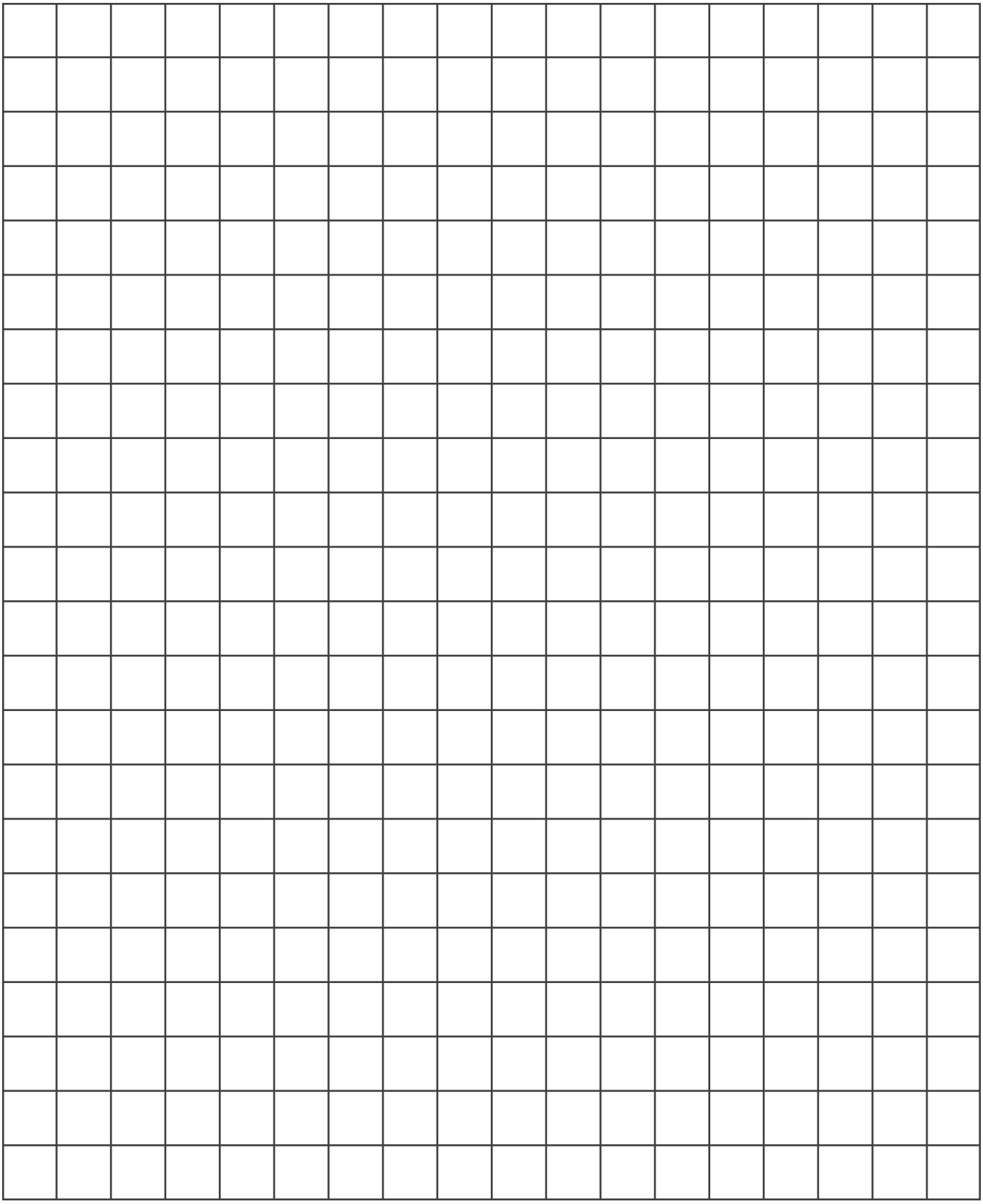
I don't agree because _____

_____

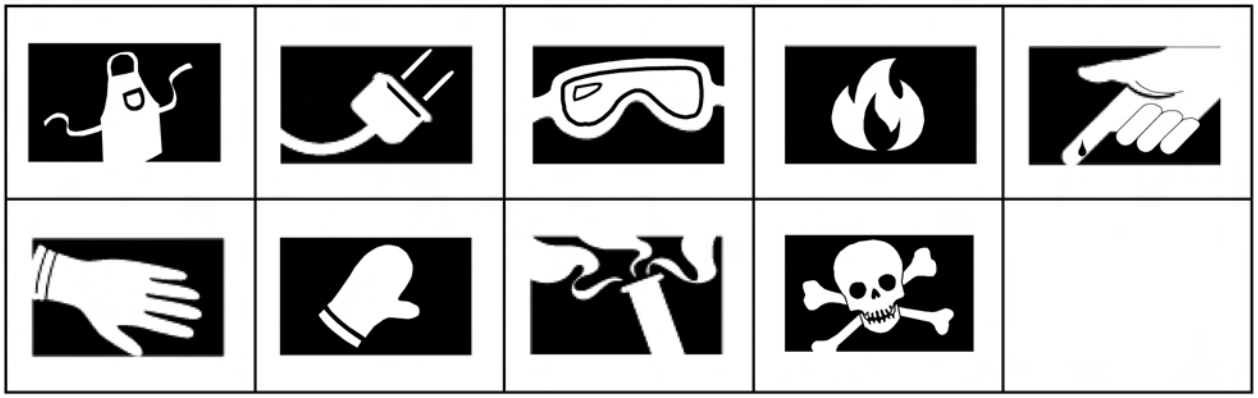
_____

OHT 3

Centimetre Grid



Safety Precaution Symbols



OHT 5

PMI Chart

Interesting	
Minus	
Plus	

TEST IT!

Paper Towel Test, Part 1

In this investigation, you will compare three brands of paper towel to find out if one brand absorbs water better than the others.

Question

Is one brand of paper towel more absorbent than other brands?

Safety Precautions

- Clean up the work area and wash your hands with soap and water when you finish the investigation.

What You Need

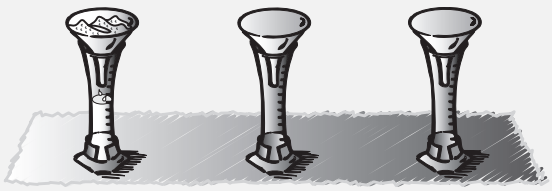
3 sheets of paper towel
(each a different brand)
pencil
3 – 250 mL beakers
3 – 100 mL graduated cylinders
300 mL water
3 funnels
timer

What to Do

1. Make sure that the three sheets of paper towel are all the same size. Use a pencil to write the brand name on each paper towel.
2. Place one piece of paper towel into each beaker.
3. Measure 100 mL of water into each graduated cylinder.
4. Carefully pour the 100 mL of water into each beaker. Leave the paper towel in the water for one minute.
5. Place a funnel into each of the graduated cylinders.

TEST IT! (continued)

6. Gently pour the water and paper towel from one beaker into the top of the funnel.



Do the same with the other beakers. Let the paper towels sit in the funnels for one minute.

7. Remove one funnel and discard the wet paper towel. Record the volume of water that collected in the graduated cylinder.

Brand Name of Paper Towel	Volume of Water Collected in the Graduated Cylinder (mL)	Volume of Water Absorbed by the Paper Towel (100 mL – amount collected)

8. Repeat step 7 for the second and third paper towels.

What Did You Observe?

9. Which graduated cylinder contained the most water?

10. Which graduated cylinder contained the least amount of water?

What Did You Discover?

11. Which brand of paper towel held the most water?

12. Which brand of paper towel was the most absorbent? Explain how you know.

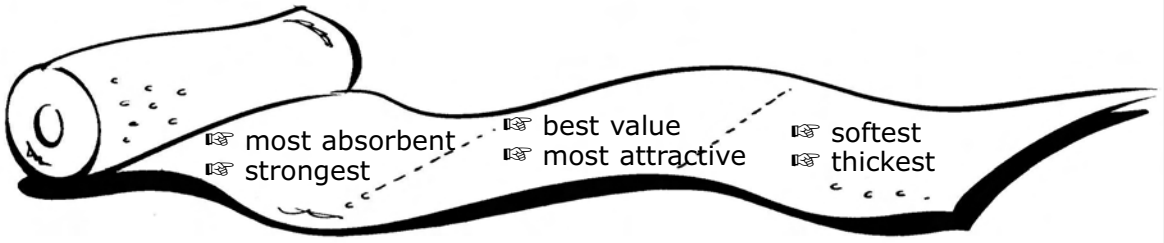
Types of Variables

Variable	Meaning	Example
Manipulated	the factor that is changed	• _____
Responding	the factor that changes as a result	• _____
Controlled	the factors that must be kept the same	• _____ • _____

TEST IT!

Paper Towel Test, Part 2

Variables used to advertise paper towels



Advertisers talk about variables when they make claims about a product. The absorbency of paper towels is one variable you see in ads. Another variable is how strong the paper towel is. Use the following steps to design an investigation to test the strength of paper towels. When you are done, you will write a lab report to let others know about your findings, just like scientists do.

Question

Which brand of paper towel is the strongest?

What Do You Think Will Happen?

1. Read the "Planning the Test" section, on page 6. Predict which brand of paper towel will be the strongest. Fill in the blanks to record your prediction.

I predict that _____ is the strongest paper towel, because _____ .

Safety Precautions

2. List all the safety precautions that you think apply.

What You Need

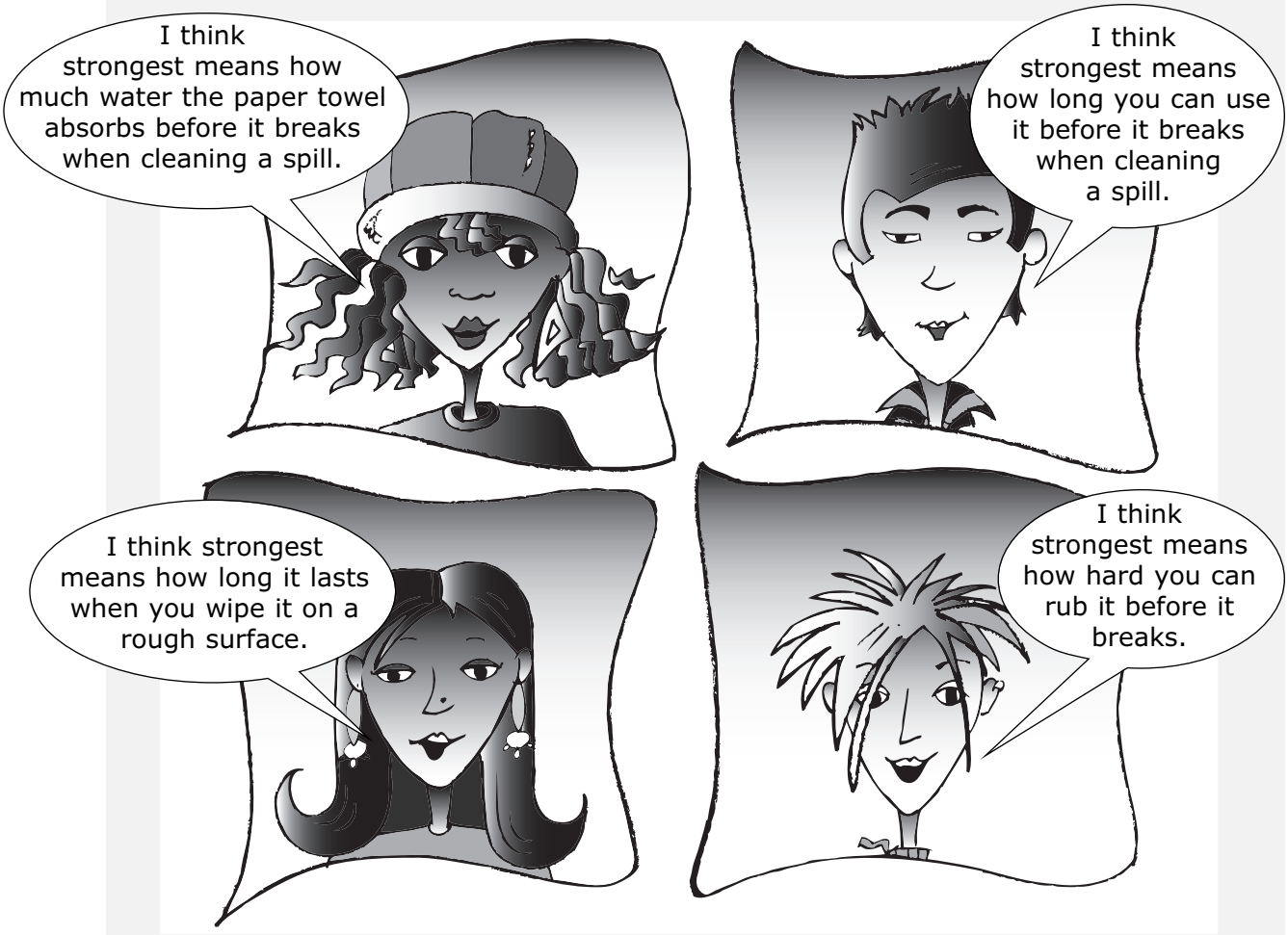
3. List the materials and apparatus that you will need to carry out your test.

TEST IT! (continued)

Planning the Test

To find out which paper towel is strongest, first you need to decide what "strongest" means. Share your ideas with your classmates. Then fill in the blanks to record the meaning of "strongest" that you all agree to use in this investigation.

- For this investigation, the strongest paper towel is the paper towel that _____



Once you have decided what "strongest" means, you need to think about the features of paper towels that could make them strong. Thinking about these features will help you make a meaningful prediction about the results of the test you are going to design. Observe the different brands of paper towels. Use ✓ or ✗ in the chart on the next page to compare the features of the paper towels. Add other features that you observe.

TEST IT! (continued)

Features	Same ✓	Different ✗
Size of sheets		
Colour of sheets		

What to Do

4. On another sheet of paper, list the steps that you are going to follow to do your fair test.

5. Name the manipulated variable for your fair test. _____

6. Name the responding variable for your fair test. _____

7. List the controlled variables for your fair test.

_____

What Did You Observe?

8. Record the results of your investigation on another sheet of paper.

What Did You Discover?

9. Was your prediction correct? YES NO

Explain how you know. _____

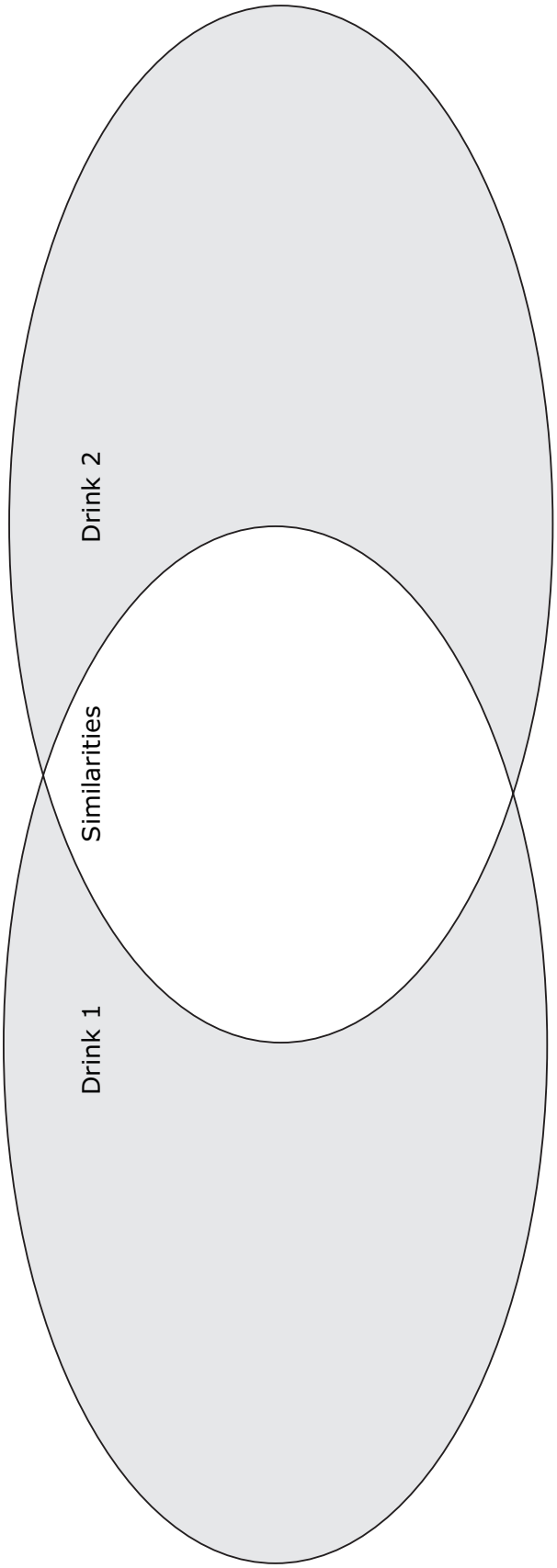
10. Was your investigation a fair test? YES NO

Explain how you know. _____

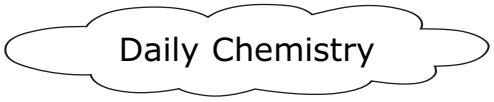
Scientific Method

Scientific Method Skills	Description	Used This Skill?
Ask a question	• Decide what you want to find out. State this as a question.	✓
Gather information	• Gather scientific information about the question.	
Predict	• Predict what you think will happen.	
Plan the investigation	• Identify the variables. • List what you will need. • List the steps that you will follow. • Identify safety precautions.	
Conduct the investigation	• Follow the steps and safety precautions.	
Measure and record	• Observe and measure changes that occur. Record them in a chart or data table.	
Analyze	• How do your results help you answer the question you are investigating?	
Conclude	• Based on your observations, what did you learn?	
Evaluate	• Think about how you could improve your investigation. • If possible, make changes and repeat your investigation.	
Communicate	• Tell others what you learned.	

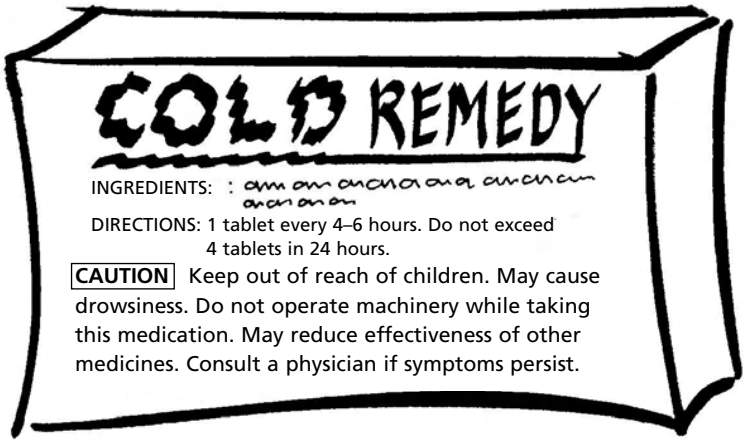
Compare Energy Drinks

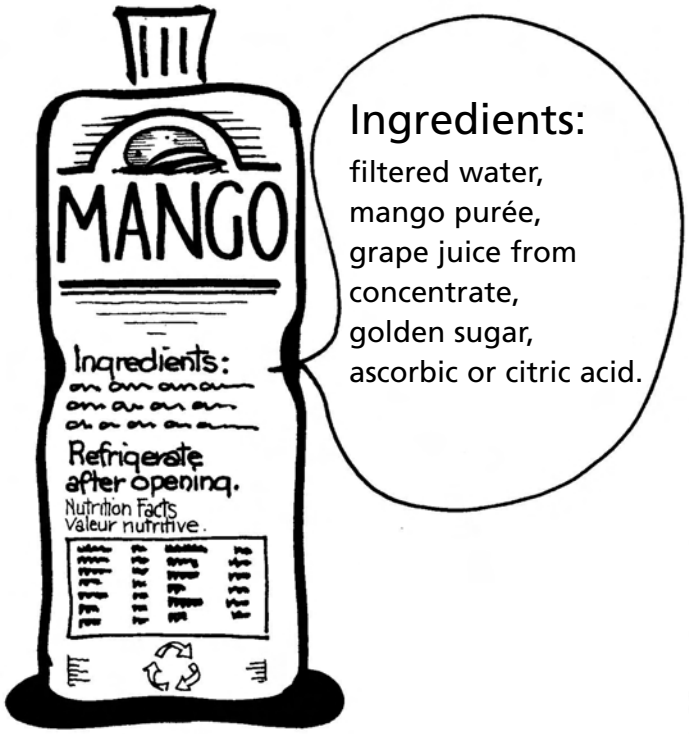


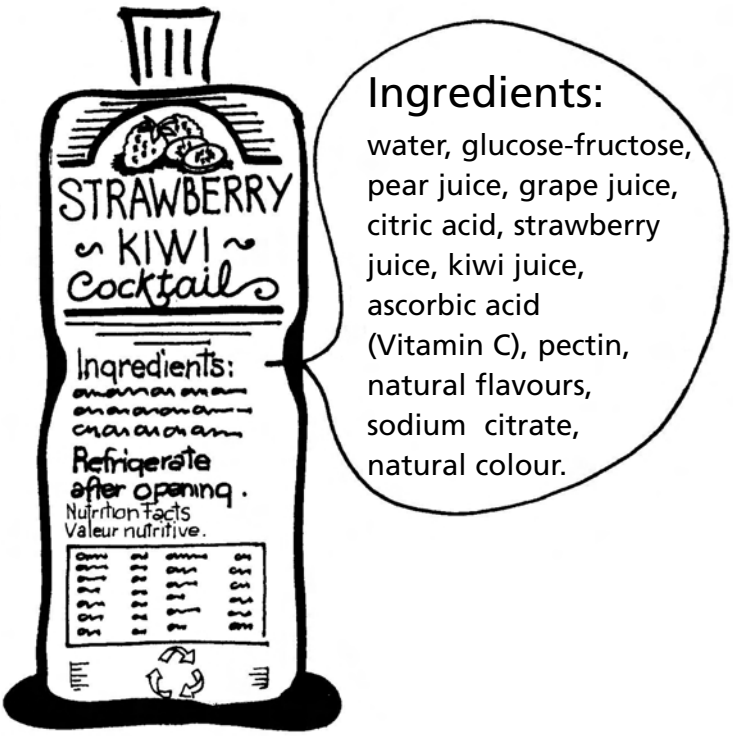
Daily Chemistry



Information Please







On food labels, the ingredients are listed from most to least amount. That means there is more of the first ingredient than any other one listed.

WHMIS Labels

DHMO

No odour, colour, or taste.

Risk Phrases

Inhaling liquid can cause death.

Health Hazard Data

Gas may cause severe burns.

Solid may cause severe tissue damage.

Ingesting large quantities may cause excessive sweating, urination, bloating, nausea, or vomiting.

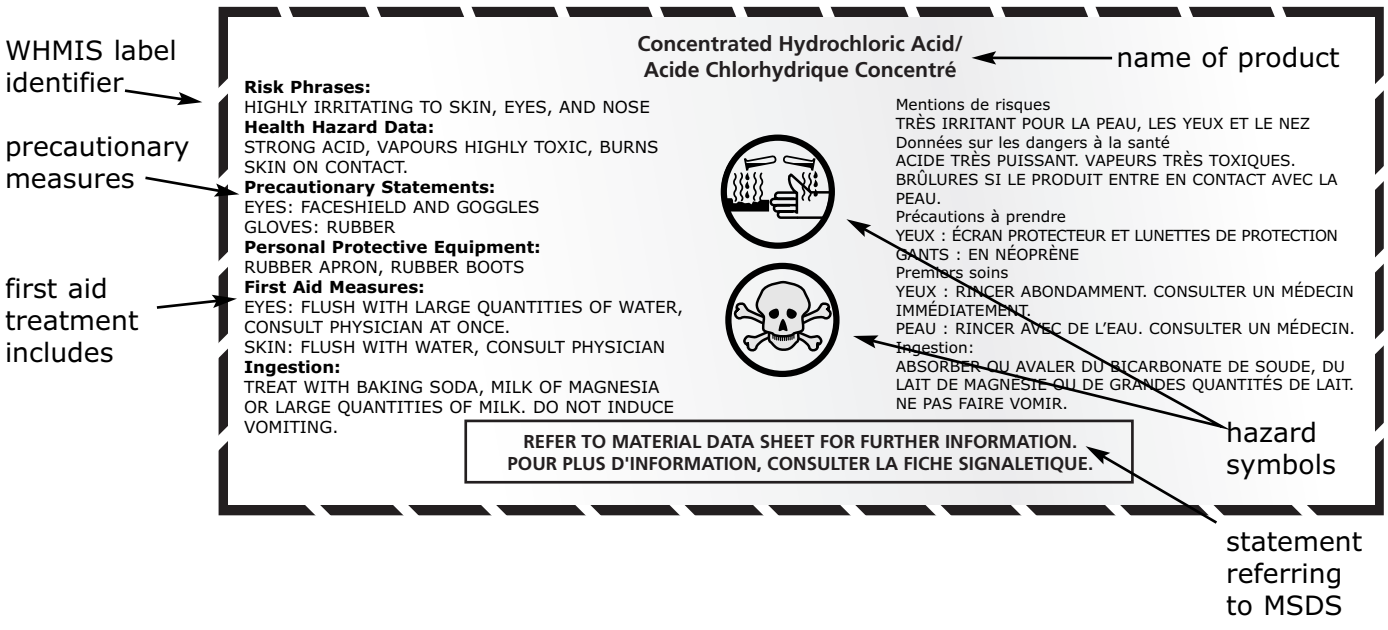
Personal Protective Equipment

Wear gloves when you use very hot or cold DHMO.

First Aid Measures

When inhaled: Consult physician at once.

REFER TO MATERIAL DATA SHEET FOR FURTHER INFORMATION.



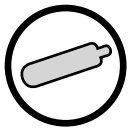
Periodic Table

Metal
Non-metal
Metalloid

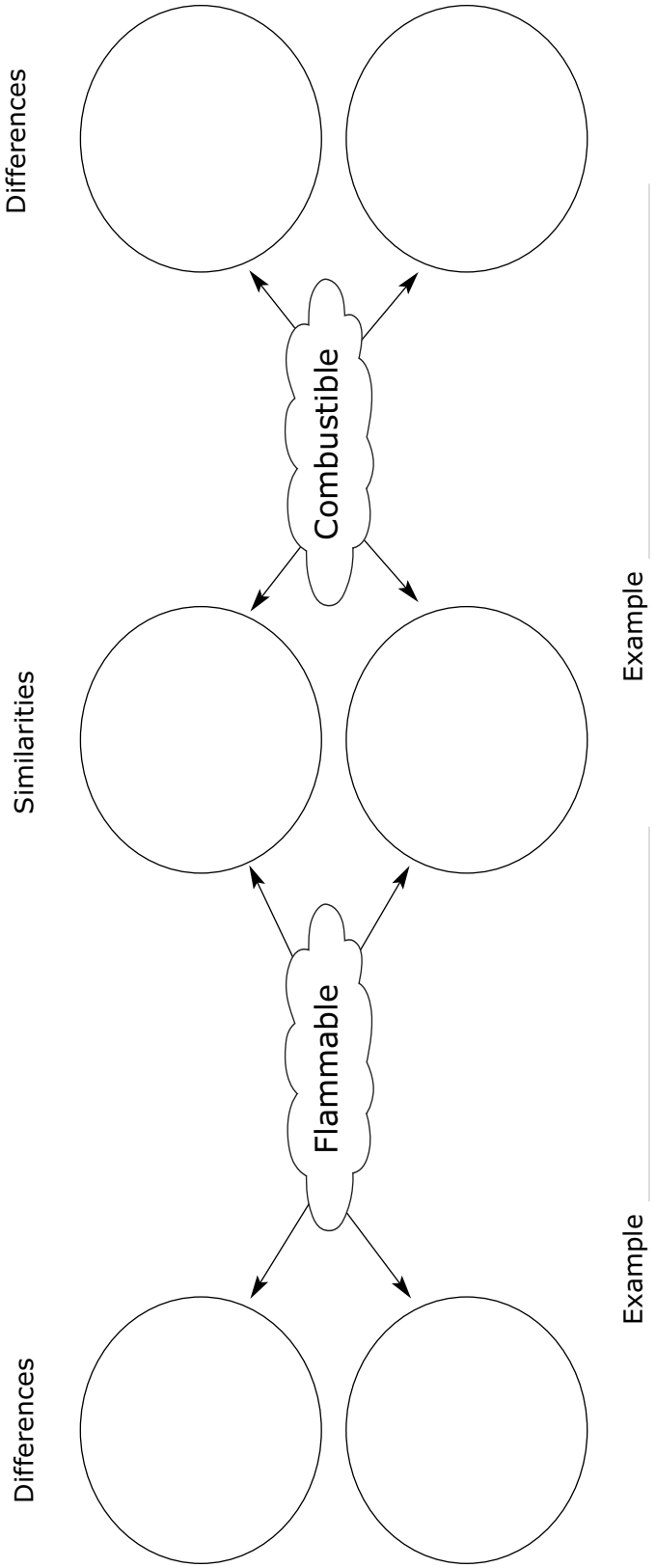
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110	111	112	113	114				

58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

WHMIS Symbols

Symbol	Meaning
	Compressed gas
	Reactive
	Corrosive
	Oxidizing material
	Poisonous
	Flammable
	Biohazardous
	Toxic

Compare Flammable and Combustible

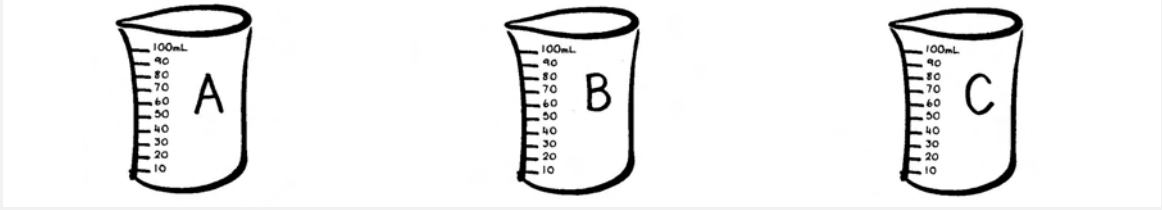


Making and Diluting a Solution

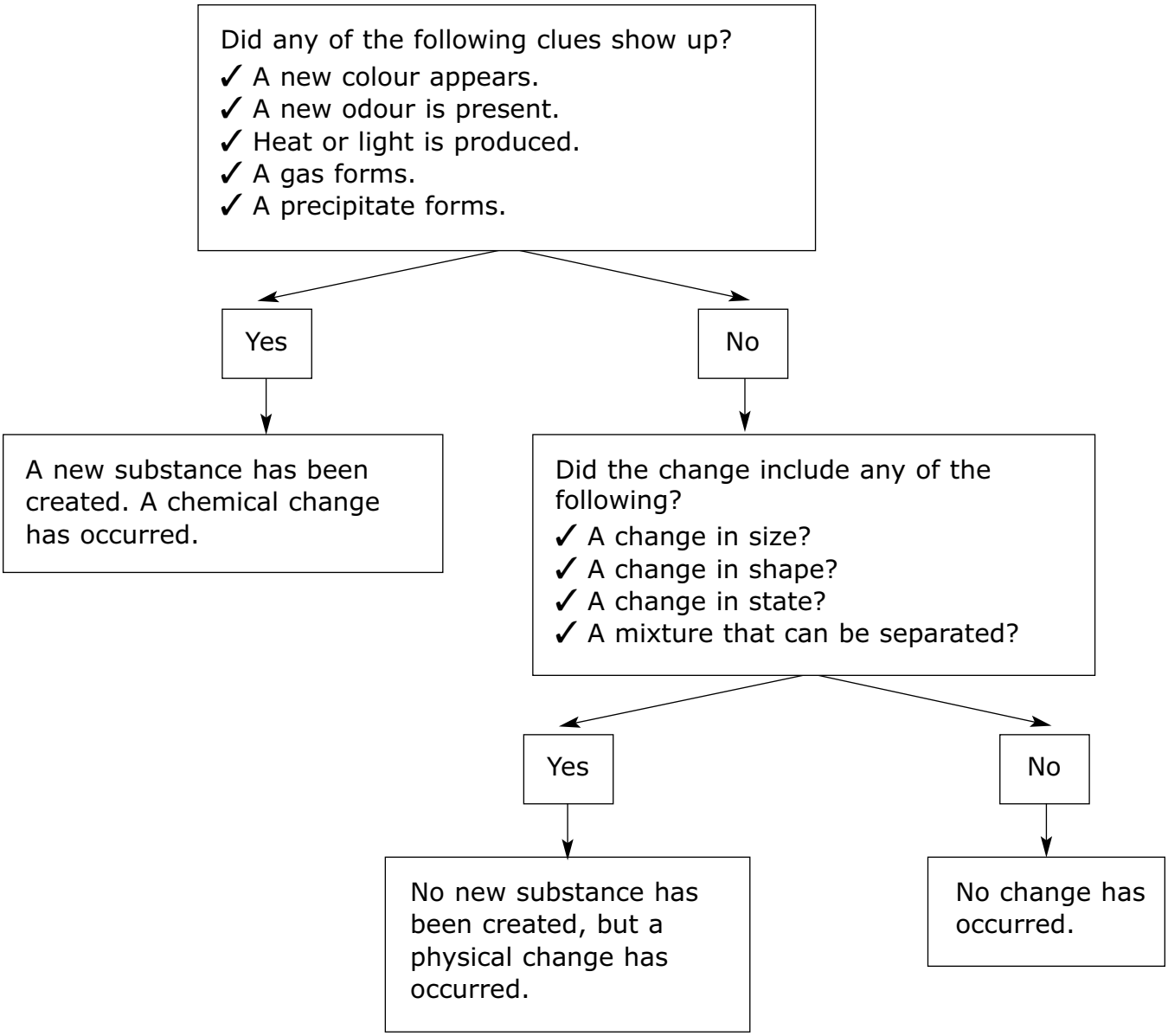
What Did You Find Out?

6. a) Shade the beakers below to show how much of the stock solution is contained in each one.

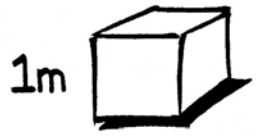
b) On the line under each beaker, write how the colour of the beaker compares to the other two. Use the words darkest, medium, or lightest.



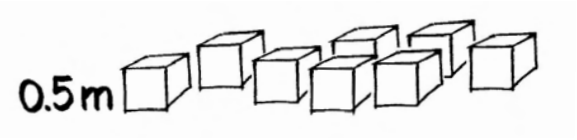
Identifying Physical Changes and Chemical Changes



Surface Area



Each face of this cube is
1 m by 1 m.



Each face of these cubes is
0.5 m by 0.5 m.

1. Use the formula $A = l \times w$ to calculate the area of each side of the large cube.
$A = l \times w$

$A =$ _____ $\times$ _____

$A =$ _____ m^2

2. How many sides are there in a cube?

_____

3. Multiply the number of sides by the area of each side. What is the total surface area of the cube?

_____ $\times$ _____ $=$ _____ m^2

4. Use the formula $A = l \times w$ to calculate the area of each side of a smaller cube.
$A = l \times w$

$A =$ _____ $\times$ _____

$A =$ _____ m^2

5. Multiply the number of sides by the area of each side. What is the total surface area of each cube?

_____ $\times$ _____ $=$ _____ m^2

6. How many cubes are there?

_____

7. Multiply the number of cubes by the total surface area of each cube. What is the total area of this set of cubes?

_____ $\times$ _____ $=$ _____ m^2

8. The set of eight cubes was made using the one large cube. How many times larger is the surface area of the set of small cubes than the surface area of the large cube? _____

TEST IT!

Big or Small: Faster or Slower?

Consider how you changed the surface area of the sugar cube to affect the rate of dissolving in the What's Going On? activity on the previous page. Use what you have learned to design a procedure to identify different ways you might increase the rate that bubbling antacid tablets (also called effervescent tablets) react with water.

Question
How does surface area affect how fast an effervescent tablet dissolves?

What Do You Think Will Happen?

1. Circle two words to make this a true statement:
The tablet with the LARGER SMALLER surface area will dissolve at a FASTER SLOWER rate.

2. Read the steps at the beginning of the What to Do section before you answer these questions.

a) What variable are you testing? _____

b) List at least three variables that will be important to keep the same. _____

_____

Safety Precautions 

- If glass beakers break, use a brush and a dust pan to collect the pieces. Put them in the broken glass container.
- Clean up the work area and wash your hands well with soap and water at the end of the investigation.

What You Need
3 – 100 mL beakers
stopwatch
3 identical antacid tablets
plastic bag or mortar and pestle
water

What to Do

3. a) Describe how you will change the surface area of the tablets.

_____

b) What visual clue will you use to watch the rate of change of the tablets? _____

TEST IT! (continued)

c) When will you start and stop the stopwatch?

4. Write a step-by-step procedure for testing how surface area affects the rate of change.

What Did You Observe?

5. Make a table to record your observations.

What Did You Learn?

6. What did you learn about surface area and the rate of a change?

7. Did your procedure work well? YES NO
If you had to improve at least one thing, what would you change?

TEST IT!

Concentrated or Dilute: Faster or Slower?

Read the What to Do section before you answer these questions.

Question

1. What question will you try to answer in this test?

What Do You Think Will Happen?

2. Do you think there will be a difference in rate of change when the concentrations of the acid solutions change? YES NO

Explain.

3. a) What variable are you testing?

b) List at least three variables that will be important to keep the same to make this a fair test, and why.

Safety Precautions

- Wear the safety glasses during the investigation.
- Wash your skin well if you spill acid on it.
- Clean up spills immediately after they happen.
- Clean up the work area and wash your hands well with soap and water at the end of the investigation.

What You Need

Solution 1: 20 mL low-concentration hydrochloric acid
Solution 2: 20 mL medium-concentration hydrochloric acid
Solution 3: 20 mL high-concentration hydrochloric acid
3 equal-sized pieces of magnesium ribbon
stopwatch

TEST IT! (continued)

What to Do

4. Check off each box as you do the steps.

- ❑ Add a piece of magnesium metal to Solution 1. Start the stopwatch as soon as the metal hits the acid.
- ❑ Stop the watch when the magnesium metal completely reacts with the acid and disappears.
- ❑ Record the time in the table.

5. Check off each box as you do the steps.

- ❑ Add a piece of magnesium metal to Solution 2. Start the stopwatch as soon as the metal hits the acid.
- ❑ Stop the watch when the magnesium metal completely disappears.
- ❑ Record the time in the table.

6. Check off each box as you do the steps.

- ❑ Add a piece of magnesium metal to Solution 3. Start the stopwatch as soon as the metal hits the acid.
- ❑ Stop the watch when the magnesium metal completely disappears.
- ❑ Record the time in the table.

What Did You Observe?

7. Record the relative concentration of each solution and the time for reaction of each. Then circle the relative rate of change.

	Concentration of Solution	Time for Reaction (s)	Rate of Change
Solution 1	High Medium Low		Fast Medium Slow
Solution 2	High Medium Low		Fast Medium Slow
Solution 3	High Medium Low		Fast Medium Slow

What Did You Learn?

8. Look back at the question you developed for this investigation. What did you find out?

TEST IT!

Hot or Cold: Faster or Slower?

Question

How does temperature affect the rate of a change?

What Do You Think Will Happen?

1. Circle the correct word to complete the statement.

a) The change will be fast when the temperature of water is HOT COLD.

b) The change will be slow when the temperature of water is HOT COLD.

2. Read the What to Do section before you answer these questions.

a) What variable are you testing? _____

b) List at least three variables that will be important to keep the same to make this a fair test.

_____

_____

Safety Precautions

- If glass beakers break, use a brush and a dust pan to collect the pieces. Put them in the broken glass container.
- Do not touch the top of the hot plate at any time.
- To unplug a hot plate, pull on the plug, not the cord.
- Clean up the work area and wash your hands well with soap and water at the end of the investigation.

What You Need

3 – 100 mL beakers
120 mL water
hot plate
ice
thermometer
stopwatch
2 identical effervescent antacid tablets
ruler

What to Do

3. Check off each box as you do the steps.

- ❑ Pour 50 mL of water into each of two beakers. Label the beakers A and C.
- ❑ Place beaker C on the hot plate. Plug in the hot plate and turn on the heat.
- ❑ In a third beaker, put 20 mL of water and a handful of ice. Label it B.

TEST IT! (continued)

4. Check off each box as you do the steps. Use beaker A.

- ❑ Hold the thermometer in the water, not touching the sides of the beaker, for 30 seconds.
- ❑ Read the temperature. Record it in the chart on the next page.
- ❑ One partner should hold the tablet above the beaker. Another partner should have the stopwatch ready.
  - Drop one effervescent tablet in the room temperature water.
  - Start the stopwatch as soon as the tablet hits the water.
- ❑ Stop the watch when the whole tablet reacts (disappears).
- ❑ Record the time in the chart.

5. Check off each box as you do the steps. Use beaker B.

- ❑ Add or subtract water until there is 50 mL of ice water in the beaker.
- ❑ Hold the thermometer in the water, not touching the sides of the beaker, for 30 seconds.
- ❑ Read the temperature. Record it in the chart.
- ❑ One partner should hold the tablet above the beaker. Another partner should have the stopwatch ready.
  - Drop one effervescent tablet in the ice water.
  - Start the stopwatch as soon as the tablet hits the water.
- ❑ Stop the watch when the whole tablet reacts (disappears).
- ❑ Record the time in the chart.

6. Check off each box as you do the steps. Use beaker C.

- ❑ Turn off the hot plate.
- ❑ Hold the thermometer in the water, not touching the sides of the beaker, for 30 seconds.
- ❑ Read the temperature. Record it in the chart.
- ❑ One partner should hold the tablet above the beaker. Another partner should have the stopwatch ready.
  - Drop one effervescent tablet in the hot water.
  - Start the stopwatch as soon as the tablet hits the water.
- ❑ Stop the watch when the whole tablet reacts (disappears).
- ❑ Record the time in the chart.

TEST IT! (continued)

What Did You Observe?

7. Record your results in the table.

	Temperature (°C)	Time (s)	Rate of Change (Fast, Slow, or In-Between)
A. Room temperature water			
B. Ice water			
C. Hot water			

What Did You Learn?

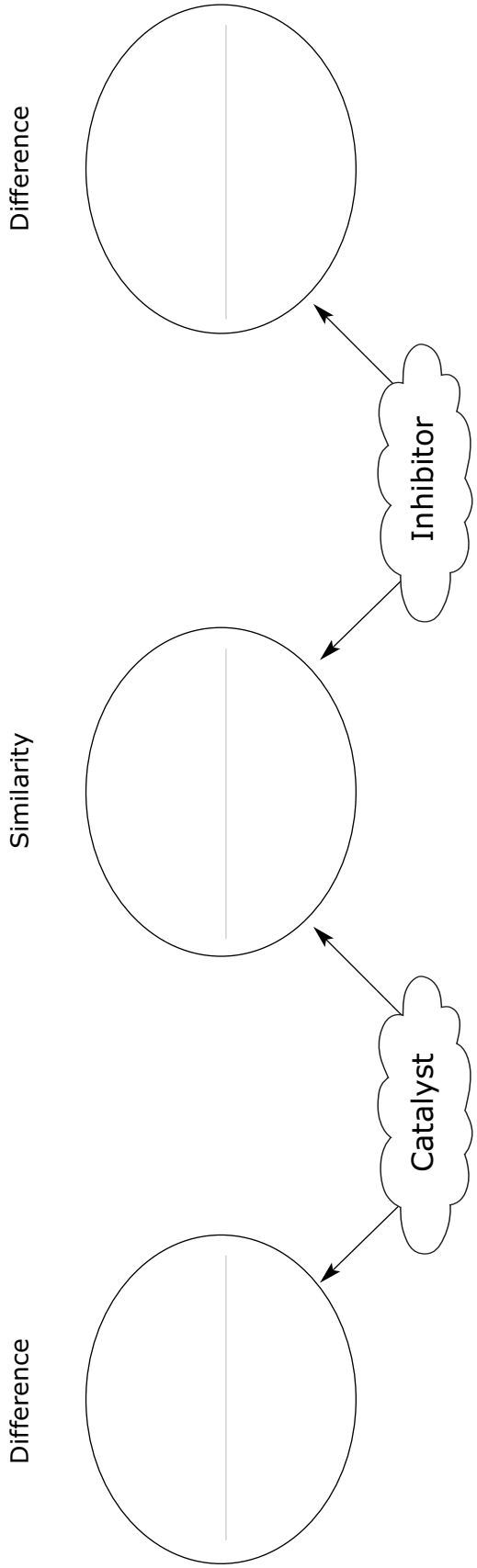
8. Graph the time it took for the tablet to react each time. Use the checklist to help you complete your graph.

- ❑ Title your line graph.
- ❑ Title the *x*-axis as "Temperature of Water (°C)." This is the independent variable.
- ❑ Title the *y*-axis as "Time for the Tablet to React (s)." This is the dependent variable.
- ❑ Decide on a scale for each axis. Use at least 60° on the temperature axis. Number each axis.
- ❑ Plot the points for the hot, room temperature, and ice water readings using the data in the table.
- ❑ Join the points.

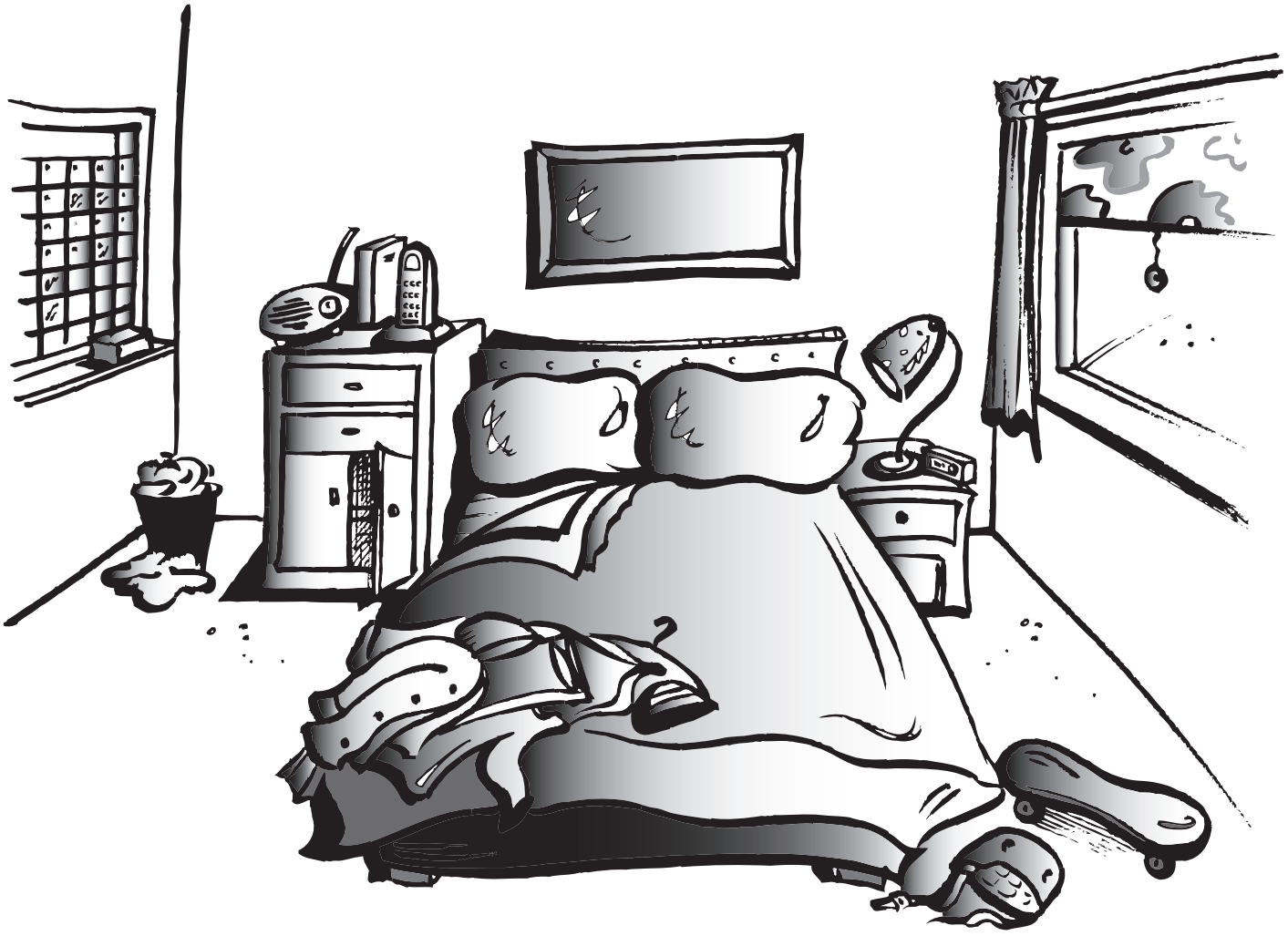
9. Extend the line of your graph so it goes to 60°C. If the data points do not make a clear line, use your ruler to estimate the best straight line to join the points and draw it in lightly with a pencil. Read your pencil line to find out how long it would take the tablet to dissolve if the temperature of the water was

a) 20°C _____ **b)** 40°C _____ **c)** 60°C _____

Compare Catalysts and Inhibitors



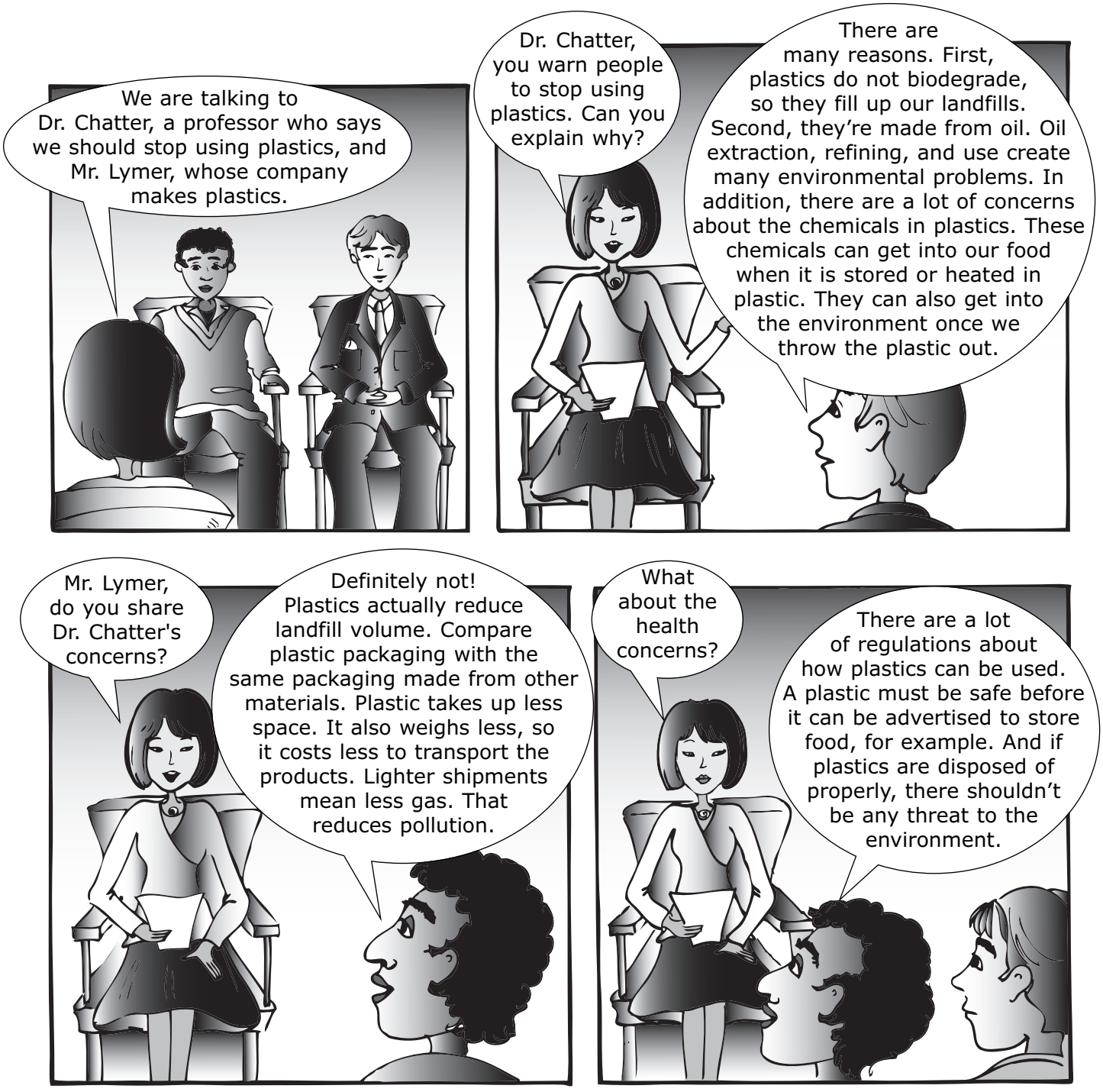
Plastics in Your Life



Types of Plastic

Recycling Code and Name of Plastic	Properties	Uses
a) 1		
b) 2		
c) 3		
d) 4		
e) 5		
f) 6		
g) 7 Other plastics		

Plastics, Health, and the Environment



TEST IT!

POP THE TOP!

Use your knowledge of rates of reaction to power-up a rocket. A film canister and lid will be your model rocket. The fuel will be made of an effervescent tablet and water.

Before you start, consider the variables you will work with.

1. a) If I use a different surface area of the solid, then the _____ and the _____ must be kept the same.

b) If I use a different amount of the reactants, then the _____ and the _____ must be kept the same.

c) If I change the temperature of the water, then the _____ and the _____ must be kept the same.

Question

2. What question will you ask?

What Do You Think Will Happen?

3. Predict the results of your test.

Safety Precautions 

4. What safety precautions will you need to take to prevent injury?

What You Need

clear film canister with a snap-on lid
effervescent tablets
water
metre stick or stopwatch
mortar and pestle (optional)
thermometer (optional)

TEST IT! (continued)

What to Do

5. Describe what you will do. Use these questions to help you.

a) Circle the variable you will test:
AMOUNT SURFACE AREA TEMPERATURE

b) Which variables will stay the same?

c) How will you change the variable for each test? Fill in the Details of Variable column in the observation chart on the next page. For example, if the surface area of the tablet will change, you might list: whole, halves, quarters, and crushed.

d) Will you measure the distance the rocket travelled or the time it takes to pop the top off the rocket? Add Distance or Time to the title of the Result column in the observation chart. Include the unit of measure.

6. a) Write a step-by-step procedure for carrying out the test. Have these instructions approved by your teacher before you start testing.

b) Add any more equipment or materials you will use to What You Need.

c) Sketch the set-up for the test.

What Did You Observe?

7. What happened when you combined the effervescent tablet and water?

8. Record your results.

Test	Details of Variable	Result: _____
1		
2		
3		
4		

TEST IT! (continued)

What Did You Discover?

9. Graph your data. Use the checklist to help you complete your graph.

- ❑ Title your graph.
- ❑ Title and label the *x*-axis with the variable you tested.
- ❑ Decide on a scale for the *y*-axis.
- ❑ Title and label the *y*-axis with the distance or time.
- ❑ Plot the observation points you recorded in the chart.
- ❑ Join the points.

10. What happened to the result as the variable changed?

11. **a)** Did changing the variable make a difference to the time or distance travelled? YES NO

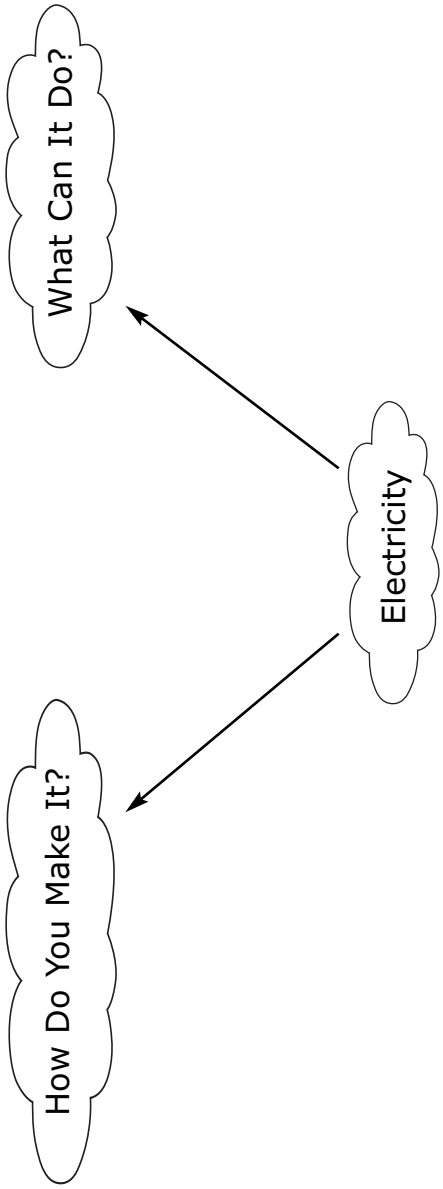
b) What evidence supports your answer?

12. How would you improve this test if you repeated it?

13. Would someone who repeated your test get the very same results? YES NO Explain why or why not.

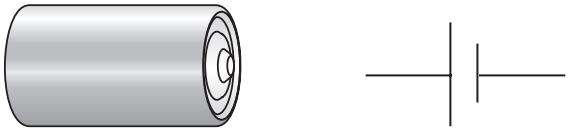
14. Did your fuel use a physical or chemical change to launch the rocket? Use the flowchart on page 50 to help you decide.

Electricity



Parts of a Circuit and Circuit Symbols

☑ **Source**: A battery is one source of electric energy.

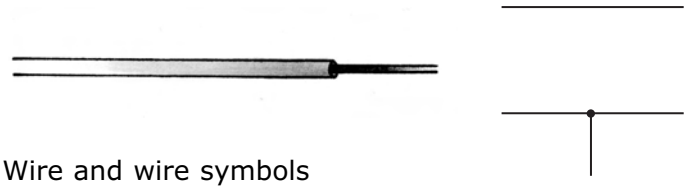


Battery and battery symbol

☑ **Load**: A load changes electric energy into another kind of useful energy. Examples of loads are light bulbs, motors, heaters, and speakers.

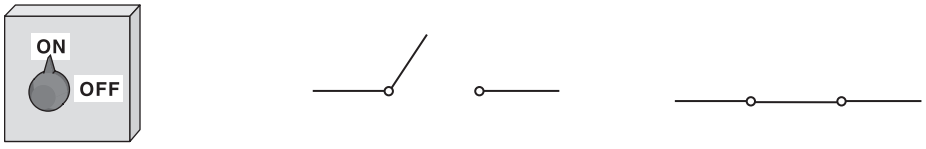
Light bulb and load symbol

☑ **Conductor**: A conductor is material that electricity flows along. A wire is a type of conductor. All wires are shown using straight lines.



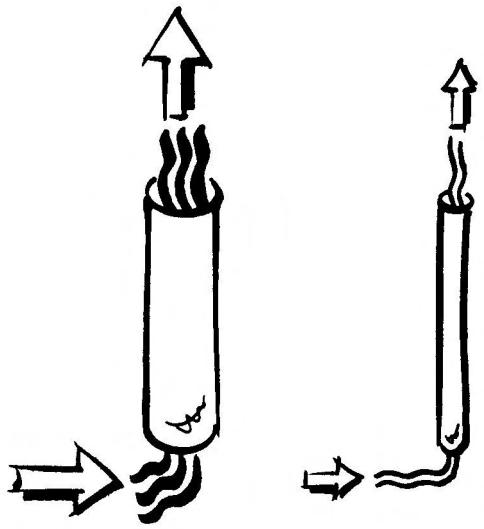
Wire and wire symbols

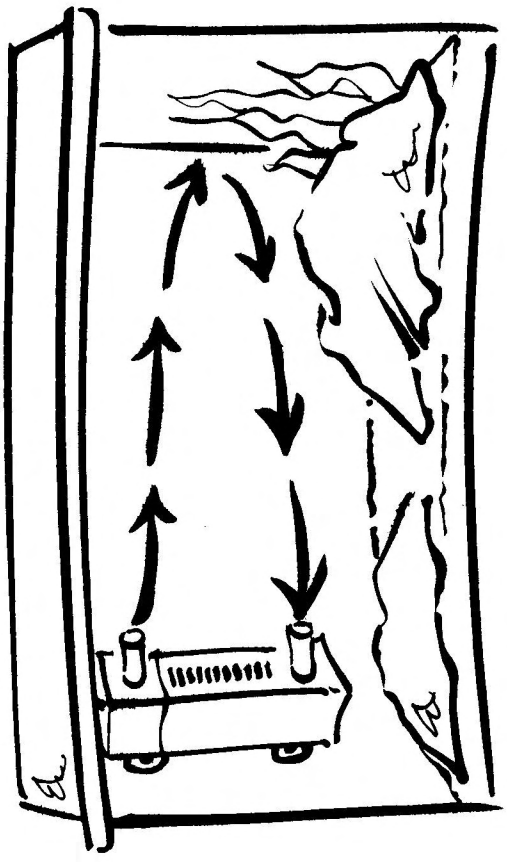
☑ **Switch**: Device that controls the current in an electric circuit. A switch lets you open and close a circuit.



Switch and switch symbols

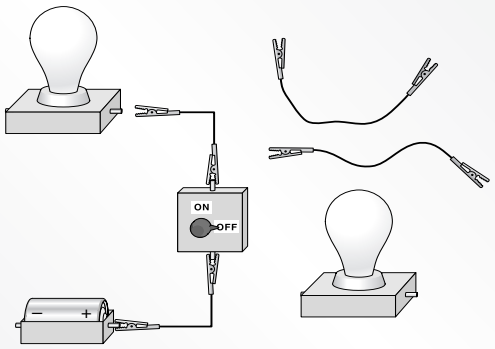
Measuring Current





Building Circuits Checklist

1. Safety comes first.

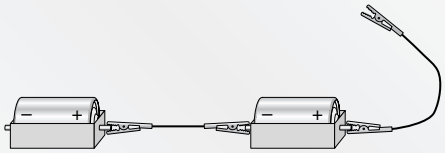


- ☑ Check all your equipment. Replace any damaged equipment.
- ☑ Remove all metal jewellery.
- ☑ Make sure your work area is clean, dry, and uncluttered.

2. Connect loads in order.

- ☑ Connect one end of a wire to the positive terminal of the battery.
- ☑ Connect components one at a time.
- ☑ Complete the circuit by connecting the free end of the last wire to the negative terminal of the battery.
- ☑ If you are connecting one wire to another, use the alligator clips to hold the wires together.

3. Face all batteries the same way.



- ☑ If you are connecting batteries together, always connect the positive terminal of one battery to the negative terminal of the next battery.

4. Keep switches off.

- ☑ Always keep the switch in the "off" position until the circuit is complete. When you are ready to use your circuit, turn the switch on. Turn it off when you are finished.

Calculate the Power Used

To calculate power, you need to know the amount of energy in **joules (J)**. You also need to know the amount of time in seconds (s).

A CD player uses 2550 J in 30 s. What is the power rating of the CD player? Show your work.

How to Solve It

STEP 1: Write down what you know.

Power = ?
Energy = 2550 J
Time = 30 s

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

STEP 2: What do you want to find out?

How much power is produced.

STEP 3: Use the formula.

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

$$\text{Power} = \frac{2550\ \text{J}}{30\ \text{s}}$$

C 2550 ÷ 30 = 85

STEP 4: Express the power in watts.

The power rating of the CD player is 85 W.

Solve These

1. A hand dryer in a washroom uses 7500 J in 5 s. What is the power rating of the hand dryer? Show your work.

STEP 1: Write down what you know.

Power = ?
Energy = _____
Time = _____

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

Calculate the Power Used (continued)

OHT B–6

STEP 2: What do you want to find out?

How much _____ is produced.

STEP 3: Use the formula.

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

$$\text{Power} = \frac{\square}{\square}$$

C ____ ÷ ____ = ____

STEP 4: Express the power in watts. _____

_____

2. An LED traffic light uses 1020 J in 60 s. What is the power rating of the LED traffic light? Show your work.

STEP 1: Write down what you know.

Power = ?

Energy = _____

Time = _____

What formula do you use?

_____ = $\frac{\square}{\square}$

STEP 2: What do you want to find out?

_____

STEP 3: Use the formula.

$$\text{Power} = \frac{\square}{\square}$$

$$\text{Power} = \frac{\square}{\square}$$

C ____ ÷ ____ = ____

STEP 4: Express the power in watts. _____

_____

Your teacher will give you additional questions to try on your own.

Calculate Your Cost

You leave a 100 W light bulb on for 2.0 h. How much energy in kWh does the light bulb use? Show your work.

How to Solve It

STEP 1: Write down what you know.

Energy used = ?
Power = 100 W
Time = 2.0 h

1 kW = 1000 W
Energy used = Power x Time

STEP 2: What do you want to find out?

How much energy is used.

STEP 3: Convert watts to kilowatts.

100 W ÷ 1000 = 0.1 kW

STEP 4: Use the formula.

Energy used = Power x Time
Energy used = 0.1 kW x 2.0 h
Energy used = 0.2 kWh

If 1 kWh costs 9.0¢, how much did it cost to leave the light bulb on? Show your work.

How to Solve It

STEP 5: What do you want to find out?

How much 0.2 kWh of energy costs.

STEP 6: Multiply the amount of energy by the price of energy.

Total cost = 0.2 kWh x 9.0¢

= _____

Calculate Your Cost (continued)

STEP 7: State the total cost.

It cost 1.8¢ to leave the light bulb on for 2 h.

Solve These

1. a) The cooling device in a fridge needs 700 W. How much energy in kWh will the cooling device use in 3 h? Show your work.

STEP 1: Write down what you know.

Energy used = ?

Power = _____

Time = _____

1 kW = 1000 W

Energy used = Power x Time

STEP 2: What do you want to find out?

How much _____ is used.

STEP 3: Convert watts to kilowatts.

_____ W ÷ 1000 = _____ kW

STEP 4: Use the formula.

Energy used = Power x Time

Energy used = _____ x _____

Energy used = _____

1. b) If 1 kWh costs 7.0¢, how much would it cost to run the cooling device for 3 h? Show your work.

STEP 5: What do you want to find out?.

How much _____ kWh of energy costs.

STEP 6: Multiply the amount of energy by the price of energy.

Total cost = _____ x _____ C ____ X ____ = ____

STEP 7: State the total cost.

_____

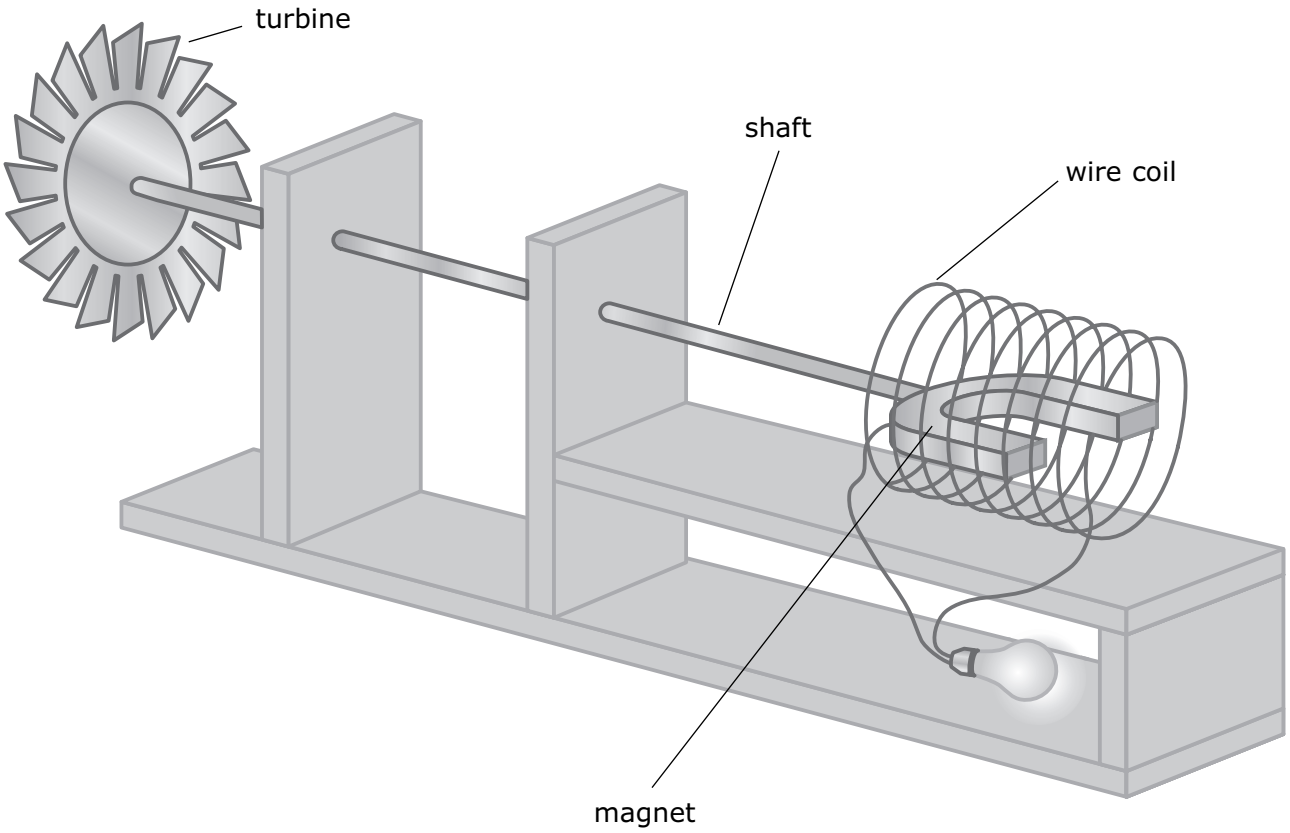
Your teacher will give you additional questions to try on your own.

How Do Electric Generators Work?

The _____ moves a wire coil. →

The _____ moves across a magnet. →

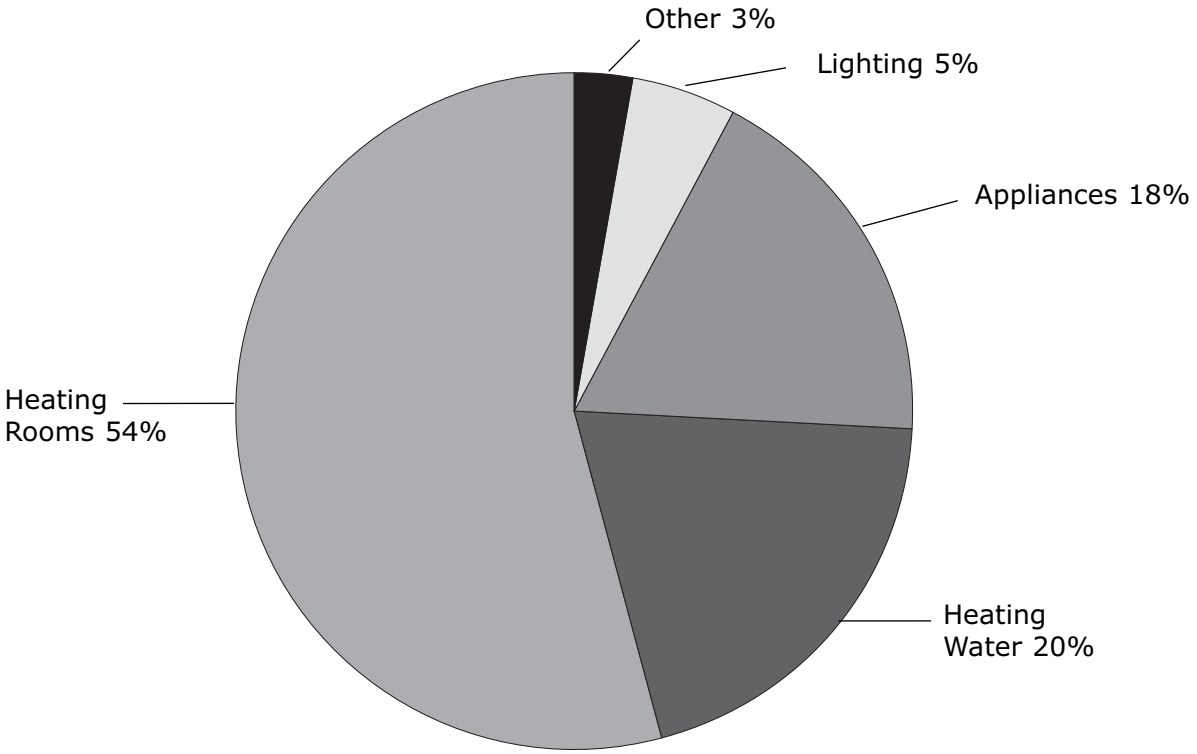
_____ flows in the wire coil.



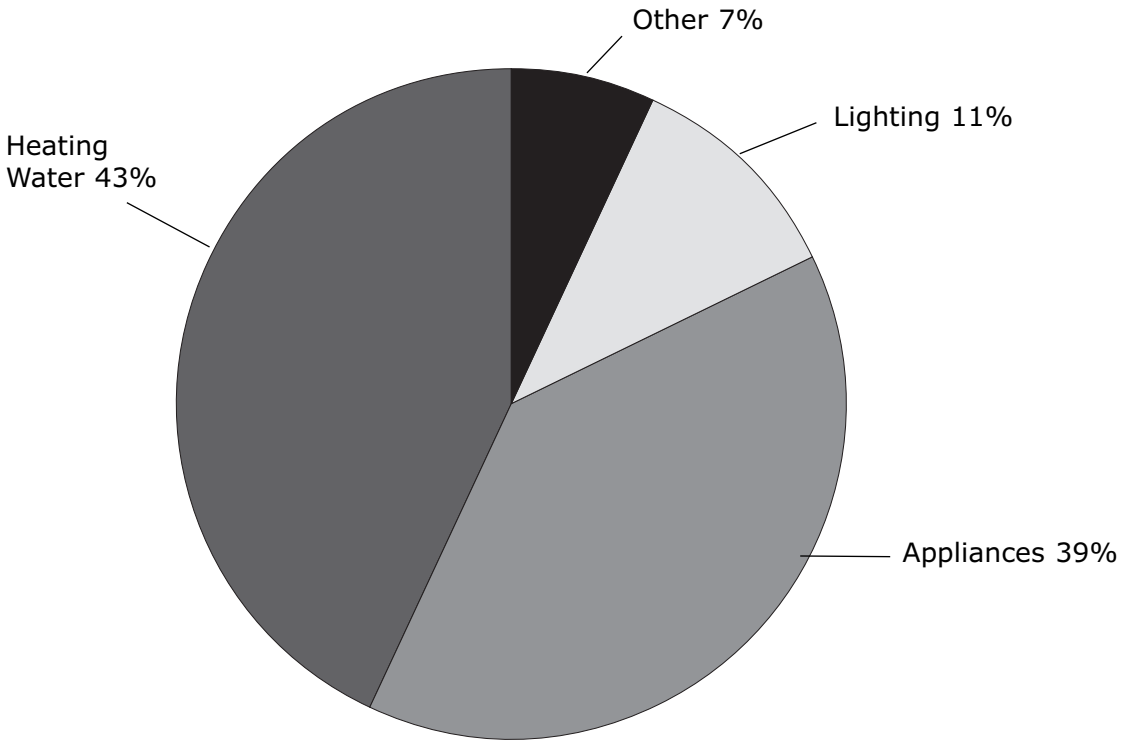
Electric Energy and the Environment

Electric Energy Option	Plus	Minus	Interesting
Fossil fuels			
Hydroelectric power			
Nuclear power			

Energy Consumption

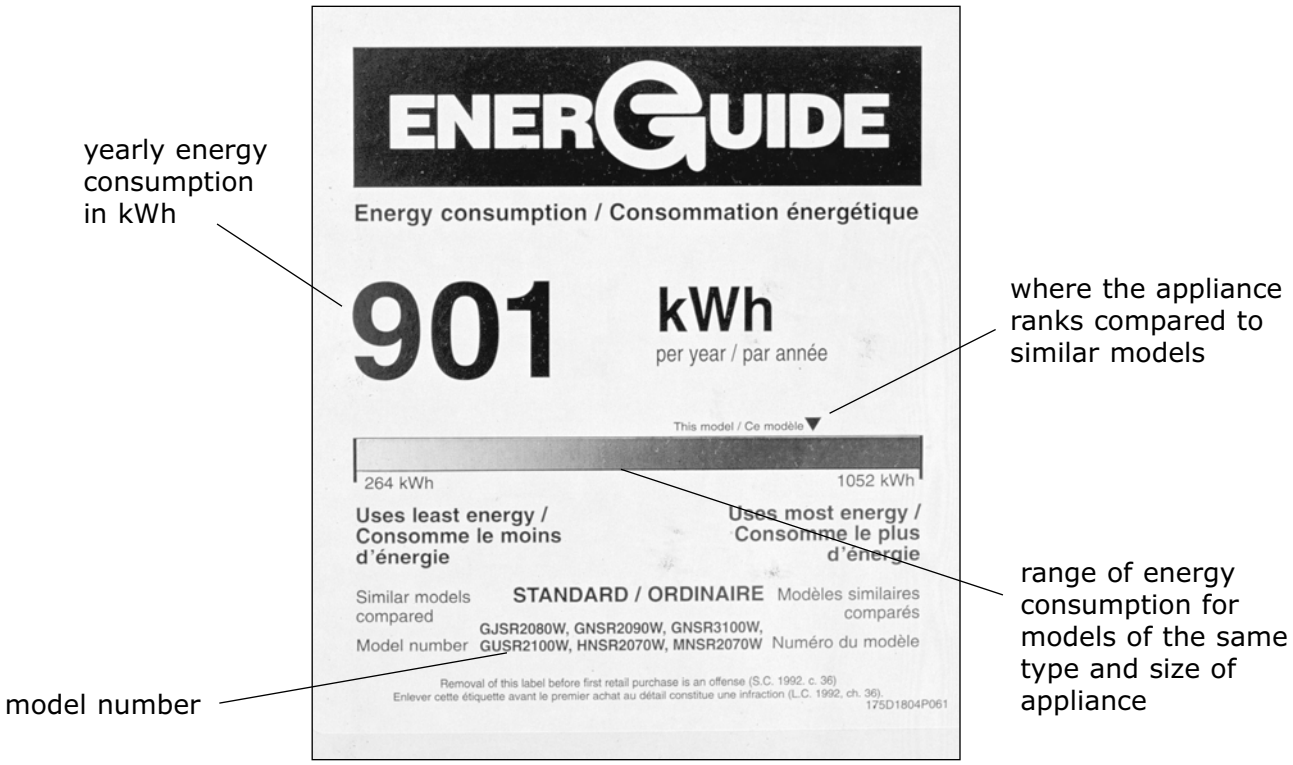


Electric energy consumption for a home heated by electric energy

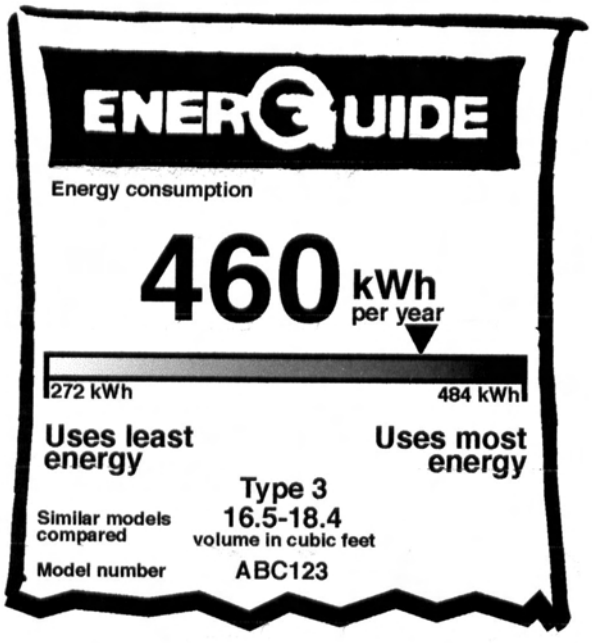


Electric energy consumption for a home not heated by electric energy

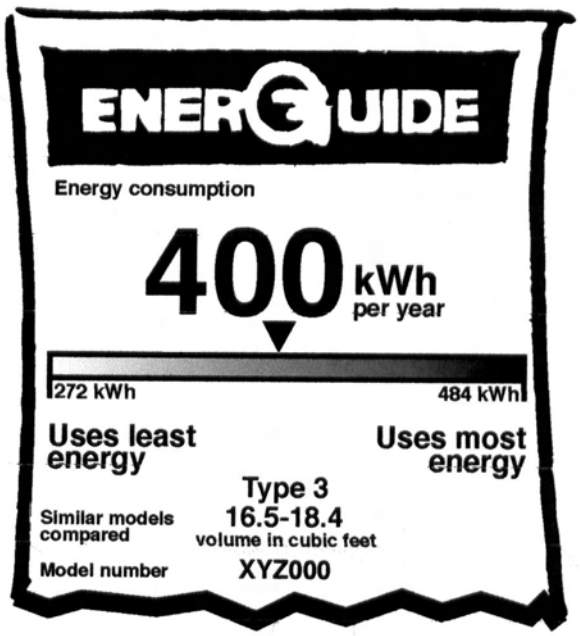
EnerGuide Ratings



Source: The Energuide Appliance Directory 2005, Natural Resources Canada.



Model A



Model B

Comparing Costs

You can use an appliance's EnerGuide rating to find out how much it will cost to use the appliance for a year.

The price of electric energy is 8.0¢/kWh. How much would it cost to use a fridge produced in 2002 for one year? (**Hint:** Find the EnerGuide rating in the table above.)

How to Solve It

STEP 1: Write down what you know.

Energy consumed in a year = EnerGuide rating = 514 kWh/year
Price of energy = 8.0¢/kWh
Cost for one year = Energy consumed in a year x Price of energy

STEP 2: What do you want to find out?

How much it will cost to use the fridge for one year.

STEP 3: Multiply the energy consumed by the price of energy.

Cost for one year = Energy consumed in a year x Price of energy
= 514 kWh/year x 8.0¢/kWh [C] 514 [X] 8.0 [=] 4112
= 4122¢/year [C] 4122 [÷] 100 [=] 41.22
= $41.22

Comparing Costs (continued)

The average lifespan of a fridge is 17 years. What is the cost of using the fridge over its lifespan?

How to Solve It

STEP 4: Multiply the yearly cost by the lifespan of the appliance.

Cost over lifespan = $41.12 year/x 17 years [C] 41.12 [X] 17 [=] 699.04

= $699.04

Solve These

2. a) The price of electric energy is 10.0¢/kWh. How much would it cost to use a clothes dryer produced in 1984 for one year?

STEP 1: Write down what you know.

EnerGuide rating = _____ kWh/year Price of electric energy = 10.0¢/kWh

Total cost for one year = _____ x _____

STEP 2: What do you want to find out?

How much _____ for one year.

STEP 3: Multiply the energy consumed by the price of energy.

Cost for one year = Energy consumed in a year x Price of energy

= _____ kWh/year x _____ ¢/kWh _____

= _____ ¢ ÷ 100 _____

= _____

2. b) The average lifespan of a clothes dryer is 18 years. What is the cost of using the clothes dryer over its lifespan?

STEP 4: Multiply the yearly cost by the lifespan of the appliance.

Cost over lifespan = _____ x _____

= _____

Your teacher will give you additional questions to try on your own.

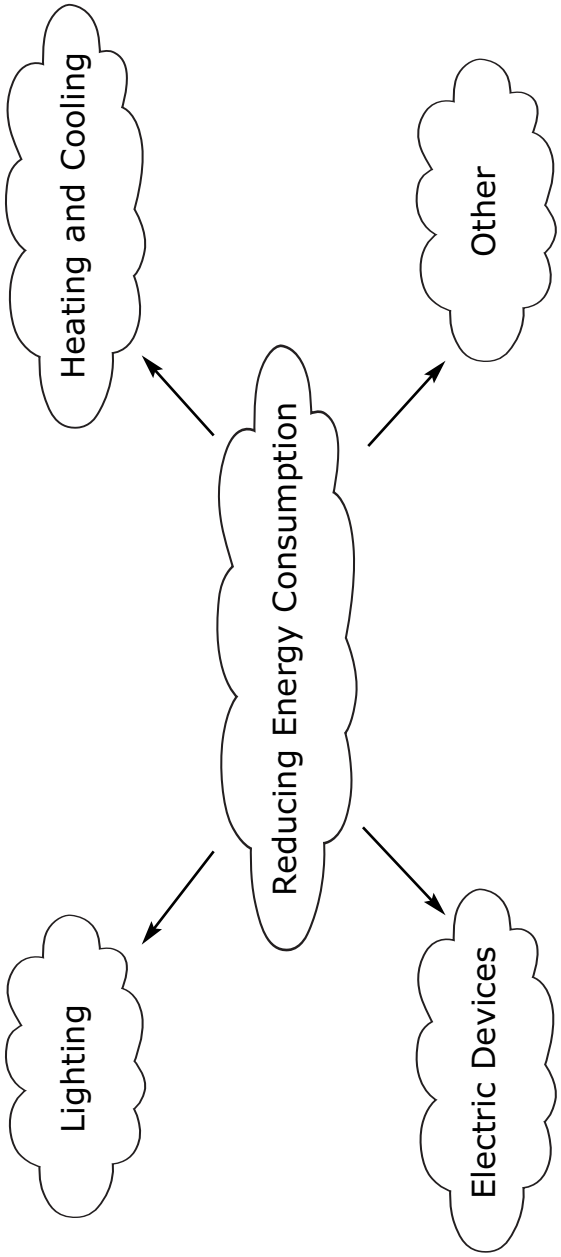
Energy Consumption at Home

A	B	C	D	E	F
Electric Device	**Power Rating (W)**	**Power (kW)** (Column B ÷ 1000)	**Hours Used per Day**	**Energy Used per Day (kWh)** (Column C x Column D)	**Energy Used per Month (kWh)** (Column E x 30 days)

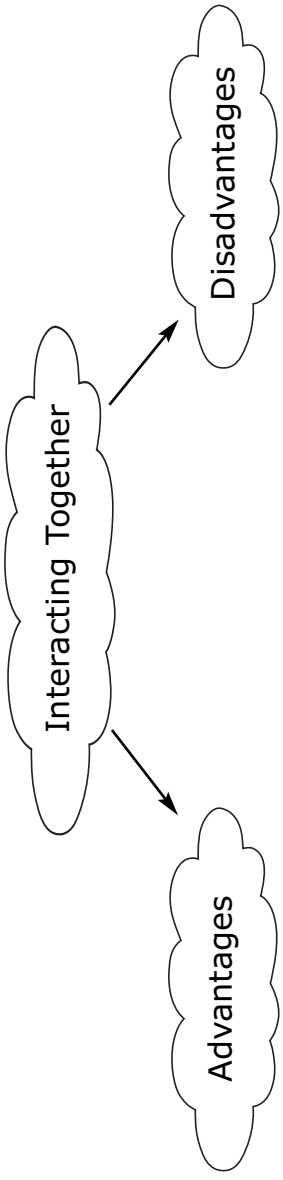
School Energy Audit

Electric Energy Use	Observations
Lighting	**a)** What types of lights are in the classrooms? **b)** What types of lights are in the hallways? **c)** About how many lights does the school have? (Include outdoor lights and lights in hallways and classrooms.) **d)** Note any lights that are left on all the time.
Computers	**e)** How many computers does the school use? **f)** Record the power rating of one of the computers. _____ kWh **g)** Are the monitors always left on? YES NO **h)** Are the computers always left on? YES NO

Reducing Energy Consumption

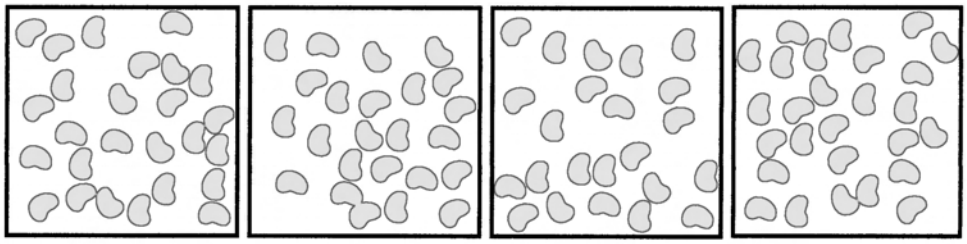


Interacting Together

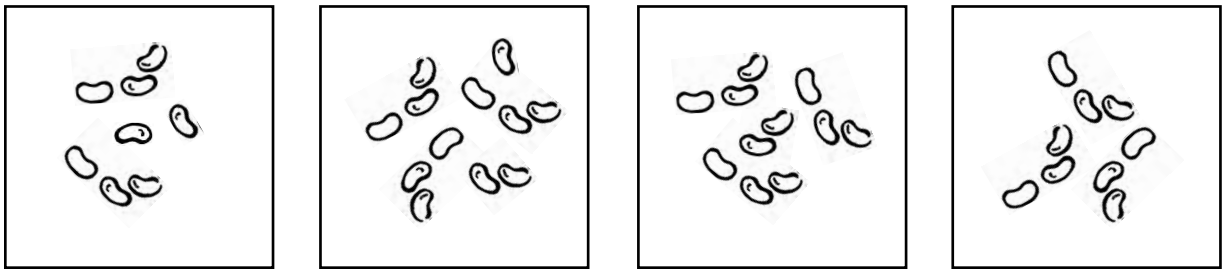


Estimating Beans

Example
25 beans = 1 container
25 beans x 4 containers = 100 beans
There are an estimated 100 beans.



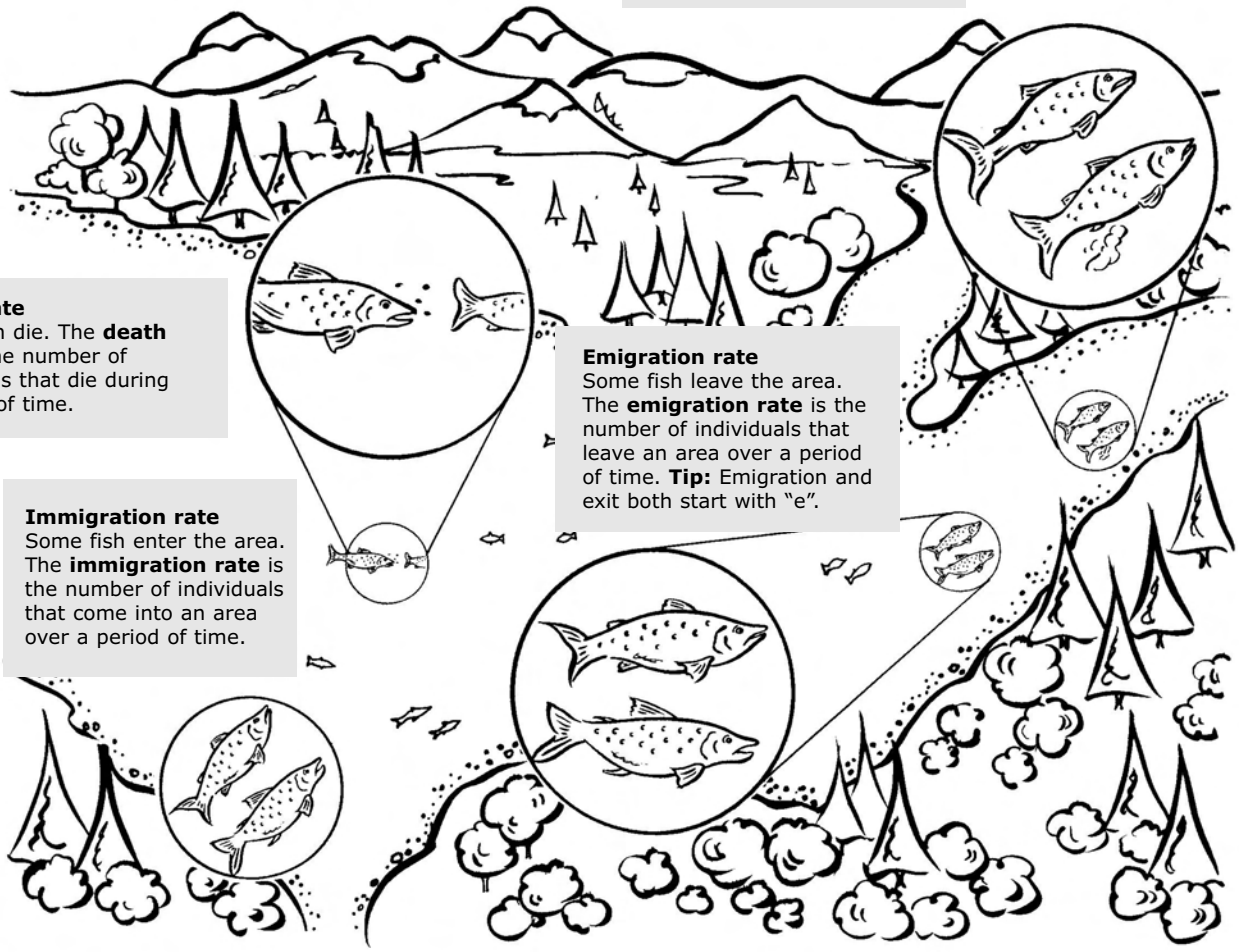
Each mark represents one bean.
Example
Square 1 = 26 beans
Square 2 = 24 beans
50 beans ÷ 2 squares = 25 beans per square
25 beans x 4 squares = 100 beans
There are an estimated 100 beans.



Factors that Affect the Size of a Population

The period of time for each rate is usually one year.

Birth rate
Some fish are born. The **birth rate** is the number of individuals produced over a period of time.



Death rate
Some fish die. The **death rate** is the number of individuals that die during a period of time.

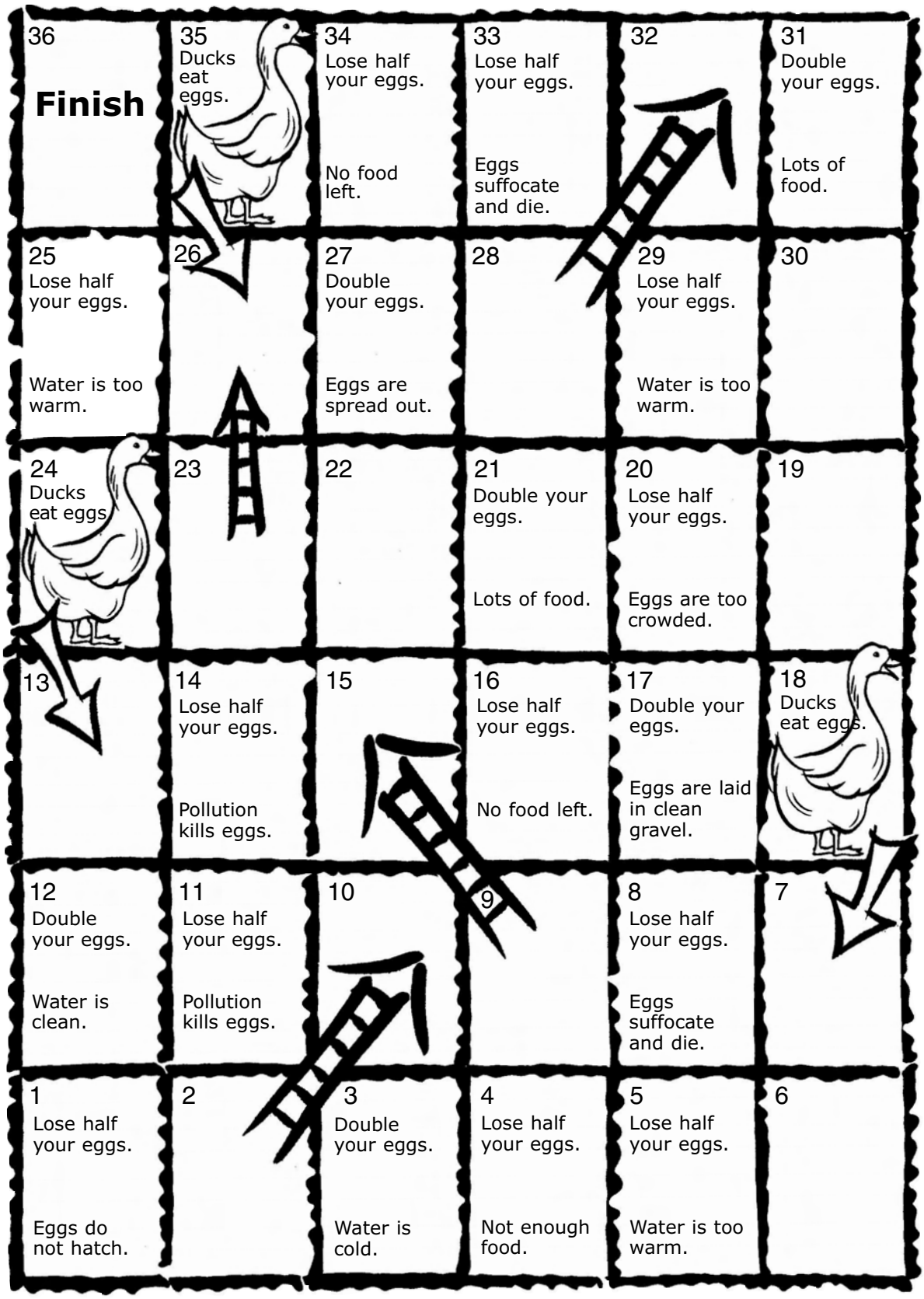
Emigration rate
Some fish leave the area. The **emigration rate** is the number of individuals that leave an area over a period of time. **Tip:** Emigration and exit both start with "e".

Immigration rate
Some fish enter the area. The **immigration rate** is the number of individuals that come into an area over a period of time.

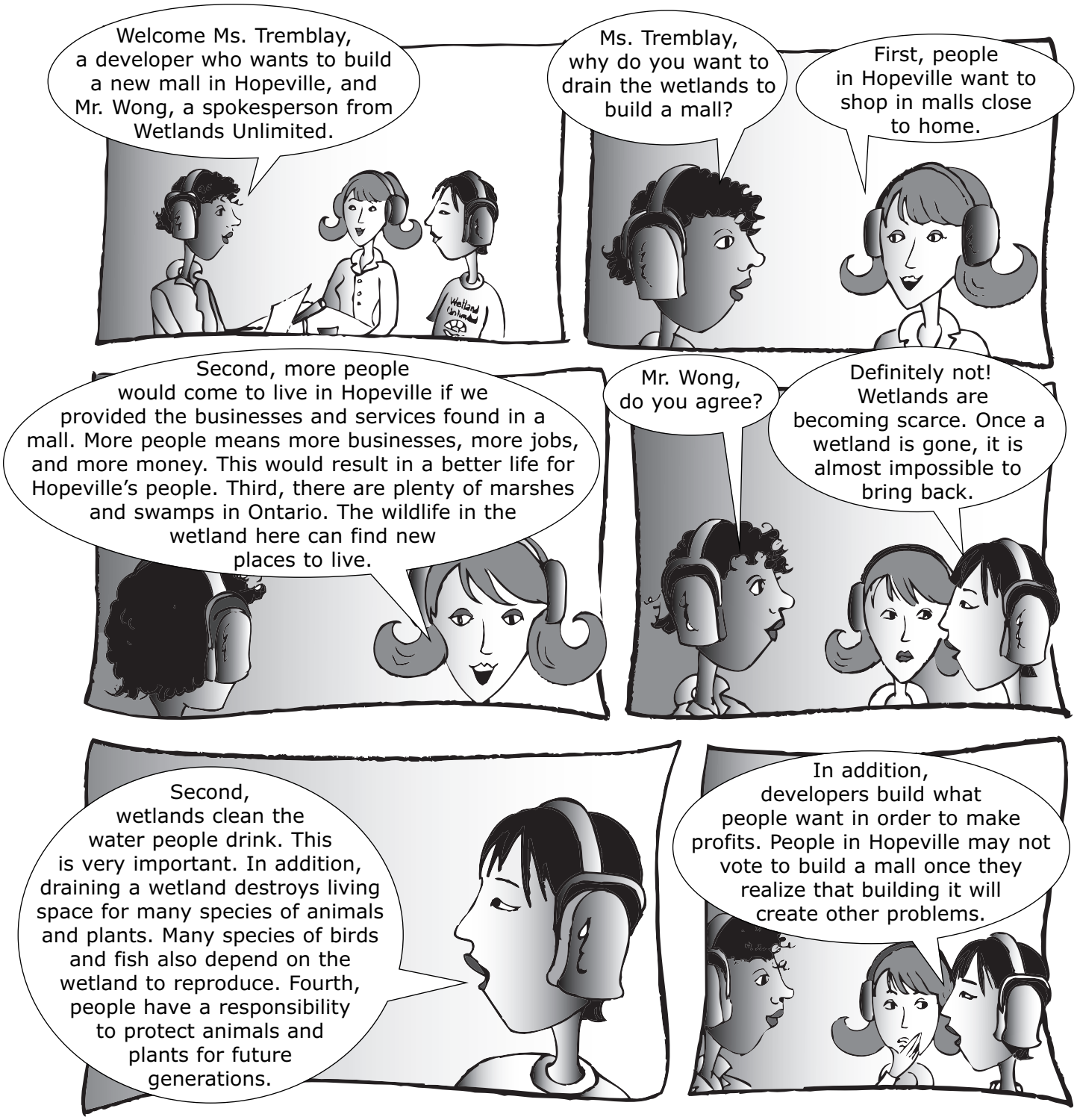
Death rate and emigration rate decrease the population size.

Birth rate and immigration rate increase the population size.

Survivor Game Board



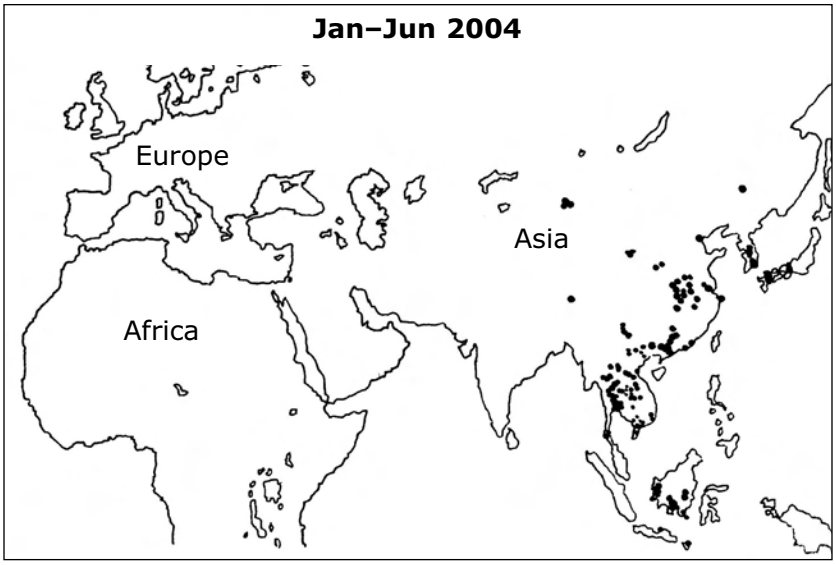
Draining a Wetland to Build a Mall

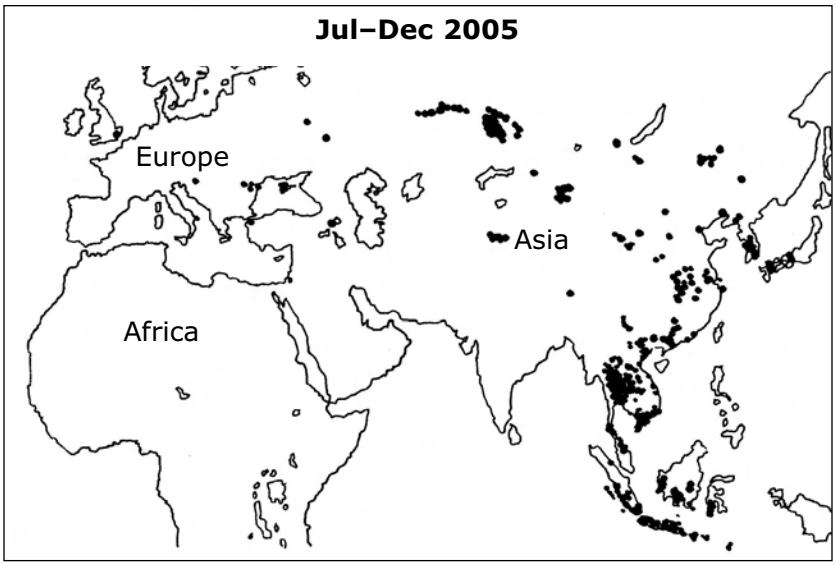


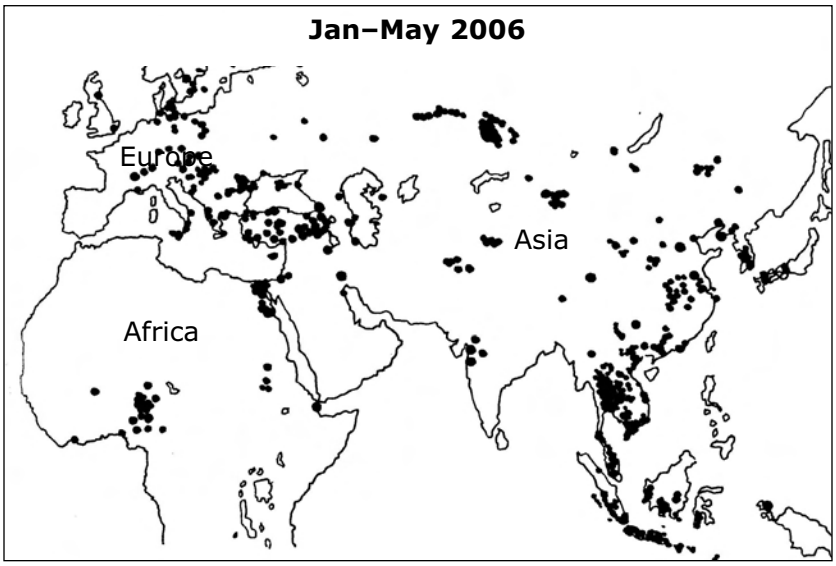
Microscope Checklist

- ❑ Plug in your microscope and turn on the light.
- ❑ Turn the nosepiece until the low-power lens faces the stage.
- ❑ Put the slide on the stage.
- ❑ Secure it in place using the stage clips.
- ❑ Use the coarse-adjustment knob to bring the lens as close as it will go to the stage.
- ❑ Look in the eyepiece. Slowly turn the coarse-adjustment knob to get the object in focus.
- ❑ Make sure the sample is in the centre of the circle.
- ❑ Turn the fine-adjustment knob to get the best focus possible.

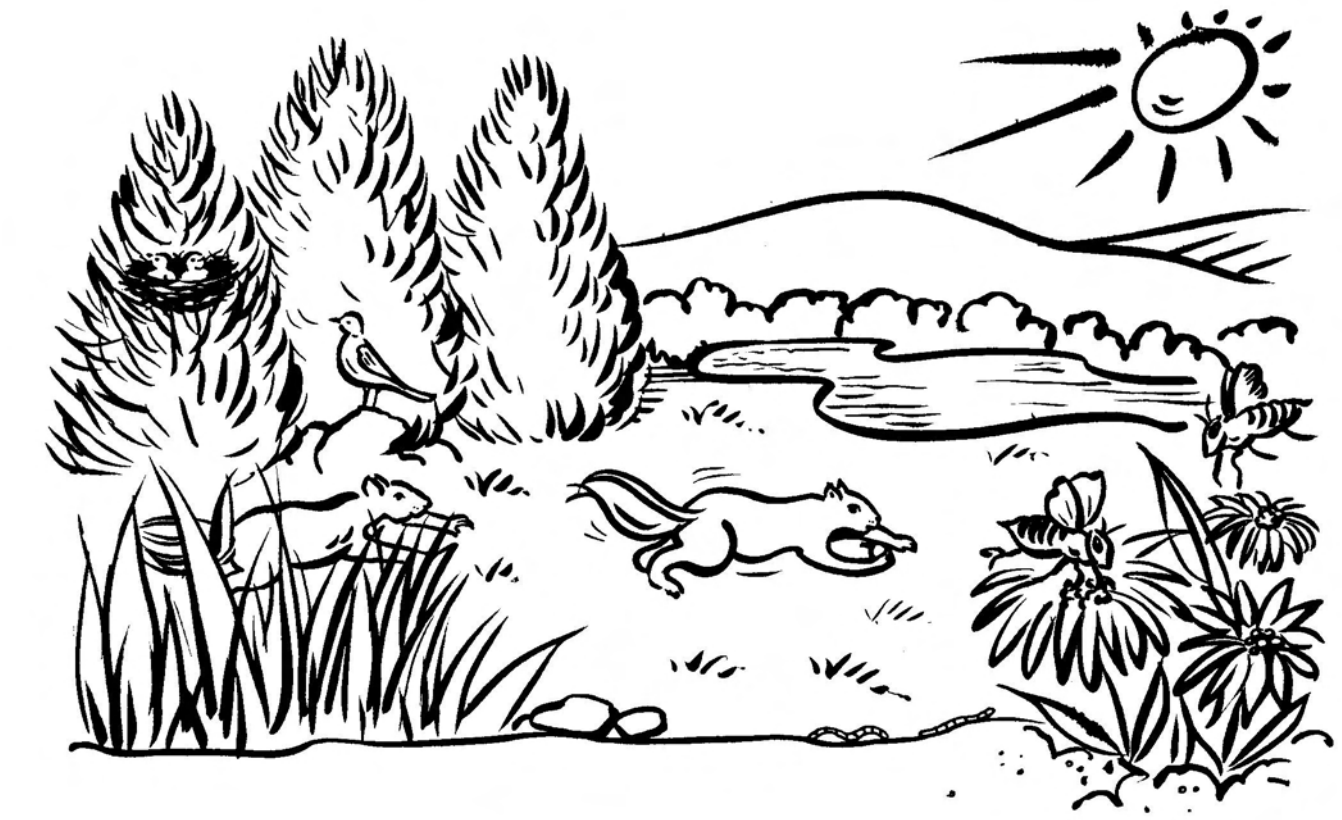
Spreading Disease







Park Ecosystem



Producers and Consumers

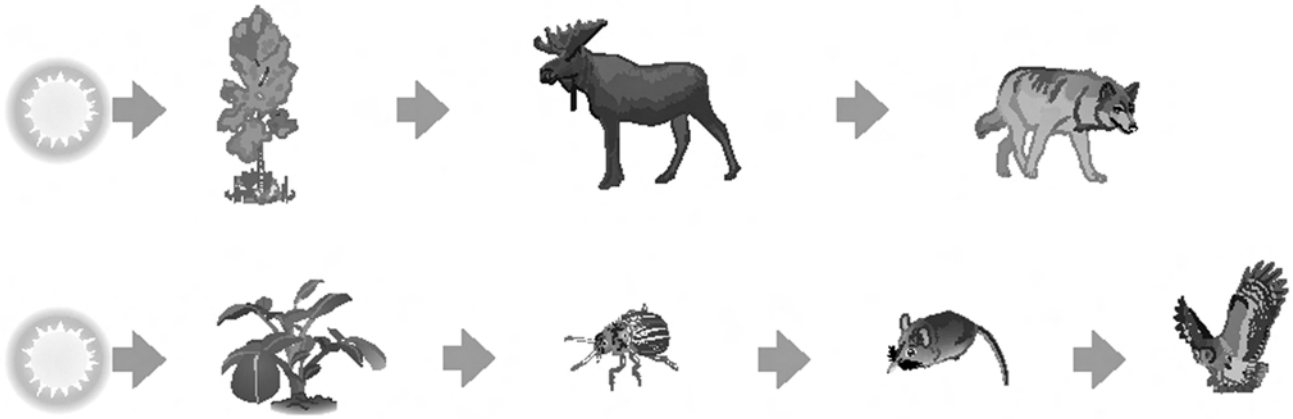
Pond ecosystem

Consumers

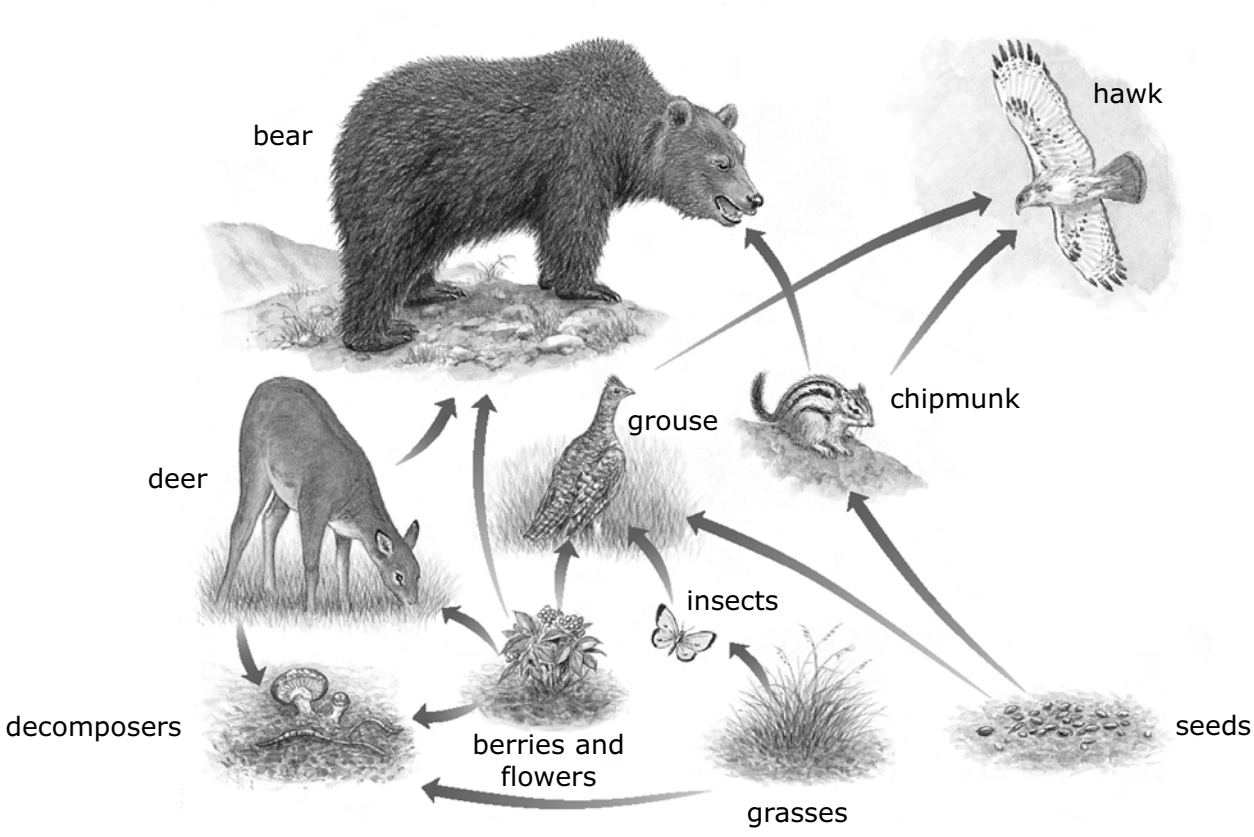
Carnivores are animals that eat only other animals.	**Herbivores** are animals that eat only plants.	**Omnivores** are animals that eat both plants and animals.
		
Frogs eat mostly insects and worms.	Snails eat plants such as algae.	Crayfish eat insects, snails, and small plants.

Food Chains and Food Webs

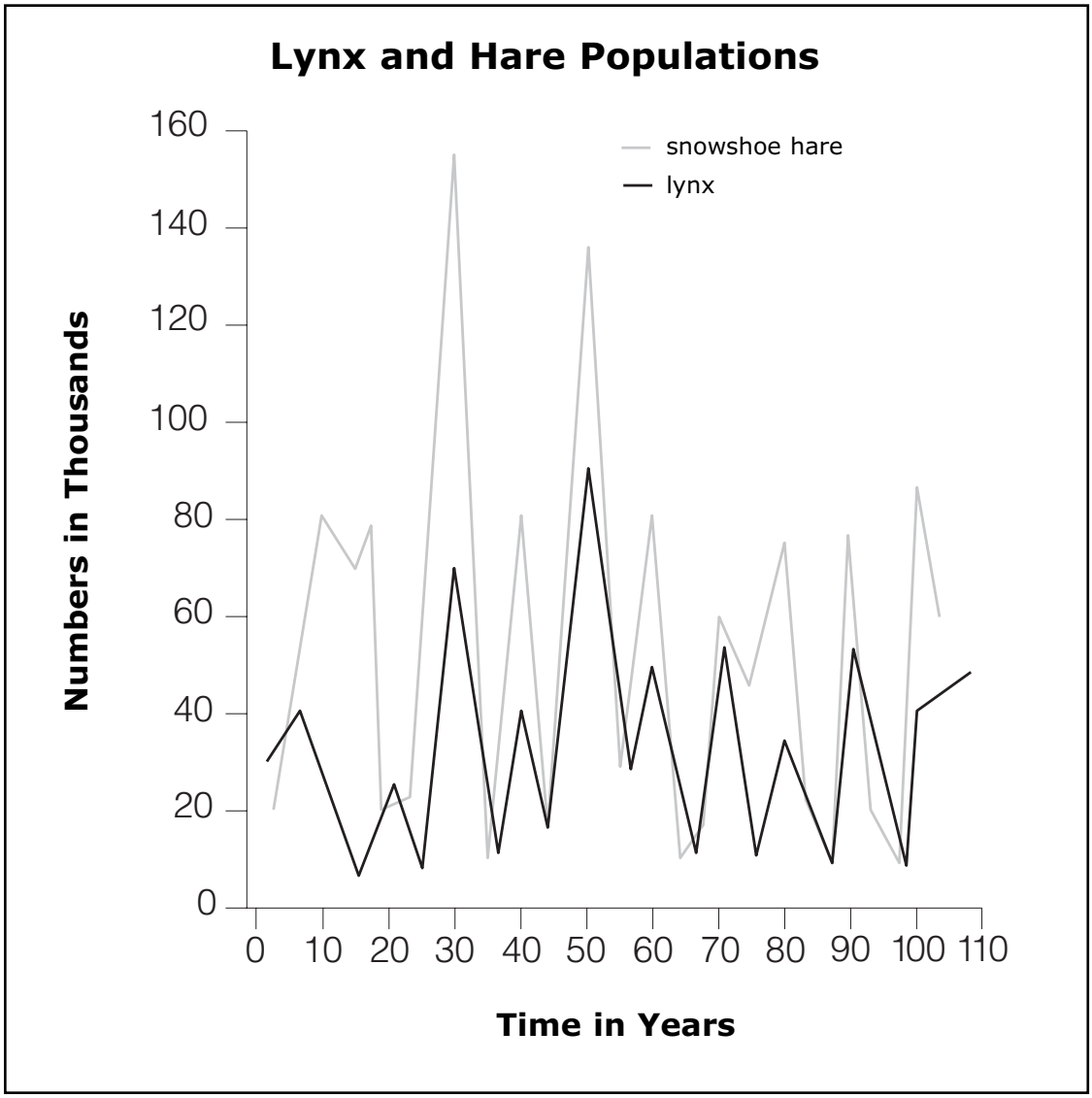
Food Chains



Food Web



Lynx and Hare Graph

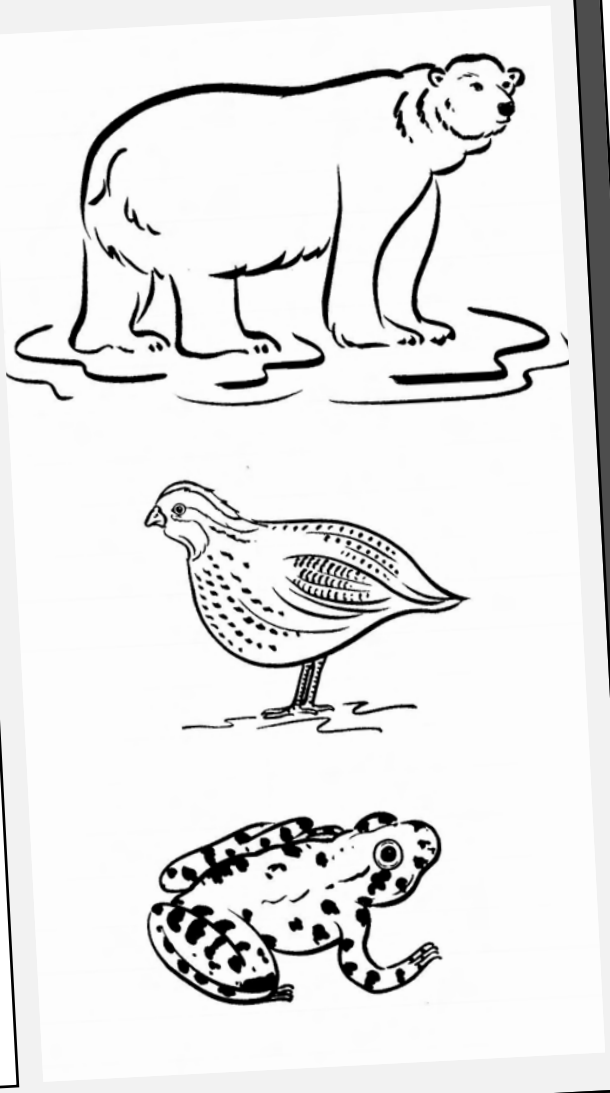


Endangered Species Ad

FACTS

- ✓ There are 15 589 species threatened with extinction worldwide.
- ✓ In the last 500 years, human activity has caused 844 species to become extinct.
- ✓ Habitat loss affects 86% of all threatened birds, 86% of mammals, and 88% of threatened amphibians such as frogs and salamanders.
- ✓ The total number of threatened animal species has increased from 5205 to 7266 since 1996.
- ✓ Of the 129 bird extinctions, 103 have occurred since 1800. The rate of extinction is speeding up.

Find out what you can do to help save nature.



Second-Hand Smoke Ad

Compare Packaging

Name of Product _____	Mass (g)
Product and packaging	
Product	
Packaging	

❑ Calculate the percent of the product that is packaging.

$$\frac{\text{mass of packaging}}{\text{mass of product + packaging}} \times 100 = \%\ \text{packaging}$$

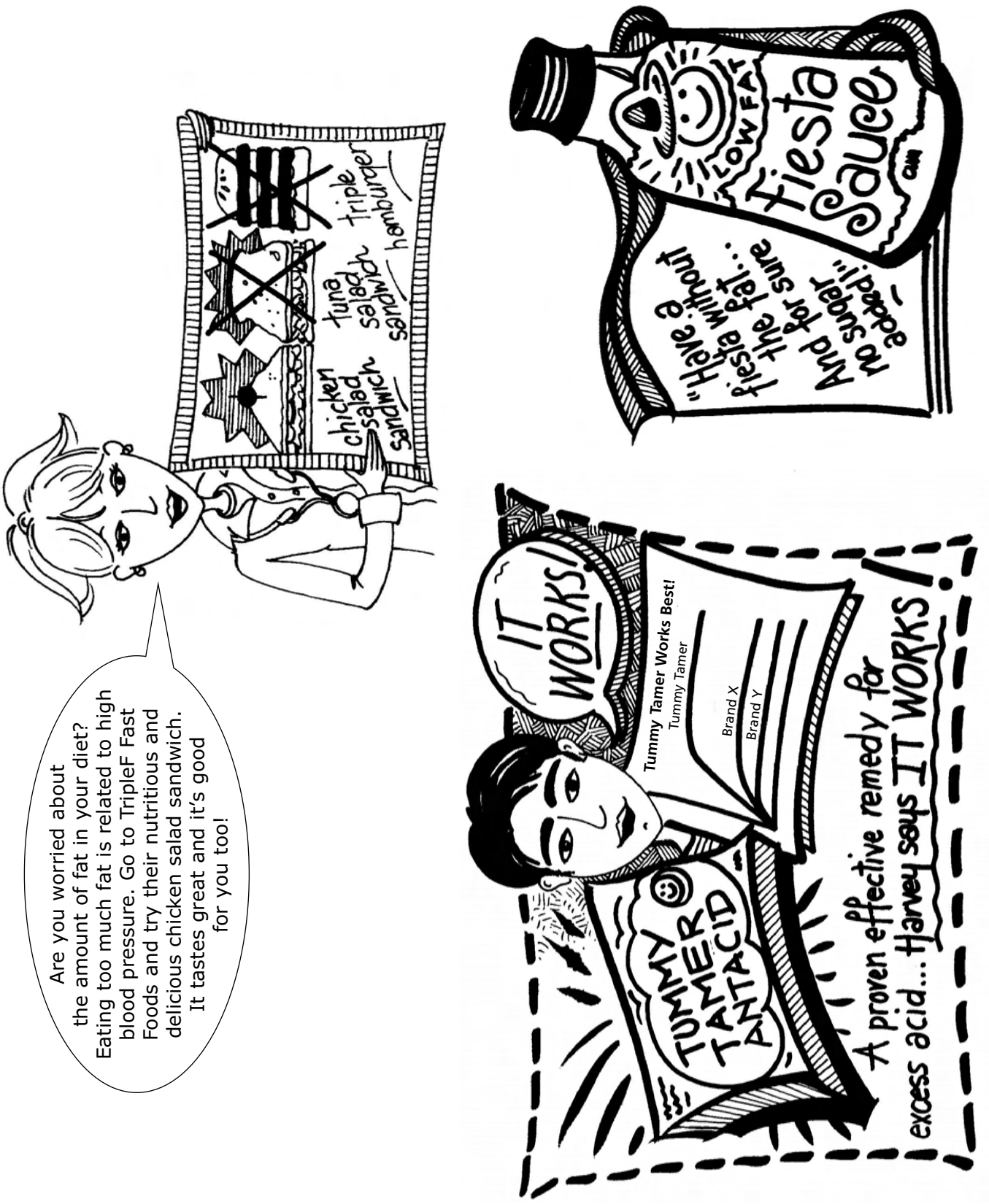
$$\frac{\square}{\square + \square} \times 100 = \_\_\_\_\_\ \%$$

Reduce Waste at School

Waste	How Is It Handled? Where Does It Go?
a) Paper	
b) Glass	
c) Plastic	
d) Cardboard	
e) Sawdust and wood	
f) Metal	
g) Organic waste	

Examples of Advertising Techniques

Advertising Claims



Compare Food Labels

Tuna salad sandwich

Nutrition Facts / Valeur nutritive		
Serving (1 sandwich) (255 g) / Portion (1 portion) (255 g)		
Calories / Calories 450		
		% Daily Value / % Valeur quotidienne
Fat / Lipides 22 g		**34 %**
Saturated / saturés 6 g + **Trans / trans** 0 g		**30 %**
Cholesterol / Cholestérol 40 mg		**13 %**
Sodium / Sodium 1190 mg		**50 %**
Carbohydrate / Glucides 46 g		**15 %**
Fibre / Fibres 4 g		**16 %**
Sugars / Sucres 5 g		
Protein / Protéines 20 g		
Vitamin A / Vitamine A		10 %
Vitamin C / Vitamine C		40 %
Calcium / Calcium		15 %
Iron / Fer		20 %

Triple hamburger

Nutrition Facts / Valeur nutritive		
Serving (1 order) (216 g) / Portion (1 portion) (216 g)		
Calories / Calories 590		
		% Daily Value / % Valeur quotidienne
Fat / Lipides 34 g		**52 %**
Saturated / saturés 11 g + **Trans / trans** 0 g		**56 %**
Cholesterol / Cholestérol 55 mg		**28 %**
Sodium / Sodium 1070 mg		**45 %**
Carbohydrate / Glucides 47 g		**16 %**
Fibre / Fibres 3 g		**12 %**
Sugars / Sucres 8 g		
Protein / Protéines 24 g		
Vitamin A / Vitamine A		6 %
Vitamin C / Vitamine C		6 %
Calcium / Calcium		30 %
Iron / Fer		25 %

Chicken salad sandwich

Nutrition Facts / Valeur nutritive		
Serving (1 sandwich) (224 g) / Portion (1 portion) (224 g)		
Calories / Calories 555		
		% Daily Value / % Valeur quotidienne
Fat / Lipides 29 g		**45 %**
Saturated / saturés 8 g + **Trans / trans** 0 g		**40 %**
Cholesterol / Cholestérol 101 mg		**22 %**
Sodium / Sodium 1127 mg		**43 %**
Carbohydrate / Glucides 37 g		**12 %**
Fibre / Fibres 2 g		**8 %**
Sugars / Sucres 3 g		
Protein / Protéines 34 g		
Vitamin A / Vitamine A		12 %
Vitamin C / Vitamine C		8 %
Calcium / Calcium		13 %
Iron / Fer		14 %

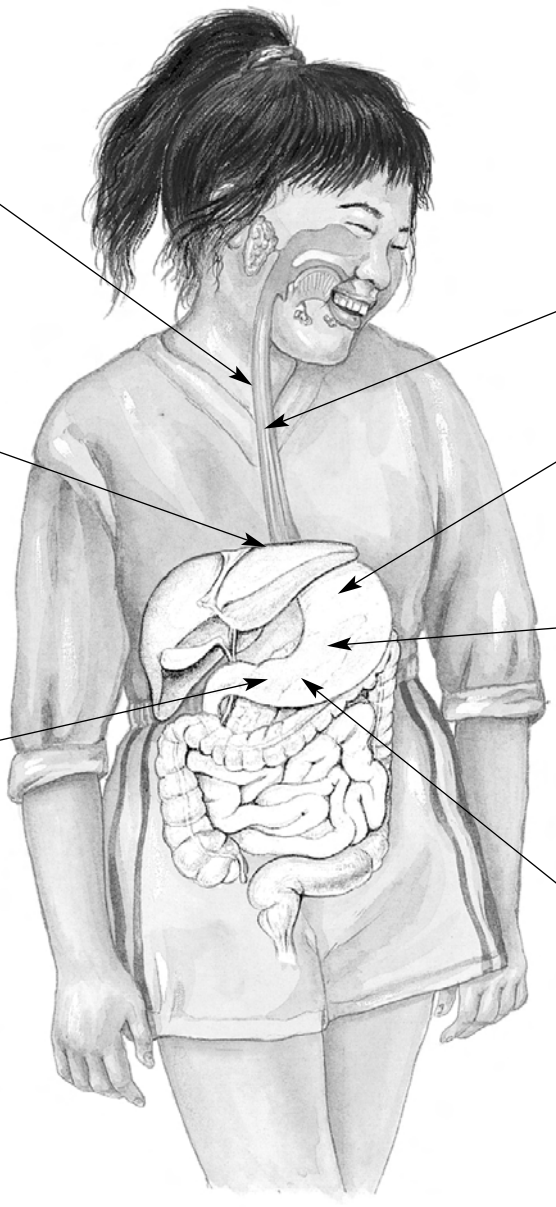
Amount Per Serving	Tuna Salad Sandwich	Triple Burger	Chicken Salad Sandwich
Calories			
Fat			
% Daily Value			
Sodium (salt)			
% Daily Value			

What Causes Heartburn?

The esophagus is a long tube that pushes food to your stomach.

There is a muscular ring where the esophagus joins the stomach. The ring stays closed most of the time. It opens to let food pass into the stomach.

The stomach is a muscular bag that expands when food enters it.



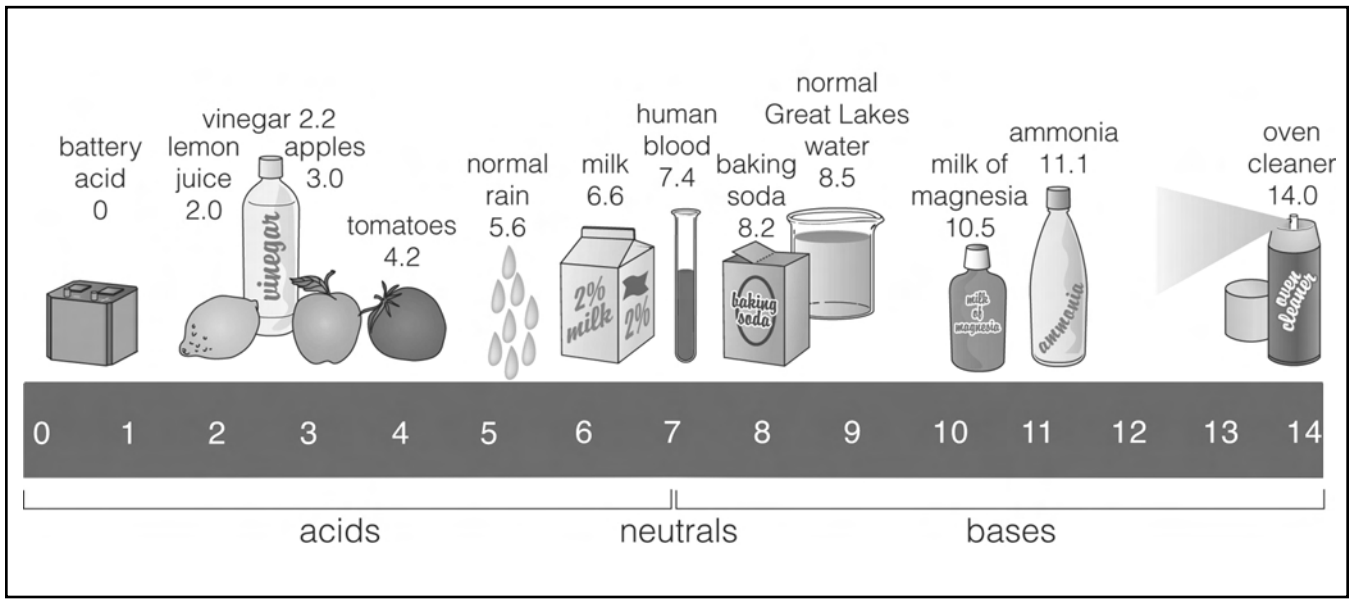
esophagus

stomach

The inside lining of the stomach makes a strong acid that mixes with food and helps to break it down.

The inside lining of the stomach also makes a protective liquid called mucous to protect the stomach from the strong acid.

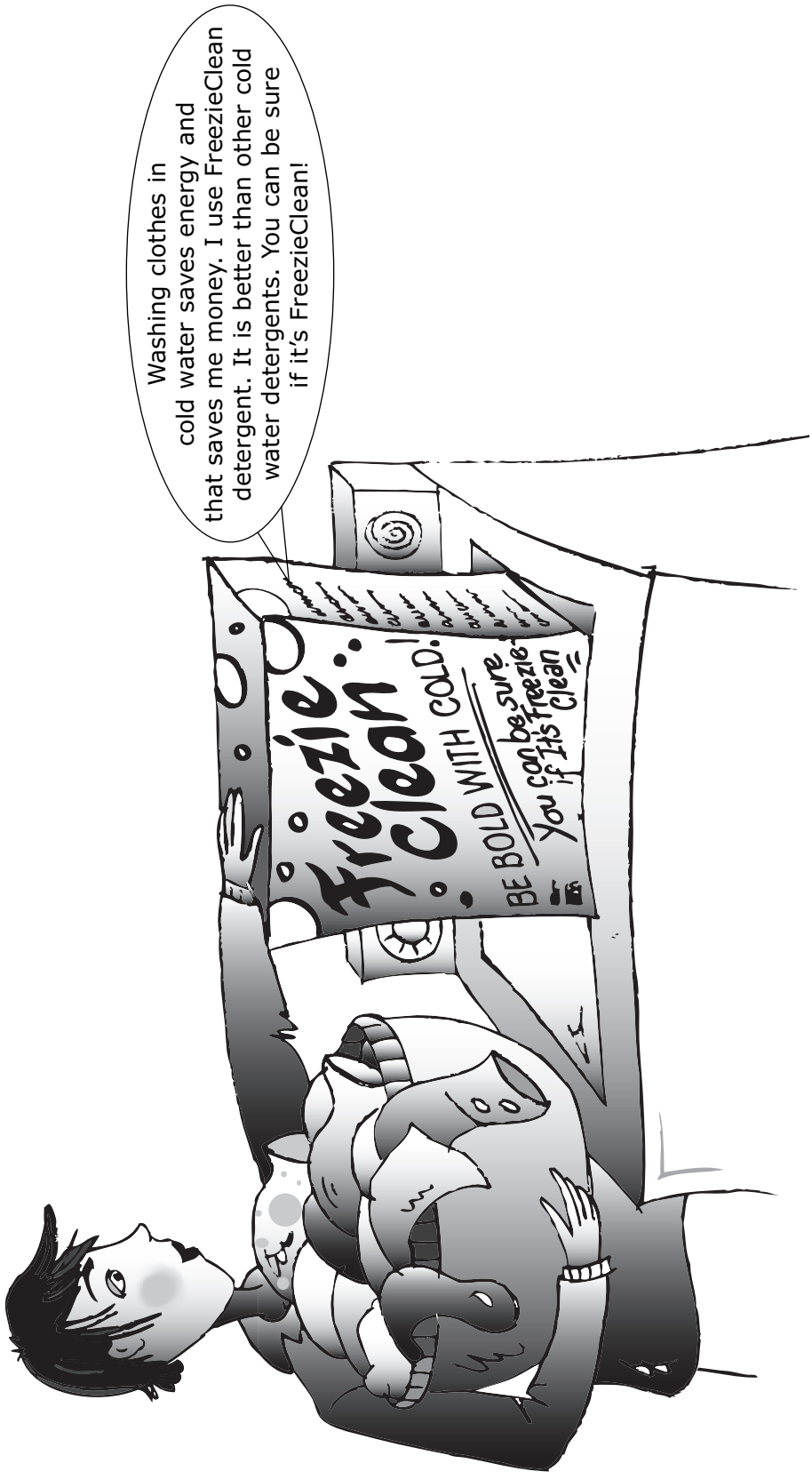
pH Scale



The pH scale

Substance	pH	Acid or Base
Vinegar		
Lemon juice		
Milk of magnesia		
Baking soda		

Unfinished Claim



Which Laundry Detergent Cleans Better in Cold Water?

How will I make the fabric dirty?

How long will I let the dirt sit on the fabric before washing it?

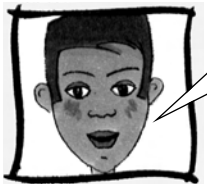
How will I wash the fabric samples?

How will I make sure each fabric sample gets washed the same way?

What type of container will I use?

What type of fabric will I test?

What temperature will the cold water be?



How much detergent will I use in each trial?