&

SAFETY IN THE SCIENCE LAB

Why are safety rules important in the lab?

-because the lab is a dangerous place

AND

safety rules ensure that everyone stays safe

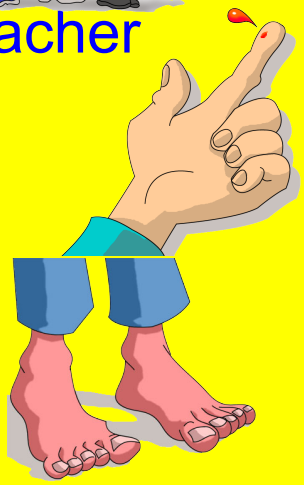
and everyone knows what to do if an accident happens

Safety precautions:

1. Never enter the science lab without a teacher
2. Wait for instructions before doing any experiments
3. never eat or drink in the lab

4. Never fool around in the lab

5. Report any accidents to your teacher immediately



6. When doing experiments ....

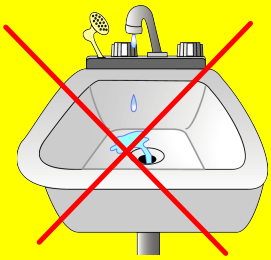
tie back long hair

wear shoes that cover your feet

wear a lab coat and safety goggles when using chemicals

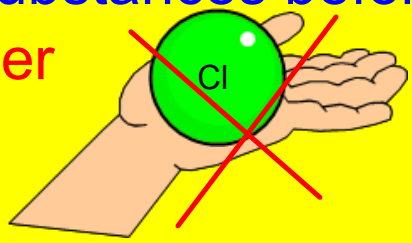
7. Learn how to smell substances in the lab properly

8. Never pour chemicals down the sink



9. If your body comes in contact with chemicals.....rinse with water and tell the teacher

10. Do not touch any substances before checking with the teacher



11. Know where all safety equipment is located and the nearest exit

What is it used for?

Where is it in the lab?

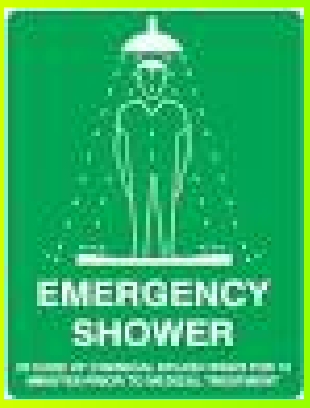
Eye wash

What is it for?

Location?

Purpose?

Location?



Purpose?

Location?

Fire Extinguisher

Purpose?

Location?

First Aid Kit

Purpose?

Location?

LAB SAFETY POSTER

KNOW AND IDENTIFY

Workplace **H**azardous

Materials **I**nformation **S**ystem

Symbols for products used at

WHAT INFORMATION DOES WHMIS PROVIDE?

WHMIS provides information through:

LABELS on containers of controlled products

MSDS for each controlled product

SCIENCE EDUCATION INFORMATION

BIOHAZARDOUS

This classification includes any organisms and the toxins produced by these organisms that have been shown to cause disease, or are believed to cause disease in either humans or animals. These hazards are often found in hospitals and on products and materials that are harmful, such as viruses or bacteria

Blood sample containing the Hepatitis B Virus is a biohazardous infectious material because it may cause hepatitis in people exposed to it

Ebola and Flesh-eating disease are also biohazardous + zombies

CORROSIVE

This symbol is the 2nd most common symbol found in homes across North America. It is found on products which corrode (eat away) metals or cause permanent damage to human tissues such as the skin and eyes on contact by burning, scarring or blinding.

Corrosive materials may also cause metal containers or structural materials to become weak, leak or collapse.

Bleach, Battery Acid, Ammonia and Hydrochloric Acid are examples.

FLAMMABLE

Class B

Flammable or combustible materials will ignite and continue to burn if exposed to a flame or source of ignition.

Materials are classified as a flammable gas, flammable aerosol, flammable liquid, combustible liquid, flammable solid, or reactive flammable material.

Oil and Gasoline are examples of flammable materials.

COMPRESSED GAS

Class A

A compressed gas is a gas at room temperature **20 °C** and pressure, packaged as a pressurized gas by compression or refrigeration and is usually quite heavy.

The potential hazard of compressed gases occurs when sudden rupturing of the container causes it to become a dangerous projectile.

Includes such things such as Propane and Acetylene bottles, as well as Oxygen tanks.

OXIDIZING

Oxidizing material may or may not burn itself, but will release oxygen or another oxidizing substance, and thereby causes or contributes to the combustion of another material.

Oxidizing material has to be stored in special containers and must be transported with extreme care.

Ozone, Chlorine, and Nitrogen Dioxide are oxidizing materials which support a fire and are highly reactive.

Class D-1

POISONOUS

Materials Causing *Immediate and Serious* Toxic Effects

This symbol is the most common found symbol in homes
It is found on materials that are toxic when ingested
These materials may be classified as toxic or very toxic based on information such as **LD50**

Bleach, Mr. Clean, Tide, Cyanide and rat poisoning are very toxic. Most household chemicals and cleaners contain this symbol

DANGEROUSLY REACTIVE

Certain chemicals when mixed, undergo vigorous reactions and can produce harmful side effects.
They may react violently under conditions of shock, or when there is an increase in pressure or temperature.
They may also react vigorously with water to release a toxic gas.

Chemicals that should not be mixed are bleach, drain cleaner, and ammonia because, when combined, they form a toxic gas.

TOXIC

Materials Causing Other Toxic Effects

Class D-2

A pure substance or mixture that may be any one of the following: a carcinogen, a teratogen, a reproductive toxin, a respiratory tract sensitizer, an irritant or a chronic toxic hazard.

Chemicals that fit into this category cause slower effects to the body.

Asbestos, Arsenic and Nicotine are toxic substances.

MSDS

DRESS APPROPRIATELY

Tie back long hair.

Do not wear loose sleeves.

Do not wear shorts.

Do not wear sandals.

Do not wear contact lenses.

KNOW WHAT IS EXPECTED

Read everything thoroughly before you begin doing anything

No food or beverages.

Do not perform unauthorized experiments.

Never work alone in the lab.

Report all accidents immediately to your teacher.

PREPARE A CLEAN WORK AREA

- Bring only those materials that are essential for the lab activity
- Keep area clear
- No running
- Do not leave experiments unattended.
- Turn off hot plates when away from your bench

WAIT FOR PERMISSION TO START

All experiments performed in the Science lab
must be performed under the supervision of the teacher

It is essential that the teacher
knows you are ready to begin,
so you can be properly supervised

GENERAL SAFETY

Touch substances only when told to do so

Smell substances using the proper technique - wafting
Chemicals should always be smelled by holding the container in front of your face and slowly (in a circular motion) wafting the vapors toward your nose. Never place the chemical right at your nose and inhale.

Pour substances properly and safely

GLASSWARE PRECAUTIONS

Use only heat-resistant glass - Pyrex or Kimax
Beware of hot glass. Hot glass looks like cold.
Never use cracked glass.
Always keep the open end of the test tube pointed away from everyone.
Never allow any container to boil dry.

ADDITIONAL PRECAUTIONS

- Report broken or damaged equipment immediately (DO NOT USE IT)
- Clean up work area completely when you are finished
- Report all accidents to the teacher immediately (no matter how minor)

CLEAN-UP AND DISPOSAL

- Clean up all spills immediately
- Wash all glassware thoroughly and place in drying racks
- Clean up work area and return all equipment and materials as directed by your teacher
- Use the chemical waste bins to dispose of harmful chemical substances and dispose of broken glassware in the broken class container (metal), following your teacher's directions

FIRST AID

Rinse off substances immediately that come into contact with skin or clothing

Wash hands before and after handling substances and before leaving the Lab

Treat burns using cold water or ice

PERSONAL PROTECTIVE EQUIPMENT

Wear chemical splash goggles and protective shoes.

Wear chemical resistant gloves

Wear a lab coat and/or a chemical resistant apron

SAFETY EQUIPMENT

Know the location of all of the science lab safety equipment, including:

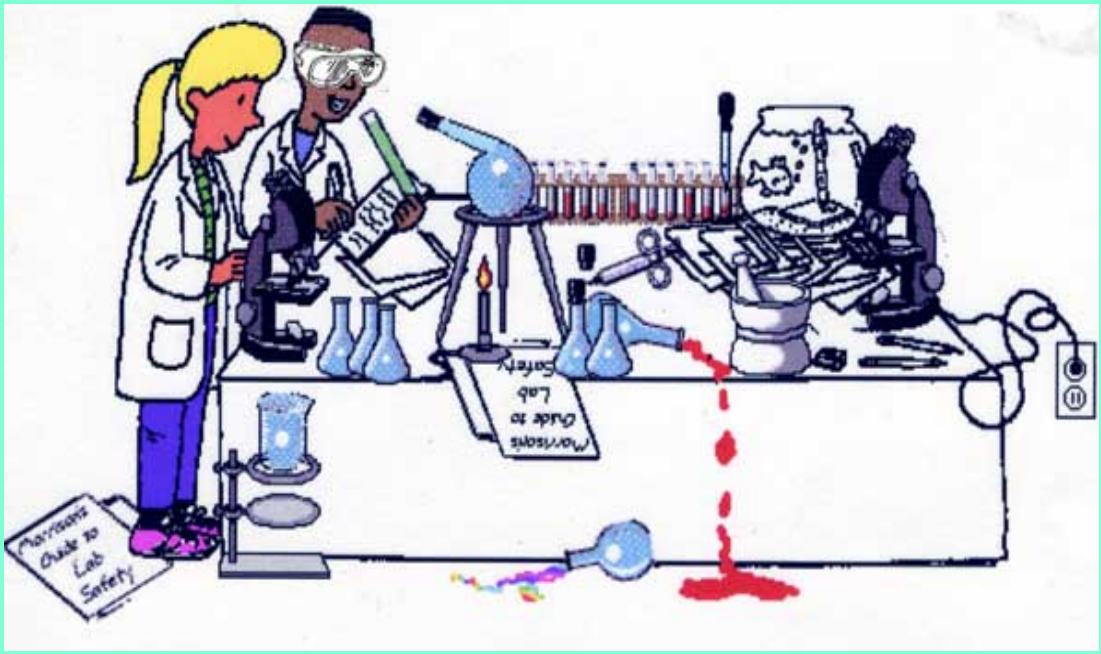
Safety Shower
Eye Wash
Fire Blankets
Fire Extinguishers
Fire Exits
First Aid Kit

USING HOT PLATES

Hot Plates

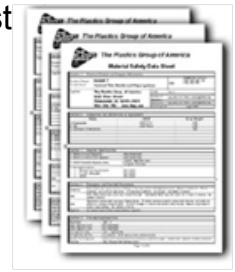
Use hot plates that have thermostatic controls.
Use a beaker of water on the hot plate to heat substances in test tubes.
Use tongs or gloves to pick up hot objects.
Turn off hot plate when not in use.
Unplug cords by pulling on the plug, not the cord.
Report and replace equipment that has frayed or has been damaged cords.
Make sure electrical cords are placed properly where no one will trip over them.

Spot the mistakes!!!



MSDS

The **Material Safety Data Sheets**
are important information resources for Science st



Each MSDS includes the following:

- technical information on the substance
- a list of its hazardous ingredients
- chemical hazard data
- control measures
- personal protective equipment that should be used
- instructions in accident prevention while using the substance
- specific handling, storage and disposal procedures
- emergency procedures to follow in the event of an accident.

Identifying Variables & Designing Investigations

Holy Trinity Variables and Safety Presentation

3 Kinds of Variables

- Manipulated (Independent) Variable – something that is changed by the scientist
- What is tested
- What is manipulated or changed by the tester.

Holy Trinity Variables and Safety Presentation

3 Kinds of Variables

- Responding (Dependent) Variable – something that might be affected by the change in the independent variable
- What is observed
- What is measured
- The data collected during the investigation

Holy Trinity Variables and Safety Presentation

3 Kinds of Variables

- Controlled Variable – a variable that is not changed
- Also called constants
- Allow for a "fair test"

For Example:

Holy Trinity Variables and Safety Presentation

Students of different ages were given the same jigsaw puzzle to put together. They were timed to see how long it took to finish the puzzle.

Holy Trinity Variables and Safety Presentation

Identify the variables in this investigation.

Holy Trinity Variables and Safety Presentation

- Ages of the students
- Different ages were tested by the scientist

What was the manipulated (independent) variable?

Holy Trinity Variables and Safety Presentation

- The time it to put the puzzle together
- The time was observed and measured by the scientist

What was the responding (dependent) variable?

Holy Trinity Variables and Safety Presentation

- Same puzzle
- All of the participants were tested with the same puzzle.
- It would not have been a fair test if some had an easy 30 piece puzzle and some had a harder 500 piece puzzle.

Same person timing students

What was a controlled variable?

Holy Trinity Variables and Safety Presentation

Another example:

Holy Trinity Variables and Safety Presentation

An investigation was done with an electromagnetic system made from a battery and wire wrapped around a nail. Different sizes of nails were used. The number of paper clips the electromagnet could pick up was measured.

Holy Trinity Variables and Safety Presentation

What are the variables in this investigation?

Holy Trinity Variables and Safety Presentation

Manipulated (Independent) variable:

- Sizes of nails
  - These were changed by the scientist

Holy Trinity Variables and Safety Presentation

Responding (Dependent) variable:

- Number of paper clips picked up
- The number of paper clips observed and counted (measured)

Holy Trinity Variables and Safety Presentation

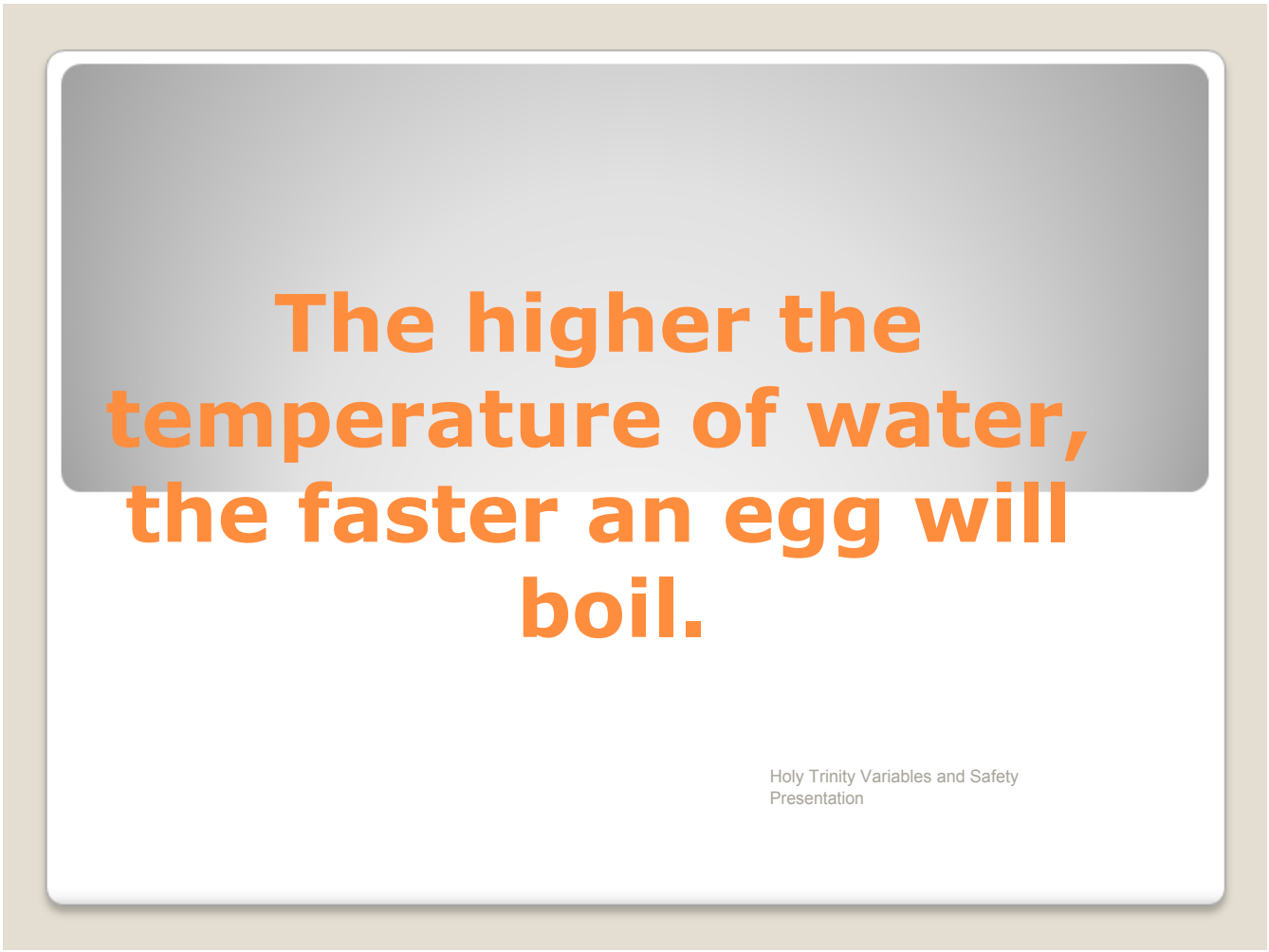
Controlled variables:

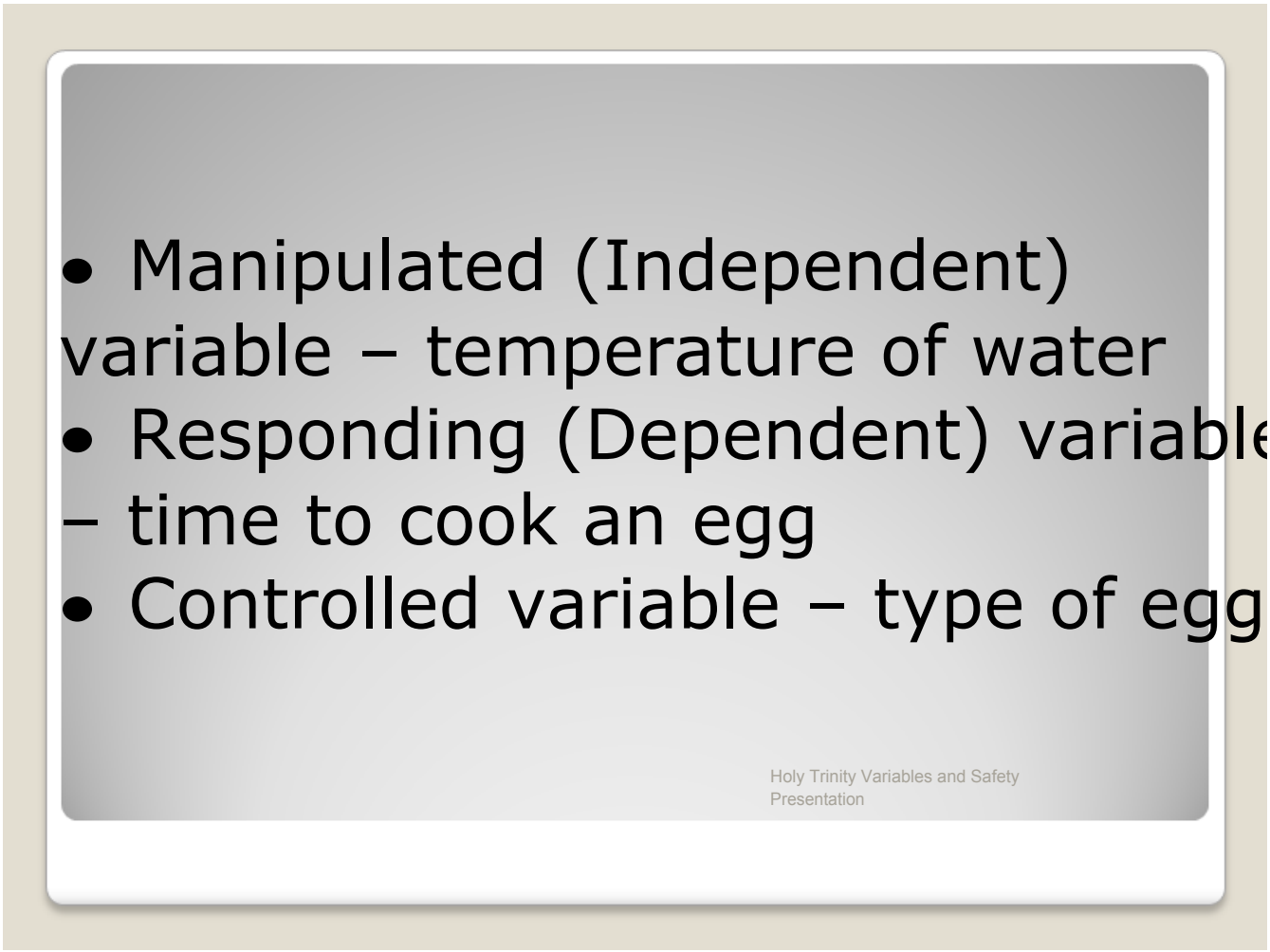
SAME

- Battery, wire, type of nail
- None of these items were changed

One more:

Holy Trinity Variables and Safety Presentation


The higher the temperature of water, the faster an egg will boil.
Holy Trinity Variables and Safety Presentation


• Manipulated (Independent) variable – temperature of water
• Responding (Dependent) variable – time to cook an egg
• Controlled variable – type of egg
Holy Trinity Variables and Safety Presentation


Last one:
Holy Trinity Variables and Safety Presentation

The temperature of water was measured at different depths of a pond.

Holy Trinity Variables and Safety Presentation

- Manipulated (Independent) variable – depth of the water
- Responding (Dependent) variable – temperature
- Controlled variable – same thermometer, same area in pond.

Holy Trinity Variables and Safety Presentation

manipulated ... temperature of water

responding... how fast the egg boils

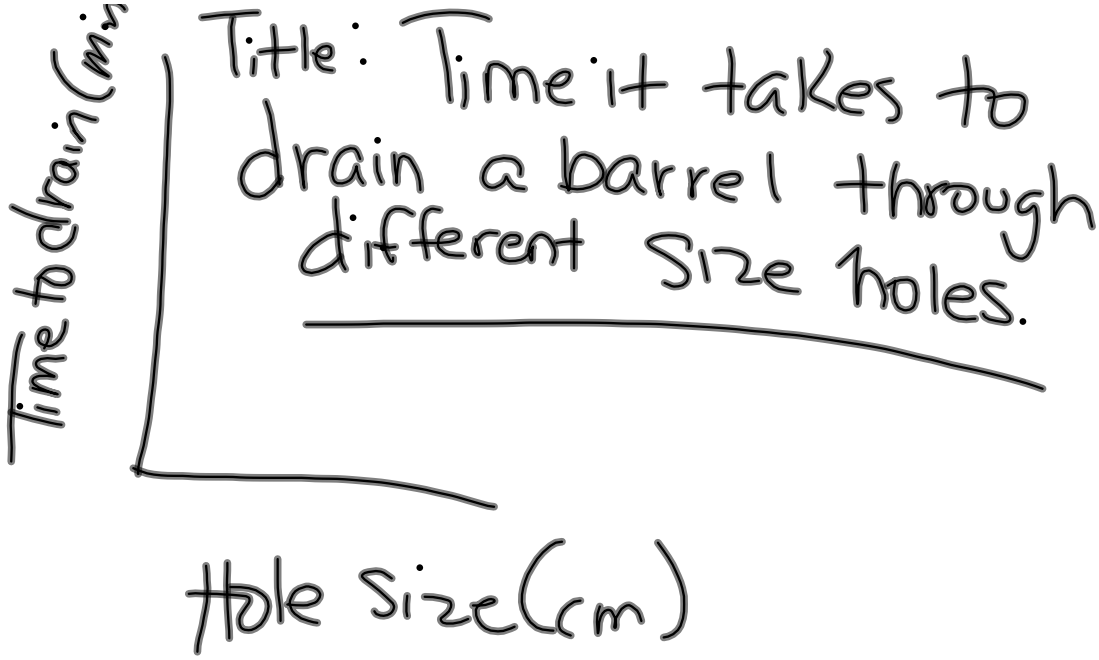
Controls: Same pot, Same amount of water in pot

Skill building

	MR
Hole size (cm)	Time to drain
BMX	

Manipulated: Hole Size

Responding: Time to drain


Title: Time it takes to drain a barrel through different size holes.
Time to drain (min)
Hole size (cm)

Conclusion:

I conclude that as the size of the hole increases the time to drain decreases.


Title: Height of a bean plant after ten days
Height of bean plant (mm)
0
1
2
3
4
5
6
7
8
9
10
0
½
2
4
6
8
10
Day
Time (days)

Designing Investigations

Holy Trinity Variables and Safety Presentation

The greater the amount of soap in a soap and water mixture, the bigger a soap bubble can be blown.

- Design an investigation to test this hypothesis.
- Identify the variables
- What exactly will be changed? How will it be changed?
- What exactly will be measured? How will it be measured?

Holy Trinity Variables and Safety Presentation

The farther a ball drops, the higher it will bounce.

- Design an investigation to test this hypothesis.
- Identify the variables
- What exactly will be changed? How will it be changed?
- What exactly will be measured? How will it be measured?

Holy Trinity Variables and Safety Presentation