

Key Question

Why is collecting and organizing information and data important?

Think-Pair-Share – 1 Minute

Scientific Method Quiz

KWL – Experimental Design

Brainstorm the first two bullets onto your KWL sheet. Save the last for the end of class.

- What do you know?
- What do you want to know?
- What did you learn?

Experimental Design

Learning Targets

I can...

- Identify the three types of variables in an experiment
- identify quantitative and qualitative data
- decide whether data is directly or inversely proportional.
- Determine if an experimental setup would be defined as having "good experimental design."

Variable

- 3 types of variables



1. Independent Variable

- The factor that is changed is known as the **independent variable**.

2. Dependent Variable

- The factor that is measured or observed is called the **dependent variable**.

3. The Control Variable

- Everything that is kept constant, does not change in an experiment.

The Control

- The experimenter makes a special effort to keep all variables **constant** except the **one she is changing**, so that they will not affect the measurements.
- Those factors are called **control variables**.

What is the Purpose of a Control Variable?

- Controls are **NOT** being tested

Example of Controls & Variables

- For example, suppose you want to figure out the fastest route to walk home from school.
- You will try several different routes and time how long it takes you to get home by each one.
- Since you are only interested in finding a route that is fastest for you, you will do the walking yourself.

What are the Variables in Your Experiment?

- Varying the route is the **independent variable**
- The time it takes is the **dependent variable**
- Keeping the same walker throughout makes the walker a **control variable.**

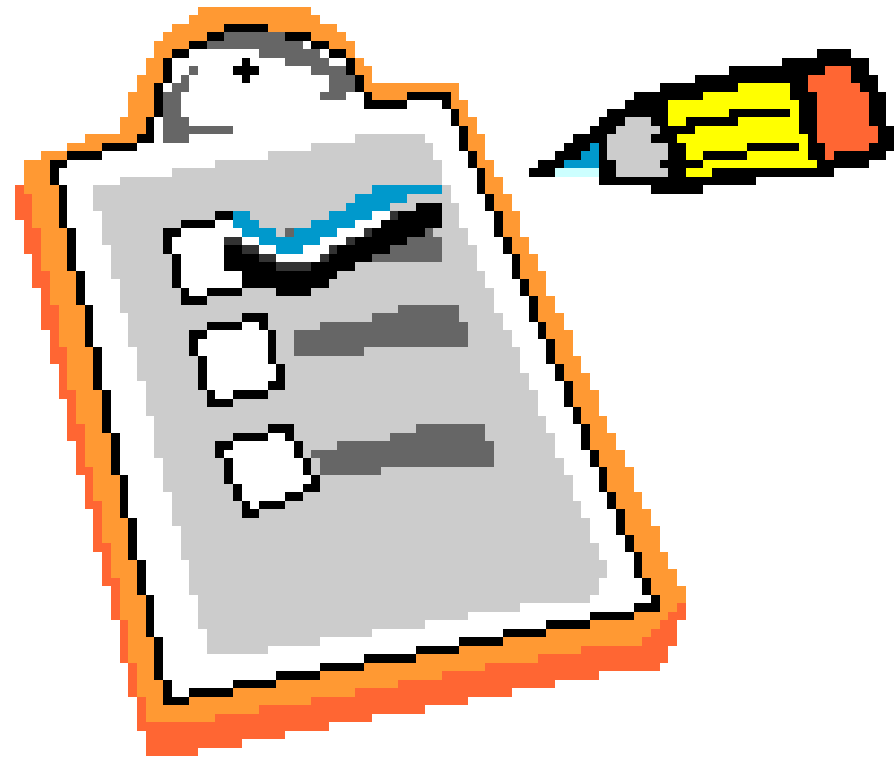
One more thing... it is best to do **many trials**, changing the independent variable many times.

Valid Experiments

- Choose only **one independent variable** to manipulate
- Choose only **one dependent variable** to measure
- All others are **control variables**
- Do **many trials**, changing the independent variable many times
- Make sure both variables are **quantitative** (numbers)

Data

- Results of the experiment
- May be quantitative (numbers) or qualitative
- Physics is usually quantitative



Data

- Must be **organized**
- Can be organized into **charts, tables, or graphs**

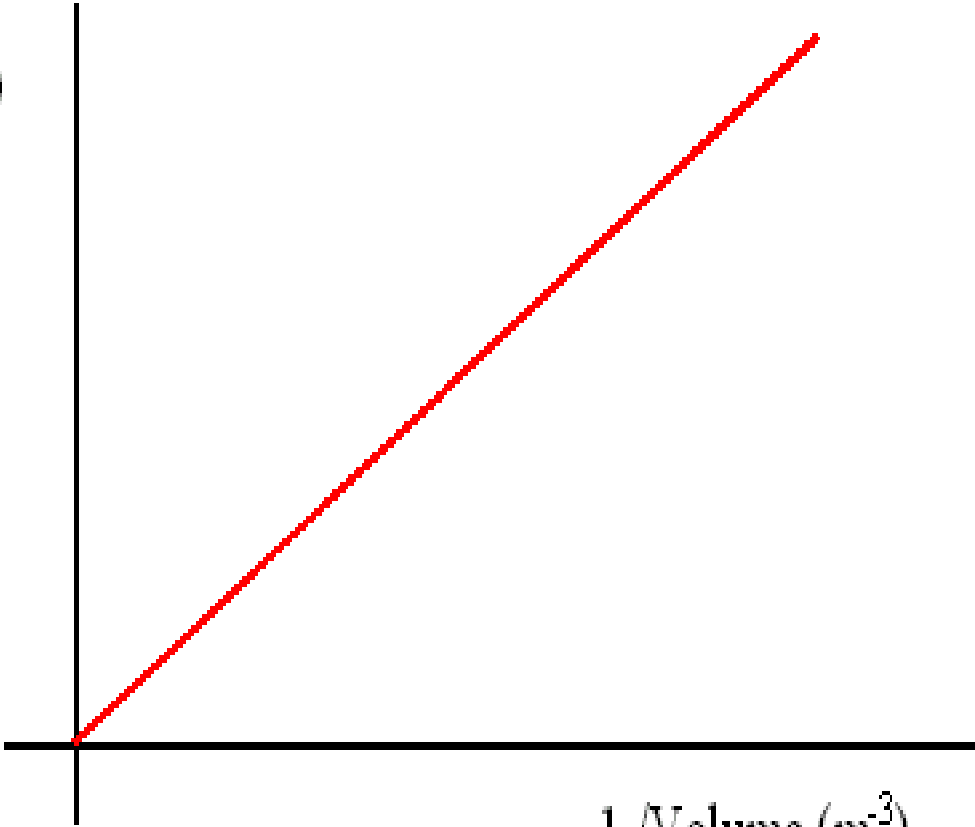
Two Types of Data:

- Directly Proportional
- Inversely Proportional

Data -

- **Directly proportional** data means **increasing** the independent variable causes the dependent variable to **increase**

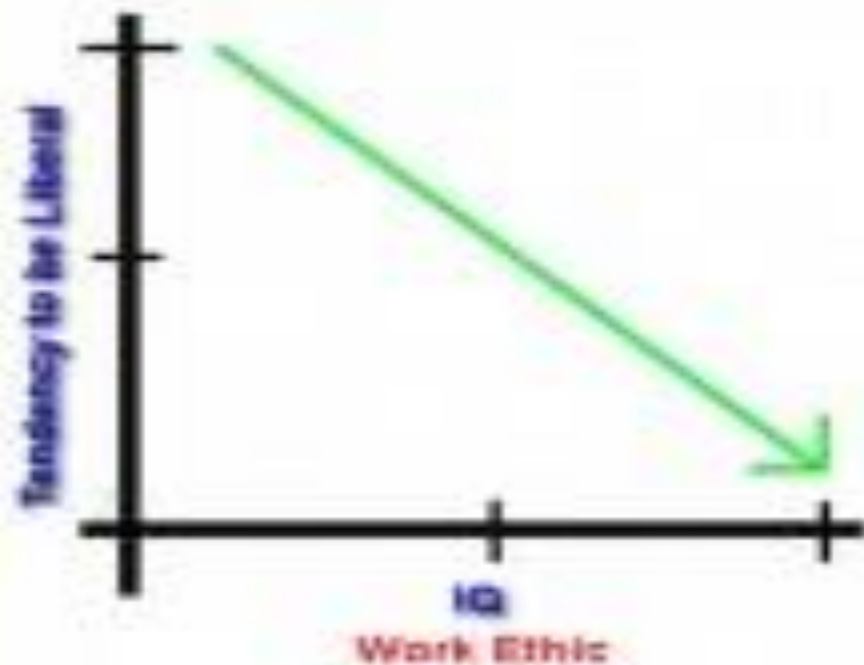
Pressure (kPa)



$1/\text{Volume (m}^{-3}\text{)}$

Data

- **Inversely proportional** data means **increasing** the independent variable causes the dependent variable to **decrease**



INVERSELY PROPORTIONAL

Just kidding... you know that

KWL – Experimental Design

- What do you know?
- What do you want to know?
- What did you learn?