What is Physics?

Unit 1

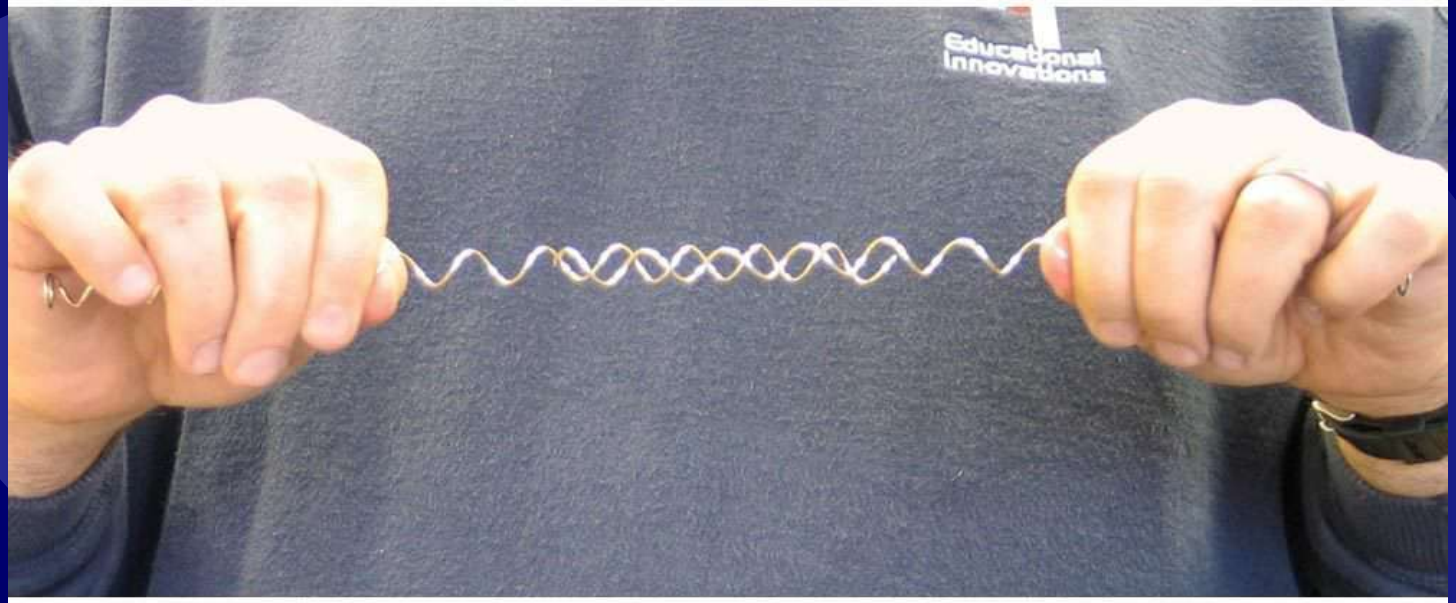
- Physics is the study of the physical world.
- Any problem that deals with temperature, size, motion, position, shape or color involves Physics.

- 7 Areas of physics include: **Mechanics, Thermodynamics, Waves, Optics, Electromagnetism, Relativity, and Quantum Mechanics**

Scientific Method

- Observe
- Hypothesis
- Test or Experiment
- Conclusion

Wire



Cup and Water

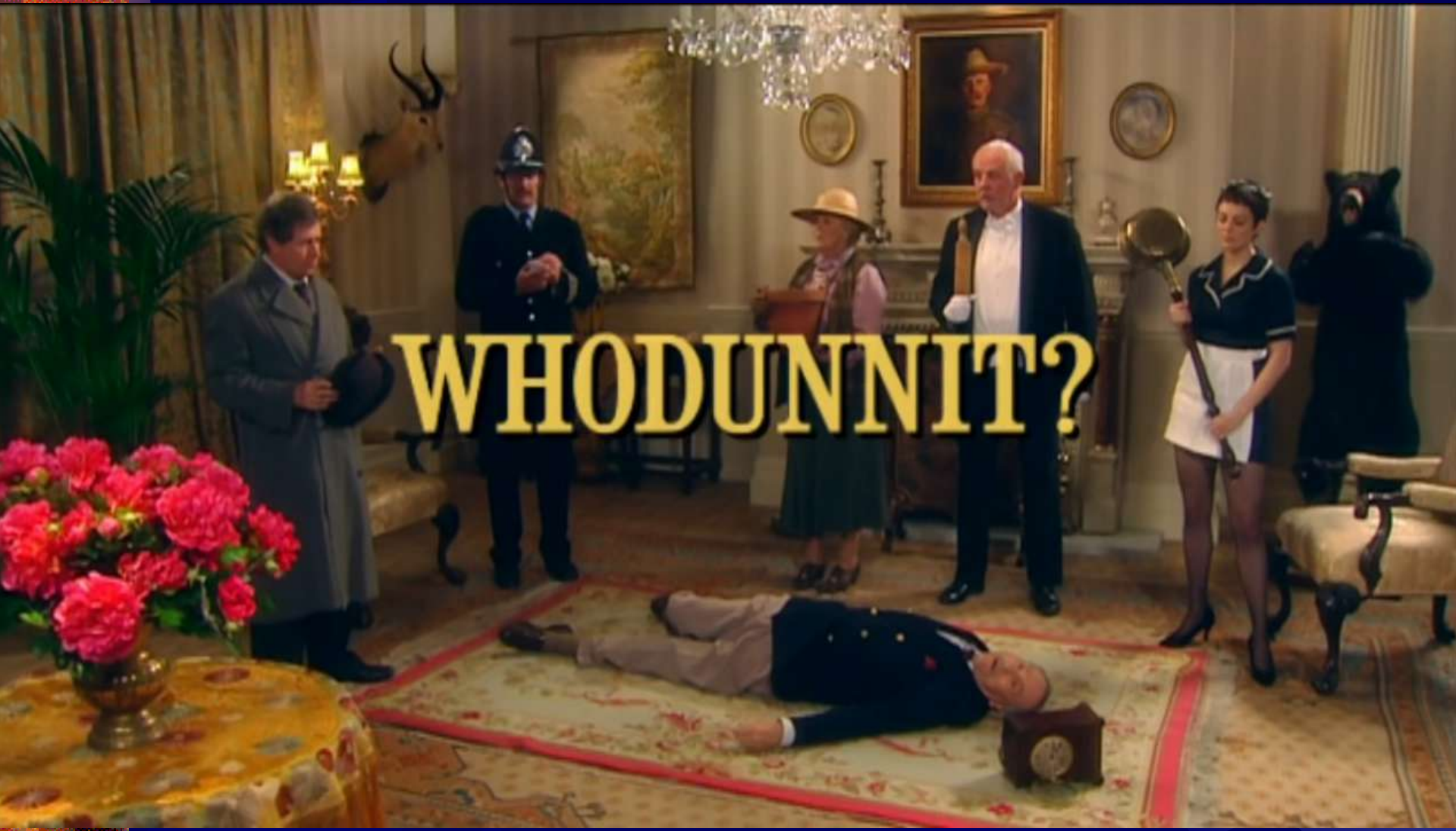
Flask and Pencil

Flash Paper

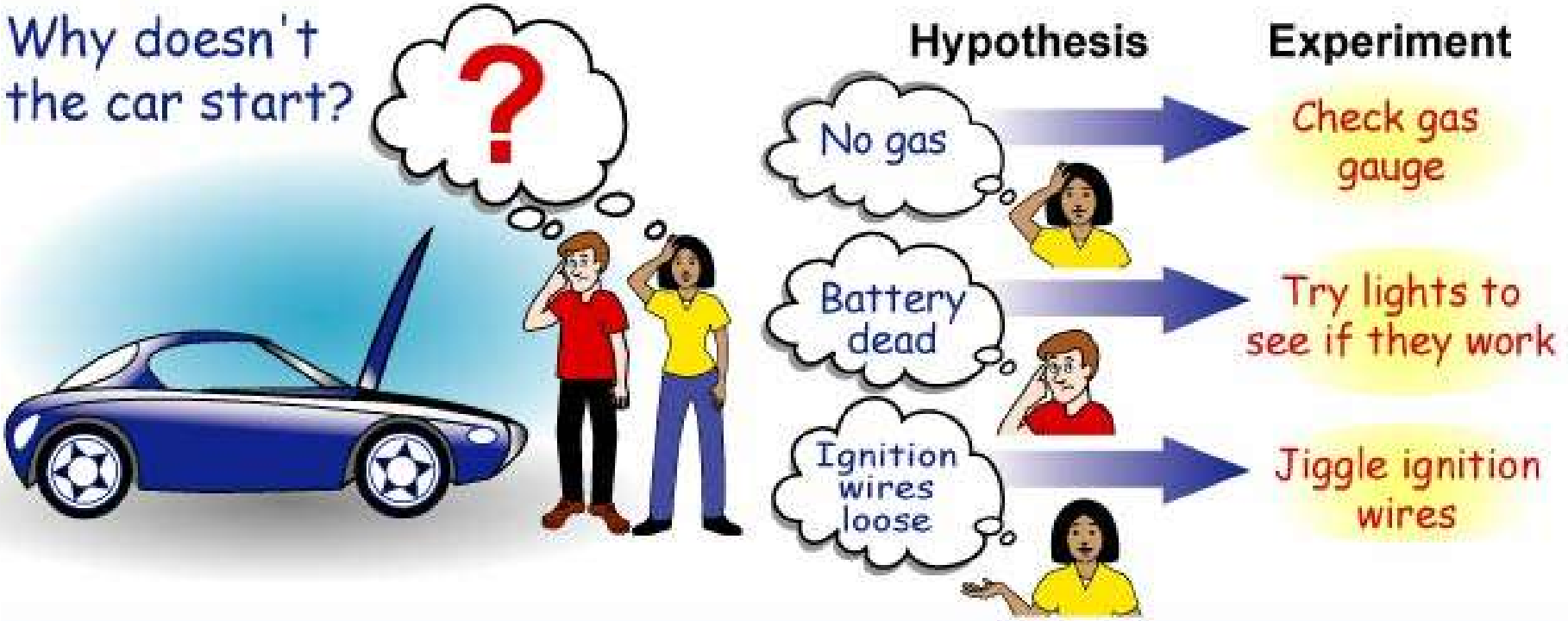
Fortune Fish

Sand Spoons Hydrophobic


skyone
PRESS


WHODUNNIT?

Scientific Method



Steps in the scientific method

STEP	EXAMPLE
1. Ask a question.	1. Why doesn't the car start?
2. Formulate a hypothesis.	2. Maybe the battery is dead.
3. Design and conduct an experiment.	3. Turn the lights on to test the battery.
4. Collect and analyze data.	4. The lights go on.
5. Make a tentative conclusion.	5. Battery is OK.
6. Test conclusion, or if necessary, refine the question, and go through each step again.	6. Are the ignition wires loose or wet?


01:12 21:42

- **Model** – a replica or description designed to show the workings of an object or system.
- **Controlled Experiment** – an experiment used to test a hypothesis and that uses variables.

Variables

- Variables are what you change during an experiment.
- For instance, if you wanted to find out if surface type made a hot wheel car roll faster, you would change out the type of surface and roll the car.
- The changed surface (carpet versus tile floor) would be the **changed independent variable**.
- The **measured dependent variable** would be the speed of the car.

Types of Variables

In Science Experiments

INDEPENDENT VARIABLE

the one factor you change

presence or absence of caffeine

DEPENDENT VARIABLE

factor you measure in response to change

number of words recalled

CONTROLLED VARIABLES

factors you hold constant

- *caffeine source*
- *caffeine amount*

CONFOUNDING VARIABLES

hidden variables that might affect results

- *time of day*
- *caffeine sensitivity*

Does caffeine affect how many words you remember?

Independent versus Dependent Variables

John wants to conduct a test to see if a new lubricant on the axle of his toy car will increase the speed of his car on a 10 foot track. Identify the correct variables for his experiment. Match the term to its correct definition.

Track # 2	Car #7		
	Trial #1	Trial #2	Trial #3
Before Lubrication	5.1 sec	5.3 sec	5.2 sec
After Lubrication	4.7 sec	4.9 sec	4.8 sec

Car

Track

Lubricant

Speed of Car

Measured (Dependent) Variable

Change (Independent) Variable

Controlled Variable

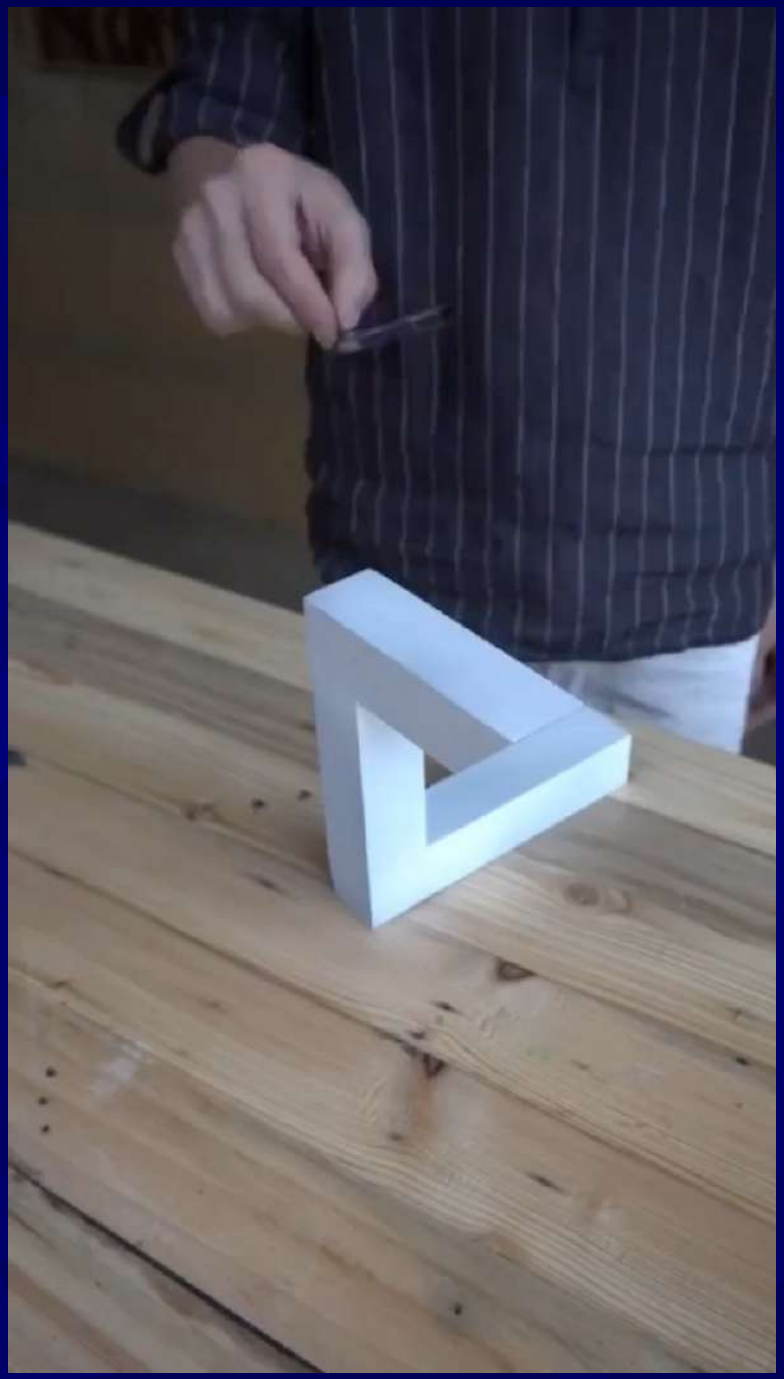
Controlled Variable

- **System** – a set of items considered separately
- **Scientific Hypothesis** – an explanation for observations

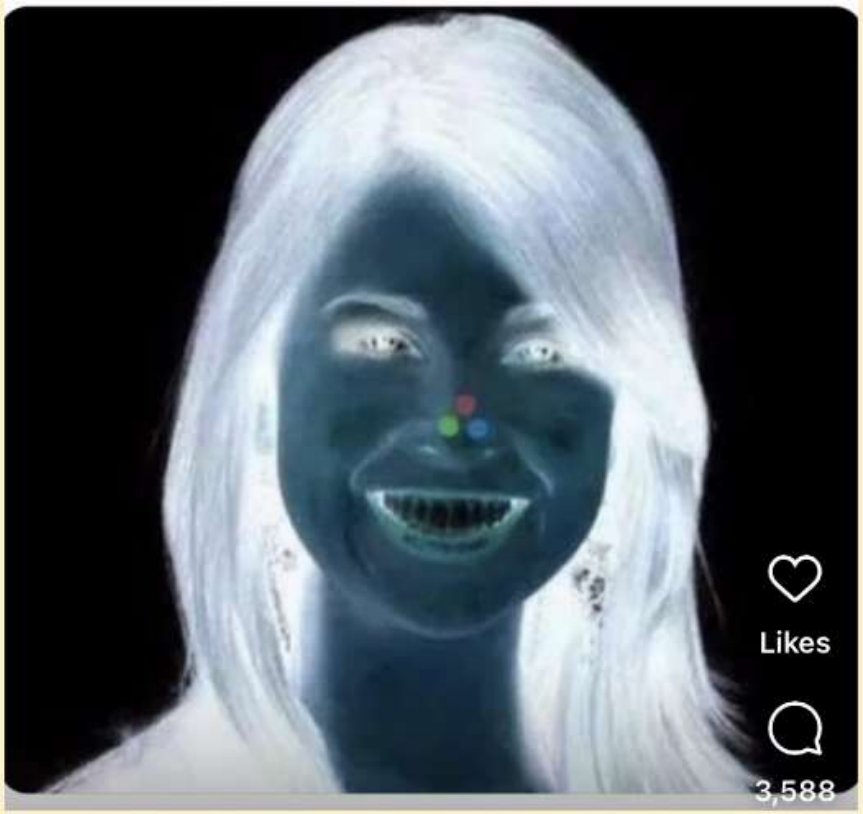
4 Types of Error

- Human Error – You screwed up!
- Method Error – Use a different method to measure each time so you get different results.
- Parallax Error – Line of Sight error
- Instrument Error – Your instrument is wrong.

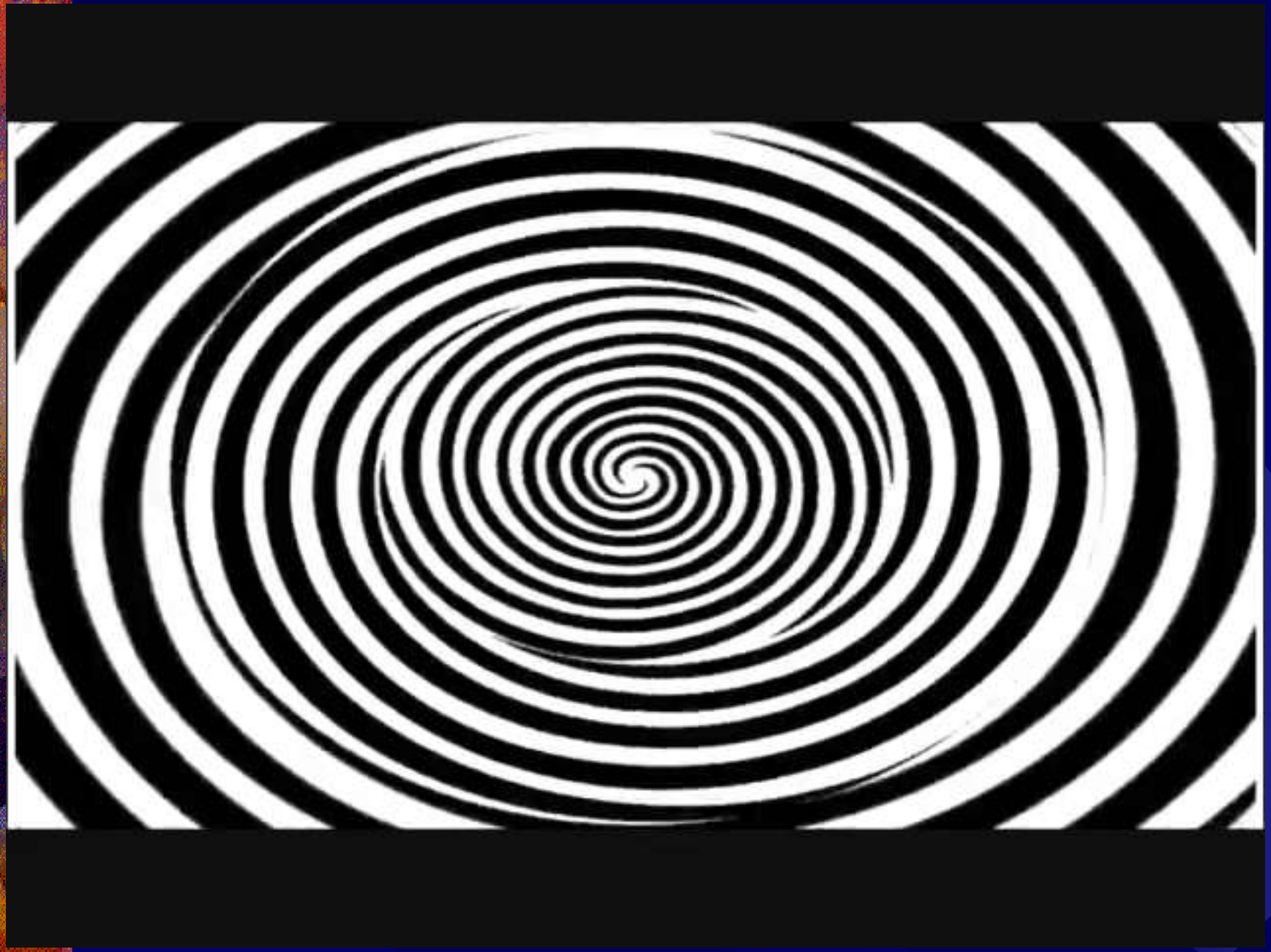
Human Errors

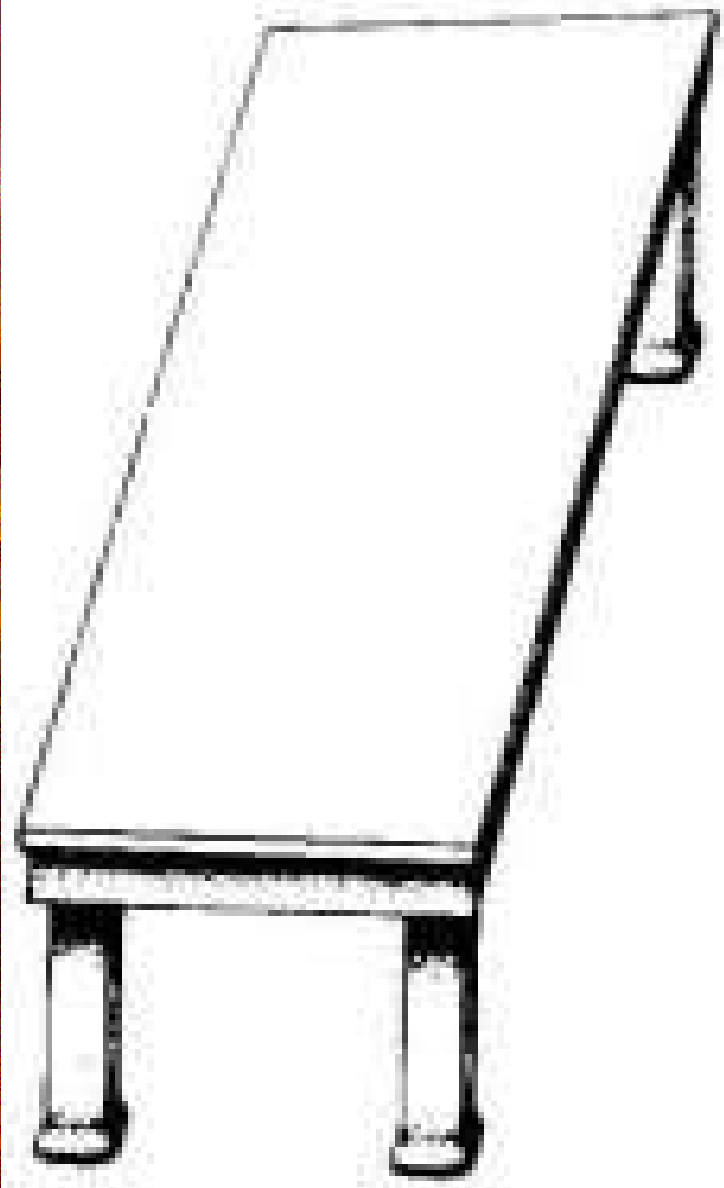


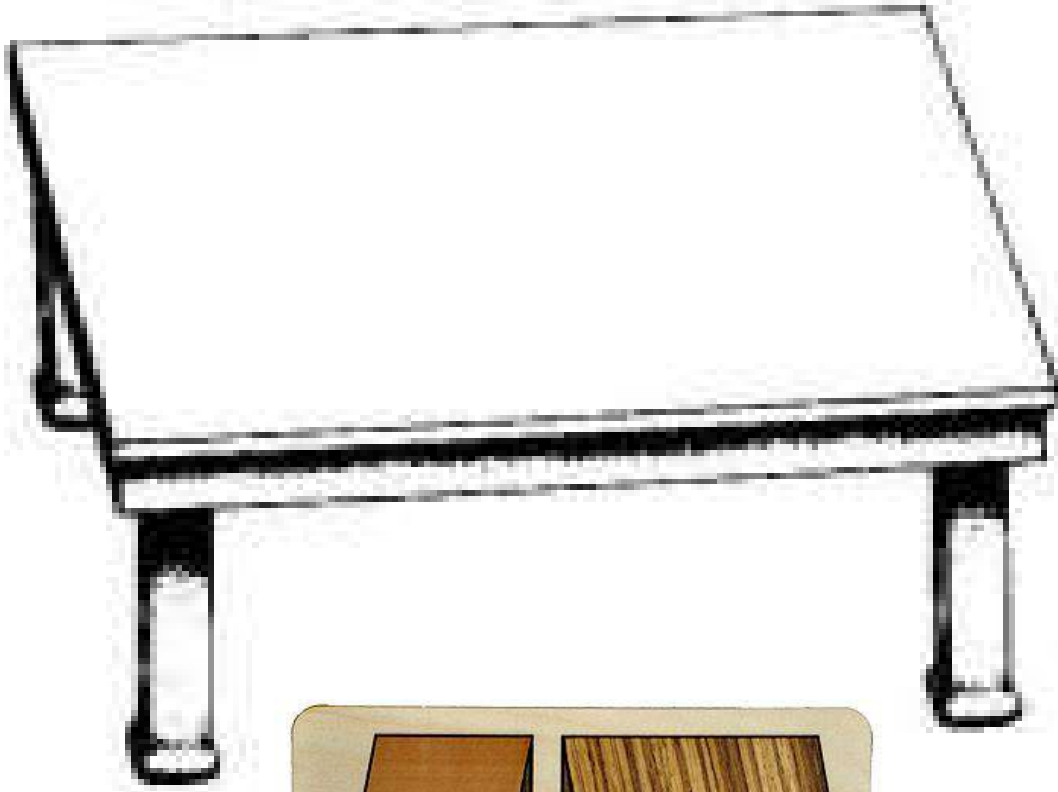
Candle Observations

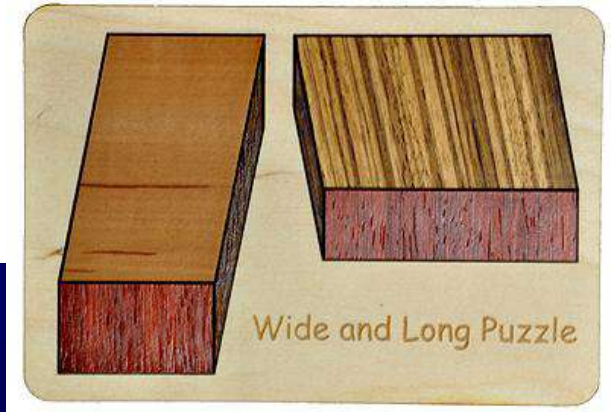


Look at the red dot on her nose for 30 seconds then look at a blank wall and blink fast.








Wide and Long Puzzle

Method Error

On July 23, 1983, Air Canada's Flight 143, with 69 people onboard, ran out of fuel at an altitude of 41,000 ft. The pilot managed to glide the plane down safely as he was very experienced glider pilot. 22,300 pounds of jet fuel had been put instead of 22,300 kg.

Centimeters versus Inches

Parallax Error

- Hold a pencil at arms length and look at it with one eye closed. Now close the open eye and open the other. Notice how the pencil appears to shift.
- This is an example of Parallax Error and can cause mistakes in measurements when reading meter sticks and other equipment.

Real World Example of Parallax Error

Instrument Error