Lab Pretest Blue: Friday…….Yellow Monday

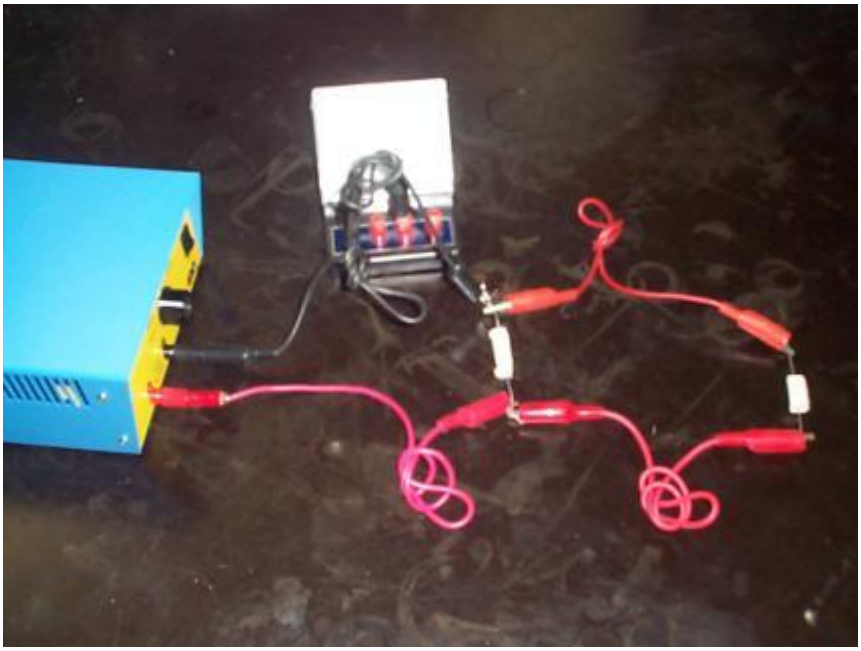
ST Labs Covered: Parallel versus Series circuits;
Gears (ratios)
Transformation Systems
Plastics lab

STE mystery box
solenoid
calorimetry

1. **Parallel versus Series Circuits.**

a) When you build a simple circuit, which one's wired assembly resembles an 8?_parallel

b) Draw how you would connect an ammeter to a parallel circuit in order to measure total current.



c) How many decimal places would the following measurement have if the needle was exactly on the 200?

zero

d) What if it was halfway between the 0 and 100 mA?

Zero decimals; measurement would be 50. mA

This is how you do it:

1) Figure out what the smallest division is:

Example: 100 mA/10 division = 10mA/division

2) Divide the result by 2:

Example: 10mA/2 = 5 mA

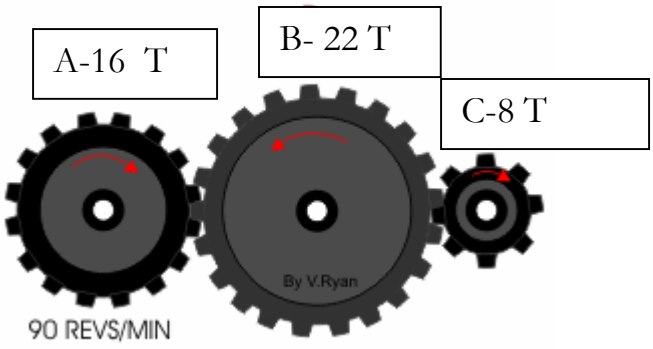
3) Any measurement with this instrument and scale will have as many decimal places as the answer from step 2

Example: 5mA has no decimal places, so if the current was on the 200 mA line, you would record it without decimal places.

2. Draw a gear train with the least number of gears possible. You want the input and output to move in the same direction.

You need 3 gears like in the diagram for #3.

3. How many turns will the output gear make if the A- gear makes 90 turns in one minute? Show work.



T = 

$V_{out}/V_{in} = n_{out}/n_{in}$

$x/90 = 16/8$

$x = 180$ turns/min or rpm

b) Why did you have to place a black mark on each of the gears when doing this lab?

We used a black mark to keep track of the starting point when we counted turns.

Transformation Systems

4. The part that's attached to the drill bit turns at 90° to the direction of the input gear. Which part of the drill is also responsible for this rotation in a different plane?

It's the small gear that's attached to the larger gear turned by the handle.

ay

5. What transformation is involved in the hand drill?

Circular to helicoidal.

6. What is the advantage of a longer handle from the point of view of work and force?

We get the same work done with less force since the distance is larger.

7. a) Would a pointy drill bit without threads work better than the one shown? No.

b) Why?

We would shorten the distance and need more force without threads.

8. What parts in the design of the eggbeater make the blades turn faster than the handle?

The input gear is larger than the output gear.

Plastics

9. a)What physical property was being used to identify plastics when we were checking if they floated in a liquid? density

b) Why were different liquids used? Since plastics have a wide range of densities, we need different liquids of varying densities.

c) Not all plastics break in the same fashion. Why not?

The bonds are different.

d) Why do you think PVC is the only plastic to produce a green flame in the Beilstein test?

e) PVC is the only one with chlorine which forms copper chloride.

f) The floatability test works best if the plastic are inserted _1_at a time and about ____1 cm_____under the surface.

STE Mystery Box

10. You have four identical resistors. Here are the voltages measured;

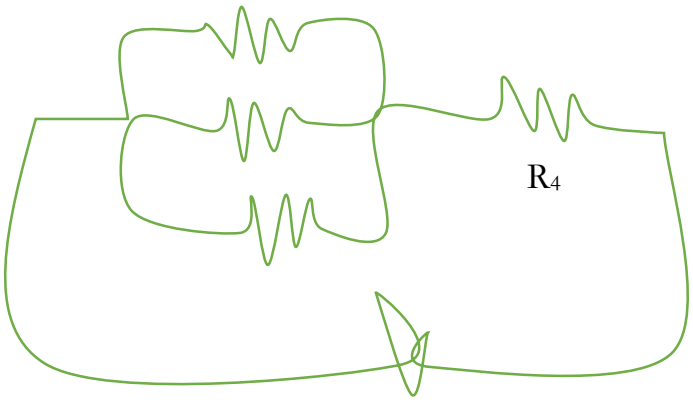
V_T = 12.0 V

V_1= 2.9 V

V_2 = 3.0 V

V_3 = 3.0 V

V_4 = 9.0 V



Draw the circuit. Show where R_1, R_2, R_3 and R_4 are.

STE Calorimetry

11. To get the specific heat of a metal , what basic procedure was used?

(1) First weigh a piece of metal.
(2) Boil water and add the metal to the water.
(3) Meanwhile weigh 100.0 ml of cold water in a calorimeter.
(4) Record the cold water's temperature.
(5) Record the boiling temperature(use that as metal's initial temp)
(6) Transfer the metal to the cold water in the calorimeter.
(7) Record the maximum temperature.

12. What calculations were used?
-Qhot = Q cold, and we solved for c of the metal.

13. What was the main error source in the design of the experiment?

We had to assume that no heat was lost to the air during and after the transfer.

STE Solenoid Lab

13. What was used to get the direction of the magnetic field?

A compass

14. What could have been done to make the compass flip direction?

We could have switched the polarity(+/-) on the wires.
15. Why didn't the compass respond to the earth's magnetic field while the electromagnet was turned on?
The nearby field from the solenoid is more strongly felt than that of the earth.