Unit 2 E&M Physics

Daily Slides

Physics- October 27 & 28

Schedule Monday and Tuesday

1. Opening Phenomenon
2. Individual Modeling
3. Pair Share Out
4. Pair Modeling
5. Modeling Rubric
6. Revise Models
7. Class Model
8. Class Questions and Possible Experiments
9. Unit Materials

Warm Up

Please turn on your camera- you will need it today and in the future.

In your notebook, write down...

- What you think modeling means?
- Have you done it in other classes?
- Topic and which class?

Standards

- M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.

#3: Modeling Rubric I can create an accurate model based on a phenomenon and include all relevant details and that shows all of my thinking

	4	3	2	1	0
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Scientific Accuracy	The model is an accurate representation and integrates all relevant concepts that are scientifically accurate.	The model is an accurate representation and some relevant concepts are missing.	The model is a partially accurate representation due to some concepts being integrated inaccurately.	The model is an inaccurate representation due to the misconception of concepts.	The model is not an accurate representation because no scientific concepts are expressed.
Student Thinking	Student clearly communicates all aspects of their thinking to others through the model that contain fully developed connections.	Student communicates their thinking to others through the model that contain fully developed connections but requires assumptions by the reader to understand.	Student communicates their thinking to others through a model with partially developed connections.	Student attempts to communicate their thinking to others through a model but thoughts are fragmented/disorganized.	The student does not communicate beyond observation.
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Revisions	The model has been revised based on feedback to include all relevant new understandings and/or new evidence.	The model has been revised, based on feedback, to include some relevant new understandings and/or new evidence.	The model has been revised, based on feedback, but does not include any relevant new understandings.	The model has not been revised to include relevant new understandings and/or new evidence, but students have received feedback for revision.	The model has not been revised.

Hour 6 - What is in a great model?

1. Labeling
2. Color coding
3. Key
4. Pictures
5. Phrases explaining things
6. Title
7.

Hour 6: What we noticed

- Attraction between magnet and pipe as the magnet was falling on all sides of the magnet
- The magnet kind of spun as it was falling
- Eddy waves prevent magnet and pipe from touching
- Pipe was copper or aluminum
- Neodymium magnet
- Anti-gravity, magnet fell slower than you would expect
-

Hour 6: Questions we have? Variables to test?

Questions

- What is the charge of the metal tube
- Does the magnet have + and - sides?
- What is the difference between the copper and the aluminum?
- How exactly does the eddy current interact with the magnetic field of the magnet?
- Does this event occur only when the magnet goes through the inside of the tube/will the magnet “float” in a different scenario?

To Test:

- size/type of magnet
- Material of the tube
- Thickness of the tube
- Would the magnet float in place if the tube was on its side
- If one end of the pipe was covered

Physics- October 29 and 30

1. Observation Balloon Labs
2. Van De Graaff Demos

Warm Up

- What is a time you got “shocked” by an object? What happened?
- Go Green or Go Blue?
- Take out a notebook to model in today.

Standards

- 1.1 Electrostatics: Students can identify the relationship between charged objects, neutral objects,water and other materials.

Physics- November 2th and 4th

1. PhET Charges
2. Organize Observations

Warm Up

- Take out your observations from **Thursday/Friday.**
- Write in the chat one of your observations.

***Remember no classes on Tuesday!**

Standards

- 1.1 Electrostatics: Students can identify the relationship between charged objects, neutral objects,water and other materials.

Organize Observations Hour 4

Charged vs. Charged-

-

Charged vs. Neutral-

-

Charged vs. Water-

-

Charged vs. Metal-

-

Organize Observations Hour 6

Charged vs. Charged-

-

Charged vs. Neutral-

-

Charged vs. Water-

-

Charged vs. Metal-

-

Physics- November 5th and 6th

1. What is a charge?
2. Review Observations
3. How do we charge something?
4. Modeling & CER

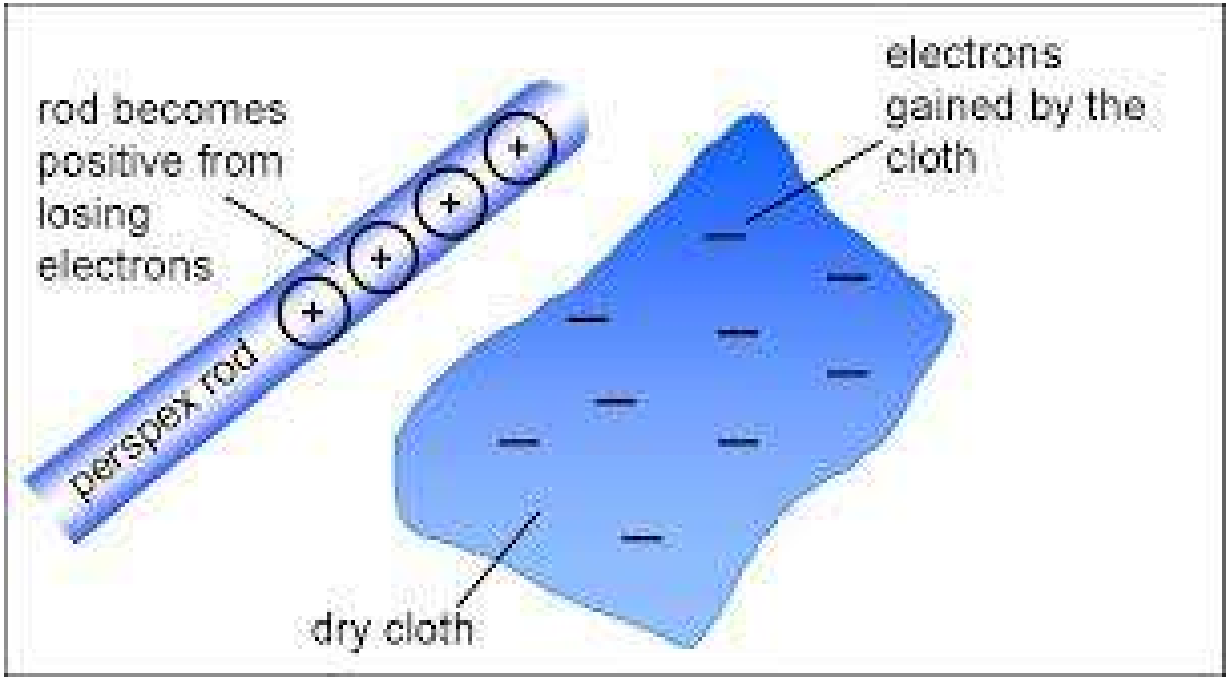
Warm Up

- Take out your observations from last block

Standards

- 1.1 Electrostatics: Students can identify the relationship between charged objects, neutral objects,water and other materials.
- M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.
-

What is a charge?



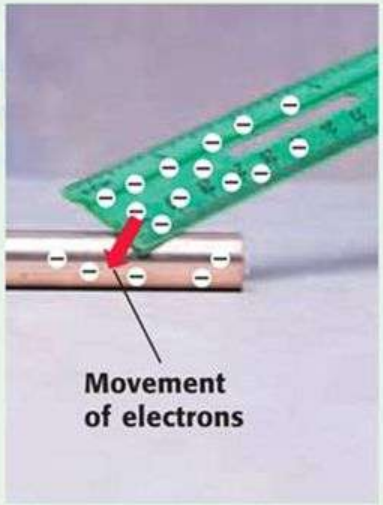
How

Three Ways to Charge an Object

Friction

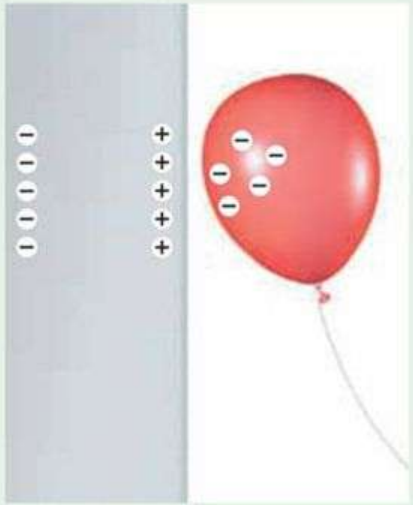
The friction of rubbing a balloon on your hair causes electrons to move from your hair to the balloon. Your hair and the balloon become oppositely charged and attract each other.

Conduction



When a negatively charged plastic ruler touches an uncharged metal rod, the electrons in the ruler travel to the rod. The rod becomes negatively charged by conduction.

Induction



A negatively charged balloon makes a small section of a metal beam have a positive charge through induction. Electrons in the metal are repelled by and move away from the balloon.

Hour 4

charge vs. charge

two charged objects resisted each other

The balloon vs. wall on the Phet Lab is a charge vs. charge example

Alike charges repelled each other.

opposite charges attract each other

charge vs. neutral

neutral attracts the charge

When the sweater was natural, the balloon was attracted and stuck itself on

The balloon and the water

charge vs. metal

the charges would go through the material to the metal

the charge built up was release when he touched the doorknob

The charge travels from the bottom up to be released

metals like copper and aluminium are conductors so they conductor the electricity/ charge.

charge will go down the metal to release

Interactions of Charged Objects

- Charged vs. Charged
  - Moved apart
- Charged vs. Neutral
  - Attracted
- Charged vs. Water
  - Attraction (bent towards it, but didn’t touch)
- Charged vs. Metal
  - Attraction + transfer of electrons (spark or shock)
- Neutral vs. Neutral
  - Nothing happens

Modeling Assessment

1) Model the phenomenon that you are assigned
2) Describe what is happening and why
3) Use 2-3 examples from class (demos or PhET) to explain the why
4) What type of charging and why?

You will be assigned one of the following:

#1: Hoover Plate

#2: Can Go Go

#4: Bubble Trouble

#9: Wingardium Leviosa

#3: Modeling Rubric I can create an accurate model based on a phenomenon and include all relevant details and that shows all of my thinking

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11/9 & 11/10

Schedule

1. Intro to Circuits
2. Circuit Exploration
3. Drawing Circuits
4. Practice

Warm Up

- Did you turn in your modeling assessment from last week?

Standards

1.2 Circuit Configuration: I can explain and model the energy transfer in different circuit configurations and predict behavior.

M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.

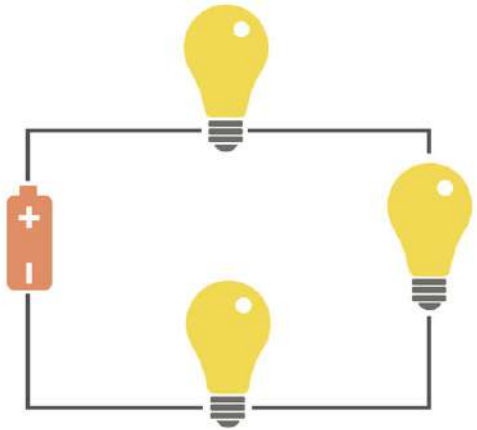
11/11 & 11/12

Schedule

1. Series vs. Parallel
2. Explore Circuits Assignments
3. Review Circuit Assignment
4. Work Time

Warm Up

- If a light burns out in a Christmas light, what usually happens?
- Imagine you remove a bulb. What would happen? Why?



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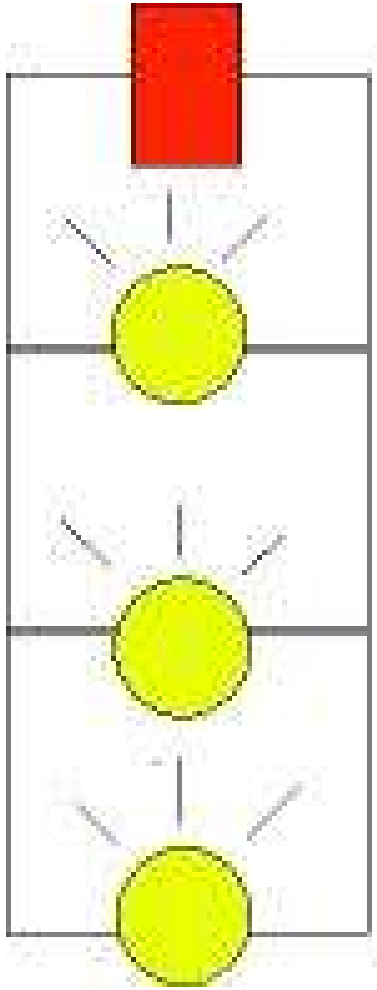
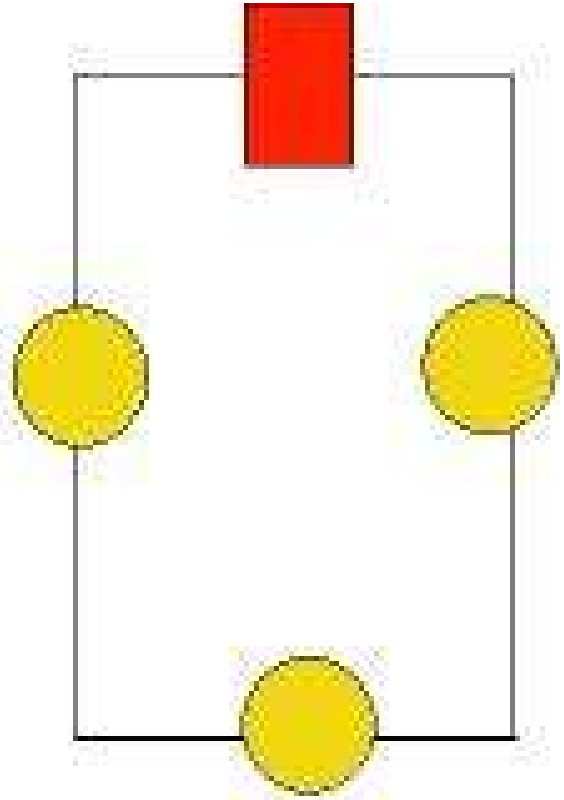




Explore and Make Conclusions about Brightness (Using PhET with partner or whole class)

Write down what it looks like, what is the brightness compared to 1 bulb and what the configuration looks like.

1 Bulb (control) comparing everything to!

1. 2 Bulbs in Series
2. 1 Bulb & Switch
3. 2 Bulbs in Parallel
4. 1 Bulb with Low # Resistor
5. 1 Bulb with High # Resistor
6. 1 Bulb in Series with more wires

Class Conclusions

Configuration	Brightness
Control vs. #1	
Control vs. #2	
Control vs. #3	
#2 vs. #3	
Control vs. #4	
#5 vs. #6	
Control vs. #5	

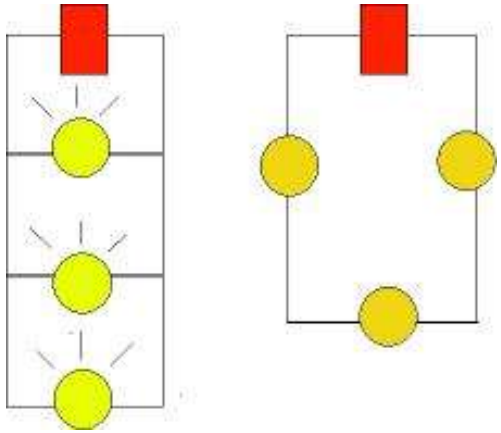
11/13 & 11/16

Schedule

1. Circuit Diagram Practice
2. Reading Resistors

Warm Up

Which one is in parallel and series? What do you predict will happen to the brightness?



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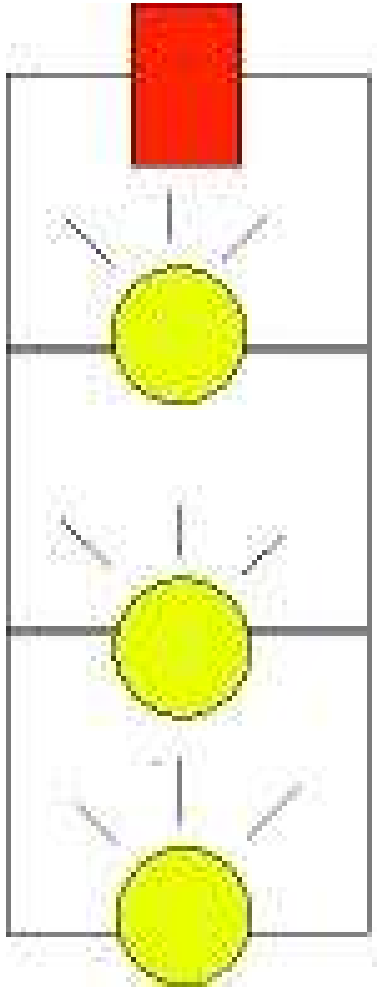
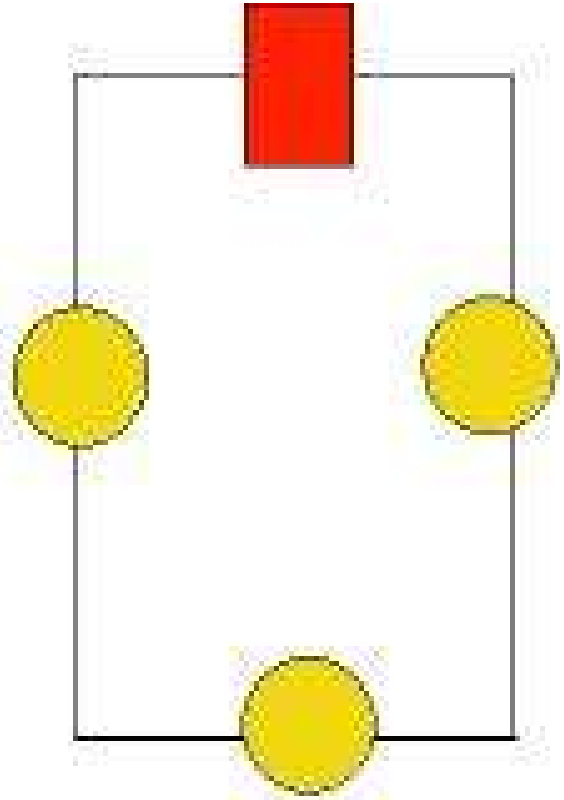




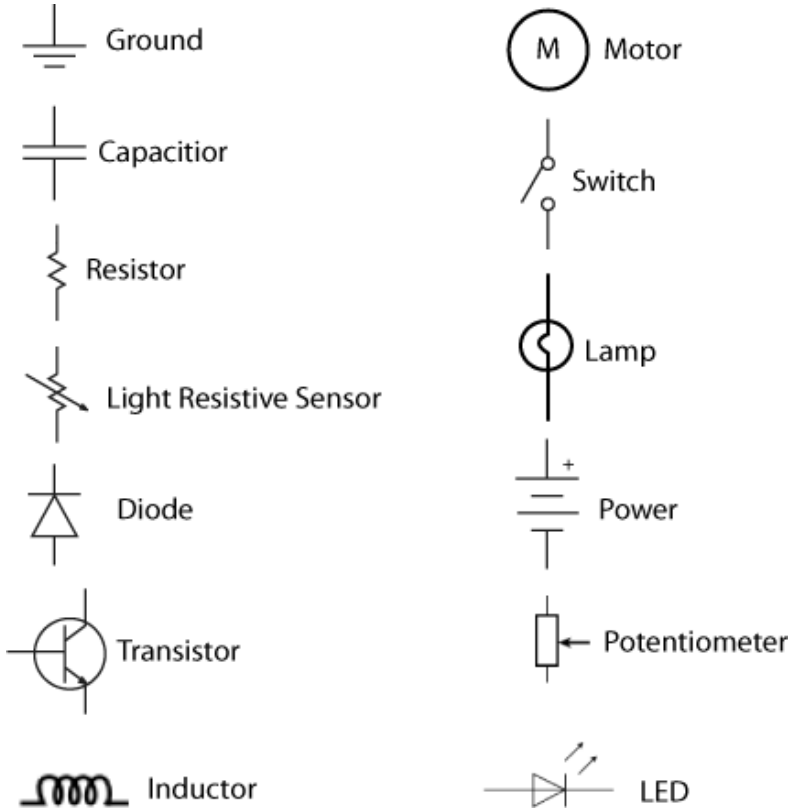
Series and Parallel Circuits In Everyday Life

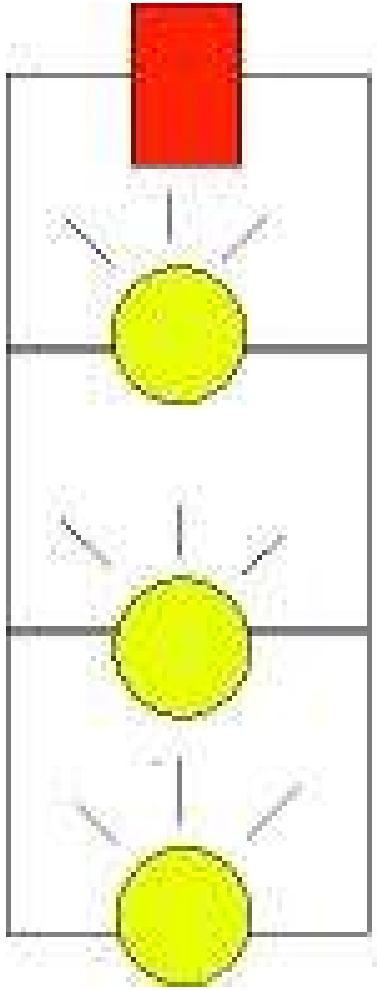
Series:

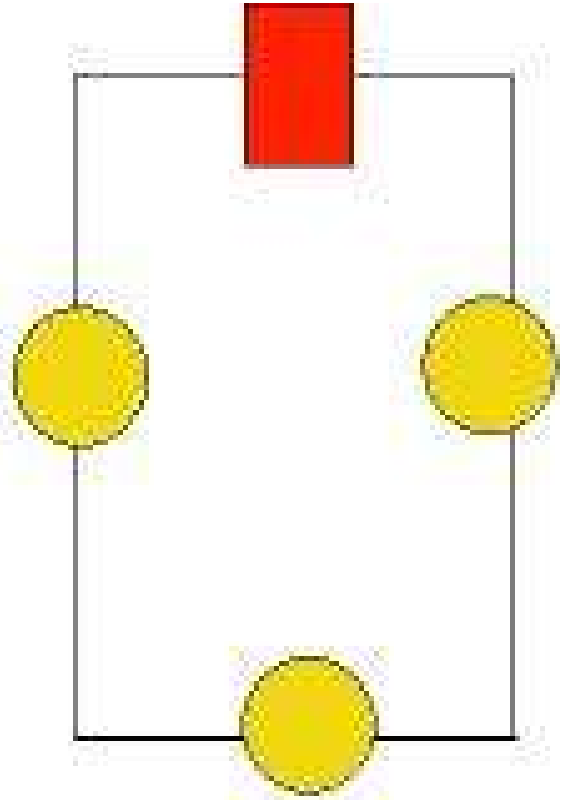
Parallel:

Drawing Circuits

1) Always straight lines
2) No Labels
3) Box-shaped
4) Always has a battery
5) Replace parts of the circuit with symbols
6) Just try it!







Practice (all have a battery)

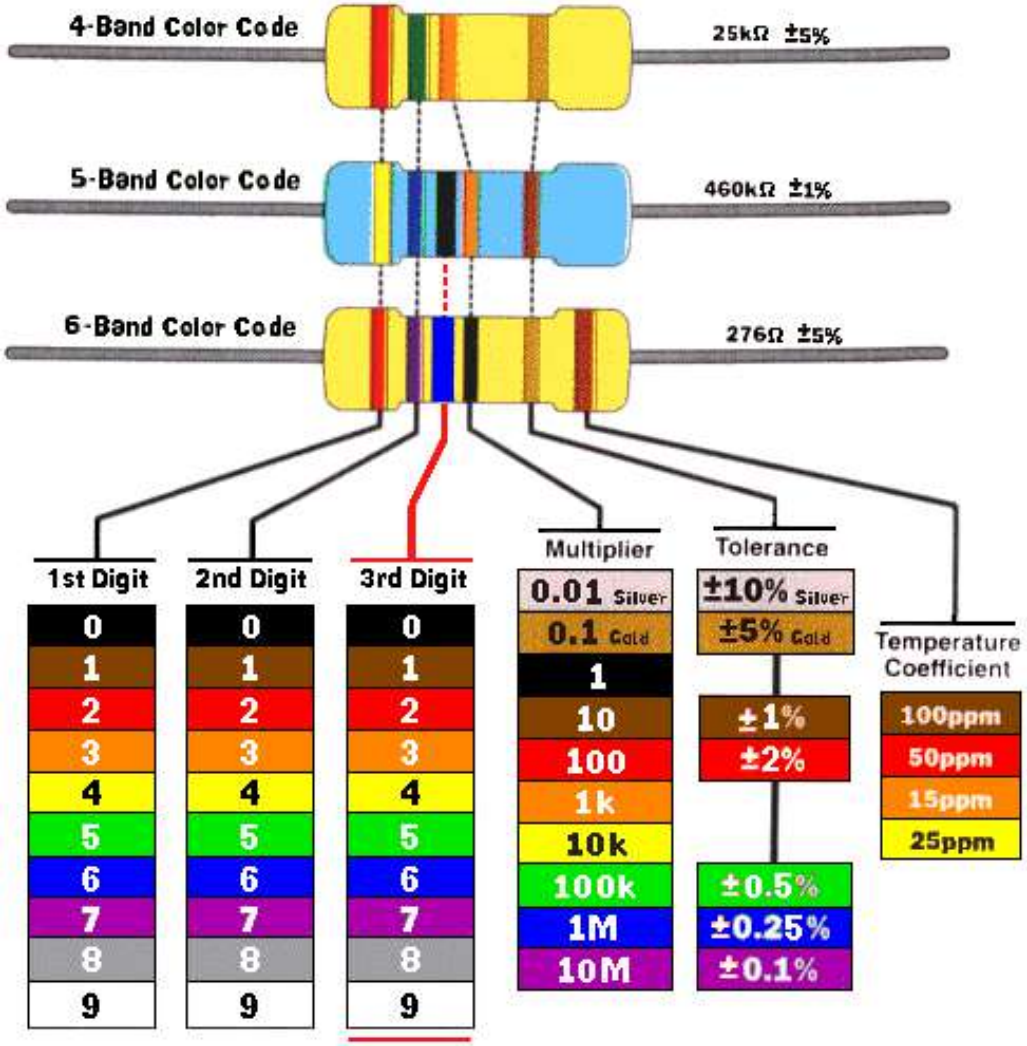
1. 1 Bulb
2. 2 Bulbs in Series
3. 1 Bulb & Switch
4. 2 Bulbs in Parallel
5. 1 Bulb with Resistor
6. 2 bulbs in series with a resistor in parallel with the bulbs
7. 2 bulbs in parallel with a switch next to the battery

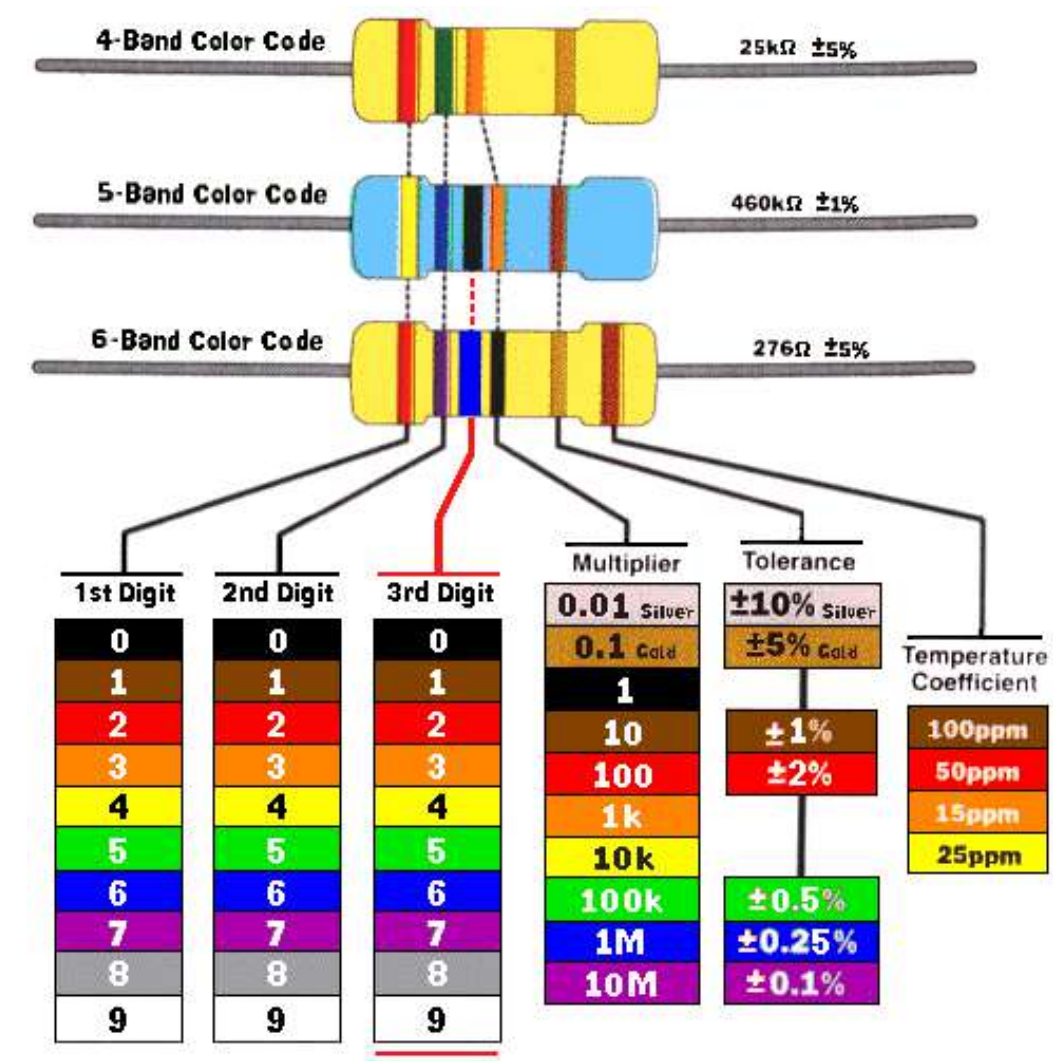
Teacher Examples on PhET

What’s a resistor?

Slow down the flow of electrons.

Strength?


4-Band Color Code
25kΩ ±5%
5-Band Color Code
460kΩ ±1%
6-Band Color Code
276Ω ±5%
1st Digit
2nd Digit
3rd Digit
Multiplier
Tolerance
Temperature Coefficient
0
1
2
3
4
5
6
7
8
9
0.01 Silver
0.1 Gold
1
10
100
1k
10k
100k
1M
10M
±10% Silver
±5% Gold
±1%
±2%
±0.5%
±0.25%
±0.1%
100ppm
50ppm
15ppm
25ppm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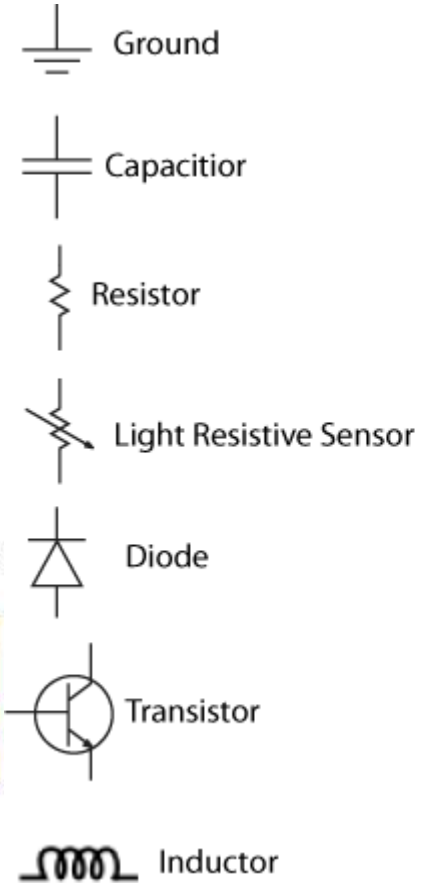
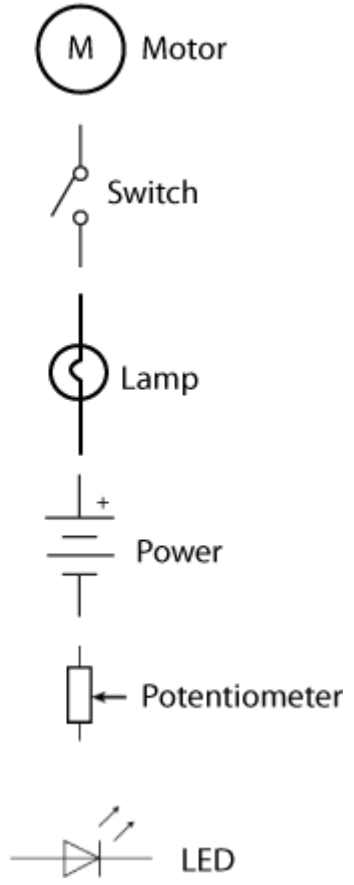
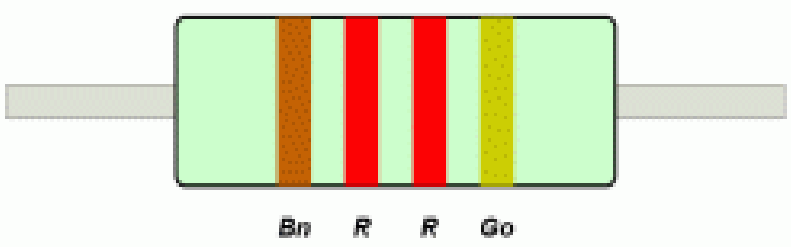
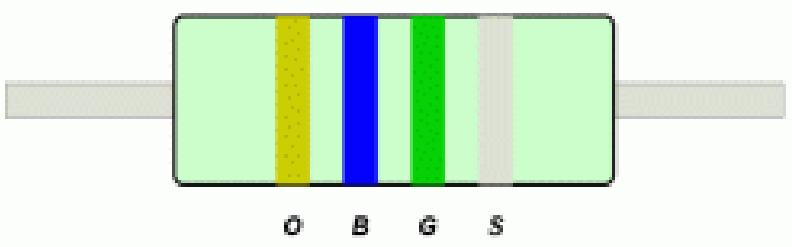
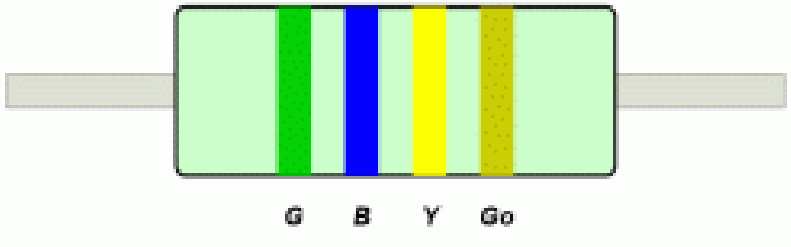
3rd Digit
Multiplier
Tolerance
Temperature Coefficient
0
1
2
3
4
5
6
7
8
9
0.01 Silver
0.1 Gold
1
10
100
1k
10k
100k
1M
10M
±10% Silver
±5% Gold
±1%
±2%
±0.5%
±0.25%
±0.1%
100ppm
50ppm
15ppm
25ppm

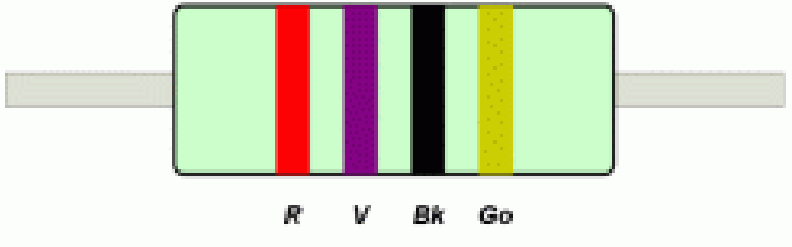

Ground
Capacitior
Resistor
Light Resistive Sensor
Diode
Transistor
Inductor

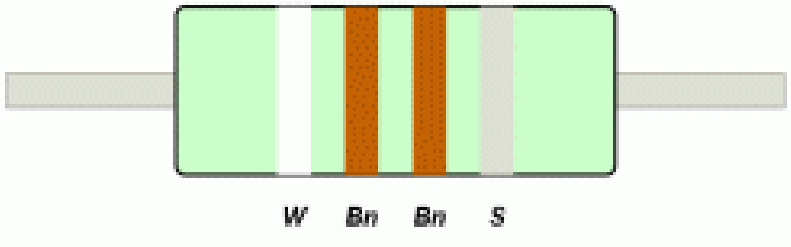

M
Motor
Switch
Lamp
+
Power
Potentiometer
LED

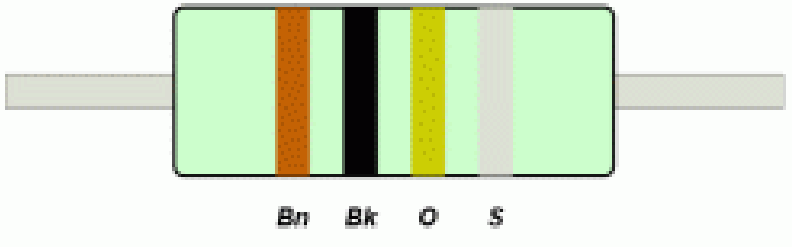

Bn R R Go


O B G S


G B Y Go

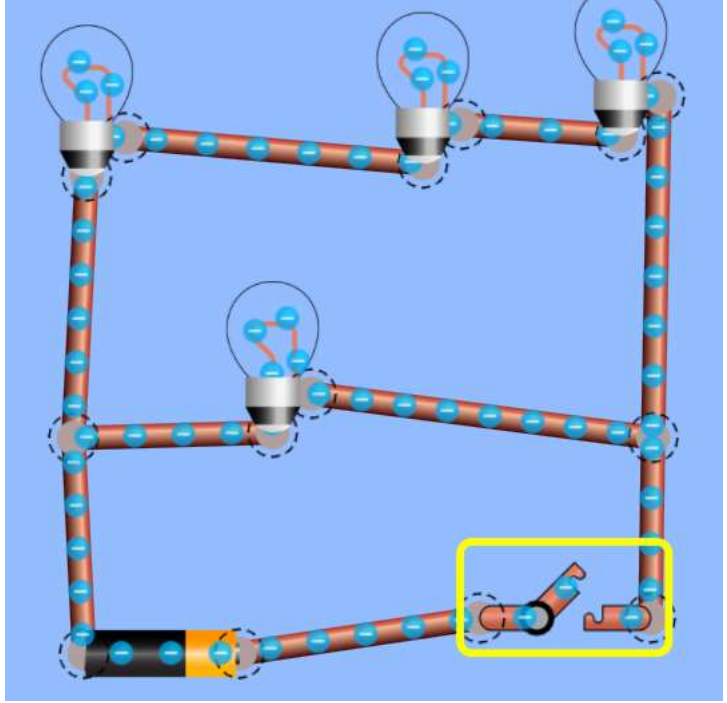

R V Bk Go

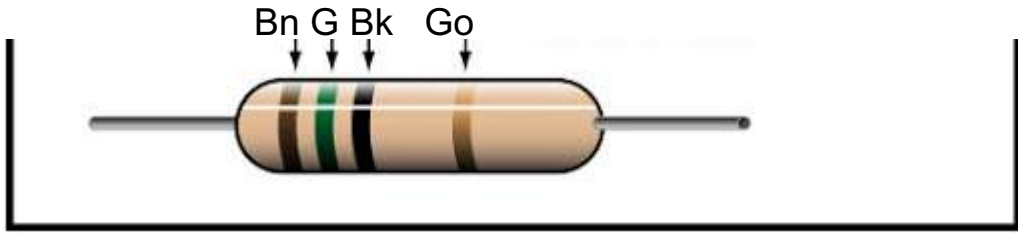

W Bn Bn S


Bn Bk O S

Exit Ticket 11/13

1) Create a circuit diagram for the circuit on the right
2) What will happen when you close the switch?
3) Predict the brightness of the bulbs.
4) Determine the resistance on the resistor on the right.





11/17 & 11/18

Schedule

1. Ohm's Law
2. Practice Exploration

Next Block: Open Note Assessment on Drawing Circuits, Reading Resistors, Resistance and Ohm's Law

Warm Up

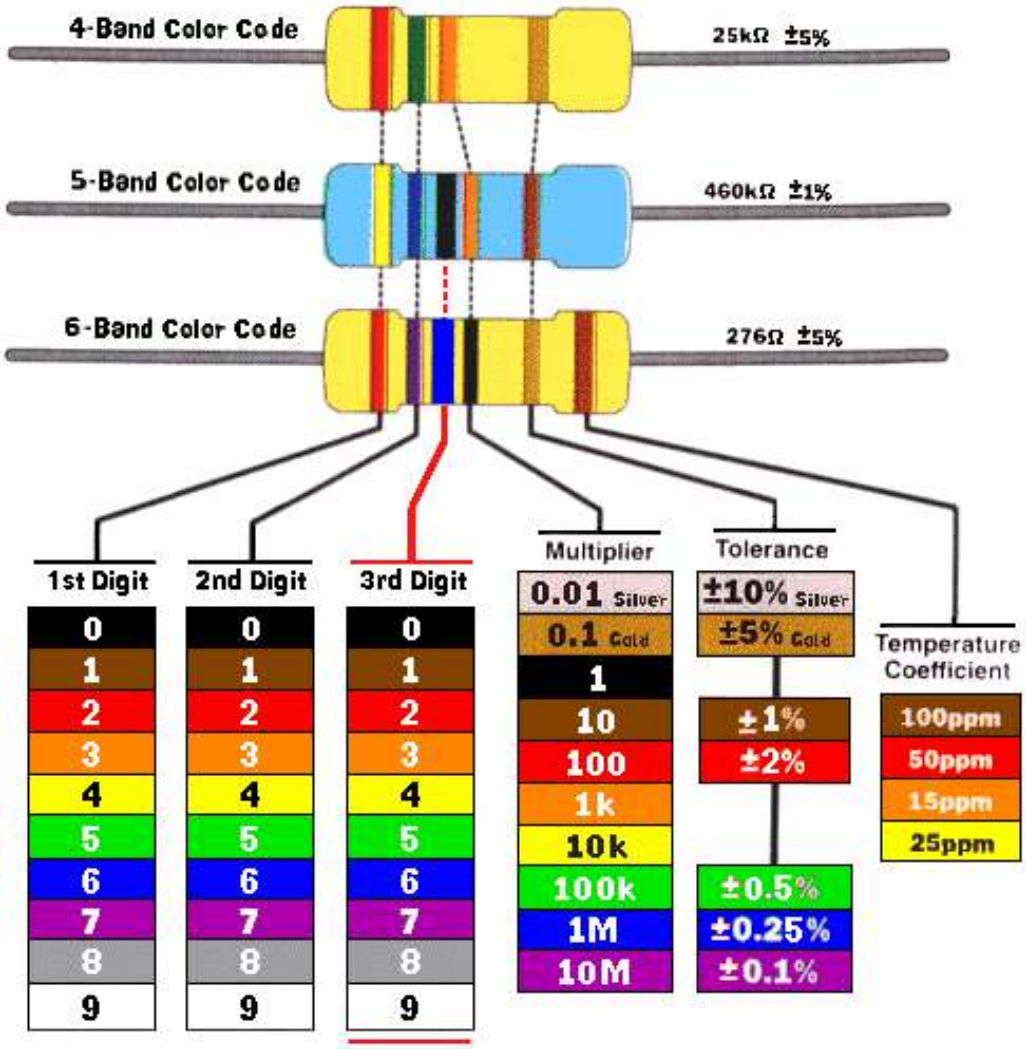
Create a resistor band (using the color chart to make...)

- 320 ohms
- 1 ohm
- 15k ohms
- 150 ohms
- 230 ohms

Standards

2.2 Circuit Configuration: I can explain and model the energy transfer in different circuit configurations and predict behavior.

2.3 Ohm's Law

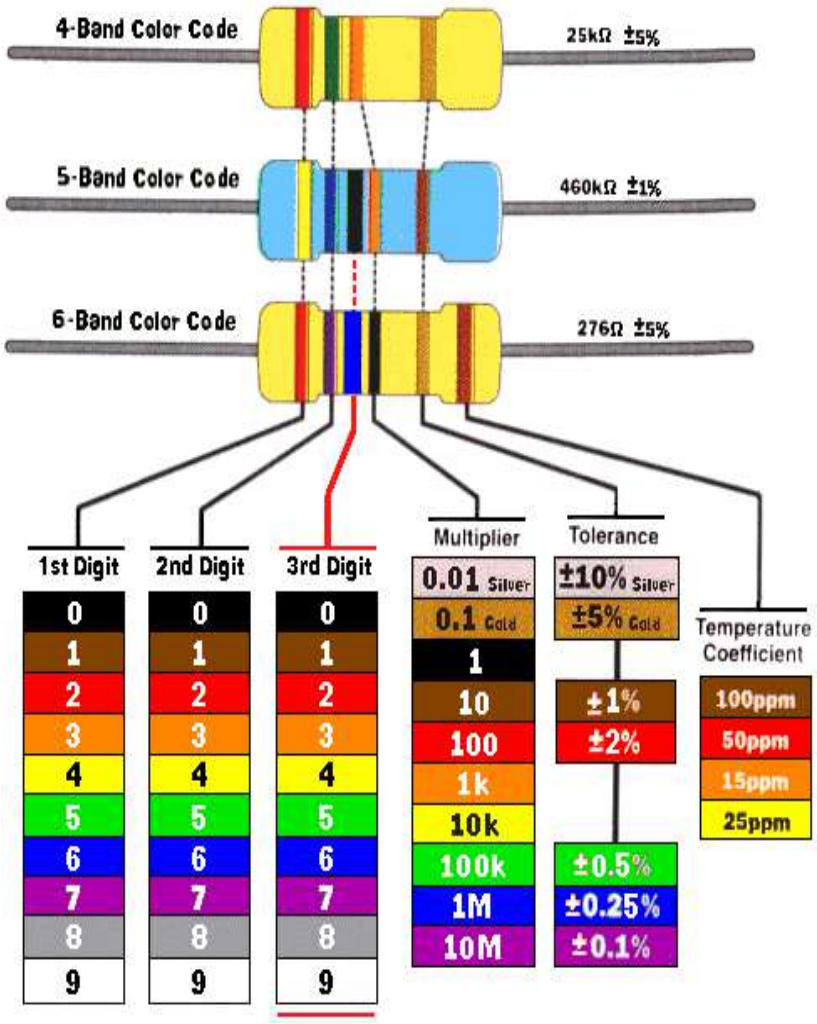


Warm Up

Create a resistor band (using the color chart to make...)

- 320 ohms
- 1 ohm
- 15k ohms
- 150 ohms
- 230 ohms

You can use 4 band or 5 band



Exercise 1

Using the color chart above, decode the value of the following resistors and indicate the tolerance:

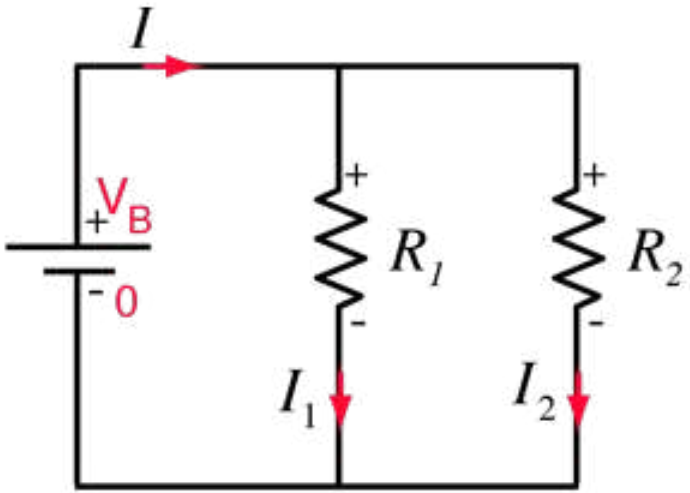
1. Brown, Black, Red, Gold. _____
2. Yellow Violet, Yellow, Gold. _____
3. Brown, Black, Green, Gold. _____
4. Blue, Grey, Black, Gold. _____
5. Orange, White, Orange, Gold. _____

Exercise 2

What are the color bands on the following value resistors all of which have a 5% tolerance?

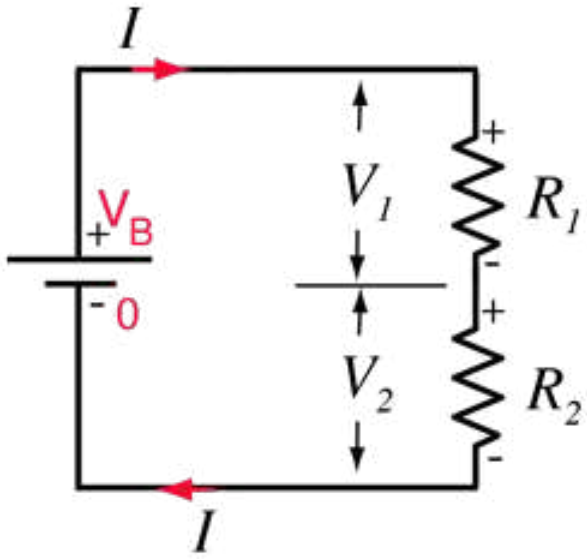
1. 22 k Ω _____
2. 10 Ω _____
3. 10 k Ω _____
4. 470 kΩ _____
5. 33 kΩ _____
6. 220 kΩ _____

How do we PROVE series and parallel are different?



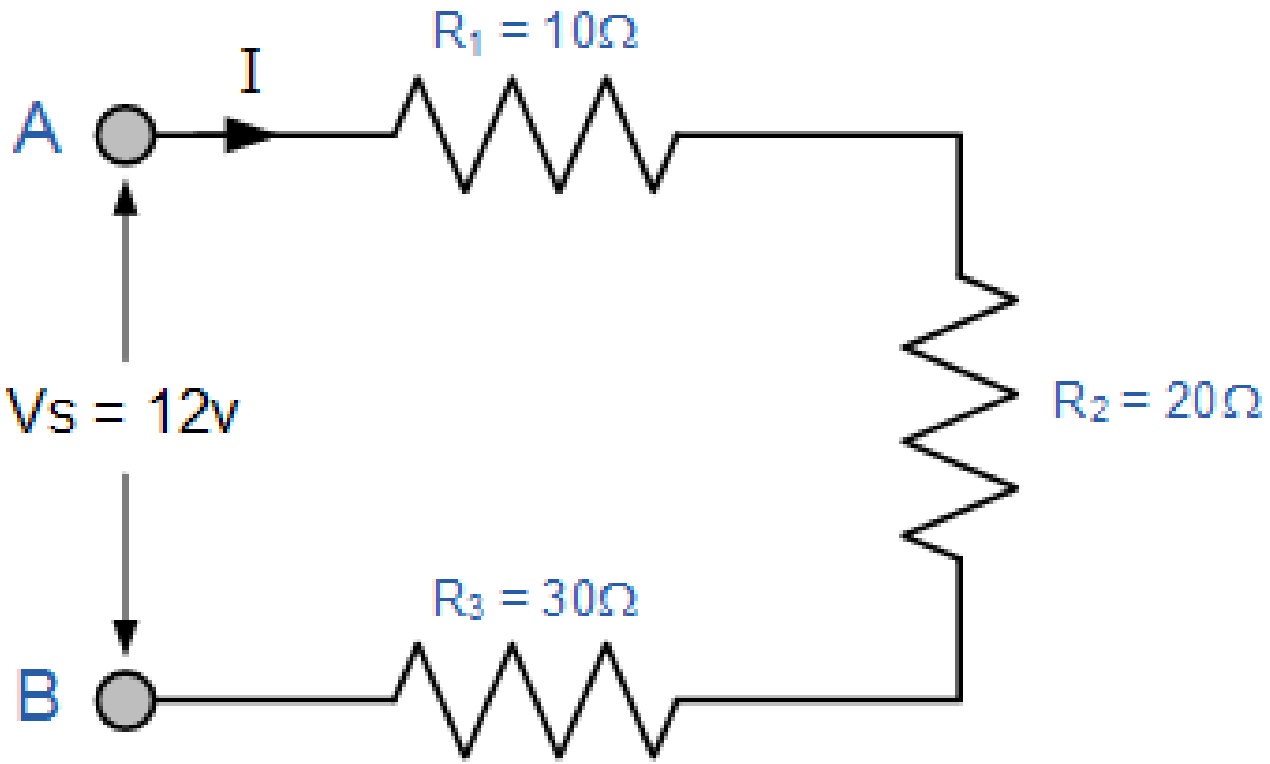
Parallel resistors

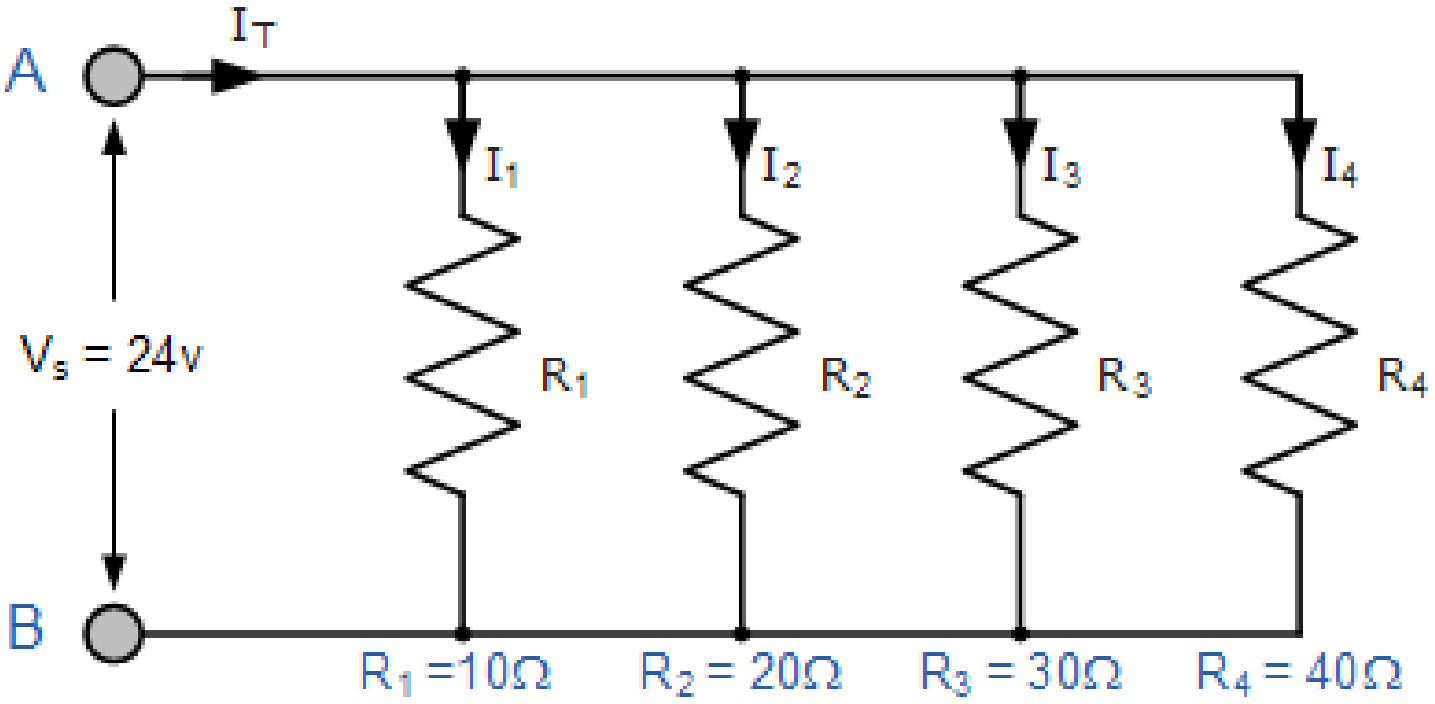
$$\frac{1}{R_{equivalent}} = \frac{1}{R_1} + \frac{1}{R_2}$$



Series resistors

$$R_{equivalent} = R_1 + R_2$$


R1 = 10Ω
I
A
Vs = 12v
R2 = 20Ω
R3 = 30Ω
B


A
B
I_T
I_1
I_2
I_3
I_4
$V_s = 24v$
R_1
R_2
R_3
R_4
$R_1 = 10\Omega$
$R_2 = 20\Omega$
$R_3 = 30\Omega$
$R_4 = 40\Omega$

PhET Practice

- Teacher will make a circuit
- Draw the circuit
- Determine the resistance

11/19 & 11/20

Schedule

1. Review Equivalent Resistance
2. Ohm's Law
3. Practice Exploration

Next Block: Open Note Assessment on Drawing Circuits, Reading Resistors, Resistance and Ohm's Law

Warm Up

Create a circuit on PhET with 2 resistors in series that is parallel with another 2 resistors in series. Every resistor is 100 ohms.

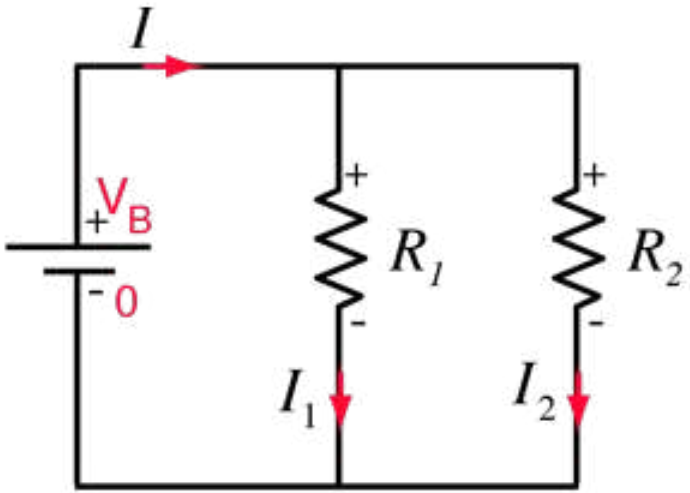
Create a circuit diagram.

What is the equivalent resistance?

Standards

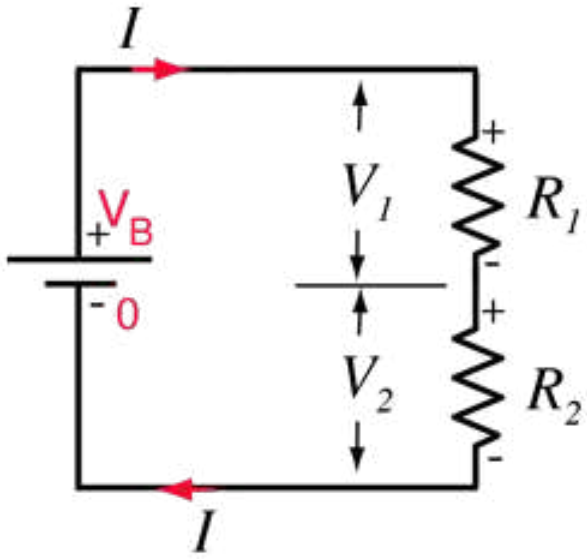
2.2 Circuit Configuration: I can explain and model the energy transfer in different circuit configurations and predict behavior.

2.3 Ohm's Law



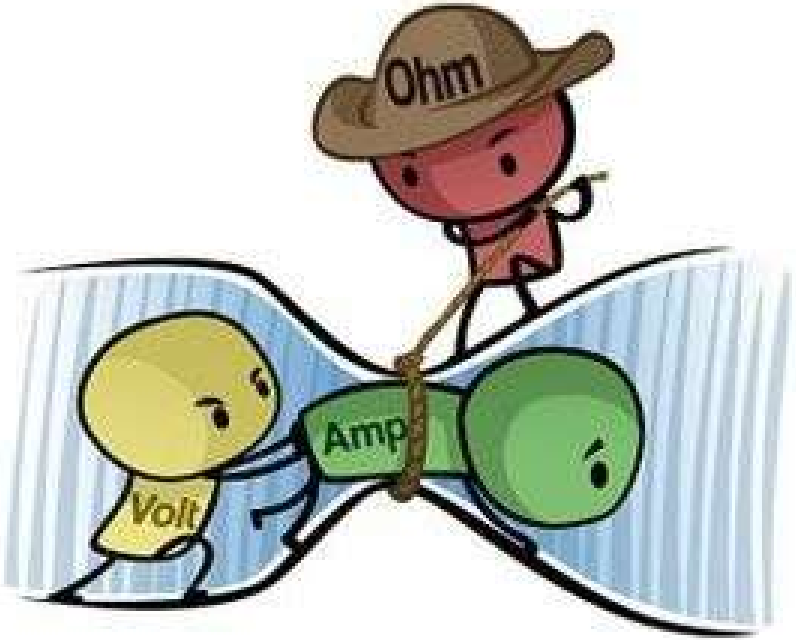
Parallel resistors

$$\frac{1}{R_{equivalent}} = \frac{1}{R_1} + \frac{1}{R_2}$$



Series resistors

$$R_{equivalent} = R_1 + R_2$$



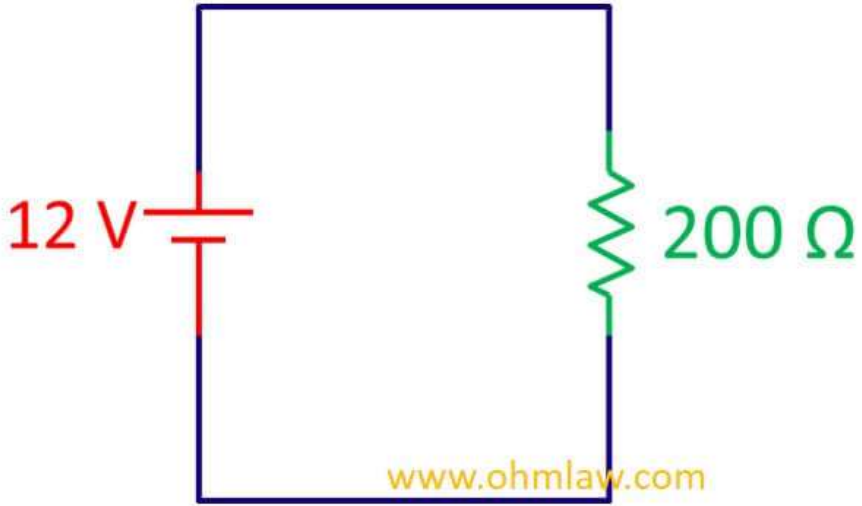
V=IR

V:

I:

R:

Application of Ohm's law to complete circuit

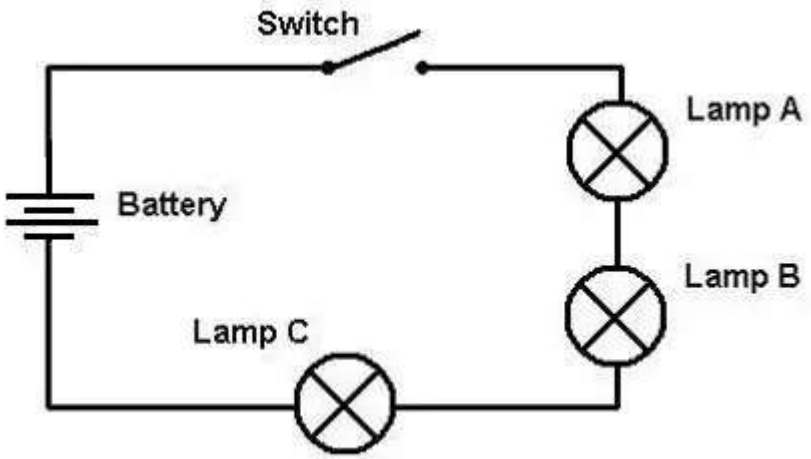


Voltage = 12 V

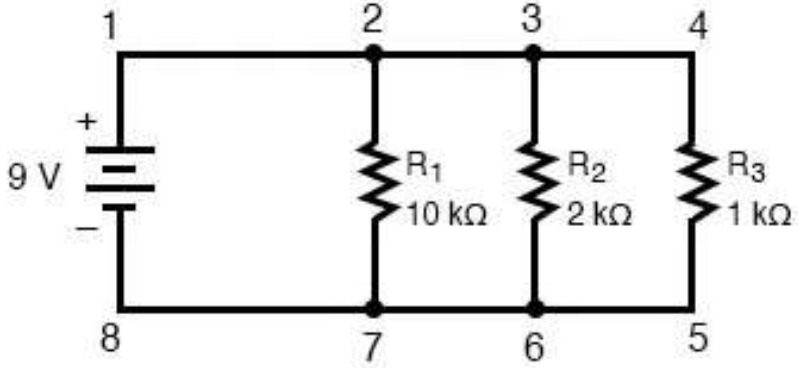
Resistance = 200 Ω

Current = ?

Lamp A: 100 Ohms
Lamp B: 50 Ohms
Lamp C: 70 Ohms
V = 20 Volts
Determine Equiv Resistance and Current



K = 1000
Determine Equiv Resistance and Current



Open Note Assessment Monday!

1. I will show you a circuit (4 total)
2. Creating Circuit Diagrams
3. Find equivalent resistance
4. Determine current or voltage using Ohm's Law

Cameras must be on for assessments :) We don't have many like this

PhET Circuit Practice

11/23 & 11/24

Schedule

Circuit Assessment

Enjoy your Thanksgiving Break!

Warm Up

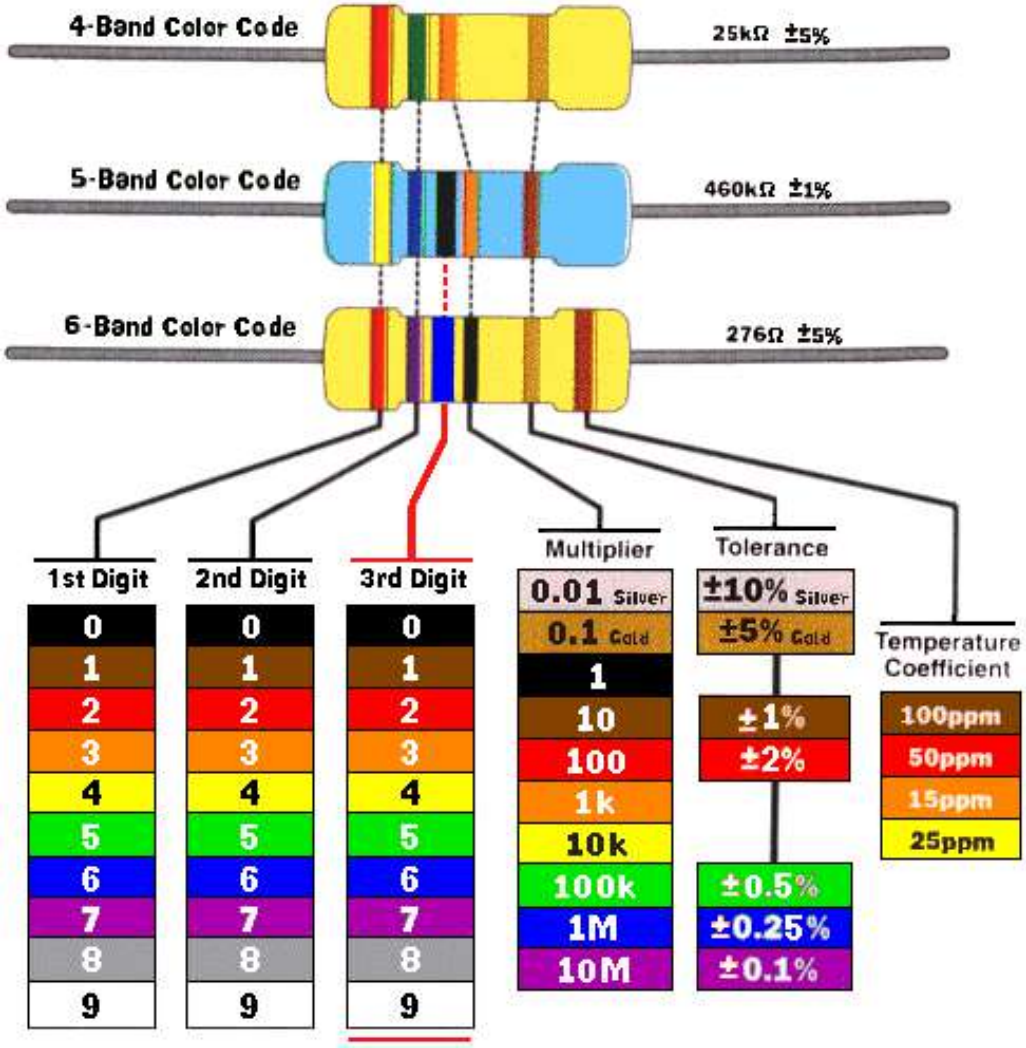
What is Ohm's Law?

If I have a resistor with green, blue, black, gold what is the resistance? (use color chart on Google Classroom)

Standards Assessed On

2.2 Circuit Configuration: I can explain and model the energy transfer in different circuit configurations and predict behavior.

2.3 Ohm's Law


4-Band Color Code
25kΩ ±5%
5-Band Color Code
460kΩ ±1%
6-Band Color Code
276Ω ±5%
1st Digit
2nd Digit
3rd Digit
Multiplier
Tolerance
Temperature Coefficient
0
1
2
3
4
5
6
7
8
9
0.01 Silver
0.1 Gold
1
10
100
1k
10k
100k
1M
10M
±10% Silver
±5% Gold
±1%
±2%
±0.5%
±0.25%
±0.1%
100ppm
50ppm
15ppm
25ppm

Circuit Assessment

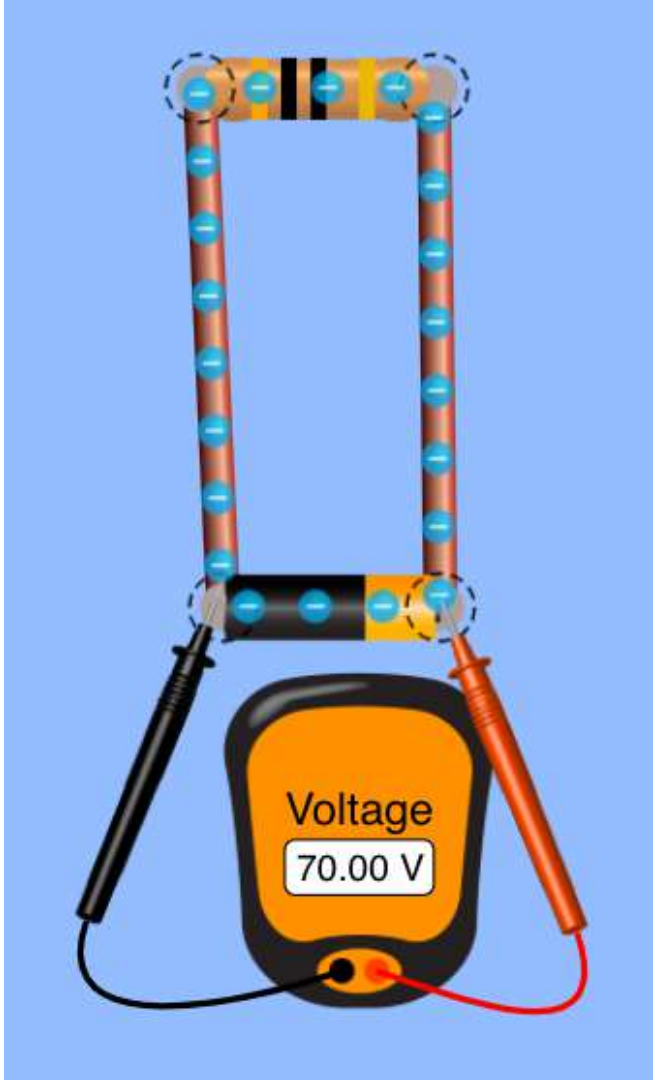
Cameras on and faced towards your whole face.

1. Determine the resistance of the resistor(s) using the color bands (chart google classroom).
2. Create a circuit diagram
3. Find the equivalent resistance
4. Find the current using Ohm's Law. Make sure you show all work and units.

Assessed on 2.2 Circuit Configuration (resistors, circuit diagrams) 2.3 Ohm's Law (Equivalent Resistance, Ohm's Law)

Circuit #1

1. Determine the resistance of the resistor(s) using the color bands (chart google classroom Assignment).
2. Create a circuit diagram (do not put in the voltmeter)
3. Find the equivalent resistance
4. Find the current using Ohm's Law. Make sure you show all work and units.



Circuit #2

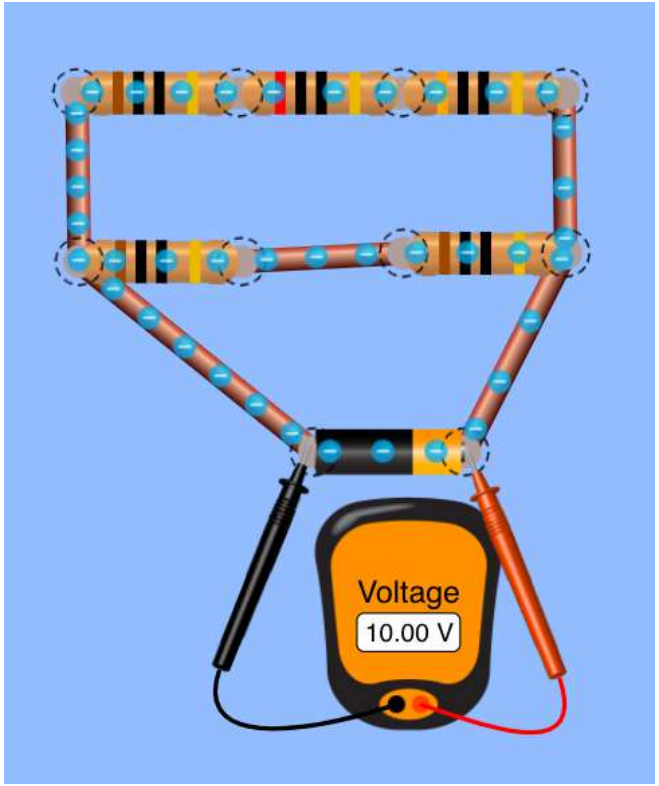
1. Determine the resistance of the resistor(s) using the color bands (chart google classroom Assignment).
2. Create a circuit diagram (do not put in the voltmeter)
3. Find the equivalent resistance
4. Find the current using Ohm's Law. Make sure you show all work and units.

Circuit #3

1. Determine the resistance of the resistor(s) using the color bands (chart google classroom Assignment).
2. Create a circuit diagram (do not put in the voltmeter)
3. Find the equivalent resistance
4. Find the current using Ohm's Law. Make sure you show all work and units.

Circuit #4

1. Determine the resistance of the resistor(s) using the color bands (chart google classroom Assignment).
2. Create a circuit diagram (do not put in the voltmeter)
3. Find the equivalent resistance
4. Find the current using Ohm's Law. Make sure you show all work and units.



Physics- 11/30 and 12/1

Schedule

1. Electricity and Magnetism Exploration
2. Class Conclusions

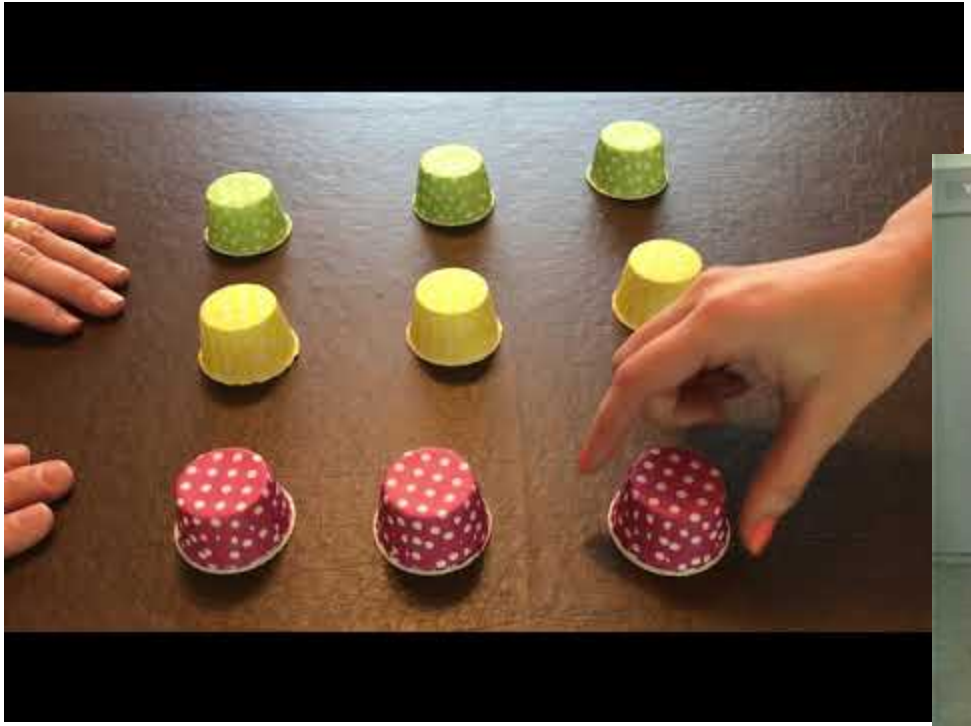
Warm Up

-

Standards

1.4 Electricity and Magnetism: I can determine the cause and effect relationships between electrical components and/or magnets in contact with each other.

M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.

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Electricity and Magnetism Investigation

1. How do the magnets interact? Describe in detail.
2. How do the magnets interact with the bottle of iron filings, paperclips, nails and compass?
3. What do you notice happens when you interact the **wire coil** with the bottle of iron filings, paperclips, nails and compass?
4. What do you notice happens when you interact the **wire coil attached to the battery** with the bottle of iron filings, paperclips, nails and compass?
5. What do you notice happens when you interact the different size of magnets together?
6. What happens when you turn the generator at different speeds? What are the mechanics of the generator? What happens when you connect the extra light bulb in parallel?
7. Create a Motor- watch video

Physics- Wednesday, October 23rd

Schedule

1. Class Conclusions
2. Review Phenenmon
3. Final Modeling of Phenomenon
4. Turn in Model + Standards Sheet

Warm Up

- Take out your notebook and sit with your partner from yesterday.

Standards

1.4 Electricity and Magnetism: I can determine the cause and effect relationships between electrical components and/or magnets in contact with each other.

M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.

E&M Stations

1. Magnets
    a. What properties did you notice?
    b. Magnetic field- define!
    c. Show video!
2. Wire Coil and Motor
    a. What did you notice?
    b. Show video!
3. Generator


MAGNETS
how do they work?


GP
SUPER
ALKALINE

Final Model of Phenomenon

Front: Model Phenomenon to include **all relevant details** and explain **why** the magnet is moving the way it is.

Back: Explanation of phenomenon and application to what we learned in class (at least 3 different topics and vocab)

Turn in with standards sheet and your final attempt for ALL standards!

Physics- Friday, October 25th

Schedule

1. Finish Up Phenomenon Models
2. Present to teacher and check in about grades
3. Work on Electric Eel Phenomenon

Warm Up

- Take out your model and electric eel article!

Standards

1.4 Electricity and Magnetism: I can determine the cause and effect relationships between electrical components and/or magnets in contact with each other.

M.1 Modeling Details: All relevant details are present in the model to explain unobservable mechanisms and show input/output with no extraneous details.