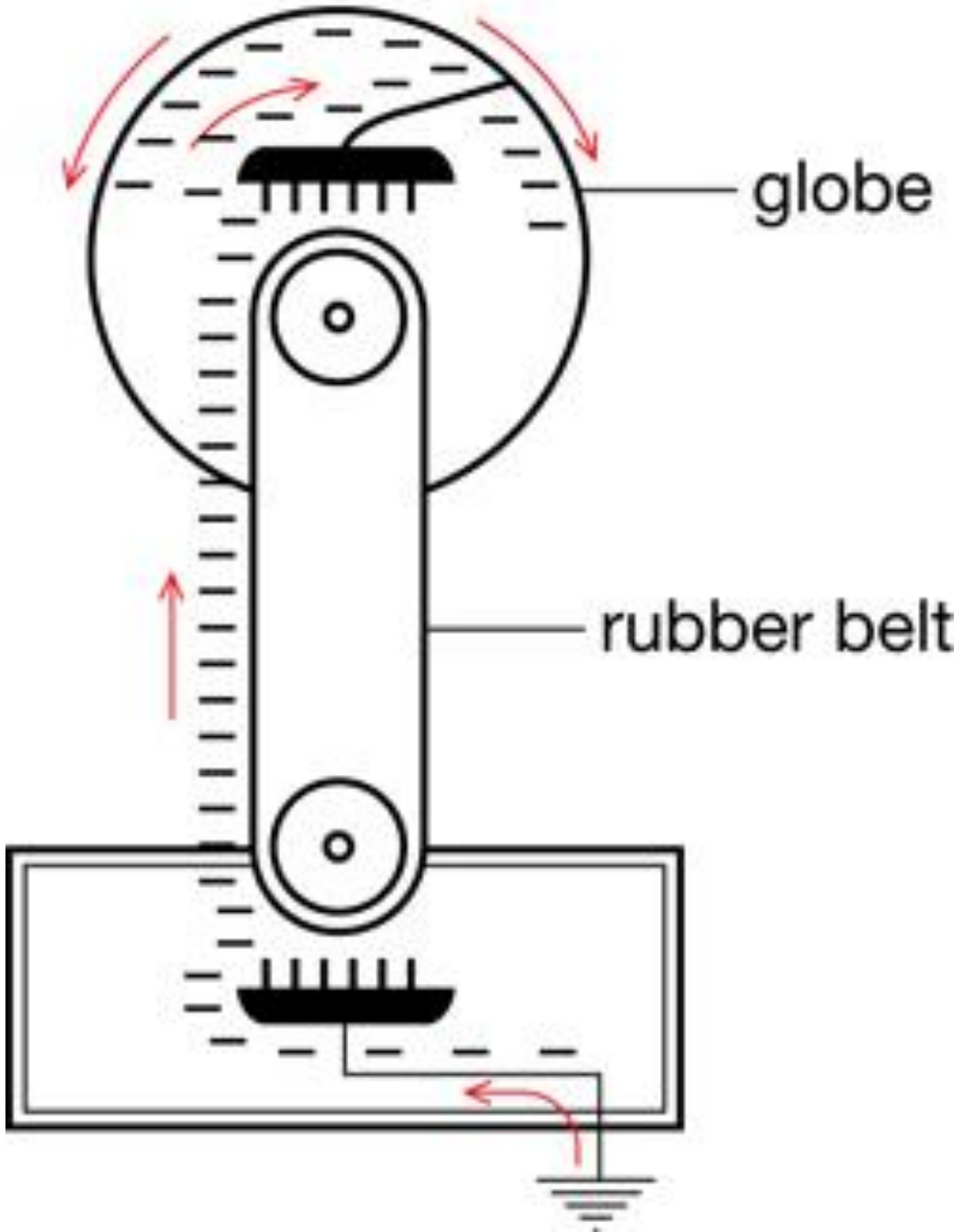
Electrical Energy

10/5/15

Energy Flow



Why does your hair stand on end when it's charged?

A. Charges want to discharge to the air

B. Ionic Bonding

C. Charged hair wants to get as far apart as possible

D. Scientists do not understand this phenomena

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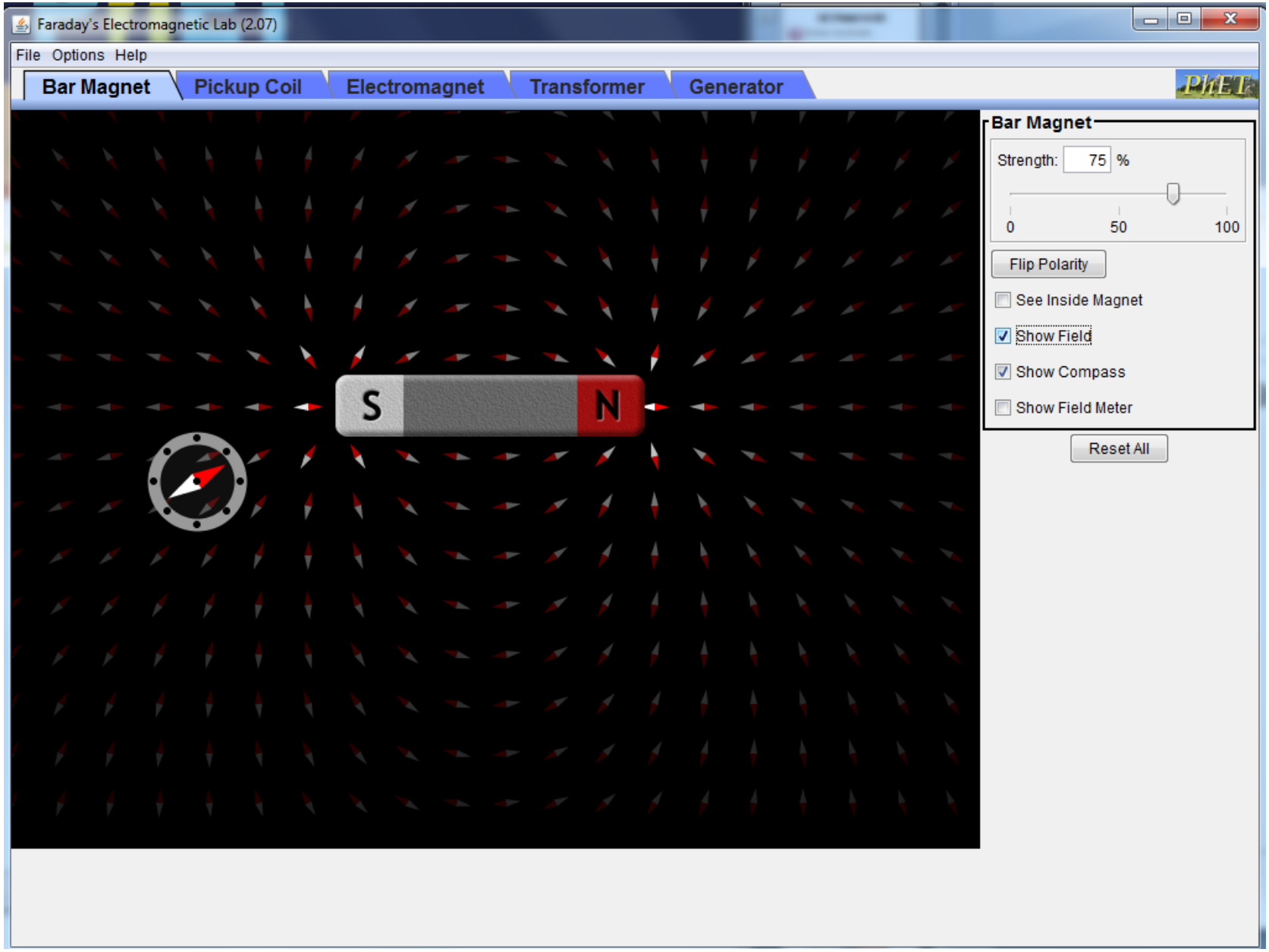
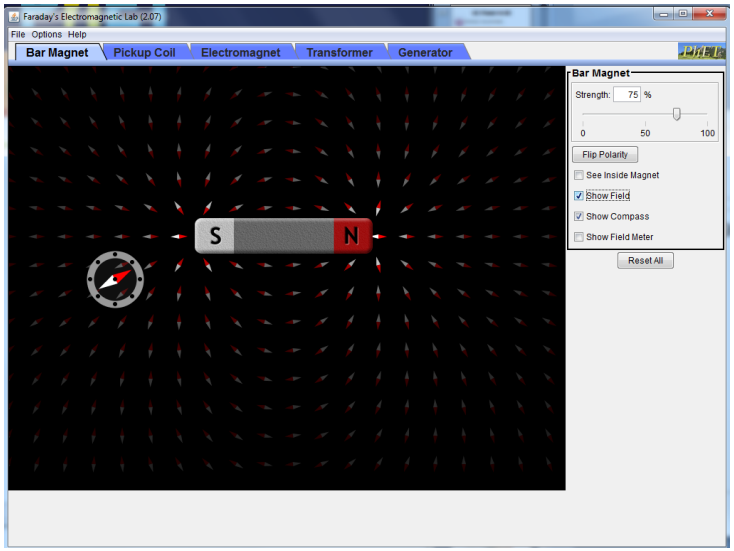
Lion Eats the Sun


Faraday's Electromagnetic Lab (2.07)
File Options Help
Bar Magnet
Pickup Coil
Electromagnet
Transformer
Generator
PhET
S
N
Bar Magnet
Strength: 75 %
0
50
100
Flip Polarity
See Inside Magnet
Show Field
Show Compass
Show Field Meter
Reset All



When working on the homework, I felt

A. Comfortable that I figured it all out
B. Like I got a lot from the sim but missed some key concepts
C. Lost, I just couldn't figure out how things connected
D. I didn't try it.

Magnets

In lab, magnets *strongly* attracted

A. Nail, paper clip
B. Nail, Paper Clip and Aluminum rod
C. PVC Pipe, plexiglass, glass
D. A and C
E. B and C

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Magnets

1. Magnets have nothing to do with electrical charges.

2. Magnets always have a North pole and a South pole. North attracts South and North repels North.

3. Students often confuse magnets with electric charges because they follow the basic rule of opposites attract and likes repel. However, it's for different reasons.

Magnets

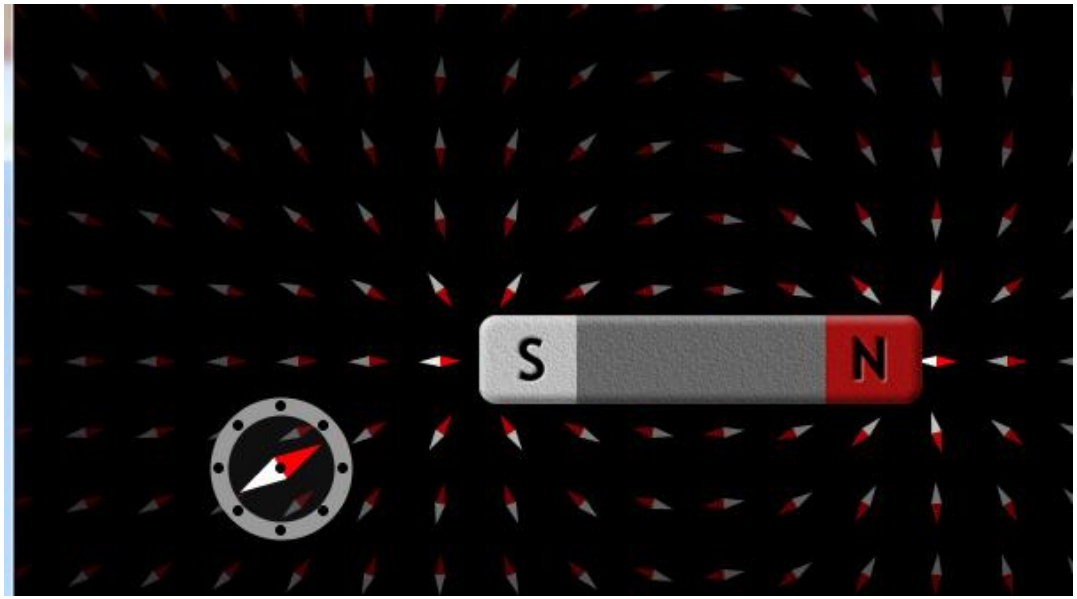
Which end of the compass is attracted to the Magnet?

A. Same color

B. Opposite Color

C. Both

D. Not attracted



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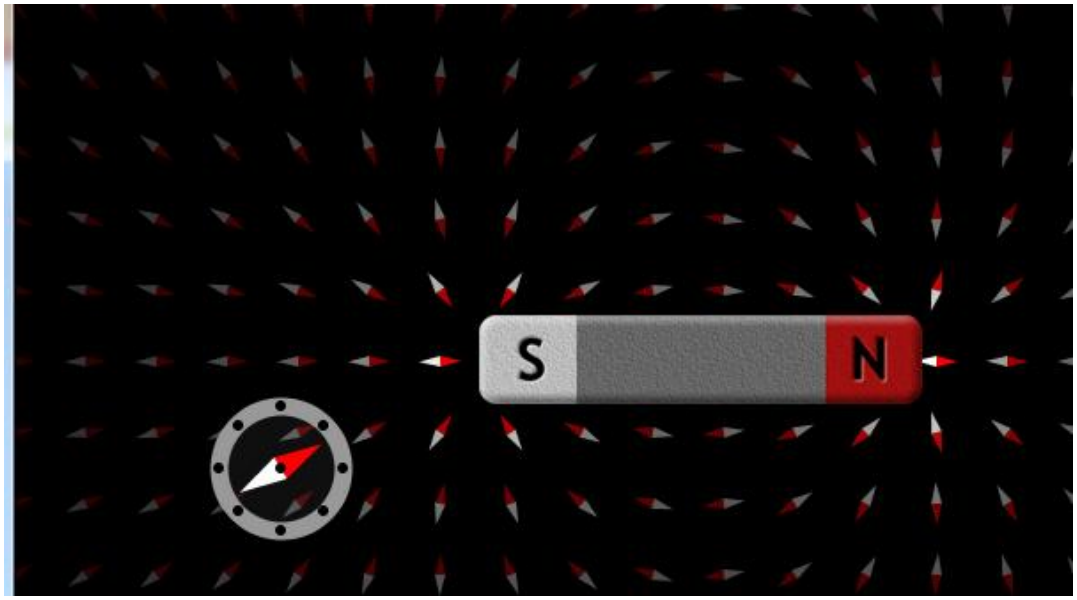
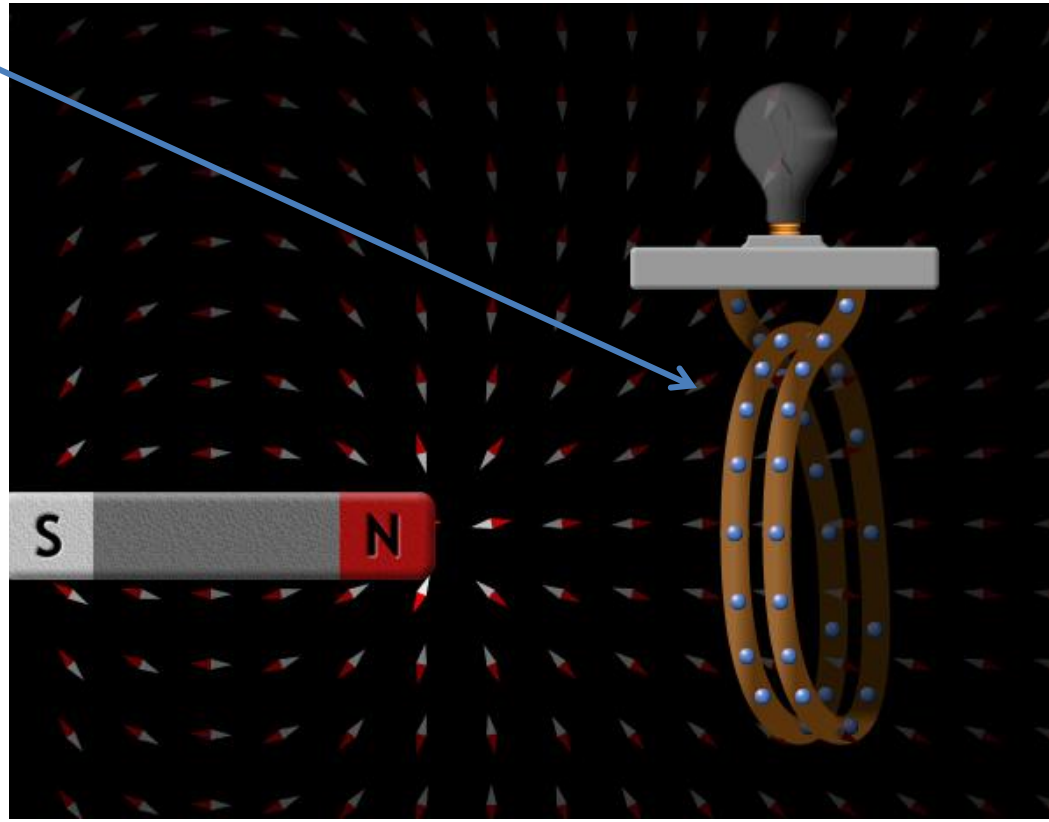


What are the blue dots?

A. Magnets
B. Magnetic field
C. Electrons
D. Protons



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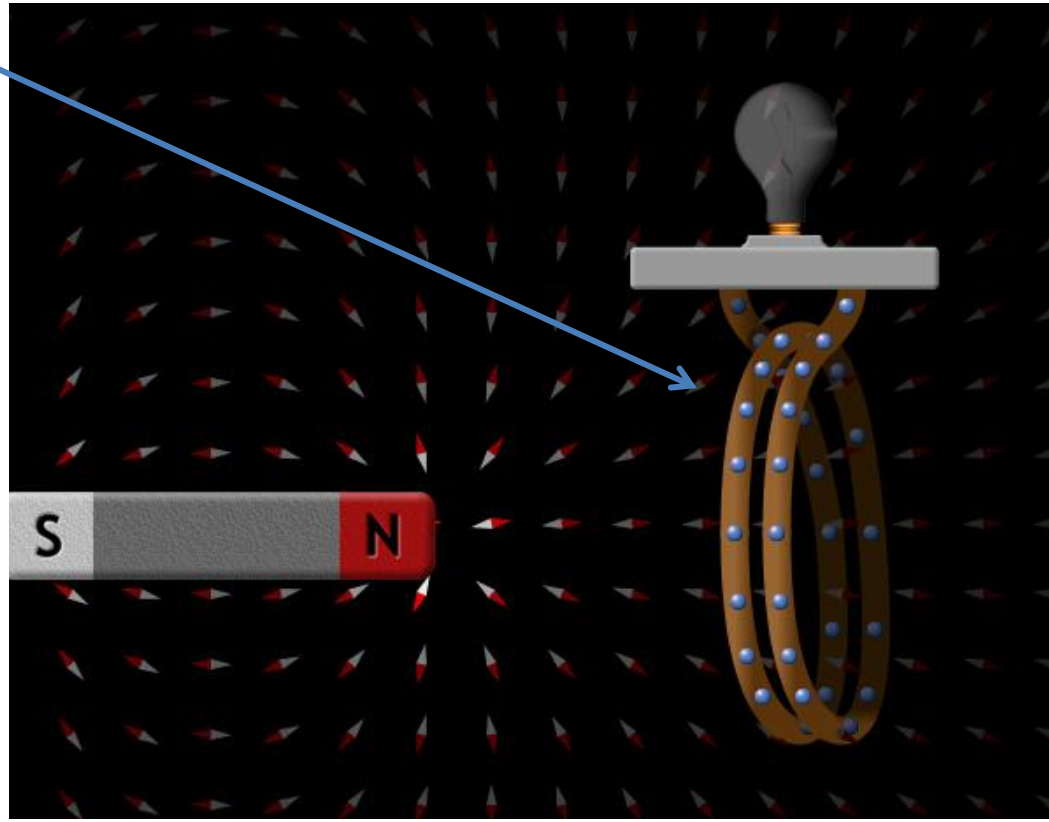


Lab Info

Gravitational Potential Energy U_g

$$mgy$$

m = mass (in kilograms)

g = acceleration due to gravity (9.8 m/s^2)

y = height

Joe has a mass of 75kg and climbs up on a desk 1 m off the floor. What is his gravitational potential energy with respect to the floor?

$U_g = 75\ \text{kg}\ \ 9.8\ \text{m/s}^2\ \ 1\ \text{m} =$ **735 J**

More Lab Info

Power

P = energy/unit time

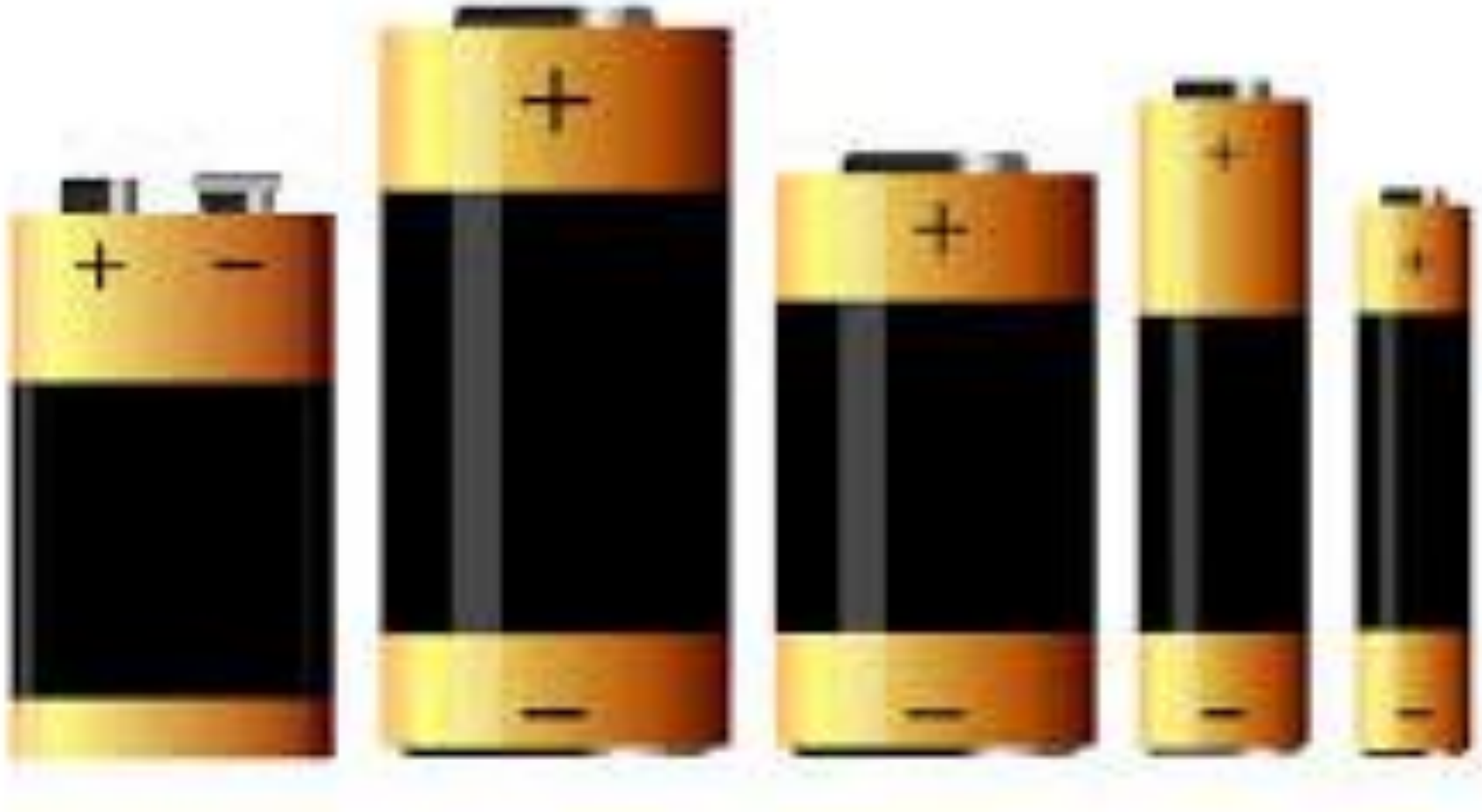
Let's say it took Joe 1.5 seconds to get up on that desk. How much power did he exert?

$P = 735\ \text{J}/\ 1.5\text{s} = \mathbf{490\ W}$

What do you notice about batteries?

Contacts have opposite charges

Caused by a chemical reaction inside. Once the reactions are complete, the battery is dead.



Contacts have opposite charges

Which end are electrons attracted to?

A. +

B. -

C. Both

D. Not enough info

Contacts have opposite charges

Which end are electrons attracted to?

A. +

B. -

C. Both

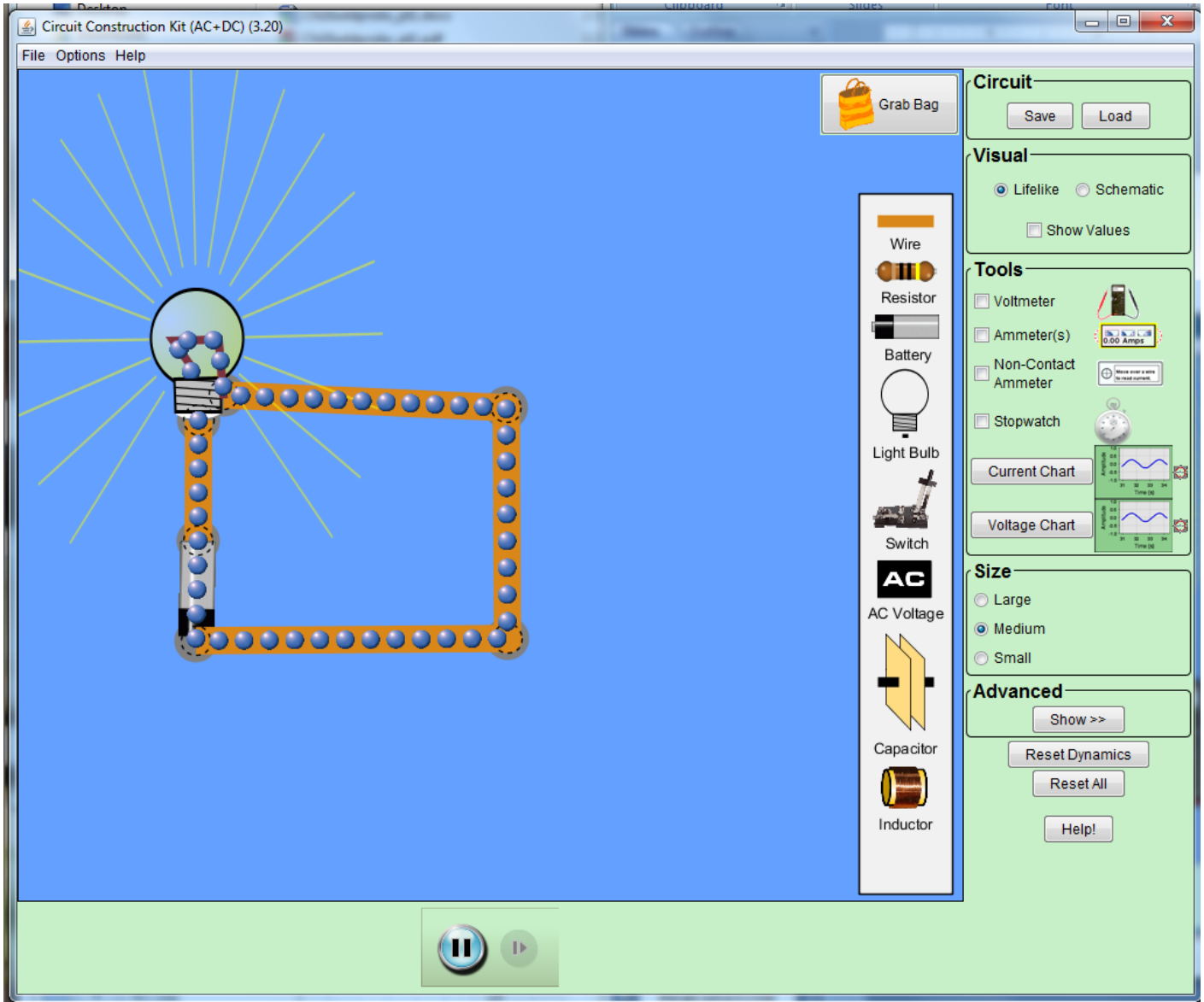
D. Not enough info

Contacts have opposite charges

Electrons are attracted to +

Electrons are repelled by -

PhET - CCK


Circuit Construction Kit (AC+DC) (3.20)
File Options Help
Grab Bag
Wire
Resistor
Battery
Light Bulb
Switch
AC
AC Voltage
Capacitor
Inductor
Circuit
Save
Load
Visual
Lifelike
Schematic
Show Values
Tools
Voltmeter
Ammeter(s)
0.00 Amps
Non-Contact Ammeter
Stopwatch
Current Chart
Voltage Chart
Size
Large
Medium
Small
Advanced
Show >>
Reset Dynamics
Reset All
Help!

Bottom line

- **Current** is *flow of electrons* caused by opposite charges attracting and likes repelling.

- **Resistance** is *friction* acting on the electrons.

That's it!

What gets used up in a circuit

A. Current
B. Electrons
C. Voltage in the battery
D. Chemical Energy of the battery
E. None of the above

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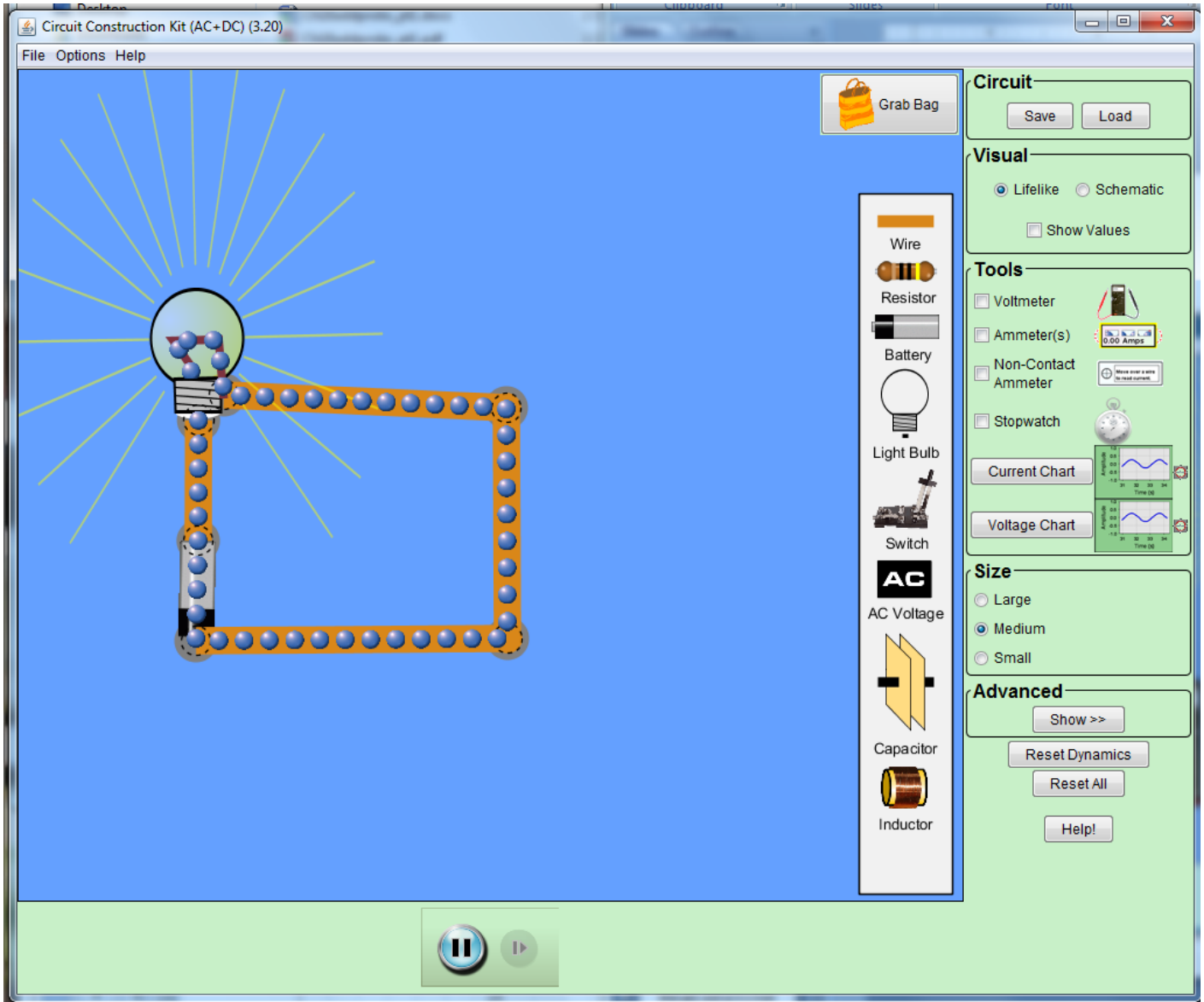
Chemical Energy of the battery…

Or power from power plant

- Burn Coal or Natural Gas
- Covert to mechanical energy
- Then to Electrical

PhET - CCK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Save
Load
Visual
Lifelike
Schematic
Show Values
Tools
Voltmeter
Ammeter(s)
0.00 Amps
Non-Contact Ammeter
Stopwatch
Current Chart
Voltage Chart
Size
Large
Medium
Small
Advanced
Show >>
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Help!

AC Power in US

Everything is waves/oscillations

How many cycles per second is the sim?

A. ½ a cycle
B. 1 cycle
C. 2 cycles
D. 4 cycles

AC Power in US

Everything is waves/oscillations

How many cycles per second is the sim?

A. **½ a cycle**
B. 1 cycle
C. 2 cycles
D. 4 cycles

60 Hz or 60 cycles per second

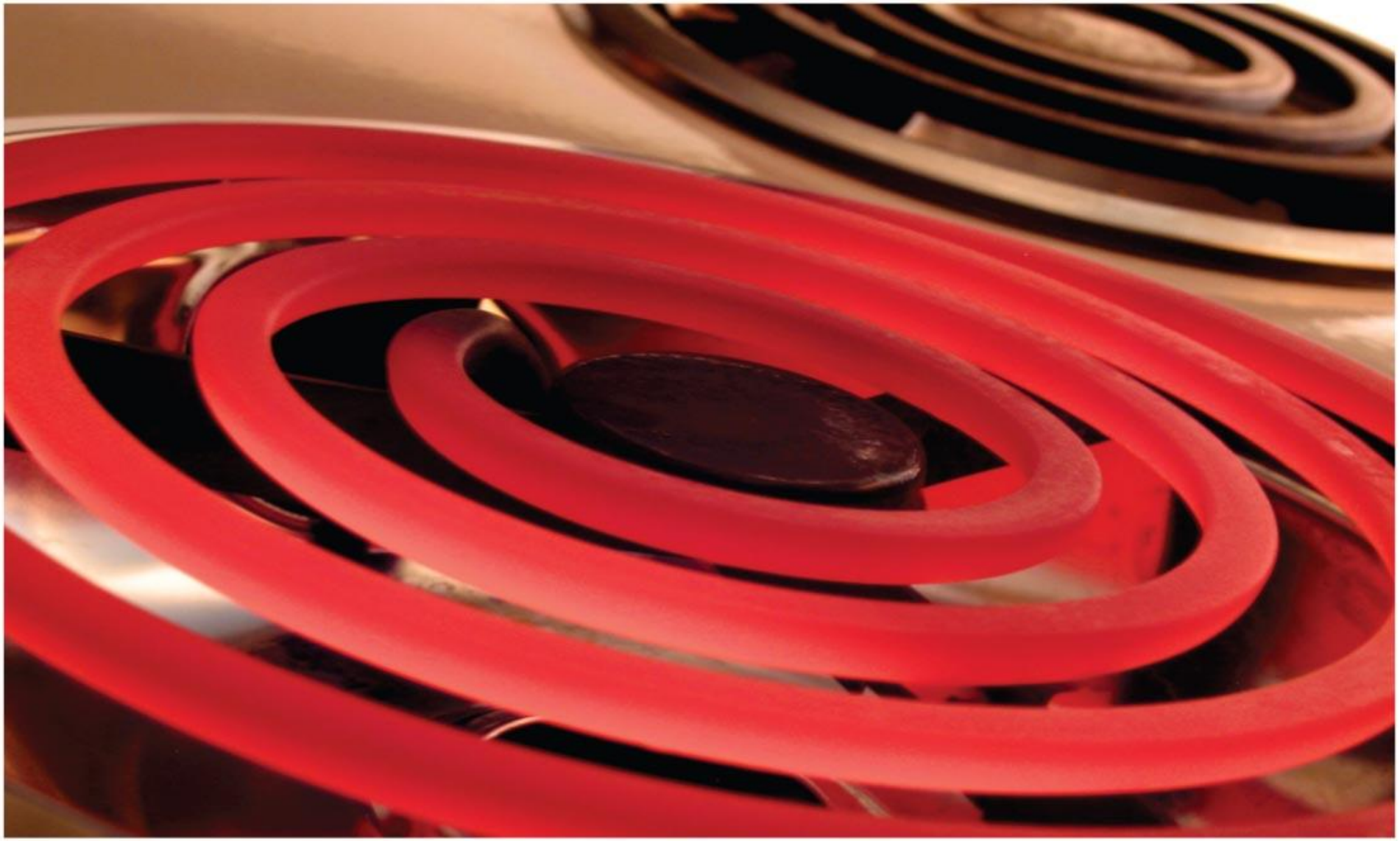
String circuit

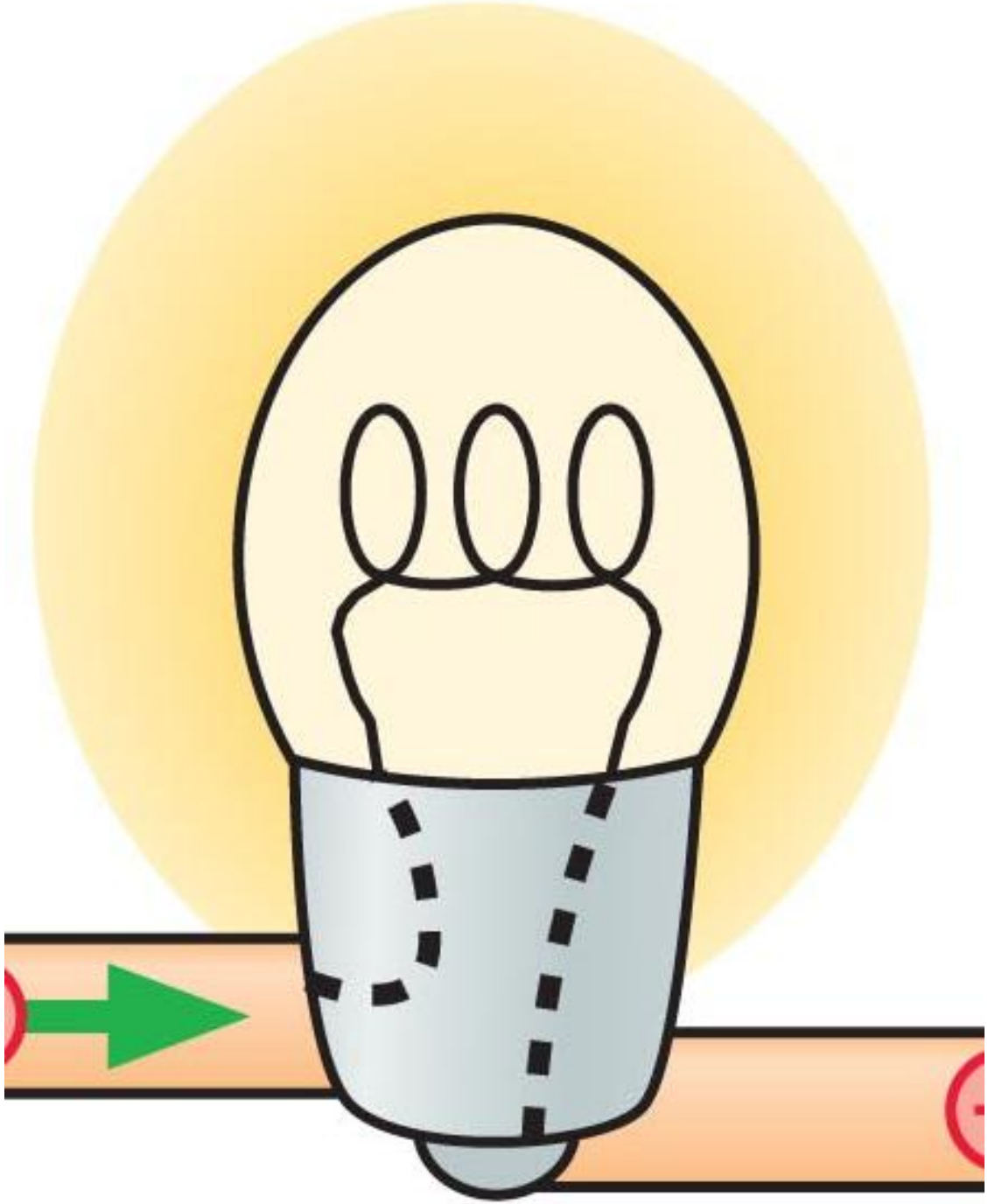
Any idea what could cause a burner to heat up?

What causes a burner or a toaster to heat up?

A. Complicated electronics
B. Magic
C. Simple circuit with lots of resistance
D. Other

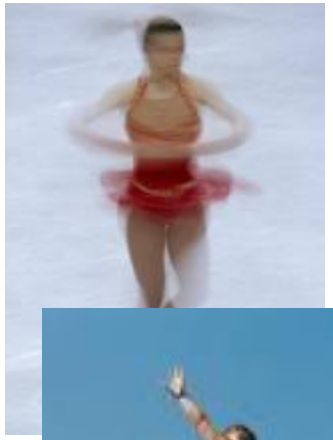
Lots of resistance so lots of friction





Energy Forms

Kinetic – Energy of Motion



Rotational Kinetic – Energy of motion (spinning)

Potential – position

Elastic potential – something elastic is stretched or compressed

Rotational Energy

- Energy of motion