Reminders 08-10-09:

- Last Exam Thursday
- Read Chapters 20, 21, and 22
- Answers to Standardized Test p. 561 1D, 2C, 3A, 4D, 5A, 6C, 7D, 8B, 9B

Objectives:

- Coulomb's Law
- Electric Fields
- Ohm's Law

$$F\Delta t = m\Delta v = \text{Impulse}$$

$$= .020\,kg\left(255\tfrac{m}{s} - 475\right)$$

$$W_{net} = \Delta KE$$

$$= \frac{1}{2}m\left(v_f^2 - v_i^2\right)$$

$$mgh_i + \frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2$$

$$|\vec{F}| = \frac{K|q_1||q_2|}{r^2}$$

$$K = 8.99 \times 10^9 \, N \, m^2/C^2$$

$$e^- = -1.602 \times 10^{-19} C$$

$$p^+ = +1.602 \times 10^{-19} C$$

Two charges, q_A and q_B, are at rest near a positive test charge, q_T, of 7.2 μC. The first charge, q_A, is a positive charge of 3.6 μC, located 3.5 cm away from q_T at 35°; q_B is a negative charge of −8.9 μC, located 6.8 cm away at 130°.

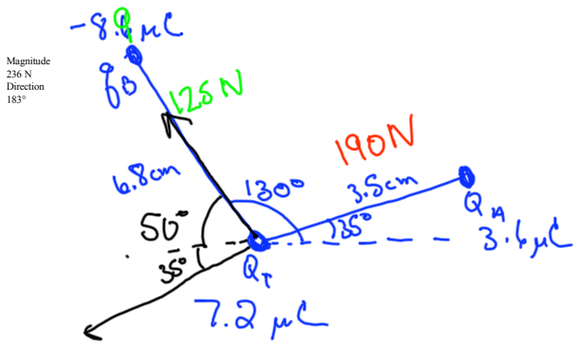
(a) Determine the magnitude of each of the forces acting on q_T.

force caused by qA
190 N
force caused by qB
125 N

$1\mu C = 1.0 \times 10^{-6} C$

(b) Sketch a force diagram. (Do this on paper. Your instructor may ask you to turn in this work.)

Magnitude
236 N
Direction
183°

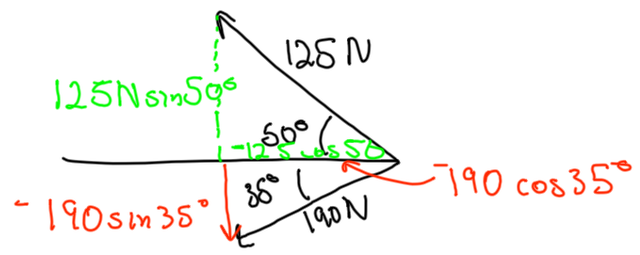


$$F_{AT} = \frac{K|q_A||q_T|}{r_{AT}^2} = \frac{(8.99\times10^9)(3.6\times10^{-6})(7.2\times10^{-6})}{(.035m)^2}$$

$$= 190N$$

$$F_{BT} = \frac{K|q_B||q_T|}{r_{BT}^2} = \frac{(8.99\times10^9)(8.9\times10^{-6})(7.2\times10^{-6})}{(.068m)^2}$$

$$= 125N$$



$$\Sigma F_x = -125\cos 50 - 190\cos 35° = -236N$$

$$\Sigma F_y = 125N \sin 50° + -190\sin 35° = -132N$$

$$F = \sqrt{(-236N)^2 + (-132N)^2} = 240N$$

$$\theta = \tan^{-1}\left(\frac{-132}{-236}\right) + 180° = 183°$$

$$f = \frac{G M_E m}{r_E^2}$$

$$\frac{f}{m} = \frac{G M_E}{r_E^2} = g$$

g — gravitational field Strength

m — test mass

$$\frac{F}{q_0} = \frac{K q}{r^2}$$

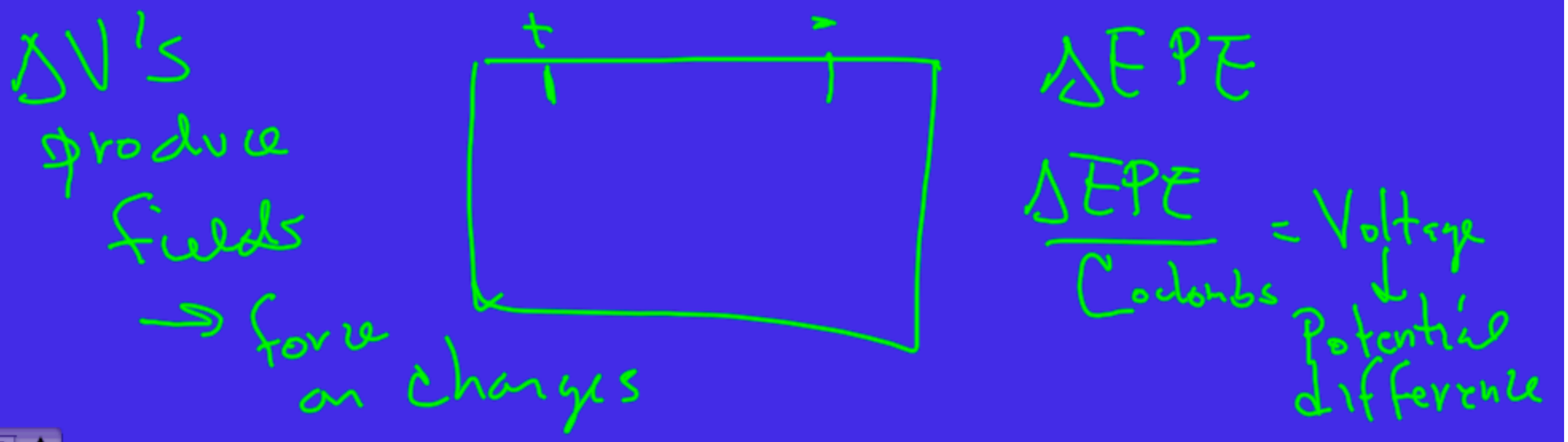
q is the cause of the field

q_0 is test charge

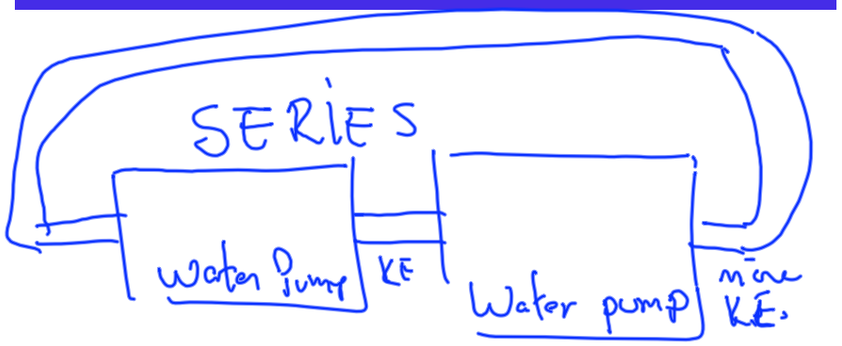
Electricity-Current and Voltage

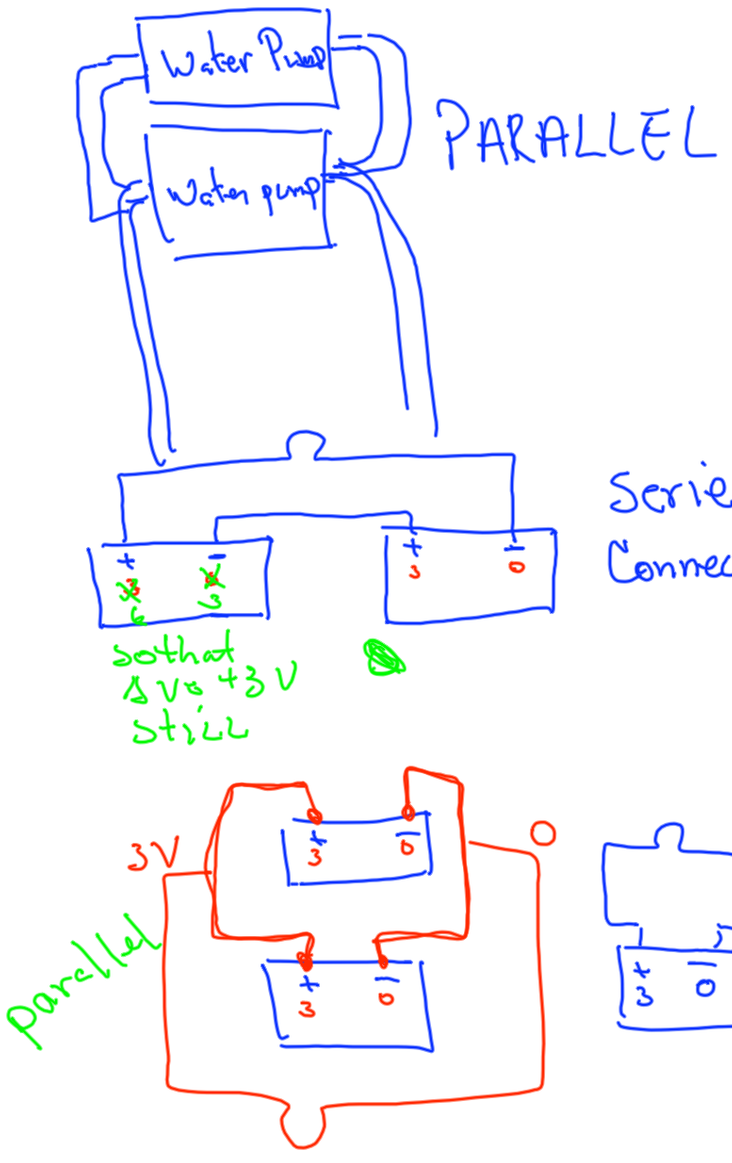
- In electricity and electronics, voltage causes electrons to flow in a wire. It is analogous to water pressure in mechanical systems.

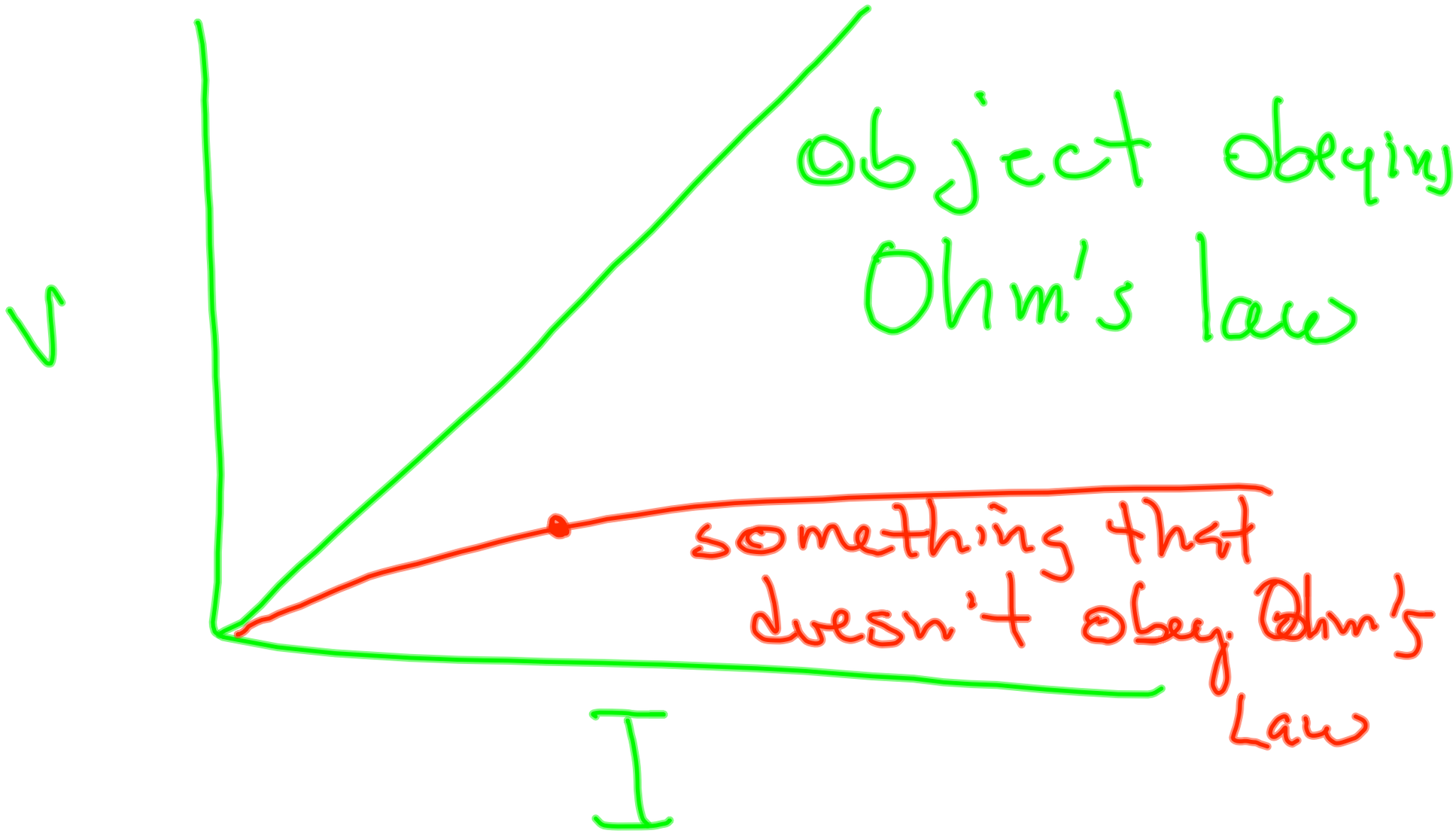
Remember, we are making analogies.

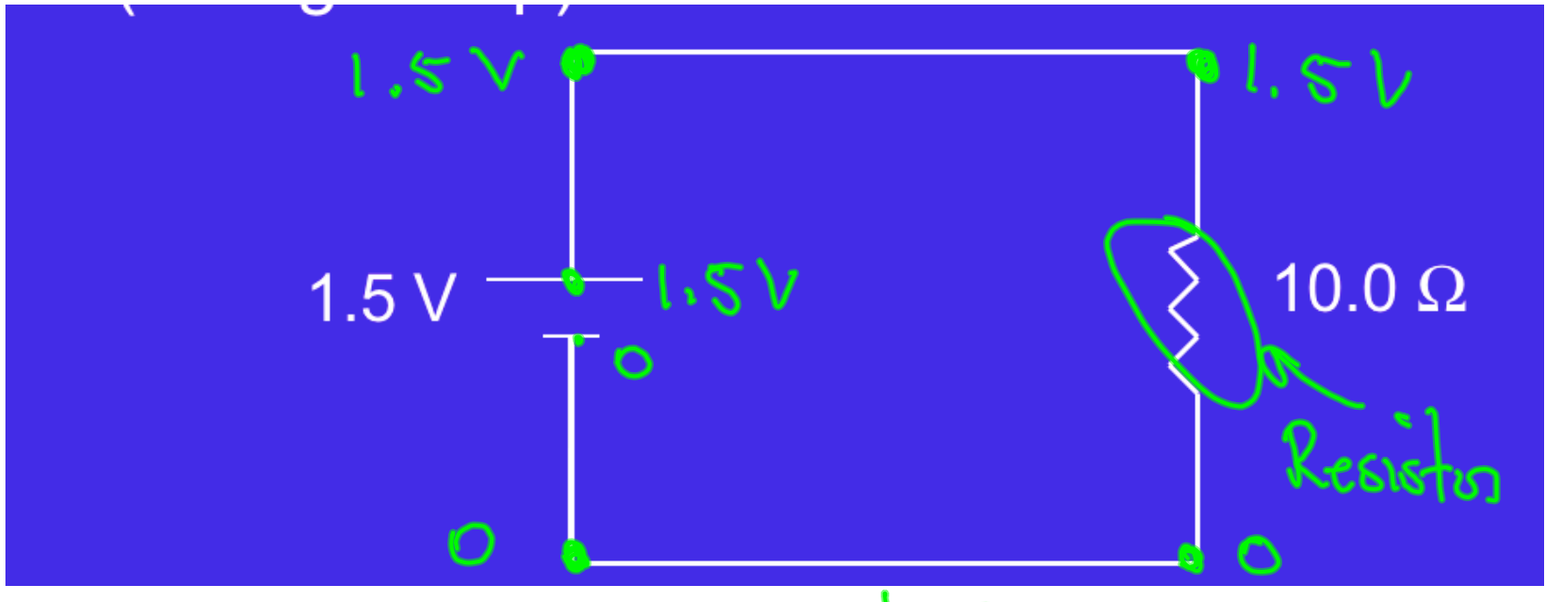


- Suppose we have a light bulb and two batteries. How can we wire the batteries so that it glows more brilliantly?






V
object obeying Ohm's law
something that doesn't obey Ohm's Law
I



Potential difference
$= 1.5\,V$

$V = IR \qquad I = \frac{V}{R} = \frac{1.5V}{10.0\,\Omega}$

$= 0.15\,A$

$= 150\,mA$

$1\,mA = 10^{-3}\,A$