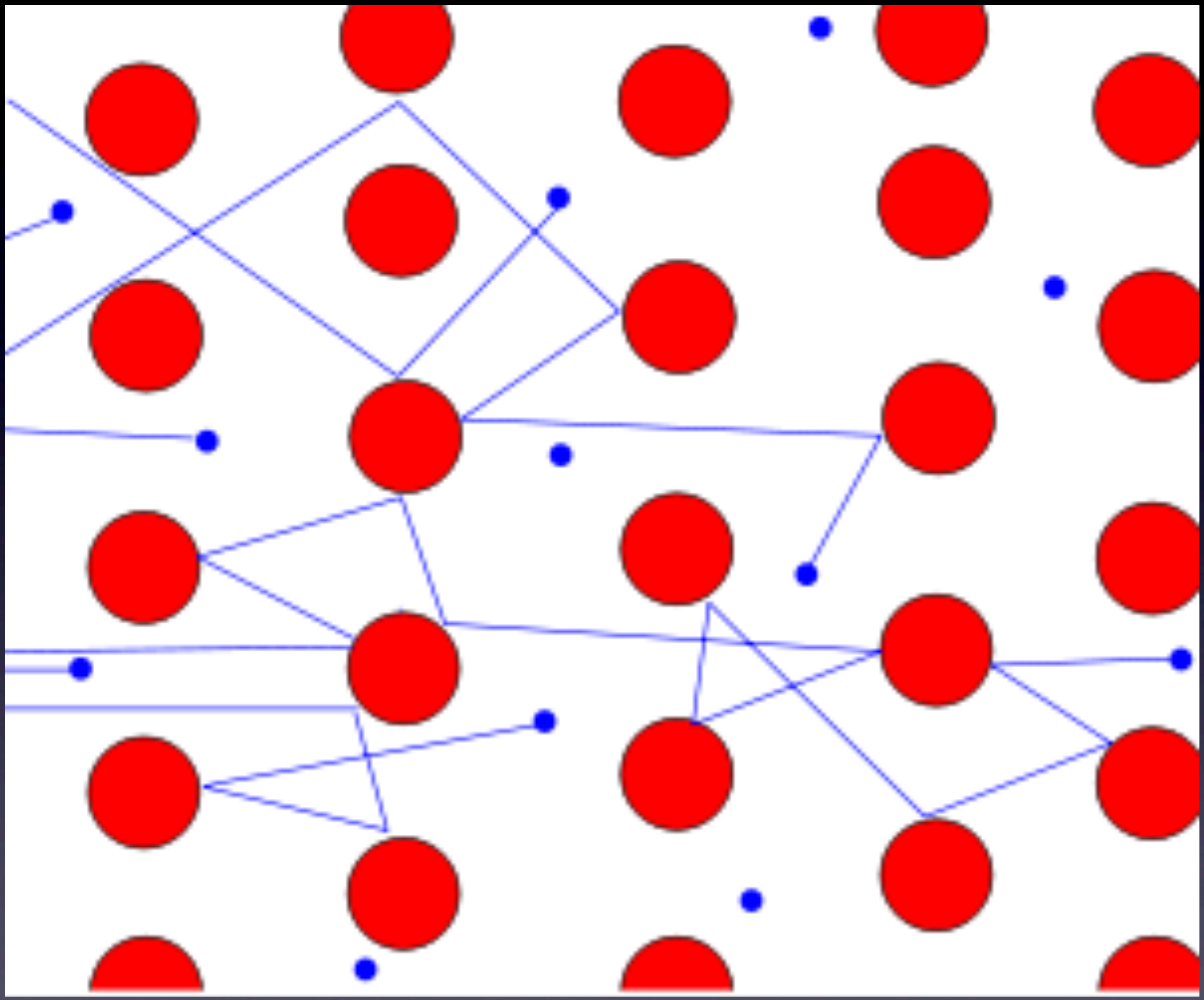


What is a metal?

What is a metal?

A material that conducts electricity

What is an electric current?

What is an electric current?

Flow of charges

How can electrons move so freely?

How can electrons move so freely?

They are loosely bound to their atoms

If the atoms in a metal have a larger valence, will this metal have a larger number of conduction electrons?

(C) Yes
(D) No

Question #1

What factors affect conductivity?

What factors affect conductivity?

$$\sigma = \frac{ne^2\tau}{m}$$

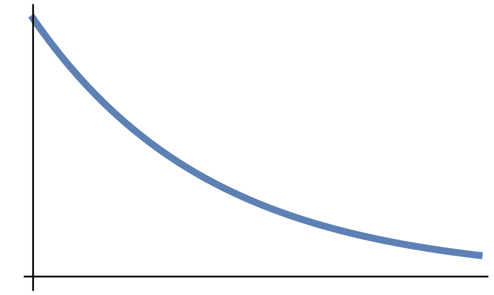
Classical Model of Conduction

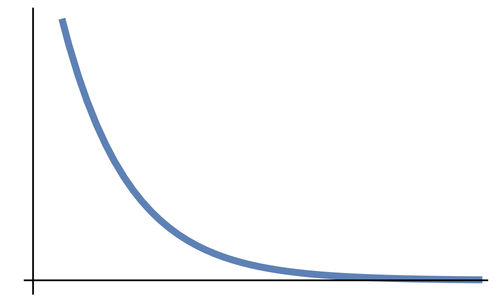
1 $$\mathbf{a} = -\frac{e}{m}\mathcal{E}$$

2 $$\langle \mathbf{r} \rangle = \frac{1}{2}\mathbf{a}\langle t^2 \rangle$$

3 $$\mathbf{v}_d = \frac{\frac{1}{2}\mathbf{a}\langle t^2 \rangle}{\tau}$$

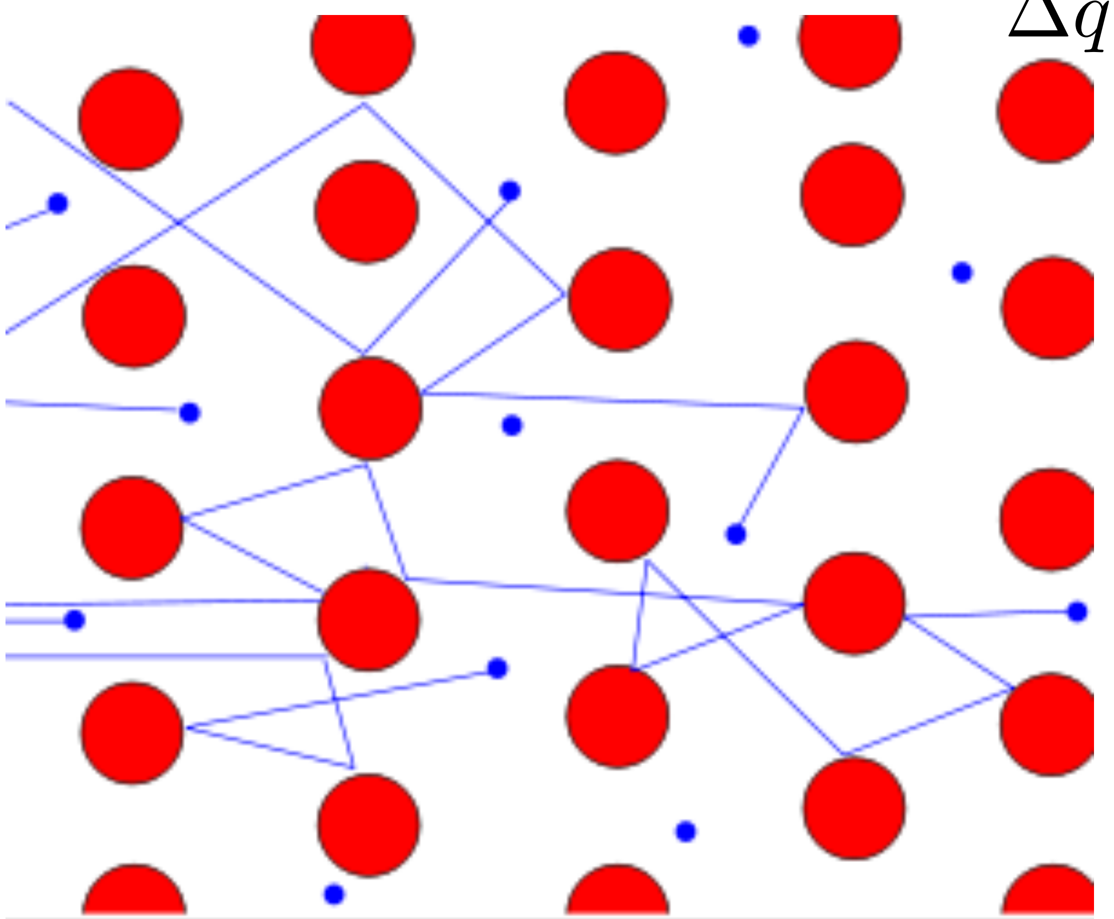
4 $$P(t) = \frac{1}{\tau}e^{\frac{-t}{\tau}} \longrightarrow$$





5 $$\langle t^2 \rangle = \int_0^{\infty} \frac{t^2}{\tau} e^{\frac{-t}{\tau}}\,dt = 2\tau^2$$

6 $$\mathbf{v}_d = \frac{-e\tau}{m}\mathcal{E}$$



7 $$\Delta q = -env_d\Delta t$$

8 $$I \equiv \frac{\Delta q}{\Delta t}$$

9 $$\mathbf{J} = \frac{\mathbf{I}}{A} = -ne\mathbf{v}_d = \frac{ne^2\tau}{m}\mathcal{E}$$

10 $$\sigma = \frac{ne^2\tau}{m}$$

If a wire is thicker, will its conductivity be larger?

Question #2

(D) Yes
(E) No

If a wire is thicker, will its resistance be larger or smaller?

Question #3

(A) Smaller
(B) Larger

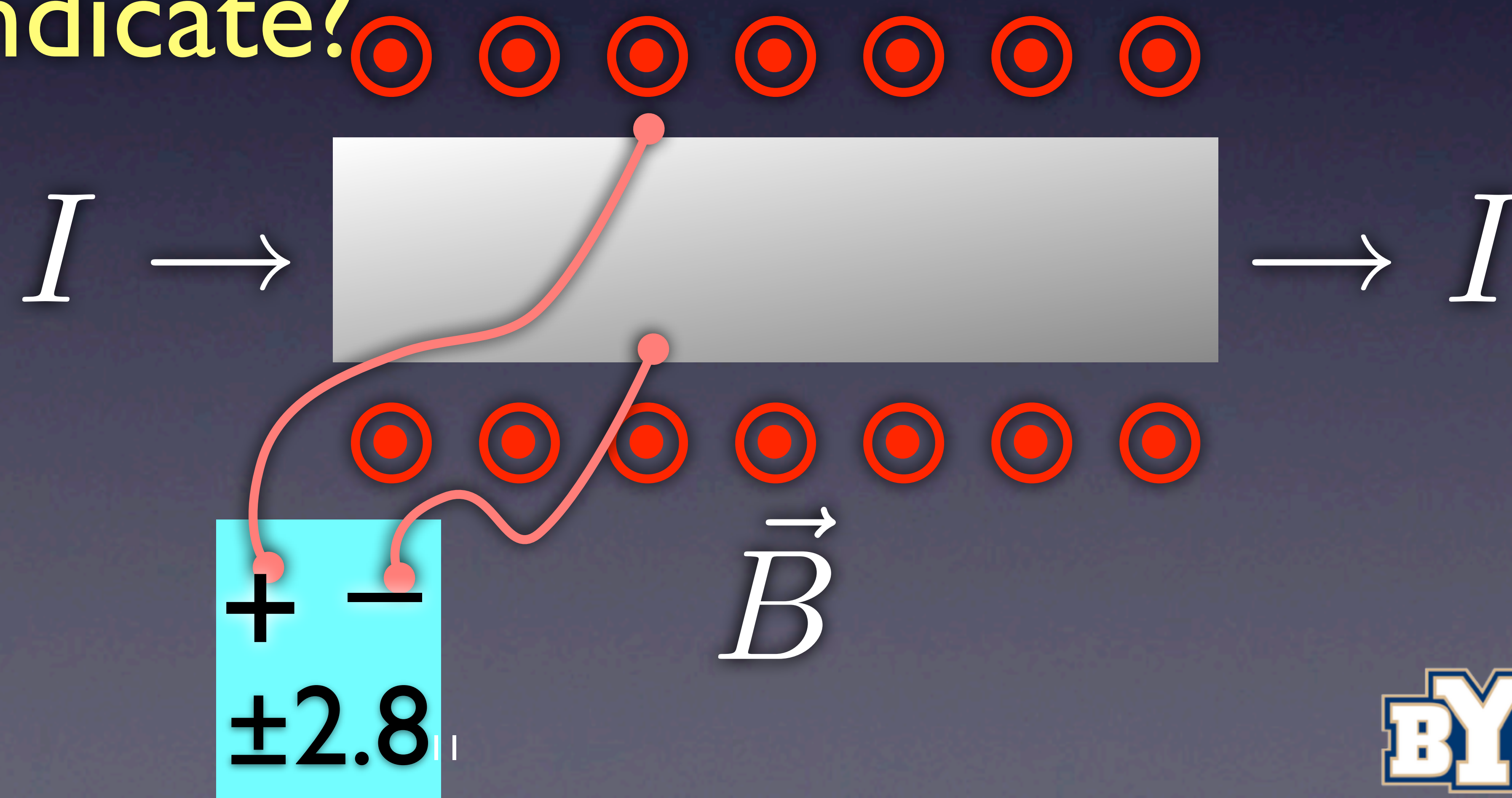
Consider a current flowing through a conductor to the right. (Electrons are flowing to the left.) We place this current in a magnetic field pointing out of the screen. In which direction is the force of the magnetic field on the moving electrons?

(A) Down

(B) Up

Question #5

Consider a current flowing through a conductor to the right. (Electrons are flowing to the left.) We place this current in a magnetic field pointing out of the screen. If we measure the voltage across the conductor as shown, what sign will the meter indicate?



(A) –

(B) +

Question #6

Consider a current flowing through a conductor to the right. Suppose the carriers have positive charge. We place this current in a magnetic field pointing out of the screen. In which direction is the force of the magnetic field on the moving carriers?

(B) Up

(C) Down

Class is over and I'm still here

Push any button on your iclicker