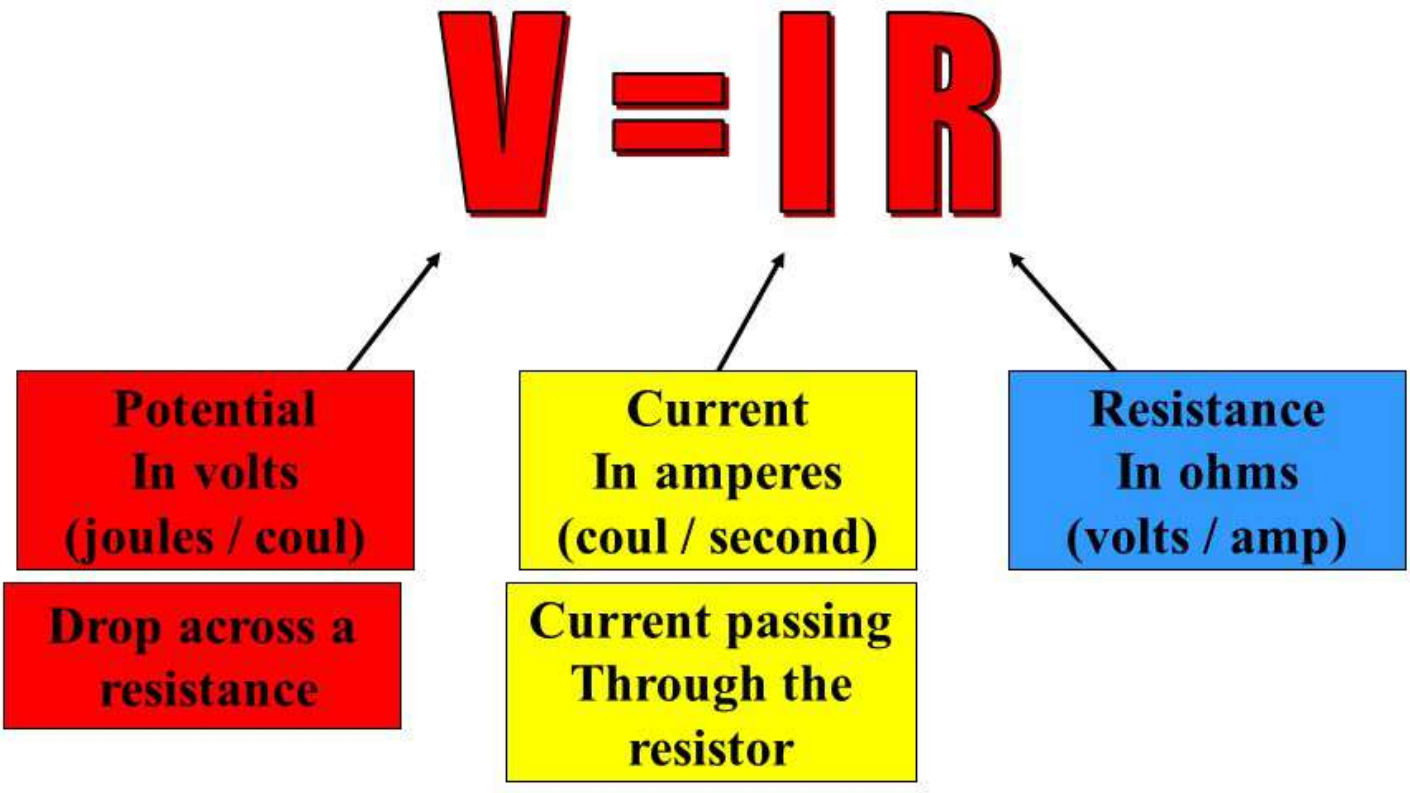
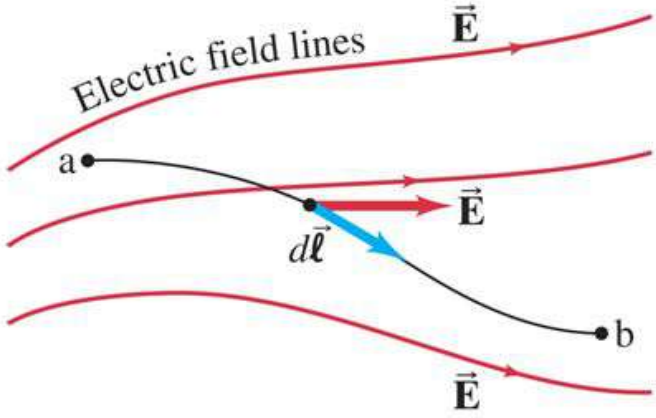
Ohm's Law



Relation between Electric Potential and Electric Field

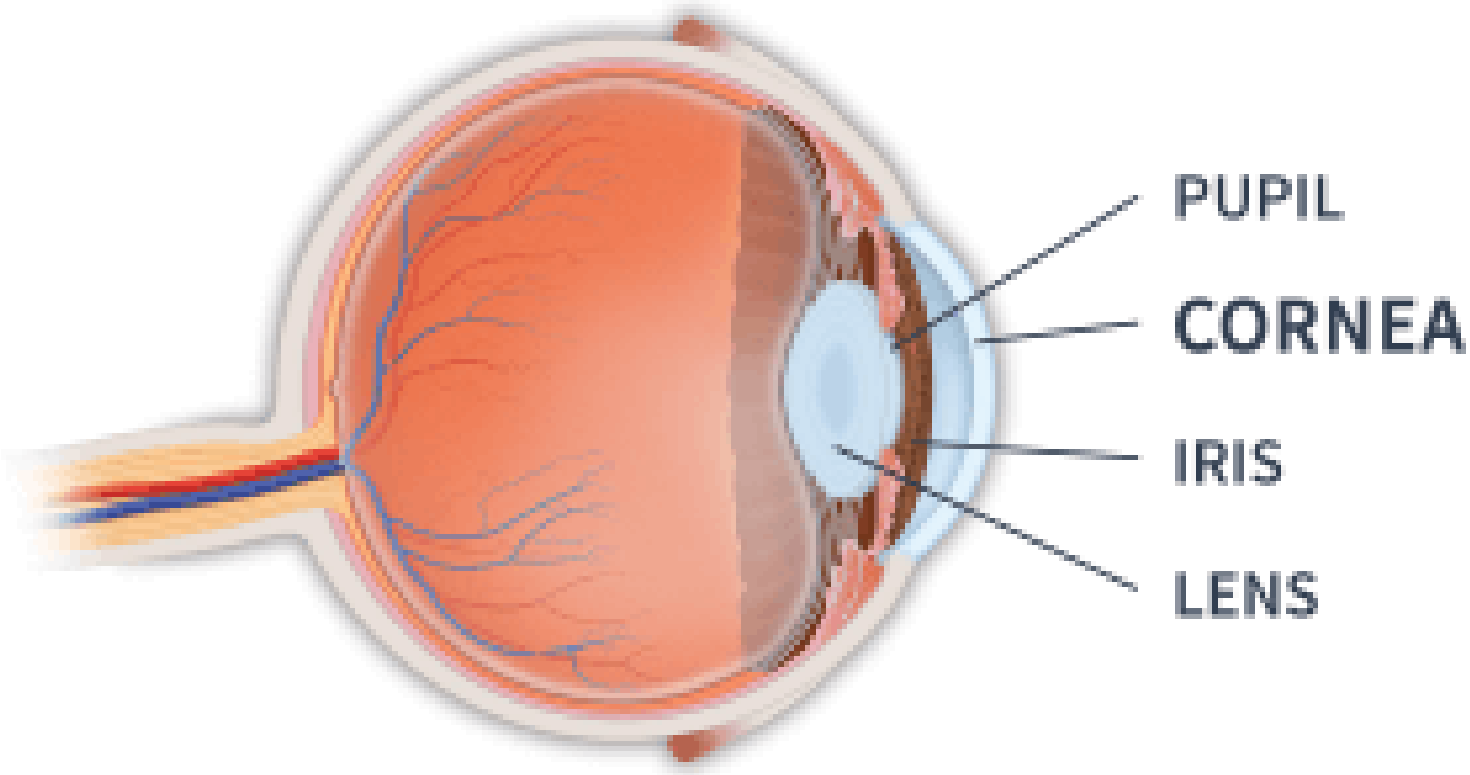
The general relationship between a conservative force and potential energy:

$$U_b - U_a = -\int_a^b \vec{\mathbf{F}} \cdot d\vec{\ell}.$$



Substituting the potential difference and the electric field:

$$V_{ba} = V_b - V_a = -\int_a^b \vec{\mathbf{E}} \cdot d\vec{\ell}.$$

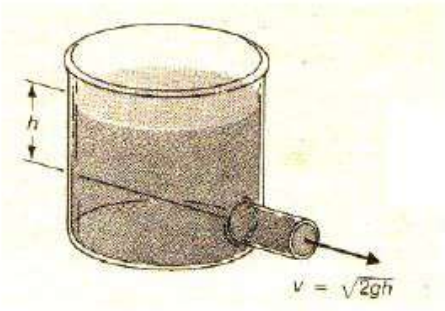


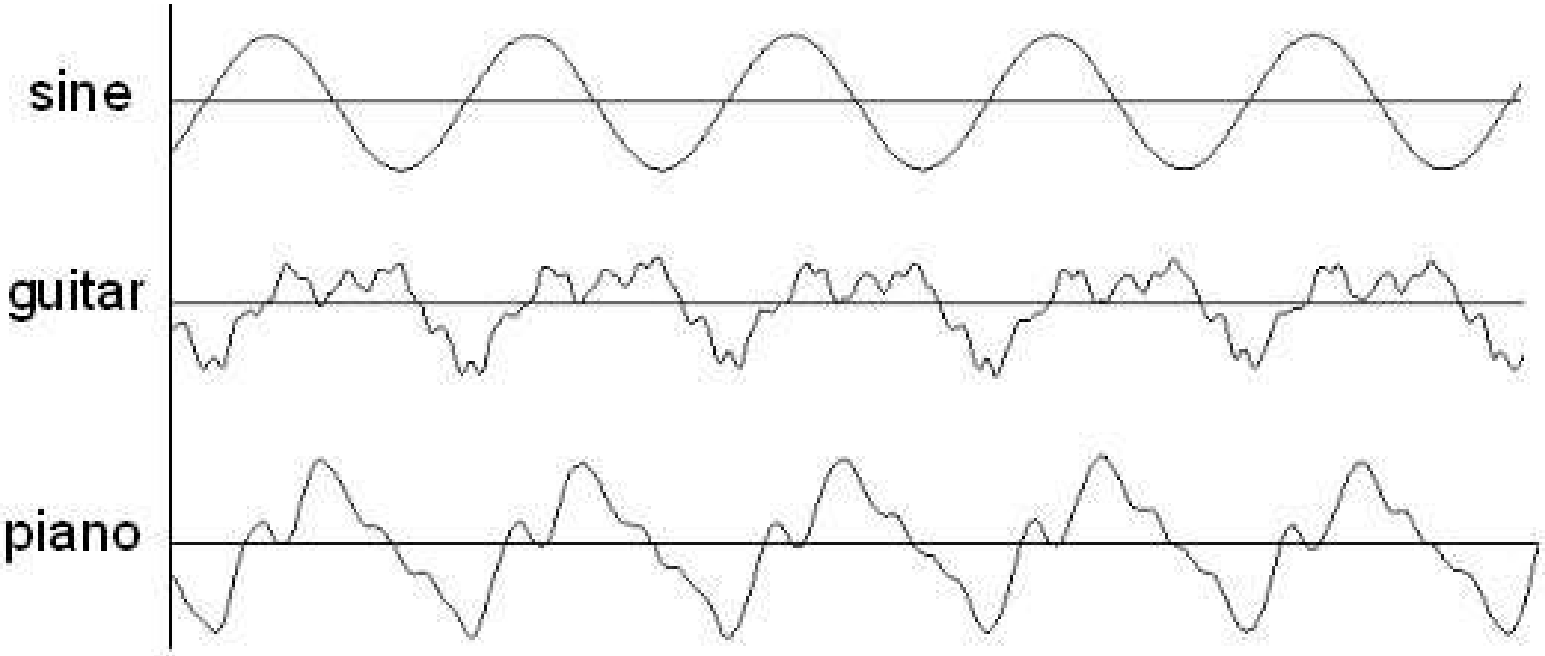
Torricelli's Theorem

Torricelli's Theorem states that the speed at which the liquid comes out is the same as the speed of a body falling from rest from the height h.

$$\frac{1}{2}\rho v^2 = \rho g h$$

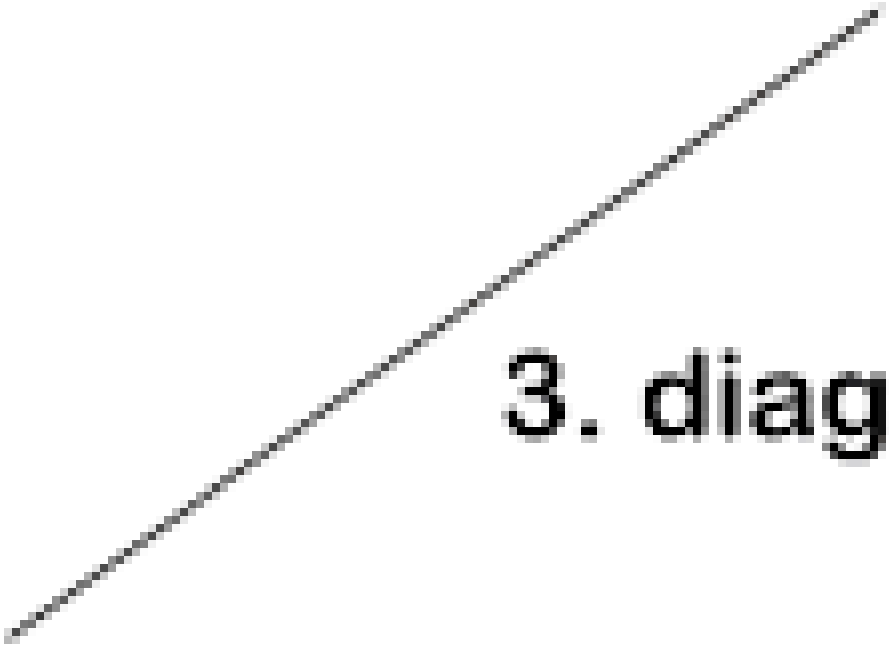
$$\boxed{v = \sqrt{2gh}}$$



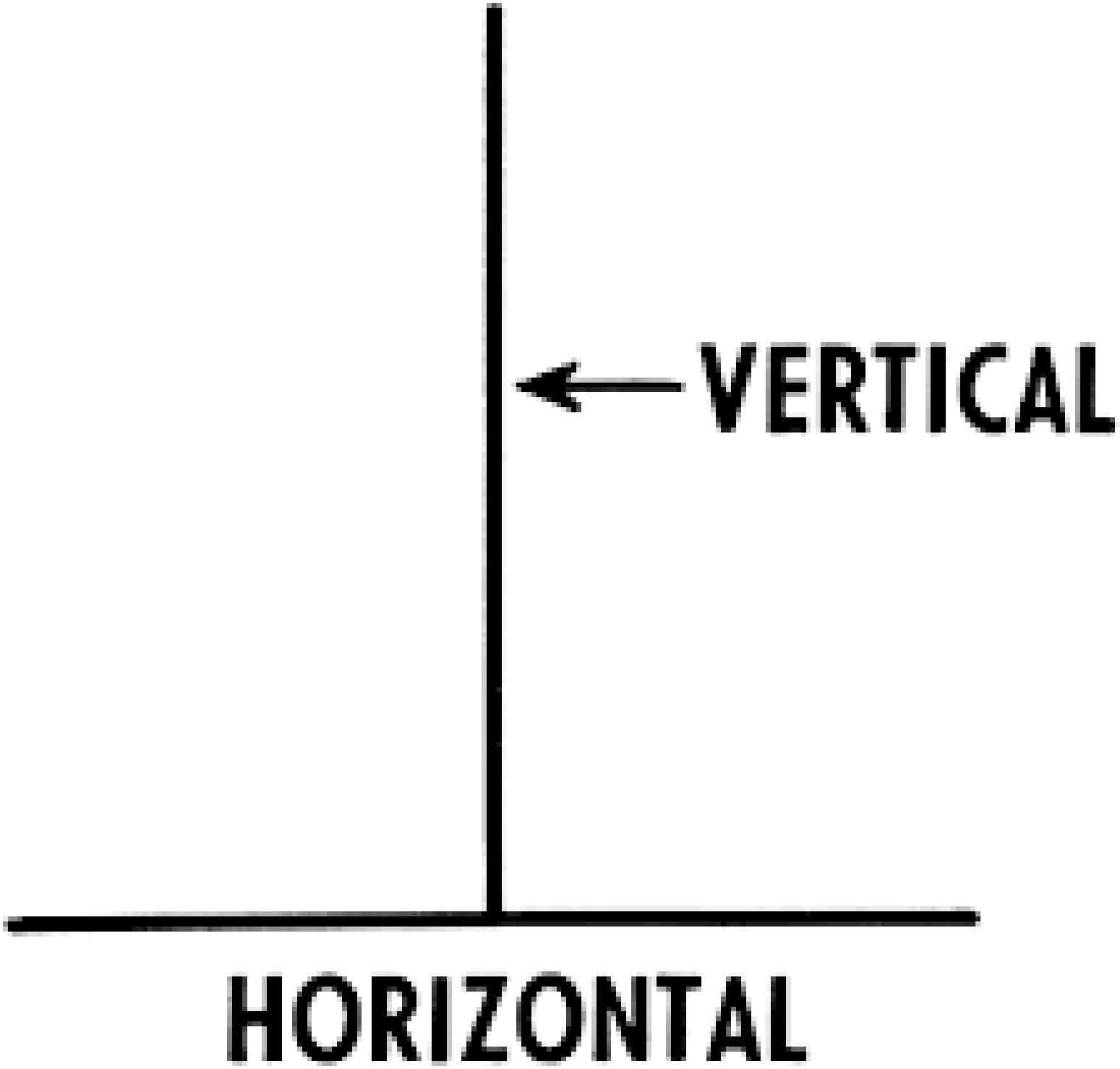


1. horizontal

2. vertical



3. diagonal



Final volume, $V_2 = V_1[1 + \gamma(t_2 - t_1)]$

from equation (21.3)

i.e. $V_2 = V_1 + V_1\gamma(t_2 - t_1)$

from which, $(t_2 - t_1) = \dfrac{V_2 - V_1}{V_1\gamma}$

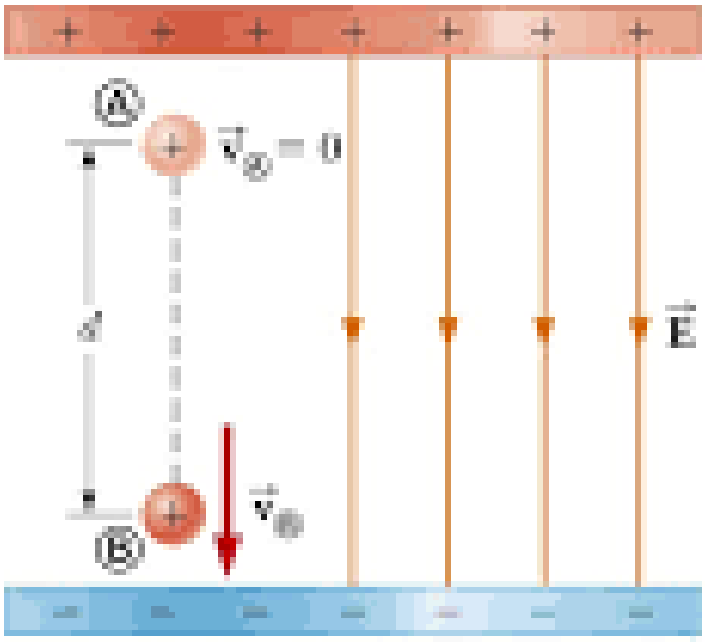
$$= \frac{478 - 476}{(476)(1.8 \times 10^{-4})}$$

$$= 23.34°C$$

Hence, $t_2 = 23.34 + t_1 = 23.34 + 15 = 38.34°C$

Charged Particle in a Uniform Field, Example

- A positive charge is released from rest and moves in the direction of the electric field
- The change in potential is negative
- The change in potential energy is negative
- The force and acceleration are in the direction of the field
- Conservation of Energy can be used to find its speed

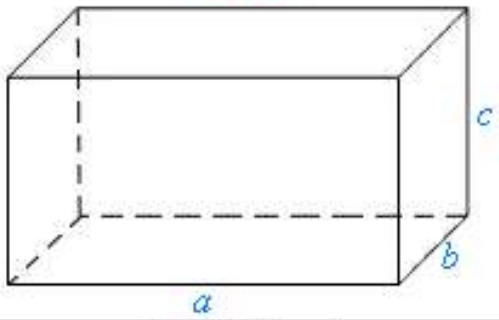


المساحات و الأحجام في الفضاء

S_L : رمز المساحة الجانبية و S_T : رمز المساحة الكلية و V رمز الحجم.

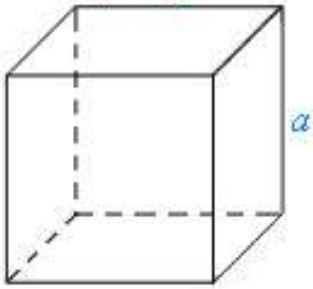
متوازي المستطيلات القائم

$$S_L = 2(bc + ac)$$
$$S_T = S_L + 2ab$$
$$V = abc$$



مكعب

$$S_L = 4a^2$$
$$S_T = 6a^2$$
$$V = a^3$$

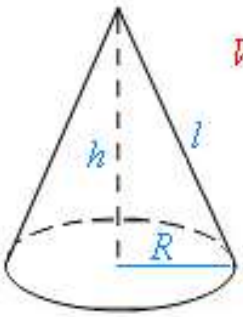


أسطوانة قائمة

$$S_L = 2\pi Rh$$
$$S_T = 2\pi Rh + 2\pi R^2$$
$$V = \pi R^2 h$$

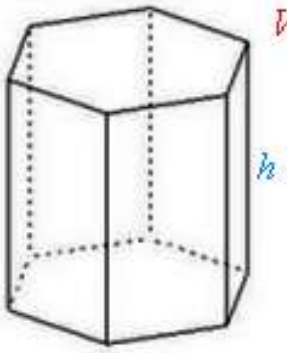
مخروط قائم

$$S_L = \pi Rl$$
$$S_T = \pi Rl + \pi R^2$$
$$V = \frac{1}{3}\pi R^2 h$$



موشور قائم

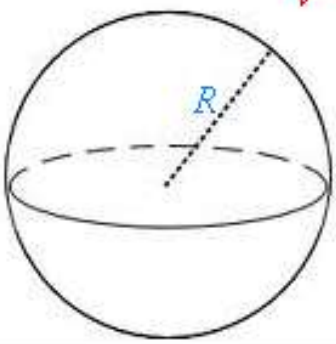
$$S_L = ph$$
$$S_T = ph + 2A$$
$$V = Ah$$

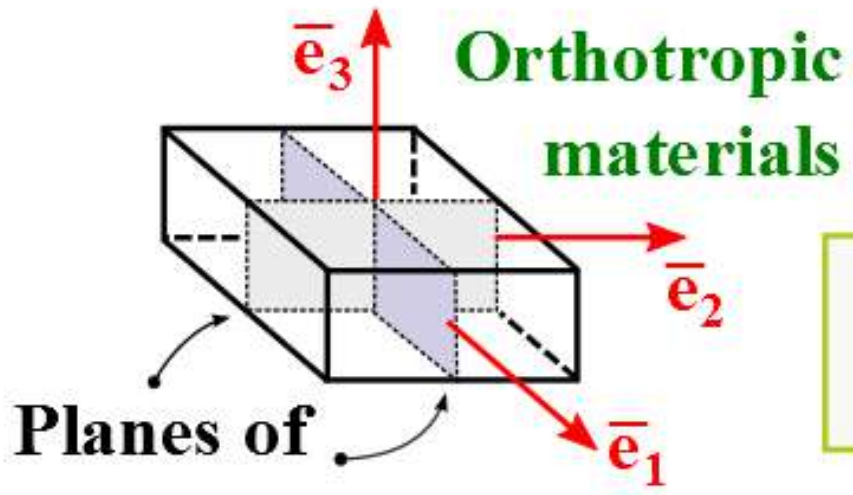


p محيط القاعدة
A مساحة القاعدة

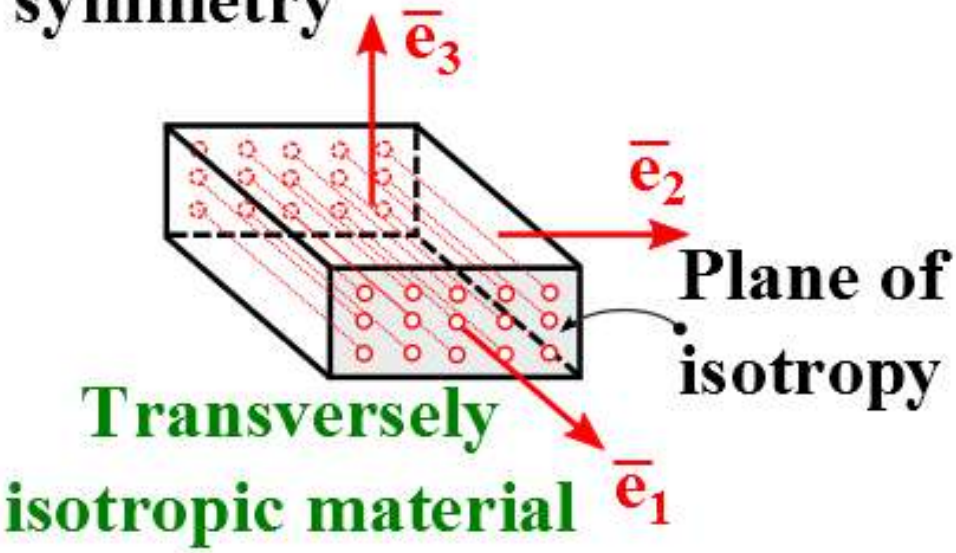
كرة

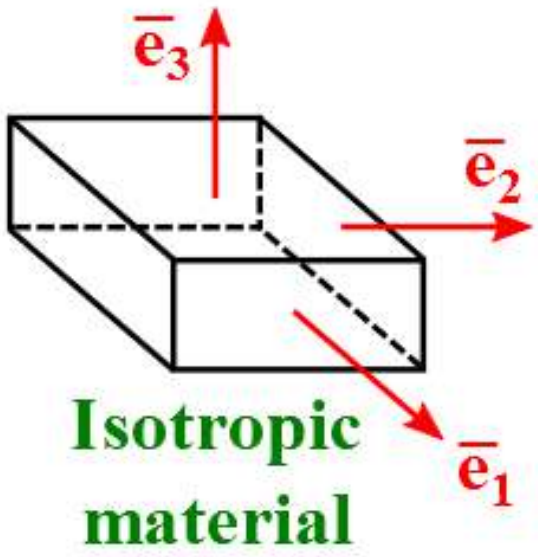
$$S_T = 4\pi R^2$$
$$V = \frac{4}{3}\pi R^3$$

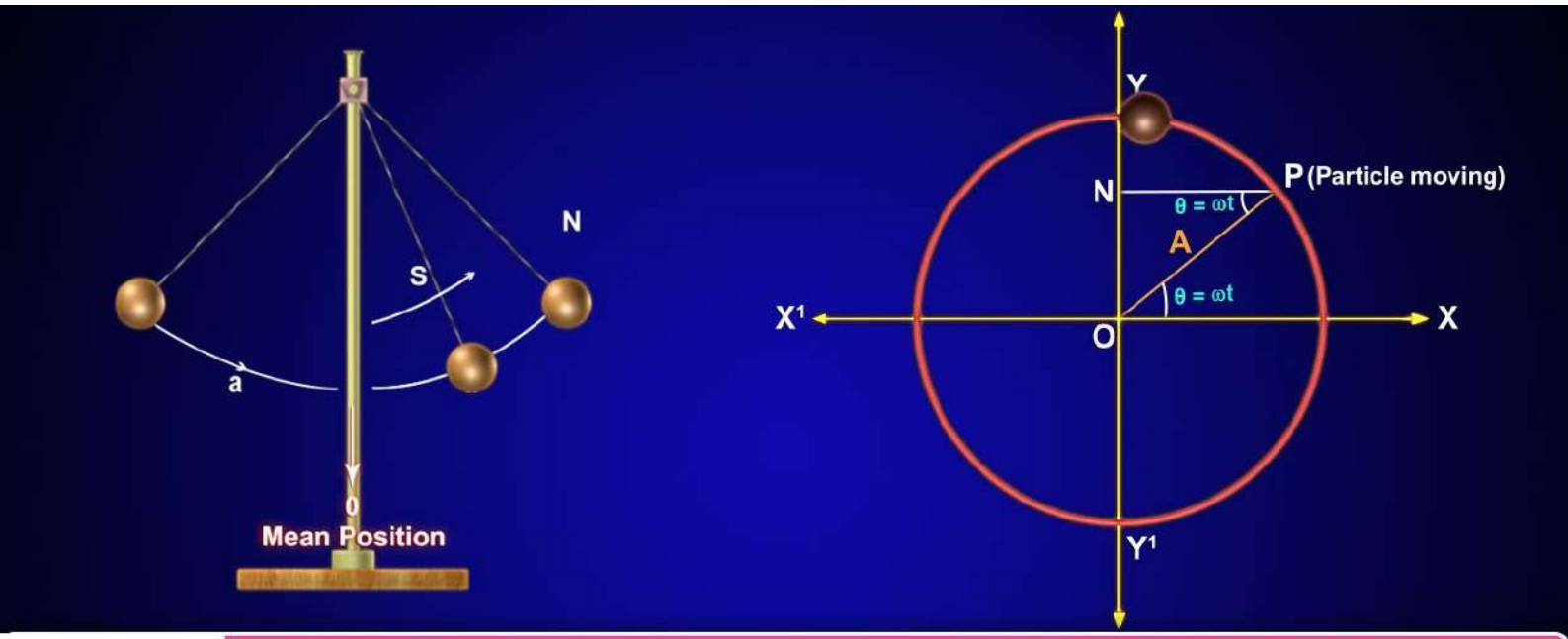




$\bar{e}_1, \bar{e}_2, \bar{e}_3$ form the material basis

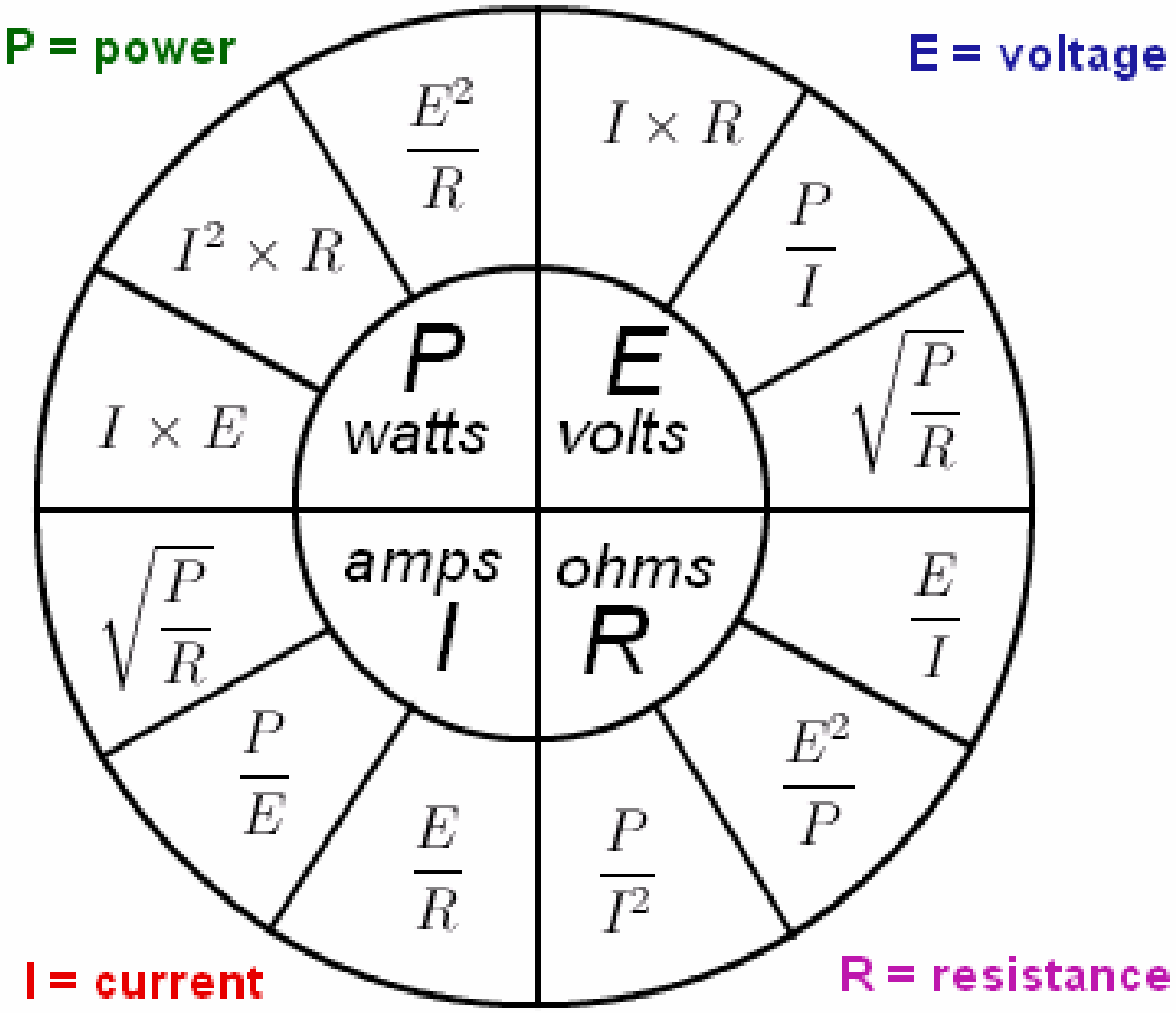


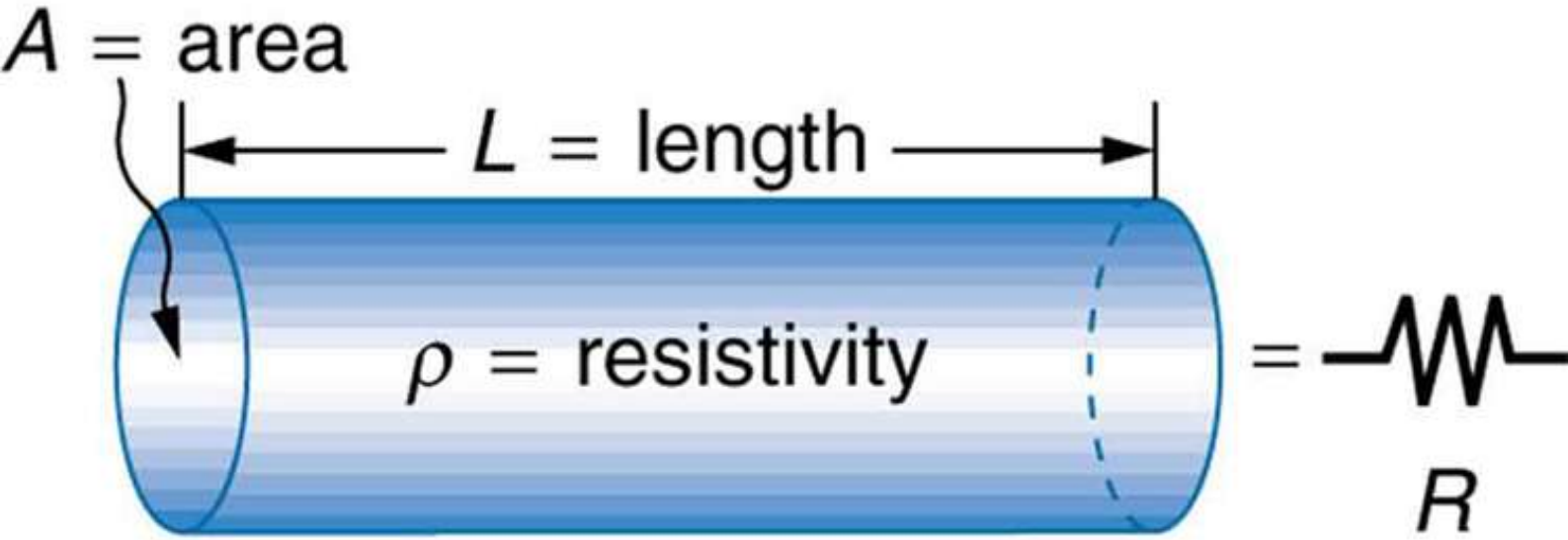




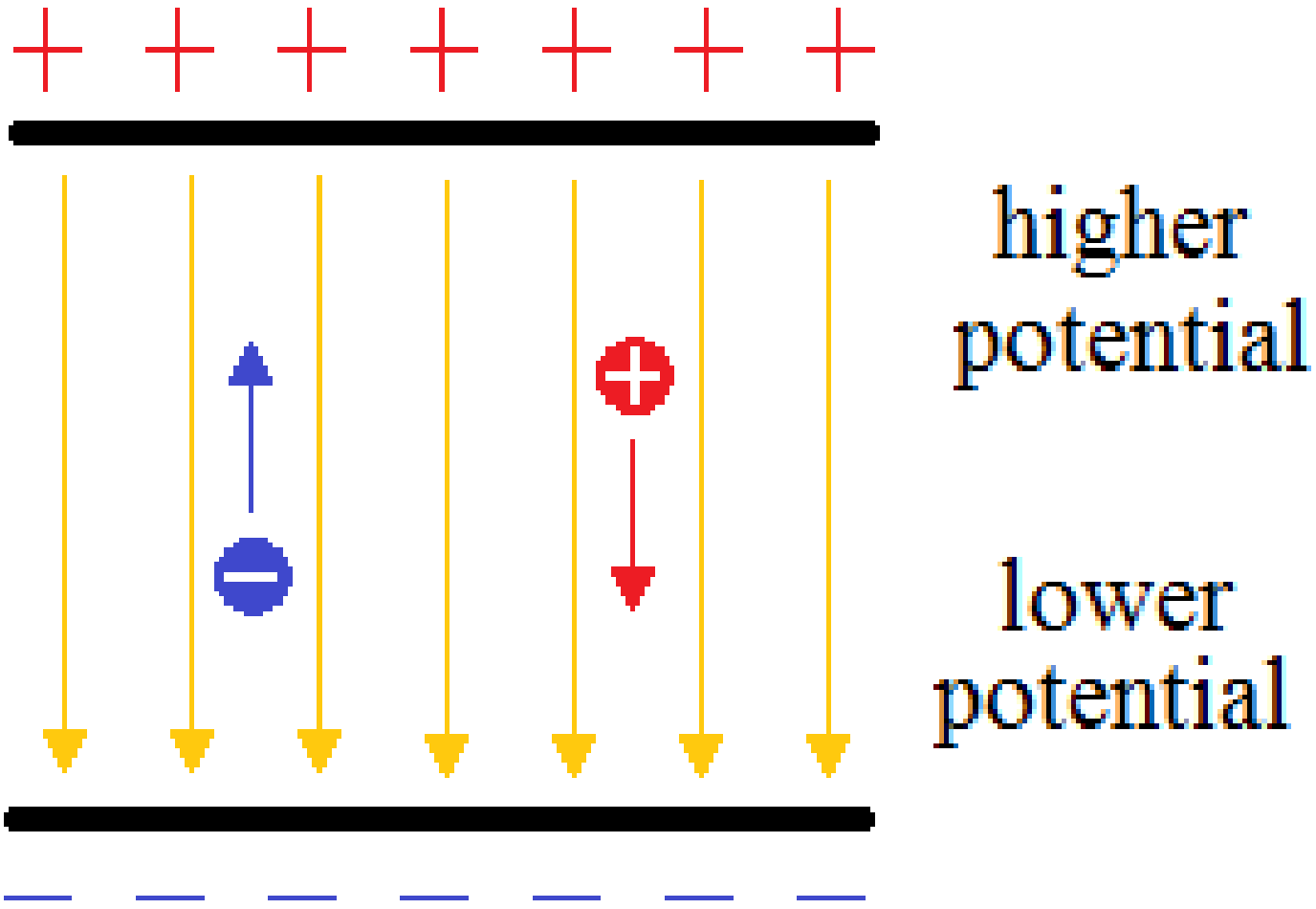
ACTIVE
The Joy Of Happy Learning

SIMPLE HARMONIC MOTION





$$R = \rho \frac{L}{A}$$



Chapter 17 Young&Freedman
Some things are hot, some things are cold.
Heating (usually) causes expansion.

In thermal contact, two objects (eventually) reach the same temperature.

Daniel Gabriel Fahrenheit (1686–1736)

Fahrenheit temperature:

The zero point was determined by placing the thermometer in brine: a mixture of ice, water, and ammonium chloride, a salt. This is a frigorific mixture.

96 degrees, was the level of the liquid in the thermometer when held in the mouth or under the armpit of his wife.

Celsius used ice/water and water/steam for 0 and 100.

2. Thermal Equilibrium

a) **Equilibrium**: system is "balanced" or unchanging in time

b) **Thermal Equilibrium**: system's temperature does not change with time

c) A **frigorific mixture:** is a mixture of two chemicals that reaches an equilibrium temperature independent of the temperatures of the components chemicals
   - "ice bath" will stabilize at **0°C**).
   - Ammonium chloride and ice stabilizes at -17.8°C or **0°F**