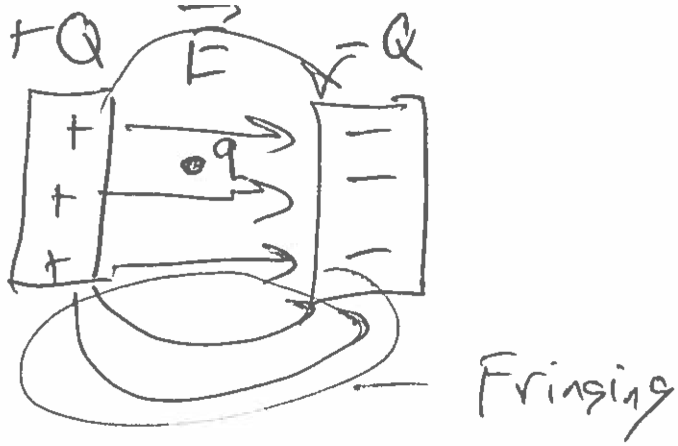


$$\vec{E} = 7.0 \times 10^{4}\ \frac{N}{C}\ \hat{x}$$

$$q = +5\,mC$$

$$\vec{F} = q\vec{E} = (5 \times 10^{-3}\,C)\left(7.0 \times 10^{4}\ \frac{N}{C}\right)\hat{x}$$

$$\vec{F} = 35 \times 10\ N\ \hat{x}$$

$$\boxed{\vec{F} = 350\,N\ \hat{x}}$$

q has a mass of 10 kg $\quad \vec{a} = ?$

$$\vec{F} = m\vec{a}$$

$$\vec{a} = \frac{\vec{F}}{m} = \frac{350\,N}{10\,kg}\ \hat{x}$$

$$\boxed{\vec{a} = 35\,m/s^{2}\ \hat{x}}$$

Electric field lines

1) start on positive charges
   end on negative charges

2) number of field lines per Area
   indicate relative strength of field

3) Tanget line to any field line is
   the direction of a force created
   between a charge and the field

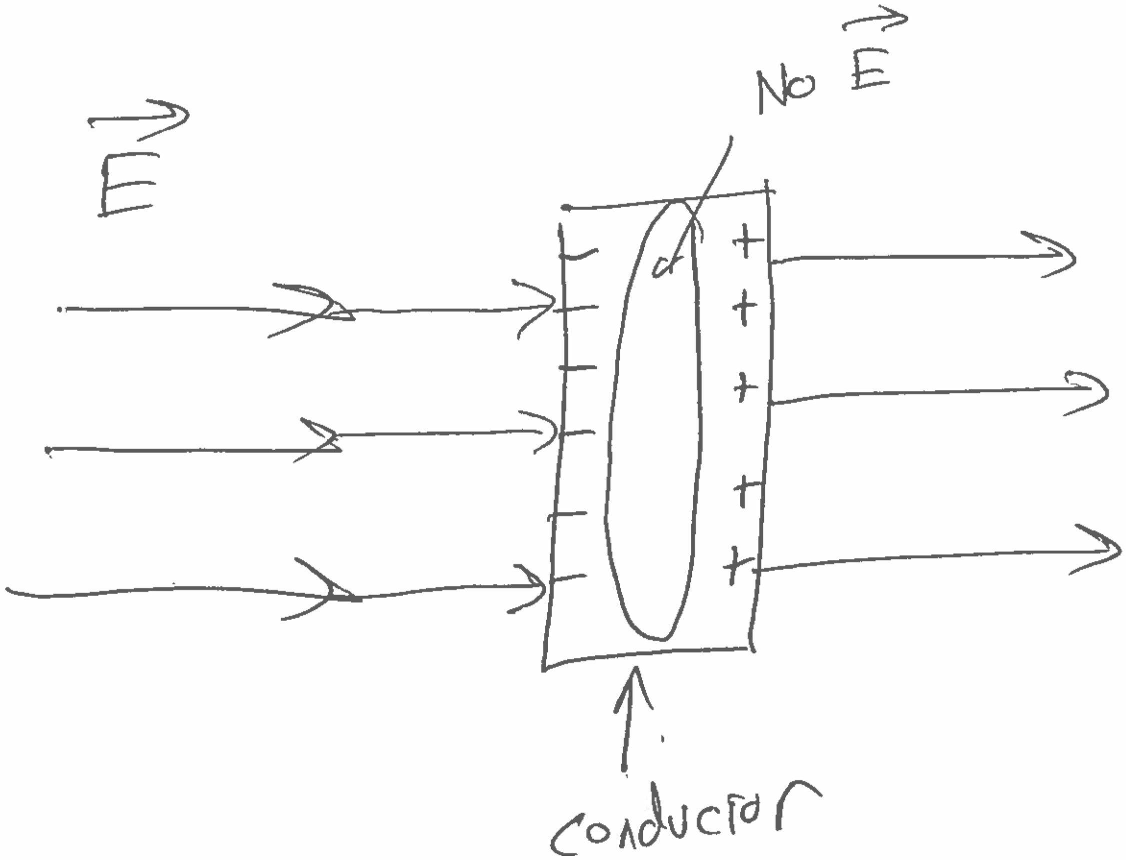
4) field lines represent the path a
   positive test charge would take moving
   in the field.

Conductors posses charges that can move (in ideal) instantaneously.

Breakdown voltage is the voltage at which a nonconducting object will conduct if this exceeded.

for Air ~ 1 million Volts/meter.

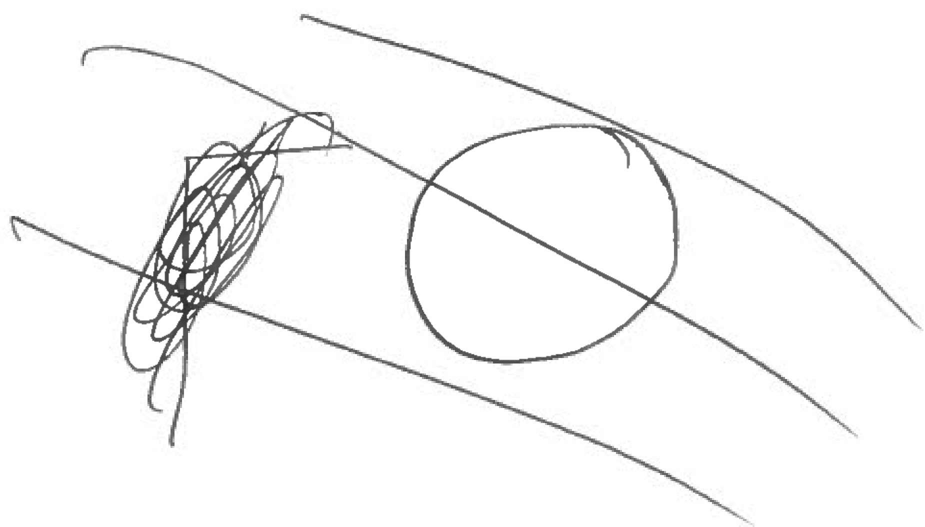
$$1 \text{ Volt } (V) = 1 \, J/C$$

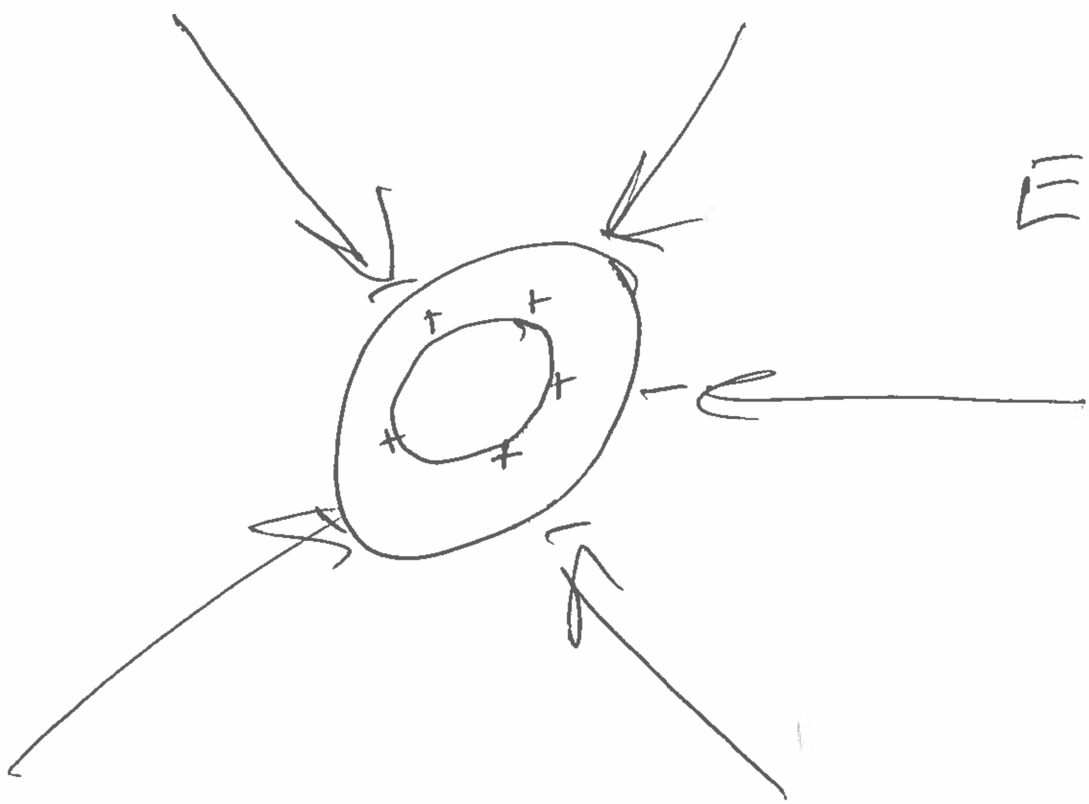


Electric fields Do not exist in the interior of A conductor.

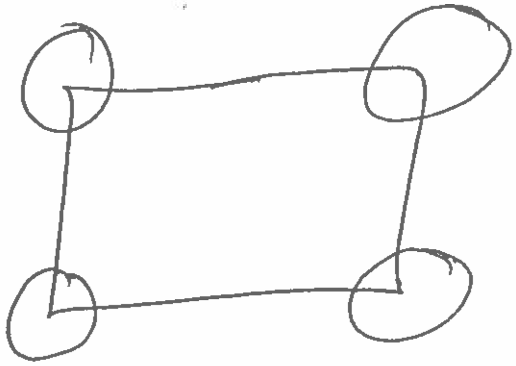
Skin effect is electric field existing in a thin layer on outer part of a conductor.

This effect of no field creates shielding.

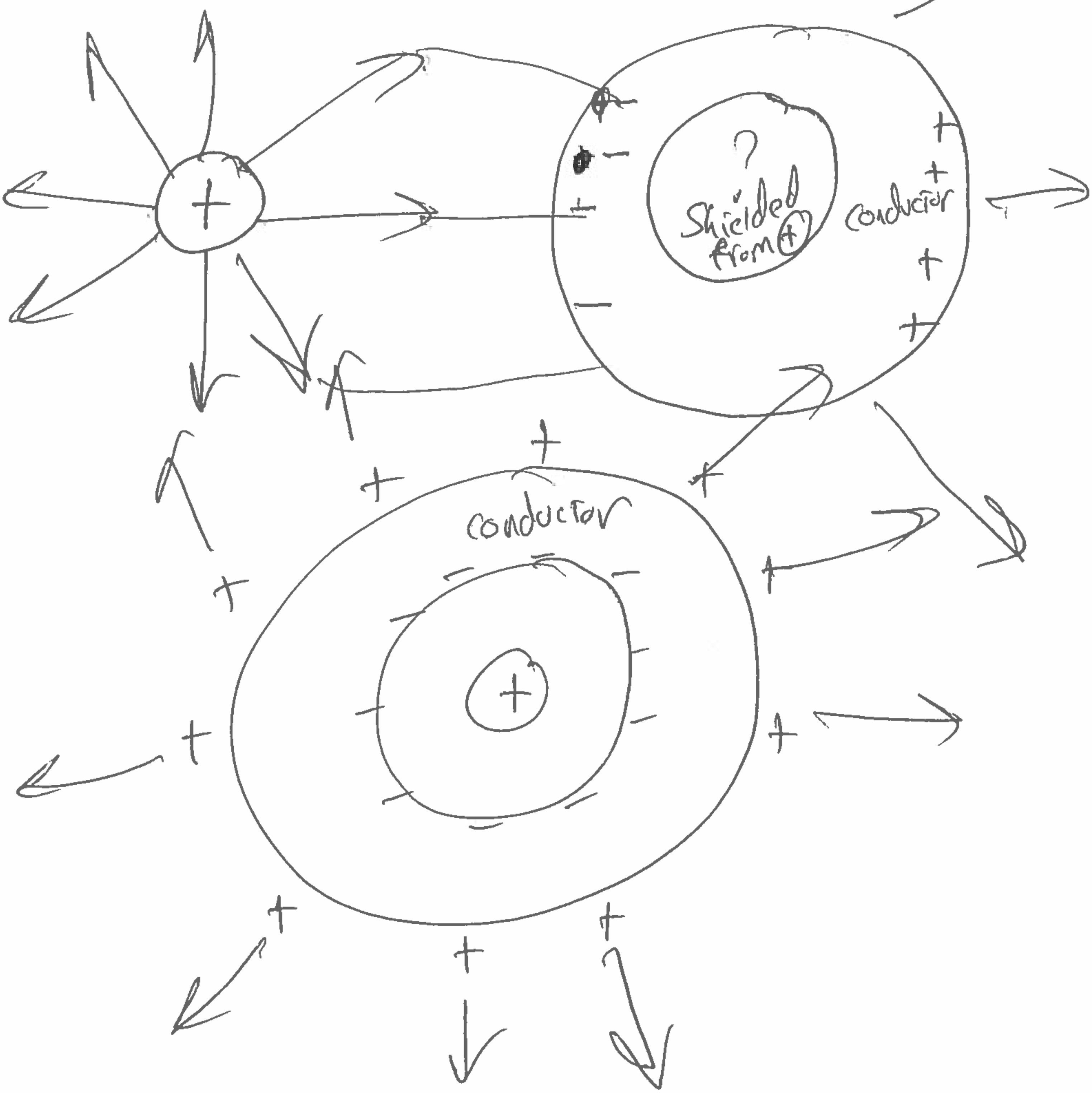


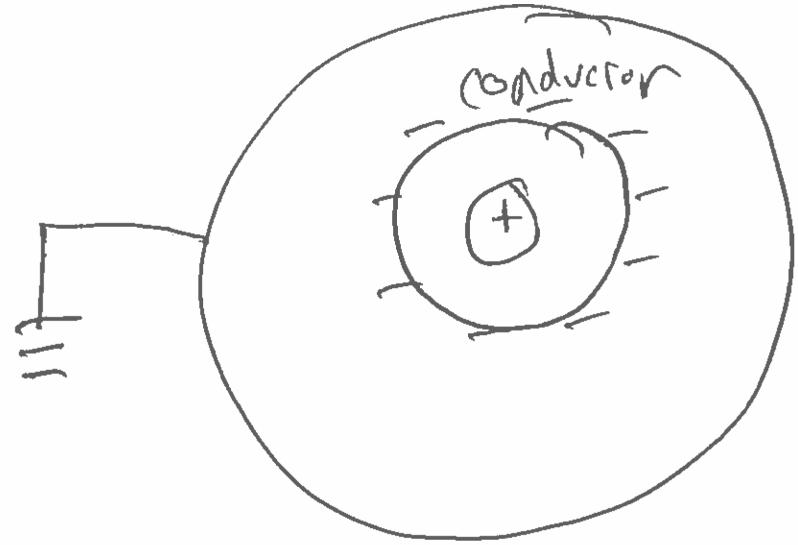


E-field lines are always perpendicular to conductors.



High concentration of $\vec{E}$ at corners and sharp edges

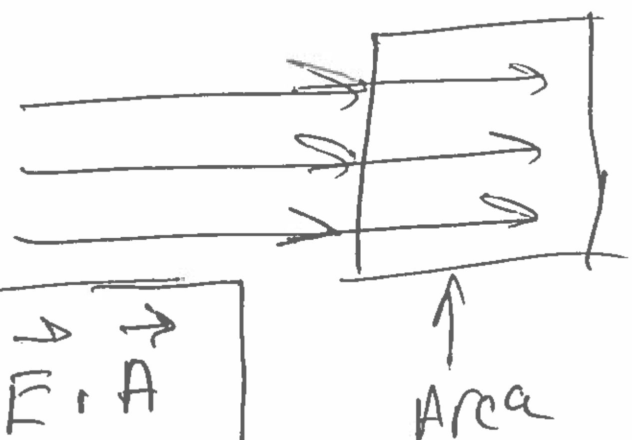




Shielded from inside.

Flux is the amount of something passing through a unit area in a unit amount of time.

Electric flux



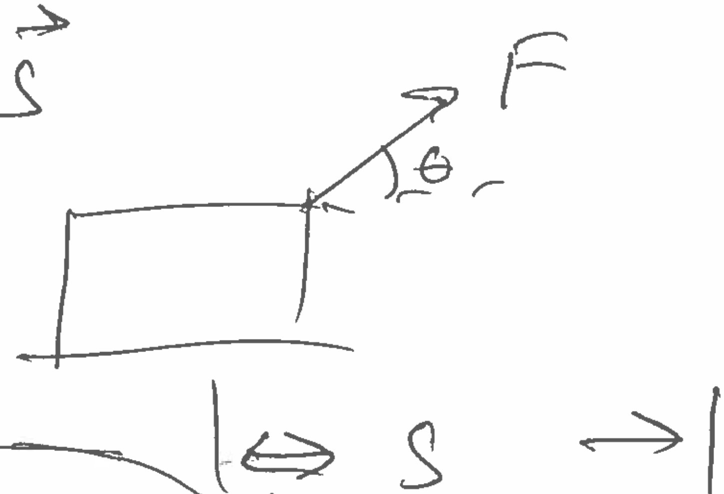
$$\Phi_E = \vec{E} \cdot \vec{A}$$

Dot Product is one way of multiplying vectors that result in a scalar not a vector.

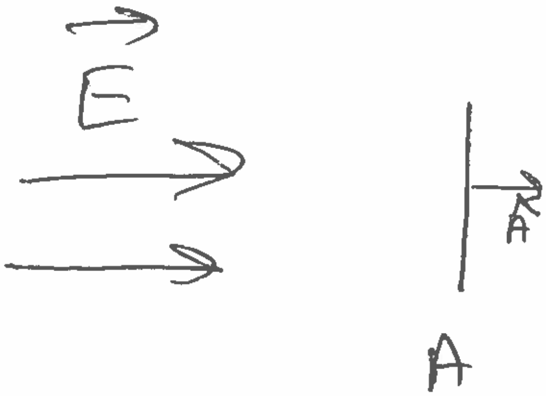
$$\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta_{AB}$$

It is the product of A and the component of $\vec{B}$ that lies parallel to $\vec{A}$.

$$W = \vec{F} \cdot \vec{S}$$



$$W = F\cos\theta\, S$$

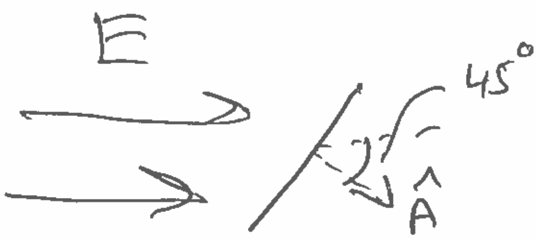


angle between Area and $\vec{E}$

Remember direction of Area is $\perp$ to Area

$$\Phi = EA\cos(0) = EA$$

$$\Phi = EA\cos(90^\circ) = 0$$



$$\Phi = EA\cos 45^\circ$$

Gauss's Law

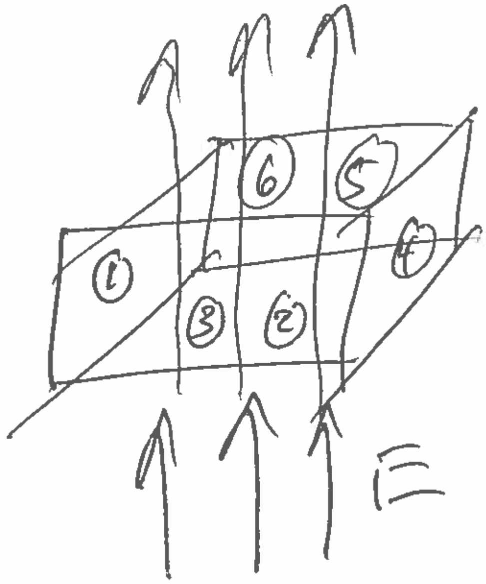
The electric flux Through a Closed area is equal To The Amount of charge inside The area divided by The permitivity of free space.

$$\Phi_E = \frac{Q_{enc}}{\varepsilon_0} = \vec{E} \cdot \vec{A}$$

We use This rule To help determine $\vec{E}$ of charge distributions

$$\vec{E}_{net} = \sum_i \vec{E}_i$$

Gauss's Law simplifies This Process.



① - Left side
② - bottom
③ - Front
④ Right
⑤ back
⑥ Top

$\Phi_{Net} = ? = 1$

$\Phi_{Net} = \Phi_{left} + \Phi_{Right} + \Phi_{Front} + \Phi_{Back} + \Phi_{Bot} + \Phi_{Top}$