Gravity Fields

Contact forces are those in which two objects touch each other. These are the forces we are familiar with when you push a chair for example. However, forces like gravity affect objects at a distance, though empty space. Fields were invented as a way of talking about this.

Consider a fire, you could say the fire was surrounded by a "heat field"

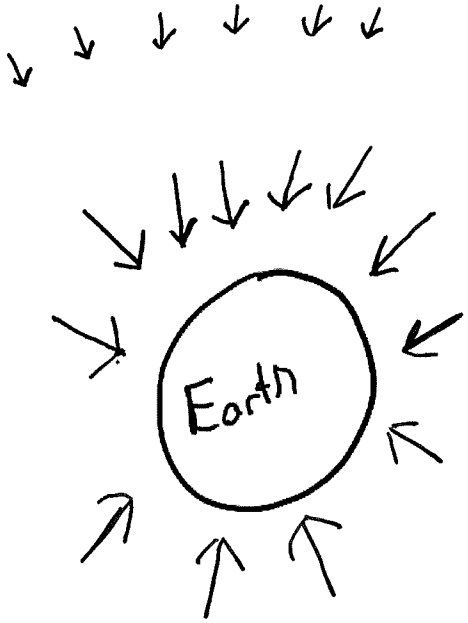
As you get closer to the fire: Strength of heat field increases

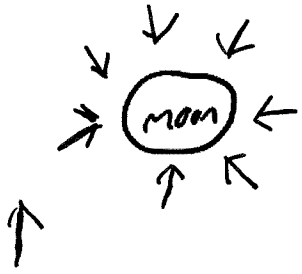
If the fire gets larger: Strength of heat field increases

Gravity is a Force so a gravity field is a Force field.

Since force is a vector, a gravity field has direction.

One way of representing a gravity field is by drawing arrows showing the direction and strength of the force of gravity that would act on an object in that space.





We have been using the idea of a gravitational field strength through the equation

$F_g = mg$ ← Gravitational field strength

on Earth $g = 9.8 m/s^2$ or $9.8 N/kg$

Outside of Earth we can determine the strength of the gravitational field

$$F_g = F_g$$

$$mg = \frac{GM_1 m_2}{r^2} \rightarrow g = \frac{GM}{r^2}$$

What is the gravitational field strength on the surface of the moon?

$M_{moon} = 7.35 \times 10^{22}$ kg

$r_{moon} = 1737.1$ km

$$g = \frac{6.674 \times 10^{-11} \times 7.35 \times 10^{22} kg}{(1737100)^2}$$

$$= 1.63 m/s^2$$

or $1.63 N/kg$