

Earth vs Mars



Mars is 0.53 Earth Diameter
0.10 Earth Mass
0.38 Earth surface gravity

Earth vs Mars Atmosphere

Atmospheric pressure is the force exerted by this mass of gas per unit area of surface

Equation for pressure?

$$p = F/A$$

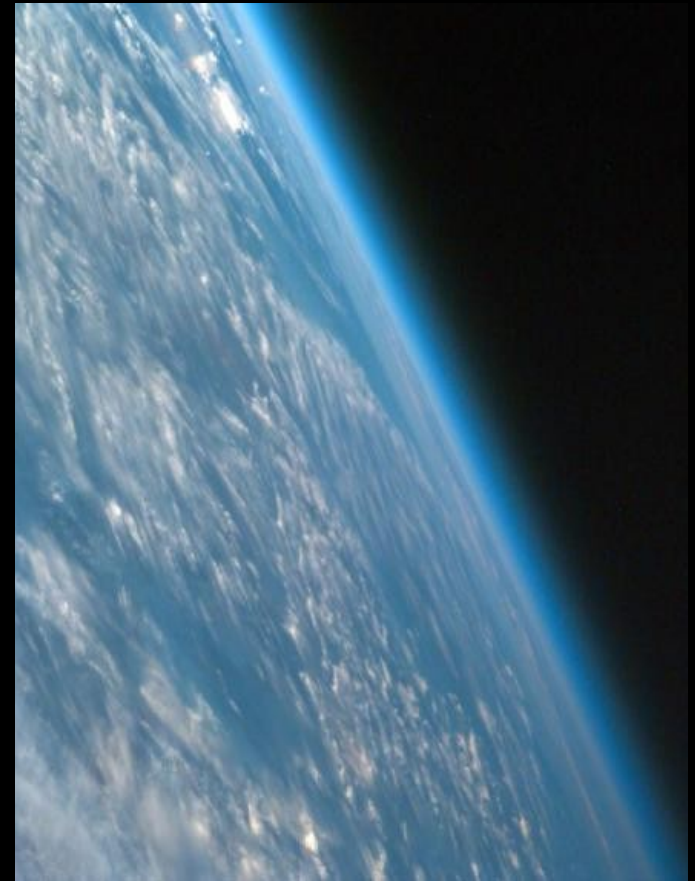
$$A = 4\pi r^2$$

Equation for force?

$$F = ma \quad F = mg$$

$$\text{Therefore } pA = mg$$

Solve for m



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Solve for m

Earth:

$$p = 1 \times 10^5 \text{ Pa}$$

$$r = 6 \times 10^6 \text{ m}$$

$$g = 9.81 \text{ m/s}^2$$

Mars:

$$p = 600 \text{ Pa}$$

$$r = 3 \times 10^6 \text{ m}$$

$$g = 3.75 \text{ m/s}^2$$



Earth vs Mars Atmosphere

Mass of Earth atmosphere 4.61×10^{18}

Mass of Mars atmosphere 1.81×10^{16}

Units?

$$mg = pA$$

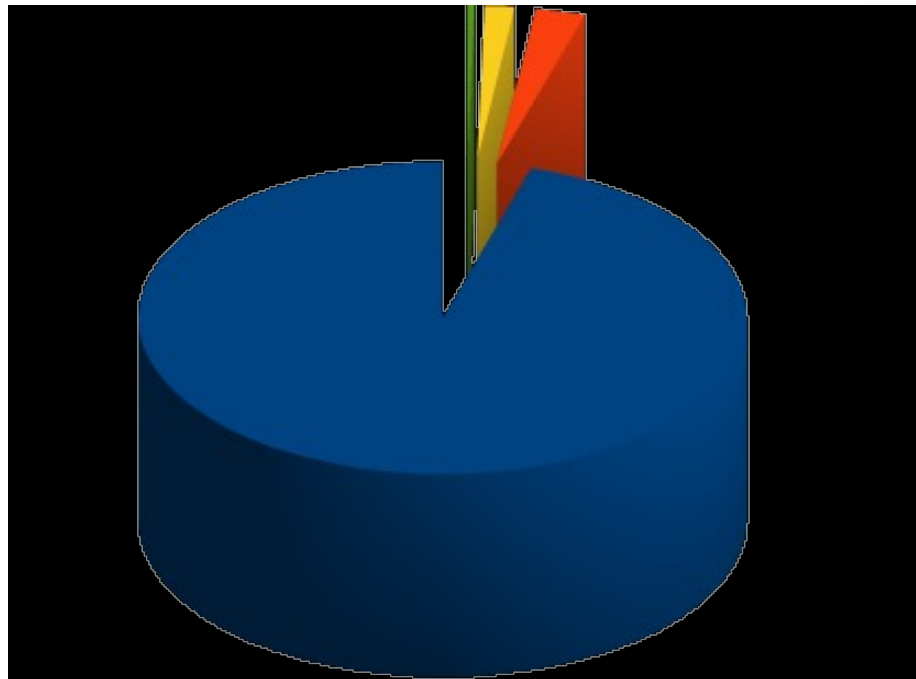
$$m = pA/g$$

$$\begin{aligned} m &= p \quad \quad \quad \times A \quad / g \\ &= \text{N/m}^2 \quad \quad \times \text{m}^2 / \text{m/s}^2 \\ &= \text{kgm/s}^2\text{m}^2 \quad \times \text{m}^2 \text{s}^2 / \text{m} \end{aligned}$$

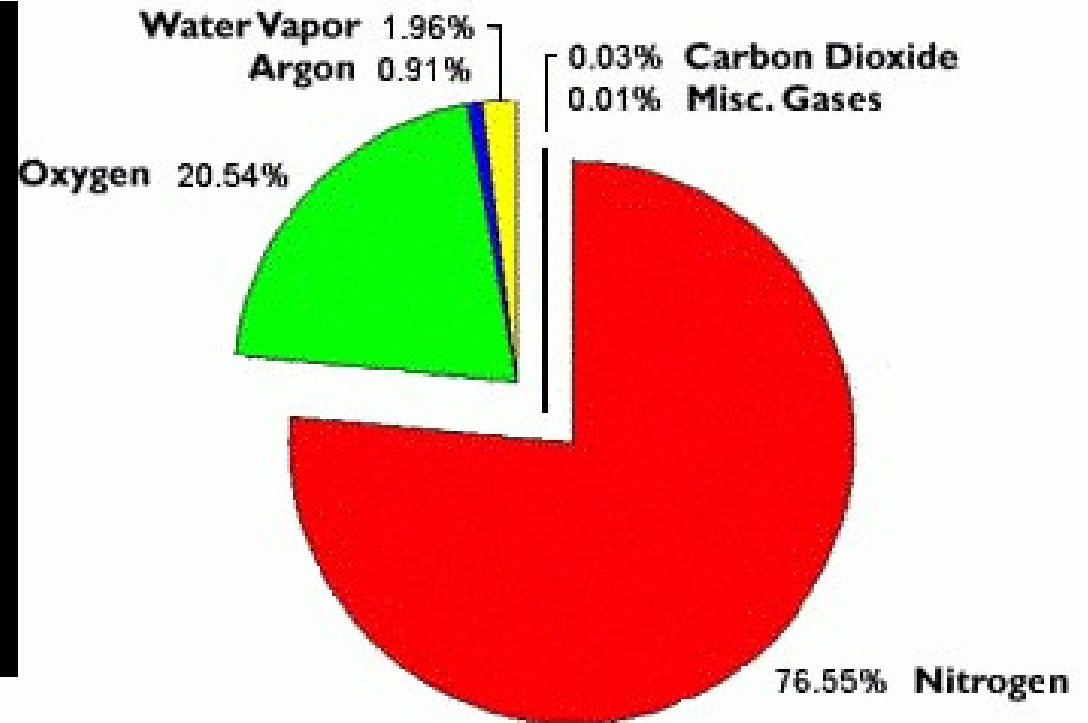
cancelling out mass = kg

Earth vs Mars: Atmosphere

Which graph show the composition of Mars or Earth atmosphere?



- Carbon dioxide (95.3%)
- Nitrogen (2.7%)
- Argon (1.6%)
- Other (0.4%)



Any types of Earth life that can survive on a CO₂ rich atmosphere?