

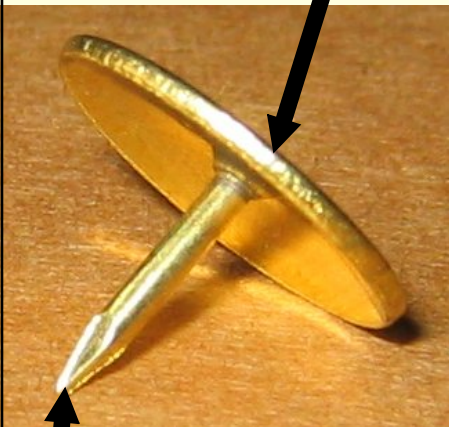
Pressure

Objectives:

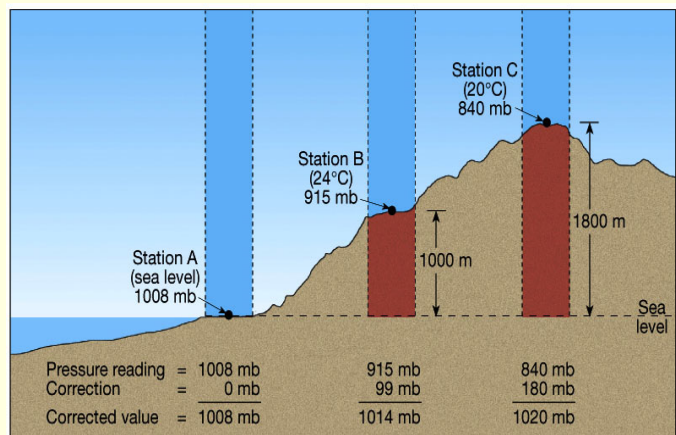
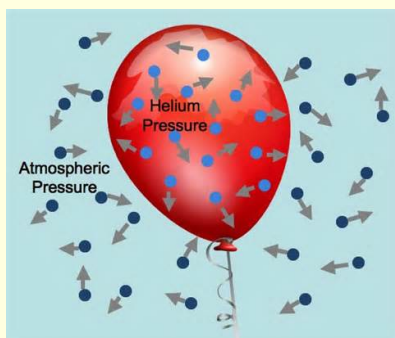
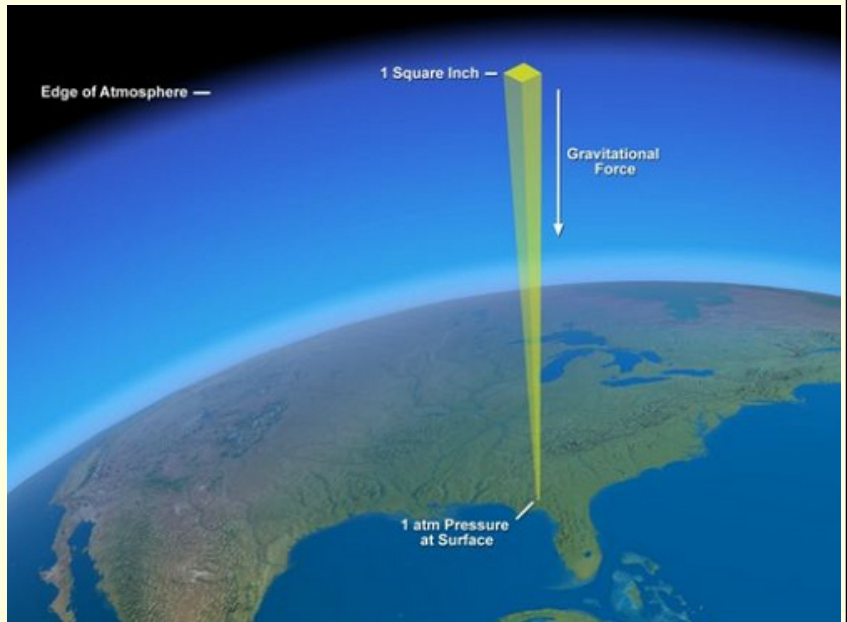
I can define pressure.

I can convert between different units of pressure.

area of
low pressure



area of
high pressure



Pressure: the force per unit area

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

bed of nails



water balloon



vac

can of soda

A

Force = 500 N

Area of contact = 325 cm²
 Pressure = $\frac{\text{force}}{\text{area}}$
 = $\frac{500 \text{ N}}{325 \text{ cm}^2} = 1.5 \text{ N/cm}^2$

B

Force = 500 N

Area of contact = 13 cm²
 Pressure = $\frac{\text{force}}{\text{area}}$
 = $\frac{500 \text{ N}}{13 \text{ cm}^2} = 38.5 \text{ N/cm}^2$

C

Force = 500 N

Area of contact = 6.5 cm²
 Pressure = $\frac{\text{force}}{\text{area}}$
 = $\frac{500 \text{ N}}{6.5 \text{ cm}^2} = 77 \text{ N/cm}^2$

1) Using model 1, answer the following questions
 a) What is the force applied by the dancer in A, B, & C?

all three are same force of 500 N

b) What is the area for the dancer in A, B, & C?

A is 325 cm² B is 13.5 cm² C is 6.5 cm²

c) What is the pressure for the dancer in A, B, & C?

A is 1.5 N/cm² B is 38.5 N/cm² C is 77 N/cm²

d) What is the relationship between area and pressure?

**As the area decreases,
 the pressure increases**

Direct

Inverse

e) What is the relationship between force and pressure?

As the force increases

Direct

, **the pressure increases**

Inverse

f) What variable has a greater effect on pressure?

Both

Force

Pressure

SI unit of pressure = Force/area

$1\text{N}/\text{m}^2 = 1 \text{ Pascal (Pa)}$ where

Force = $\text{kg} \cdot (\text{m}/\text{s}^2) = 1 \text{ Newton (N)}$

(at 0 C°)

1 Atmosphere (atm) =

= 760 mm Hg

= 760 torr

= 101.325 kPa

= 101325 Pa

= 14.7 psi

(at 0 C°)

1 Atmosphere (atm) = 760 mm Hg = 760 torr = 101.325 kPa = 14.7 psi

1. The average atmospheric pressure in Denver, Colorado is 0.830 atm. Express this pressure in:

a. mmHg
$$0.830 \text{ atm} \left| \frac{760 \text{ mmHg}}{1 \text{ atm}} \right. = 630.8 \text{ mmHg}$$

b. kPa
$$0.830 \text{ atm} \left| \frac{101.325 \text{ kPa}}{1 \text{ atm}} \right. = 84.1 \text{ kPa}$$

c. psi
$$0.830 \text{ atm} \left| \frac{14.7 \text{ psi}}{1 \text{ atm}} \right. = 12.2 \text{ psi}$$

2. Convert 780 mmHg to psi

$$780 \text{ mmHg} \left| \frac{14.7 \text{ psi}}{760 \text{ mmHg}} \right. = 15.1 \text{ psi}$$