

اهم ... قاعدة الغاييل بسم الله

Ch. 10

Scale	Freezing point	Boiling point	Division
Celsius $C^{\circ}$	$0 C^{\circ}$	$100 C^{\circ}$	100
Fahrenheit $F^{\circ}$	$32 F^{\circ}$	$212 F^{\circ}$	180
Kelvin	$273,15 K^{\circ}$	$373,15 K^{\circ}$	100

$$\square T_F = \frac{9}{5} T_C + 32$$

$$\square T_K = T_C + 273,15$$

• pressure:

$$\bar{p} = \frac{F}{A}$$

- p of gas:

$$p = \frac{F}{A} \rightarrow \begin{array}{l} \text{القوة} \\ \text{الناتجة} \\ \text{على المساحة} \end{array}$$

مساحة المساحة

- unite of pressure is pascal (pa) where  
 $1 \text{ pa} = 1 \text{ N/m}^2$

- other unite: (atm)

- gauge pressure:  
the difference ...

$$P_{in} - P_{out}$$

$$\bullet 1 \text{ atm} = 1,013 \times 10^5 \text{ pa}$$

$$= 1,013 \text{ bars}$$

$$= 760 \text{ torr}$$

$$= 760 \text{ mm Hg} \rightarrow \text{طلي متر} \times \text{زئبق}$$

$$\sim_{net} = \sim_{in} - \sim_{out}$$

$$= 760 \text{ torr}$$

$$= 760 \text{ mm Hg} \rightarrow \text{فلي فتر } \times \text{ زبفه}$$

ch. 12

□ length expansion

$$\Delta L = \alpha L_0 \Delta T$$

$\alpha$  ←  $\kappa^{-1} \text{C}^{-1}$

□ Area expansion

$$\Delta A = 2\alpha A_0 \Delta T$$

$\gamma$  ←

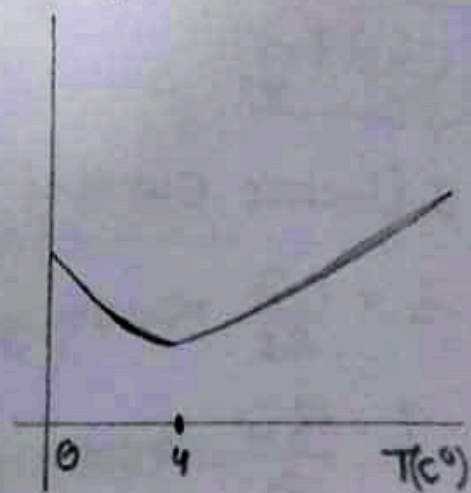
□ Volume expansion

$$\Delta V = 3\alpha V_0 \Delta T$$

$\beta$  ←

$$\begin{aligned} \bullet \text{ Fractional increase} &= \frac{\Delta A}{A} = \frac{2\alpha A_0 \Delta T}{A} \\ &= 2\alpha \Delta T \leftarrow \end{aligned}$$

Volume



water anomaly  
characteristic

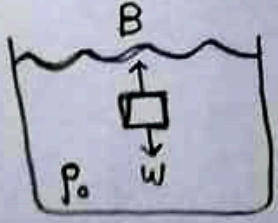
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# ch. 13

Buoyant Force = B

Floating =  $\frac{\rho_{object}}{\rho_{fluid}}$

Submerged =  $\frac{\rho_{object}}{\rho_{fluid}}$



$$B = \rho_0 V g$$

$\rho_0$  ← كثافة السائل  
 $V$  ← حجم الجسم المغمور داخل السائل

$$\Rightarrow \text{fraction of submerged} = \frac{V_s}{V} = \frac{\rho}{\rho_0}$$

$$\Rightarrow \text{fraction of non-submerged} = 1 - \frac{V_s}{V}$$

• Flow rate (Q) → حجم الماء الذي يمر بنقطة معينة عند زمنية معينة

$$Q = \frac{\Delta V}{\Delta t} \Rightarrow \text{it's unit } m^3/s$$

• the equation of continuity → يتغير ان Q ثابت في جميع النقاط في حال تساوي المقاطع

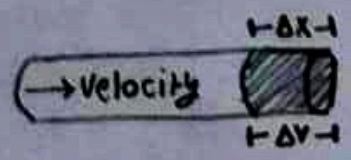
$$Q_1 = Q_2 = Q_3 \dots$$

$$\Delta V = A \Delta x = A v \Delta t$$

$$\Delta V = Q \Delta t \rightarrow \text{سرعة الجريان}$$

$$\text{So!! } Q = A v$$

← مساحة المقطع



\* للتحويل من لتر إلى  $m^3$  ينضرب في  $10^{-3}$   
 أو  $\frac{\quad}{1000}$

• Bernoulli's equation

• Bernoulli's equation:

$$P_a + \rho g y_a + \frac{1}{2} \rho v_a^2 = P_b + \rho g y_b + \frac{1}{2} \rho v_b^2$$

⇒ Fluid at rest ( $v=0$ ) in lake

$$P_a + \rho g y_a = P_b + \rho g y_b$$

$$P_b = P_a + \rho g h$$

سؤال البرميل المقلوب

$$v_1 = \sqrt{2gh}$$

$$P_1 = P_2$$

$$v_2 = 0$$

(c)  
dy  
ic

⇒ venturi tube  $y_1 = y_2$  الأنباب ثابت

$$P_a + \frac{1}{2} \rho v_a^2 = P_b + \frac{1}{2} \rho v_b^2$$

$$v_2 = A_1 \sqrt{\frac{2(P_a - P_b)}{\rho(A_a^2 - A_b^2)}}$$

the manometer (U-shaped tube)

$$① P = P_{atm} + \rho g h$$

$$② \text{gauge pressure} = P - P_{atm} = \rho g h$$

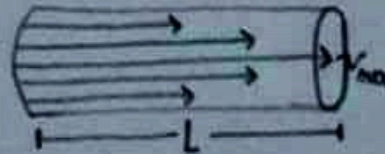
# Ch 14

$$F = \underbrace{\rho}_{\text{كثافة}} \underbrace{A}_{\text{Pa} \cdot \text{s}} \underbrace{v}_{\frac{1}{\rho}}$$

□ laminar flow in a tube: جريان الكامن في انبوب

$$\bar{v} = 1/2 v_{max}$$

$$\bar{v} = \frac{\Delta P R^2}{8 \eta L}$$



$$Q = A \bar{v}$$

$$Q = \frac{\Delta P R^4 \pi}{8 \eta L}$$

□ power dissipation: القدرة المفقودة او المنتجة

$$P = F \bar{v} = \Delta P A \bar{v} = \Delta P Q$$

$\leftarrow$  power  $\pi R^2$   $\leftarrow$  pressure

□ Flow Resistance: مقاومته الجريان

$\Rightarrow$  وهي نسبة التغير في الضغط الى معدل الجريان

$$R_f = \frac{\Delta P}{Q} = \frac{8 \eta L}{\pi R^4} \rightarrow \text{its unit is Pa} \cdot \text{s/m}^2$$

□ Contact  
قوة

If  $\theta < 90^\circ$

If  $\theta > 90^\circ$

If  $\theta = 90^\circ$

$F_{cos}$

$8 L \sigma$

$8 (2 \tau)$

# Ch. 1

□ Coulomb

$$F = (K)$$

□ Elec

$$E = \frac{F}{q}$$

□ Elect

$$v =$$

قوة  
الضغط

$$v =$$

□ Flow Resistance : مقاومته الجريان  
 ⇒ وهي نسبة التغير في الضغط إلى معدل الجريان

$$R_f = \frac{\Delta P}{Q} = \frac{8\eta L}{\pi R^2} \rightarrow \text{it's unit is Pa} \cdot \text{s/m}^2$$

ch. 15

□ Cohesive force in liquids : قوى التماسك

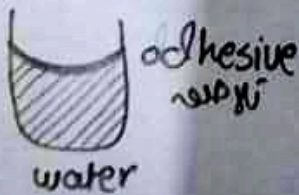
① Surface tension = ظاهره التوتر السطحي

$$\gamma = \frac{F}{L} \text{ For each surface} \Rightarrow \text{it's unit is N/m}$$

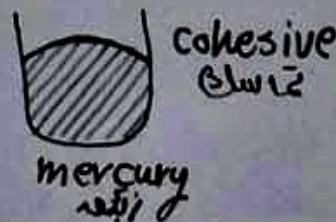
$$\gamma = \frac{F}{2L} \text{ For surface and its opposite}$$

→ surface tension

② Cohesive and adhesive force =



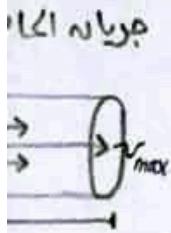
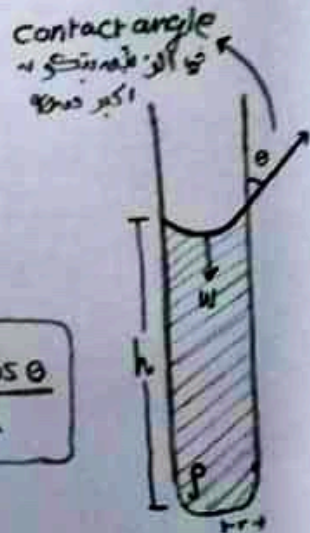
it surface has a concave shape (مقعر) because water wets the surface



it surface has a convex shape (مقوس) because mercury does not wet glass

□ contact angles and capillarity %  
 زاوية التماس      الخاصية الشعرية

If  $\theta < 90^\circ$  water will rise  $\rightarrow h+$   
 If  $\theta > 90^\circ$  " " depressed  $\rightarrow h-$   
 If  $\theta = 90^\circ$  " " neither rise nor fall  $\rightarrow h=0$



$$F \cos \theta = w$$

$$\delta L \cos \theta = mg \quad (\pi r^2 h)$$

$$\delta (2\pi r) \cos \theta = \rho v g$$

$$h = \frac{2\gamma \cos \theta}{\rho r g}$$

Ch. 16

□ Coulmb's law %

$$F = \frac{K |q_1| |q_2|}{r^2}$$

$\rightarrow 9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$

$$K = \frac{1}{4\pi \epsilon_0}$$

permittivity of free space

□ Electric field %

$$E = \frac{F}{q} \Rightarrow E = \frac{KQ}{r^2} \Rightarrow E_{\text{total}} = E_1 + E_2 \dots$$

its write N/C

□ Electric potential %

$$V = \frac{U}{q} \Rightarrow \text{its write Volt (V) = J/C}$$

طاقة الوضع      فرق الجهد

$$V = \frac{KQ}{r}$$

$$V = \frac{U}{q}$$
 فرق الجهد  $\Rightarrow$  it's write Volt (V) = J/C.

$$V = \frac{kQ}{r}$$

Ch 17

□ Electric Current :

$$I = \frac{\Delta Q}{\Delta t} \Rightarrow \text{average}$$

$$I = \frac{dQ}{dt} \Rightarrow \text{instantaneous}$$

$$\Rightarrow \text{it's write (A) Ampere = C/S}$$

□ Resistance

Ohm's law  $V = IR$   $\rightarrow$  فرق الجهد  
 $R = \frac{P}{A}$   $\rightarrow$  بقدره على تفرغ التيار / قانون اوم  
 $\Rightarrow$  unit of R ohm ( $\Omega$ ) = V/A  $\Rightarrow \sigma = \frac{1}{\rho}$

resistance per unit leng =

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



Ch 23

□ the index of refraction :  $n$  معامل الانكسار

$$n = \frac{c}{v}$$

$c \rightarrow$  speed of light in vacuum  
 $v \rightarrow$  " " " " medium

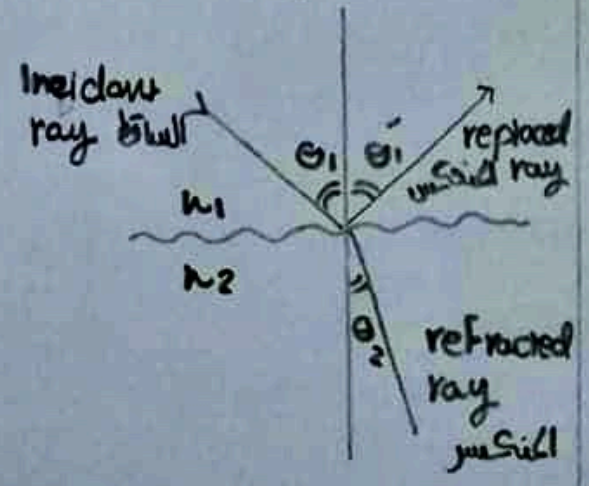
□ frequency and wavelength : التردد والطول الموجي

$$f = \frac{v}{\lambda} \Rightarrow [n_1 v_1 = n_2 v_2] \Rightarrow \frac{n_1}{n_2} = \frac{v_1}{v_2} = \frac{\lambda_2}{\lambda_1}$$

□ Snells law

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\theta_1 = \theta_1'$$



Ch 24

□ lenses ————

- convex محدب + (R) وبتقوسها
- concave مقعر - (R) وبتقوسها
- plane مسطح ∞ (R) وبتقوسها

□ focal length البعد البؤري

## Ch. 24

- lenses
- Convex محدب + وينتفخ (R)
  - Concave مقعر - وينتفخ (R)
  - plane مسطح ∞ وينتفخ (R)

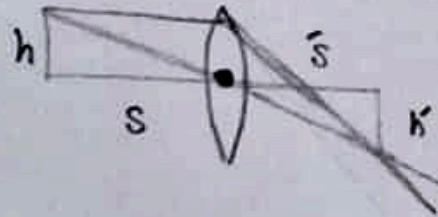
□ focal length البعد البؤري

$$\frac{1}{F} = (n-1) \left( \frac{1}{R_1} + \frac{1}{R_2} \right)$$

□ thin lens formula معادلات الرقيقة

$$\frac{1}{F} = \frac{1}{s} + \frac{1}{s'}$$

F → + convex  
F → - concave



## Ch. 30

(A) → number of protons + neutrons

X

(Z) → number of protons just

A - Z = number of neutrons

# Ch 31

## • type of Radiation :

### 1) Alpha ( $\alpha$ )

- they are helium nuclei  ${}^4_2\text{He}$
- " " positively charged protons
- low speed  $v = 0.05c$  سرعت بسیار کم از نور و از همه کمتر
- they have greatest ionization but least penetration

placed ray  
acted  
will

### 2) Beta ( $\beta$ )

- negatively charged
- high speed  $v \approx 0.9c$
- less ionization and greater penetration than alpha

### 3) Gamma ( $\gamma$ )

R)  
R)  
R)

- electromagnetic waves of very short wavelength and high frequency
- no electric charge
- least ionization and greatest penetration
- high speed  $v = c$