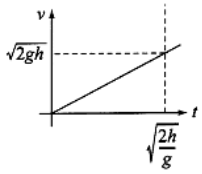
物理重點整理

自由落體 ❶ $v = gt$ ❷ $y = \frac{1}{2}gt^2$



距地H高落下 (a)時間 $T = \sqrt{\frac{2H}{g}}$ (b)著地速率 $v = \sqrt{2gH}$

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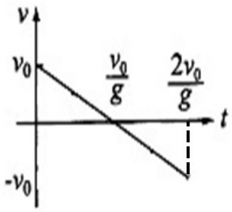
鉛直上拋 ❶ $v = v_0 - gt$ ❷ $y = v_0 t - \frac{1}{2}gt^2$



以 V_0 速度自地面鉛直上拋

(a) 上升時間 $t = \frac{v_0}{g}$ (b) 最大高度 $H = \frac{v_0^2}{2g}$

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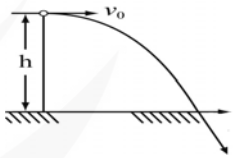
水平拋射



飛行時間 $T = \sqrt{\frac{2H}{g}}$ 水平射程 $R = v_0\sqrt{\frac{2H}{g}}$

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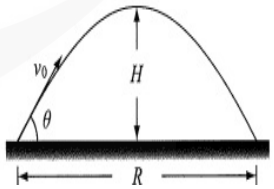
斜向拋射



飛行時間 $T = \frac{2v_0 \sin\theta}{g}$ 最大高度 $H = \frac{(v_0 \sin\theta)^2}{2g}$

水平射程 $R = \frac{2v_0^2(\sin\theta)(\cos\theta)}{g} = \frac{v_0^2 \sin 2\theta}{g}$

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加速**上升**:

$$F - mg = ma \Rightarrow F = m(g + a)$$

加速**下降**:

$$mg - F = ma \Rightarrow F = m(g - a)$$

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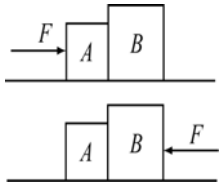
A、B 兩木塊質量分別為 m_A 及 m_B，置光滑平面上。



今以 F 之力**由左側**推 m_A，兩木塊間接觸力為 $m_B a$

今以 F 之力**由右側**推 m_B，兩木塊間接觸力為 $m_A a$

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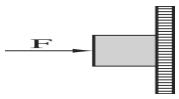
❶正向力=水平推力 ❷靜摩擦力 f_s = 物重

❸物與牆間**作用力**為 $\sqrt{(mg)^2 + F^2}$



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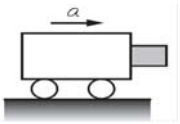
（加速向右）物體不會掉下來的條件 $a \geq \dfrac{g}{\mu_s}$



上、下兩木塊相對靜止的條件 $a \leq \mu_s g$

（光滑地面）

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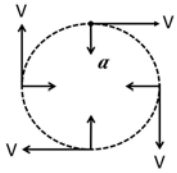
等速(率)圓周、等角速度運動 （切線加速度= a_t = 0 ）



角速度 $\omega = \dfrac{2\pi}{T}$ $v = \dfrac{2\pi R}{T} = \omega R$ $a_c = \dfrac{V^2}{R} = \omega^2 R = \dfrac{4\pi^2 R}{T^2}$

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❶總能量 $N\overline{E}_k = \dfrac{3}{2}PV = \dfrac{3}{2}nRT = \dfrac{3}{2}NKT$

❷分子平均(質心)動能 $\overline{E}_k = \dfrac{3}{2}KT = \dfrac{3PV}{2N}$

❸方均根速率 $V_{rms} = \sqrt{\dfrac{3KT}{m}} = \sqrt{\dfrac{3RT}{M}} = \sqrt{\dfrac{3PV}{Nm}} = \sqrt{\dfrac{3PV}{nM}} = \sqrt{\dfrac{3P}{\rho}}$

(a) 理想氣體常數 R= 0.082 atm-l/mole-k= 8.317 J/mole-k)

(b) 每 1 mole 升(降)1 ^0C(1K)時，動能增(減) $\dfrac{3}{2}R = 12.48$焦耳

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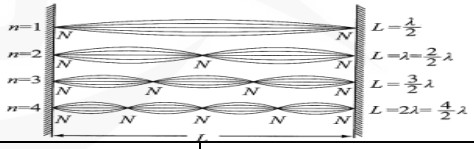
弦波波速 $v = \sqrt{\dfrac{F}{\mu}}$；F :張力(牛頓) μ:線密度(單位長度的質量)= $\dfrac{m}{\ell}$($\dfrac{公斤}{公尺}$)

兩端固定之弦的駐波

$\ell = \dfrac{\lambda}{2} \times n$ $f = \dfrac{nv}{2\ell}$



頻率不變	名稱		頻率
n=1	第一諧音	基音	$f_1 = \dfrac{v}{2\ell}$
n=2	第二諧音	第一泛音	$f_2 = \dfrac{2v}{2\ell}$

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球面鏡成像公式

焦距 f: 凹面鏡取＋ ; 凸面鏡取－

物距 p 鏡前實物取＋

像距 q 鏡前實像取＋ ;鏡後虛像取－

高斯式：$\dfrac{1}{p}+\dfrac{1}{q}=\dfrac{1}{f}=\dfrac{2}{r}$