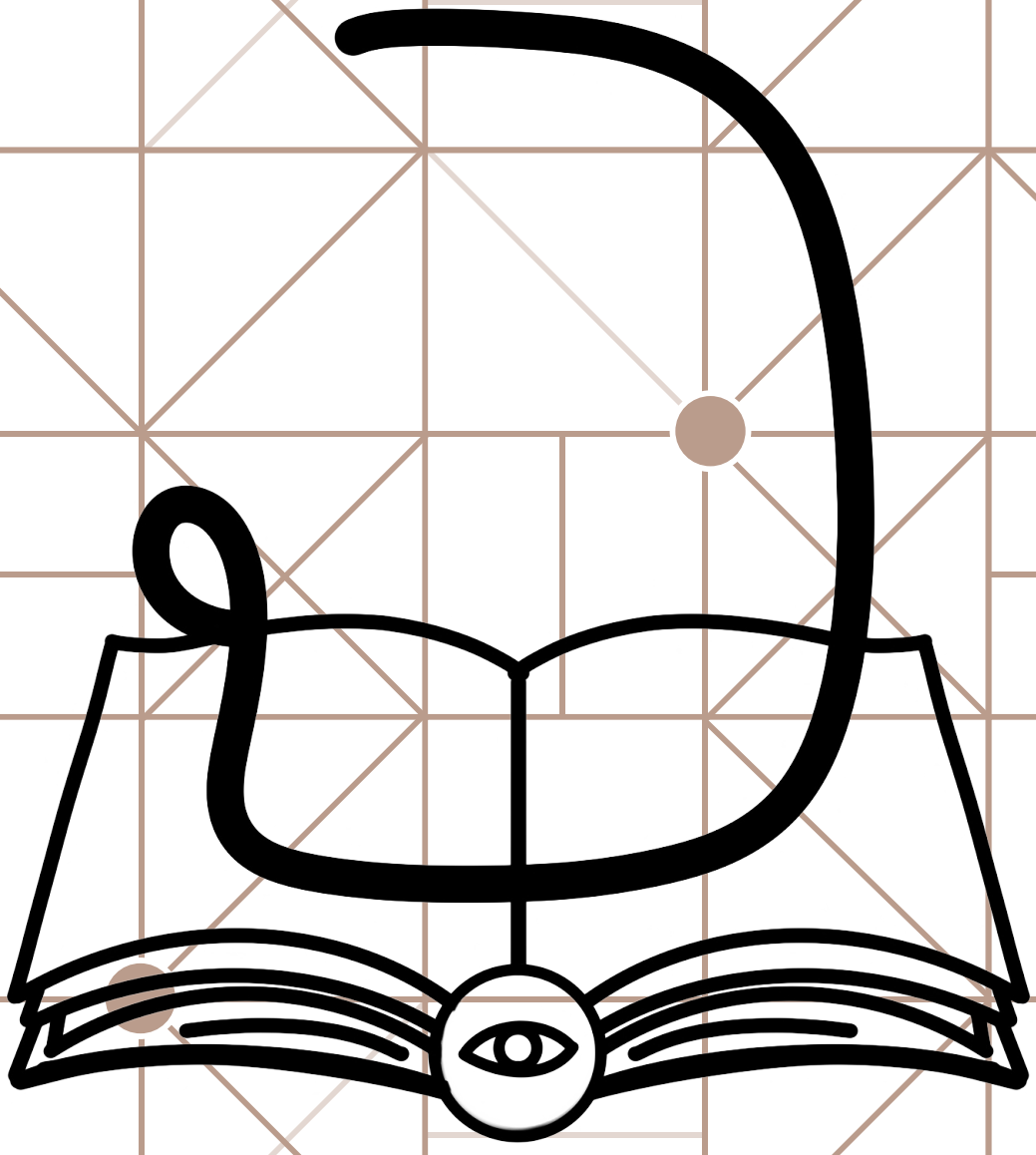


PHYSICS II

NIRUTH PROMBUTR, PH.D.

Physics II

- **Mechanical Part II**

  - work and energy / Power (Ch. 5) → Quiz I
    - Definition of work & energy
    - conservation of energy.
  - Momentum (Ch. 6)
    - Definition of momentum
    - conservation of momentum.

  } Midterm

  - circular motion (Ch. 17) → Quiz II
    - & Projectile motion
  - Rotational motion (Ch. -)
    - Extra text

  } Final Exam

Work

- effect of the force that makes the object move.
- $W = F \cdot S$
  - ↳ where W is work,
    F is force (parallel to S), and
    S is distance.

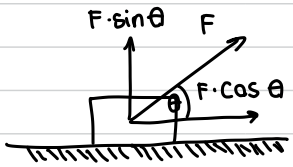


Fig 1.1 Force pulling an object

∴ $W = FS\cos\theta$

↳ work is measured in Joules (Newton-metre) $[kg \cdot m^2 \cdot s^{-2}]$

* Chapters are according to Sang D. et all., (2014) Cambridge International AS and A Level Physics Couse book, 2e, Cambridge: Cambridge University Press

Note: ∘ $\theta = 90^\circ \rightarrow W = F \cdot S \cdot \cos 90^\circ$ (Fig 1.2)

$= F \cdot S \cdot 0$

∴ no work is done

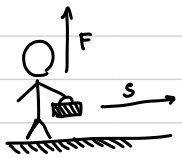


Fig 1.2 walking with a suitcase

∴ no work is done because $F \perp S$

∘ $F, S = 0 \rightarrow W = F \cdot S \cdot \cos\theta$

$= 0 \cdot 0 \cos\theta$

∴ no work is done

Fig 1.3 pulling a suitcase up

∴ work is done, $F \parallel S$

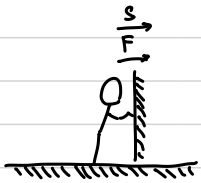
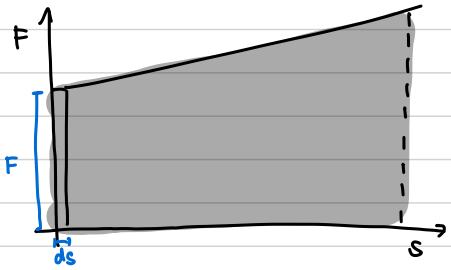


Fig 1.3 Man pushing a wall

∴ no work is done ∵ $S = 0$

Graph:



∘ W = Area under graph F - S

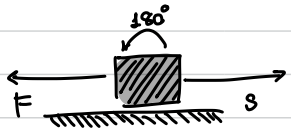
$W = \int F \cdot dS$

* for more information : Sang D. et all., 2014. Chapter 5 : Page. 69 - 72

- $\theta = 180^\circ \rightarrow W = F \cdot S \cdot \cos 180^\circ$

  $W = F \cdot S \cdot -1$

  $W = -FS$



Power (กำลัง)

- derivative of work on time $\left(\frac{d}{dt} W\right)$

- $P = \frac{W}{t} = \frac{F \cdot S \cos\theta}{t} = F \cdot v \cdot \cos\theta$

  ↳ where P is power,
  W is work,
  t is time,
  F is force,
  S is distance, and
  v is velocity.

  ↳ power is measured in 1) Watts (SI) [Joules $\cdot s^{-1}$], and
  2) Horse Power (Informal) [1 HP = 746 W].