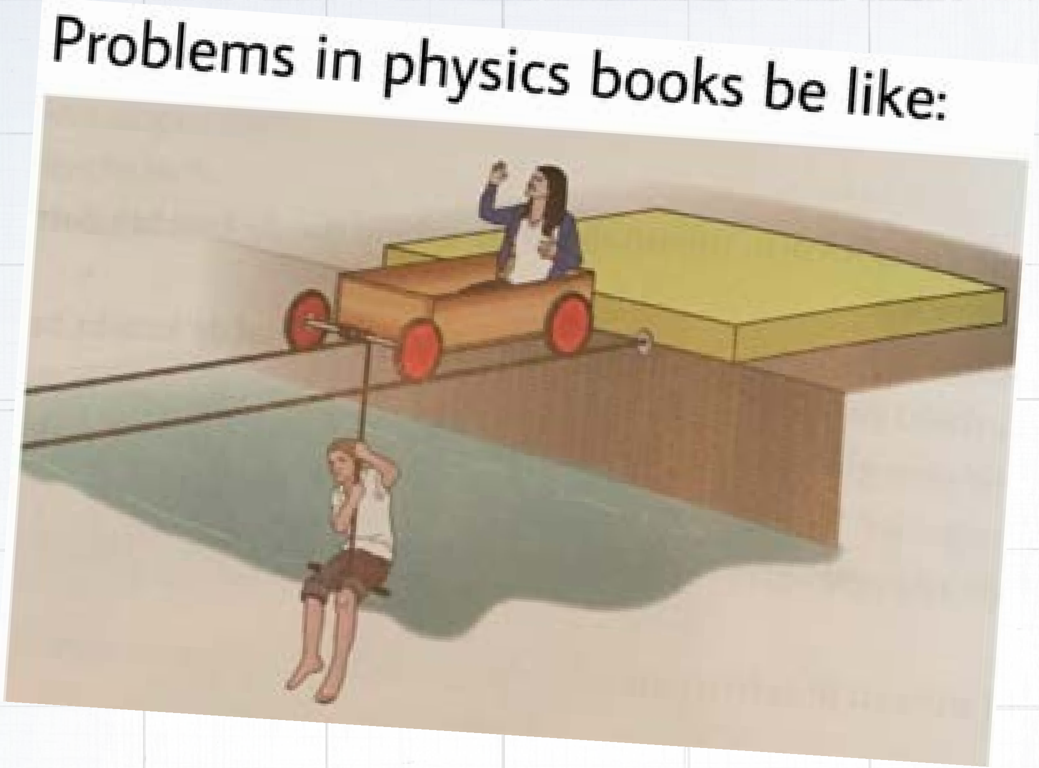
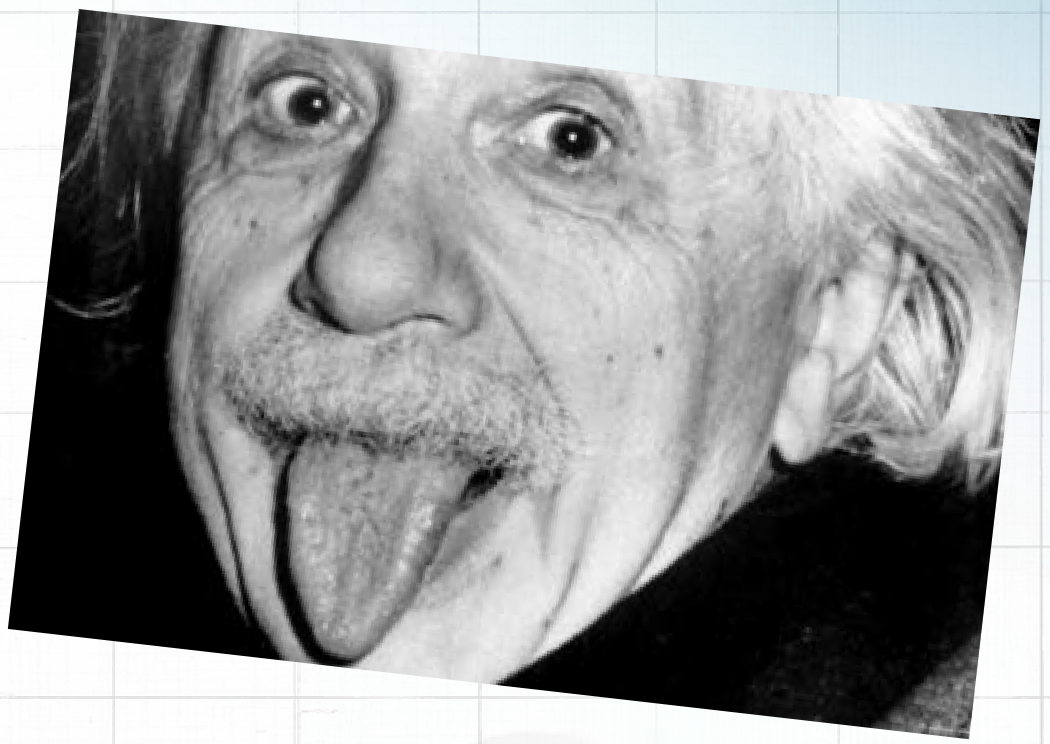
Project REACH
CALABARZON


Problems in physics books be like:



PHYSICS


Isaac Newton: *sitting under a tree*
The apple:
I'm about to start this man's whole career

PHYSICS

- **Kinematics**
  - Motion in one and two dimensions (position, velocity, acceleration)
- **Newton's Laws of Motion**
  - Force, mass, weight, and free-body diagrams
- **Work, Energy, and Power**
  - Kinetic and potential energy, work-energy theorem

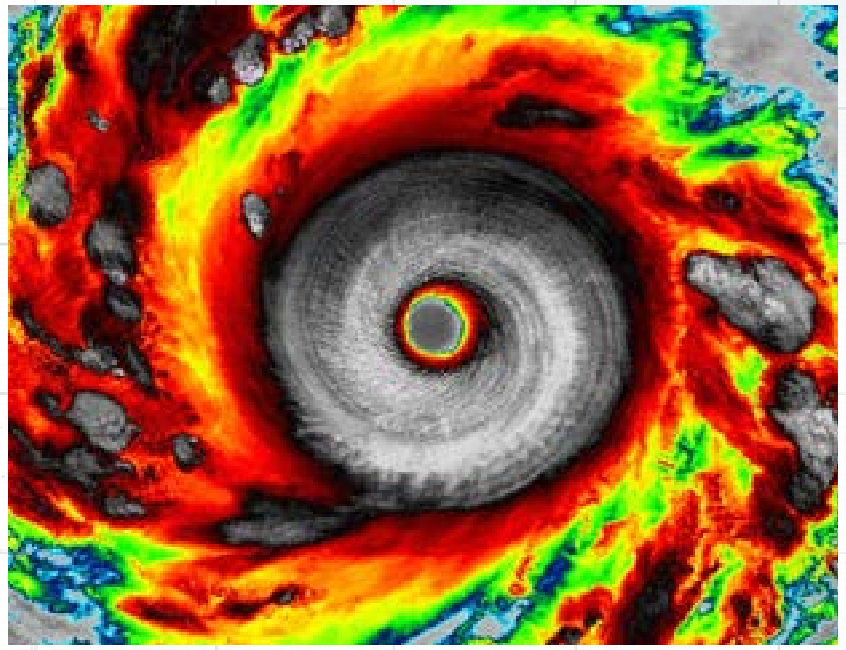
PHYSICS

- **Momentum and Collisions**
  - Conservation of momentum, elastic and inelastic collisions
- **Electrostatics**
  - Electric charge, Coulomb’s law, and electric fields
- **Waves and Sound**
  - Wave characteristics (speed, frequency, wavelength) and sound waves

Preliminary Topics

Physical Quantity

Any number that is used to describe a **physical phenomenon quantitatively**.



Preliminary Topics

Two Categories:

1. Fundamental/Base Quantities

- Quantities that **exist by themselves**
- **Ex:** time, length, mass, temperature

2. Derived Quantities

- Quantities that are **dependent on other quantities**
- **Ex:** velocity, acceleration, force

	Quantity	SI unit	Abb.	Dimension
1	Length	meter	m	[L]
2	Mass	kilogra	kg	[M]
3	Time	second	s	[T]
4	Electric current	ampere	A	[A]
5	Temperature	kelvin	K	[K]
6	Luminous intensity	candel	cd	[cd]
7	Amount of substance	mole	mo	[mol]

Preliminary Topics

QUESTION 1

The world land speed record of **763.0 mi/h** was set on October 15, 1997 by Andy Green in the jet-engine car Thrust SSC. Express this speed in **meters per second**.

a. 317.92 m/s

b. 20,461.12 m/s

c. 341.02 m/s

d. 21,422.26 m/s

Preliminary Topics

QUESTION 1

The world land speed record of **763.0 mi/h** was set on October 15, 1997 by Andy Green in the jet-engine car Thrust SSC. Express this speed in **meters per second**.

1 mi = 1.609 km **1 km = 1,000 m** **1 h = 3600 s**

$$763\frac{mi}{h}(\frac{1.609\,\text{km}}{1mi})(\frac{1000m}{1\,\text{km}})(\frac{1h}{3600s})$$

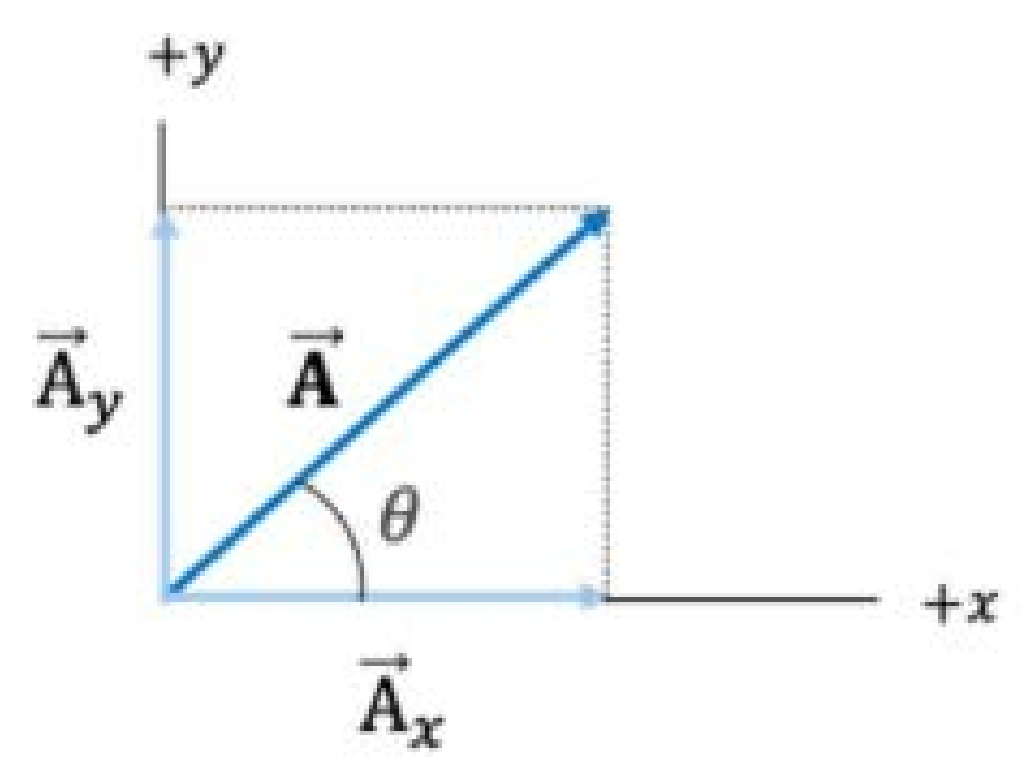
$$763\frac{mi}{h} = 341.02\frac{m}{s}$$

c. 341.02 m/s

Preliminary Topics

Scalar Quantity

- Quantity that is specified by a **single number** of physical unit.
- describe by a **magnitude**



Vector Quantity

- Quantity specified by **a number of physical unit** and a **direction**
- denoted by an **arrow above** $\overrightarrow{V}$

$$\overrightarrow{A} = \overrightarrow{A_x} + \overrightarrow{A_y}$$

$$A_x = A\cos\theta \qquad A_y = A\sin\theta$$

$$A = \sqrt{A_x^2 + A_y^2} \qquad \tan\theta = \frac{A_y}{A_x}$$

Preliminary Topics

QUESTION 2

A student walks **13 meters North**, **5 meters East**, **7 meters North**, and **3 meters West** to attend their Physics class. What is the total displacement and its direction?

a. 20 m, NE

b. 20 m, NW

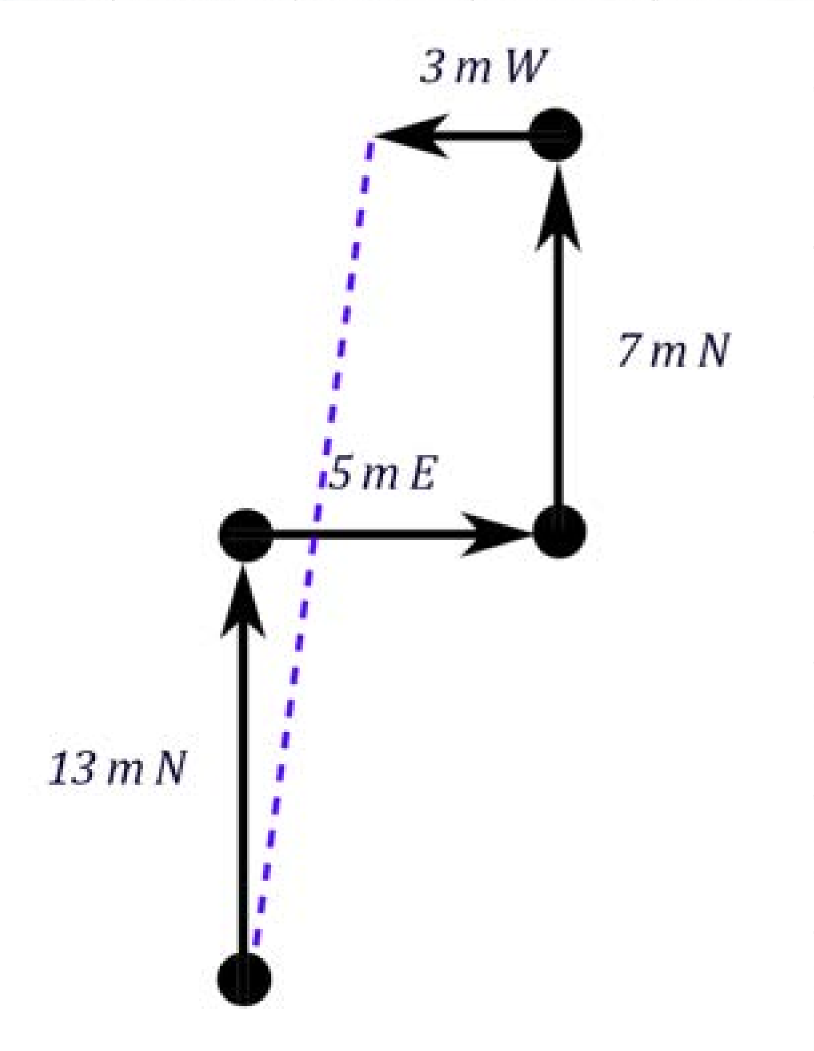
c. 21 m, NE

d. 21 m, NW

Preliminary Topics

QUESTION 2

A student walks **13 meters North**, **5 meters East**, **7 meters North**, and **3 meters West** to attend their Physics class. What is the total displacement and its direction?



$$d_x = 5m - 3m = 2m$$

$$d_y = 13m + 7m = 20m$$

$$d = \sqrt{d_x^2 + d_y^2} = \sqrt{2^2 + 20^2} \approx 20.099$$

$$\tan\theta = \frac{d_y}{d_x} \quad \theta = \tan^{-1}\left(\frac{d_y}{d_x}\right) = \tan^{-1}\left(\frac{20}{2}\right) = 84.29^\circ$$

Direction is at **NE**

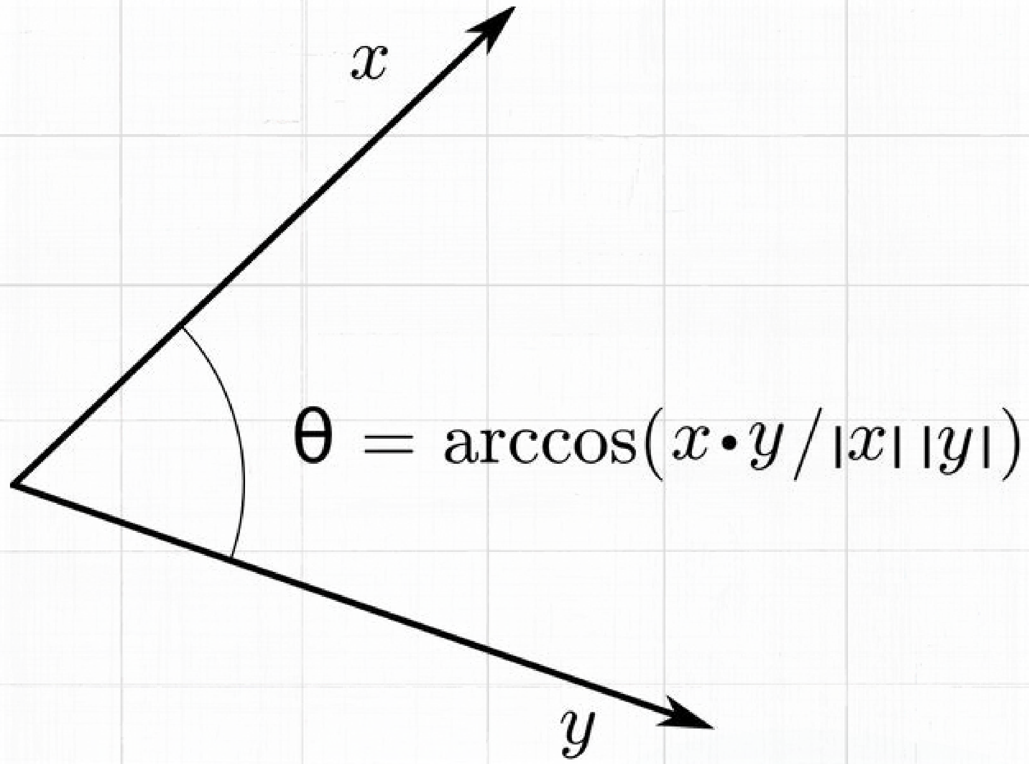
$\boxed{\textbf{a. 20 m, NE}}$

Preliminary Topics

Vector Multiplication

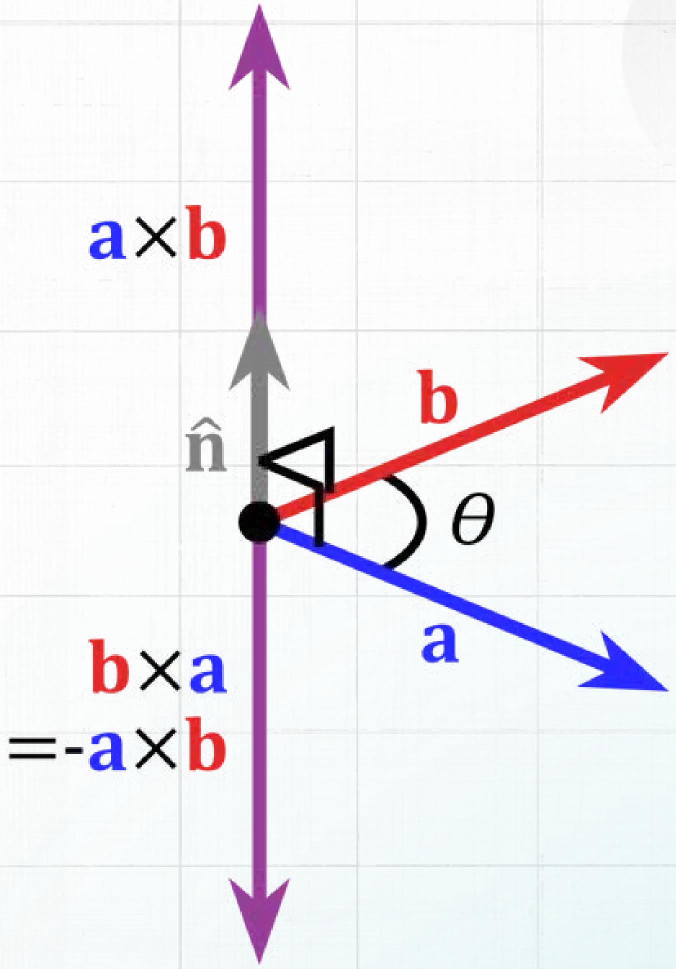
Dot Product

$$\overrightarrow{A} \cdot \overrightarrow{B} = AB\cos\theta$$



Cross Product

$$\overrightarrow{A} \times \overrightarrow{B} = AB\sin\theta\hat{n}$$



Kinematics

Kinematics

A branch of physics that deals with the motion of objects **without reference** to the **causes of motions (forces)**.

$$v = \frac{s}{t}$$

$$v = u + at$$
$$s = ut + \frac{1}{2}at^2$$
$$s = vt - \frac{1}{2}at^2$$
$$s = \frac{u+v}{2}t$$
$$v^2 = u^2 + 2as$$

Kinematics

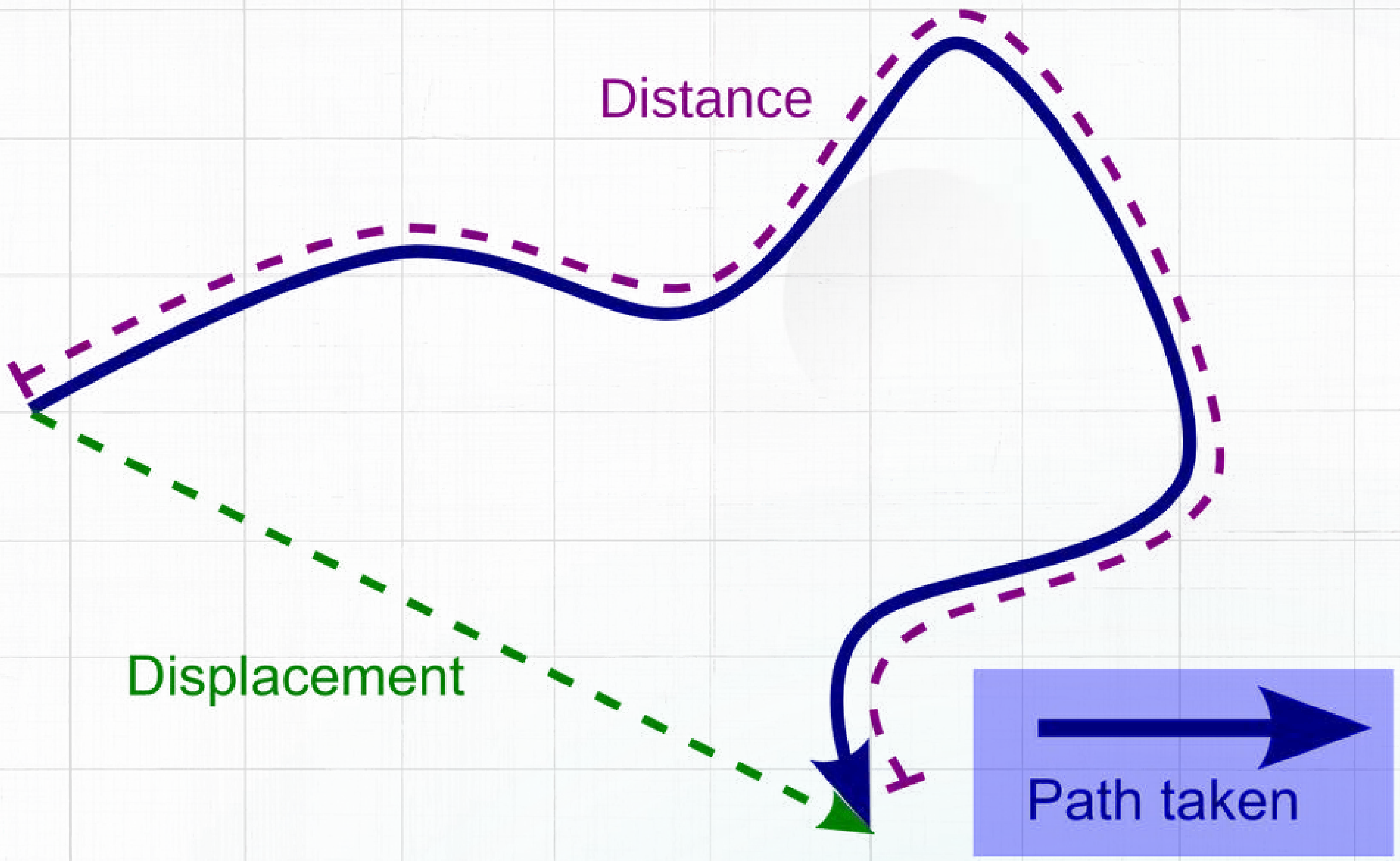
Position

A vector that specified an **object's location relative to a reference point**

Displacement

Change of position of an object,

$$\Delta x = x - x_0$$



Kinematics

Average Velocity

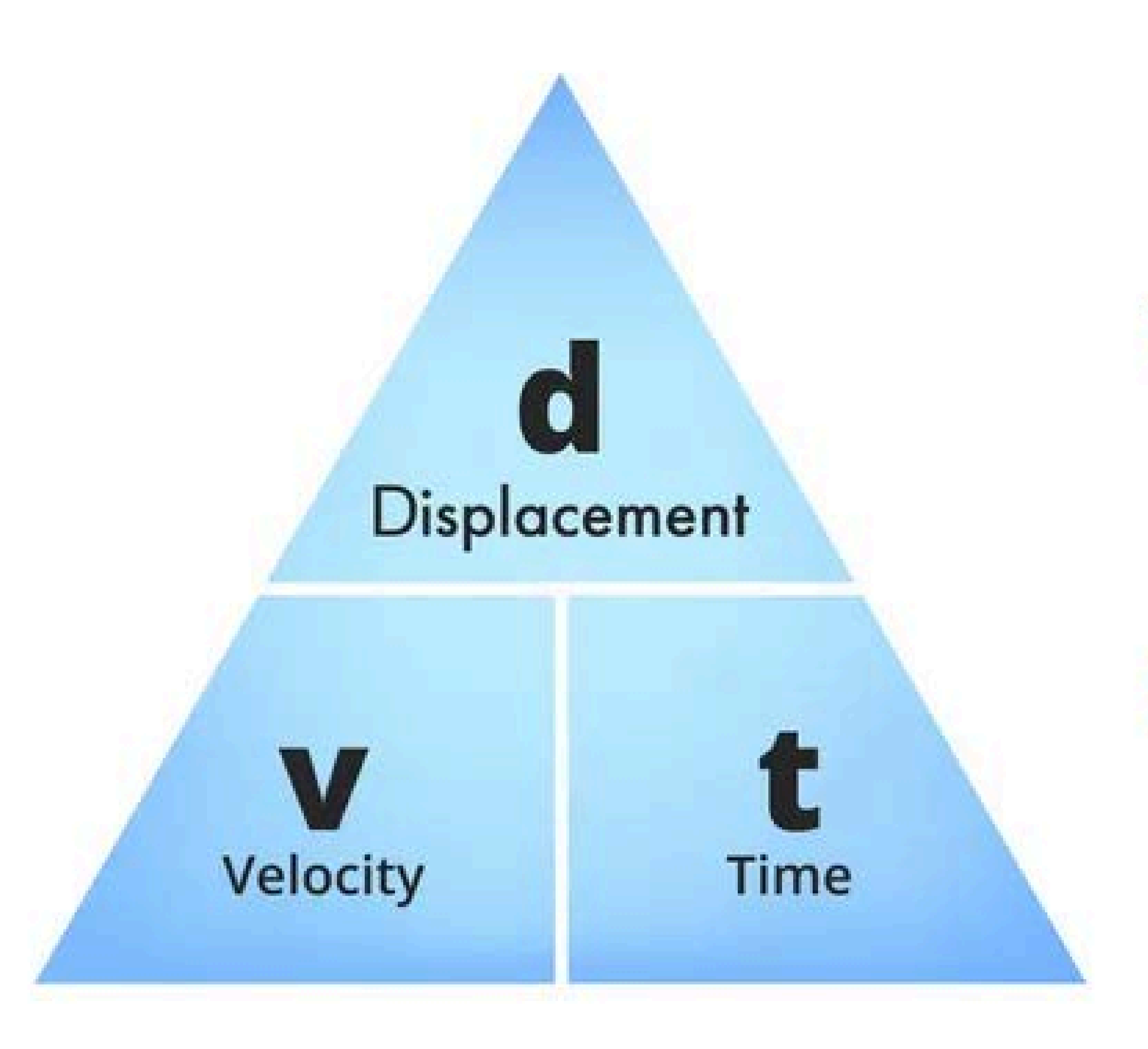
Change of position of an object or displacement over **time elapsed**

$$v = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1}$$

Average Acceleration

Rate at which the **velocity changes**

$$a = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1}$$



Kinematics

Kinematic Equations for Uniformly Accelerated Motion (UAM)

UAM equations are considered to be **equations of motions** derived from the definitions of **average velocity** and **average acceleration**.

(1) $$v = v_0 + at$$

(2) $$\Delta x = (\frac{v + v_0}{2})t$$

(3) $$\Delta x = v_0 t + \frac{1}{2}at^2$$

(4) $$v^2 = {v_0}^2 + 2a\Delta x$$

Preliminary Topics

QUESTION 3

A motorcyclist heading **East** through a small town **accelerates at a constant 4.0 m/s²** after he leaves the city limits. At time **t = 0,** he is **5.0 m East** of the city-limits signpost while he moves **east at 15 m/s**. Find his **position** from city-limits signpost and **velocity** at **t = 2.0s**.

a. 43 m, 21.5 m/s

b. 35 m, 23 m/s

c. 35 m, 21.5 m/s

d. 43 m, 23 m/s

Preliminary Topics

QUESTION 3

$$\Delta x = v_0 t + \frac{1}{2} a t^2$$

$$\Delta x = 15\frac{m}{s}(2s) + \frac{1}{2}\left(4\frac{m}{s^2}\right)\left(2s^2\right)^2$$

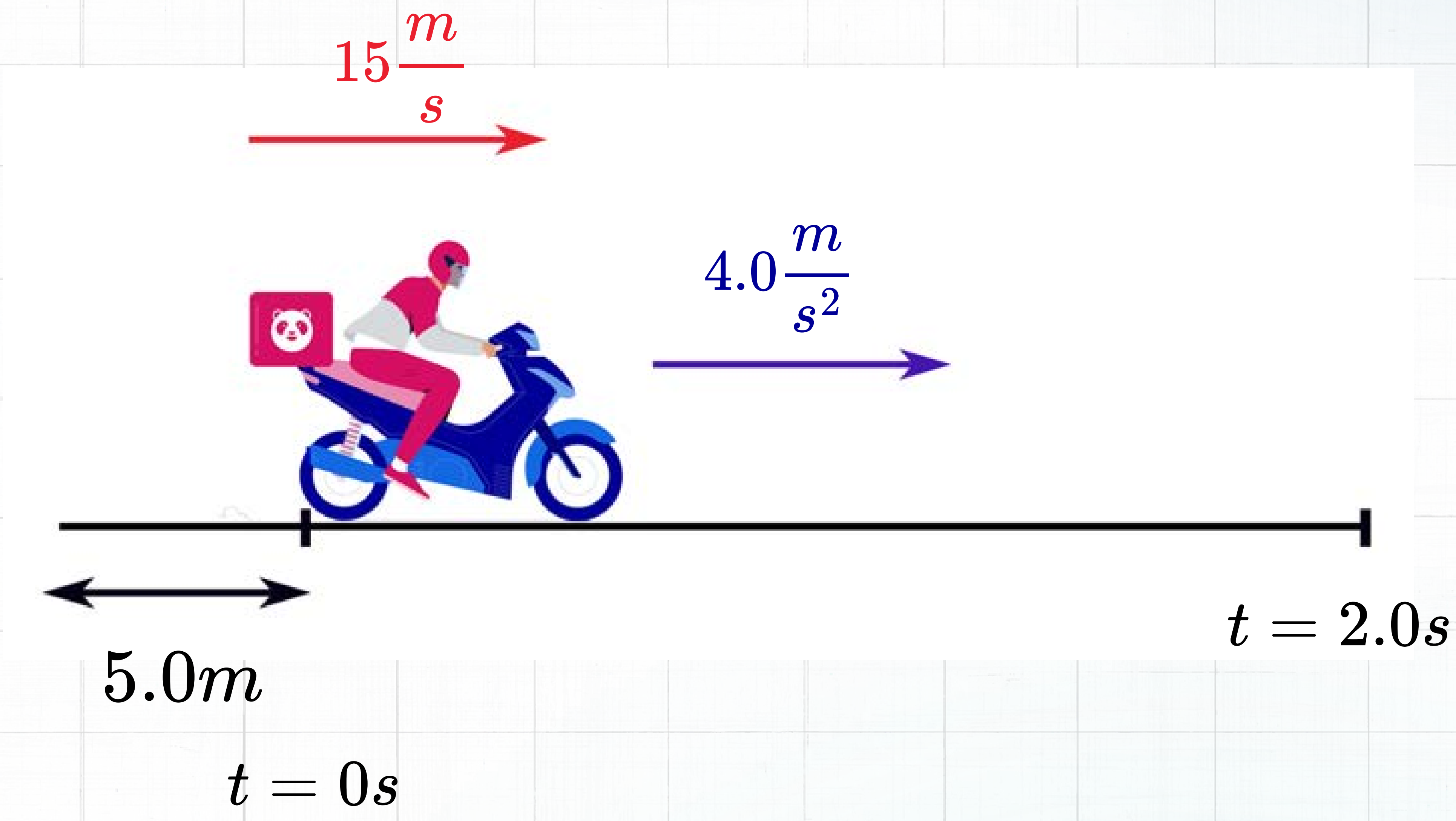
$$\Delta x = 38m$$

$$x = 5m + 38m = 43m$$

$$v^2 = {v_0}^2 + 2a\Delta x$$

$$v = \sqrt{v_0^2 + 2\left(4\frac{m}{s^2}\right)(38m)}$$

$$v = 23\frac{m}{s}$$



d. 43 m, 23 m/s

Kinematics

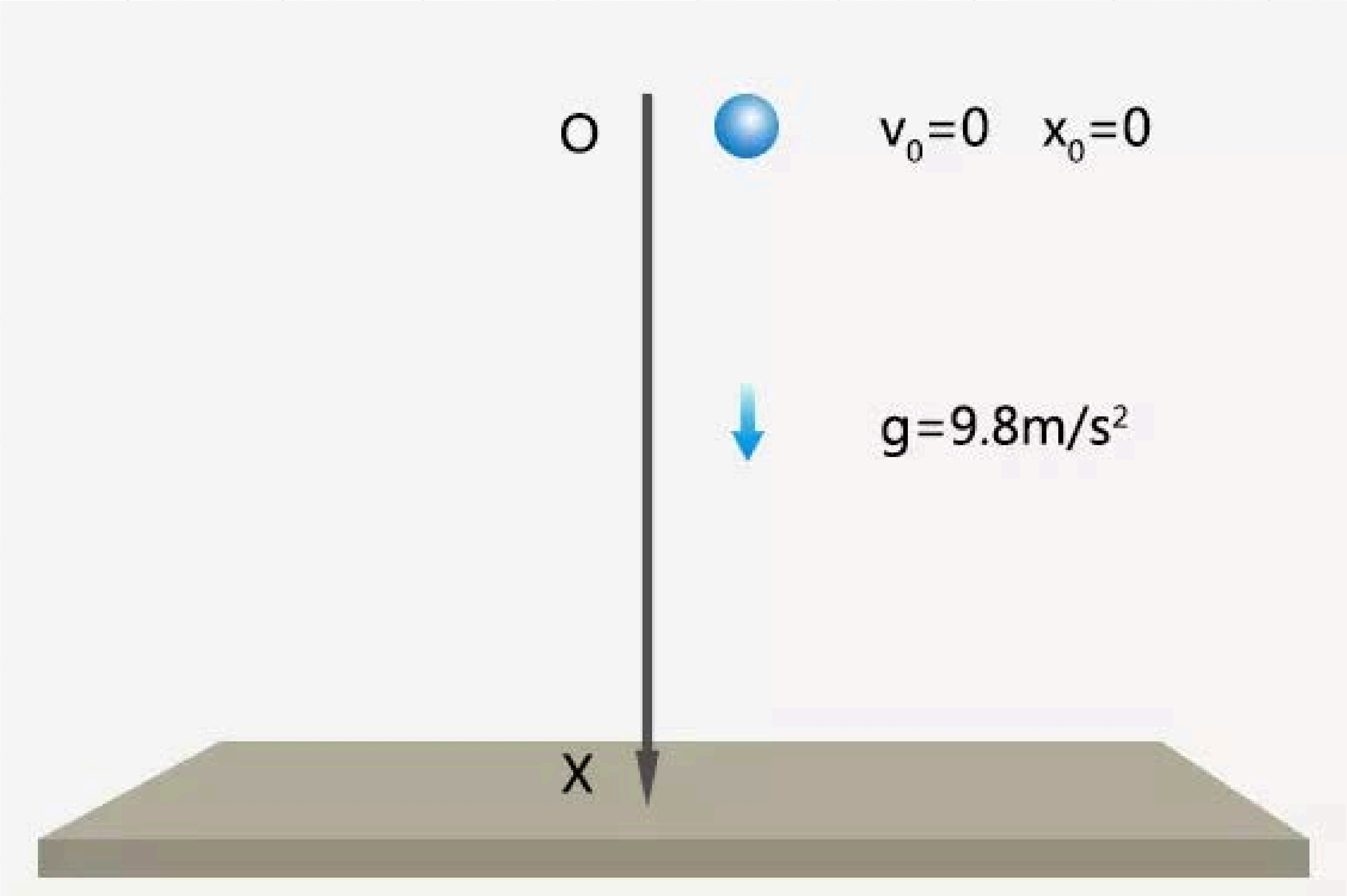
UAM equations in y-direction

(1) $$v_y = v_{0y} - gt$$

(2) $$\Delta y = (\frac{v_y + v_{0y}}{2})t$$

(3) $$\Delta y = v_{0y}t - \frac{1}{2}gt^2$$

(4) $$v_y{}^2 = v_{0y}{}^2 - 2g\Delta y$$



Kinematics

QUESTION 4

A coin is dropped from the tower and **falls freely from rest**. What are its **position** and **velocity** after **3.0s**?

a. 44.145 m, 29.43 m/s

b. 40.215 m, 29.43 m/s

c. 44.145 m, 28.43 m/s

d. 40.215 m, 28.43 m/s

Kinematics

QUESTION 4

Key Words: falls freely from rest $v_0 = 0$

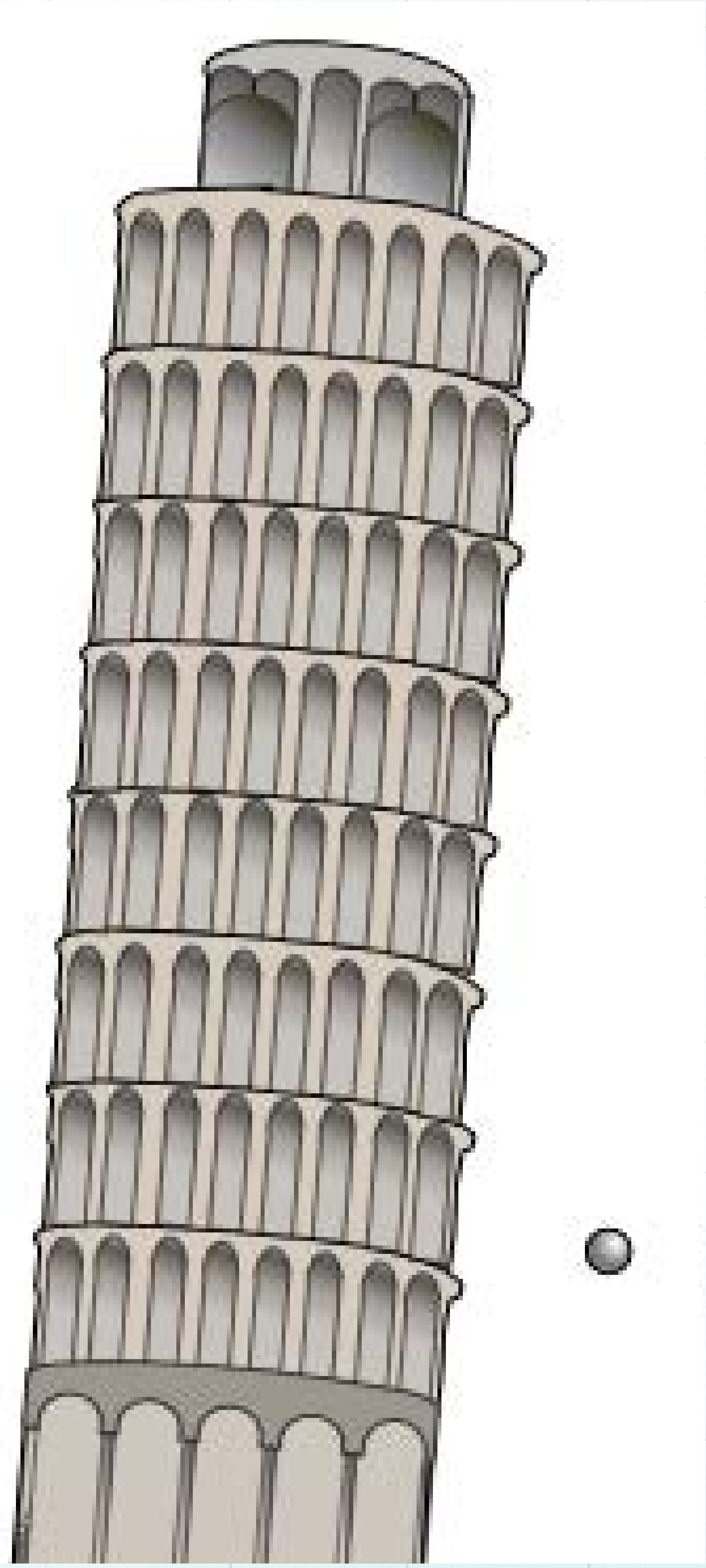
$$\Delta y = v_{0y}t - \frac{1}{2}gt^2 = 0\,(2s) - \frac{1}{2}\left(-9.81\frac{m}{s^2}\right)(3s)^2$$

$$\Delta y = 44.145m$$

$$v_y = v_{0y} - gt = 0 - \left(-9.81\frac{m}{s^2}\right)(3s)$$

$$v_y = 29.43\frac{m}{s}$$

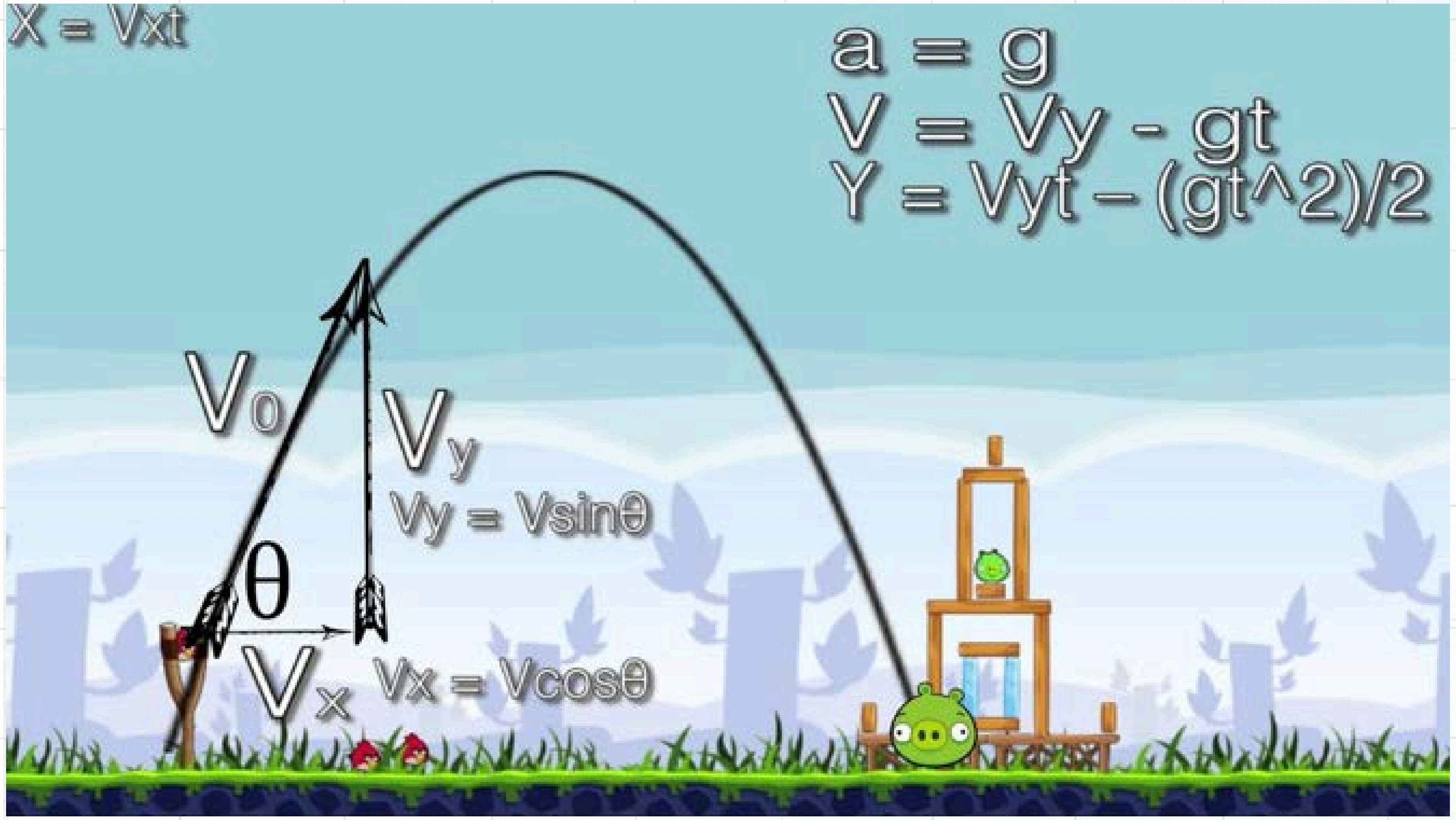
a. 44.145 m, 29.43 m/s



Kinematics

Projectile Motion

Type of motion where an **object is thrown**, or **projected** into the air, and the **only acting force** on the object is **gravity**.



Considered as **two-dimensional motion**.

NOTE:

- **Horizontal** velocity is **constant**
- **Vertical** velocity **changes** because of the acceleration due to gravity.

Kinematics

Projectile Motion

Maximum height of projectile,

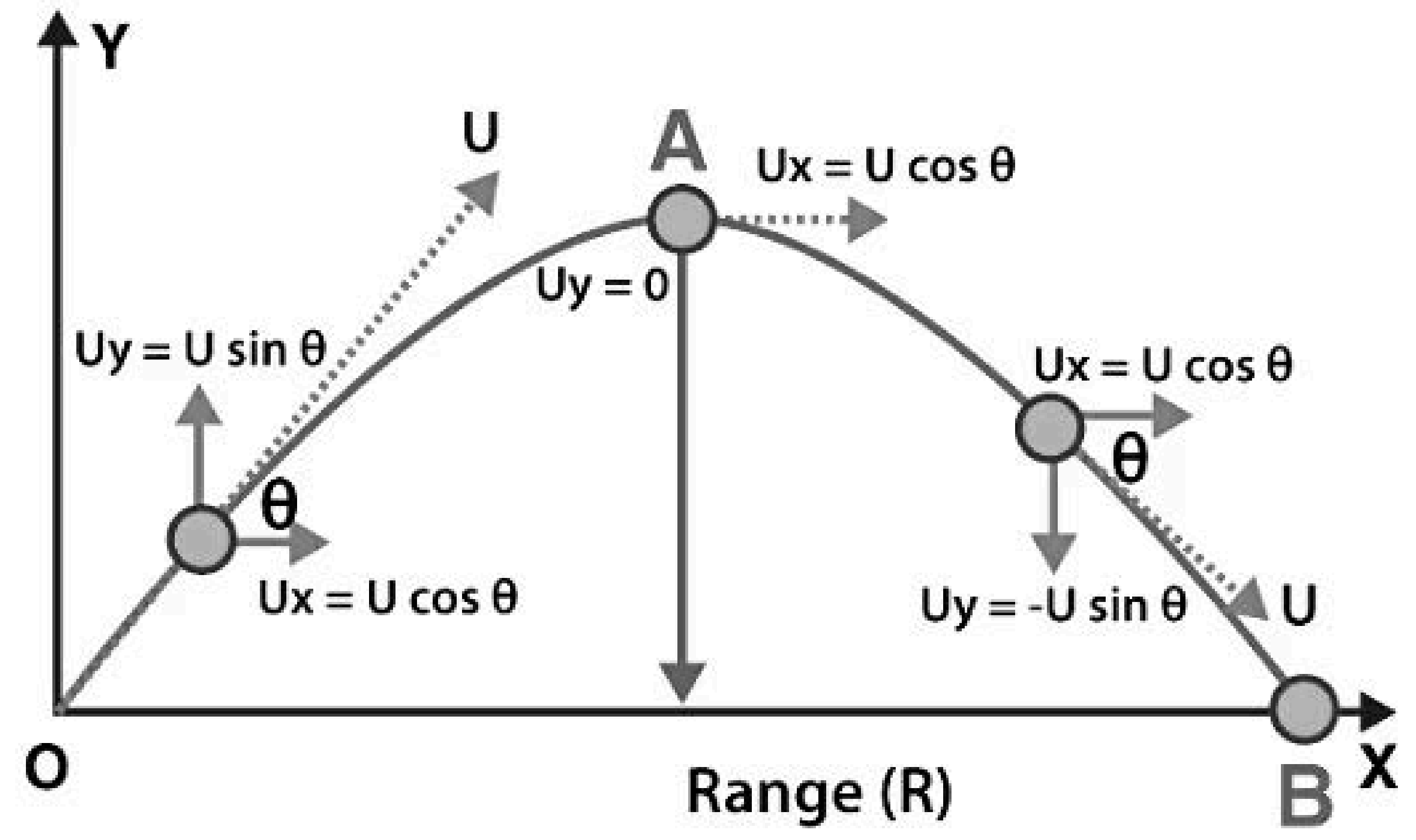
$$h = \frac{v_{0y}^2}{2g} = \frac{(v_0 \sin\theta)^2}{2g}$$

Time of flight,

$$t = \frac{2v_0 \sin\theta}{g}$$

Range,

$$R = \frac{v_0^2 \sin 2\theta}{g}$$



Kinematics

Uniform Circular Motion

Type of motion which an **object** travels **a circular path** at **constant speed.**

A **centripetal force must exists** to maintain this motion.

Ex: rotating disk, centrifuge

Kinematics

Uniform Circular Motion

Average Speed

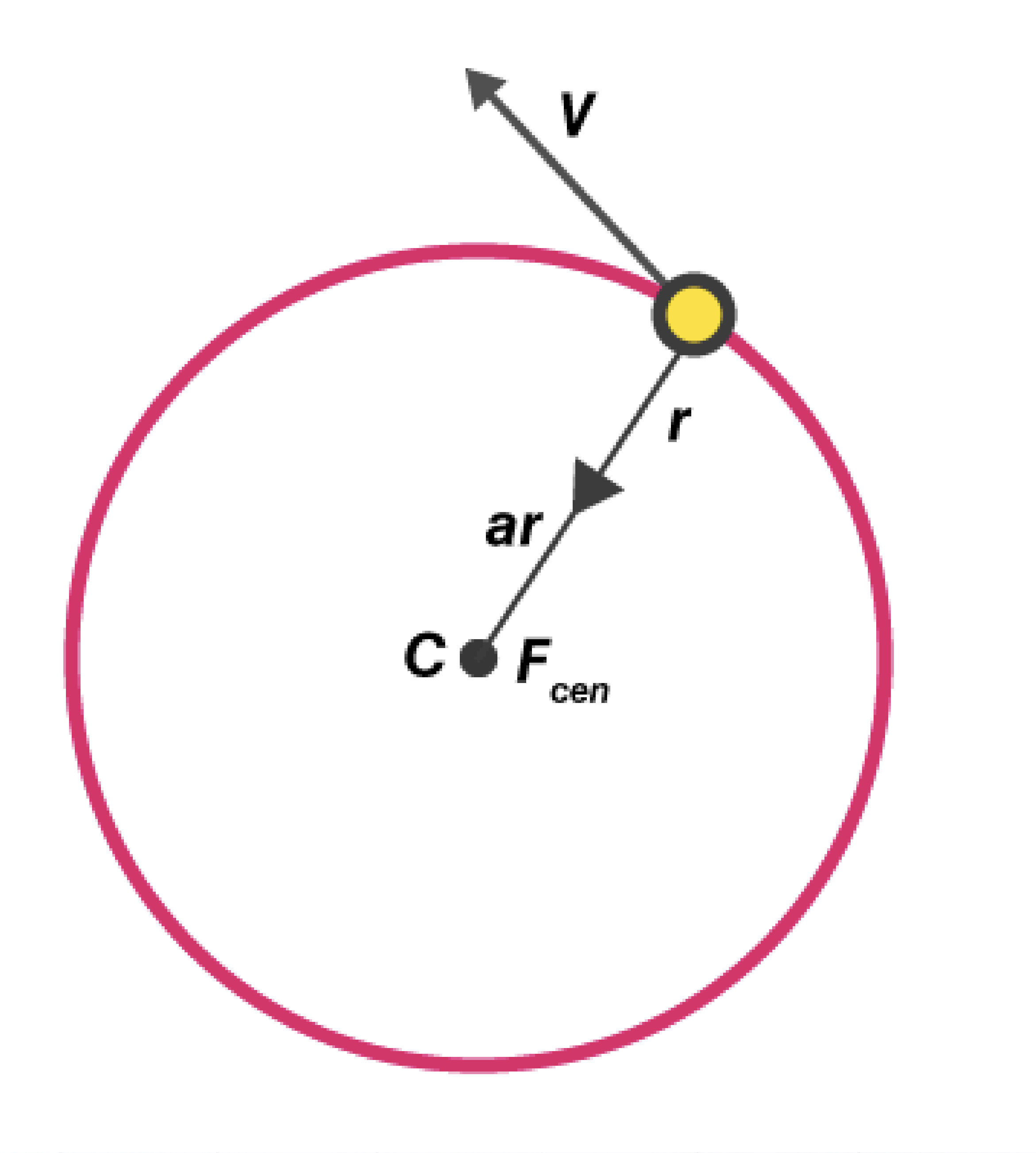
$$v = \frac{2\pi r}{T}$$

Centripetal Acceleration
directed radially inwards

$$a_c = \frac{v^2}{r}$$

Centripetal Force

$$F_c = ma_c = \frac{mv^2}{r}$$



Kinematics

QUESTION 5

Passengers on a carnival ride move at **constant speed** in a **horizontal circle** of **radius 5.0 m**, making a complete circle in **4.0 s**. What is their **acceleration**?

a. 12.54 m/s^2

b. 10.54 m/s^2

c. 12.32 m/s^2

d. 10.32 m/s^2

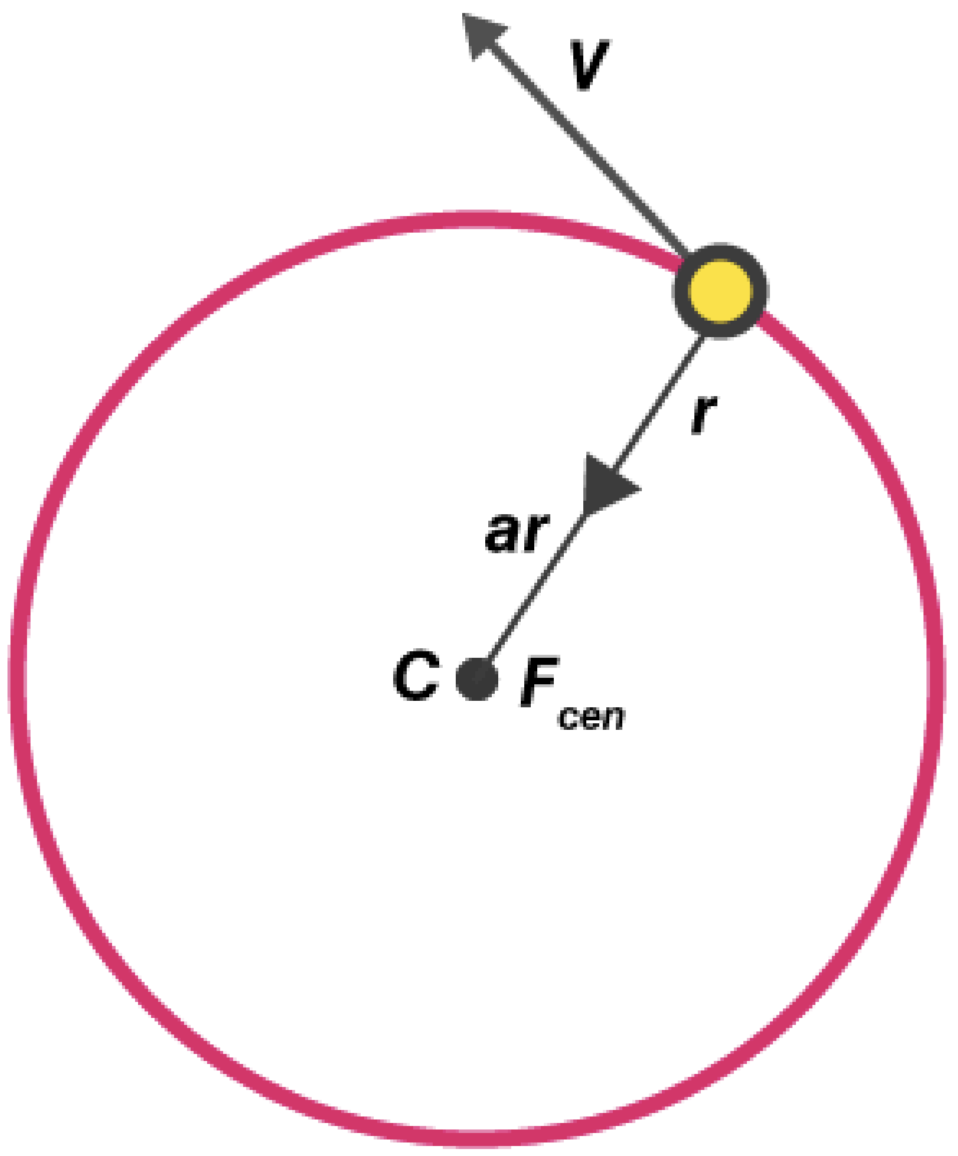
Kinematics

QUESTION 5

$$v = \frac{2\pi r}{T} = \frac{2\pi\left(5m\right)}{\left(4s\right)} = 7.85\frac{m}{s}$$

$$a = \frac{v^2}{r} = \frac{\left(7.85\frac{m}{s}\right)^2}{5m} = 12.32\frac{m}{s^2}$$

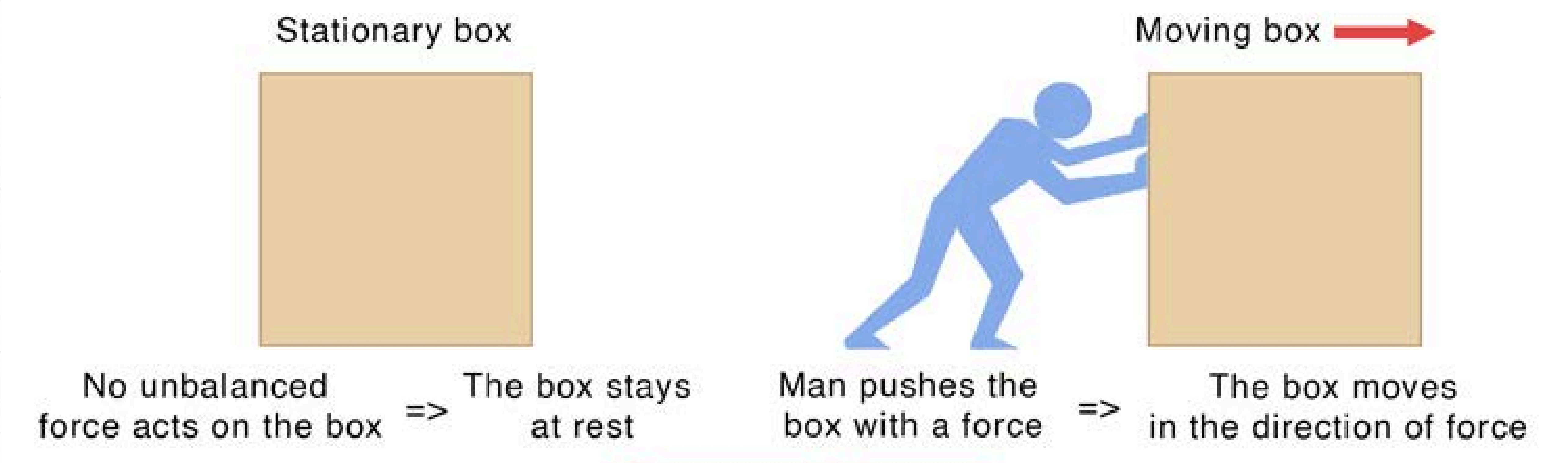
c. 12.32 m/s²



Newton’s Laws of Motion

1st Law (Law of Inertia)

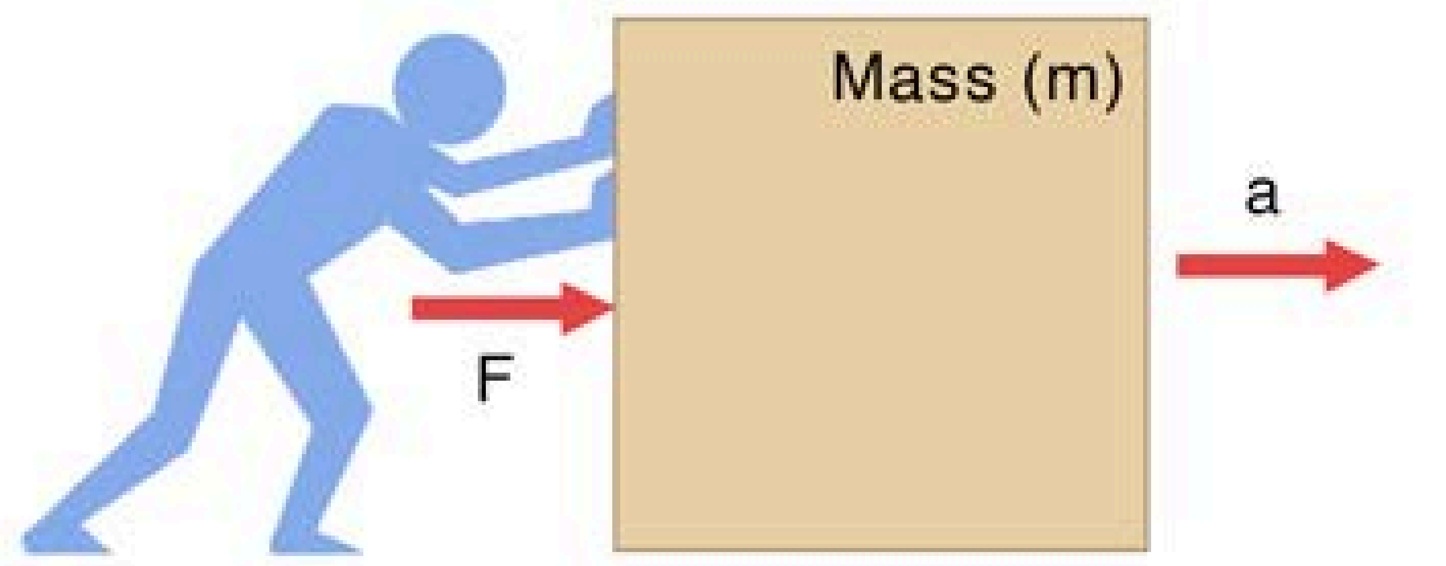
Objects **naturally** maintain their **current state** of **rest or motion**, **resisting any changes** unless acted upon by an **external force**.



Newton's Laws of Motion

2nd Law (Law of Acceleration)

The **acceleration** of an object is **directly proportional** to the **magnitude** of the **net force applied** in the **same direction** as the **force** and **inversely proportional** to the object's mass.



Force (F) = mass (m) x acceleration (a)

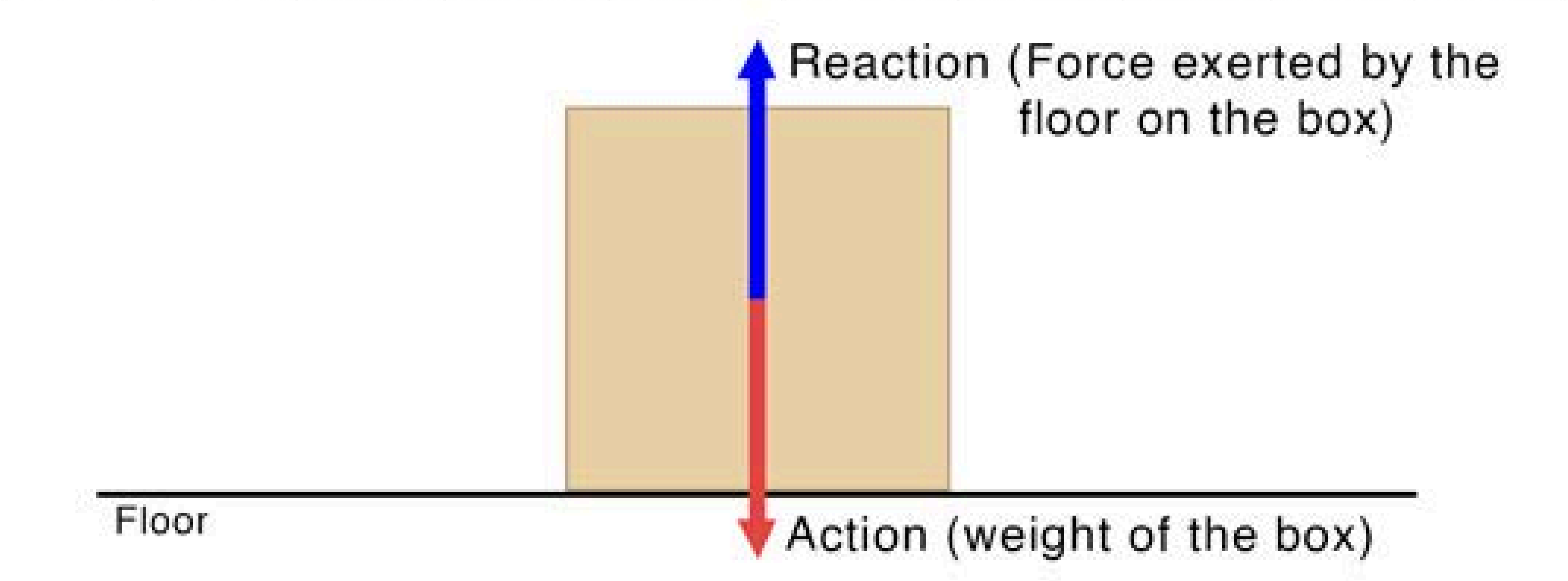
$$F = ma$$

$$a = \frac{F}{m}$$

Newton’s Laws of Motion

3rd Law (Law of Action-Reaction Pair)

If **two bodies** exert forces on each other, these forces have the **same magnitude** but **opposite directions**.



Newton’s Laws of Motion

Mass

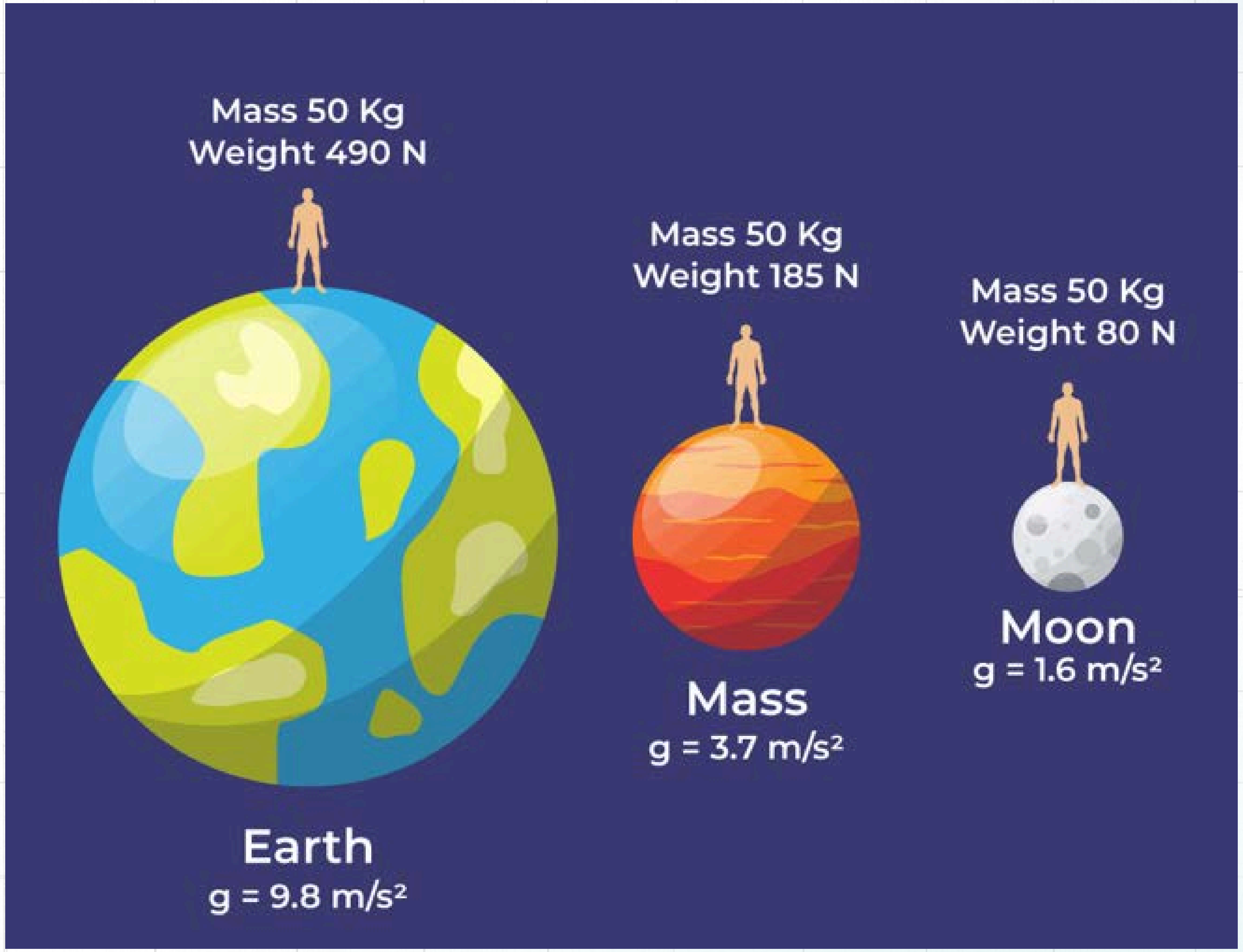
- measure of **inertia**
- **inherent** property of an object

VS

Weight

$$W = mg$$

- force due to **gravity**
- dependent on **acceleration due to gravity**

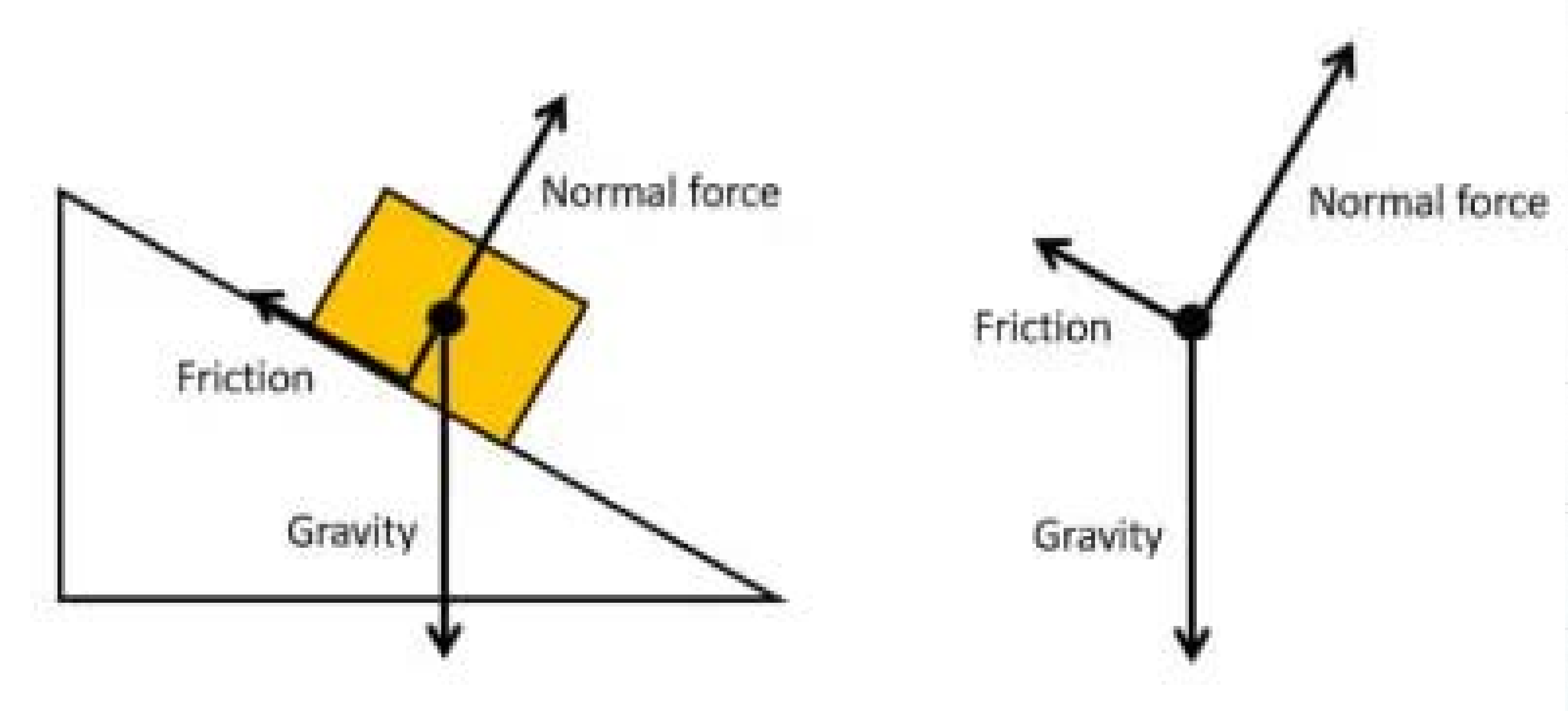


Newton’s Laws of Motion

Free-body Diagrams (FBD)

Graphical representation of forces on a body. A body considered as a **point particle** that is free from the environment.

Only the external forces acting on the body of interest are **considered**.



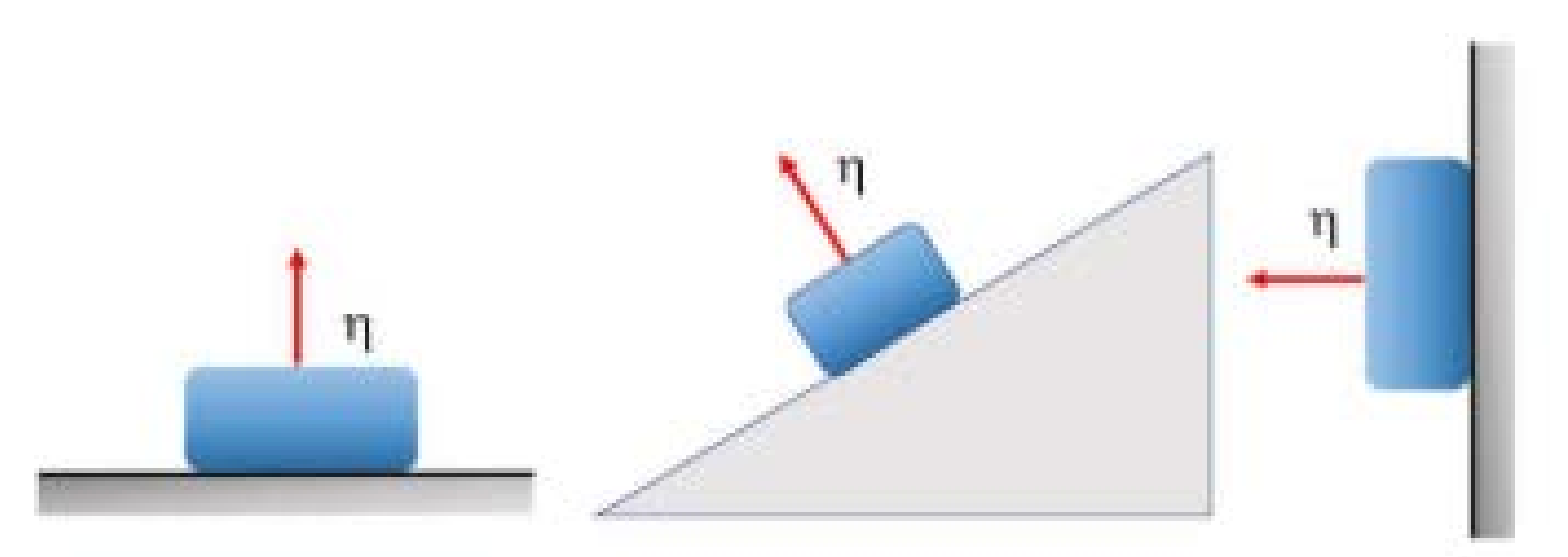
Unit: Newton (N), dyne (Dyn)

Newton's Laws of Motion

Types of Forces:

Normal Force (N)

Type of **contact force** that acts as a **"support force"** exerted on an object in contact with another object. Always **perpendicular** to the **surface** of the object.



Newton's Laws of Motion

Types of Forces:

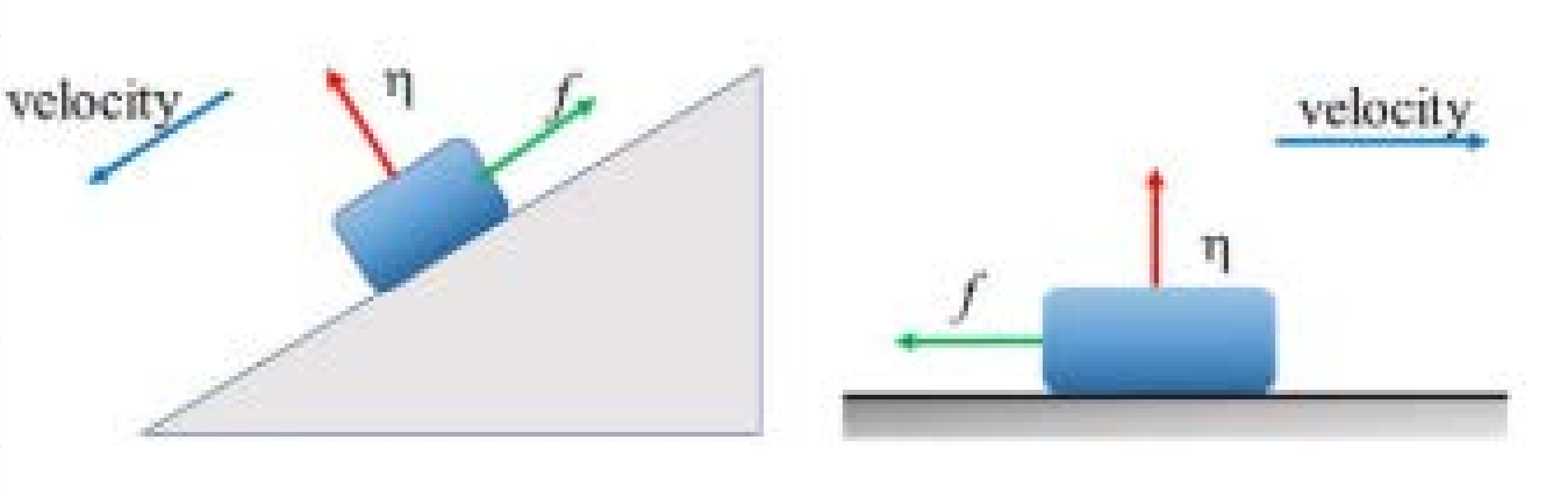
Fritcional Force (f)

A **motion retarder** or **stopper**, always **directed against** the direction of motion. Also **dependent** on the type of **material**.

$$f = \mu N$$

$\mu =$ coefficient of friction

$N =$ normal force



Newton's Laws of Motion

Types of Forces:

Fritcional Force (f)

2 Types of Frictional Force:

1. Static Friction (fs)

acts to **keep** the object from moving

$$f_s = \mu_s N$$

2. Kinetic Friction (fk)

acts when the object is in **motion**

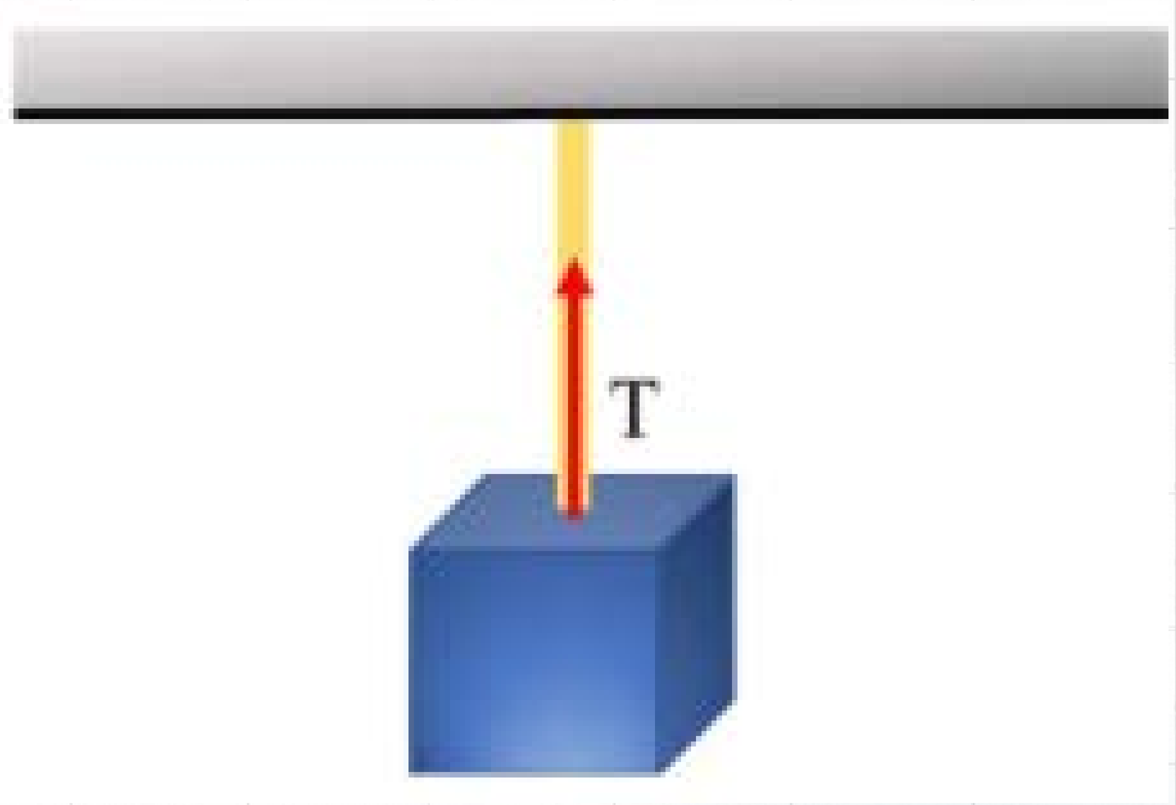
$$f_k = \mu_k N$$

Newton's Laws of Motion

Types of Forces:

Tension

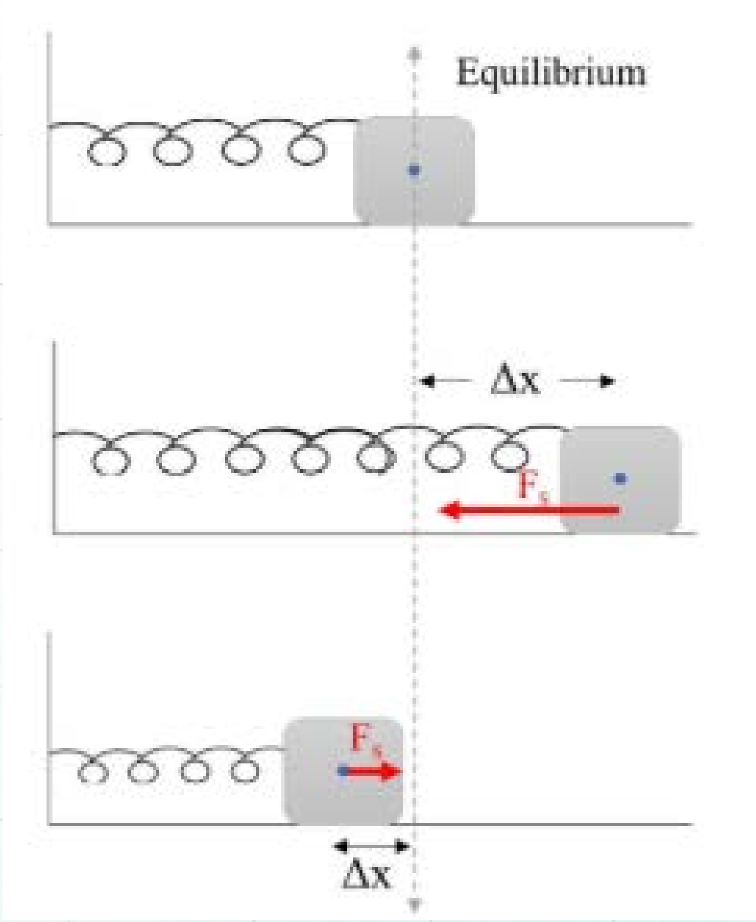
A **pulling force** exerted on an object by a rope, cord, etc.



Hookean Spring Force

Restoring force when a spring is either **compressed** or **extended**.

$$F_s = -k\Delta x$$



Newton’s Laws of Motion

QUESTION 6

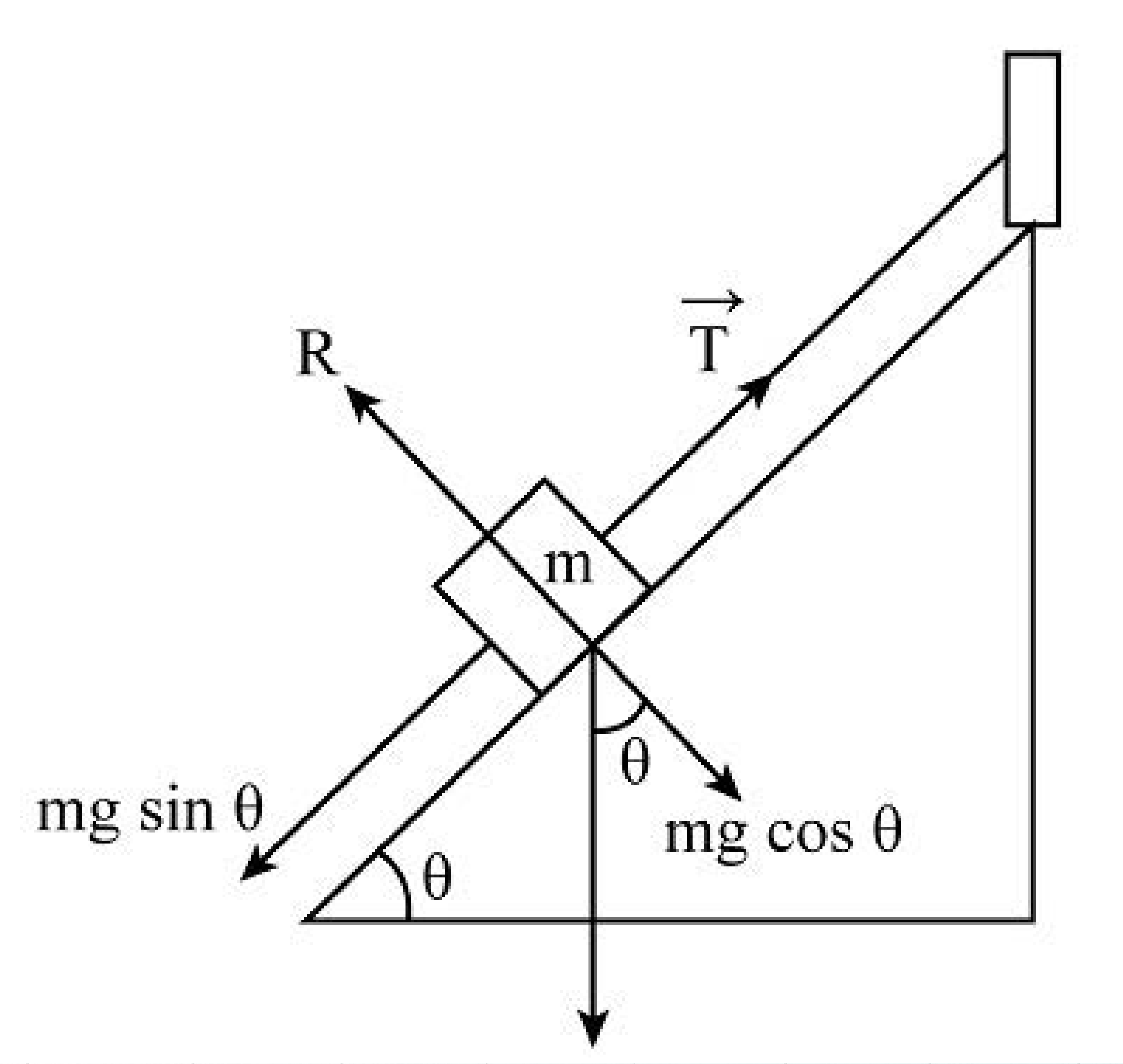
If the mass is 5 kg and $\theta = 50°$, what is the tension T? **Assume no frictional forces.**

a. 56.1 N

b. 64.7 N

c. 41.8 N

d. 38.3 N

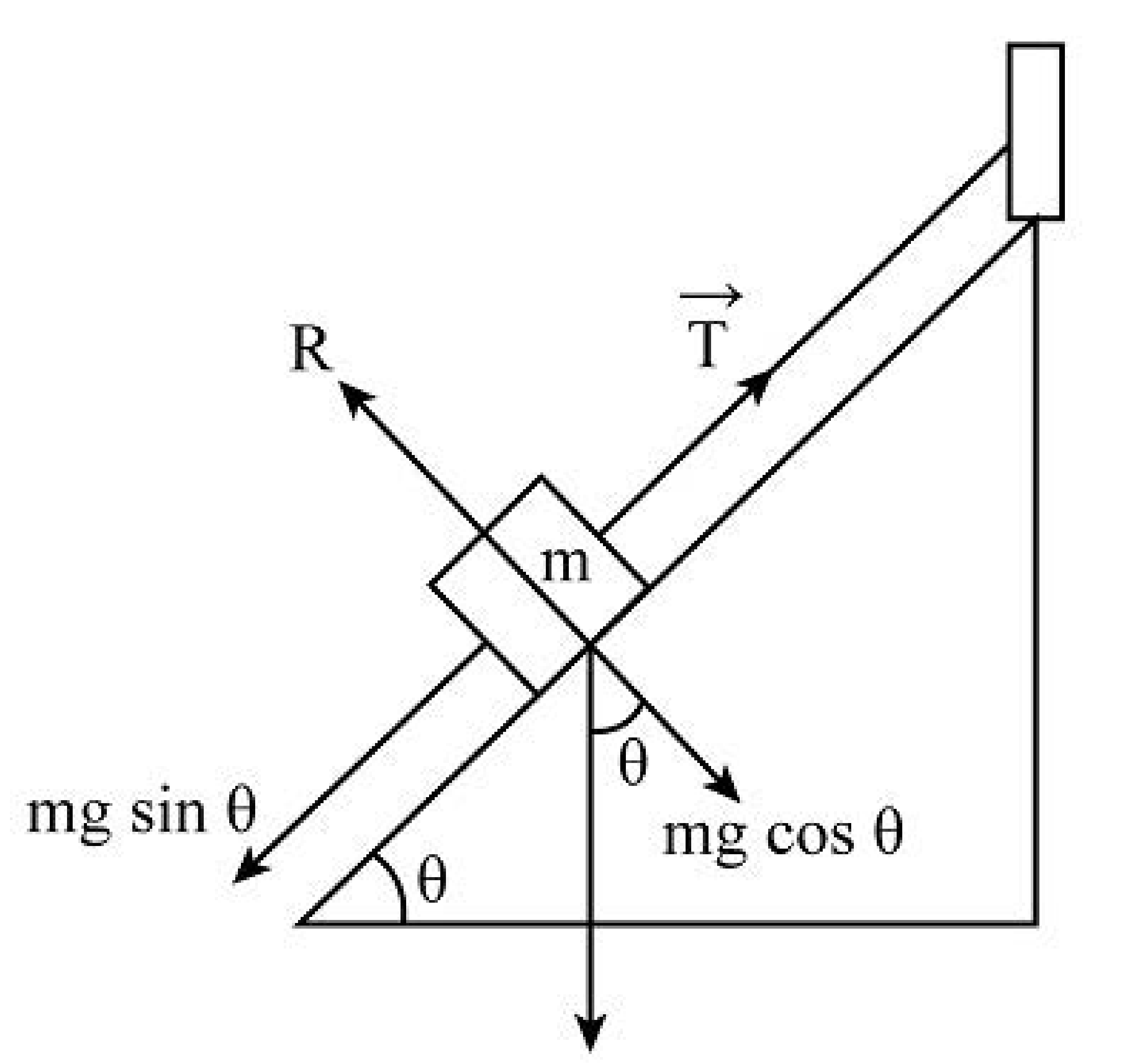


Newton's Laws of Motion

QUESTION 6

No friction so the forces acting on the mass are **weight** and **tension**. Since the block is not in motion, the forces are **equal** to each other.

$$\Sigma F_y = 0$$
$$T - W = 0$$
$$T = W$$



Newton's Laws of Motion

QUESTION 6

From the figure,

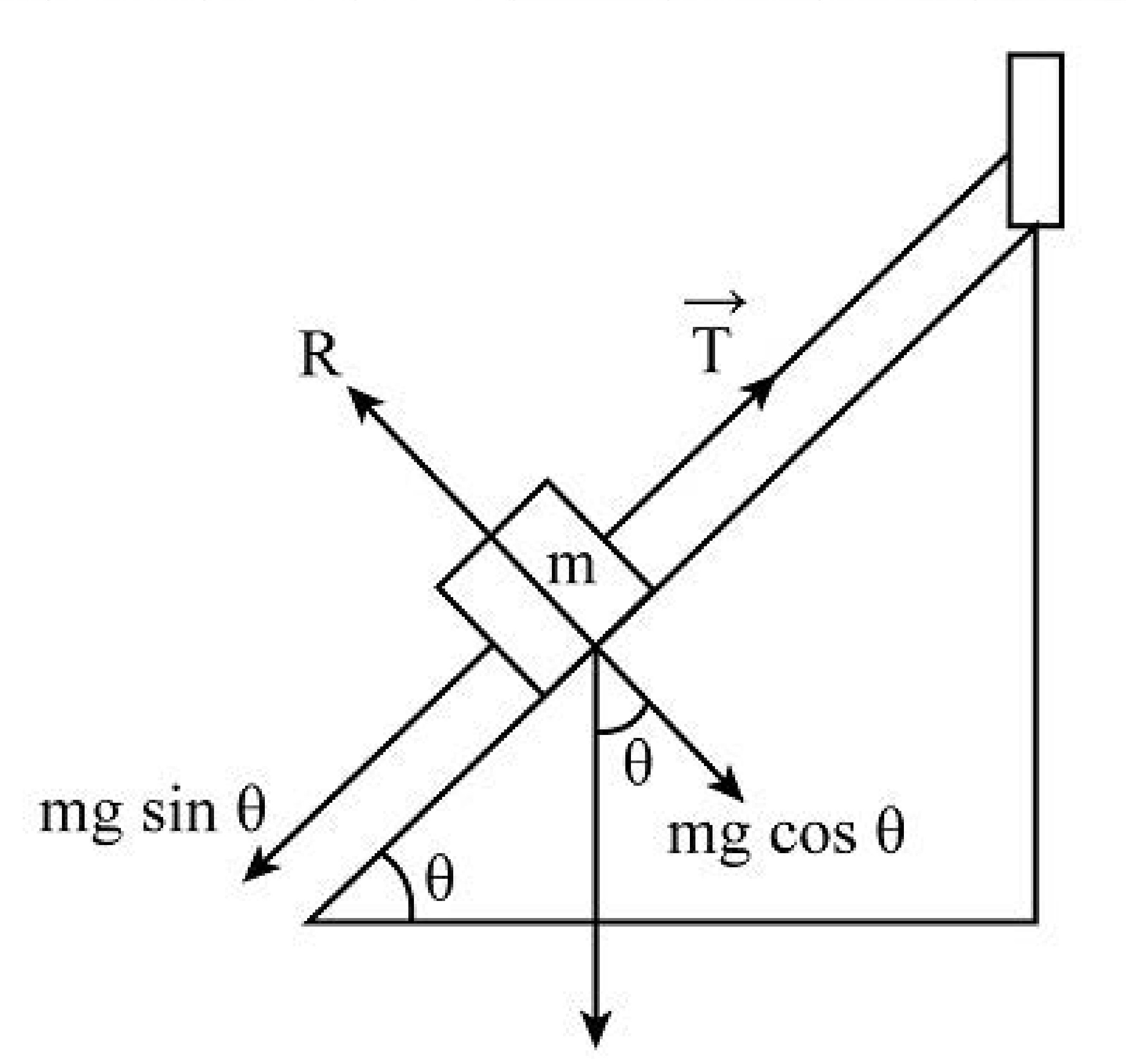
$$W = mg\sin\theta$$

$$T = mg\sin\theta$$

$$T = (5kg)\left(10\frac{m}{s^2}\right)\sin(50)$$

$$T = 38.3N$$

d. 38.3 N



Work, Energy and Power

Work (W)

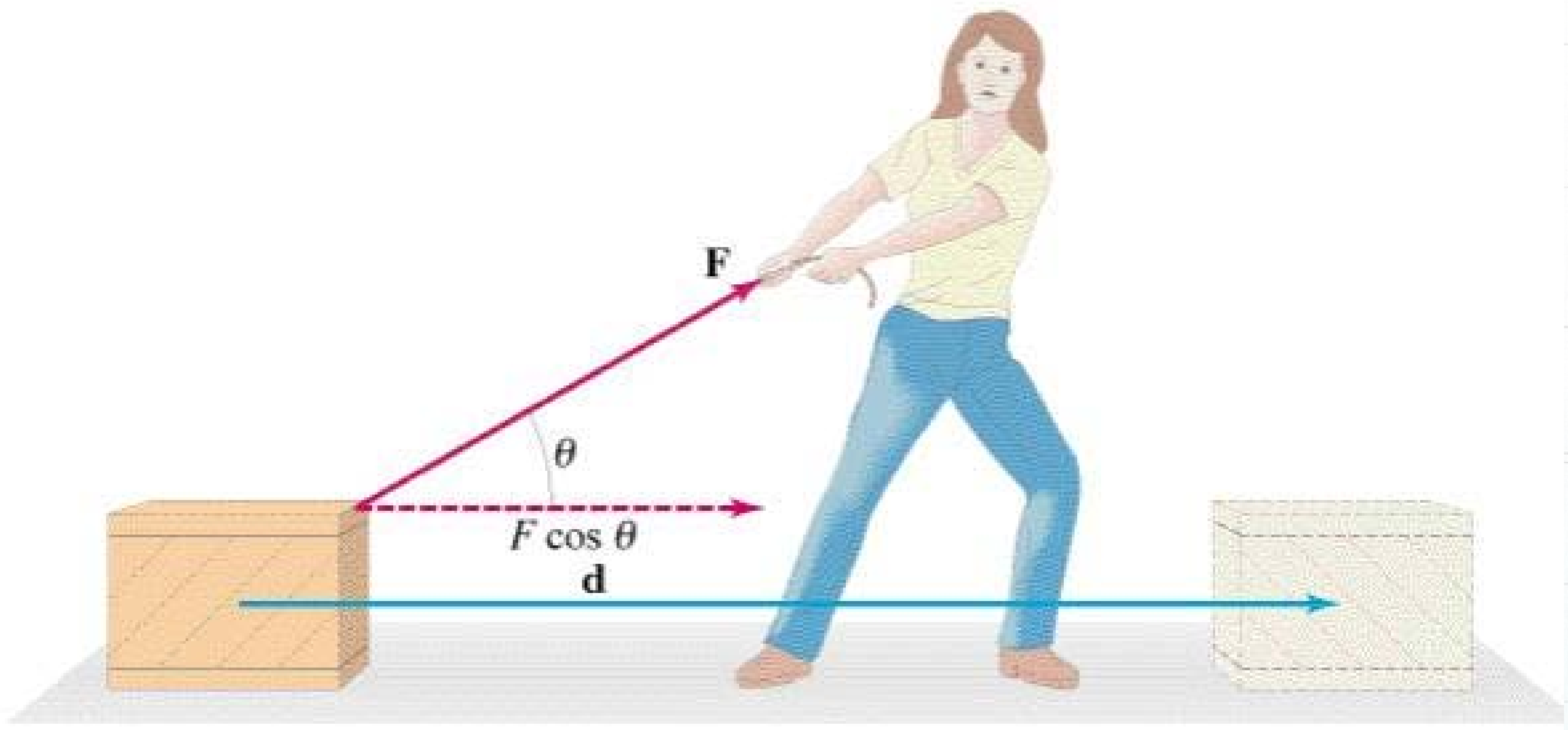
A **scalar quantity**, is the **dot product** of force and displacement.

$$W = \overrightarrow{F} \cdot \overrightarrow{d} = Fd\cos\theta$$

where: $F =$ force

$d =$ displacement

$\theta =$ angle between force and displacement

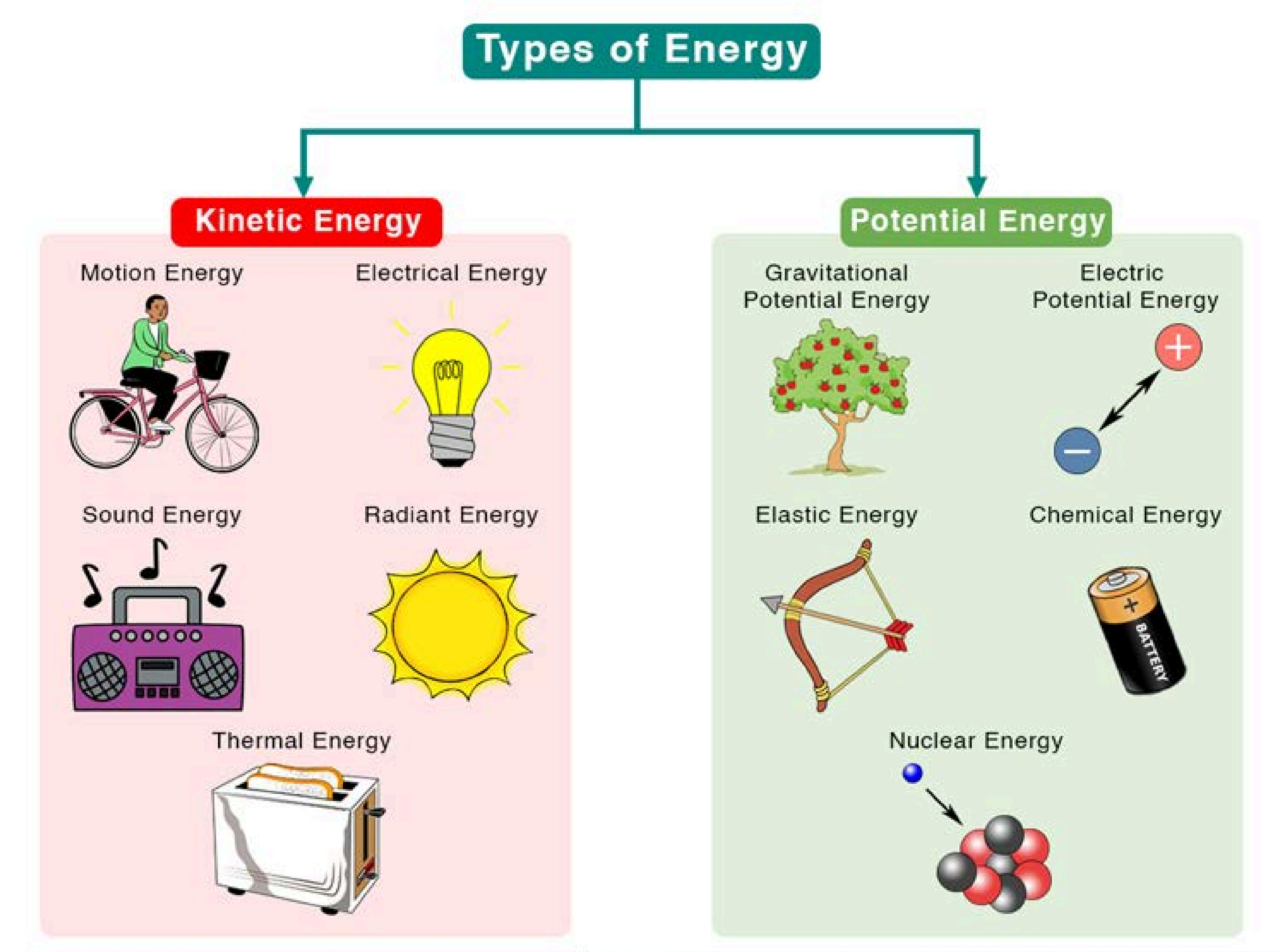


Work, Energy and Power

Energy

Ability to **do work** or to **exert a force** causing **displacement** of an object

Unit: Joule (J), kilowatt-hour, calorie (cal), electronvolt (eV)



Work, Energy and Power

Kinetic Energy (K)

The **kinetic energy (K)** of a particle is a **scalar quantity**. It depends on the **particle's mass** and **speed**, not its direction of motion.

$$K = \frac{1}{2}mv^2$$

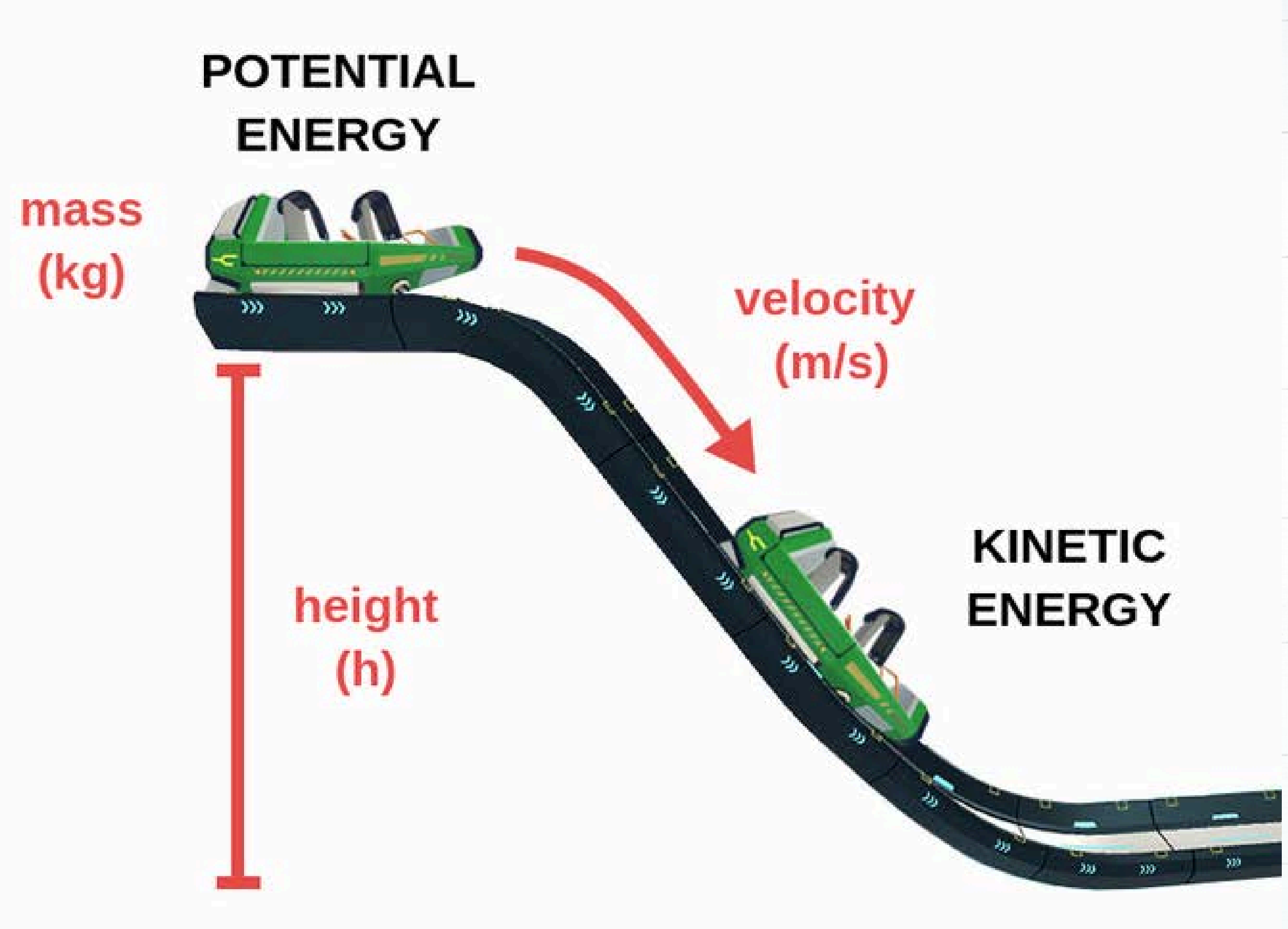
where: $m =$ mass of the particle

$v =$ velocity of the particle

Work, Energy and Power

Potential Energy (U)

The **potential energy (U)** is associated with the **position** of the object within some system. It is a **shared property of the system**, not the object. A **system** is a **collection of objects** interacting via **forces** or **processes** that are internal to the system.



Work, Energy and Power

Gravitational Potential Energy

Gravitational potential energy is the energy associated with a **body's weight** and its **height from the ground**. The objects interact with the earth through the **gravitational force**. The potential energy is for the **earth-object system**.

$$U_{grav} = mgh$$

where: $m =$ mass of the object

$g = 9.8\frac{m}{s^2} \approx 10\frac{m}{s^2}$

$h =$ height from the reference point

Work, Energy and Power

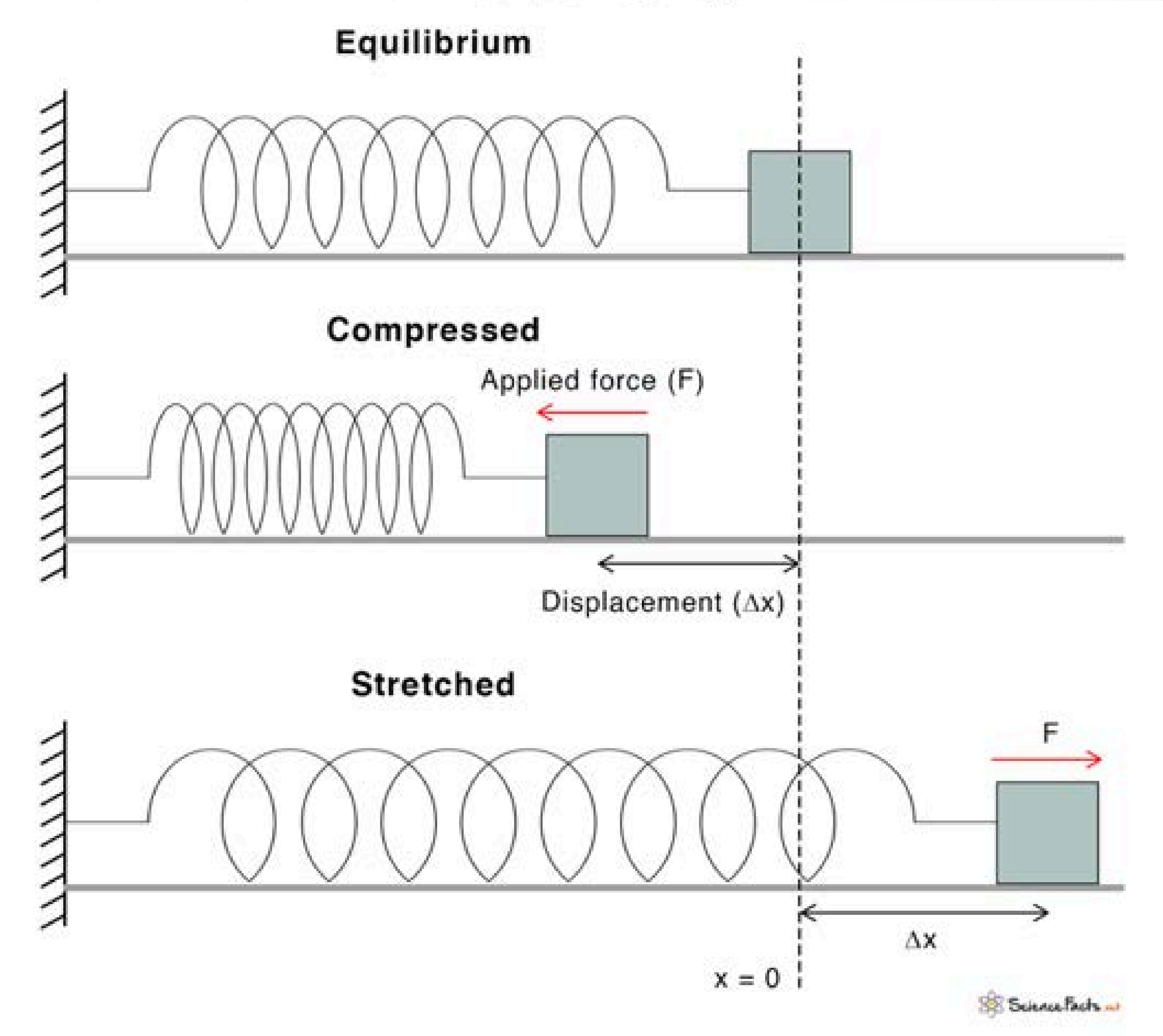
Elastic Potential Energy

The **elastic potential energy** of the system can be thought of as the **energy stored** in the **deformed spring** (one that is either **compressed or stretched** from its equilibrium position x=0).

$$U_{et} = \frac{1}{2}kx^2$$

where: $k =$ spring constant

$x =$ displacement from equillibrium position



Work, Energy and Power

Conservation of Mechanical Energy

The **total mechanical energy (E)** of a system is composed of **kinetic energy (K)** and **potential energy (U)**. When **only conservative forces** do work on a system of **two or more particles**, the **total mechanical energy** of the system **does not change**.

$$E_1 = E_2$$

$$K_1 + U_1 = K_2 + U_2$$

$$\frac{1}{2}mv_1^2 + mgh_1 + \frac{1}{2}kx_1^2 = \frac{1}{2}mv_2^2 + mgh_2 + \frac{1}{2}kx_2^2$$

Work, Energy and Power

QUESTION 7

A ball drops from a height **h**. What more do we need to calculation **initial potential energy**?

a. Elasticity of the ball

b. Horizontal displacement

c. Final velocity

d. Mass

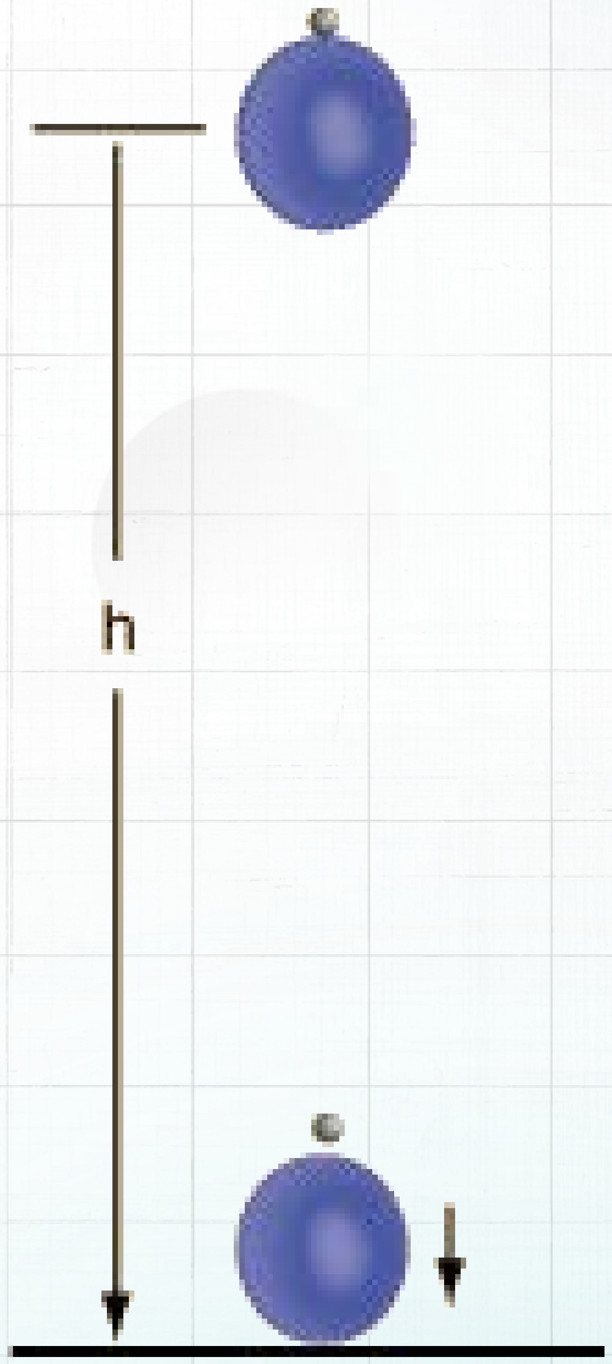
Work, Energy and Power

QUESTION 7

A ball drops from a height **h**. What more do we need to calculation **initial potential energy**?

$$U_{grav} = mgh$$

d. Mass



Work, Energy and Power

QUESTION 8

Which of the following is **not an example** of potential energy?

a. An incredibly compressed spring

b. An apple dangling from a branch

c. A candy bar

d. A running woman

Work, Energy and Power

QUESTION 8

Which of the following is **not an example** of potential energy?

a. An incredibly compressed spring

b. An apple dangling from a branch

c. A candy bar

d. A running woman

Work, Energy and Power

Power

Rate at which **energy** is **transferred**.

$$P = \frac{W}{t}$$

Unit: 1 Watt (W) = 1 J/s

1 horsepower (hp) = 746 W

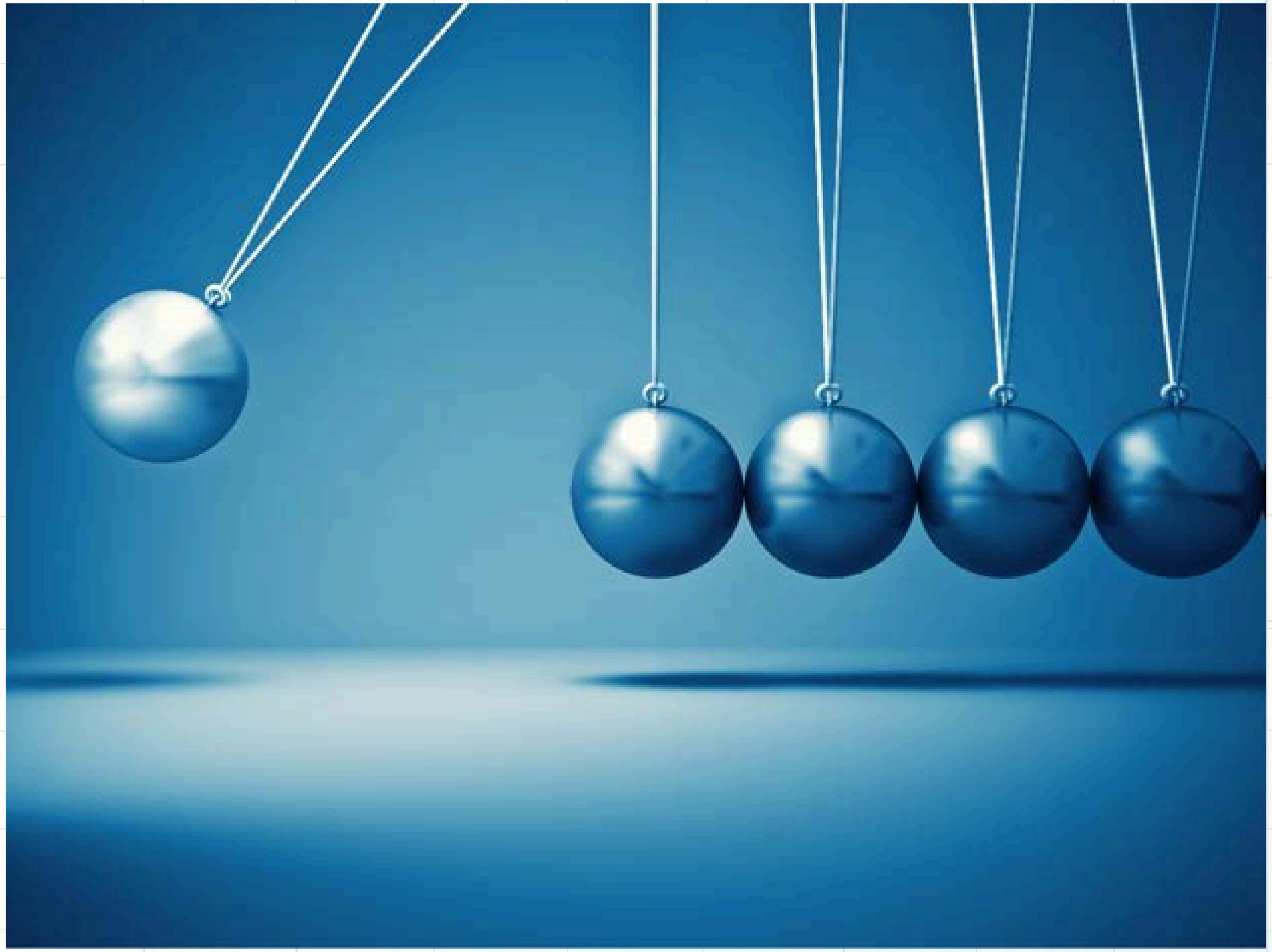
Momentum and Collisions

Momentum

The **effort** you need to **stop an object** from moving.

$$p = mv$$

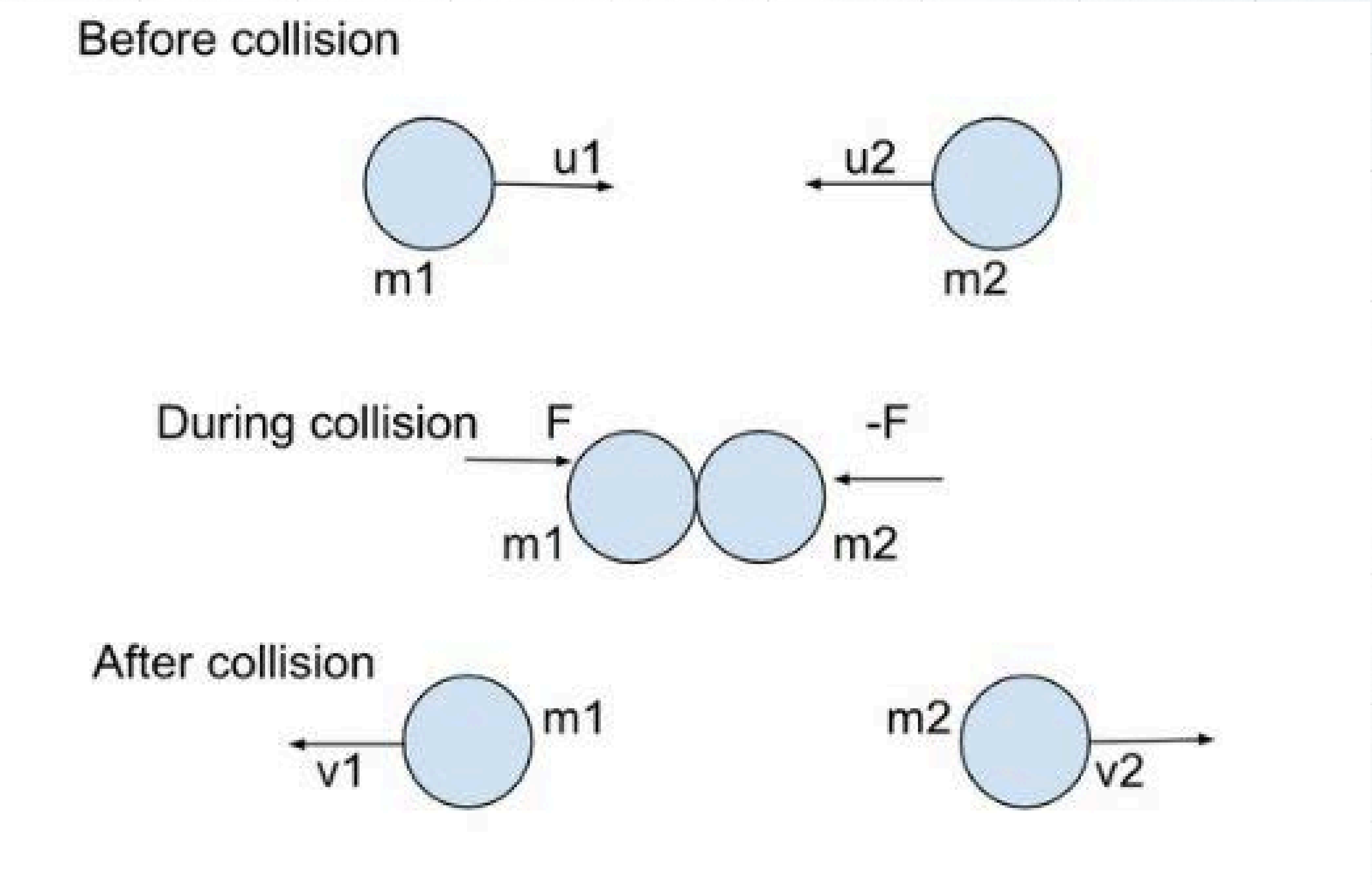
Unit: kg m/s or Ns



Momentum and Collisions

Collision

An event during which **two particles come close** to each other and interact by **means of forces,**



Conservation of Momentum

$$p_i = p_f$$

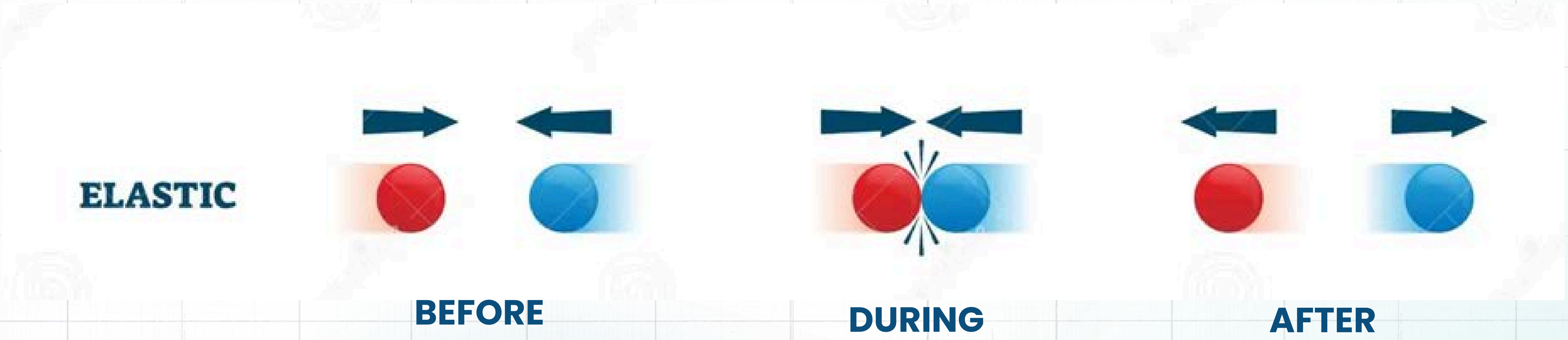
$$m_{1i}v_{1i} + m_{2i}v_{2i} = m_{1f}v_{1f} + m_{2f}v_{2f}$$

Momentum and Collisions

Elastic Collision

A collision in which there is **no net loss in kinetic energy** in the system as a result of the collision. Both **momentum** and **kinetic energy** are **conserved quantities** in elastic collisions

$$m_{1i}v_{1i} + m_{2i}v_{2i} = m_{1f}v_{1f} + m_{2f}v_{2f}$$

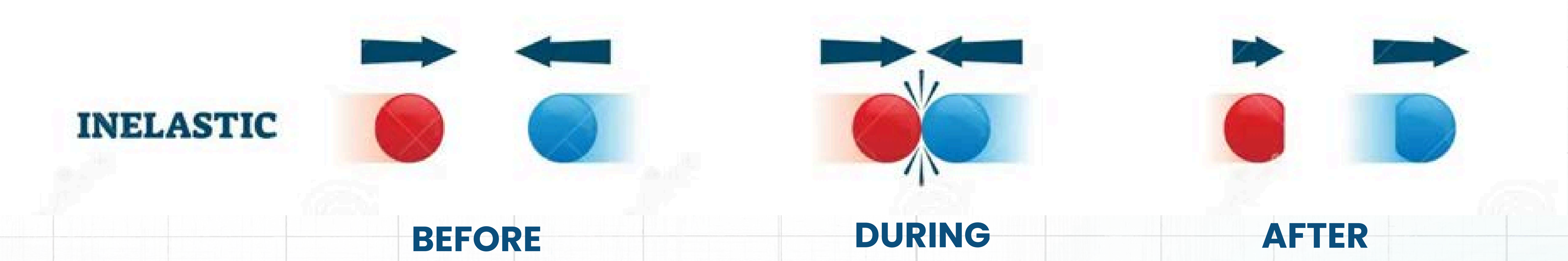


Momentum and Collisions

Inelastic Collision

Some amount of kinetic energy of a colliding object/system is **lost**.

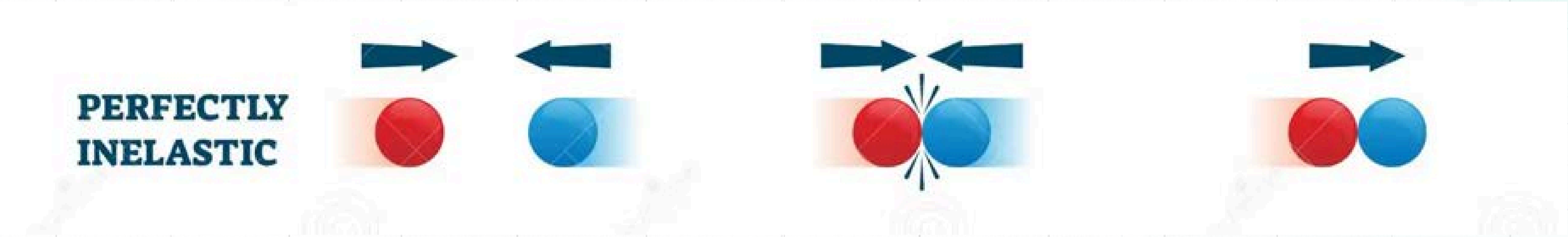
$$m_{1i}v_{1i} + m_{2i}v_{2i} = (m_1 + m_2)v_{2f}$$



Momentum and Collisions

Perfectly Inelastic Collision

One in which **objects stick together** after **impact**, and the **maximum** amount of **kinetic energy** is **lost**



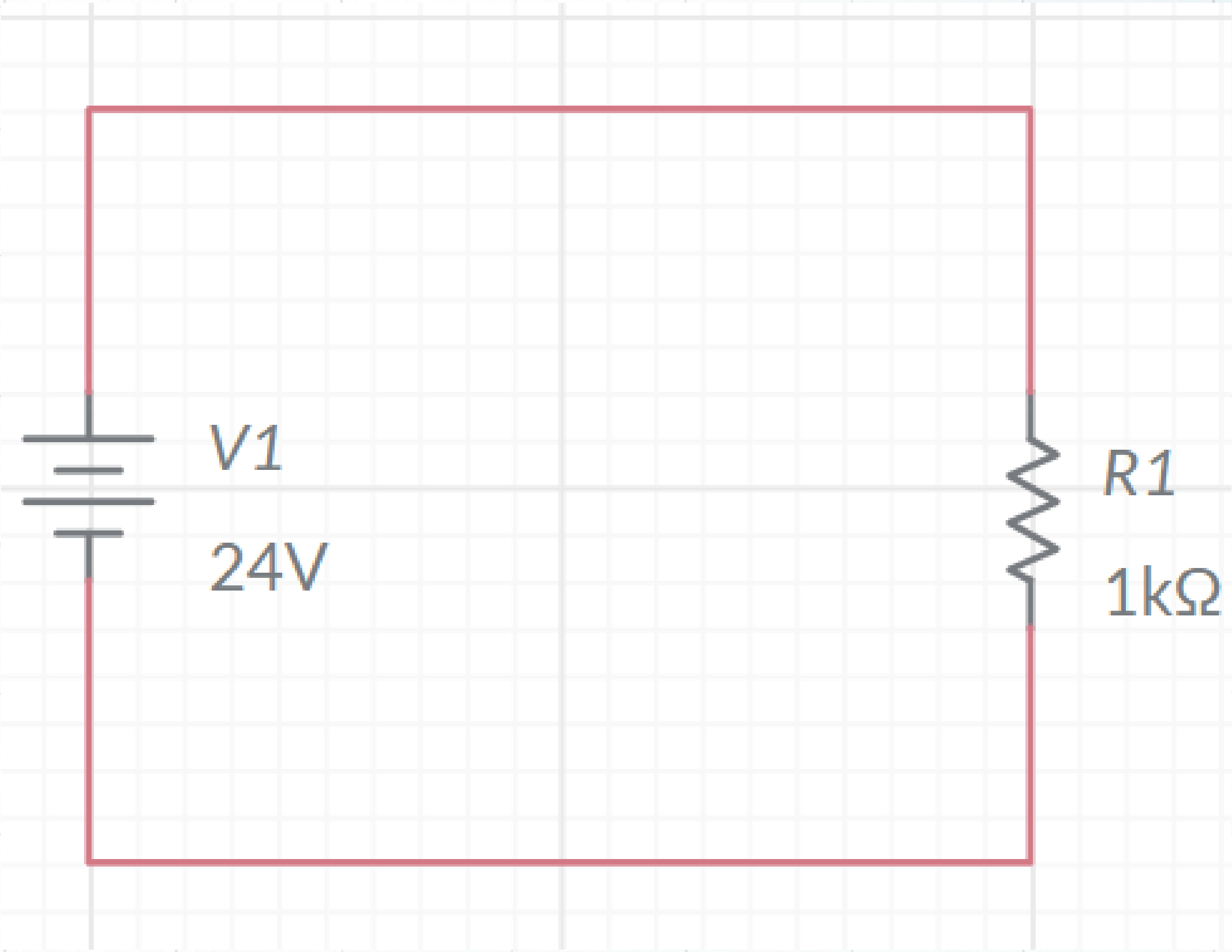
BEFORE DURING AFTER

Electrostatics

Ohm's Law

This law states that the **electric current** through a **conductor** between two points is **directly proportional** to the **voltage** across the two points.

$$V = IR \qquad I = \frac{V}{R} \qquad R = \frac{V}{I}$$



Ohm's law is an **empirical relation** which accurately describes the conductivity of the vast majority of **electrically conductive materials** over many orders of magnitude of current.

Elecrostatics

QUESTION 9

What is the resistance in a circuit with a **voltage of 50 V** and a **current of 8 A**?

a. 42 Ω

b. 58 Ω

c. 0.16 Ω

d. 6.25 Ω

Elecrostatics

QUESTION 9

What is the resistance in a circuit with a **voltage of 50 V** and a **current of 8 A**?

Ohm's Law $V = IR$

$$R = \frac{V}{I} = \frac{50V}{8A} = 6.25\Omega$$

d. 6.25 Ω

Elecrostatics

QUESTION 10

A circuit has a **current I**, a **voltage V**, and **a resistance R**. If the voltage remains **constant**, but the **current is doubled (2I)**, what must the new resistance be?

a. 2R

b. 1/2R

c. 4R

d. 1/4R

Elecrostatics

QUESTION 10

A circuit has a **current I**, a **voltage V**, and **a resistance R**. If the voltage remains **constant**, but the **current is doubled (2I)**, what must the new resistance be?

Ohm's Law $$V = IR$$

Since voltage is **constant**, we equate our old equation to new equation,

$$I_1 R_1 = I_2 R_2$$

Elecrostatics

QUESTION 10

The second current is equal to **two times** the first current **(doubled)**

$$I_2 = 2I_1$$

Substituting to earlier equation,

$$I_1 R_1 = 2I_1 R_2$$

$$R_1 = 2R_2$$

$$R_2 = \frac{1}{2R_1}$$

b. 1/2R

Electrostatics

Ohm's Law

Another form of **Ohm's law** in **electromagnetics** is,

$$\overrightarrow{J} = \sigma \overrightarrow{E}$$

where:

$\overrightarrow{J} \equiv$ current density

$\sigma \equiv$ conductivity

$\overrightarrow{E} \equiv$ electric field

Electrostatics

Conductivity

The **proportionality factor σ** is an empirical constant **varying** from one material to another called **conductivity**. Measure of a material's **ability to conduct electric current**.

Resistivity

The **reciprocal** of conductivity is **resistivity ρ** which measures the ability of a material to **oppose the flow of current,**

$$\rho = \frac{1}{\sigma}$$

Electrostatics

Conductors

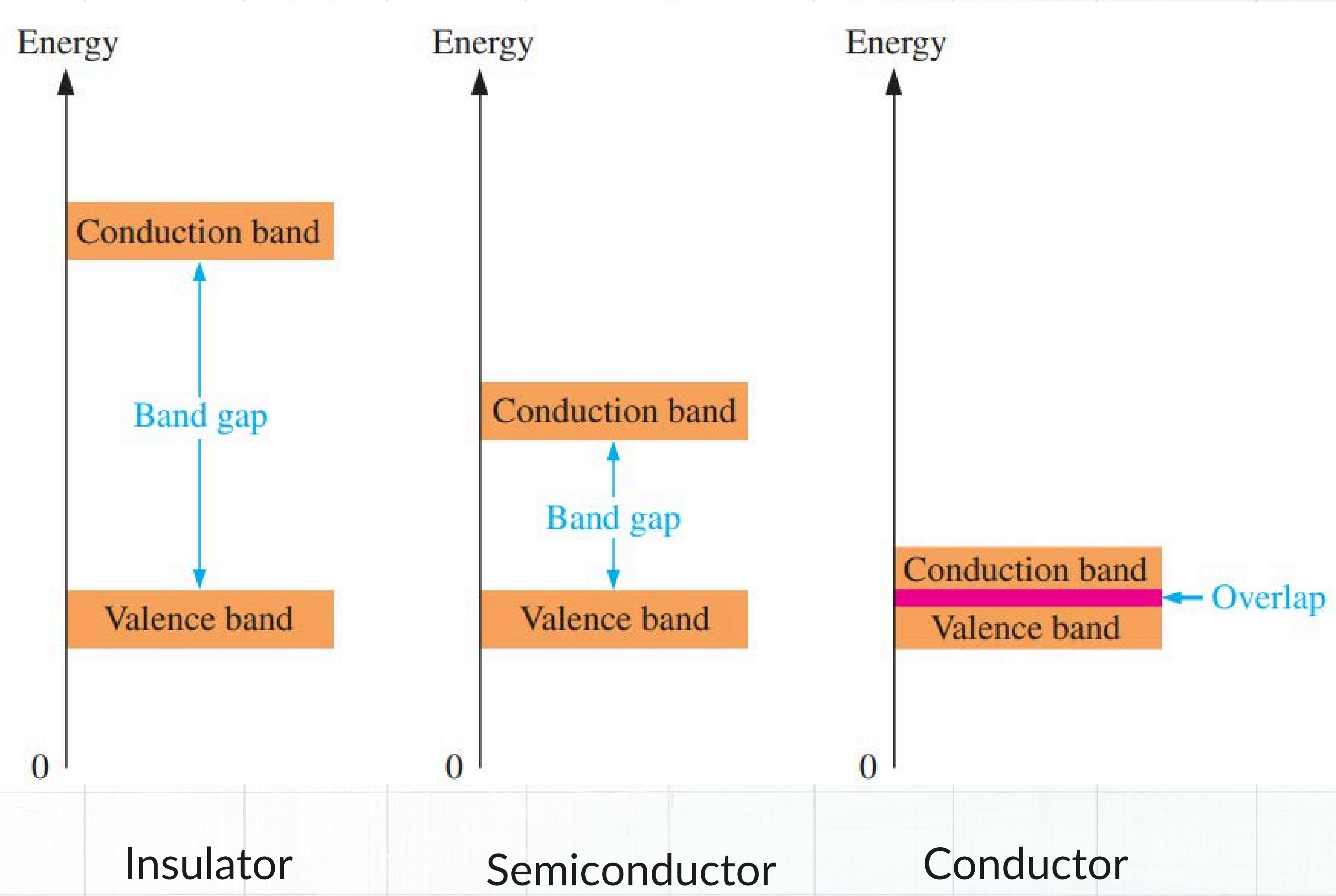
Materials that **easily conduct electric current** (materials with ↑ **electrical conductivity** and ↓ **resistivity**.

Semiconductors

Materials that **can conduct electricity** at certain conditions.

Insulators

Materials that **does not conduct electric current** in normal conditions (↑ **resistivity)**.



Energy diagrams for the three types of materials.
From Floyd, T,L, (2018))

Electrostatics

Coulomb's Law

The **magnitude** of the **electrostatic force F** between **two point charges** and is **directly proportional** to the product of the magnitudes of **charges** and **inversely proportional** to the **square of the distance** between them. **Like charges repel** each other, and **opposite charges attract** each other.

Electrostatics

Coulomb's Law

$$F = k\frac{|q_1 q_2|}{r^2} = \frac{1}{4\pi\varepsilon_0}\frac{|q_1 q_2|}{r^2}$$

where: $q_1 \equiv$ point charge 1

$q_2 \equiv$ point charge 2

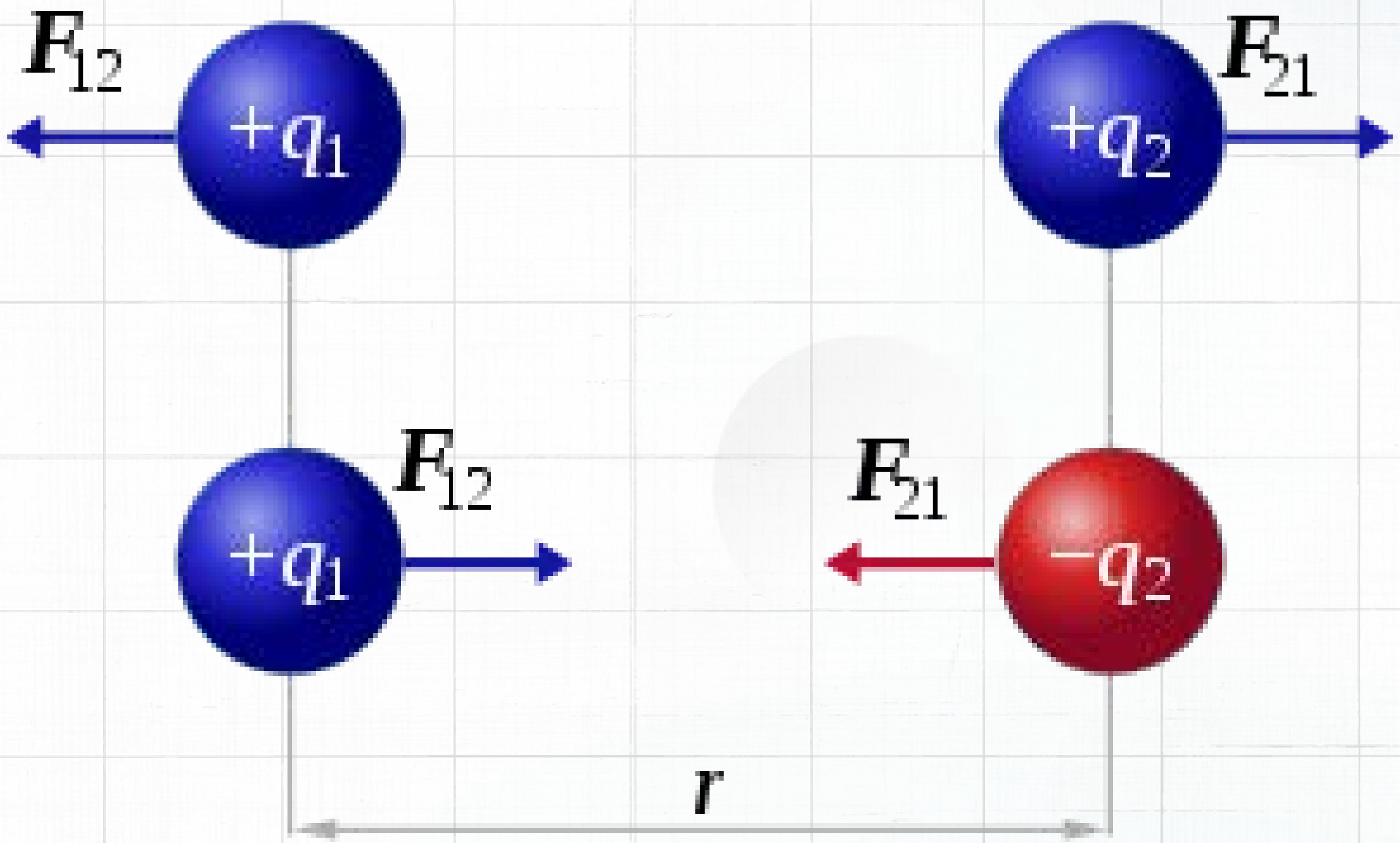
$r \equiv$ distance between the charges

$k \equiv$ Coulomb's constant

$(k = 9.0 \times 10^9 N \cdot m^2/C)$

$\varepsilon_0 \equiv$ permittivity of free space

$(\varepsilon_0 = 8.85 \times 10^{-12} C/N \cdot m^2)$



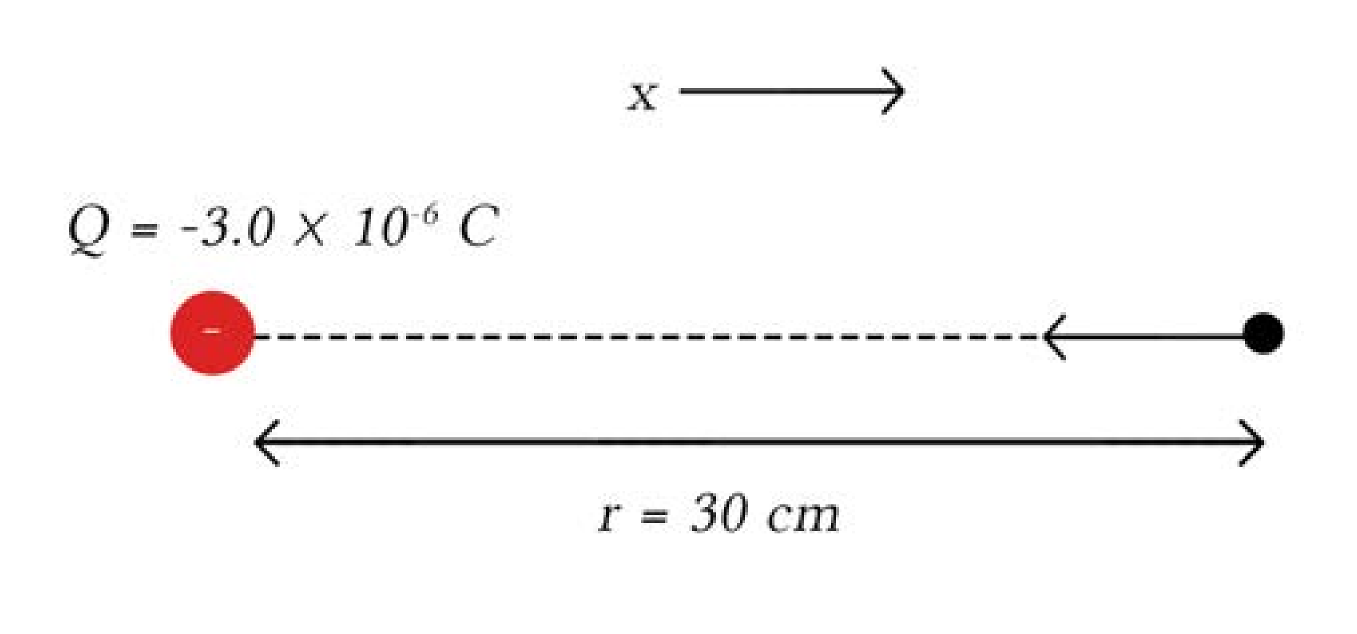
$$\left|F_{12}\right| = \left|F_{21}\right| = k_e \frac{|q_1 \times q_2|}{r^2}$$

Electrostatics

Electric Field

A **vector field** that associates to each point in space the **Coulomb force** experienced by a **unit test charge**, its magnitude is,

$$E = k\frac{|Q|}{r^2} = \frac{1}{4\pi\varepsilon_0}\frac{|Q|}{r^2}$$



Direction of electric field points to the **-x axis**.

$$Q = -3.0 \times 10^{-6} C$$
$$r = 30cm = 0.3m$$
$$k = 9.0 \times 10^{9} N \cdot m^2/C$$

$$E = k\frac{|Q|}{r^2} = (9.0 \times 10^{9} N \cdot m^2/C)\frac{|-3.0 \times 10^{-6} C|}{(0.3m)^2}$$

$$E = 3.0 \times 10^{5}\frac{N}{C}$$

Waves and Sounds

Waves

Disturbance in a medium that carries **energy without net movement** of particles or medium

Involves **periodic, repetitive movement**

Waves and Sounds

Mechanical Waves

Requires a **medium** in order to **propagate itself.**

Types of Mechanical Waves:

1. **Longitudinal Waves**

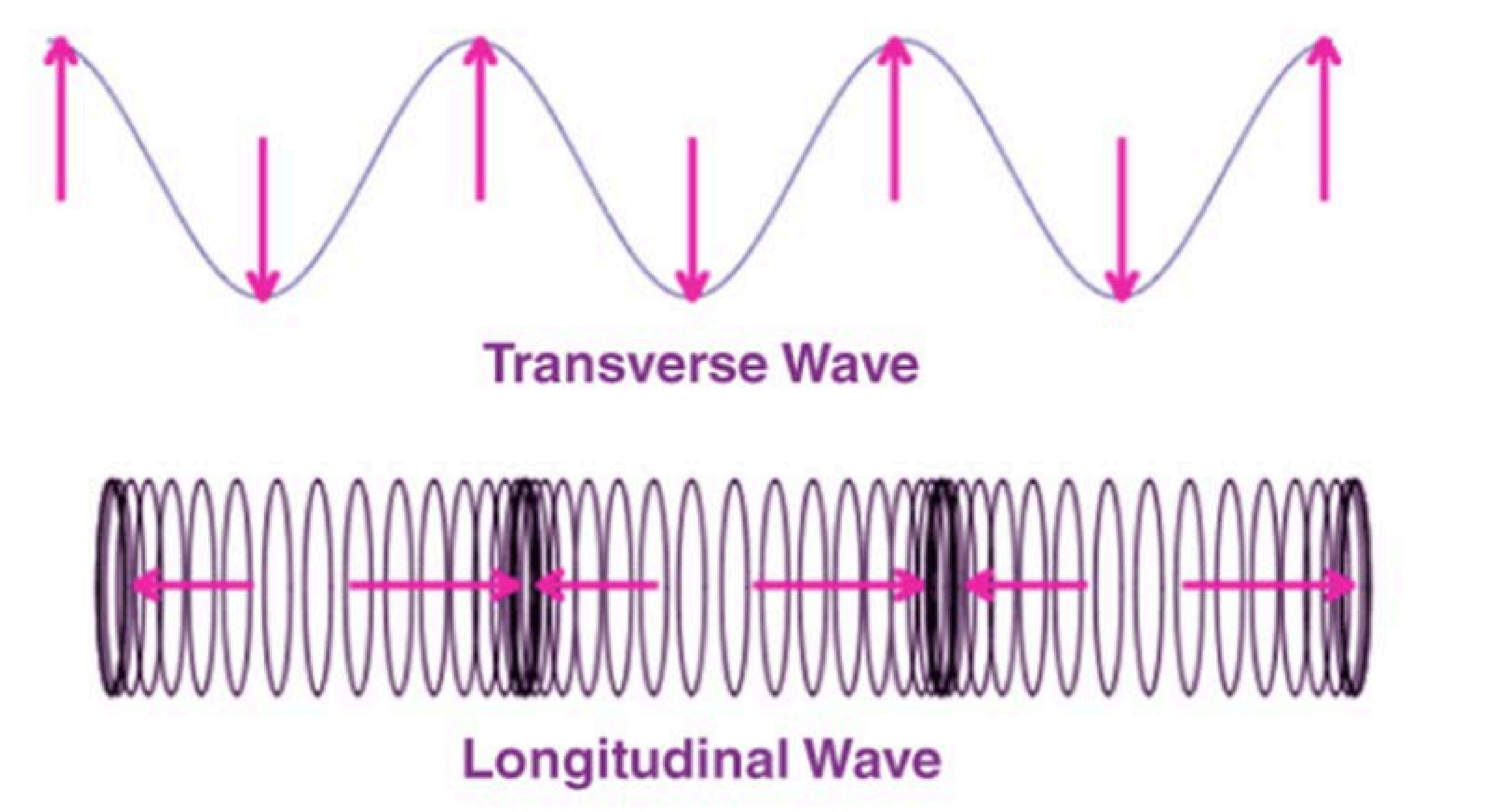
   Movement of particles is **parallel** to **motion of energy**, displacement of medium is in **same direction** as direction in which wave is moving (Ex: Sound waves, pressure waves)

2. **Transverse Waves**

   Movement of particles is **at right angles or perpendicular** to the motion of energy (Ex. Light)

Waves and Sounds

Mechanical Waves



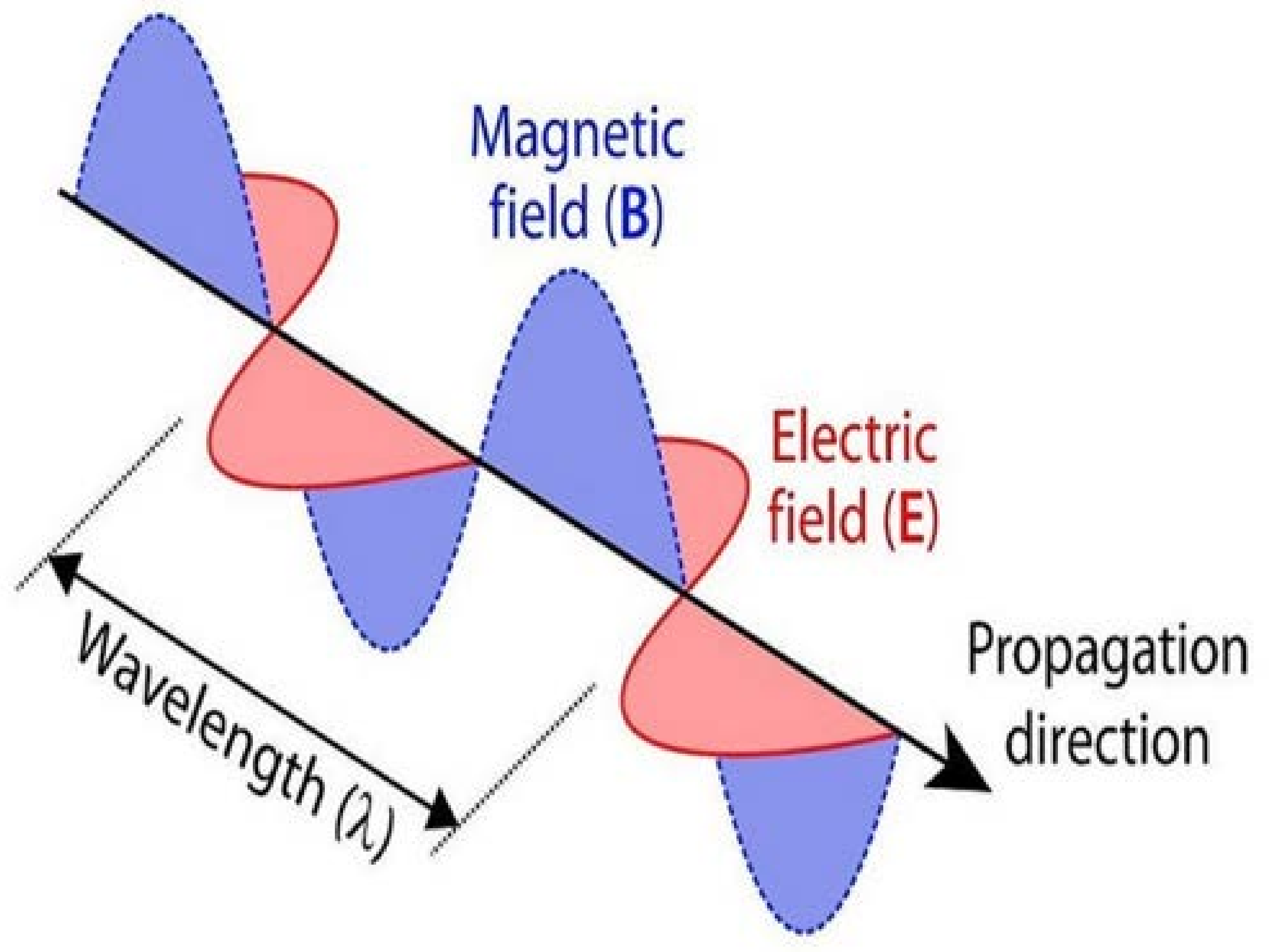
Waves and Sounds

Surface Waves

Particles travel in **circular motion** in which waves occur at **interfaces**.
(Ex. Waves in the ocean, ripples in a cup of water)

Electromagnetic Waves

- Created by a **combination** of **electric** and **magnetic fields**
- Do **not need** a **medium** to travel
- Travel through **vacuum** at **same speed** (speed of light)



Waves and Sounds

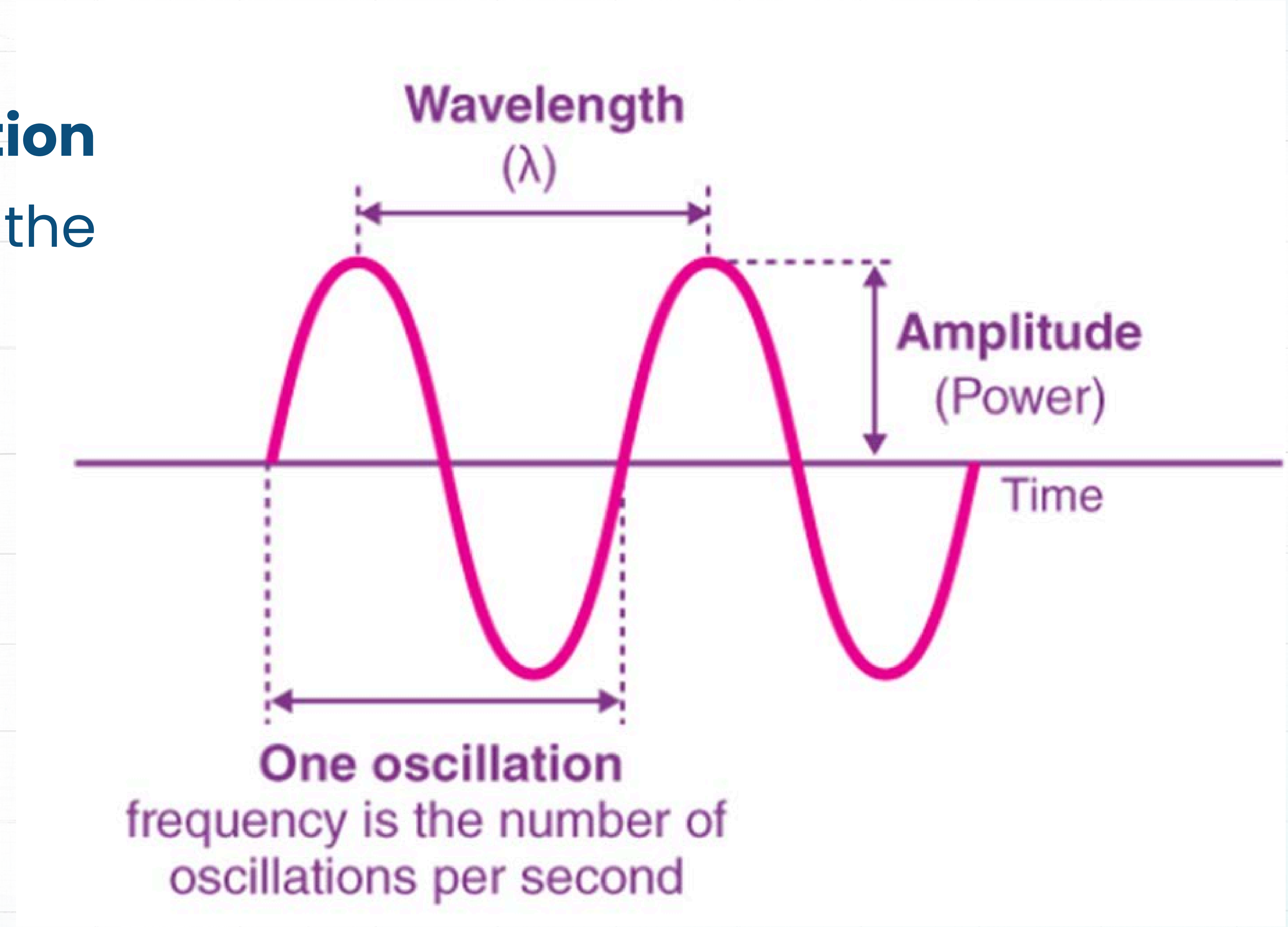
Amplitude

Measures the **magnitude** of **oscillation** of a **particular wave** (height of the wave)

Wavelength

Distance of **one full cycle** of the oscillation

$$c = \lambda f$$



Waves and Sounds

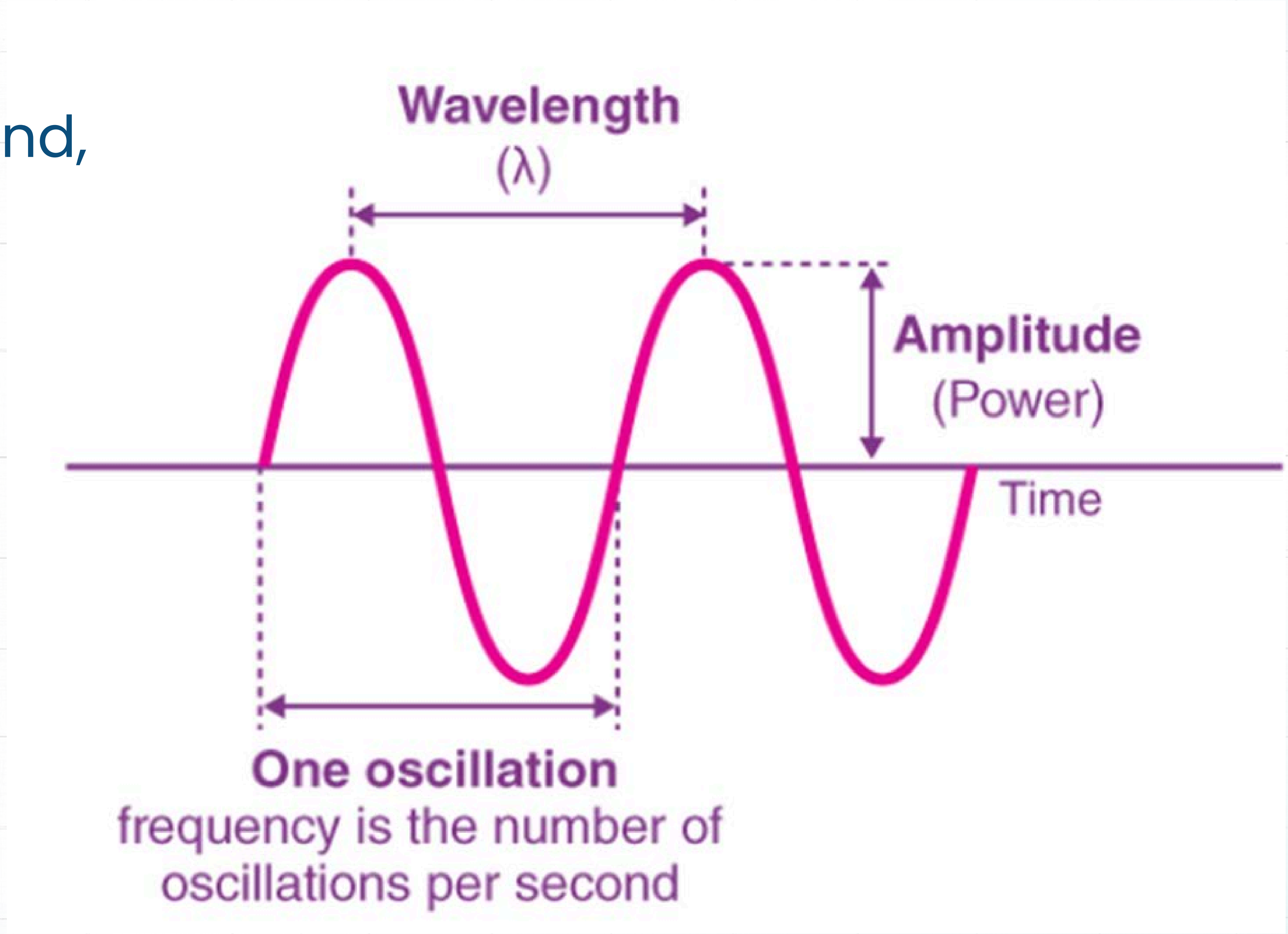
Frequency

Number of cycles per second, expressed in 1/s or Hertz (Hz)

Proportional to **energy,**

$$E = hf$$

$$h = 6.626 \times 10^{-34}\ \text{Js}$$



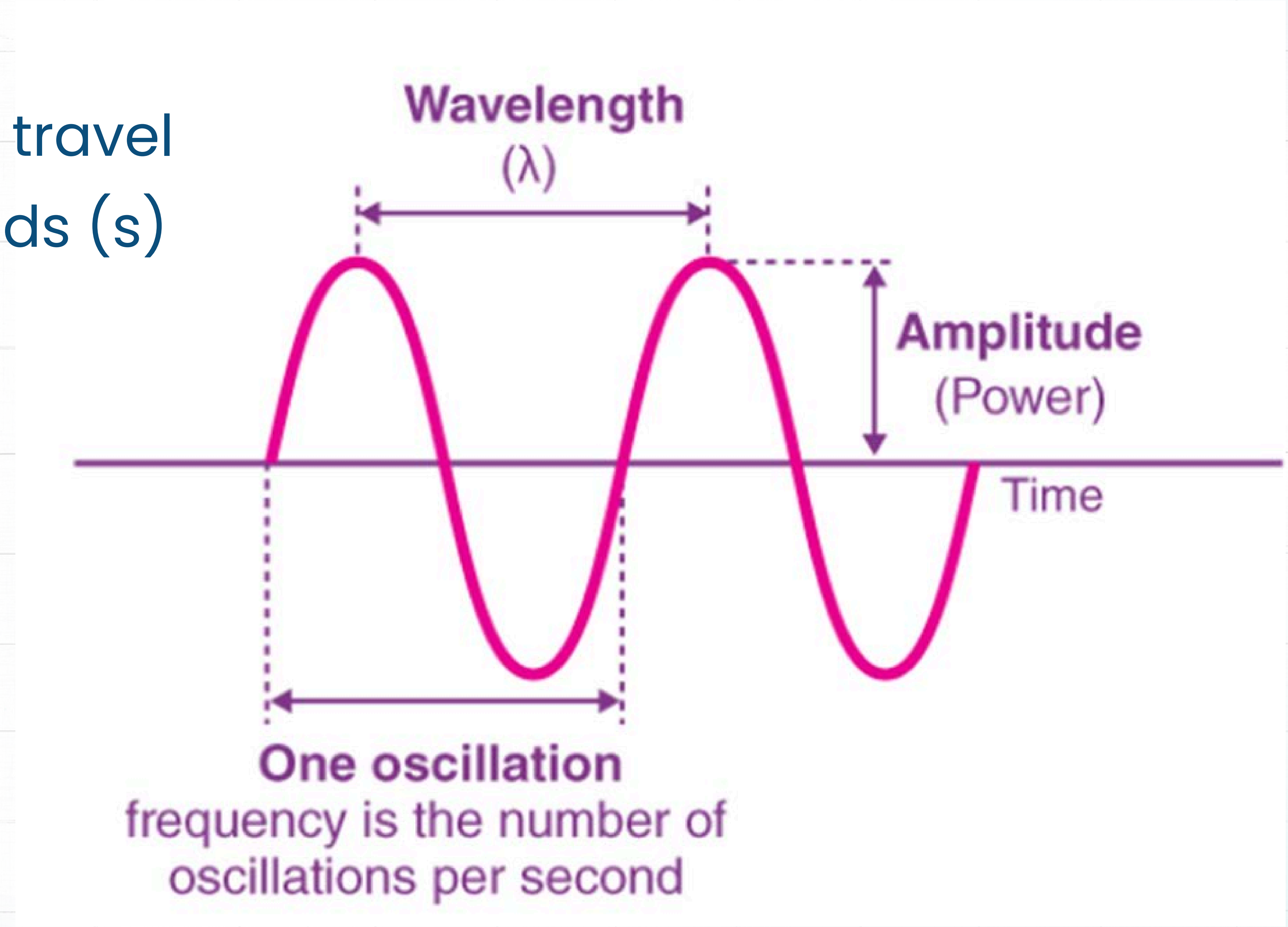
Waves and Sounds

Period

Amount of time a wave takes to travel **one wavelength**, measured in seconds (s)

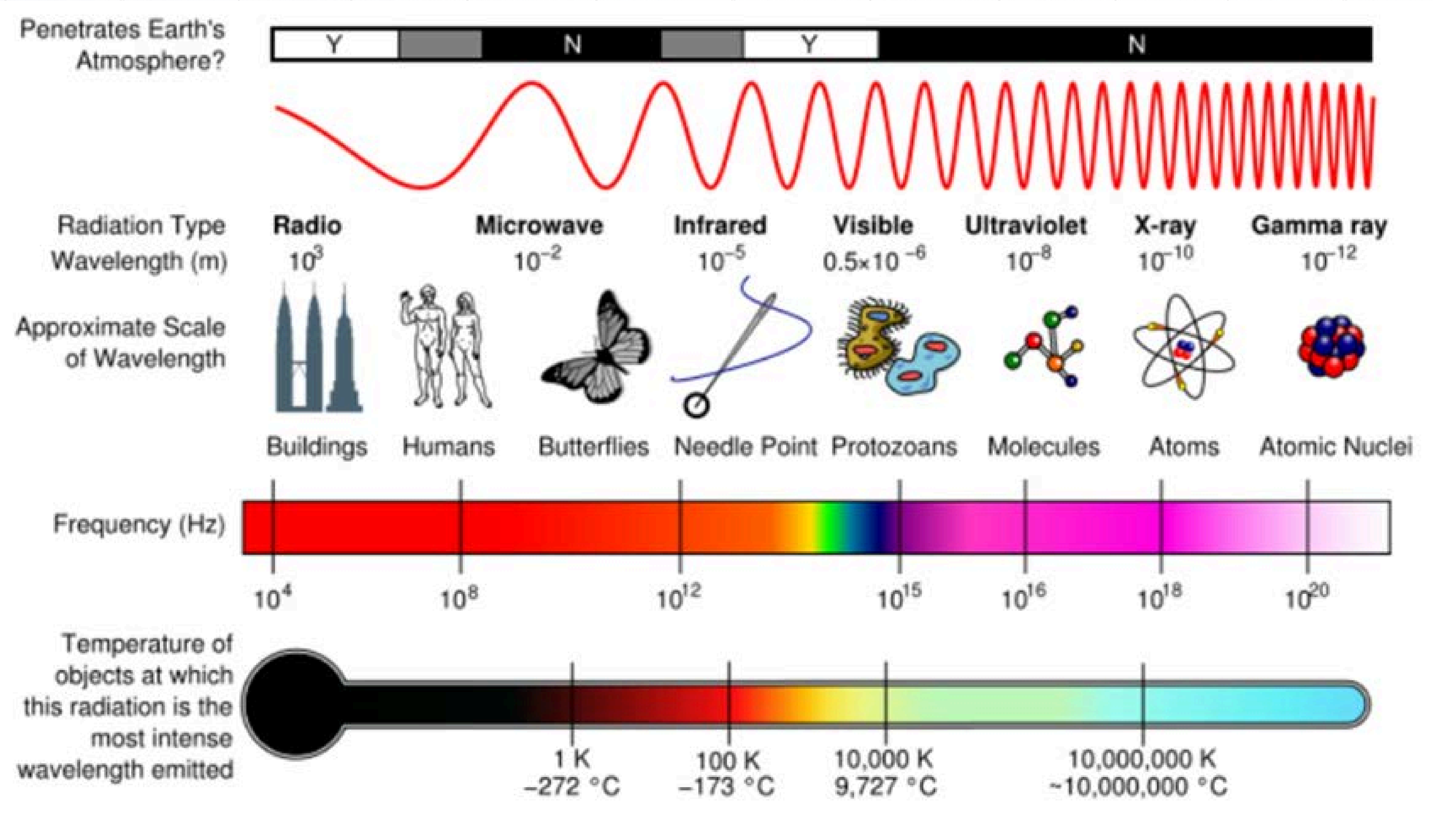
Reciprocal to the **frequency**,

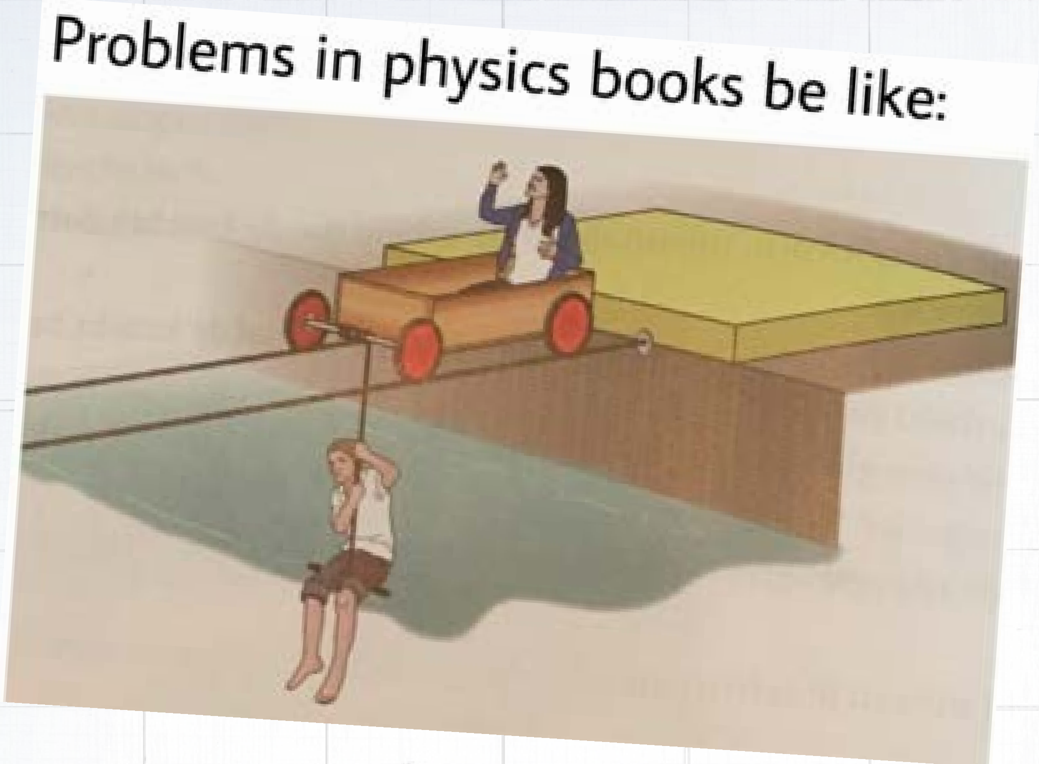
$$\tau = \frac{1}{f}$$

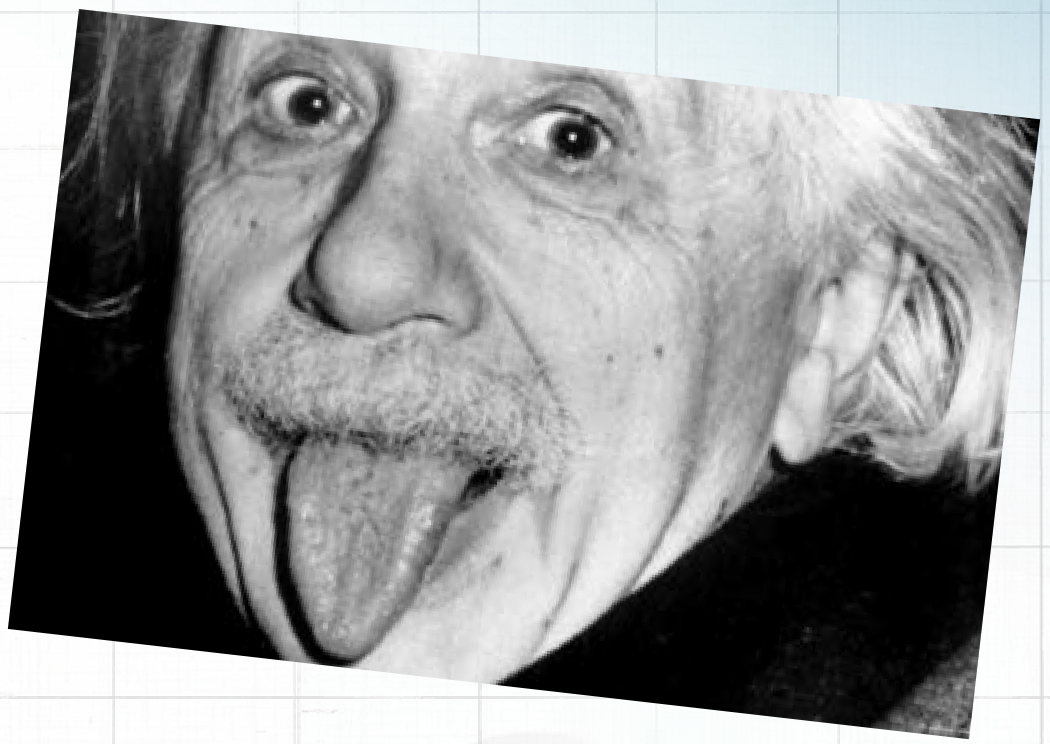


Waves and Sounds

Electromagnetic Spectrum




Problems in physics books be like:



PHYSICS


Isaac Newton: *sitting under a tree*
The apple:
I'm about to start this man's whole career