



Ministry of Higher Education and Scientific Research  
University of Al-Mustaqbal  
College of Health and Medical Technologies



**General Physics**  
**Frist Stage**

**A Lecture Four Title / Practical**

**Introduction to Radiation Protection & Shielding**

**Part Two**

AN

**By**

***Dr. Ahmed Najm Obaid***

**[ahmed.najm.obaid@uomus.edu.iq](mailto:ahmed.najm.obaid@uomus.edu.iq)**

**ORCID: [0000-0001-6120-243X]**

**2025-2026**

# Basic principles of radiation protection (Time – Distance – Shielding)?

## 1. Time

### Concept

Radiation dose is directly proportional to exposure time.

Reducing the time spent near a radiation source reduces the received dose.

$$\text{Radiation dose} \propto \text{exposure time}$$

Practical example: A technician stands near a patient for 10 seconds versus a technician stands near a patient for 2 seconds. Which one receives a higher dose?

Question: Reducing exposure time by half will result in:

- A) Double the dose.
- B) No change in dose.
- C) Reducing the dose by half.

## 2. Distance

### Physical Law

Radiation intensity decreases with the square of the distance from the source.

$$I \propto \frac{1}{(d)^2}$$

(I) = Radiation intensity (or dose)

(d) = distance from the radiation source

### Numerical Example

- At 1 meter → 100% dose (Reference value)
- At 2 meters → 25% dose

$$I \propto \frac{1}{(d)^2}$$

$$I \propto \frac{1}{(2)^2} \Rightarrow \frac{1}{4} \Rightarrow 25\%$$

Quick Quiz – 3 Minute! (Individual activity)

Total score: 0.5 point

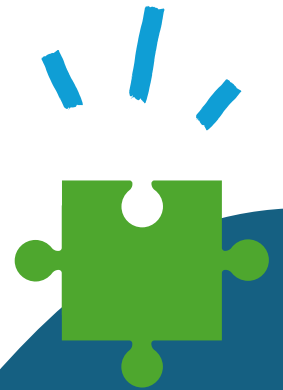
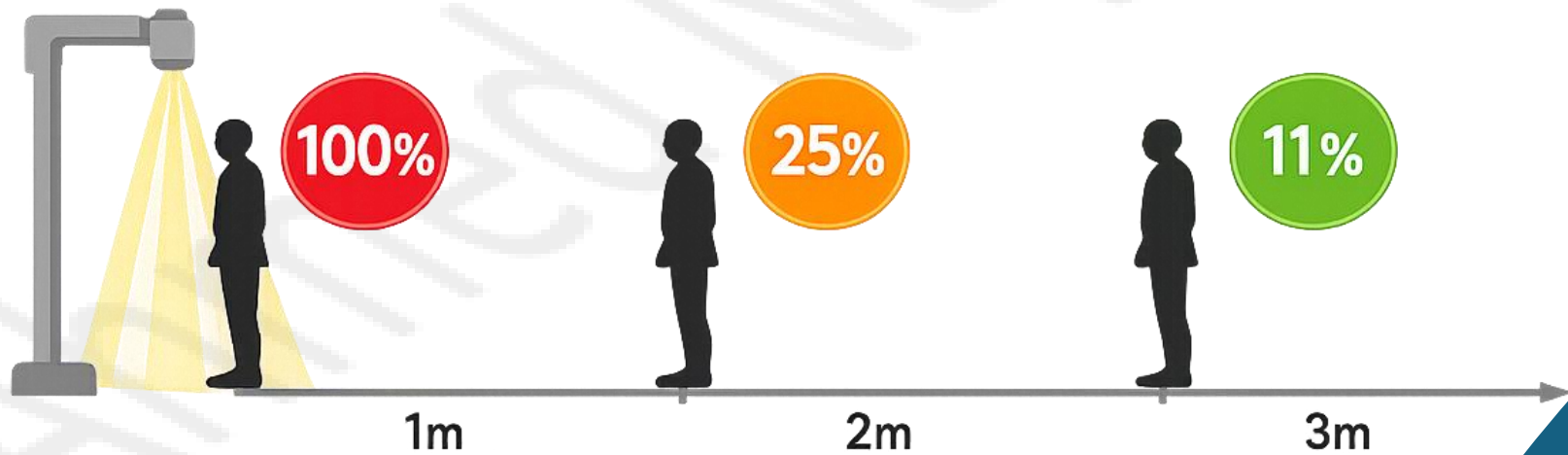
**Question (1)** A radiographer is standing 1 meter away from an X-ray source and receives a radiation dose of 100%. Using the inverse square law, calculate the percentage of radiation dose received when the distance is increased to 3 meters?

A) 11.11% dose

B) 12.11% dose

C) 13.11% dose

D) 14.11% dose



### 3. Shielding

#### Concept

Shielding involves placing **absorbing materials** between the **radiation source** and the **person**.

#### Types of Shielding

##### Personal Shielding

- Lead apron
- Thyroid shield
- Lead gloves

##### Structural Shielding

- Lead-lined walls
- Lead glass viewing window
- Mobile lead barriers

Any

Question



***Thank you for  
listening***