DAY: DATE:

Subject:

General Science & Ability

What is Radioactivity? Differentiate b/w Natural and Artificial Radioactivity.

Outline of the question:

1- Introduction
2- Definition of Radioactivity
3- Types of Radioactivity
   3.1- Natural Radioactivity
   3.2- Artificial Radioactivity
4- Comparison Table
5- Conclusion

1- INTRODUCTION

Radioactivity is a fundamental phenonmenon in nuclear physics with widespread implication in Sience, medicine, and Industry. Discovered in the late 19th century, it represents the Spontaneous emission of Particles or electromagnetic radiation from the unstable nuclei of certain

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atoms. This process results in the transformation of one element into another and is central to both natural and artificially induced nuclear reactions.

2- RADIOACTIVITY

Radioactivity is a spontaneous disintegration of unstable atomic nuclei accompanied by the emission of alpha particles, β particles (β), and (γ) Gamma particles. The process was first discovered by Henri Becquerel in 1896 and later extensively studied by marie and pierre curie.

3- TYPES OF RADIOACTIVITY

Radioactivity can be broadly classified into two types:

3.1- Natural Radioactivity:

Natural Radioactivity refers to the emission of Radiation from naturally occuring isotopes without any human intervention.

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i- Characteristics:

- found in elements such as uranium-238, thorium-232, and potassium-40.
- occurs in natural spontaneously.
- commonly found in Rocks, soil, water and even in the human body.
- contributes to the earth's internal heat.

ii- Examples:

- Uranium decay into thorium and ultimately lead.
- Carbon-14 used in Radiocarbon dating.

3.2- ARTIFICIAL RADIOACTIVITY

Artificial Radioactivity (Induced) is the process in which stable istopes are made radioactive by human intervention typically through nuclear reaction in Reactors or particle accelerations

i- Characteristics:

Induced by bombarding stable nuclei with neutrons, protons, or other particles created in laboratories or nuclear reactor widely used in medicine (e.g) cancer, Radiotherapy), agriculture and Industry.

ii- Example:

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- Technetium - 99m used In medical imaging.
- Cobalt - 60 used in cancer treatment

4. COMPARISON TABLE

Feature	Natural Radio	Artificial Radio
oRigin	Occurs naturally	Man-Made
Elements	Uranium, Thorium Radon	Technetium-99m, cobalt 60
Process	Spontaneous nuclear Decay	Induced by Particle bombardment
Control	Cannot be controlled	Can be controlled
Application	Radiometric dating, Geological studies	medicine, Industrial-Radiography

5 - Conclusion:

Radioactivity, whether natural or artifical, Play a vital Role In advancing human Knowledge & Improving quality of life while natural Radioactivity occurs spontaneously, artifical radioactivity has allowed Scientist to harness and control nuclear Phenomena for Particles appliction

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What is dengue fever? Disscuss it Causes, Symptoms, modes of transmission and preventive measures:

Outline of this question:

1 - introduction
2 - Definition of Dengue fever
3 - Causes of Dengue fever
  3.1 - contribution factors include
4 - Symptoms of Dengue fever
5 - Mode of Transmission
6 - preventive measure
7 - conclusion

1. INTRODUCTION

Dengue fever is a mosquito-borne viral infection that poses a significant public health threat particularly in tropical and subtropical regions. with increasing urbanization, climate change, and global travel, the incidence of dengue has surged in recent decades, making it a priority for disease prevention and control efforts worldwide.

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2- Dengue feves

Dengue feves is an acute viral filness caused by the dengue virus, which is transmitted primarily by the Aedes aegypti mosquito. The disease manifests with highh feves, sevese causes, bleeding and organ impairment.

3- Causes of Dengue

The primary causes of dengue feves is infection by any one of the 4 dengue vius sesotypes (DENV-1, DENV-2, DENV-3, DENV-4), all of which belong to the flaviviridae family

3.1- Contributing factoss:

- presence of Aedes mosquitas: Specially Aedes aegypti
- poos sanitation and stagnant wates: which seve as breeding grounds.
- climate conditions: Such as wam and huumid wates
- Inadequate Public health infrastuctuse: In densely populated areas.

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4- Symptoms of Dengue

- Sudden high-grade fever (up to 104°F)
- Severe headaches, especially behind the eyes
- Muscles and joint pain (breakbone fever)
- Skin Rash appearing a few days after onset fever
- Nausea and vomiting.
- Mild bleeding (e.g., Nosebleeds, gum bleeding)
- In severe cases: Dengue hemorrhagic fever or dengue shock syndromes, leading to internal bleeding, Low platelet cont, and even death if untreated.

5- Modes of Transmission

Mosquito bite:

The virus is primarily transmitted to humans through the bite of an infected female Aedes aegypti.

5.2- Human-mosquito-human cycle:

when a mosquito bites a dengue-infected person, it become a carrier and can transmit the virus to other.

5.3- Rare transmission Routes:

Blood transfusion, organ transplant, and from mother to fetus during pregnancy or childbirth.

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6- Preventive measures

6.1- elimination of mosquito breeding sites:
Remove stagnant water from pots, tires, containers, Drains.

6.2- use of mosquito repellents & nets:
especially during early morning and

6.3- late afternoon hours when Aedes mosquitos are most active.

Wearing Protective Clothing:
long sleeves & pants Reduce skin exposure.

Community engagement:
educating the public about dengue symptoms and preventive practice

fogging and fumigation:
especially in outbreak-prone areas

7- Conclusion

Dengue fever remains a significant public health concern, Particularly in Developing countries like pakistan. Its prevention Require a multi-pronged approach involving individual responsibility, community participation, and government-led initiatives for mosquito control and public health education.

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The sum of three consecutive prime Numbers is 159, find the Numbers:

Solution:

Let: P_1, P_2, P_3

$P_1 + P_2 + P_3 = 159$

$(43 + 47 + 53 = 143)$

$47 + 53 + 59 = 159$

So:

$P_1 = 47$

$P_2 = 53$

$P_3 = 59$

The perimeter of a circle having a radius 6 cm is equal to?

Solution:

$R = 6cm$

circumference $= 2\pi r$

substitute of given value of r:

$= 2 \times \pi \times 6$

$= 12\pi$

$= 12 \times 3.14$

$= 37.6992cm \quad = 37.70\,cm$

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The Sum of Two numbers is 23, and product is 132. find the numbers.

Solution:

Lets 2 numbers x & y.

$$x + y = 23 \quad \text{—①}$$

$$xy = 132 \quad \text{—②}$$

from equation ①

$$y = 23 - x$$

(3) and (2)

$$x(23 - x) = 132$$

$$23x - x^2 = 132$$

$$x^2 - 23x + 132 = 0 \quad \text{—④}$$

$$11 \times 12 = 132, \qquad 11 + 12 = 23$$

So:

$$x^2 - 11x - 12x + 132 = 0$$

$$x(x-11) - 12(x-11) = 0$$

$$(x-11)(x-12) = 0$$

$$x = 11 \quad , \quad x = 12$$

$$= 11 \text{ and } 12$$

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A man buys a car for Rs. 70 million after getting a discount of 20%. what was the marked prices of the car?

Solution:

Selling price = 80% of x

= 0.8x

we are given:

0.80x = 70 million

Now solve for x:

$$x = \frac{70}{0.80}$$

$$x = 87.5 \text{ million}$$

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Differentiate b/w star & a planet. How does a start become a black hole?

Outline of the question:

1- Difference B/w stars and planet
2- How a star Become a black hole
(i) Stellar evolution
(ii) collapse of massive stars
(iii) Supernova explosion
(iv) formation of Black hole
3- conclusion:

1- Difference

Feature	Star	Planet
Definition	A star is a luminous celestial body that generate light and heat through nuclear fusion.	A Planet is a non-luminous celestial body that orbits a star.
Light emission	Emit its own light due to nuclear Reaction	Does not emit light; Reflect light from a sta
Example	The Sun	Earth, Mars Jupiter.

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Energy source	Powered by nuclear fusion of hydrogen into helium	Has no internal source of energy.
Temp.	extremely high (millions of degrees in core).	Much cooler compared to star
Size & mass	(much larger and more massive)	Relatively small, less mass

2- How to become a Black Holes? (star)

Stellar evolution:

A star spend most of its life fusing hydrogen into helium in its core (main sequence). when Hydrogen is exhausted, the core contracts and outer layers expand (Red giant)

Collapse of massive stars:

If the star is massive enough (typically more than 20 - 25 times the mass of the sun), fusion cannot counter-balance gravity after the supernova stage.

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Supernova explosion:

The outer layers of blown away In a massive explosion. when the balance b/w gravity & outward pressure from fusion break down, the star collapses under its own gravity. This collapse can trigge a supernova

3. Conclusion

Stars and planets, though both fundamental components of the universe differ profoundly in their nature & role. while stars are luminous powerhouses of energy. planet are dependent bodies that orbit them. The death of a massive star can lead to one of the most mysterious phenomenons in the cosmos - the formation of a black hole - demonstrating the dynamic & power ful forces at play In the universe.