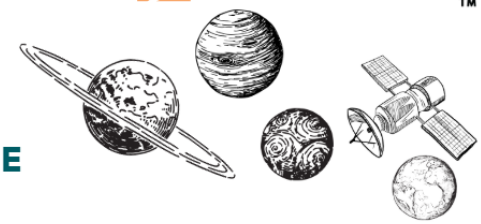
PROJECT-BASED LEARNING ACTIVITY

EVERY CHILD DESERVES A LITTLE SPACE TO EXPLORE

SPACE 2XPLORE™



Lesson 55: The Space Environment and Its Challenges

PBL Activity: Live4Space – Invisible Death Rays

Life in space produces profound changes in biology. All organisms on Earth have adapted to perform under conditions of gravity, atmosphere, and cycles of light and darkness that have not changed in millions of years, conditions which are altered aboard spacecraft like the ISS. In order for humans to spend long durations in space to reach distant planets or simply conduct exciting research, we must try to solve the complex problem of living in space.

Timing: 120 min

Objective:

- Discovering how biological systems respond, acclimate and adapt to the space environment.
- Understanding the purpose of the research and experiments being conducted on the International Space Station (ISS).

Scenario:

Humans will ultimately land and potentially inhabit Mars for a considerable amount of time. NASA and commercial aerospace companies have vowed to put humans on Mars within the next decade. Humans will need to survive the harsh Martian environment in order to return home safely. One of the most notable hazards is radiation (e.g., ultraviolet (UV), solar, galactic cosmic)!! Scientists need to understand the effects of radiation of humans and find ways to protect against it.

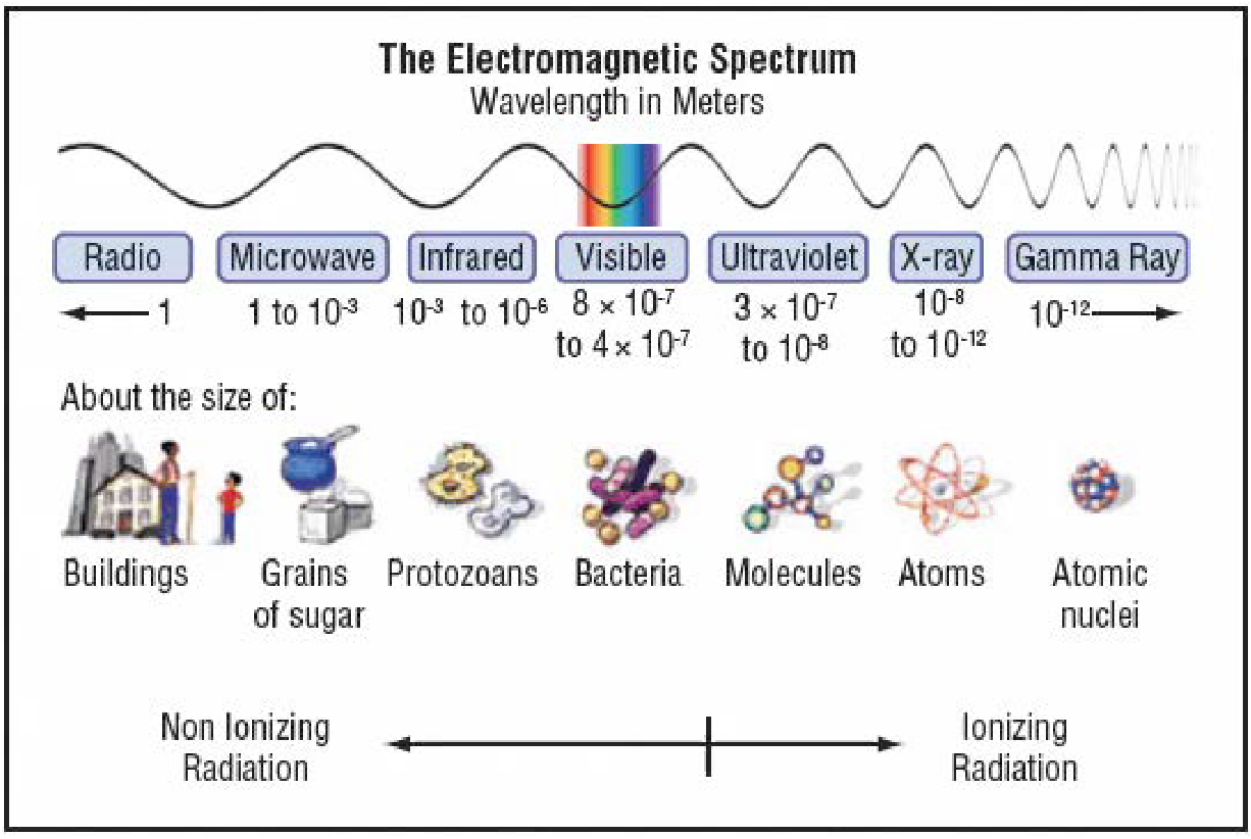
In order to determine the effect of UV radiation on living cells we will use bacteria.

- Bacterial cells contain DNA just as plant and animal cells do, and the DNA in cells is damaged by UV radiation.
- On Earth we have our atmosphere, particularly the ozone to protect our DNA from harmful UV radiation. Mars however has no ozone layer and so its surface is not protected from this radiation.
- Using bacterial plates determine the effect of UV light on cellular life forms (bacteria).

Resources/Materials:

- PowerPoint slides
- Discussion Guides
- Add more (i.e. 3D printer, virtual reality headsets)

Photos/Diagrams:



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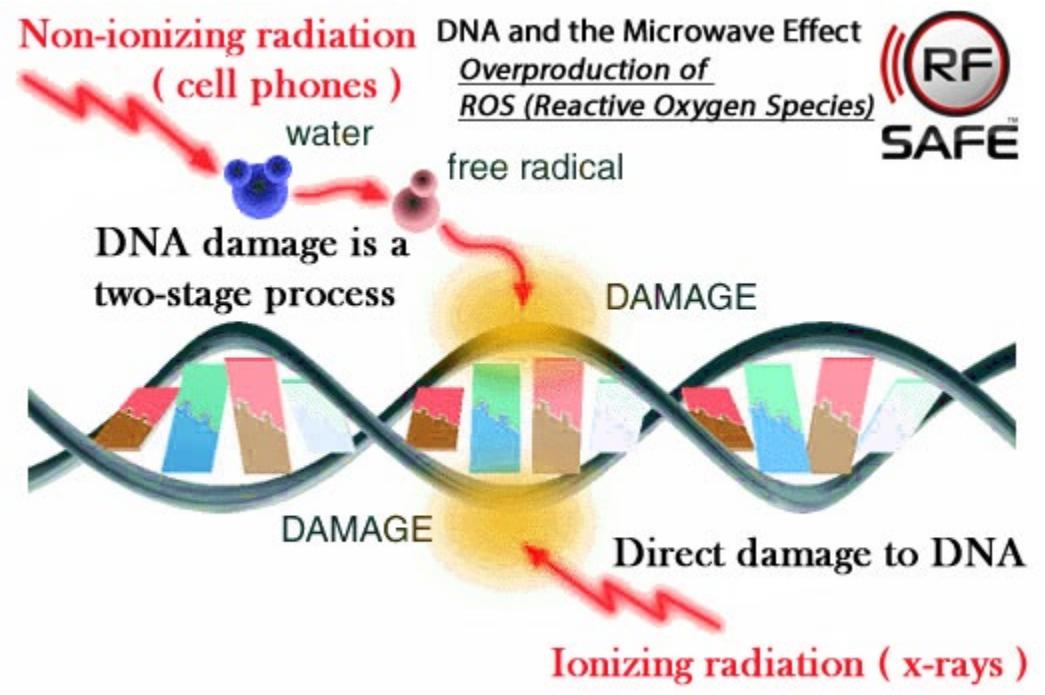

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