

General Science (2016)

Q: What do you know about remote sensing techniques? Explain the resolution and write down of its various types?

Remote Sensing:

Remote Sensing is the Science of obtaining information about objects or areas from a distance, typically using aircraft or satellites. This technology uses sensors to detect and classify objects on Earth's surface through the use of electromagnetic radiations such as

- i. Light
- ii. Heat
- iii. Radio waves

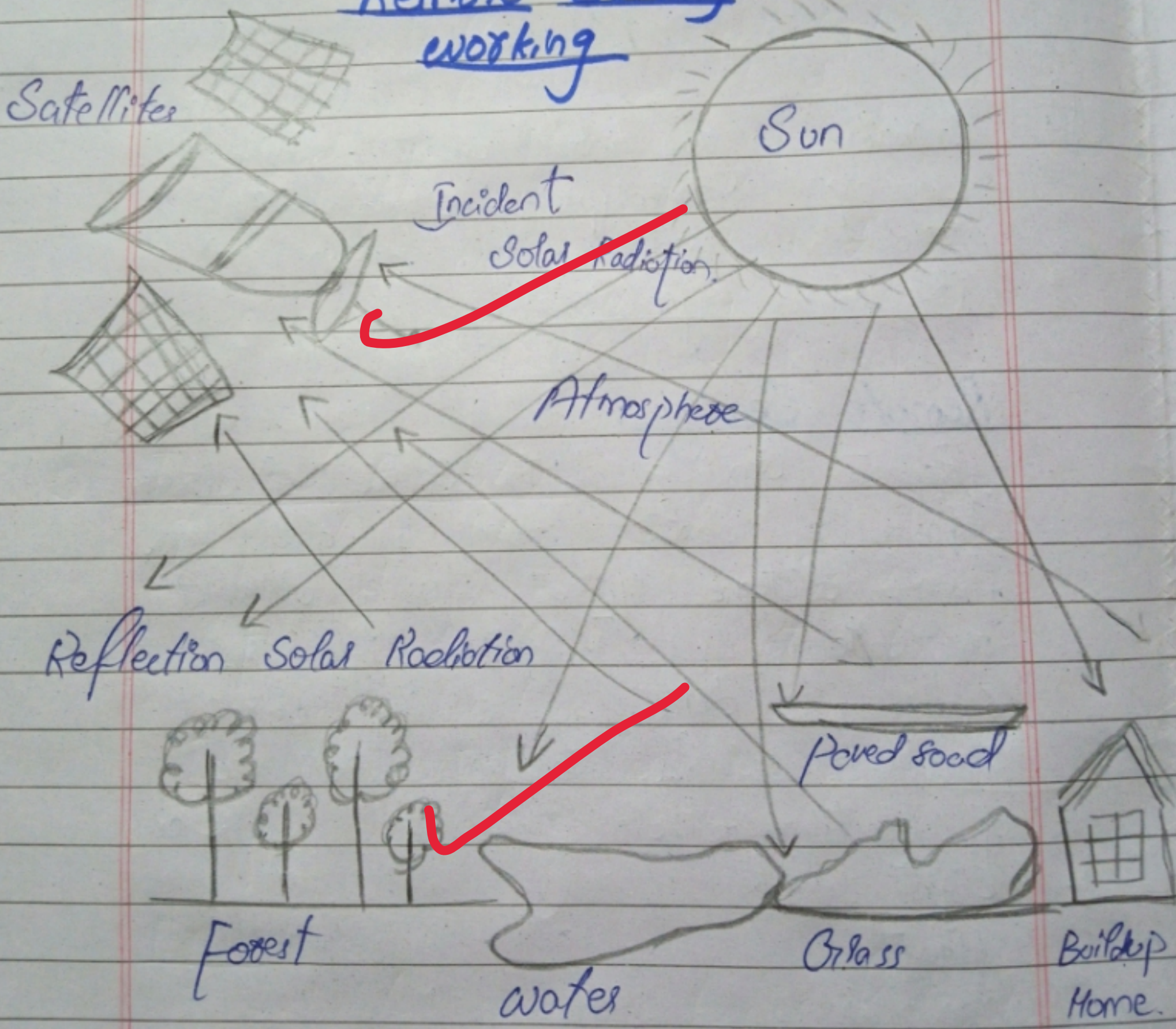
Remote Sensing is widely used in various fields including environmental monitoring, agriculture, forestry, geology and urban planning.

Resolution in Remote Sensing:

The resolution of remote sensing imagery is a critical factor that determines the level of details that can be captured and analyzed.

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Remote Sensing working



Types of Resolution in Remote Sensing:

There are four (4) primary types of resolution in remote sensing:

1. Spatial Resolution:

Spatial resolution refers to the size of the smallest possible features that can be detected. It is often described in terms of pixel size, with smaller pixels representing high spatial resolution.

Example:

An image with a spatial resolution of 1 meter means that each pixel represents a 1 meter by 1-meter area on the ground.

High-Resolution image = 0.5 meters

Low-Resolution image = 30 meters

2. Spectral Resolution:

Spectral resolution refers to the ability of a sensor to distinguish between different wavelengths of light. It is determined by the number and width of spectral bands that the sensor can capture.

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Example:

A multispectral sensor might capture data in a few broad bands e.g; red, green, blue, near-infrared. while the a hyperspectral sensors can capture data in hundreds of narrow bands, allowing for more precise identification of materials.

3. Temporal Resolution:

Temporal resolution defines as the frequency at which a sensor can revisit and capture data for the same location.

It is important for monitoring changes over time.

Example:

A satellite with a temporal resolution of 1 day can capture images of the same area daily, which is useful for tracking rapid changes such as natural disasters or vegetation growth.

4. Radiometric Resolution :

Radiometric resolution refers to the sensitivity of a sensor to detect differences in signal strength. (i.e., the ability to distinguish slight differences in energy levels).

Example :

An 8-bit sensor has 256 possible intensity levels (0-255), while a 12-bit sensor has 4,096 levels (0-4,095).

Higher radiometric resolution allows for more detailed detection of a variation in the intensity of reflected or emitted radiation.

Summary of various types:

Each type of resolution plays a critical role in remote sensing, and an appropriate resolution depends on the specific application and requirement of the study. For example, high spatial resolution is essential for urban planning, while high spectral resolution is crucial for mineral exploration and vegetation analysis.

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