

# The Earth

These notes are your ultimate revision weapon to revise the Earth. We've distilled years of previous exam questions (PYQs) into one powerful, concise resource. Everything you need to know, nothing you don't.

- **PYQs, Decoded:** All key concepts from past exams, organized and simplified.
- **Revise in Record Time:** Short, precise, and designed for last-minute review.
- **Focus on What Matters:** Master high-probability topics and boost your confidence.

## Geography: Core Concepts

### Earth's Coordinate System: Latitude & Longitude

- **Latitude ( $\phi$ )**
  - **Definition:** Lines measuring distance north or south of the Equator.
  - **Key Points:**
    - Equator:  $0^\circ$  latitude
    - North Pole:  $90^\circ$  North latitude
    - South Pole:  $90^\circ$  South latitude
    - Latitudes beyond  $90^\circ$  North or South are impossible.
- **Longitude**
  - **Definition:** Lines measuring distance east or west of the Prime Meridian.
  - **Key Point:** Prime Meridian:  $0^\circ$  longitude.
- **The Global Grid**
  - The intersection of the Equator ( $0^\circ$ N) and the Prime Meridian ( $0^\circ$ E) is located in the **Gulf of Guinea, Atlantic Ocean**.

## Great Circles

- **Definition:** Any circle that divides the Earth into two equal halves.
- **Examples:**
  - The **Equator**
  - All **lines of longitude (meridians)**
- **Not a Great Circle:** Any line of latitude **other than the Equator** (e.g., 60°N) is a smaller circle.

## Locating Places & Antipodes

- **Determining Northernmost/Southernmost Position:** The location with the highest numerical value for its northern latitude is the farthest north.
  - *Example:* Among Beijing, New Delhi, New York, and Rome, **Rome (41°54'N)** is the farthest north.
- **Finding the Antipode** (exact opposite point on Earth):
  - **Latitude:** Reverse the hemisphere (North becomes South).
  - **Longitude:** Subtract the original longitude from 180° (East becomes West).
  - *Example:* The antipode of 30°N, 50°E is **30°S, 130°W**.

## Geographical Extremes

- **Longest North-South Extension:** **Chile** (approx. 17°S to 56°S).
- **Regional Location:** The coordinates 50°N, 50°E are located in **Europe** (near Belgium).

## Time Zones and Longitude

### Longitude and Time Calculation

- **Basic Principle:**
  - Earth rotates 360° in 24 hours → **15° per hour**.
  - Therefore, **1° of longitude = 4 minutes** of time difference.

- **Calculating Longitude from Time:**
  - 2 hours ahead of GMT = **30° East** (e.g., Cairo).
  - 5 hours ahead of GMT = **75° East**.
  - 3 hours ahead of GMT = **45° East**.
  - 90° longitude difference = **6-hour** time difference.
- **Calculating Time from Longitude:**
  - Noon at 82°30'E = **6:30 AM at Greenwich (0°)**.
  - A telegram sent from Greenwich at noon, received at 6:00 PM (with a 12-min delay), means the location is **87° East**.

### The Prime Meridian (0° Longitude)

- **Definition:** The line of 0° longitude, passing through Greenwich, England. Basis for **Greenwich Mean Time (GMT)**.
- **Countries it Passes Through:** United Kingdom, France, Spain, Algeria, Mali, Burkina Faso, Togo, Ghana.
- **Countries it Does Not Pass Through:** Niger, Nigeria, Portugal.
- **Capital Cities on GMT:** London (UK), Lisbon (Portugal), Accra (Ghana), Dublin (Ireland).
  - *Not on GMT:* Addis Ababa, Ethiopia (2 hours 36 minutes ahead).

### The International Date Line (IDL)

- **Location:** Approximately along the **180° meridian**, primarily in the Pacific Ocean. It is **not straight** and is adjusted to avoid land masses.
- **Time Difference from Greenwich:** 12 hours.
- **Crossing the Date Line:**
  - **East to West (America to Asia):** Add one day.
  - **West to East (Asia to America):** Subtract one day.

## Indian Standard Time (IST)

- **Reference Meridian:** 82°30'E.
- **Difference from GMT:** 5 hours 30 minutes ahead (GMT +5:30).
- **Application:** When it is noon at the IST meridian, it is 6:30 AM at Greenwich.
- **First Sunrise in India (New Millennium):** Seen on **Katchal Island** (~93°30'E).

## Key Latitudinal Lines

### The Equator (0° Latitude)

- **Characteristics:**
  - Divides Earth into Northern and Southern Hemispheres.
  - Length: ~40,000 km (24,901 miles).
  - **78.7%** over water; **21.3%** over land.
- **Countries it Passes Through (13 countries):** Brazil, Colombia, Democratic Republic of the Congo, Ecuador, Gabon, Indonesia, Kenya, Kiribati, Republic of the Congo, Sao Tome and Principe, Somalia, Uganda.
  - *Does not pass through:* Mexico, Venezuela, Equatorial Guinea, Rwanda, Brunei.
- **Climatic Significance:**
  - **Minimum annual temperature range** due to consistent sunlight.
  - Location of the **Intertropical Convergence Zone (ITCZ)**.
- **Comparative Geography:**
  - The Equator, Tropic of Cancer, and Tropic of Capricorn all pass through **Africa**.
  - **Singapore** is the city nearest to the Equator from common options.

## The Tropic of Cancer (23.5° N)

- **Astronomical Fact:** On the **Winter Solstice** (Dec 21/22), the noon sun altitude at the Tropic of Cancer is **43.0°**.
- **Location:** 23° 30' North.
- **Nearest Indian City:** Jabalpur (23° 11' N). Also near Ahmedabad and Ujjain.
- **Countries it Passes Through:** India, Bangladesh, Myanmar, Saudi Arabia, UAE, Oman, China, Taiwan, Mexico, Bahamas, Egypt, Libya, Algeria, Mauritania, Mali, Niger, Chad.
  - *Does not pass through:* Iran.

## The Tropic of Capricorn (23.5° S)

- **Countries it Passes Through:** Chile, Argentina, Paraguay, Brazil, Namibia, Botswana, South Africa, Madagascar, Mozambique, Australia.
  - *Does not pass through:* Bolivia.
- **Meteorological Impact on India:** When the sun is overhead here (Dec 21/22), **high pressure develops over North-West India**.

## Earth's Motion: Days, Nights, and Seasons

- **Equinox**
  - **When:** March 21 (Vernal) and September 23 (Autumnal).
  - **Condition:** Day and night are of **equal duration** (~12 hours each).
  - **Sun Overhead At:** The **Equator**.
- **Summer Solstice (Northern Hemisphere)**
  - **When:** Around June 20/21.
  - **Condition:** **Longest day** in the Northern Hemisphere.
  - **Sun Overhead At:** The **Tropic of Cancer**.
  - **Effects:** Smallest noon shadow; 24-hour daylight at the Arctic Circle.
- **Winter Solstice (Northern Hemisphere)**
  - **When:** Around December 21/22.

- **Condition: Shortest day** in the Northern Hemisphere (longest day in the Southern Hemisphere).
- **Sun Overhead At: The Tropic of Capricorn.**

## Earth's History and Geology

### Origin and Age of the Earth

- **Theories of Origin:**
  - **O. Schmidt:** Earth originated from gases and dust.
  - **James Jeans:** Proposed the "Tidal Theory."
  - **F. Hoyle & Littleton:** Proposed the "Nova Hypothesis."
- **Determining Age:** Primary method is **Uranium dating**.

### Geological History & Evolution of Life

- **Geological Time Scale:**
  1. **Pleistocene Epoch:** The "**Great Ice Age**" (began over a million years ago).
  2. "**Little Ice Age**": A colder period from **1650 A.D. to 1870 A.D.**
- **Age of Dinosaurs:** Lived approximately **208 to 144 million years ago**.
- **Chronological Order of Life Forms:**
  1. Shelled animals
  2. First insects
  3. First reptiles
  4. First mammals
- **First Fossil Evidence:** Dates to the **Archean Age** (~3.5 billion years ago).
- **Factors Influencing Evolution:** Continental drift and glacial cycles.

## Plate Tectonics and Continental Drift

- **Supercontinents:**
  - **Pangea:** The original single huge landmass, surrounded by the ocean **Panthalassa**.
  - It split into:
    - **Laurasia** (north)
    - **Gondwanaland** (south)
- **Composition of Gondwanaland:** South America, Africa, Australia, Antarctica, Madagascar, Arabian Peninsula, Indian Subcontinent.
  - *Not part of Gondwanaland:* North America (part of Laurasia).
- **Mechanism of Drift:** Primarily due to **tectonic activities** (movement of plates).
- **Specific Plates:** The **Cocos Plate** is located between Central America and the Pacific Plate.

## Geological Forces and Changes

- **Types of Forces:** 
  - **Orogenic forces:** Cause **folding** (bending of rock layers) and mountain-building.
  - **Epeirogenic forces:** Cause large-scale vertical movements of continents.
- **Causes of Dynamic Changes:** A combination of:
  - **Endogenic Forces:** Geothermal energy, plate movements, gravitational force.
  - **External & Astronomical Factors:** Electromagnetic radiation, Earth's rotation and revolution.

## Know More About The Earth:

- [The Earth – Old Year Questions](#)
- [The Earth One Liner Questions & Answers](#)