NEED to KNOW

Higher Geography

Quick and easy revision

Key content at your fingertips

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Contents

Getting the most from this book

This *Need to Know* guide is designed to help you throughout your course as a companion to your learning and a revision aid in the months or weeks leading up to the final exams.

The following features in each section will help you get the most from the book.

You need to know

Each topic begins with a list summarising what you need to know in this topic for the exam.

Exam tips

Key knowledge you need to demonstrate in the exam, tips on exam technique, common misconceptions to avoid and important things to remember.

Key terms

Definitions of **highlighted** terms in the text to make sure you know the essential terminology for your subject.

Do you know?

Questions at the end of each topic to test you on some of its key points. Check your answers here: **www.hoddereducation.co.uk/needtoknow/answers**

Synoptic links

Reminders of how knowledge and skills from different topics in your Higher course relate to one another.

End-of-section questions

Questions at the end of each main section of the book to test your knowledge of the specification area covered. Check your answers here: **www.hoddereducation.co.uk/needtoknow/answers**

1 Physical environments

1.1 Atmosphere

You need to know

- the global heat budget
- the redistribution of energy by atmospheric and oceanic circulation
- the cause, characteristics and impact of the intertropical convergence zone

Synoptic link

The atmospheric changes and oceanic currents discussed in this chapter can be linked to the *Global climate change* topic. In addition, the movement of the ITCZ can be linked to rural land degradation in the Sahel, which in discussed in the *Rural* topic.

Global heat budget

On Earth, all of our energy comes from the Sun:

- Incoming solar heat (**insolation**) from the Sun can be **absorbed** or **reflected**, meaning that not all the heat reaches the Earth's surface.
- This incoming heat energy is balanced by the amount of heat escaping back into space.
- This vertical transfer of solar energy between Earth and space is known as the Earth's **heat budget** (Figure 1.1).

Key terms

Insolation Heat from the Sun received by the Earth

Absorbed Taken in

Reflected Returned back

Heat budget The balance between incoming heat absorbed by the Earth and outgoing heat escaping it in the form of radiation

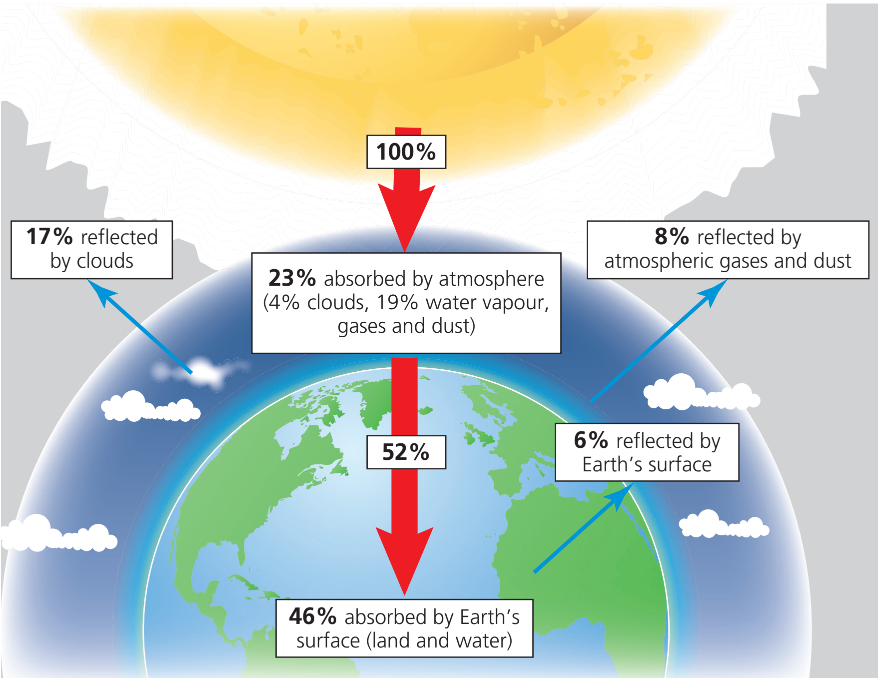

Figure 1.1 The Earth's heat budget

Figure 1.1 shows that the Earth's surface can absorb only 46% of incoming solar radiation (insolation) from the Sun. The rest is lost in a variety of ways:

- Absorption of insolation by clouds (4%) and by water vapour and other particles in the air (19%) leads to 23% of insolation not reaching the surface of the Earth.
- Reflection from the clouds, atmospheric gases and the Earth's surface accounts for 31% of energy bouncing back into space.
- The reflective power of the Earth's surface is called the **albedo** and it varies across the Earth. More reflection occurs at the poles due to ice/snow covering up to 85% of the land.
- **Scattering** may also account for a very small percentage of solar energy not reaching the surface.

Overall, the atmosphere absorbs 23% and the Earth's surface 46%, giving a total of 69% being absorbed. The total being reflected accounts for 31% of the Sun's energy.

Exam tip

In the exam you may be asked to describe and explain the energy exchanges that result in the Earth's surface absorbing less than 50% of the solar energy that reaches the outer atmosphere.

Surplus of solar energy

The energy that reaches the Earth's surface is not distributed evenly across the planet (Figure 1.2). In fact, there is a **surplus** of solar energy in the **tropical latitudes** and a **deficit** towards the poles.

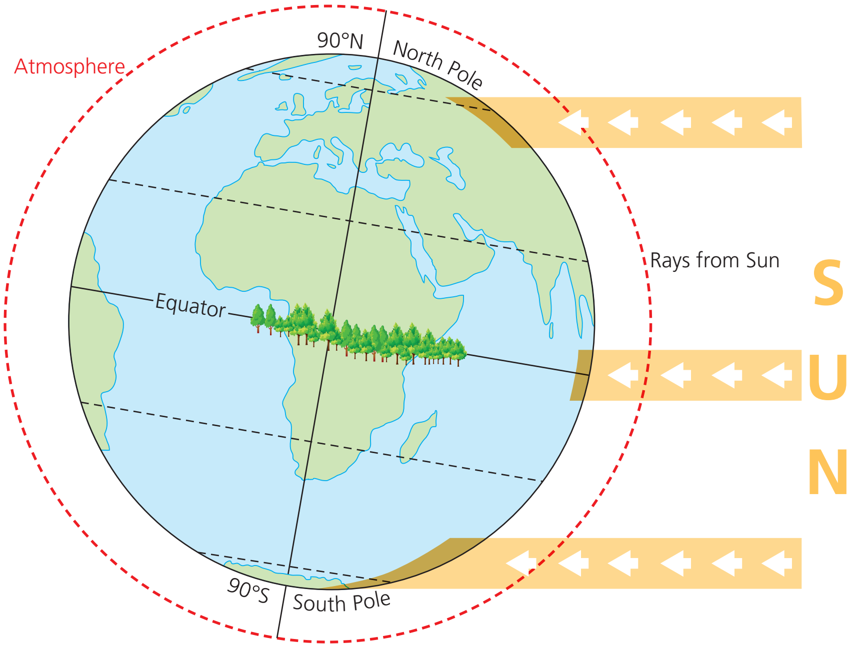

Figure 1.2 The distribution of solar energy

- The Sun's rays are concentrated on tropical latitudes as the intensity of insolation is greatest where rays strike vertically.
- the Sun's rays pass through less atmosphere at the **Equator**, therefore less energy is lost through absorption, reflection and scattering.

Key terms

Albedo The amount of light that is reflected by a surface

Scattering Thrown in different directions

Surplus Overabundance

Tropical latitudes The area between the Tropic of Cancer and the Tropic of Capricorn

Deficit A lack of

Equator An imaginary line drawn around the middle of the Earth at an equal distance from the North Pole and the South Pole

- Due to the curvature of the Earth, heat energy is spread over a larger area at the poles, weakening this energy.
- The tilt of the Earth also changes at different times of the year, so insolation levels differ:
  - In June, the northern hemisphere tilts towards the Sun, meaning more solar energy is received, creating summer conditions.
  - The opposite happens in December, resulting in winter.

Exam tip

Be careful not to use reverse points. For example, if you have already mentioned in your answer that the Sun's rays pass through less atmosphere at the Equator and therefore less energy is lost through absorption, reflection and scattering, do not repeat yourself by saying the opposite — that the Sun's rays pass through more atmosphere at the poles and therefore more energy is lost through absorption, reflection and scattering. You will be credited only once.

Redistribution of energy

In order to balance out distribution of energy at the Earth's surface, there is a constant transfer between the Equator and the poles. This is achieved through atmospheric circulation and oceanic currents.

Atmospheric circulation

Warm air is transferred from the Equator to higher (colder) latitudes, and the cold air from the poles is distributed to the lower (warmer) latitudes. The process by which this occurs is as follows:

1. Incoming insolation from the Sun arrives at the Equator.
2. Warm air rises at the Equator, creating an area of **low pressure**.
3. Air travels into the upper atmosphere towards 23.5° north and south of the Equator (Tropic of Cancer and Tropic of Capricorn).
4. Here, it begins to cool and sink back down to Earth, creating an area of **high pressure**.
5. Some of this air returns to the surface as trade winds travelling back to the Equator and forming the Hadley cell.
6. The remainder of the air travels north over the surface as the westerlies, to converge at 66° north and south of the Equator (the mid-latitudes).
7. Here, warm tropical air meets colder polar air travelling down from the Arctic/Antarctic on the polar easterlies.
8. This convergence causes air to rise, flowing into the upper atmosphere and creating a low-pressure zone.
9. From here, some air travels back towards the Equator on high-altitude winds called jet streams, forming the Ferrel cell.

Key terms

Low pressure A low-pressure area is where the atmospheric pressure is lower than that of surrounding locations; also called a depression

High pressure A high-pressure area is where atmospheric pressure is higher than normal; also called an anticyclone