

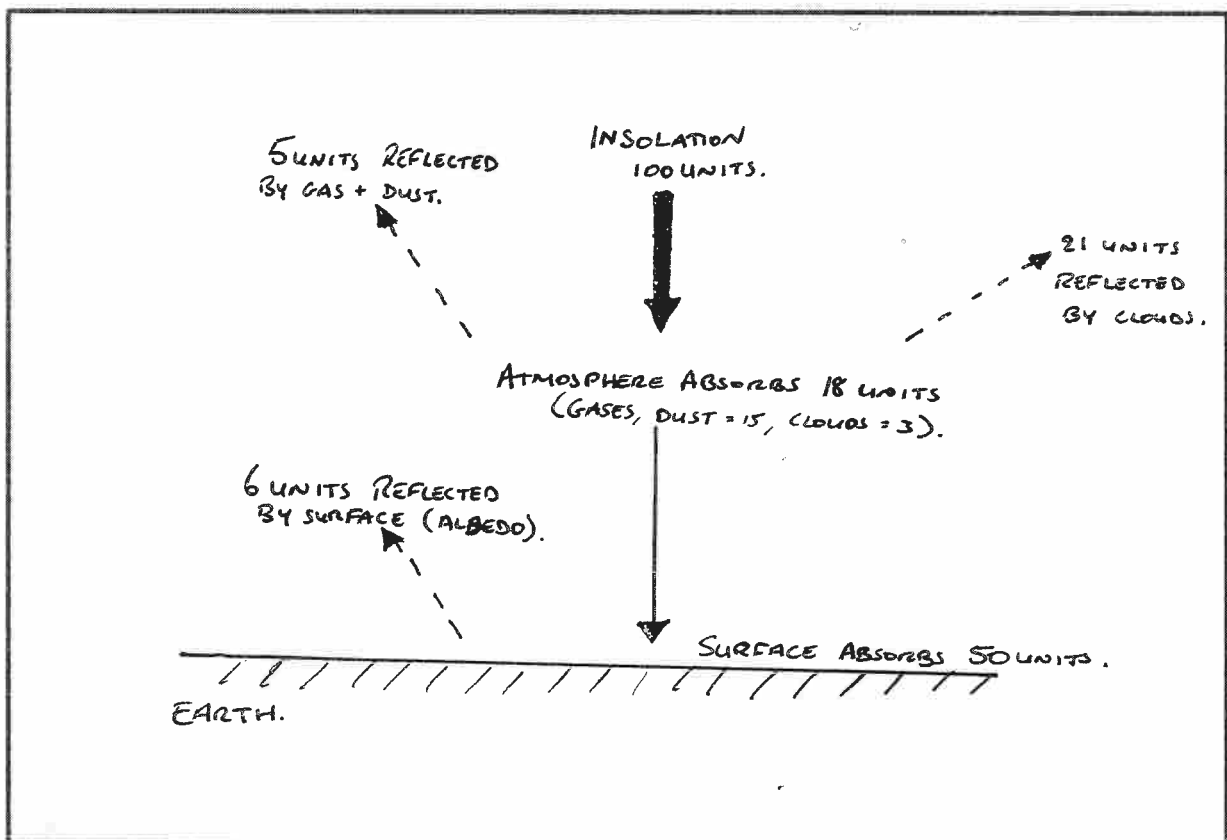
## AS Revision - Atmosphere

The following document should outline the main parts to revise for your exam questions on the atmosphere.

### Atmospheric Processes

The global energy balance requires knowledge of how the incoming solar radiation (**INSOLATION**) passes energy to the earth and the earth's ability to balance this energy through an open system of input, energy stores and outputs.

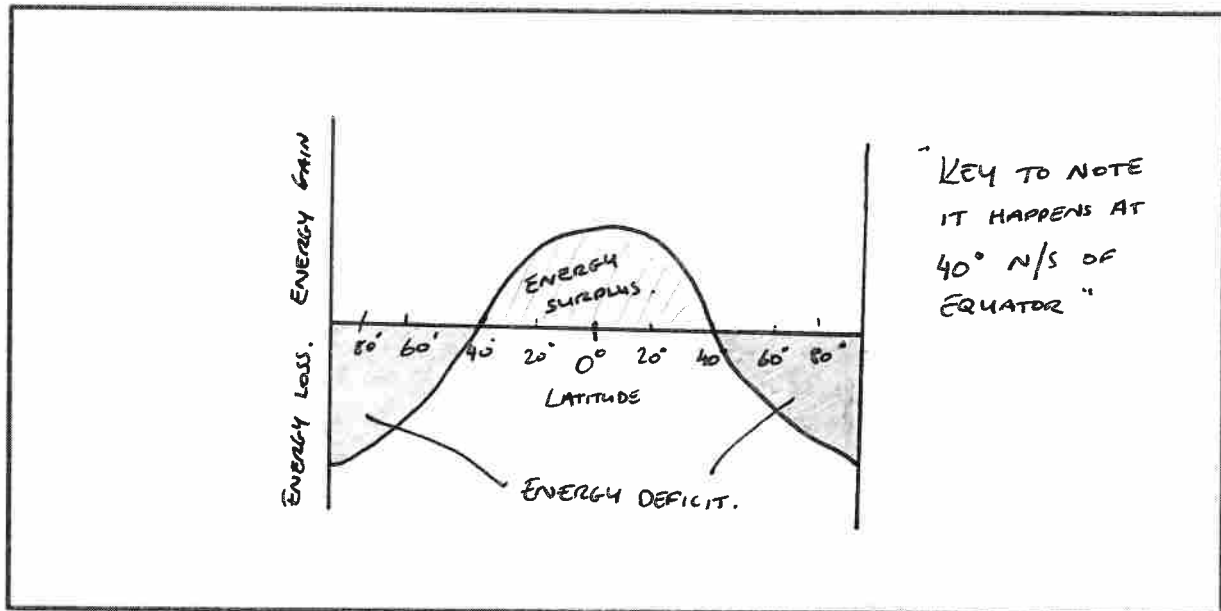
Insolation is short-wave and only half reaches the earth's surface. The rest is reflected or absorbed. The surface is heated and reflects energy back out as long-wave radiation to heat our atmosphere. The following diagram summarises what happens:



### The Heat Budget:

This is to do with the earth being curved and areas being closer to the sun than others. Anywhere between  $40^\circ$  N/S of the equator are closer to the sun and receive more insolation with sun higher in the sky all year round and in a year, they would build up a surplus of heat. Beyond  $40^\circ$ , the insolation is greatly reduced due to the thickness of atmosphere and the extra distance the

insolation has to travel. There are also periods when there is less hour of sunshine. Over the year, this leads to an energy deficit.



Latitude is not the 3 only factor affecting temperature. Others include:

- Altitude
- Continentality – difference between land and sea
- Prevailing winds
- Cloud cover
- Aspect – south facing

#### Heat Transfers:

To keep the world habitable, the deficit of energy in the north and south is supplemented by the surplus in the tropics. This creates an energy balance. There are 2 types of heat transfer:

1. **Vertical heat transfers** which travel vertically from surface into the atmosphere, cooling the land and heating the air. They include:
  - a. Radiation
  - b. Conduction
  - c. Convection
2. **Horizontal Heat Transfers** exchange energy across lines of latitude. These include:
  - a. **Wind** – thought to be most important
  - b. **Ocean currents** – 35% of energy exchanged. Examples: warm current Gulf Stream and cold current returning cold water: Labrador Current.

#### Wind speed and direction:

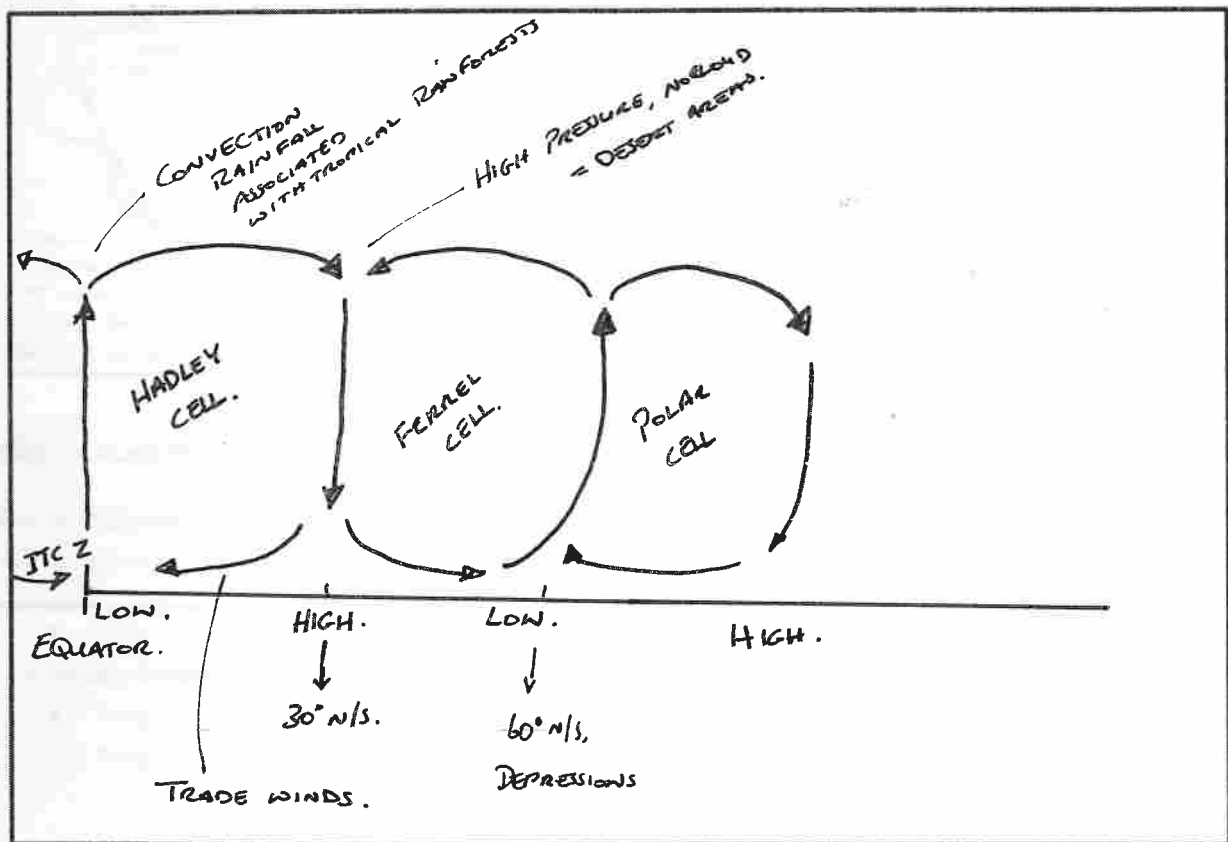
##### Rules:

- From high to low the wind doth blow.
- Wide isobars low pressure gradient – calmer, narrow isobars = larger gradient = strong winds.

- Speed also reduced by friction and happens mostly in lowest 1000m of air due to surface irregularities. Fastest winds in troposphere 5km up and reach 400km/hr.
- Direction affected by pressure gradient, friction and **Coriolis Effect** (rotation of the Earth). **Coriolis Effect** only happens from  $5^\circ$  N/S of equator and is stronger the further it gets away. No influence on speed. In the northern hemisphere, winds are deflected to the right of expected path and left in the southern hemisphere.

### General Circulation of the Atmosphere.

You should know the each of the cells and how the air circulates around them forming the **tricellular** model.

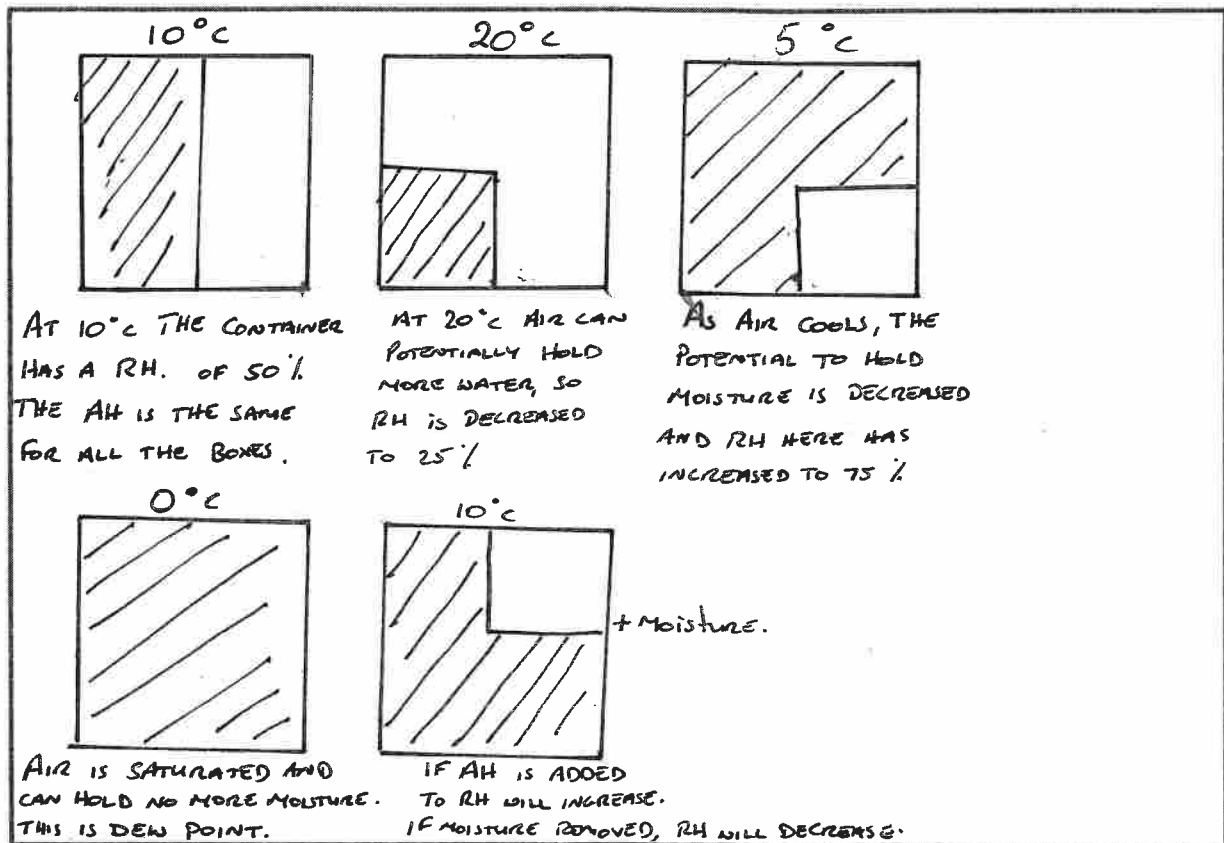


## Humidity:

2 types of humidity:

- **Absolute** – the actual amount of moisture in a volume of air
- **Relative** – the percentage of moisture in the air relative to temperature of air and its potential to hold moisture. Warm air can hold more so RH is lower.

MADE UP  
FIGURES FOR  
EXAMPLE ONLY.

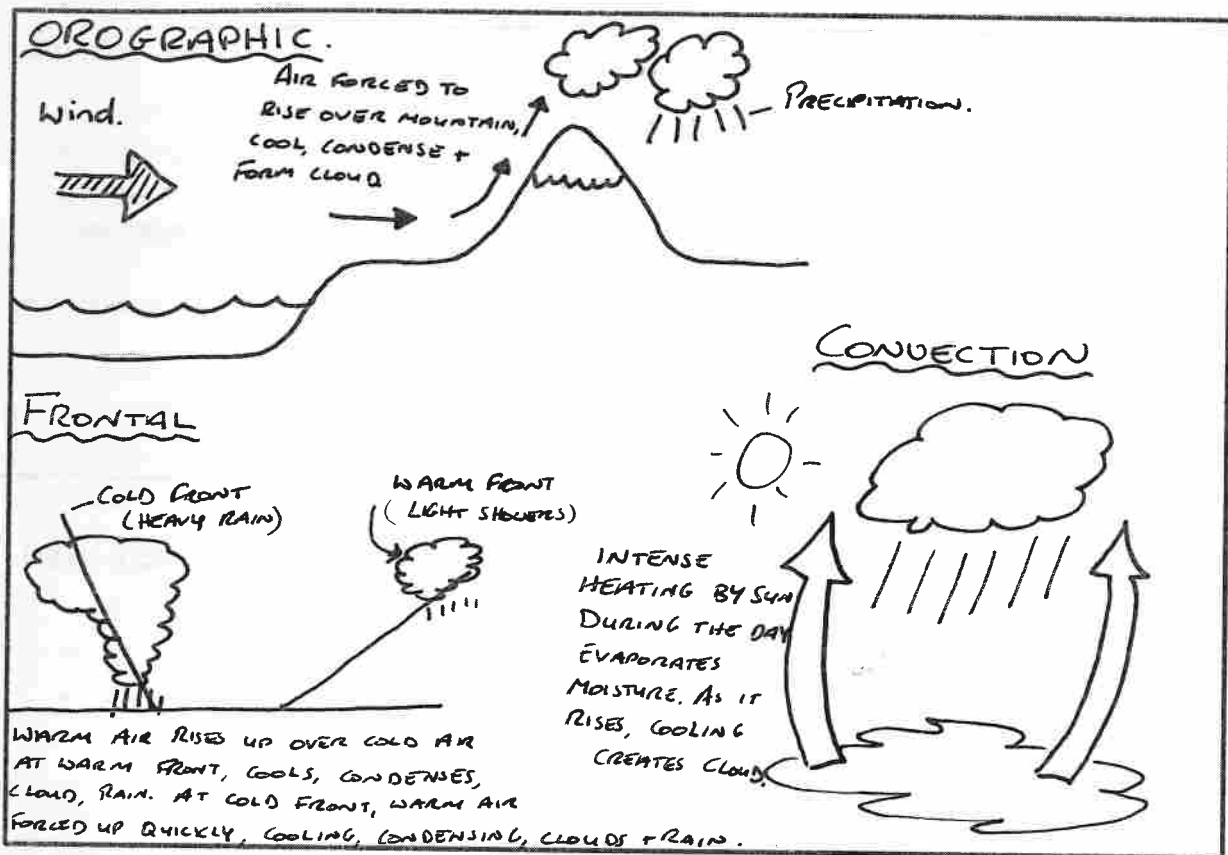


Condensation occurs at **dew point** when the air is saturated by moisture and can hold no more. It can occur for various reasons: (see page 66 of text book).

- Advection cooling
- Radiation cooling
- Cooling by uplift

This cooling of air in the higher parts of the troposphere can lead to precipitation. There are 3 types of rainfall:

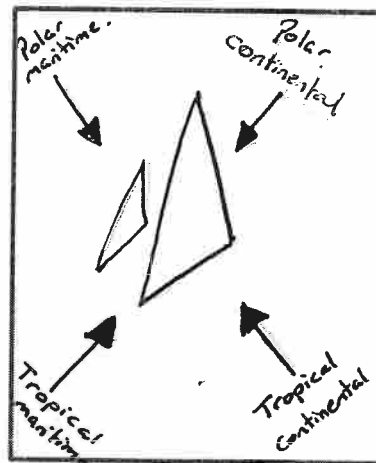
- Orographic/relief
- Frontal
- Convection



### Mid-Latitude Weather Systems

Occur in the area between 30-60° above or below the equator. 4 air masses play a part in forming the weather:

- Polar maritime
- Polar continental
- Tropical maritime
- Tropical continental



### Short and long questions:

You need to know the formation of depression and anticyclone. In fact for a depression, you may be asked to draw the diagram (see page 70). There will also be questions on the impacts of the weather systems or comparisons between the two. Case study material is essential (pages 71-73)

Examples:

Using an annotated diagram, describe the structure of a mid-latitude frontal depression and use your case study material to help you discuss the impact of such a weather system on people.

Explain the weather associated with a summer anticyclone and, using your case study material, contrast the impacts of winter and summer anticyclones on people.

Contrast the effects of low and high pressure systems on the weather of mid-latitude areas.

**Remember that all the case study detail can be called into shorter questions too.**

### Extreme Weather Events:

This section is all hurricane! We must know the following information:

- Conditions necessary for a hurricane to form
- How it forms
- Reasons why it dies
- Case Study Katrina and the management, impacts and protective measures. (Evaluate)

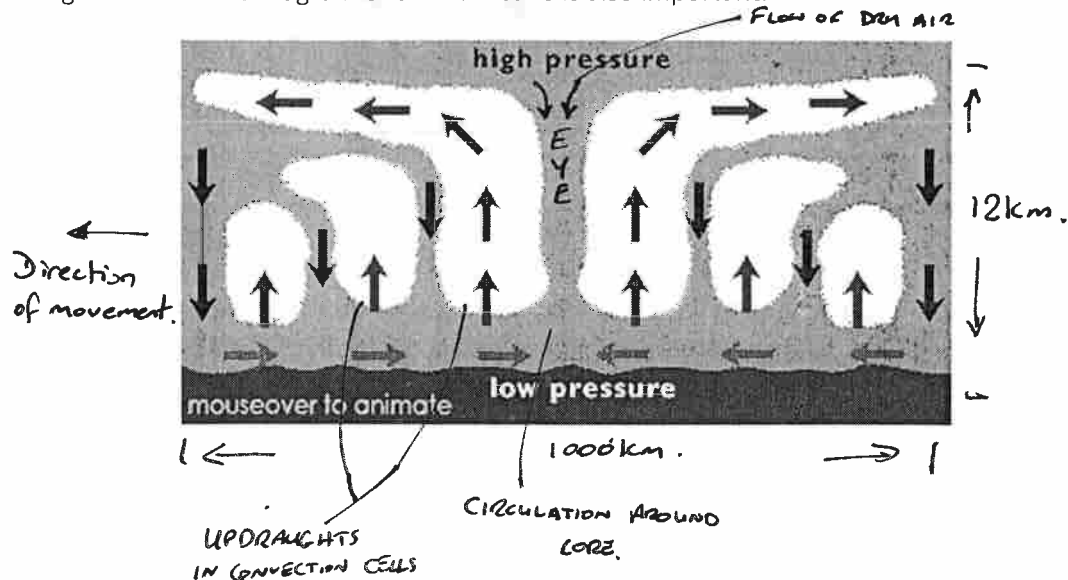
### Formation of hurricane

[https://www.youtube.com/watch?v=Wk\\_FVXVnE2I&feature=player\\_detailpage](https://www.youtube.com/watch?v=Wk_FVXVnE2I&feature=player_detailpage)

or type in BBC How hurricanes form.

If you watch and listen to this, the explanation is very good and easy to follow. Add the detail from the 12 points on page 75 to make it a complete essay question or answer to a short question.

Being able to draw a diagram of the hurricane is also important.



### The effects of hurricanes:

3 effects:

- Intensive rainfall – possible flooding
- Strong winds – destruction of property
- Storm Surge – massive coastal flooding eg. Irrawaddy River in Burma 2008, 70,000 swept away and 1 million homeless.

### Hurricane Katrina:

You must know the damage to people and property with at least 2 facts/figures. The questions can focus a little on these, but longer questions will focus on both impacts and protective measures and an evaluation of how successful they are. Text book lays it out with the protective measure and evaluation can be made with how Katrina affected the measure.

- Prediction and Warning
- Education
- Building Codes
- Coastal and river engineering
- Insurance

*With reference to a hurricane or tropical cyclone you have studied at a national or regional scale, evaluate the protective measures used to reduce the loss of life and damage to property.*

*For a named hurricane event, describe the effects of the hurricane on people and property and evaluate the effectiveness of the protective measures used to reduce the loss of life and damage to property.*