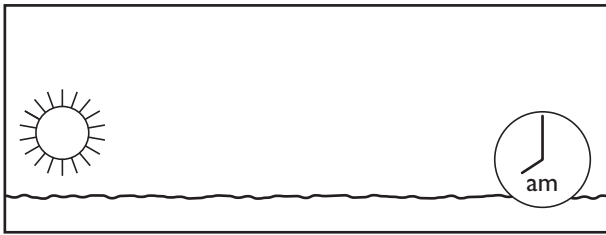


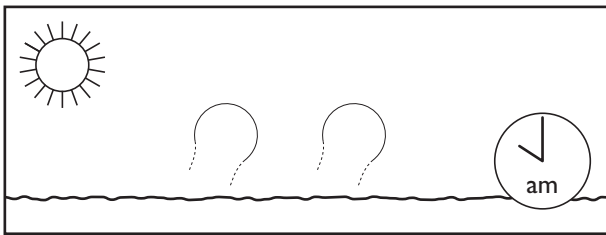
## Clouds

**When conditions are right, cumulus clouds grow to great heights and become towering giants. These are the clouds that produce showers of heavy rain. Most towering clouds follow a daily pattern.**

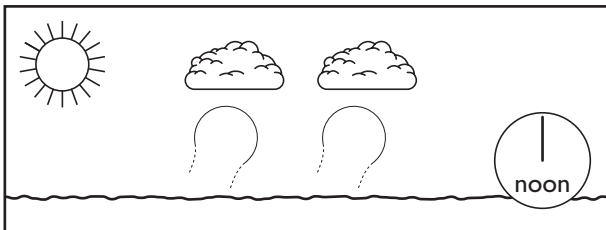
For each of these diagrams, write a sentence to explain what is happening.



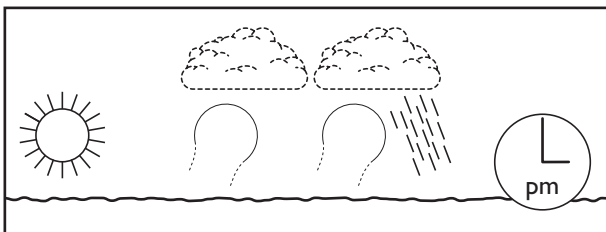
**Q1.** .....  
 .....  
 .....



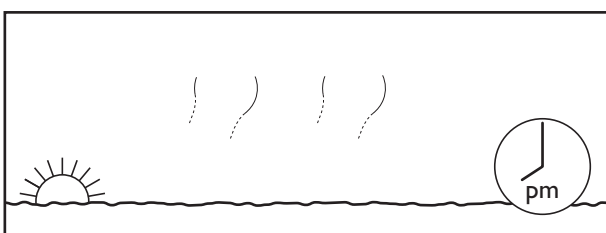
**Q2.** .....  
 .....  
 .....



**Q3.** .....  
 .....  
 .....



**Q4.** .....  
 .....  
 .....



**Q5.** .....  
 .....  
 .....

## Background

### Cumulus clouds

Cumulus clouds are individual clouds that form when warm air rises. (For more information see pages 38 to 40 of this teacher's resource book.) They may form patterns of small clouds (often called pillow clouds) or even high-level patterns consisting of thousands of tiny clouds (forming a 'mackerel sky'). Under suitable conditions, and particularly in the tropics or interiors of continents in summer, they may also form giant towering thunderclouds, known as cumulonimbus clouds.

The pattern of cumulus clouds tells how air is behaving in the sky. There is always a balance between rising and sinking air. Clouds occur where warm moist air is rising; clear patches show where air is sinking. With giant thunderstorms, the cool sinking air provides very strong winds at ground level, while the rising air can generate tornadoes.

### The development of rain-bearing cumulus clouds

Rain-bearing cumulus clouds are called cumulonimbus clouds. They typically begin to billow up on a hot morning, their towers gradually building until they dominate the sky. The great height to which they grow shows that they contain very strong updraughts, or thermals.

### Cumulus clouds, rain and hail

The different amounts of water and ice in a cloud are critical to the way that rain forms. In tropical cumulus clouds, thermals can be very strong and water droplets may have to be very large before they can fall. But strong air currents actually sweep the droplets together until they become large enough to fall from the cloud. This explains why tropical rain is made of large droplets.

Sometimes droplets are carried rapidly up and down inside a cloud by the fierce thermals. As they reach the cloud top they begin to freeze, and get a coating of ice (called rime); then they are forced rapidly downwards, gathering a coating of more small water droplets before being carried aloft once more where the surface water again freezes. After several cycles, large hailstones may form in this way, sometimes reaching the size of golf balls or even oranges.

## Answers

There are bound to be a great variety of answers to this worksheet. Here are the ideas that each diagram contains.

- Q1. The early morning sky is clear and bright. The Sun is already beginning to heat the ground, and some parts of the air are becoming hotter than others.**
- Q2. By mid-morning there are bubbles of hot air breaking away from the heated layer of air near the ground. They cannot yet be seen because the water is still vapour. No condensation has yet occurred.**
- Q3. The bubbles of air get higher and cooler. Now they form droplets and their upper regions can be seen as clouds. This is when clouds 'suddenly' appear in the sky. New bubbles of air are rising in the wake of those that are already forming cloud.**
- Q4. The clouds are getting taller and deeper. The droplets of water are being whisked about inside the cloud, bumping into each other and forming bigger droplets. These big, heavy droplets fall out of the cloud as rain. We experience them as showers because the individual clouds soon pass over us, but the rain is continuous from each cloud.**
- Q5. As the heat from the Sun wanes, no new air bubbles rise. Those that are in the sky complete their life cycles, and rain continues for a while into the evening. Then the sky begins to clear and a fine night occurs.**