

## SECTION 4

Questions 31-40 :Write **ONE WORD ONLY** for each answer.

### The history of weather forecasting

#### Ancient cultures

- many cultures believed that floods and other disasters were involved in the creation of the world
- many cultures invented 31..... and other ceremonies to make the weather gods friendly
- people needed to observe and interpret the sky to ensure their 32.....
- around 650 BC, Babylonians started forecasting, using weather phenomena such as 33.....
- by 300 BC, the Chinese had a calendar made up of a number of 34..... connected with the weather

#### Ancient Greeks

- a more scientific approach
- Aristotle tried to explain the formation of various weather phenomena
- Aristotle also described haloes and 35.....

#### Middle Ages

- Aristotle's work considered accurate
- many proverbs, e.g. about the significance of the colour of the 36....., passed on accurate information.

#### 15th-19th centuries

- 15th century: scientists recognised value of 37..... for the first time
- Galileo invented the 38.....
- Pascal showed relationship between atmospheric pressure and altitude
- from the 17th century, scientists could measure atmospheric pressure and temperature
- 18th century: Franklin identified the movement of 39.....
- 19th century: data from different locations could be sent to the same place by 40.....

In this series of lectures about the history of weather forecasting, I'll start by examining its early history – that'll be the subject of today's talk.

Ok, so we'll start by going back thousands of years. Most ancient cultures had weather gods, and weather catastrophes, such as floods, played an important role in many creation myths. Generally, weather was attributed to the whims of the gods, as the wide range of weather gods in various cultures shows. For instance, there's the Egyptian sun god Ra, and Thor, the Norse god of thunder and lightning. Many ancient civilisations developed rites such as (Q31) dances in order to make the weather gods look kindly on them.

But the weather was of daily importance: observing the skies and drawing the correct conclusions from these observations was really important, in fact their (Q32) survival depended on it. It isn't known when people first started to observe the skies, but at around 650 BC, the Babylonians produced the first short-range weather forecasts, based on their observations of (Q33) clouds and other phenomena. The Chinese also recognised weather patterns, and by 300 BC, astronomers had developed a calendar which divided the year into 24 (Q34) festivals, each associated with a different weather phenomenon.

The ancient Greeks were the first to develop a more scientific approach to explaining the weather. The work of the philosopher and scientist Aristotle, in the fourth century BC, is especially noteworthy, as his ideas held sway for nearly 2,000 years. In 340 BC, he wrote a book in which he attempted to account for the formation of rain, clouds, wind and storms. He also described celestial phenomena such as haloes – that is, bright circles of light around the sun, the moon and bright stars – and (Q35) comets. Many of his observations were surprisingly accurate. For example, he believed that heat could cause water to evaporate. But he also jumped to quite a few wrong conclusions, such as that winds are breathed out by the Earth. Errors like this were rectified from the Renaissance onwards.

For nearly 2,000 years, Aristotle's work was accepted as the chief authority on weather theory. Alongside this, though, in the Middle Ages weather observations were passed on in the form of proverbs, such as 'Red (Q36) sky at night, shepherd's delight; red sky in the morning, shepherd's warning'. Many of these are based on very good observations and are accurate, as contemporary meteorologists have discovered.

For centuries, any attempt to forecast the weather could only be based on personal observation, but in the fifteenth century scientists began to see the need for (Q37) instruments. Until then, the only ones available were weather vanes – to determine the wind direction – and early versions of rain gauges. One of the first, invented in the fifteenth century, was a hygrometer, which measured humidity. This was one of many inventions that contributed to the development of weather forecasting.

In 1592, the Italian scientist and inventor Galileo developed the world's first (Q38) thermometer. His student Torricelli later invented the barometer, which allowed people to measure atmospheric pressure. In 1648, the French philosopher Pascal proved that pressure decreases with altitude. This discovery was verified by English astronomer Halley in 1686, and Halley was also the first person to map trade winds.

This increasing ability to measure factors related to weather helped scientists to understand the atmosphere and its processes better, and they started collecting weather observation data systematically. In the eighteenth century, the scientist and politician Benjamin Franklin carried out work on electricity and lightning in particular, but he was also very interested in weather and studied it throughout most of his life. It was Franklin who discovered that (Q39) storms generally travel from west to east.

In addition to new meteorological instruments, other developments contributed to our understanding of the atmosphere. People in different locations began to keep records, and in the mid-nineteenth century, the invention of the (Q40) telegraph made it possible for these records to be collated. This led, by the end of the nineteenth century, to the first weather services. It was not until the early twentieth century that mathematics and physics became part of meteorology, and we'll continue from that point next week.