



# how to measure air pressure using a barometer

The barometer must be hung on a wall or a post. It will not work properly lying flat on a table, for instance. Let it hang for a minute before taking a reading. There are four scales on the dial.

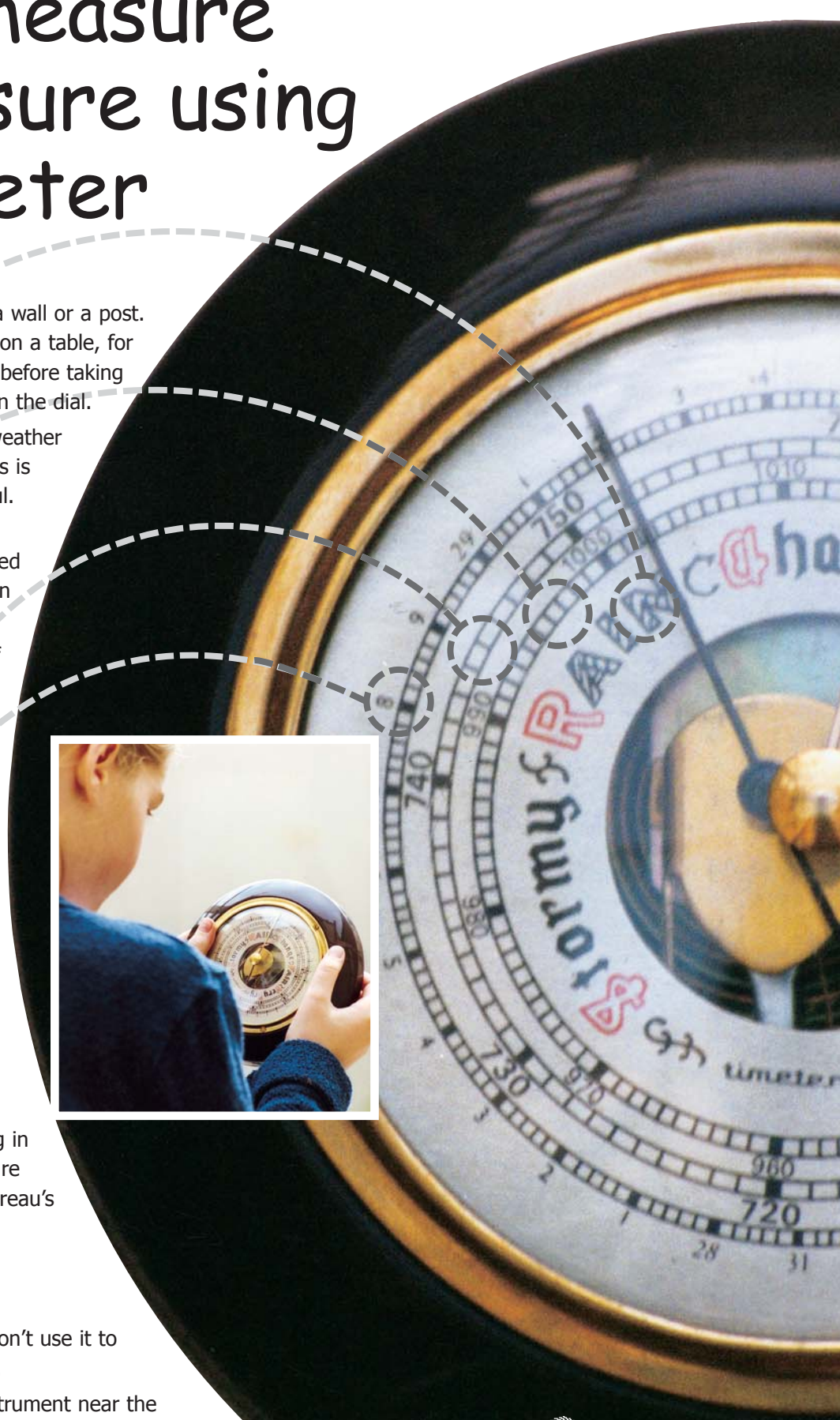
- ◆ The inner scale describes the weather in words, such as "stormy". This is only a guide and is rarely useful.
- ◆ The next scale is millibars, or hectopascals (hPa), the unit used by the Bureau of Meteorology in Australia.
- ◆ The third scale is millimetres of mercury, which simulates the reading from a liquid mercury barometer (details over the page).
- ◆ The fourth scale is inches of mercury – imperial units that are not used in Australia any more.

If you know how high your town or suburb is above sea level, you can convert your air pressure reading to the mean sea level (MSL) pressure (details over the page). Divide your altitude (in metres) by nine, then add that number to your barometer reading in hectopascals. Now you can compare the result with readings on the Bureau's MSL analysis and forecast charts.



## do's and don'ts

- ✗ A barometer is not a discus. Don't use it to practice for the next Olympics.
- ✓ Be careful. Don't leave the instrument near the edge of a table.
- ✗ Do not try to recalibrate the barometer. Report errors or breakages to your teacher.





# air pressure

Air pressure is the force exerted by the weight of the atmosphere. Most of the time we are unaware of air pressure, but we do become aware of it if the pressure changes quickly, such as when you descend in an aircraft and your ears 'pop' in adjusting to the greater pressure.

In general, the pressure is less for those flying in an aircraft than for those lying on the beach. For the one location, air pressure also varies with time, and these latter changes are very important in studying and forecasting the weather. They are especially valuable in forecasting wind speeds and direction.

Weather charts show the pressure at one altitude or level, such as the mean sea level (MSL). They are drawn with points of equal air pressure joined by lines called isobars (can you spot the two 1028 hectopascal isobars below?).

When drawing charts from air pressures readings taken at different altitudes, the observations are converted to the same level (MSL, for instance) using a mathematical equation (see over the page).

## the instrument

A barometer is an instrument used to measure atmospheric pressure.

Older-style **mercury barometers** comprise a glass tube about 84 centimetres high, closed at the top and open at the bottom. When the tube is filled with mercury and the open end is placed in a cup of the same liquid, the level of mercury in the tube falls to a height of about 76cm above the cup.

This leaves an almost perfect vacuum at the top of the tube, and variations in atmospheric pressure cause the liquid to rise or fall by small amounts.

A more convenient and safer version of the instrument is now commonly used. The **aneroid (without fluid) barometer** contains a flexible metal cylinder from which most of the air has been evacuated.

When air pressure increases, the sides of the cylinder are pushed closer together. When the pressure falls, the cylinder expands again.

The cylinder is connected to a pointer that moves around a dial. The expansion and contraction of the cylinder is very small but is magnified by a system of springs and levers connected to the pointer.

