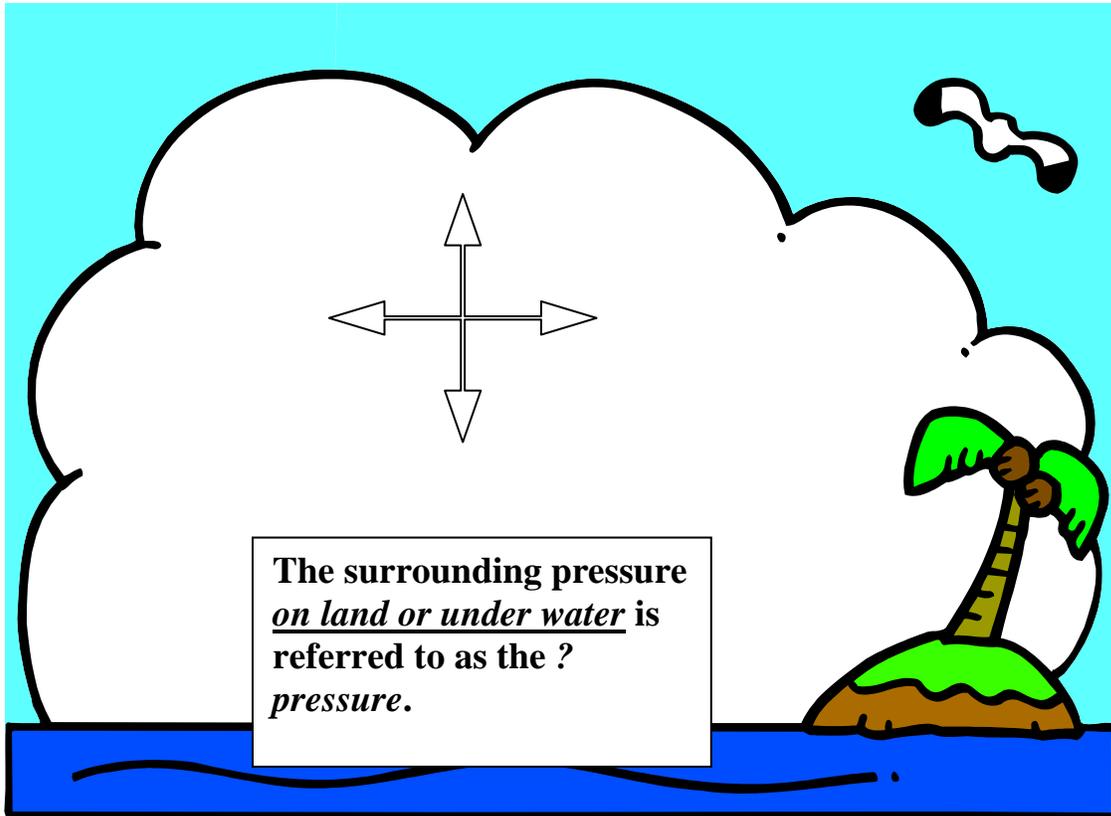


Ambient Pressure Overhead Transparency

Ambient Pressure = _____ and _____ Pressure,
collectively



Background Reading

It can be confusing when different terminology is used to describe the same thing. One example is the use of multiple terms to indicate the pressure around us *and* the different measurement units for that pressure.

1. The surrounding pressure, *on land or under water*, is referred to as the *ambient pressure*.
2. If the surrounding pressure is from the *weight of air*, it is the *atmospheric pressure*
3. If the surrounding pressure is from the *weight of water*, it is the *water pressure*

Ambient Pressure on land and under water.

1. When surrounded by air, ambient pressure = atmospheric pressure = barometric pressure.
2. When surrounded by water, ambient pressure = water pressure.

WHAT ARE THE MEASUREMENT UNITS FOR THE AMBIENT PRESSURE?

Weather forecasters usually report air pressure in terms of a barometer reading in **inches**, e.g., "the barometer is currently 30 inches of mercury and rising." A barometer is an instrument for measuring atmospheric pressure, so *barometric* pressure is just another term for atmospheric pressure. (Students make a simple barometer.)

There are several units of measurement for ambient pressure. None is universally used, as different groups seem to prefer different terms to describe this pressure. The various terms are listed in Table 1, arbitrarily subdivided according to whether or not they are commonly employed in diving.

Note that "bar" is commonly used in European diving. North Americans who rent air gauges in other countries may find them calibrated in bars. Thus, a tank filled to 3000 psi would register 206 bars.

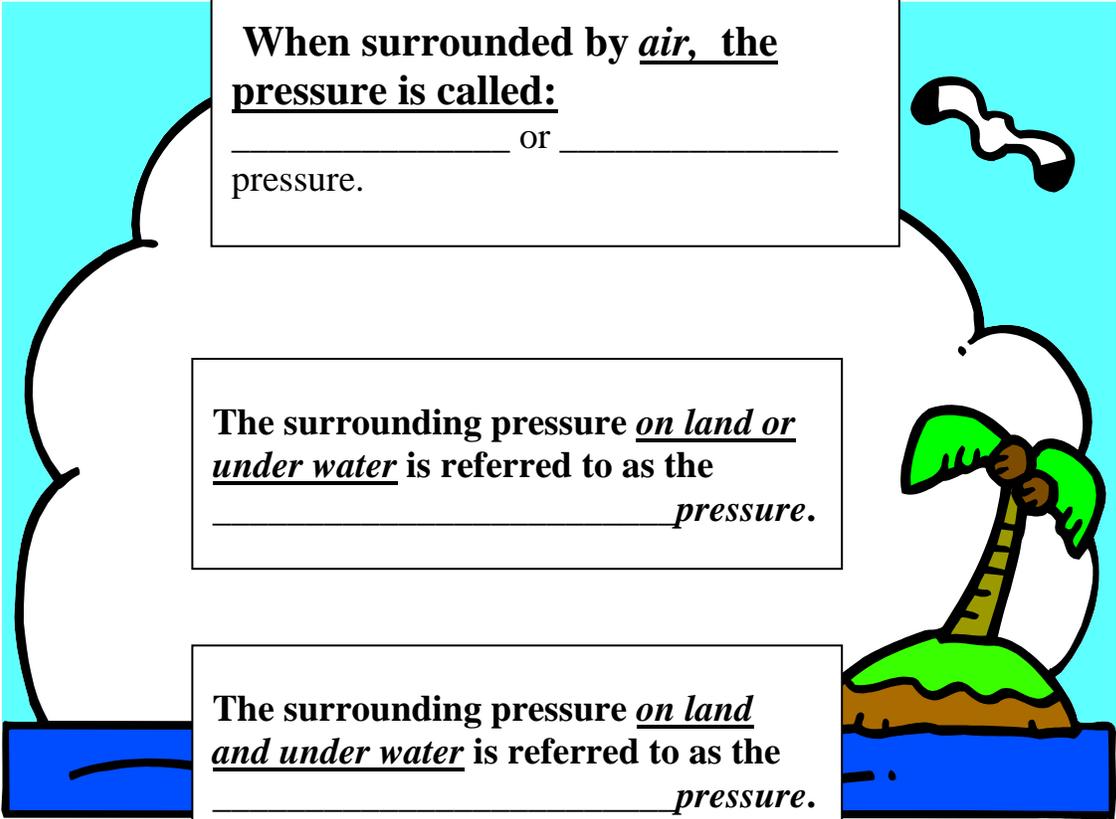
| TABLE 1. VARIOUS UNITS OF MEASUREMENT FOR <u>AMBIENT</u> PRESSURE (fsw = feet sea water; Hg = mercury) | | | |
|--|------------------|---------------|---------------------------------------|
| ambient pressure at: | | | |
| <u>used in diving</u> | <u>sea level</u> | <u>33 fsw</u> | |
| psi | 14.7 | 29.4 | |
| atmospheres | 1 | 2 | |
| bar (non-U.S. only) | 1.01 | 2.02 | |
| <u>used in other fields</u> | | | |
| cm H ₂ O | 988 | 1976 | |
| inches Hg (mercury) | 29.92 | 59.84 | (air pressure at surface for weather) |
| mm Hg (torr) | 760 | 1520 | (air pressure at surface for weather) |
| kilopascal | 101.3 | 202.6 | (air pressure aloft) |

WHAT IS AN "ATMOSPHERE" OF PRESSURE?

1. **One atmosphere (atm.) is the air pressure at sea level and equals 14.7 psi.**
Note that the term "one atmosphere" is just a measurement; you don't have to *be* at sea level to be surrounded by one atmosphere. **You** could be in a submarine 330 feet under water and still be surrounded by one atm. of pressure within the submarine (though the submarine hull would be surrounded by 10 atm. of water pressure).
2. **Similarly, two atm. is twice the sea level pressure.** Two atm. = 29.4 psi, a pressure reached at 33 fsw (Table 1). You could also experience this pressure on land, in a hyperbaric chamber. Conversely, the air pressure at 18,000 feet altitude = 7.35 psi, but this could be experienced at sea level as well, inside a chamber that can simulate altitude.
3. Don't confuse "atmosphere," which is one unit of measurement, with "atmospheric pressure," which is a general term for the surrounding air pressure. **Atmospheric pressure** could be any value, e.g., one atm. (sea level pressure), one-half atm. (18,000 feet), zero (outer space), or three atm. (inside a hyperbaric chamber).
4. Another important unit of measurement is **millimeters of mercury, abbreviated mm Hg** (Hg is the chemical symbol for mercury). Some texts refer to mm Hg by the term "torr," after the Italian Evangelista Torricelli (1608-1647), a pioneer in the measurement of atmospheric pressure; one mm Hg = one torr. Air pressure at sea level is 760 mm Hg (or 760 torr). In medicine and science, mm Hg is commonly used as the unit for partial pressures of gases.
5. Note that psi and mm Hg reflect different ways of measuring the same thing. At sea level, air *weighs* **14.7 pounds per square inch of earth's surface, so the pressure is 14.7 psi.** It is also true that this weight of air will *support* a column of mercury 760 mm high, so the air pressure is also 760 mm Hg.

Student Activity Sheet

Ambient Pressure = _____ and _____ Pressure, collectively.



When surrounded by air, the pressure is called:
_____ or _____
pressure.

The surrounding pressure on land or under water is referred to as the
_____ *pressure*.

The surrounding pressure on land and under water is referred to as the
_____ *pressure*.

Answer Key

Ambient Pressure = Air and water pressure, collectively.

