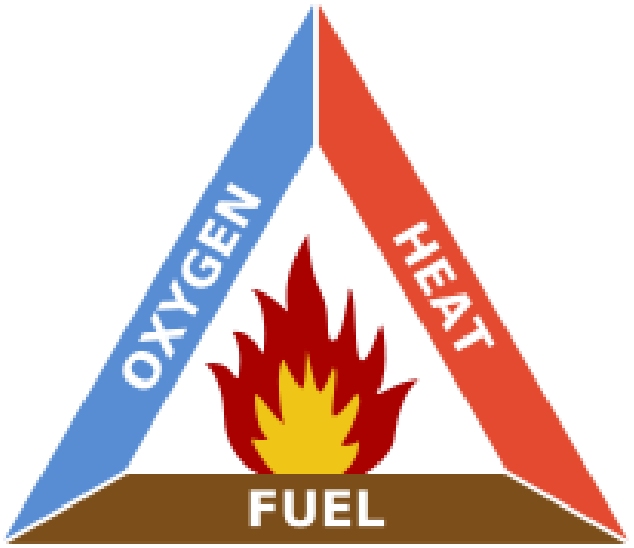
Unit 203: Scientific principles for domestic, industrial and commercial plumbing

Outcome 5
Principles of combustion and heating gases

Principles of combustion

Fire is one of the most destructive elements that exists.
Combustion is a chemical reaction with oxygen:

Fuel + Oxygen + Heat = Fire
Propane + Oxygen + spark = Flame



Principles of combustion

Various gases are used in plumbing situations:

- Soldering
- Heating water
- Space heating
- Cooking

The three common gases are:

- Natural gas
- Propane
- Butane

Principles of combustion

Values of gases

	Natural gas	Propane	Butane
Relative density	**0.58**	**1.78**	**2.0**
Calorific value	**38.5MJ/m^3**	**95.0MJ/m^3**	**121.5MJ/m^3**
Flame temperature	**1930^{0}C**	**1980^{0}C**	**1996^{0}C**
Air/gas ratio (approx)	**10:1**	**24:1**	**30:1**

Principles of combustion

Natural gas: commonly used in domestic properties for boiler and cooker fuel. Ventilation is required in certain applications. Not hot enough for soldering.

Propane: commonly used for caravan boiler and cooking. Also used if mains gas is unavailable. Ventilation required.

Butane: commonly used in barbecues, due to high calorific value. Too hot for soldering. Ventilation required.