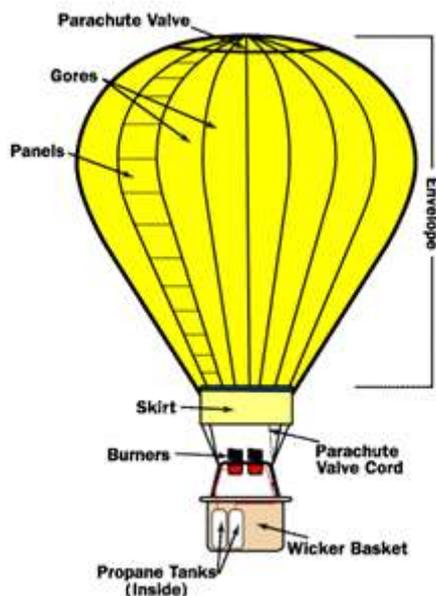


Science – Today we are going to look at the science behind a hot air balloon and how they work.

If you actually need to get somewhere, a hot air balloon is an unpractical vehicle. You can't really steer it, and it only travels as fast as the wind blows. But if you simply want to enjoy the experience of flying, there's nothing quite like it. Many people describe flying in a hot air balloon as one of the most peaceful, enjoyable activities they've ever experienced. You'll be amazed by the beautiful simplicity of these early flying machines!

Balloon Design

Hot air balloons are based on a very basic scientific principle: warmer air rises in cooler air. Essentially, hot air is lighter than cool air, because it has less mass per unit of volume. To keep the balloon rising, you need a way to reheat the air. Hot air balloons do this with a burner positioned under an open balloon envelope. As the air in the balloon cools, the pilot can reheat it by firing the burner.



A hot air balloon has three essential parts: the burner, which heats the air; the balloon envelope, which holds the air; and the basket, which carries the passengers.

In most modern hot air balloons, the envelope is constructed from long nylon gores, reinforced with sewn-in webbing. The gores, which extend from the base of the envelope to the crown, are made up of a number of smaller panels. Nylon works very well in balloons because it is lightweight, but it is also fairly sturdy and has a high melting temperature. The skirt, the nylon at the base of the envelope, is coated with special heat-resistant material.

The hot air won't escape from the hole at the bottom of the envelope because buoyancy keeps it moving up. If the pilot continuously fires the burner the balloon will continue to rise.

Hot air balloons also have a cord to open the parachute valve at the top of the envelope. When the pilot pulls the attached cord, some hot air can escape from the envelope, decreasing the inner air temperature. This causes the balloon to slow its rise. If the pilot keeps the valve open long enough, the balloon will sink and fall. Most hot air balloons use a wicker basket for the passenger compartment. Wicker works very well because it is sturdy,

flexible and relatively lightweight. The flexibility helps with balloon landings: wicker material flexes a little, absorbing some of the energy.

Essentially, these are the controls – heat to make the balloon rise and venting to make it sink. This raises an interesting question: If pilots can only move hot air balloons up and down, how do they get the balloon from place to place? As it turns out, pilots can influence their direction by changing their altitude, because wind blows in different directions at different altitudes. To move in a particular direction, a pilot ascends or descends to the appropriate level, and rides with the wind. Since wind speed generally increases as you get higher in the air, pilots can also control speed by changing altitude.

Answer the questions based on the information above.

1. Why is a hot air balloon not a good way to travel?
2. Why is hot air lighter than cool air?
3. What are the three essential parts of a hot air balloon and what does each part do?
4. What type of material is used to construct the envelope of the hot air balloon?
5. Why does nylon work well to make the balloons?
6. What type of force keeps the hot air from escaping?
7. How does the pilot slow the rise of the hot air balloon?
8. Why does wicker work well to carry passengers?
9. Explain how a pilot can move the hot air balloon in a particular direction.