Onwards and upwards

For years and years people have tried to make buildings more and more impressive. And it seems the best way to impress is to make a building tall. Very tall.

But it's not a simple task - there are many obstacles getting in the architect's way. Perhaps the most obvious obstacle is gravity. The more stories you build, the more weight there is pushing down onto the ground floor.

One way of making a tall building would be to make it wider at the base than at the top - think about the Pyramids in Egypt. Or you could create really strong walls on the lower floors by making them thicker.

This is limiting, though. Think about a pyramid the height of the Empire State Building. It would have a massive base and something so narrow at the top that no one could get in. And tall buildings aren't just for show; they're generally built to house hundreds of offices or flats using only a small ground space.

Fortunately, in the late 1800s, engineers overcame this pyramid-shaped dilemma. It was thanks to the mass production of iron and steel. Engineers were able to make long beams of iron which could make the skeleton of a building. It was much lighter - and stronger - than bricks and mortar. And it took up less space.

Nowadays it's common to see tall buildings sprouting up in our towns and cities.

Home sweet home

It's all well and good talking about pyramids and skyscrapers, but the sort of building we're most familiar with is a house. These too have to be built to a number of stringent standards.

Think about the essential properties of your house. It has to keep you warm and dry. You want light to come in through the windows (and you want to be able to see out of them). You want some way of getting in and out of the house. You want walls to separate the rooms. The list could go on and on. Each of these properties requires different materials and joining techniques, all with certain standards.

Take windows as an example. Windows are made of glass. Simple. But glass comes in many shapes and sizes. So certain standards have to be met to make sure your windows aren't going to smash when lightly tapped, or blow out from their frames when a slight breeze blows.

Windows also need to retain some heat. It seems pointless having insulated walls and roofs if there are windows dotted about the place letting all the heat out. Double glazing is one of the most common ways of insulating windows. And, you've guessed it; there are ways and means of testing the thermal conductivity of these windows.

Then there are all the services we expect in our house - electricity, gas and water. There are numerous regulations to make sure the potential danger of, say, electrocution is kept to a minimum. We take it for granted that we won't get a shock when we turn a light on. But if it wasn't for British Standards you'd be much more likely to have some dodgy electrics installed.

Plumbing, too, has many standards to be followed. Imagine how difficult it would be to fit a new tap if all the pipes, screws, washers and nuts and bolts were non-standard sizes.

Right screws

To construct a large building you need to comply with many different standards. There are thousands of bits and pieces that have to be manufactured and then put together.

Numerous different people will be involved with the process - using British Standards ensures it runs smoothly. For example, a designer will put his ideas onto paper, an engineer will then order the bits of steel and a steel manufacturer will deliver exactly the right sized parts.

If there was some breakdown in communication the engineering firm would lose millions of pounds. Or worse still, they could build a shoddy building that fell down.

So standards ensure components are compatible, materials are strong enough and the resulting construction is safe and long-lasting.

I feel the earth move

Earthquakes are a big problem in some countries. We even have small tremors in Britain from time to time. So we have to take the Earth's movement into account when constructing a building.

Buildings, therefore, often have 'damper systems' built into them. These are designed to absorb the violent shock caused by an earthquake. They break up the waves of motion that could otherwise send a building crashing to the ground.

And it's not just earthquakes that are a problem. Strong winds also have an effect on buildings - especially tall ones; so damper systems are also used to counteract movement caused by the wind.

Patrick Mahon, Senior Structural Engineer, Alan Baxter Associates, was the chief designer of this building near Canary Wharf, South London. The building, which is currently under construction, took one and a half years to design and detail; it should take a total of two years to build.

"British Standards provide a standard method for building design that's recognised worldwide," says Patrick. "Combined with good common sense and logic, British Standards must be used to make sure the building is both economical and safe.

"We use laws of mechanics to work out what forces and loads will act on the structure; and British Standards use formulas that have been created from physical testing. These tell us the 'ultimate limit state capacity' of the structure. In very simple terms, that's the amount of force it'll take before breaking."