Topic: Solar system / space and time

Astronomy and football

http://www.primaryscience.ie/media/pdfs/col/astronomy_and_football_activity.pdf

What you will need:

- Large beach ball, small pea, small seed (to represent the Sun, Earth and Moon).
- A football field
- Balls of various sizes to represent the different planets (an actual soccer would be good for one of the planets).
- If using Styrofoam balls the following are suggested size ratios:
- 1(Mercury): 1¼ (Mars): 1½ (Venus): 1½ (Earth): 2(Neptune): 2½ (Uranus):3(Saturn): 4(Jupiter): 6(Sun).
- (These are workable sizes and are not the actual ratios – you could fit thousands of Earths into the Sun! You could also use different fruits to represent the planets, e.g. melons, apples, grapes, etc.)

Background information:

A football field can be used to compare distances in our Solar System. It should help towards some understanding of the vastness of our part of the Universe.
The planets orbit the sun in an elliptical path, so each planet has a maximum and a minimum distance from the sun. To help us get a realistic feel of sizes, a large beach ball can represent the Sun, a small pea the Earth, and a small seed the Moon.
Pluto, the smallest, is one of the coldest places in our Solar System (minus 230º C!), but is no longer classified as a planet. In 2006 the International Astronomical Union re-defined the word 'planet', and Pluto is now classified as a 'dwarf planet'. So there are now officially 8 planets in the solar system rather than 9.

Because it is difficult to deal with distances of thousands of millions of kilometres, astronomers often use Astronomical Units (A.U.): they called the distance from Earth to the sun 1 A.U. Mars is just over one-and-a-half times further from the sun than the Earth, so its distance is called 1.52 A.U.

Questions:

What is our planet called?
Where does the light and heat on Earth come from? (The sun)
Looking at the small pea (Earth) and large beach ball (the Sun) "How big is the Sun compared to the Earth?" (about 7000 times bigger!)
Why does the sun look so small to us? (Because it is so far away)
What would happen to you if you went close to the sun? (You would roast!)
Does the sun move? (No, the Earth revolves around the sun, once in a year).

What to do:

1. On the 'football field' (whether a real one or just a large space in the school yard) place the sun on one goal-line, and Neptune on the other goal-line.
2. Place appropriately-sized balls or fruit in order from Mars to Jupiter.

Topic: Solar system / space and time

The moon, craters and meteorites

http://www.primaryscience.ie/media/pdfs/col/meteorites_activity.pdf

What you will need:

- large tray (minimum 4 centimetres deep)
- flour or sand
- newspaper
- plasticine (or else different-sized spherical objects, e.g. marbles, balls, beads), drinking chocolate powder, metre stick
- cm rulers
- sieve

Preparation

This activity may be best done outdoors as it is quite messy!

Background information

The dark circles which you can see on the Moon (with your naked eye, or better with binoculars) are craters. A crater is a hollow on the surface of the Moon. These craters were formed when meteorites hit the Moon's surface. The impact of the meteorites caused the hollows to form and some of the surface to be thrown up and out around the crater. This is called *ejecta* (because it was ejected from the surface). Meteorites are bits of rock in space.

Questions

Have you ever heard of a crater? (The children may know about a crater being the hollow at the top of a volcano – it is important to emphasize that the two types of crater are completely different).
Do you know of any other type of crater?
Have you any idea what might cause them?
What happens if you drop something heavy onto soft sand on the beach?
Is it the same as dropping something onto a wooden floor?

What to do

Spread the newspaper onto the floor, put the tray on the newspaper and put some flour onto the tray, until it is about 5 or 6 centimetres deep. Make the flour as smooth as possible without packing it down. Hold the sieve over the flour and put some drinking chocolate into it and shake it until you get a thin brown layer on the flour.
Make different sized balls from plasticine (these are the 'meteorites').

Younger children:
Drop one of the balls onto the moon's surface.
Draw what happens.
Drop a different ball onto the moon's surface.

Does it make a bigger or smaller crater?
Drop some more balls and draw a moon surface.

Older children:

1. Drop one ball and measure the diameter of the crater. Now drop the same ball from different heights; each time carefully remove the ball and measure the size of the crater. How do different heights change the size of the crater?
2. Drop different sized balls from the same height onto the flour. How do different balls change the size of the crater?
3. Does it make a difference if you measure to the furthest splash of flour from the impact? (Tip: the easiest way of measuring the diameter of the ball is to put a ruler on either side of the ball and use another ruler to measure the distance between them).
4. Form conclusions about how to make craters of different sizes.

Safety

Some flour may fly up when the balls are dropped from a height. The children should stay at a safe distance so the flour does not get into their eyes.

Follow-up activity

Use 'meteorites' of different weight and note if there is any difference in the craters.
Throw the 'meteorites' (gently!) at different angles onto the flour and notice if the craters are any different shape.
Throw the 'meteorites' at different speeds to see if that makes any difference to the size of the crater.
What happens if we change the shape of the meteorite (easy if it is made of plasticine)?
What happens if the meteorite disintegrates on impact? Try mud balls instead of hard balls.
What happens if the surface is wet? Try dropping the meteorite onto dry, moist and wet surfaces.

Topics: Solar system / Space and time

The Tides

Why does the ocean have high and low tides?

MATERIALS

- Bucket
- Plastic ball or balloon
- Water

STEPS

1. Half fill the bucket with water.
2. Place the ball in the bucket so it is floating.
3. Place both hands onto the ball and push down very slowly.
4. Let the ball come up again.
5. Watch the change in water level.

DID YOU KNOW?

Seventy per cent of Earth's surface is covered with oceans. Every twelve hours the tides rise and fall. This happens without the level of water changing. As Earth and the Moon spin, gravity pulls them together and the Moon pulls at the ocean water directly beneath it, causing it to rise and fall. When it is high tide on one side of Earth, it will be low tide on the other side.