

The Big Questions

Bright Ideas Time

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Big Questions - Biology

Slide	Theme	Ages	Ideas / misconceptions
3	Animals including humans	4-11	Whether or not something is alive and how it is possible to know is one of the big ideas in science. This discussion will lead to an exploration of the characteristics of living things.
4	Plants	4-11	It is harder for children to understand a plant is alive, as it does not appear to move and does not talk! Look at daisies opening in the day and closing at night, plants moving towards light and venus fly traps.
5	Animals including humans Plants	7-11	<p>A flame appears to exhibit many of the life processes:</p> <ul style="list-style-type: none">• Nutrition - it uses fuel• Growth – fires become larger• Movement – flames flicker• Reproduction – flames can leap from one place to another• It produces ‘waste’ – ash and smoke• It needs oxygen <p>Of course, a flame is not living as it is not made up of cells and it is not growing, reproducing, or producing waste in a biological sense. This can form the basis of a very interesting discussion.</p>



Big Questions

How do you know the person next to you is alive?





Big Questions

Is a tree alive?





Big Questions

Is a flame alive?





Slide	Theme	Ages	Ideas / misconceptions
7	Plants	7-11	<p>It is amazing to consider the fact that the mass of the tree has been produced as a result of photosynthesis. Pupils at Key Stage 2 are expected to know that plants produce their own food, but they are not expected to understand the concept of photosynthesis. It is a common misconception amongst children and adults to think that the roots take in the food for the plant and this is not helped by the fact that some fertilisers are labelled 'plant food'. The roots take in the necessary minerals (dissolved in water) but the 'food' is provided by the Sun's energy which is captured in the leaf and together with the carbon dioxide and water forms the mass of the plant. The pupils therefore need to understand that the light and water and air (the carbon dioxide) are necessary for growth because the leaf 'processes' these to form the mass of the plant.</p>



I planted a tree in my garden 4 years ago.

It now weighs 250 kg more.

Where did this 250 kg come from?





Big Questions - Materials

Slide	Theme	Ages	Ideas / misconceptions
9	States of matter	4-11	This is quite a challenging question - children often describe a solid as 'hard' and can then be shown a sponge and asked if that is then a liquid.
10	States of matter	4-11	Children tend to be able to arrive at the concept of a solid having a 'fixed shape' whilst a liquid will 'take the shape of its container.' But what about sand or flour which will take the shape of its container? Children may not understand that one small grain of sand has a fixed shape.
11	States of matter	7-11	This is an example of evaporation, i.e. the change of state of the water in the puddle from a liquid to a gas (water vapour). Children may not realise that evaporation is different from boiling. It takes place at a lower temperature and is much less vigorous. Evaporation takes place more rapidly when there is a large surface area so a puddle is ideal.
12	Properties of materials	7-11	When a solid dissolves in a liquid, it appears to disappear but where has it gone? Dissolving involves two materials; the resulting solution is a mixture of both. Children may not realise that the dissolved substance is still present in the solution even though it can't be seen - the solid breaks down into very, very small particles which are spread throughout the particles of the liquid.



What are the
properties of a
solid?





What are the
properties of a
liquid?





Big Questions

Where does a puddle go?





Where does sugar go when it is dissolved in water?





Big Questions - Physics

Slide	Theme	Ages	Ideas / misconceptions
14	Light	4-7	Young children may think that shiny objects emit light. Being in pitch darkness, where a hand literally cannot be seen in front of a face, brings home the concept that there needs to be a source of light in order to see. This then leads on to the following question.
15	Light/Space	7-11	We see the stars as they were when the light left them. This means that there is a slight chance that some of the stars that we see no longer exist. Since the light that enters our eyes left stars thousands or millions of years ago, it is possible that some have undergone a catastrophic happening and no longer exist as stars. It is also salutary to consider the fact that when the light left some of these stars, dinosaurs existed on Earth. The light that enters our eyes from these stars has been travelling through space since the time of the dinosaurs & only now enters our eyes!
16	Electricity	7-11	It is interesting to realise that electricity would be unusable if insulators did not exist, as well as conductors. Turning on any switch would a shocking experience!



Big Questions

What can you see when there is absolutely no light?





Big Questions

Why do we see 'history' whenever we look at the stars?





Why are insulators as important as conductors?





Big Questions - Physics

Slide	Theme	Ages	Ideas / misconceptions
18	Space	7-11	Children may not know that the diameter of the Sun is 400 times the diameter of the Moon because in the sky the Sun appears to be the same size as the Moon. This is because it is 400 times further away - an amazing coincidence. The Moon can therefore just cover the Sun and obscure it completely during a total eclipse.
19	Space	7-11	Children tend to have quite a crowded picture of space and think that there are other stars between the Earth and the Sun. They may also mention meteorites, asteroids, etc. There are two other planets between Earth and the Sun, but they are relatively tiny and are in constant orbit around the Sun. There will be very small amounts of matter between the Sun and us. Nothingness is a very difficult concept to grasp.
20	Space	7-11	It is helpful for each pupil to act out being the Earth orbiting the Sun – they spin around and circle the ‘Sun’ at the same time and they soon feel odd! So if the Earth is moving, why don’t we sense it at all? Children may think that we are not moving at all, or that we are moving so slowly that we cannot feel it. In fact, to make one complete rotation in 24 hours, a point near the equator of the Earth must move at close to 1000 miles per hour. The Earth is also moving on a huge orbit around the Sun once a year and our orbital speed around the Sun is about 67,000 miles per hour. The fact is that everything is moving with us and so we do not sense the motion. This is relativity!



Why do the Sun and Moon look the same size in the sky?





Big Questions

What is
between the
Earth and the
Sun?





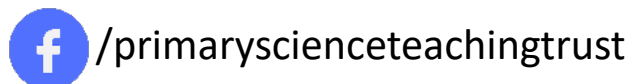
Why don't we sense motion?



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