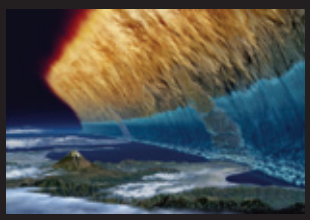



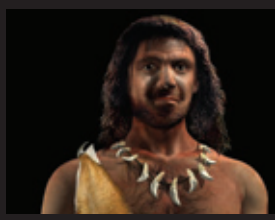

User's guide

MIRACLE PLANET

EPISODE 1

The Violent Past

There was a period when the Earth's surface was hotter than the Sun. And yet somehow, despite all the odds stacked against it, life on the planet would endure.

Before Screening the DVD

1. Borrow a pair of binoculars or a telescope and go outside on a clear night when the moon is full. As well as some large dark areas that look flat and featureless, you should be able to see pits, or holes, in the surface. These are called impact craters—or just craters. How many can you count?

2. If you live near a river, a pond, or a lake, go there with a pebble, a small stone and a larger rock. Drop each one in the water and watch the effects after they hit the water.

3. Dinosaurs lived from roughly 245 to 65 million years ago. How long before that do you think the first forms of life appeared on Earth?

4. How long do you think life—not just human but any life—could exist with no water and no food?

After Screening the DVD

1. In the early years of our solar system there were many inner planets circling the Sun where, today, only Mercury, Venus, Earth and Mars exist. What happened to the rest of those other young planets?

2. Why was gravity important in the creation of the planets? How has gravity played an important role in Earth's later formation?

3. In ***The Violent Past***, one scientist suggests that the first life on Earth may have come from Mars. How did it get here?

4. How do we know that Mars once had water on its surface?

5. The Earth has been struck by asteroids 25 times more often than the Moon, and yet there are very few craters today on Earth compared to the Moon. Why?

6. A tiny piece of paint from an old rocket in Earth's orbit once hit a window on one of the space shuttles. Travelling at 28,000 kilometres an hour, the paint fleck almost destroyed the spacecraft. How does that story relate to what you learned about the Barringer crater in Arizona?

7. Why would the collision of a 500-kilometre-wide asteroid with Earth have made the temperature of the surface of our planet as hot as the Sun's?

8. How did life survive the tremendous heat caused by an asteroid's collision?

9. The word "serendipity" means an accidental discovery. What was the discovery that scientists made in the diamond mines of South Africa and how could it be considered serendipitous?

Follow-Up Projects

1. Did you know that in 2001 a car-sized spacecraft called NEAR Shoemaker actually landed on an asteroid more than 300 million kilometres from Earth? Prepare a report for your class explaining the mission and what it discovered.

2. The Barringer crater is probably the best-known crater on Earth, but Canada has at least two much larger craters. Go on the Internet and see if you can discover where they are and what they look like.

3. Scientists believe that at one point in our planet's past, life existed for millions of years in a form of suspended animation—like a very long period of hibernation. Some people believe that we can preserve people today by freezing them and putting them in a similar state of suspended animation and then "wake" them up in the future when we find a cure for what killed them. Read about this field, called cryogenic or cryonic suspension, on the Internet. Get together in groups of four in your class and talk about what some of the moral and ethical questions this practice might raise.

GLOSSARY

Anaerobic: Literally, without oxygen. The opposite of aerobic. Some organisms can survive anaeorobically—without any oxygen.
Asteroid: A small, solid object, ranging in size from dust-like particles to objects hundreds of kilometres across, that orbits the Sun.
Ejecta: Material, such as rocks, tossed out of an impact crater.
Impact crater: A hole in the ground caused by the impact of an object from space. Also referred to sometimes as simply a crater.
Kinetic energy: The energy an object has as a result of its motion. A marble rolling down a ramp has kinetic energy; a stationary marble has none.
Meteorite: A solid body from outer space that survives coming through our atmosphere without completely burning up and hits the Earth.
Microbe: A microscopic organism, such as bacteria or algae.
Permian: A period in Earth's history that lasted from 286 to 248 million years ago.
Pillow lava: Molten lava from inside the Earth that cools and forms into rocks underwater.
Photosynthesis: The life-sustaining process used by plants to convert the energy of light into chemical energy and store it as sugar.
Suspended animation: A form of hibernation of life in which all body processes, such as breathing and eating, stop.
Tectonic: The large geological forces that shape the formation of the Earth's outer skin—its crust.
Vapourize: The process of turning a liquid into a gas, caused by heating the liquid.

Suitable for ages 13 to 17
Related subjects: Geography, biology, physics, chemistry, earth science

For more information, visit the Web site at <www.nfb.ca/miracleplanet>.
Study guide available online at <www.nfb.ca/guides>.

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