



# Earth Ball Activity Book

## ANSWERS

Page	Activity	Answer
3	Naming Earth	Orontius, Theia
4-5	Solar System	From left to right: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
8	Then and Now	The Earth Ball is different from the old map because new technology allows us to get an accurate image of what Earth looks like. Back in those days, we didn't have that advantage. So the reason the map is so different is not because Earth has changed dramatically during these hundreds of years. The Earth is in fact changing (the continents are moving), but at a very slow pace.
10	Earth's Composition	Water: 70.8% Land: 29.2%
11	Earth's Geology	Blue: water Green: forest White: ice Grey: mountain Brown: desert
11	A Matter of Life and Death	Water: This is where biological processes take place and where the first reactions occurred that led to the emergence of life. Mass: The gravity has to be strong enough for the planet to retain its atmosphere. The atmosphere is needed for water to stay in liquid form, among other things. Sunlight: Fuels organisms' activities (photosynthesis). Rotation and rotational tilt: some form of seasons are needed to stimulate life. Temperature between $-15^{\circ}\text{C}$ and $115^{\circ}\text{C}$ : In this range, liquid water can still exist under certain conditions. Plus, if it's too cold, chemicals will react more slowly which can affect the reactions necessary for life.  Elements: Carbon, hydrogen, oxygen and nitrogen are the four elements most essential for life.
13	Counting Continents	Six continents.



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## ANSWERS PART 2

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14–15	Day and Night	<ul style="list-style-type: none"><li>• The answer to this question will depend on the sunlight at the time you are looking at it.</li><li>• The line between light and shadow moves from east to west.</li><li>• Earth rotates in the opposite direction of this line.</li><li>• The Sun sets in the west and rises in the east.</li><li>• The shadow is longest when the Sun rises and sets. The shadow is shortest when the Sun is in its highest position in the sky (around noon).</li></ul>
16	The Seasons	Summer: The hemisphere tilted towards the Sun. Winter: The hemisphere tilted away from the Sun.
17	The Seasons: non-tilted axis	We would have no seasons. It would still be warm at the equator and cold at the poles, but this would not vary throughout the year.
18	The Seasons: angles	<ul style="list-style-type: none"><li>• The bottom sun ray warms the ground more efficiently because the light hits the ground straight on, while the other ray hits Earth at an angle, causing the light to spread out. This decreases the amount of energy hitting that area, plus the light has to go through more of the atmosphere which absorbs some of the sunlight. Also, due to Earth's tilt, the sunlight will hit this area for a lesser portion of the day.</li><li>• Seasons in the two areas: Warm and summery in North America, cold and wintery in South America, which can be seen from the tilted axis. In the winter, the sunlight hits Earth at an angle because the Sun is lower in the sky, spreading the light out and decreasing the amount of energy hitting any given area. The days are also much shorter, so the Sun has a much shorter time to warm up the ground.</li></ul>
19	Upside down	There's no up and down in space, just the orientation we choose to give it. Earth's gravity is pulling on anything surrounding it, in all directions. So no matter where on Earth you stand, gravity will pull you towards Earth's centre, keeping you from 'falling off'.
20–21	Scales in Our Solar System	You can spot Mount Everest and The Nile.



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22	Earth Life	<p>A selection of places:</p> <p>Africa: Madagascar, Cape Floristic Region, the Coastal Forests of Eastern Africa, Horn of Africa, Succulent Karoo (South Africa and Namibia)</p> <p>Asia: the Philippines, Papua New Guinea, the Coral Triangle, Himalayas, Japan, New Zealand</p> <p>Europe: the Mediterranean Basin</p> <p>North &amp; Central America: The Caribbean Islands, Coiba Island (Panama), California Floristic Province, The Caribbean Islands</p> <p>South Africa: The Atlantic Forest, the Tropical Andes region, Madidi National Park (Bolivia), Yasuni National Park (Ecuador)</p>
32	The Shape of the Earth	<ul style="list-style-type: none"><li>• Number 1. Even if the Earth is wider along the equator, this eccentricity is so small that the Earth is very close to spherical. You can't tell from a picture of Earth that the equator is wider.</li><li>• Earth is wider along the equator because it rotates.</li></ul>
34	Orbit	12 m
34–35	Phases	Half the Moon is always lit up by the Sun. The reason we see the Moon as having phases is because we see it at different angles as it orbits Earth.
36	Solar eclipse	<p>Observability: During a lunar eclipse, Earth casts a shadow on the Moon. The Moon is visible from the half of Earth facing away from the Sun, so half of Earth will be able to see the lunar eclipse. But during a solar eclipse, the Moon casts a shadow on Earth. Because the Moon is smaller than Earth, the shadow cast by the Moon on Earth will only cover a tiny bit of Earth's surface. And it is on that bit of surface that the solar eclipse is visible.</p>
42	Collision	<p>Where: A poorly populated area, such as Antarctica.</p> <p>Why: Very few people are at risk of being killed. The most dangerous place would probably be the ocean, because it could cause tsunamis and vaporise sea bed sediments, which would cause climate change for several years.</p> <p>What: If the asteroid is big enough (around 1.6 km and bigger), it can wipe out most of the life on Earth. A smaller asteroid (around 100 m) would have an amount of energy greater than the largest nuclear bombs made today and would wipe out cities. An even smaller asteroid (30 m) would create a large crater and cause a gigantic shockwave.</p>



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## ANSWERS PART 4

Page	Activity	Answer
43	The Man in The Moon	The Moon is always showing us the same face because it rotates once around its axis in about the same time it takes to complete one orbit of the Earth. We say it is in synchronous rotation. The phenomenon of the Moon always facing us the same way is called tidal locking.
46	Reaching Outer Space	0.3 cm