# Earth As A Planet

Identify the correct answer:

(a) The round shape of the Earth was first proved by
(i) Aristotle (iii) Ferdinand Magellan
(ii) Galileo (iv) Kepler

(b) The shadow of the Earth cast on the moon during eclipses is
(i) square (iii) conical
(ii) rectangular (iv) round in shape

(c) The difference between the equatorial diameter and polar diameter is
(i) 62 km (iii) 56 km
(ii) 42 km (iv) 90 km

(d) The horizon of the Earth seems to widen with
(i) decreasing altitude (iii) increasing altitude
(ii) decreasing length (iv) increasing length

(e) When we watch a ship approaching the harbour we first see the
(i) whole ship (iii) top of the mast
(ii) bottom of the ship (iv) hull

(f) At the equator the length of 1° of latitude is
(i) 110.58 km (iii) 150.18 km
(ii) 111.7 km (iv) 111.32 km

(g) The shape of the Earth looks like that of
(i) an apple (iii) a guava
(ii) a pear (iv) a pineapple

(h) Jupiter is about times bigger than the Earth.
(i) 9.444 (iii) 3.883
(ii) 11.209 (iv) 2.032

(i) The English word 'Earths' means
(i) table (iii) book
(ii) ground (iv) ball

(j) The circumference of the Earth was first measured by
(i) Hadley (iii) Eratosthenes
(ii) Holmes (iv) Ferrel

Write True or False :

(a) Earth has a layer of air surrounding it composed of 21% Nitrogen and 50% Oxygen and the rest carbon dioxide. False

(b) Jupiter keeps the large rocks away from the Earth by its strong gravity. True

(c) The core of the Earth has silica and iron. False

(d) The circumference of the Earth is about 40,000 Km. True

(e) The Bedford level experiment was performed by Bedford. False

(f) The term Geoid means 'earth shaped'. True

Fill in the blanks with appropriate words :

(a) Around 350 B.C. the great Aristotle first declared that the Earth was round.

(b) At 45° latitude an observer finds the North star midway between the zenith and the horizon.

(c) Aeroplanes can fly round the Earth following Mercator's chart.

(d) The shape of the Earth with two flattened ends and a bulge at the equator is called an oblate spheroid.

Answer in one or two words :

(a) Who first observed the shape of the Earth as an oblate spheroid?

Ans- Jean Richard

(b) Where on the Earth is the weight of an object measured by a spring balance, the greatest?

Ans- Poles

(c) What is the length of the Earth's polar diameter?

Ans- 12714 Km

(d) What determines the size of a planet?

Ans- Diameter

(e) What are the large holes on the surface of the moon called?

Ans- Crater

(f) What is the full form of GPS?

Ans- Global Positioning System.

Match the following:

(a) Bedford Level Experiment – Dr. Wallace

(b) length of 1° longitude at the equator – 111.32 Km

(c) Water on earth – 70.9%

(d) GPS – Haversine Formula

(e) Alexandria – Egypt

Short answer question:

(a) Write in short about the Earth as an oblate spheroid.

Ans- Equatorial and polar diameters of the Earth are 12,757 and 12714 km respectively. Since the Earth is flattened at the poles and bulges at the Equator, geodesy represents the figure of the Earth as an oblate spheroid. The oblate spheroid, or oblate ellipsoid is an ellipsoid of revolution obtained by rotating an ellipse about its shorter axis.

(b) Give two proofs on Earth's sphericity.

Ans- The proofs on Earth's spherecity are as follows:

(i) Ferdinand Magellan (1519 - 1522):

Ferdinand Magellan started his circumnavigation on 1519 from the strait of Magellan. After completing his journey he reached after three years at 1522 from the same place from where he started his journey.

If the Earth would be flat then he must have completed his journey in some other place. This proves the Earth to be spherical.

(ii) Aerial photograph:

The aerial photograph taken from space shows the disc shape of the Earth.

(c) What is GPS?

Ans- GPS or Global Positioning System is a space based satellite navigation system made up of a network of 24 artificial satellites into orbit. It provides the location of any place in the world in any type of climate. Location of a place is determined in terms of (i) Latitude, (ii) Longitude, (iii) Altitude and (iv) Time.

(d) Discuss briefly about Earth's unique position in the Solar System.

Ans- Earth is at the third position in the Solar System after Mercury and Venus. This position is unique as it is neither too close nor too far from the Sun. So sufficient amount of sunlight penetrates and optimum temperature is maintained on the Earth, which ensures existance of life possible on Earth.

Answer the following questions:

(a) Write three proofs to show that the Earth is round.

Ans- The proofs to show that the Earth is round are written below:

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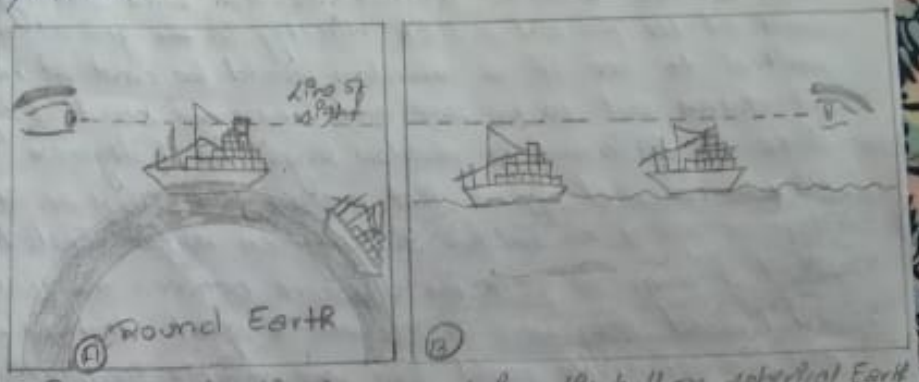
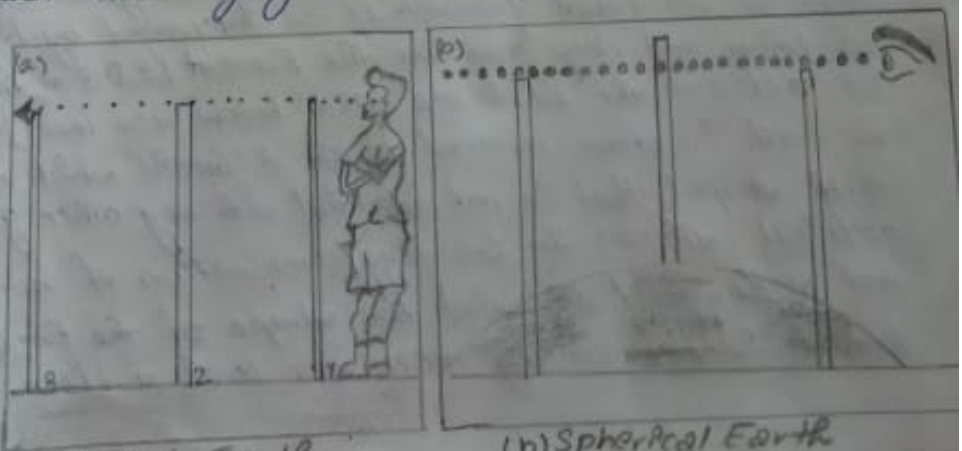
(iv) Observation of ship:
When we see a boat coming from a distance, we first see its uppermost part and slowly the whole boat. If the Earth would be flat then it would be possible to see the full boat at a time. This proves Earth to be spherical.




(A) Mast of ship is seen before the hull on spherical Earth
(B) The entire ship is seen on a flat Earth.

(viii) Bedford Canal Experiment:
Dr. Wallace along Bedford Canal of Britain carried out an experiment to prove the curvature of the Earth. He fixed three poles of equal lengths at regular intervals along the canal and found that the central pole was seen slightly above the poles at both ends.




(a) Flat Earth (b) Spherical Earth

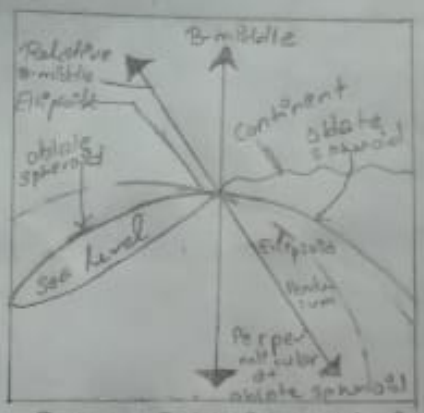
(b) How did Eratosthenes calculate the circumference of the Earth?

Ans- But over 2,000 years earlier in ancient Greece, a man arrived at nearly that exact same figure by putting a stick in the ground. That man was Eratosthenes. A Greek mathematician and head of the library at Alexandria.

Eratosthenes had heard that in Syene, a city south of Alexandria, no vertical shadows were cast at noon on the summer solstice. The sun was directly overhead. He planted a stick directly in the ground and waited to see if a shadow would be cast at noon. It turns out to be one and measured about 7 degrees. Since the difference in shadow length is 7 degrees in Alexandria and Syene, that means two cities are 7 degrees apart on Earth's 360-degrees surface. Eratosthenes hired a man to pace the distance between the two cities and learned they were 5,000 stadia apart, which is about 800 kilometers. He could then use simple proportions to find the Earth's circumference — 7.2 degrees is 1/50 of 360 degrees, so 800 times 50 equals 40,000 kilometers. And just like that, a man 2200 years ago found the circumference of the entire planet with just a stick and his brain.

(c) Why is earth's shape considered as a Geoid?

Ans- The surface of the Earth is not smooth like geometrical shape of an oblate spheroid. It is intervened by high mountains and deep seas like the Everest (8,848 m above sea level and the Dead sea 392m below sea level). So the earth is often referred to as a 'Geoid' which means 'earth shaped' that is not identical with any other geometrical shapes. In Geodesy (combination of survey and mathematical analysis), the shape of the Earth i.e. Geoid is defined by mean sea level surface.



Oblate Spheroid and (geoid)

(d) Discuss about the size of Earth in propotion to other planets.

Ans- There are eight planets in our solar system. According to size the largest planet is Jupiter and smallest is 'mercury'. Earth is at fifth position in respect to size. In other words, the Jupiter is 1319 times larger than Earth while Mercury is half the size of Earth. Nephune is four times the size of Earth. Actually, four planets namely Jupiter, Saturn, Uranus and Nephune are bigger than the Earth while Mercury, Venus, Mars are smaller than the Earth in size. Out of eight planets existence of life is possible only on Earth.