Chapter 12: Beyond Earth

Exercises — Let Us Enhance Our Learning

Q1 Match the column:

Column I
(i) Satellite of Earth
(ii) Red planet
(iii) Constellation
(iv) Planet which is commonly called an evening star

Column II
(a) Orion
(b) Venus
(c) Mars
(d) Moon

SOLUTION

The Moon is Earth's natural satellite — it revolves around the Earth.
Mars is called the Red Planet because its soil is reddish in colour.
Orion is a well-known constellation — a group of stars forming a pattern.
Venus is commonly called the Morning Star or the Evening Star, even though it is not a star.

Answer: (i) → (d) Moon; (ii) → (c) Mars; (iii) → (a) Orion; (iv) → (b) Venus.

Q2 (i) Solve the following riddle:
My first alphabet is in MAN but not in CAN
My second alphabet is in ACE and also in FAN
My third alphabet is in RAT and not in CAT
My fourth alphabet is in SUN but not in FUN
I am a planet that moves around the Sun.

(ii) Make two similar riddles by yourself.

SOLUTION

Part (i): Work out each letter clue —
First letter: in MAN but not in CAN → M
Second letter: in ACE and also in FAN → A

Third letter: in RAT but not in CAT → R
Fourth letter: in SUN but not in FUN → S
The word is MARS — a planet that revolves around the Sun.

Part (ii): Sample riddle 1 — 'My first letter is in SUN but not in BUN; My second letter is in EAR but not in BAR; My third letter is in ANT but not in ANY; My fourth letter is in HUT but not in CUT; I am the largest planet.' Answer: JUPITER.
Sample riddle 2 — 'My first letter is in EAR but not in BAR; My second letter is in ARC but not in ARE; My third letter is in RUN but not in FUN; My fourth letter is in TIP but not in TAP; My fifth letter is in HOT but not in HOG; I am a planet called the Blue Planet.' Answer: EARTH.

Answer: Part (i): MARS. Part (ii): Create your own riddles using letter clues for any planet name.

Q3 Which of the following is not a member of our Solar System?
(i) Sirius
(ii) Comets
(iii) Asteroids
(iv) Pluto

SOLUTION

The Solar System consists of the Sun, the eight planets, their moons, and many smaller objects including asteroids and comets.
Pluto is a dwarf planet and still part of our Solar System.
Comets and asteroids are also members of our Solar System.
Sirius is a star in the constellation Canis Major — it is NOT part of our Solar System. It is a distant star, far beyond our Solar System.

Answer: (i) Sirius — it is a star in the constellation Canis Major, not a member of our Solar System.

Q4 Which of the following is not a planet of the Sun?
(i) Jupiter
(ii) Pluto
(iii) Neptune
(iv) Saturn

SOLUTION

The eight planets of the Solar System are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
Jupiter, Saturn, and Neptune are all planets in this list.
Pluto was once called a planet, but in 2006 the International Astronomical Union (IAU) redefined the requirements. Pluto is now classified as a dwarf planet, not a planet.

Answer: (ii) Pluto — it is a dwarf planet, not one of the eight planets of the Solar System.

Q5 Which is the brighter star, the Pole Star or Sirius?

SOLUTION

The chapter states that Sirius (in the constellation Canis Major) is the brightest star in the night sky.
The Pole Star (Polaris), on the other hand, is described as 'not very bright' — the chapter specifically advises choosing a night without the Moon to see the Pole Star because it is not very bright.
Therefore, Sirius is much brighter than the Pole Star.

Answer: Sirius is brighter. It is the brightest star in the night sky. The Pole Star (Polaris) is not very bright.

Q6 An artist's representation of the Solar System is given in Fig. 12.12. Is the order of the planets correct? If not, write the correct order in the boxes in the figure.

SOLUTION

The correct order of the eight planets from the Sun outward is:
Mercury → Venus → Earth → Mars → Jupiter → Saturn → Uranus → Neptune.
Fig. 12.12 shows an artist's representation with answer boxes below the planets.
Compare each planet in the figure against this order and write the correct planet name in each box.

Answer: The correct order from the Sun outward is: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Write the correct name in each box in the figure.

Q7 A portion of night sky with stars is shown in Fig. 12.13. Look carefully and identify the groups of stars that form the patterns — the Big Dipper and the Little Dipper. Draw lines to connect the stars for these patterns and label them. Also, identify and label the Pole Star. You may refer to Fig. 12.4 for help.

SOLUTION

This is a drawing activity using the star-field in Fig. 12.13. Use Fig. 12.4 as a guide.

Big Dipper: a group of 7 stars shaped like a large ladle (cup + long handle). It lies in Ursa Major, also known as Saptarishi in India.

Little Dipper: a smaller group of 7 stars also shaped like a ladle. It lies in Ursa Minor.

Pole Star (Polaris): found at the tip of the Little Dipper's handle. It stays almost fixed in position and always points north.

To locate the Pole Star: extend an imaginary line through the two stars at the far end of the Big Dipper's cup — continue the line about five times that gap to reach the Pole Star.

Draw connecting lines in Fig. 12.13 to form both dipper shapes, label them, and mark the Pole Star.

Answer: Drawing activity: connect the 7-star Big Dipper (large ladle, Ursa Major/Saptarishi) and 7-star Little Dipper (small ladle, Ursa Minor). The Pole Star is at the tip of the Little Dipper's handle and always points north.

Q8 A portion of the night sky is shown in Fig. 12.14. Draw lines to connect the stars for Orion and label the star Sirius. You may refer to Fig. 12.3.

SOLUTION

This is a drawing activity using the star-field in Fig. 12.14. Use Fig. 12.3 as a guide.

Orion: look for three bright stars in a short straight line near the centre — these are Orion's belt. Connect the surrounding stars to complete the hunter's outline.

Sirius: a very bright star in the constellation Canis Major, located near Orion. To find it, extend a straight line through Orion's belt toward the east — this leads directly to Sirius.

Sirius is the brightest star in the night sky.

Draw connecting lines for Orion in Fig. 12.14 and label the bright nearby star as 'Sirius'.

Answer: Drawing activity: connect stars to form Orion (three central stars = belt). Extend the belt line eastward to find Sirius (the brightest star in the night sky) and label it.

Q9 From Earth, you can see stars fading away at dawn and appearing at dusk. During the day we do not see the stars. Explain why.

SOLUTION

Stars are always present in the sky — they do not disappear during the day.

The Sun is an extremely bright source of light. During daytime, sunlight scatters in the Earth's atmosphere and makes the entire sky very bright.

Due to this extreme brightness of the Sun and the bright daytime sky, the faint light from distant stars cannot be seen — the starlight is drowned out by the brightness.

At dawn, as the Sun rises, its light gradually brightens the sky and the stars appear to fade away one by one.

At dusk, as the Sun sets, the sky becomes darker and stars become visible again.

On the other hand, stars are always shining — we simply cannot see them during the day because of the Sun's overpowering brightness.

Answer: Stars are always present, but during the day the Sun's extreme brightness makes the sky so bright that faint starlight is invisible. At dawn the brightening sky hides them; at dusk the darkening sky reveals them.

Q10 During a clear night, try to observe the Big Dipper 3-4 times at an interval of 2 to 3 hours. Also try to locate the Pole Star each time. Does the Big Dipper appear to move? Draw a rough sketch to illustrate this, mentioning the time in each case.

SOLUTION

This is an observation activity. Here is guidance on what to do and what to expect:

Go to a dark open area on a clear night, preferably in summer around 9 p.m. Look toward the northern part of the sky.

Identify the Big Dipper — a group of 7 stars shaped like a large ladle in the constellation Ursa Major.

Note its position and draw a rough sketch showing the Big Dipper's position relative to the Pole Star at, say, 9 p.m.

Repeat your observation at 11 p.m., 1 a.m., and 3 a.m. Draw a sketch for each time.

What you will observe: The Big Dipper appears to move (rotate) around the Pole Star over the hours — it completes a circle around it. The Pole Star, however, stays nearly in the same position each time.

This apparent movement is caused by the Earth rotating on its axis.

Answer: Yes, the Big Dipper appears to move (rotate) around the Pole Star over the night. The Pole Star remains nearly fixed. Draw the Big Dipper's position at each observation time — it will be at a different angle around the Pole Star each time.

Q11 Think about the night sky and write a poem or a story on it.

SOLUTION

This is a creative writing activity. Here is a model poem inspired by the chapter:

The Night Sky
A thousand stars light up the night,
Each one a blazing, distant light.
Orion stands with belt of three,
And Sirius shines for all to see.
The Big Dipper points the way up north,
The patient Pole Star holds its course.
Planets drift on their silent road,
The Moon glows bright, a silver abode.
Beyond them all, the Milky Way,
A river of stars in grand display.
How vast the universe must be —
And full of wonders, wild and free!

Answer: Creative activity. Write your own poem or story describing the stars, constellations, Moon, planets, or the feeling of watching the night sky. The model poem above can inspire you.