

10. Tides and Ocean Currents

EXERCISE

A. Answer the following questions :

1. What are currents? What causes these currents?

Ans. Ocean current:

- It is the general movement of a mass of ocean water in a definite direction, which is more or less similar to water streams flowing on the land surface of the Earth.
- Causes of ocean currents:
 - Planetary winds
 - Variation in sea water temperature
 - Variation in sea water salinity
 - Rotation of the earth
 - Configuration of coastline.

2. What is Coriolis Force?

Ans. The Earth rotates on its axis from west to east. This rotation is the cause of deflective force known as Coriolis force, which deflects the general direction of the winds and that of the ocean currents.

3. What happens when warm and cold currents meet? How is it important for fisheries?

Ans. ● The mixing of the cold and warm currents provide ideal temperature conditions for the life of fish.

- The chief food of fish (plankton) is found in abundance in cold water.

For example, Newfoundland where Gulf Stream and Labrador meet.

4. What leads to the variation in the salinity of the sea water?

Ans. The amount of salt contained in sea water varies from one part of the ocean to another.

- The high salinity water tends to subside and move below water of low salinity.
- There is a marked variation in the salinity of the Atlantic Ocean and the Mediterranean Sea.
- Due to this variation, the ocean currents flow from the Atlantic ocean to the Mediterranean Sea.

5. Name a few important currents of the Pacific Ocean.

Ans. A few important currents of the Pacific Ocean are:

- Kuroshio Current (warm)
- Kurile or Oyashio Current (Cold)
- East Australian Current (warm)
- West Wind Drift

6. What is Gulf Stream famous for?

Ans. Gulf Stream converges with Labrador cold current near Newfoundland.

- This provides an ideal condition for the life of fish.
- The Grand Bank near Newfoundland has become an ideal fishing ground of the world.
- The chief food, plankton is found in abundance in cold water.

7. Name a few minor currents of the world.

Ans. Few important ocean currents of the world are:

- Equatorial Current

- Gulf Stream Current
- Labrador Current

8. What effect do the ocean currents have on the climate of a place?

Ans. Effects of ocean currents on the climate of a place:

- They are an important source of temperature distribution.
- They mitigate the air temperatures and help in the regulation of air routes.
- They affect the route of cyclonic streams. Low pressure conditions created by warm currents over the large masses of surface water attract cyclones.
- Warm and cold currents affect the rainfall as winds passing over the warm current picks up the , moisture and give extra rains to British Columbia, etc.
- Winds passing over cold currents do not rain at all, e.g., Kalahari desert.

9. What are the effects of tides?

Ans. Effects of tides are:

- They help to remove the debris from the sea shore.
- Strong tidal currents help ships to enter in shallow harbours, e.g., London harbour.
- Tidal energy can be harnessed to generate electricity.
- They help in producing salt in the coastal areas.

10. What is the time difference between two tides?

Ans. The time difference between each tide is approximately 12 hours and 26 minutes.

11. Explain by reference to actual examples the effects of ocean currents on climate, economy and fishing.

Ans. The effects of ocean currents on :

Climate : Same as of 8th answer

Economy and fishing:

- **Save Money for Cargo Transport**

Ships are important to carry goods across the continents. By knowing which ocean currents can help the ships travel quicker and with less fuel, the ships can save money for their transport cost.

- **Create Fishing Ground**

Fishing grounds are important for both fishermen and the big fishing industries. By knowing where fish are most abundant, the fishing business can earn more money for their living. Ocean currents play a major role in producing the food that fish feed on. With more food at a specific area, more fish will come and breed. The fishing industries can use this to their advantage. For instance, the eastern coast area in North America is the biggest fishing ground in the world. Gulf Stream and Labrador currents help the fish to flourish.

- **Generating Electricity**

Ocean currents can help more waves to generate electricity. This electricity is a form of renewable energy that will not create any pollution. The people in the island can continue with their daily works.

- **Increase Storms**

Storms rely on ocean currents to gain power. Sometimes ocean currents may cause storms to become stronger. Once the storms move inland, people's lives can be devastated. Other than damage to homes and the roads, crops and farms will suffer too.

- **Allow Crops to Grow**

The rainfall caused by the warm ocean currents is also important for agriculture. The crops will help them with their livelihood.

- **Increase Plankton Growth**

Ocean currents can increase the amount of plankton that grows in the water. This especially applies when two kinds of currents meet. When both cold and warm currents mix in the sea water, the oxygen level is increased. Many people fish for hobby but most depend on fish for income.

12. How are tides caused?

Ans. Causes of Tides:

Gravitational Force:

- They are caused by the influence of Moon on the Earth. The gravitational pull of Moon is more on Earth because of its proximity to the Earth.
- The Sun being too far away exerts some pull on the Earth due to its great mass, but it is much less as compared to Moon.

Influence of the Moon:

- It results in the formation of high tide and low tide.

The rotation of the Earth:

- Results in every meridian coming into the position of two high tides and two low tides nearly every 24 hours.

13. Name the two movements in the ocean.

Ans. The two movements in the ocean are:

- Horizontal, i.e., ocean currents
- Vertical, i.e., the rising of bottom water and the sinking of surface water.

14. Name any two warm currents of the Atlantic Ocean.

Ans. The two warm currents of the Atlantic Ocean are:

- Brazil Current
- Gulf Stream Current.

B. Give reasons :

1. The famous fishing grounds of the world are located where warm and cold currents meet.

Ans. The famous fishing grounds of the worlds are located where warm and cold currents meet :

- They provide ideal temperature conditions for the life of fish.
- The chief food of fish (plankton) is found in abundance in cold water, e.g., Newfoundland.

2. Winds are the main influence on the circulation of ocean currents.

Ans. Winds are the main influence on the circulation of ocean currents:

- The prevailing planetary winds like Trade winds, Westerlies, etc, play vital role in the origin and development of ocean currents.
- Because of the Coriolis Effect, the Northern Hemisphere currents flow to the right of the wind direction while the Southern Hemisphere currents flow to the left.
- Most of the ocean currents of the winds follow the direction of prevailing permanent or planetary winds.

3. The tidal range differs from sea to sea.

Ans. The tidal range differs from sea to sea:

- In the open oceans such as Atlantic, tides flow and ebb regularly twice a day.

- In the enclosed sea of sheltered seas such as Mediterranean or Baltic , the range may be very small.

4. The tides help in navigation.

Ans. The tides help in Navigation:

- They help in removing the debris from the sea shore.
 - Strong tidal currents help ships to enter shallow harbours.
 - In certain harbours tidal basins are constructed to store tidal water.
5. The time difference between two tides is approximately 12 hours 26 minutes.

Ans. As moon also rotates on its axis while revolving round the Earth.

6. The ocean currents flow from the Atlantic Ocean to the Mediterranean Sea surface.

Ans. Atlantic Ocean is less saline & dense than the Mediterranean Sea. So the lighter water flows from Atlantic Ocean to the Mediterranean Sea.

7. Ocean current helps in maintaining the earth's heat balance.

Ans. Ocean currents help in maintaining the Earth's heat balance by transferring the heat from lower to higher latitude through the warm ocean currents.

C. Write brief notes on the following :

1. Spring Tide

Ans. Spring Tide:

- When the Sun, Earth and Moon are in a straight line as they are at Full Moon and New Moon, the gravitational force is at its greatest because of combined force of Sun and Moon as they are pulling together.
- At this time the high tide and low tide is very low. These type of tides are called Spring Tides.

2. Neap Tide

Ans. Neap Tide:

- When the Sun, Earth and Moon are not in a straight line, they are not exerting a combined force, so the gravitational pull is much less.
- At half moon, that is, when the Sun, Moon are pulling at right angles, the force exerted is at its least and the difference between

high tide and low tide is not large. These tides are called Neap Tides.

3. Gulf Stream

Ans. Gulf Stream:

- It is a warm Atlantic Ocean current.
- It is the largest of the Western boundary currents of the North Atlantic Ocean.
- It originates in the Gulf of Mexico around 20° N and moves in a north-easterly direction along the eastern coast of North America.
- It is depleted in nutrients and incapable of supporting much life.

4. Labrador Current

Ans. Labrador Current:

- It is important cold water current in North Atlantic Ocean.
- It has its origin in the Arctic Ocean which flows from North to South between the Greenland and the Baffin Islands. Passing southwards, it merges with the Gulf Stream near Newfoundland.
- It brings down huge icebergs from the Arctic Ocean to the eastern coast of Canada which are hazardous to navigation.

D. Choose the correct option.

1. The mass of water which is occupying the greatest part of the Earth's surface is called
 - (a) Atmosphere
 - (b) Biosphere
 - (c) Hydrosphere
 - (d) Lithosphere
2. The general movement of a mass of oceanic water in a definite direction is called
 - (a) Sea wave
 - (b) Ocean current
 - (c) Tides
 - (d) Tsunami
3. Which of the following factor is not affecting the movement of ocean currents directly?
 - (a) Difference in rainfall amount
 - (b) Difference in sea water temperature

- (c) Difference in sea water salinity
 - (d) Coriolis effect
4. Which of the following ocean current is flowing in north east direction throughout the year under the influence of westerlies?
- (a) North equatorial current
 - (b) South equatorial current
 - (c) Gulf stream
 - (d) Kuril current
5. Which of the following is a cold ocean current?
- (a) Kuroshio current
 - (b) Oyashio current
 - (c) Gulf stream
 - (d) All the above
6. Dense fog is formed near Newfoundland due to
- (a) the meeting of Gulf Stream & North Atlantic Drift
 - (b) the meeting of Kuroshio and Oyashio Ocean current
 - (c) the meeting of two cold currents
 - (d) the meeting of Gulf Stream & Labrador current
7. Which of the following ocean current is responsible for moderating the climate of Western Europe?
- (a) Kuroshio current
 - (b) Oyashio current
 - (c) North Atlantic Current
 - (d) Labrador current
8. Which of the following statement is not correct about spring tide?
- (a) It happens during New & Full Moon.
 - (b) It happens when Sun, Moon & Earth are not in straight line.
 - (c) It is a high tide.
 - (d) It happens when earth gets the combined gravitational force of the Sun & Moon.
9. What happens when cold & warm ocean currents meet?
- (a) Dense fog
 - (b) Rainfall
 - (c) Cyclone
 - (d) All of these
10. Which of following reason is responsible for 12 hours 26 minutes time difference between each tide?
- (a) Moon has remained stationary.
 - (b) Moon is revolving round the Sun
 - (c) Earth is revolving round the Sun

(d) Moon is revolving round the earth.

11. Which of the following current is formed in Atlantic Ocean?

(a) Kuroshio

(b) Oyashio

(c) Monsoonal drift

(d) Gulf stream

12. Which of the following ocean current flows under the influence of trade winds?

(a) Kuroshio

(b) Gulf stream

(c) Equatorial current

(d) Monsoonal drift

Answers

1. c	2. b	3. a	4. c	5. b	6. d	7. c	8. b
9. d	10. d	11. d	12. c				

