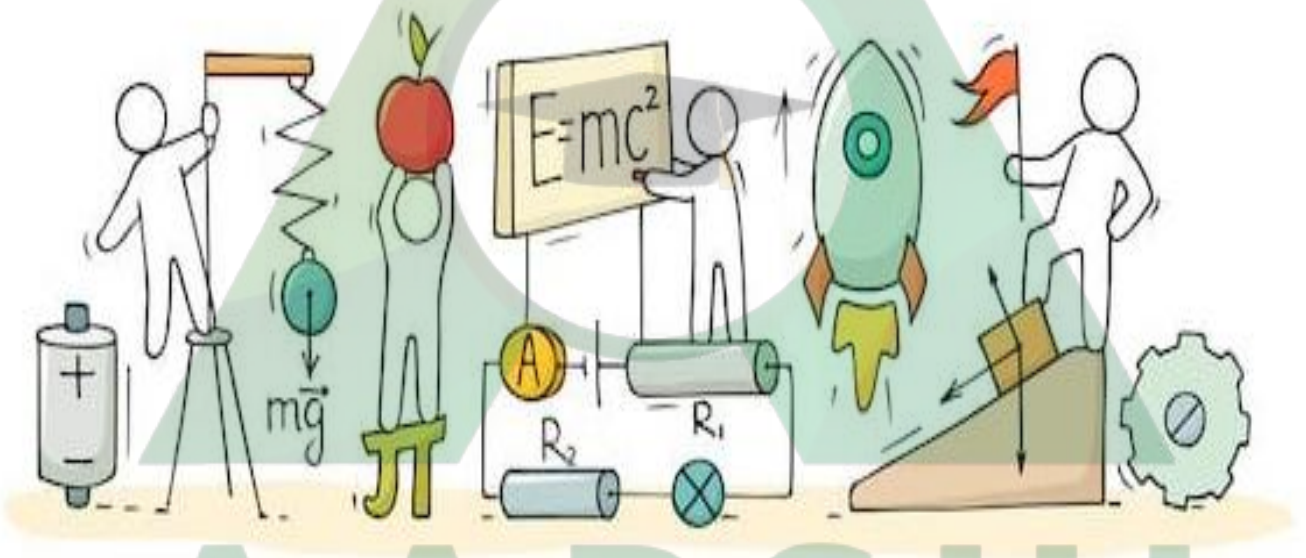
SCIENCE

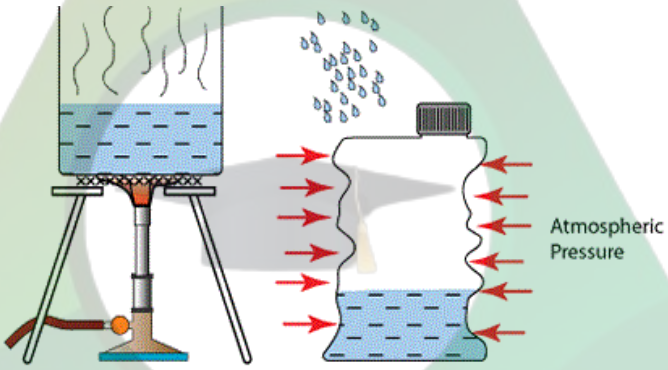
CHAPTER-8: WINDS STORMS AND CYCLONES



Winds, Storms and Cyclones

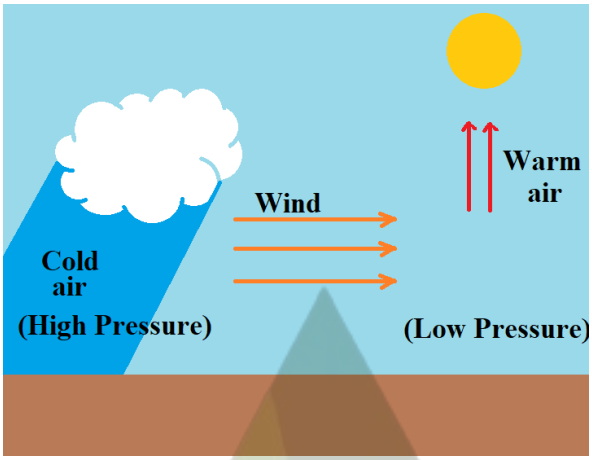
Air Exerts Pressure

- It is the force exerted by the weight of the air particles on the body.
- Air exerts a certain amount of pressure on every single thing.
- When we pour some fresh water over a heated can which contains boiling water, then it is observed that the shape of the can gets distorted.
- This is because when fresh water is poured over the can, some steam in the can condenses into water. This reduces the amount of air inside the can, thereby reducing the pressure inside the can. Now, since the pressure outside the can is greater than that inside the can, the can gets compressed.



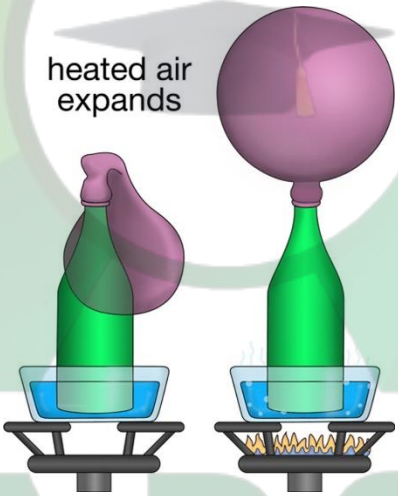
Relation between Wind (Air) and Air Pressure

- Wind speed depends on the difference in the pressure between the two regions. Wind moves from a region of high air pressure to a region of low air pressure.
- The greater the difference in pressure, the faster the wind moves.
- Increased wind speed causes reduction in air pressure and decreased wind speed causes increase in air pressure.
- On blowing air into the mouth of the bottle, the air near the mouth has higher speed. This decreases the pressure in that region. However, the pressure inside the bottle is high, which pushes the ball out. So, it is difficult to force the ball into the bottle.



Air Expands on Heating

- Air expands on heating and contracts on cooling.
- Warm air is lighter than cold air. It rises up and occupies a larger volume.
- A balloon gets inflated when the boiling tube is placed in hot water. However, the same balloon gets deflated when the tube is kept in cold water.



Wind Currents

- Wind currents are generated due to uneven heating of the earth.

Uneven heating of the equator and the poles

- The air in the equatorial regions becomes warmer due to the heating of the earth.
- This warm air rises and the cooler air from the regions in the latitude belt of 0-30 degrees on either side of the equator moves in.
- At the poles, the air is colder than that at the latitudes of about 60 degrees.

- The warm air at these latitudes rises up and the cold wind from the Polar Regions rushes in to take its place.
- This is how a wind circulation is set up from the poles to the warmer latitudes.

Uneven heating of land and water

- In summer, near the equator, the land warms up faster and the temperature of the land is higher than that of the water in the oceans.
- The air over the land gets heated and rises. This causes the winds to flow from the oceans towards the land. These are called monsoon winds.
- In winters, the direction of the wind flow gets reversed and it flows from the land to the ocean.

The word **monsoon** is derived from the Arabic word '**mausam**', which means '**season**'.

- The monsoon winds carry water due to which it rains.

Thunderstorms

- The swift movement of the falling water droplets along with rising air creates lightning and
- sound. This is called a thunderstorm. Precautions to be taken during a thunderstorm:

Do not take shelter under an isolated tree.

If in forest, take shelter under a small tree. Do not lie on the ground.

Do not take shelter under an umbrella with a metallic end.

Do not sit near a window.

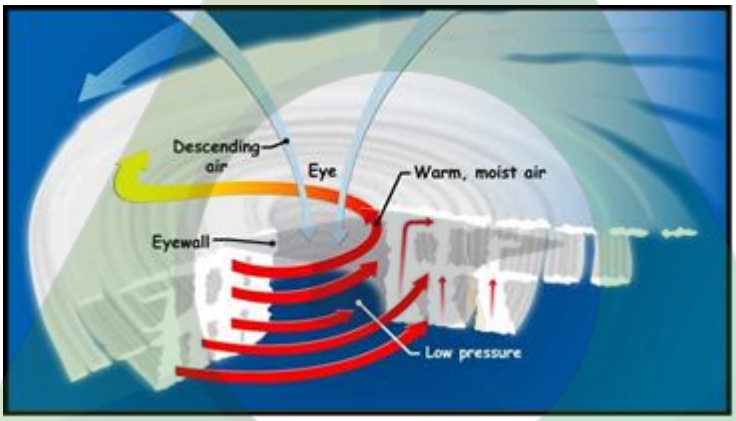
Do not take shelter in garages, storage sheds or metal sheds.

Do not take shelter in a car or a bus.

Do not be in water.

Cyclone

- Water takes up heat from the atmosphere to change into vapour before forming clouds.
- When water vapour changes back to liquid form as raindrops, heat is released into the atmosphere.
- The heat released into the atmosphere warms the air around.
- This air tends to rise and causes a drop in the pressure.
- More air rushes to the centre of the storm. This cycle is repeated.
- The chain of events ends with the formation of a very low-pressure system with very high-speed winds revolving around it. This is called a cyclone.



Structure of a Cyclone

- The centre of a cyclone is called the eye of the storm. This is a calm region.
- The diameter of the eye varies from 10-30 km. This region is free of clouds and has light winds.
- Around this clear eye, there is a cloud region of about 150 km. In this region, there are high-speed winds and thick clouds with heavy rains.
- As we move away from this region, the wind speed decreases.

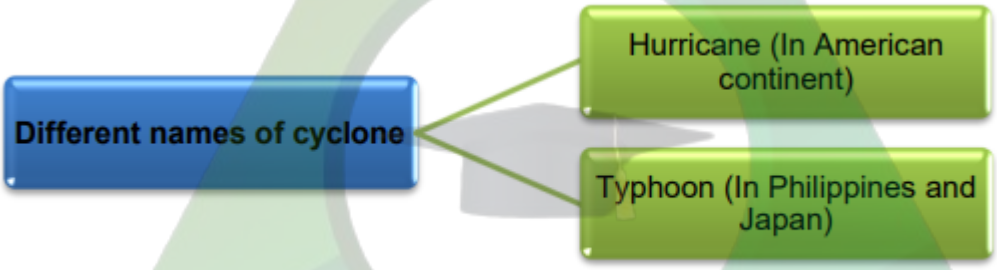
Destruction Caused By Cyclones

Sea water enters the low-lying areas causing severe loss of life and property.

Continuous heavy rainfall makes the flood situation worse.

High speed winds can damage houses, telephones and other communication system, trees etc.

Different names of Cyclone



Tornadoes

- A tornado is a dark funnel shaped cloud which reaches from the sky to the ground.
- Most of the tornadoes are weak.

- A violent tornado can travel at a speed of about 300 km/hr.
- Tornadoes may form within cyclones.
- The east coastline of India is more

Safety Measures for Cyclones

People should not ignore the warning issued by the meteorological departments through TV, radio and newspapers.

Rapid communication of warnings to all the government agencies, ports, fishermen, ships and general public should be done.

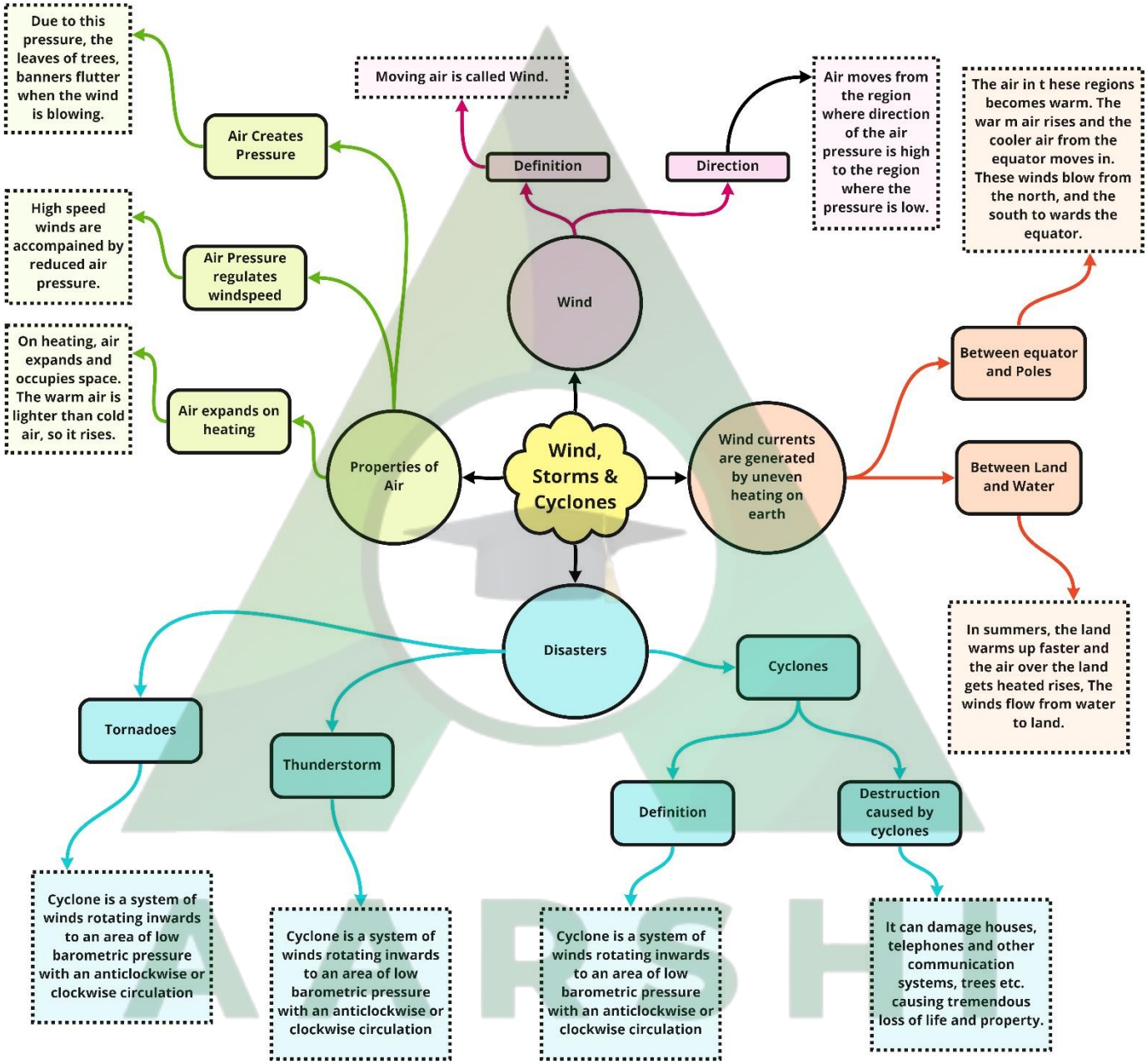
Construction of cyclone shelters in the cyclone prone areas need to be done. Administrative arrangements should be done for moving people quickly to safer places.

People should avoid driving on roads through standing water as floods may have damaged the roads.

People should make necessary arrangements to shift the essential household goods, domestic animals and vehicles to safer places.

Phone numbers of emergency services like police, fire brigade and medical centres have to be kept in hand.

Class : 7th Science
Chapter-8: Wind Storms and cyclones



Important Questions

➢ Multiple Choice Questions:

Question 1. Odisha was hit by a cyclone in the year

(a) 1998

(b) 1999

(c) 2000

(d) none of these

Question 2. Cyclone warning is issued

(a) 20 hrs in advance

(b) 12 hrs in advance

(c) 24 hrs in advance

(d) none of these

Question 3. Cyclones can be

(a) destructive

(b) useful

(c) both (a) and (b)

(d) none of these

Question 4. Wind currents are generated due to

(a) uneven heating on the earth

(b) even heating on the earth

(c) cooling on the earth

(d) none of these

Question 5. Hurricane is the name of cyclone in

(a) American continent

(b) Japan

(c) Both (a) and (b)

(d) None of these

Question 6. Tornado reaches

(a) from the oceans to the plane

(b) from the ground to the sky

(c) from the sky to the ground

(d) none of these

Question 7. A violent tornado can travel at a speed of about

(a) 300 km/h

(b) 100 km/h

(c) 50 km/h

(d) 150 km/h

Question 8. The west coast of India is

(a) less vulnerable to cyclonic storms

(b) more vulnerable to cyclonic storms

(c) not vulnerable to cyclonic storms

(d) none of these

Question 9. Which one is odd?

(a) Hurricane

(b) Typhoon

(c) Cyclone

(d) Monsoon

Question 10. A fire alarm usually detects smoke in case of fire. Where should such an alarm be placed in a room?

(a) Near the door

(b) On the floor

(c) On any wall

(d) On the ceiling

Question 11. The centre of cyclone is a

(a) calm area

(b) moving area

(c) both (a) and (b)

(d) none of these

Question 12. The warm air is

(a) lighter than the cold air

(b) heavier than the cold air

(c) equal to the weight of cold air

(d) none of the above

Question 13. A curtain is hanging at the entrance of a room. A long corridor runs at right angles to the door, that is parallel to the curtain. If a strong wind blows along the corridor, the curtain will

(a) get pushed inside the room.

(b) get pushed outside the room.

(c) get collected towards one end/swirled.

(d) remain unaffected.

Question 14. Increased wind speed

(a) does not affect air pressure

(b) reduces air pressure

(c) increases air pressure

(d) none of the above

Question 15. Air

(a) exerts pressure

(b) does not exert pressure

(c) does not affect anything anyway

(d) none of these

➢ Fill In the Blanks:

1. The moving air is called ……
2. Air exerts ……
3. High speed winds are accompanied by …… air pressure.
4. Air moves from the …… pressure region to the …… pressure region
5. The warm air is …… than cold air.
6. Regions close to the equator get …… heat from the sun.

➢ True or False:

1. Cyclone alert is issued 24 hours in advance of any expected storm.
2. Wind is caused due to difference in humidity.
3. Tropical cyclones that originate in China sea are typhoon.
4. The cold air is heavier than warm air.
5. An anemometer measures the temperature of our body.

6. The west coast of India is less vulnerable to cyclonic storms both in term of intensity and frequency.

➢ Very Short Question:

1. State the cause of generation of wind.
2. What is the direction of moving air?
3. From where, does the region close to equator get maximum heat?
4. Define see breeze.
5. When land breeze does occur in day or in night?
6. What is beau fort scale?
7. Who created beau fort scale?
8. Hot, humid tropical areas like India.
9. A thunderstorm is a storm with lightning and thunder. Its produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain and sometimes hail.
10. Thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours.

➢ Short Questions:

1. Why are people advised not to stand near fast moving train?
2. Explain wind.
3. What is a windstorm?
4. Explain land breeze.
5. How is wind helpful to Earth?
6. How do windmills work?
7. What causes a thunderstorm?
8. What is lightning?

➢ Long Questions:

1. What causes the wind to blow?
2. Explain monsoon.
3. What are the global wind patterns?
4. Explain Sea breeze.
5. What causes lightening?

✓ Answer Key-

➢ Multiple Choice Answers:

1. (b) 1999
2. (c) 24 hrs in advance
3. (a) destructive
4. (a) uneven heating on the earth
5. (a) American continent
6. (c) from the sky to the ground
7. (a) 300 km/h
8. (a) less vulnerable to cyclonic storms
9. (d) Monsoon
10. (d) On the ceiling
11. (a) calm area
12. (a) lighter than the cold air
13. (b) get pushed outside the room.
14. (b) reduces air pressure
15. (a) exerts pressure

➢ Fill In the Blanks:

1. wind
2. pressure
3. reduced
4. higher, lower
5. lighter
6. maximum

➢ True or False:

1. False
2. False
3. True
4. True
5. False

6. True

➢ Very Short Answers:

1. Answer: Winds are generated due to uneven heating on the earth.
2. Answer: Region where the air pressure is high to the region where the pressure is low.
3. Answer: From sun.
4. Answer: On a warm summer day along the coast, the differential heating of land and sea leads to the development of local winds called sea breezes.
5. Answer: Night
6. Answer: The Beaufort scale is an empirical measure for the intensity of the weather based mainly on wind power.
7. Answer: The scale was created by the British naval commander Sir Francis Beaufort around 1806.
8. Answer: India, Malaysia, Indonesia, Brazil etc.
9. Answer: Penguin, polar bear etc.
10. Answer: Fur

➢ Short Answer:

1. Answer: When train moves with high speed it creates region of lower pressure. This low pressure pushes man towards the train.
2. Answer: Wind is air in motion. It is produced by the uneven heating of the earth's surface by the sun. Since the earth's surface is made of various land and water formations, it absorbs the sun's radiation unevenly. Two factors are necessary to specify wind: speed and direction.
3. Answer: A windstorm is just a storm with high winds or violent but with little or no rain.
4. Answer: A land breeze occurs at night when the land cools faster than the sea. In this case, it is air above the warmer surface water that is heated and rises, pulling in air from the cooler land surface.
5. Answer: Wind is the fastest growing source of electricity in the world. It's often one of the least expensive forms of renewable power available. Some experts say it can sometimes be the cheapest form of any kind of power. Generating power from the wind leaves no dangerous waste products behind. Best of all, its supply is unlimited.
6. Answer: Windmills work because they slow down the speed of the wind. The wind flows over the air foil shaped blades causing lift, like the effect on airplane wings, causing them to turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.
7. Answer: The basic ingredients used to make a thunderstorm are moisture, unstable air and

lift. You need moisture to form clouds and rain. You need unstable air that is relatively warm and can rise rapidly. Finally, you need lift. This can form from fronts, sea breezes or mountains.

8. Answer: Lightning is a bright flash of electricity produced by a thunderstorm. All thunderstorms produce lightning and are very dangerous. If you hear the sound of thunder, then you are in danger from lightning. Lightning kills and injures people and properties.

➢ Long Answer:

1. Answer: As the sun warms the Earth's surface, the atmosphere warms too. Some parts of the Earth receive direct rays from the sun all year and are always warm. Other places receive indirect rays, so the climate is colder. Warm air, which weighs less than cold air, rises. Then cool air moves in and replaces the rising warm air. This movement of air is what makes the wind blow.

2. Answer: A monsoon is a seasonal wind, found especially in Asia that reverses direction between summer and winter and often brings heavy rains. In the summer, a high-pressure area lies over the Indian Ocean while a low exists over the Asian continent. The air masses move from the high pressure over the ocean to the low over the continent, bringing moisture-laden air to south Asia. During winter, the process is reversed and a low sits over the Indian Ocean while a high lies over the Tibetan plateau so air flows down the Himalaya and south to the ocean.

3. Answer: The equator receives the Sun's direct rays. Here, air is heated and rises, leaving low pressure areas behind. Moving to about thirty degrees north and south of the equator, the warm air from the equator begins to cool and sink. Between thirty degrees latitude and the equator, most of the cooling sinking air moves back to the equator. The rest of the air flows toward the poles.

4. Answer: In a warm summer day along the coast, this differential heating of land and sea leads to the development of local winds called sea breezes. As air above the land surface is heated by radiation from the Sun, it expands and begins to rise, being lighter than the surrounding air. To replace the rising air, cooler air is drawn in from above the surface of the sea. This is the sea breeze and can offer a pleasant cooling influence on hot summer afternoons.

5. Answer: Lightning is an electric current. Within a thundercloud way up in the sky, many small bits of ice (frozen raindrops) bump into each other as they move around in the air. All of those collisions create an electric charge. After a while, the whole cloud fills up with electrical charges. The positive charges or protons form at the top of the cloud and the negative charges or electrons form at the bottom of the cloud. Since opposites attract, that causes a positive charge to build up on the ground beneath the cloud. The grounds electrical charge concentrates around anything that sticks up, such as mountains, people, or single trees. The charge coming up from these points eventually connects with a charge reaching down from the clouds and – zap – lightning strikes!