PHYSICS

BOOKS - MTG IIT JEE FOUNDATION

SOME NATURAL PHENOMENA

Illustrations

1. Lightning

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2. Inflate a balloon and rub it against your dry hair and then gently place it against a wall. The balloon will stick to the wall, why is it so?

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3. Both the ebonite rods were charged by rubbing with fur. They also acquired ..... charges.

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4. Petrol tankers along the highways often have metal chains attached to it and that drag along the road. Why it is so?

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5. A glass rod rubbed with silk is brought close to two uncharged metallic spheres in contact with each other, inducing charges on them as shown in figure.

What happens when

the spheres are slightly separated, and

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6. A glass rod rubbed with silk is brought close to two uncharged metallic spheres in contact with each other, inducing charges on them as shown in figure.

What happens when

the glass rod is subsequently removed, and finally

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7. A glass rod rubbed with silk is brought close to two uncharged metallic spheres in contact with each other, inducing charges on them as shown in figure.

What happens when

the spheres are separated far apart.

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8. The diagram shows a gold coated pith-ball suspended between two plates and closer to the plate A.

Plates A and B are connected to the positive and negative poles of a high tension battery. What happens to the pith-ball? Give reason.

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9. The diagram shows a gold coated pith-ball suspended between two plates and closer to the plate A.

What would happen if B is earthed? Give reasons.

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10. A polythene piece rubbed with wool is found to have a negative charge of

$3.2 \times 10^{-7} C$. The number of electrons transferred is $x \times 10^{12}$. Find the value of x.

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11. The net charge on a substance consisting of 5×10^{14} electrons is $x\mu\,\mathrm{C}$. Find the value of x.

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12. Why should people in coastal areas shift to nearby raised ground after an earthquake?

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Solved Examples

1. Explain the formation of thunder.

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2. What is seismic focus. Where is it situated?

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3. How can a body be charged by induction?

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4. How can you test whether a body is charged or not?

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5. Explain the method of charging an object by friction.

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6. What are the precautions we should follow against earthquakes?

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7. Where do the two kinds of charges come from?

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8. What action does rubbing cause, because of which the objects acquire charge?

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9. Why are lightning strike more frequent in hilly areas ?

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10. What you meant by earthing?

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Ncert Section

1. Which of the following cannot be charged easily by friction?

A. A plastic scale

B. A copper rod

C. An inflated balloon

D. A woollen cloth.

Answer:

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2. When a glass rod is rubbed with a piece of silk cloth the rod

A. and the cloth both acquire positive charge

B. becomes positively charged while the cloth has a negative charge

C. and the cloth both acquire negative charge

D. becomes negatively charged while the cloth has a positive charge.

Answer:

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3. Write T against true and F against false in the statements.

Like charges attract each other. (T/F)

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4. Write T against true and F against false in the statements.

A charged glass rod attracts a charged plastic straw. (T/F)

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5. Write T against true and F against false in the statements.

Lightning conductor cannot protect a building from lightning. (T/F)

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6. Write T against true and F against false in the statements.

Earthquakes can be predicted in advance. (T/F)

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7. Sometimes, a crackling sound is heard while taking off a sweater during winters. Explain.

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8. Explain why a charged body loses its charge if we touch it with our hand.

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9. Name the scale on which the destructive energy of an earthquake is measured. An earthquake measures 3 on this scale. Would it be recorded by a seismograph? Is it likely to cause much damage?

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10. Suggest three measures to protect ourselves from lightning.

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11. Explain why a charged balloon is repelled by another charged balloon whereas an uncharged balloon is attracted by another charged balloon?

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12. Describe with the help of a diagram an instrument which can be used to detect a charged body.

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13. List three states in India where earthquakes are more likely to strike.

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14. Suppose you are outside your home and earthquake strikes. What precautions would you take to protect yourself?

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15. The weather department has predicted that a thunderstorm is likely to occur on a certain day. Suppose you have to go out on that day. Would you carry an umbrella? Explain.

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Exercise Level 1

1. The parts into which the earth's lithosphere is divided is

A. fault plate

B. tectonic plates

C. epicentre

D. core

Answer: B

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2. The magnitude of an earthquake is measured on

A. Seismograph

B. Electroscope

C. Richter scale

D. All of these

Answer: C

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3. A positively charged object will attract

A. positively charged object

B. negatively charged object

C. both (a) and (b)

D. none of these

Answer: B

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4. The method of charging an object by touching is called

A. induction

B. diffusion

C. conduction

D. current

Answer: C

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5. The boundaries of the earth's plates where earth quakes tends to occur are known as _____ zones.

A. fault zone

B. epic zone

C. focus point

D. lithosphere

Answer: A

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6. Lighting occurs due to

A. rain

B. wind

C. humidity

D. electric discharge

Answer: D

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7. The sudden shaking of earth is called

A. tsunami

B. volcano

C. earthquake

D. cyclone

Answer: C

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8. Consider the list of terms given below.

(i) Tsunami (iii) Floods .

(ii) Landslide (iv) lightining.

Earthquakes can cause .

A. Flood

B. Land slide

C. Tsunami

D. All of these

Answer: D

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9. The branch of science deals with the study of earthquakes and related phenomena is

A. Seismology

B. Seismography

C. Tribology

D. Epicentre

Answer: A

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10. We hear a thunder because

A. A lot of charge goes in lightning

B. The air heats up and expands all of a sudden

C. Clouds bang against each other

D. Cloud burst

Answer: B

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11. Silk acquires charge, when rubbed with a glass rod is

A. positive

B. negative

C. neutral

D. both (a) & (b)

Answer: B

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12. _____ is a device used to protect buildings from the effect of lightning.

A. Seismograph

B. Barometer

C. Lightning conductor

D. Insulation

Answer: C

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13. Electrical charge can be transferred from a charged object to another through

A. vacuum

B. air

C. insulator

D. conductor

Answer: D

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14. Lightning rods are made of

A. Copper

B. Plastic

C. Bakelite

D. Sand paper.

Answer: A

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15. Electric charge is measured in

A. coulomb

B. ampere

C. volt

D. watt

Answer: A

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16. Which of the following are the after effects of earthquakes?

A. Land slides

B. Fires

C. Pollution

D. All of these

Answer: D

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17. The inner most layer of earth is called?

A. core

B. crust

C. mantle

D. lithosphere

Answer: A

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18. Circular mass of clouds indicates the formation of

A. cyclones

B. flood

C. earthquake

D. tsunami

Answer: A

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19. The outermost layer of earth is called

A. mantle

B. crust

C. magma

D. core

Answer: B

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20. Benjamin Franklin was a/an

A. French

B. American

C. Greek

D. Australian

Answer: B

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21. Before using electroscope, it should be

A. charged

B. discharged

C. cleaned

D. closed

Answer: B

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22. Which among the following is not a part of electroscope?

A. metal disc

B. metal rod

C. metal strip

D. metal plate

Answer: D

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23. The location of epicentre in Gujarat earthquake in 2001 was?

A. Bhuj

B. Surat

C. Gandhi Nagar

D. Kachchh

Answer: D

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24. The meaning of word Tsunami is

A. destruction

B. coastal area

C. huge tides

D. huge waves

Answer: D

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25. A crack that occurs between tectonic plates

A. Fault

B. Tremor

C. Focus

D. Epic centre

Answer: A

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26. Lighting generally strikes

A. tall building

B. short trees

C. short building

D. both (a) and (b)

Answer: A

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27. The point where the vibration of earthquake begin is called

A. hypo centre

B. focus

C. epicentre

D. both (a) and (b)

Answer: B

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28. The temperature at the centre of earth is about

A. 40000°C

B. 4000°C

C. 400°C

D. 400000°C

Answer: B

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29. Molten matter thrown out from under the earth

A. magma

B. lava

C. volcano

D. core

Answer: B

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30. Who established that the spark produced by Amber and those in sky during thunderstorms were similar?

A. David Ryner

B. Benjamin Franklin

C. Charles F. Richter

D. William Richard

Answer: B

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Exercise Level 2

1. When two bodies are rubbed against each other?

A. They acquire equal and similar charges.

B. They acquire equal and opposite charges.

C. They acquire unequal and similar charges.

D. They acquire unequal and opposite charges.

Answer: B

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2. Which of the following lies on the earth's surface?

A. Seismic focus

B. Epicentre

C. Mantle

D. Core

Answer: B

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3. Richter scale is developed by

A. William Richard

B. Benjamin Franklin

C. Benjamin Richter

D. Charles F. Richter

Answer: D

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4. If you are caught outdoor during a lightning storm, what should you do?

A. Stand under a small tree

B. Go into an open field

C. Sit in a car

D. Stand under a large tree

Answer: C

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5. Where is the safest place to be during a lightning storm?

A. In a car

B. In a house

C. In the middle of the field

D. Both (a) and (b)

Answer: D

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6. When we remove polyester or woolen cloth in dark, we can see spark and hear a cracking sound. These are due to

A. Reflection of light

B. Refraction of light

C. Current electricity

D. Static electricity

Answer: D

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7. The bright flash of light seen in a dark sky accompanied with a thunderstorm is

A. Lightning

B. Collision

C. Earthquake

D. Electrolysis

Answer: A

Watch Video Solution

8. Which theory explains the location of earthquakes, volcanic eruptions and newly forming mountains?

A. Theory of plate tectonic

B. Theory of evolution

C. None of these

D. Both (a) and (b)

Answer: A

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9. Earthing is provided in buildings to

A. avoid electric shocks due to any leakage of electric current.

B. protect it from the danger of earthquakes

C. both (a) and (b)

D. none of these

Answer: A

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10. Which of the following is the best thing to do during heavy lightning?

A. Lying on the ground in an open place

B. Going to the nearest water body

C. Staying indoor away from metallic doors or windows

D. Standing under a tall tree.

Answer: C

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11. A lightning conductor installed in a building

A. does not allow the lightning to fall on the building

B. repels the lightning

C. forces the lightning to fall in an area where there is no building

D. Conducts electric charge to the ground when lightning strikes the building.

Answer: D

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12. Which of the following scales are not linear in nature?

(i) Decibel

(ii) Richter

(iii) Meter

A. (i) only

B. (ii) and (iii)

C. (ii) only

D. (i) and (ii)

Answer: D

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13. Which of these things would you do if you live in the earthquake prone area?

(i) You would keep an emergency kit always ready

(ii) You would have only open book shelves

and open cupboards in your house

(iii) You would fix the cupboards to the walls

(iv) You would not keep breakable items on the upper shelves

A. Only (iii) is correct

B. Both (i) and (ii) are correct

C. (i), (iii) and (iv) are correct.

D. All are correct

Answer: C

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14. Choose the correct statement

A. Unlike charges repel each other

B. Moving charges constitute electric current

C. A woollen cloth can not be charged

D. None of these

Answer: B

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15. The molten rocks which come out during volcanic eruption is called

A. mixture

B. magma

C. mud

D. ash

Answer: B

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16. Earthquake of magnitude 6 is more than earthquake of magnitude 5 by

A. 2 times

B. 5 times

C. 10 times

D. 100 times

Answer: C

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17. Vibration accompanying an earthquake

A. seismic waves

B. tremor

C. fault

D. moment

Answer: B

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18. Lithosphere is broken up into number of plates called

A. fault plates

B. seismic plates

C. tectonic plates

D. marble plates

Answer: C

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19. Electricity produced on rubbing is

A. static electricity

B. electromagnetic

C. current electricity

D. none of these

Answer: A

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20. Tsunami is the after effect of

A. floods

B. earthquake

C. earthquake beneath the sea

D. eruption of volcano under the sea

Answer: C

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Exercise Assertion Reason Type

1. Assertion : People struck by lightning receive a severe electrical shock and may be burnt.

Reason : Lightning carries very high voltage.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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2. Assertion : Lightning rods are conductors use to protect buildings and houses from lightning strikes.

Reason : Lightning rods conduct electric charge.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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3. Assertion : When both the strips of electroscope is charged with similar charge, they repel each other and become wide open.

Reason : Like charges always repel each other.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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4. Assertion : It is safer to stand under a tall tree during lightning.

Reason : Doing so will make you the target for lightning

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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5. Assertion : Lightning is caused by the accumulation of charges in clouds.

Reason : The process of meeting of negative and positive charges to release huge amount of energy is called electric discharge.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: B

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6. Assertion : It is not a safe option to carry umbrella at the time of thunder storm.

Reason : Taking umbrella will increase the risk of fall of lightning on the person.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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7. Assertion : The areas fall between the boundaries of two plates are called seismic or fault zones.

Reason : Fault zones are earthquake free zones.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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8. Assertion : Tsunami may cause severe earthquakes.

Reason : Earthquake may cause severe Tsunami.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

View Text Solution

9. Assertion : Core is the innermost layer of the earth.

Reason : Mantle is the outermost layer of the earth.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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10. Assertion : Sometimes a crackling sound is heard while taking off sweater during winters.

Reason : The electric discharge takes place between body and sweater.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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Exercise Comprehension Type Passage I

1. To protect tall buildings from damage by lightning a lightning conductor is find on

them. A lightning conductor consists of a metal rod ending in spikes at the top. The lower end of the rod is attached to a copper plate buried deep in the earth. If lightning does strike the building, it flows harmlessly to the earth through the metal rod, and no damage is done to the building

Who developed the idea of using lightning conductors to protect tall buildings?

A. Benjamin Franklin

B. Albert Einstein

C. Issac Newton

D. William Gilbert

Answer: A

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2. To protect tall buildings from damage by lightning a lightning conductor is find on them. A lightning conductor consists of a metal rod ending in spikes at the top. The lower end of the rod is attached to a copper plate buried deep in the earth. If lightning

does strike the building, it flows harmlessly to the earth through the metal rod, and no damage is done to the building

Which metal can be used, instead of copper to make plate, which is buried deep in the earth?

A. Silver

B. Wood

C. Plastic

D. Carbon

Answer: A

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Exercise Comprehension Type Passage Ii

1. The boundaries of the tectonic plates are the zones where earthquakes are most likely to occur. These are known as fault zones. In India, the fault zone at the boundary of the Indian plate and Eurasian plate passes through Kashmir, western and central Himalayas, the whole of North-East, Rann of Kachchh, Rajasthan and the Indo-Gangetic

plain. These areas are therefore most threatened.

The boundary of tectonic plates are also called as

A. tectonic zones

B. seismic zones

C. epic zones

D. focus zones

Answer: B

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2. Which among the following is not an earthquake prone area?

A. Rann of Kachchh

B. Indo Gangetic plain

C. Rajasthan

D. Bihar

Answer: D

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Exercise Subjective Problems Very Short Answer Type

1. Who discovered static electricity or lightning in clouds?

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2. What are the two types of charges?

View Text Solution

3. What is an electric current ? Give its SI unit.

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4. What are charged objects?

View Text Solution

5. What is lightning?

View Text Solution

6. Give some safe places during thunderstorm?

View Text Solution

7. Name the material used to transfer chargesfrom one body to other

View Text Solution

8. What do you mean by earthing?

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9. What are other natural phenomenon caused by earthquake?

View Text Solution

10. What are seismic or fault zones?

View Text Solution

11. Define lightning conductor.

View Text Solution

12. When you are in open, where should you take shelter during lightning?

View Text Solution

13. What is static electricity?

View Text Solution

14. What happens when amber is rubbed with fur?

View Text Solution

15. What are seismic waves?

View Text Solution

Exercise Subjective Problems Short Answer Type

1. What are tectonic plates?

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2. In what ways is lightning useful?

View Text Solution

3. When two bodies are rubbed against each other, what kind of charges do they acquire?

View Text Solution

4. How earthing help us to protect buildings?

View Text Solution

5. How can charging take place when the substances are rubbed?

View Text Solution

6. What is lightning conductor? How does it protect building from lightning?

View Text Solution

7. What are the effects of an earthquake?

View Text Solution

8. How can you save yourselves from lightning?

View Text Solution

9. What are fault zones? Name the fault zones in India.

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10. What preventive steps should be taken to minimize the effects of earthquake in future?

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Exercise Subjective Problems Long Answer Type

1. Explain the construction and working of electroscope.

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2. Explain the mechanism of thunderstorms.

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3. Explain the process of lightning striking a building or tree.

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4. What is an earthquake? How it is caused?

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5. Describe the scale commonly used to measure the magnitude of earthquakes.

View Text Solution

6. How many types of charges are possible in nature?

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7. The charges on an object is given by Q = ne, here n is number of electrons and e is electronic charge $\left(-1.6 \times 10^{-19} C\right)$. If an

object has charge $-5 \times 10^{-19} C$, what should be number of excess electron on it?

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Exercise Subjective Problems Integer Numerical Value Type

1. A Richter scale recorded the magnitude of intensity of an earthquake greater than x. Due to this entire city is destroyed, what should be the minimum value of x?

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Olympaid Hots Corner

1. Which of the following places in India is most likely to experiences cyclones?

A. Delhi

B. Mumbai

C. Puri

D. Bhopal

Answer: C

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2. Consider the list of terms given below

(i) Seismic Zone

(ii) Fault Zone

(iii) Mantle

(iv) Inner Core

The boundaries of the earth's plate are known as

A. (i) and (ii)

B. (i) and (iii)

C. (iii) and (iv)

D. (ii), (iii) and (iv)

Answer: A

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3. Consider the list of terms given below

(i) Tsunami

(ii) Landslide

(iii) Floods

(iv) Lightning

Earthquakes can cause

A. (i), (ii) and (iii)

B. (ii) and (iv)

C. (ii), (iii) and (iv)

D. (iii) and (iv)

Answer: A

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4. Which gas is produced in air during lightning that absorbs ultraviolet radiation present in sunlight?

A. Carbon dioxide

B. Hydrogen

C. Ozone

D. Oxygen

Answer: C

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5. Radha went for a drive when it suddenly started raining and heavy lightning occurred which caused fire near by. Radha was safe from lightning because

A. She took shelter under a tree

B. She kept sitting in car with windows shut

C. She kept sitting in car with door and windows open

D. She stood in open

Answer: B

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6. A building is protected from the effect of lightning by using

A. Seismograph

B. Electroscope

C. Lightning conductors

D. Anemometer

Answer: C

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7. Which of the following is/are correct?

(1) Besides helping in finding distance of an object, SONAR also indicates its range.

(2) Megaphone ia a device which works on the principle of reflection of sound.

(3) Ultrasonics are used to detect earthquakes.

(4) Like light, sound waves also obey laws of reflection.

A. 2, 3 and 4

B. 1, 2 and 3

C. 1, 2 and 4

D. 1, 3 and 4

Answer: C

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8. Two uncharged conducting spheres are placed in contact with each other. Which of the following diagrams best represents the

charge distribution when a negatively charged rod is placed near one of them?

A. 

B. 

C. 

D. 

Answer: C

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9. Out of the following the best safety measure against lightning strikes is

A. Stand on the terrace of the building

B. Take shelter under a tree

C. Run across an open high ground

D. Take shelter inside a metal box

Answer: D

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10. Two metal spheres are mounted on insulating stands. Sphere P is initially uncharged and sphere Q is initially positively charged. A metal rod, held by an insulating handle, is placed in contact with P and Q as shown.

What are the charges on P and Q after the rod is placed in contact with them?

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