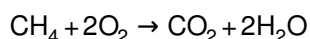**Question:1**
When a hydrocarbon fuel is burnt, it always gives out carbon dioxide and water vapour. Do you agree?

Solution:
Yes, when a hydrocarbon fuel is burnt, it gives out carbon dioxide and water vapours. Hydrocarbons are made up of carbon and hydrogen. When they are burnt in the presence of oxygen, carbon reacts with oxygen to form carbon dioxide and hydrogen reacts with oxygen to form water vapours.

Example: When we burn methane gas in the presence of a sufficient amount of oxygen, it gives carbon dioxide gas and water vapours.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

Question:2
To set fire to a combustible substance, you have to heat it to a certain minimum temperature. What is the minimum temperature called? If this minimum temperature is very low for a certain substance, what is the substance called?
Solution:
The lowest temperature at which a combustible substance starts burning in the presence of air is called ignition temperature.
The substance that has very low ignition temperature and hence, can catch fire easily are called inflammable substances.

Question:3
To extinguish a fire, you can remove the combustible substance. What other methods can you use?
Solution:
To extinguish a fire, we need to cut the supply of oxygen from the combustible substance. Other than removing the combustible substance, we can use the following methods to extinguish the fire:

i
We can use water to extinguish the small and short-range fire.
ii
We can also use a CO_2 extinguisher to put out the heavy fire or fire started due to oils. CO_2 extinguisher uses carbon dioxide gas to cut the supply of oxygen from the combustible substance.

Question:4
Carbon dioxide is the most commonly used gas for extinguishing a fire. Which properties of carbon dioxide are used here?
Solution:
Carbon dioxide is heavier than air and it settles down and cuts the supply of oxygen, which extinguishes the air.

Question:5
The innermost part of a candle flame is the hottest. Do you agree? Give reasons.
Solution:
No, the innermost part of the candle is not the hottest.
The outermost zone of a candle's flame is the hottest zone of the flame and is also a zone of complete combustion. The innermost zone is the least hot zone.

Question:6
Which fuel gives off the maximum heat when 1 kg of it is burnt? What is this amount of heat called?

Solution:

Hydrogen gives off the maximum heat when 1 kg of it is burnt. Amount of heat produced when 1 kg of fuel is burnt is called its calorific value. Unit of calorific value is kilojoule per kilogram kJ/kg

Question:7

A cheap non-polluting fuel with a very high calorific value was developed by a scientist. It had an ignition temperature of 20°C. Is it a good fuel? Give reasons.

Solution:

Yes, it is good fuel.

Reasons for good fuel:

1. It has a very high calorific value.

2. It is non-polluting in nature.

3. It has moderate ignition temperature.

Question:8

Which gas released during combustion is thought to cause global warming?

Solution:

During the combustion of hydrocarbons, carbon dioxide gas is released which is one of the main components of global warming. Increased level of carbon dioxide traps the heat of sun inside the earth atmosphere, which results in increasing the temperature of the earth.

Question:9

Which dangerous pollutant is given off if a fuel while burning does not get sufficient air?

Solution:

If a fuel while burning does not get sufficient air, then carbon monoxide is released which is a very harmful pollutant and can cause death if breathed in.

Question:10

Good fuels have

a

low ignition temperature and high calorific value.

b

low ignition temperature and low calorific value.

c

high ignition temperature and high calorific value.

d

high ignition temperature and low calorific value.

Solution:

a low ignition temperature and high calorific value.

Good fuels should have low ignition temperature

thelowesttemperatureatwhichasubstancecatchesfire and high calorific value

producealargequantityofheat.

Question:11

Calorific value of a fuel is the heat energy produced when

a

any amount of the fuel is completely burnt.

b

one kilogram of the fuel is completely burnt.

c

one milligram of the fuel is completely burnt.

d

hundred grams of the fuel are completely burnt.

Solution:

b one kilogram of the fuel is completely burnt.

The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its calorific value.The calorific value of a fuel is expressed in kilojoule per kg *kJ/kg*
.

Question:12
Which poisonous gas is formed as a result of incomplete combustion?
a
coal gas
b
carbon monoxide
c
carbon dioxide
d
nitrogen oxide
Solution:
b
carbon monoxide

Incomplete combustion of fuels produces carbon monoxide gas. It is dangerous to burn coal in a closed room because it produces carbon monoxide gas, which can kill persons sleeping in that room.

Question:13
Acid rain can be caused by the burning of
a
petrol.
b
CNG.
c
diesel.
d
coal.
Solution:
d
coal

Sulphur is found as a trace element in coal. When coal is burnt, sulphur combines with oxygen to form sulphur dioxide (SO_2). SO_2 does not react with most chemicals found in the atmosphere and can travel long distances.

Further, it reacts with water vapors in the atmosphere and causes acid rains.

Question:14
To extinguish a flame, which of these methods can be used?
a
reduce temperature to below ignition temperature
b
remove combustible substance
c
cut off air supply
d
any one of these
Solution:
d
any one of these

Job of a fire extinguisher is to cut off the supply of air, or to bring down the temperature of the fuel, or both. In some cases, a flame can also be extinguished by just removing the combustible substance.

Question:15

The hottest zone of a candle flame is

a

non-luminous zone.

b

luminous zone.

c

dark zone.

d

blue zone at the base of the wick.

Solution:

a

non-luminous zone.

Non-luminous zone is a zone of complete combustion. It is the outermost and the hottest zone of the flame with plenty of oxygen available from the surrounding atmospheric air.

Question:16

Which of these is a solid pollutant?

a

SPM

b

carbon monoxide

c

nitrogen oxides

d

sulphur dioxide

Solution:

a

SPM

Suspended Particulate Matter *SPM*

consists of mist, dust, fumes and smoke. Common chemicals that constitute SPM are nickel, arsenic and lead. When these particles are inhaled, they tend to accumulate in the lungs and cause respiratory problems and damage the lungs.

Question:17

Which of these fuels has the highest calorific value?

a

CNG

b

coal

c

hydrogen

d

petrol

Solution:

c

hydrogen

The calorific value of a fuel is expressed in kilojoule per kg *kJ/kg*

.

The calorific values of coal, CNG, hydrogen and petrol are as follows:

Coal: 25,000 -
33,000 kJ/kg
CNG: 50,000 kJ/kg,
Hydrogen: 150,000 kJ/kg
Petrol: 45,000 kJ/kg

Question:18

What is the process of burning of substances with the evolution of heat and light called?
Solution:

The process of burning of substances with the evolution of heat and light is called combustion.

Question:19

Most fuels are made up of _____ and _____
Solution:

Most fuels are made up of carbon and hydrogen.

Question:20

Which gas is produced when a fuel burns in
a
sufficient supply of air
b
insufficient supply of air.
Solution:

 a
Carbon dioxide gas is formed, when a fuel burns in sufficient supply of air.
 b
Carbon monoxide gas is formed, when a fuel burns in insufficient supply of air.

Question:21

All combustible substances must be heated to the same temperature to make them burn. True of false?
Solution:

False.
Different combustible substances catch fire at different temperatures.
A combustible substance cannot catch fire or burn if its temperature is lower than its ignition temperature.

Question:22

Any substance that can burn is an inflammable substance. True of false?
Solution:

False.
Substances that have very low ignition temperature and can easily catch fire with a flame are called inflammable substances.

Question:23

Spontaneous combustion starts at room Temperature. True of false?
Solution:

True.
The combustion in which a material suddenly bursts into flames without the application of any apparent cause is called spontaneous combustion.
Example: Phosphorous burns in air at room temperature.

Question:24

During an explosion, a large amount of _____ is given out.

Solution:

During an explosion, a large amount of <u>gas</u> is given out.

Question:25

Water is useful in putting out all fires. True or false?

Solution:

False.

Water cannot be used if electrical equipment is on fire because it can conduct electricity and cause harm.

It is also not suitable to use water to extinguish fires involving inflammable materials like oil and petrol because water is heavier than oil and sinks below it. On the other hand, oil continues to burn on the top.

Question:26

In a soda-acid type fire extinguisher, _____ reacts with sulphuric acid to give out carbon dioxide.

Solution:

In a soda-acid type fire extinguisher, <u>sodium hydrogen carbonate ($NaHCO_3$)</u> reacts with sulphuric acid to give out carbon dioxide.

Question:27

The _____ zone in a candle flame is the zone of no combustion.

Solution:

The <u>central</u> zone in a candle flame is the zone of no combustion.

Question:28

The amount of heat liberated when one kilogram of a fuel is completely burnt in sufficient supply of oxygen is called _____ _____ of the fuel.

Solution:

The amount of heat liberated when one kilogram of a fuel is completely burnt in sufficient supply of oxygen is called <u>calorific value</u> of the fuel.

Question:29

Name one unit in which the heat liberated by a fuel is measured.

Solution:

The heat liberated by a fuel is expressed in kilojoule per kg *kJ/kg*

.

Question:30

The lower the ignition temperature the better the fuel. True or false?

Solution:

False.

Fuels should have a moderately low ignition temperature. A moderately low ignition temperature makes a fuel useful.

Question:31

What are the fine particles released on burning carbon-containing fuels called?

Solution:

The fine particles released on burning carbon-containing fuels are called SPM *SuspendedParticulateMatter*

.

Question:32

What is combustion?

Solution:

Combustion is a chemical process wherein a substance reacts with oxygen to produce energy in the form of heat or light or both. It is an oxidation process because it involves the burning of a fuel, completely or partially in the presence of air. However, the presence of oxygen is not must for oxidation to take place. Elements such as magnesium also burn in an atmosphere of nitrogen or chlorine to form magnesium nitride or magnesium chloride, respectively.

Question:33

Distinguish between combustible and non-combustible substances, giving three examples of each.

Solution:

Combustible Substances	Non-combustible Substances
1. The substances that are capable of catching fire and burning are known as combustible substances.	1. The substances that are not capable of catching fire and burning are known as non-combustible substances.
2. Examples: Coal, petrol, diesel etc.	2. Examples: Stone, water etc.

Question:34

Why is it more difficult to burn some combustible substances than others?

Solution:

It is more difficult to burn some combustible substances than others because different substances catch fire at different temperatures. Some substances have a low ignition temperature; therefore, they can catch fire more easily than others. Ignition temperature plays a crucial role in determining the combustibility of different substances.

Question:35

State the conditions under which combustion occurs.

Solution:

Combustion of a fuel requires:

- Presence of a combustible substance such as coal, natural gas, wood, etc
- Presence of air to supply oxygen
- Availability of heat to raise the temperature of the fuel beyond its ignition temperature

Question:36

Why is more care needed to store kerosene than coal, though both are fuels?

Solution:

Both kerosene and coal are fuels, but we need extra care to store kerosene oil because the ignition temperature of kerosene oil is lower than that of coal. If kerosene oil is heated a little, it will catch fire easily. On the other hand, coal needs more heat to catch fire.

Question:37

What problem will arise if a fuel has an ignition temperature lower than the average room temperature? Name the type of combustion that will occur in such a case.

Solution:

If a fuel has an ignition temperature lower than the average room temperature, combustion will occur suddenly on its own. Such a combustion is known as spontaneous combustion.

Question:38

What is an explosion?

Solution:

Combustion that occurs very rapidly with the evolution of large amount of heat and light accompanied by loud sound is called explosion. Large amount of gas is also released during explosion. Hydrogen gas is an example of one of the explosive gases.

Question:39
Why is water not suitable for extinguishing a fire in an electrical appliance?
Solution:
Water is not suitable for extinguishing a fire in an electrical appliance. If water is poured on an electrical fire, it can conduct electricity and cause electric shocks to the person trying to extinguish the fire.

Question:40
Name and give chemical equations to show the products of the combustion reaction in
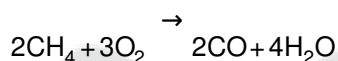*a*
limited supply of air.
b
sufficient supply of air.
Solution:
*a*
limited supply of air
If the supply of air is limited, it can result in incomplete combustion, which, in turn, produces carbon monoxide gas instead of carbon dioxide gas.

$$2CH_4 + 3O_2 \xrightarrow{} 2CO + 4H_2O$$

b
Sufficient supply of air

If the supply of air is sufficient, it can result in complete combustion. The reactants burn in oxygen and produce a limited number of products. When hydrocarbons burn in oxygen, the reaction primarily yields carbon dioxide and water.

$$CH_4 + 2O_2 \xrightarrow{} CO_2 + 2H_2O$$
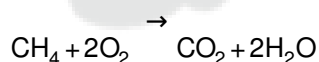
Question:41
List the different methods by which a fire can be extinguished.
Solution:
Different methods can be used to extinguish fires. They are as follows:

- Cooling off the burning material.

- Excluding oxygen from fire

- Removing fuel from fire

- Using a flame inhibitor

Question:42
What kind of fires can effectively be put out by water? What kind of fires is it not suitable for? Give reasons for both cases.
Solution:
Water cools the combustible material and the temperature is brought below the ignition temperature of

the combustible material . This prevents fire from spreading. Water vapours also surround the combustible material and help in cutting off the air supply.

Water can be used when solid materials like paper, wood etc. are on fire. However, it is not suitable for extinguishing fire in electrical appliances. If water is poured on an electrical fire, it can conduct electricity and cause electric shocks to the person trying to extinguish the fire. Moreover, water should not be used in fires involving hot cooking oil or fat because it can spread such fires.

Question:43

How does carbon dioxide extinguish a fire?

Solution:

Carbon dioxide is heavier than air and does not support combustion. Carbon dioxide extinguishes fire by displacing oxygen or by taking away oxygen from the fire triangle. Carbon dioxide is also very cold when it comes out of the extinguisher. Thus, it reduces the temperature of the fuel as well.

Question:44

What is calorific value of a fuel? Why is hydrogen not used as a fuel though it has the highest calorific value?

Solution:

The amount of heat liberated, when one kg of a fuel is completely burnt in sufficient supply of oxygen, is called the calorific value of the fuel.

Hydrogen is not used as fuel despite the highest calorific value because:

- It is lighter than air; thus, it is not easily available.
- It cannot be used in liquid form because its melting point is -253º C.
- Hydrogen gas in external air may spontaneously ignite.
- Hydrogen fire, while being extremely hot, is almost invisible; thus, it can lead to accidental burns.
- Hydrogen poses unique challenges due to its ease of leaking, low-energy ignition and wide range of combustible fuel-air mixtures.

Question:45

How are fuels classified on the basis of their physical state? Give two examples of each.

Solution:

We know that matter can exist in three states -
 solid, liquid and gas.
On this basis, fuels can be classified as follows:
Solid fuels: Examples: Wood, coal, cattle-dung cakes, bagasse *sugarcanefromwhichjuicehasbeenextracted*
, etc.
Liquid fuels: Examples: Kerosene, liquefied petroleum gas *LPG*
, fuel oil, petrol, diesel, etc.
Gaseous fuels: Examples: Natural gas, coal gas, water gas, producer gas, biogas, acetylene, etc.

Question:46

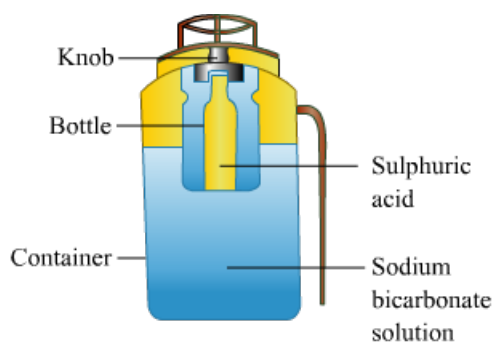How is burning of fossil fuels thought to be related to global warming?

Solution:

Combustion of most of the fuels releases carbon dioxide and nitrogen dioxide in the environment. Increase in their concentration in the air causes global warming.

Question:47

Explain, with the help of a labelled diagram, how a soda-acid type fire extinguisher works.

Solution:

A soda-acid type fire extinguisher

A soda-acid type fire extinguisher contains concentrated solution of sodium hydrogen carbonate ($NaHCO_3$) in a small cylinder fitted with a glass bottle filled with sulphuric acid. When fire breaks out, the cylinder is hit on a hard surface to break the bottle. Once the bottle breaks, the acid reacts with sodium hydrogen carbonate to evolve carbon dioxide and water in the form of vapours. Carbon dioxide, being a non-supporter of combustion, forms a blanket over the fire and extinguishes it. Water, because of its cooling effect, brings down the temperature below the ignition temperature to check burning.

Question:48
Name the different zones of a candle flame. Give details of the conditions in each zone.
Solution:
Different zones of a candle flame
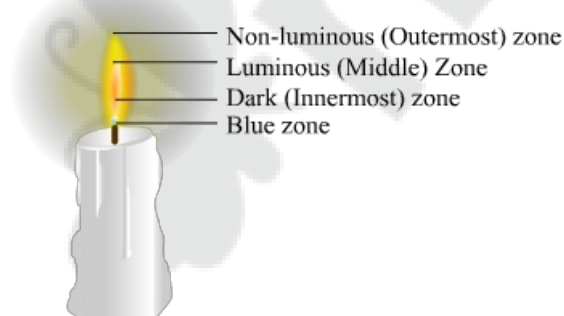
As shown in the above diagram, a candle flame has four zones. They are as follows:

Innermost zone: The flame starting from the wick has a small blue colour zone. Here, carbon monoxide produced by the incomplete combustion of carbon particles burns to give blue color.

Central zone: It lies above the innermost zone, where no combustion takes place. It is not a hot zone. It consists of unburnt vaporised particles of the wax.

Luminous zone: It is luminous and consists a pale yellow glow above the central zone. It is formed by incomplete combustion of wax vapors in limited supply of oxygenated air.

Non-luminous zone: It is the outermost and the hottest zone of the flame above the luminous flame. It is formed by complete combustion of wax vapours with plenty of oxygen available from the surrounding atmospheric air.

Question:49
What are the characteristics of a good fuel?
Solution:
Characteristics of a good fuel are as follows:
1. High calorific value: In order to have high fuel efficiency, a good fuel must have high calorific value.
2. Moderate ignition temperature: A good fuel should have moderate ignition temperature.
3. Burns easily at a moderate rate: A good fuel should burn easily in sufficient air at a moderate rate.

4. Low content of non-combustible material: A good fuel should have low content of non-combustible material.

5. Easy to store and handle: A good fuel should be easy to transport and store at a low cost and without causing any harm.

6. Lower moisture content: A good fuel should have less moisture content.

7. Fuels on combustion should not leave behind any harmful product such as CO, SO_2, etc.

8. A good fuel should have low volatile matter content.

Question:50

Discuss the impact of burning fuels on air.

Solution:

Carbon fuels like wood, coal, petroleum release unburnt carbon particles. These fine particles are dangerous pollutants, which cause respiratory diseases such as asthma.

Incomplete combustion of these fuels gives carbon monoxide gas, which is a very poisonous gas.

Combustion of most fuels releases carbon dioxide in the environment. Increased concentration of carbon dioxide in the air causes global warming.

Use of fossil fuels damages the environment with the realease of toxic gases like oxides of nitrogen and sulphur. Such gases are responsible for acid rain, which, in turn, is very harmful for crops, buildings and soil. Moreover, nitric oxide and CFCs are also responsible for depletion of ozone layer.

Question:51

Only gases burn with a flame. But when you burn wood, it initially burns with a flame. Later, it only glows without a flame. What do you think is the reason for this?

Solution:

Gases burn with a flame because they vaporise on burning. Wood initially burns with a flame because of the presence volatile gases in it. When all the gases escape, it glows without a flame.

Question:52

Would you consider coal as a good fuel? Give reasons.

Solution:

Coal meets nearly all the conditions of being a good fuel. It is economically cheap, easily available and produce no harmful odour on burning. It can be transported easily and its combustion can be controlled. Therefore, coal can be considered as a good fuel.

Question:53

When a fuel is burnt, carbon dioxide *orcarbonmonoxide*
and water vapour are given out. Can you name one fuel which burns without giving off water vapour? Why does it not give out water?

Solution:

The fuel that burns without giving out water vapour is coke, which is a pure form of carbon. It has high carbon content and low amount of hydrocarbon.

Water vapour is released from a fuel if it contains hydrogen. However, coke has very low hydrogen content and hence, water vapour is not given out. It simply burns giving carbon dioxide gas.

$$C + O_2 \xrightarrow{} CO_2$$
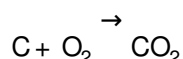
Question:54

Why does a matchstick burn on rubbing it on the side of the matchbox?

Solution:

The head of a safety match contains antimony trisulphide and potassium chlorate. The rubbing surface has powdered glass and a little red phosphorous. When the match is struck against the rubbing surface, some red phosphorous gets converted into white phosphorous. This immediately reacts with potassium chlorate in the matchstick head to produce heat to ignite antimony trisulphide and start the combustion.

Question:55

Your LPG gas stove at home is giving a yellow flame. What can this mean?

Solution:

Yellow flame indicates that the flame tube is starved of oxygen.

There can be various reasons for less oxygen like air holes of the burner may be clogged causing the fuel to burn insufficiently due to insufficient supply of air, or less amount of fuel is available; i.e., the cylinder is about to get empty.

Question:56

A flame always points upwards. Why do you think this is so?

HINT: *Gases produced in a flame are hot, and hence lighter.*

Solution:

Hot gas is generally less dense than cool gas. Flame is a very hot gas. As the flame burns, it takes the oxygen from the atmospheric air and heats the surrounding atmospheric gases. Therefore, the hot air around the flame is pushed up because it is less dense. As the air around the flame is pushed up, the air around the flame is drawn towards the flame to take the space of the lighter gases, which are pushed up. Meanwhile, the surrounding cold air is pulled down by gravity and the flame is pressurised all around by the atmospheric gases. This elongates the flame upward.

Question:57

When a candle burns, is it possible to get the wax back

a

after the wax melts?

b

after the wax burns?

HINT: *Are these physical changes or chemical changes*?

Solution:

Candle is a solid cylindrical block of wax with a wick embedded in it.

a) A candle starts melting when it comes in contact with the heat of the flame. The change in shape and size of the candle takes place. This indicates a physical change from solid state to liquid state. It is possible to get the wax back after it melts.

b) A wax candle acts as a fuel when we burn the candle. It is basically carbon. The wax oxidises *burns*

in the flame to yield water and carbon dioxide, which dissipate in the air around the candle in a reaction, which also yields light and heat. The unburnt carbon is deposited as a black substance called soot. This signifies a chemical change. It is not possible to get the wax back after it burns.

Question:58

Why do we wrap a blanket around a person whose clothes have caught fire?

Solution:

For a fire to burn, all three elements -

 heat, fuel and oxygen -

 of the fire triangle must be present. If any of these is cut off, fire will be put out. When a fire blanket completely surrounds the person whose clothes caught fire, it seals the person's body surface around the fire and cuts off the oxygen supply to the fire; thereby, putting out the fire . Thus, fire blanket acts as a fire extinguisher and stops the fire from spreading.

Question:59

Why do forest fires occur during hot summers?

Solution:

During hot summers, due to hot environment, the speed of hot air is high. This causes the dry leaves and trees to collide each other. This collision results in friction, which, in turn, produces a spark. Dry leaves easily catch those sparks and start burning. The burned leaves further spread due to air and cause the forest fire to expand.

Question:60

Why is it easier to burn dry leaves but not green leaves?

Solution:

The ignition temperature of green leaves is higher than that of the dry leaves because they contain moisture in them. Therefore, its easier to burn dry leaves but not green leaves.

Question:61

Students of a school had gone for an overnight camp. They gathered some wood and wanted to light a fire. They tried to light the fire with a matchstick but the wood would not catch fire. Someone suggested pouring kerosene over the wood, but no kerosene was available. Someone else suggested setting dry leaves on fire first with the matchstick and using it to light the wood. But they could not find any dry leaves.

Then Tanya brought a bottle of Vaseline*petroleumjelly*

that she had brought with her to apply on her skin. She smeared it over a piece of cloth and set it on fire. She used it to light the wood.

Answer these questions.

1. Why could the wood not be set on fire by the matchstick?

2.How would kerosene have helped?

3.Why were dry leaves suggested and not green leaves?

4.Which two properties of petroleum jelly were used to light the fire?

Solution:

1. The ignition temperature of the wood is very high. Matchstick is not able to produce enough heat and raise the temperature to the ignition temperature of the wood. So, wood does not set on fire by the matchstick.

2. Kerosene has a much lower ignition temperature than wood. When kerosene starts burning, due to the heat produced the temperature increases and equals to the ignition temperature of the wood, and the wood starts burning too.

3. Green leaves contain water molecules, so they can't be burn easily but dry leaves have no water content so they can be burnt easily.

4. Petroleum jelly is a mixture of hydrocarbons.

Two properties of petroleum jelly used to light the fire are:

i

Petroleum jelly contains carbon, and carbon can be easily burnt.

ii

 Petroleum jellies have a high calorific value.

Question:62

Namita noticed that the LPG gas stove in her kitchen was giving out yellow flame and blackening the utensils. She cleaned the stove burners. The flame then became blue and stopped blackening the utensils. She explained to her parents that the stove was not burning efficiently and wasting fuel because it was dirty. What values did Namita Show?

Solution:

The yellow flame coming out of the LPG cylinder because a sufficient amount of oxygen is not available for the burning of LPG.

Yellow flame shows the release of carbon monoxide which is poisonous gas and blue flame also releases a lot of unburnt carbon particles which make utensils black.

So, after cleaning of stove burner, a sufficient amount of oxygen is available which doesn't lead to the production of carbon monoxide and release less unburnt carbon. Due to which blackening of utensils stops.

Values shown by Namita is that she is well aware of environmental problems and health risks caused due to the production of carbon monoxide.

Question 1
Solution:
Let tens digit = x
Units digit = 3
∴Number = 3 + 10x
According to the condition,
7 (x + 3) = 3 + 10x
7x + 21 = 3 + 10x
21 − 3 = 10x − 7x
=> 3x = 18
x = 183
∴Number = 3 + 10x
= 3 + 10 x 6 = 3 + 60 = 63

Question 2.
Solution:
Let ten's digit = x
Then units digit = 2x
and number = 10x + 2x = 12x
According to the condition,
12x = x + 2x + 18
12x − x − 2x = 18
=> 9x = 18
x = 189 = 2
∴Number = 12x = 2 x 12 = 24

Question 3.
Solution:
Let units digit = x
and tens digit = y
Number = x + 10y
Now x + 10y = 4 (x + y) + 3
=> x + 10y = 4x + 4y + 3
10y − 4y − 4x + x = 3
=> 6y − 3x = 3
2y − x = 1 ….(i)
∴Number by reversing the order of digits = y + 10x
=>x + 10y + 18 = y + 10x
=>10x − x + y − 10y = 18
=> 9x − 9y = 18
x − y = 2 ….(ii)
∴Adding (i) and (ii)
=> 2y − y = 3

Y = 3
x = 2y − 1 = 2 x 3 − 1 = 6 − 1 = 5

∴Number = x + 10y = 5 + 3 x 10
= 5 + 30 = 35

Question 4.
Solution:
Sum of two digits of a number =15
Let units digit = x
Then tens digit = 15 – x
∴Number = 10 (15 – x) + x
= 150 – 10x + x = 150 – 9x
By interchanging the digits, the new number will be
= 10x + 15 – x = 9x + 15
According to the condition,

9x + 15 = 9 + 150 – 9x
9x + 9x = 159-15 = 144
18x = 144
=>x = $\frac{144}{18}$ = 8
∴Number = 150 – 9x = 150 – 9 x 8
= 150 – 72 = 78
Question 5.
Solution:
Let units place digit = x
and tens place digit = y
Then number = x + 10y
By interchanging the positions of the digits then
Units digits = y
and tens digit = x
∴Number = y + 10x
(x + 10y) – (y + 10x) = 63
=> x + 10y – y – 10x = 63
=> 9y – 9x = 63
=> 9(y – x) = 63
y – x = $\frac{63}{9}$ = 7
∴Hence, difference of its digits = 7 Ans.
Question 6.
Solution:
Sum of three digits of a number = 16
Let units digit of a three-digit number = x
Then tens digit = 3x
and hundreds digit = 4x
∴Number = x + 10 x 3x + 100 x 4x
= x + 30x + 400x = 431x
But x + 3x + 4x = 16

=> 8x = 16

∴x = $\frac{16}{8}$ = 2

∴Number = 431 x 862

By Anthony Jamatia

Question 1.
Solution:
We know that a number is divisible by 2 if its unit digit is 0, 2, 4, 6 or 8
Therefore, (i) 94, (ii) 570, (iv) 2398,(v) 79532 and (vi) 13576 are divisible by 2.

Question 2.
Solution:
We know that a number is divisible by 5 if its unit digit is 0 or 5.
Therefore, (i) 95, (ii) 470, (iv) 2735, (vi) 35790, (vii) 98765 and (ix) 77990 are divisible by 5.

Question 3.
Solution:
We know that a number is divisible by 10 if its unit digit is zero.
Therefore, (ii) 90 and (iv) 57930 are divisible by 10.

Question 4.
Solution:
We know that a number is divisible by 3 if the sum of its digits is divisible by 3.
Therefore
(i) 83 – 8 + 3 = 11,not divisible by 3
(ii) 378 – 3 + 7 + 8 = 18, is divisible by 3
(iii) 474 – 4 + 7 + 4 = 15, is divisible by 3

Question 5.
Solution:
We know that a number is divisible by 9, if the sum of its digits is divisible by 9. Therefore,
(i) 327 = 3 + 2 + 7 = 12,is not divisible by 9
(ii) 7524 = 7 + 5 + 2 + 4 = 18, is divisible by 9
(iii) 32022 = 3 + 2 + 0 + 2 + 2 = 9,is divisible by 9

Question 6.
Solution:
We know that a number is divisible by 4, only when the number formed by its last two digits is divisible by 4.
Therefore,
(i) 134, is not divisible by 4 as last two digits 34 is not divisible by 4.
(ii) 618, is not divisible by 4 as last two digits 18 is not divisible by 4.
(iii) 3928, is divisible by 4 as last two digits 28 is divisible by 4

Question 7.
Solution:
A given number is divisible by 8 only when the number formed by its last three digits is divisible by 8.
(i) 6132, is not divisible by 8 as last three digits 132 is not divisible by 8.
(ii) 7304, is divisible by 8 as last three digits 304 is not divisible by 8.
(iii) 59312, is divisible by 8 as last three digits 312 is divisible by 8.

Question 8.
Solution:
A given number is divisible by 11, if the difference between the sum of its digits at odd places and the sum of its digits at even places, is either O or a number divisible by 11.
(i) 22222
Sum of digit at odd places = 2 + 2 + 2 = 6
Sum of digit at even places = 2 + 2 = 4
Difference of the above sum = 6 – 4 =2,
which is not divisible by 11
22222 is not divisible by 11

(iv) 1057982
Sum of digit at odd places = 1 + 5 + 9 + 2 = 17
Sum of digit at even places = 0 + 7 + 8 = 15
Difference of the above sum = (17 – 15) = 2, which is not divisible by 11
1057982 is not divisible by 11

Question 9.
Solution:
For testing the divisibility of a number by 7, we proceed according to the following steps:
Step 1: Double the unit digit of the given number.
Step 2 : Subtract the above number from the number formed by excluding the unit digit of the given number.
Step 3 : 1f the number so obtained is divisible by 7 then the given number is divisible by 7.
(i) 693
Now, 69 – (2 x 3) = 63, which is divisible by 7
693 is divisible by 7

(iv) 12873
Now,1287 – (3 x 2) = 1281, which is divisible by 7
12873 is divisible by 7

(v) 65436
Now, 6543 – (6 x 2) = 6531, which is divisible by 7
65436 is divisible by 7

Question 10.
Solution:
The given number 7×3 is divisible by 3
The sum of its digits is divisible by 3
7 + x + 3 =>10 + x is divisible by 3
Value of x can be 2, 5, 8
The numbers can be 723, 753, 783

Question 11.
Solution:
The given number 53yl is divisible by 3
Sum of its digits is divisible by 3
i.e., 5 + 3 + y + 1 or 9 + y is divisible by 3

Values of y can be 0, 3, 6, 9
Then the numbers can be 5301, 5331, 5361, 5391

Question 12.
Solution:
Number x806 is divisible by 9
The sum of its digits is also divisible by 9
or x + 8 + 0 + 6 or 14 + x is divisible by 9
x can be 4
Number will be 4806

Cl 8 Ch 5 Ex 5C Mathematics

By Anthony Jamatia

Question 1.
Solution:
Here A can be as 6 + 7 = 13
Now 1 + 5 + 8 = 14
∴C = 1, B = 4, A = 6

Question 4.
Solution:
6 – A = 3
1 + 5 – A = 3
5 – A = 3
∴A = 5 – 3 = 2
Now 2 – B = 7
=>12 – B = 7
∴B = 5
Hence A = 2, B = 5

Question 6.
Solution:
B x 3 = B
∴B can be 5 or 0
∴5 x 3 = 15 => B = 5 or 3 x 0 =0
If B = 0, then A can be 5
∴3 x 5 = 15
∴A = 5 and C = 1
Hence A = 5, B = 0, C = 1

Question 8.
Solution:
Here we see that 6 x 9 = 54
∴A – 4 = 3 => A = 3 + 4 = 7
and 6 x 6 = 36
3B = 36 => B = 6
and C = 6
Hence A = 7, B = 6, C = 6

Question 9.
Solution:
Product of two numbers = 1 -digit number
and sum = 2-digit numbers
Let first number = x
and second number = y

∴x X y = 1-digit number
x + y = 2-digit number
By hit and hail, we sec that
1 x 9 = 9 which is I-digit number
and 1 + 9 = 10 which is 2-digit number.

Question 10.
Solution:
By hit and trail method, we see that
1 + 2 + 3 = 6 and 1 x 2 x 3 = 6
1, 2 and 3 are the required whole numbers
whose sum and product is same
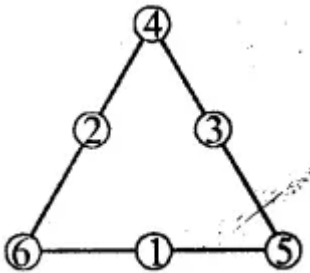
Question 11.
Solution:
In the given square, we have to interest the numbers from 1 to 9, such that the sum in each raw, column on diagonal to be 15
So, we complete it as given here

6	1	8
7	5	3
2	9	4

Question 12.
Solution:
We shall complete the triangle by intersecting the numbers from 1 to 6 without repetition so that the sum in each side be 12

SECTION TWO: MADAME CURIE

A. 1. a   2. c   3. a   4. c   5. b   6. b

B. 1. Madame Dluska expressed the wish to accompany the Curies to Sweden and she had dreamed of designing a new dress for Madame Curies for the occasion.

2. The newspaper reporters were asking many questions to the Curies. Because the Curies were private people, they wanted to be left alone. Madame Dluska's comment had to do with this. She said that it was only the beginning and as the news spread, many more people from Paris would come calling on them.

3. The Curies did not encourage the press reporters to ask questions. They did not want to go to Sweden to receive the prize in front of a large audience. They also did not show interest to meet the King of Greece. All this shows that the Curies were not after fame and wanted rather to be left alone so that they could continue to do their work in peace.

4. The Curies' research was not aimed at winning an award. All they wanted was to continue to do their work. It mattered little to them that the Nobel Prize would make them rich. They were not interested in improving their material circumstances or being known to the world. They were scientists and they were only concerned with their research. So, in a way, the Nobel Prize made little difference to them. In fact, they felt that it had only resulted in a lot of annoyance and invasion of their privacy.

5. The irony was that the Nobel Prize and all the fame that it brought the Curies in its

wake did not really get them what they wanted. Pierre did not become a professor University of Sorbonne: they did not get a laboratory. Their own nation was the la$t$ recognize their contribution to scientific knowledge and it was only Pierre's school supported their work with the little bit of money it had of its own.

C. 1. The Curies were husband and wife, but they were also independent and talented so They respected each other as such. When a reporter asked Madame Curie how she to be a good wife and mother and if her husband did not object to her being away laboratory. she replied by saying that scientists must be interested in things, not in She could speak with confidence because she knew that she had her husband's full in her research work. In fact, her work complemented and supported her husband'; Their relationship certainly contributed to their success.

2. The last anecdote tells us that Madame Curie was truly a unique person. Anybody would have felt thrilled and proud at the prospect of meeting a king, but Madame thinking only of her work. She did not see how being presented to a king would be practical use to her work. She always put her work before herself. This shows an u clarity of conviction and dedication to work. It also shows that she was not attached material things of this world. She was extremely honest about what she thought was importance to her research.

D. Accept all relevant responses.

Dluska – thrilled and excited; wanted to accompany the Curies; planning to design M clothes

Reporters – curious, intrusive and inappropriate; came in large numbers; asked probir personal questions; took many photographs

Marie and Pierre – remained unaffected; there was no change in their attitude to their very annoyed at the invasion of their privacy

I like the response of Marie and Pierre the most because it shows that they are very s about and dedicated to their work. They are also people who are not affected by mon and hence people with very strong characters.

E. 1. The news reporter – instead of talking about the research work, he asked them per questions.

2. Pierre – he wanted privacy, he did not want to take personal questions.

3. Pierre – not after money, was really interested in the research work.

F. Accept all relevant responses.

1. I was so flustered when I realised that I was going to be late for school.

2. The computer programme would not run on my obsolete computer which needs to upgraded.

3. The reporters are hounding my grand aunt who is a well-known social worker.

4. One should not violate the privacy of others.

5. A celebrity has to pay the price for being one.

G. 1. get to the bottom of   g. learn the truth about a situation

2. keep a straight face   h. not laugh at something amusing

3. every Tom, Dick and Harry   a. everyone, ordinary people

SECTION ONE: AN AMAZING ANCESTOR

A. 1. b   2. a   3. a   4. a   5. c

B. 1. The one component that links the personal computer with the typewriter is the key Computers still use the QWERTY keyboard which they inherited from typewriters. sense, the typewriter is the ancestor of the personal computer.

2. In Mark Twain's opinion, the typewriter could print faster than a human could wri might lean back in one's chair comfortably while working at it. Using the typewrit could fit in more words on a page than one could do by hand. Also, the printing v cleaner without any inkblots. Another important advantage which Mark Twain poi was that it saved paper.

3. The latest technology today also owes a lot to the ancient typewriter. The most ad mobile phones today also use the QWERTY keyboard. The only difference is that th keyboard has become smaller.

C. 1. As long as humans continue to use the keyboard in some form or the other to writ the QWERTY system of placement of keys will remain relevant. The rationale behir system seems quite sound and it really makes for fast and error-free typing. So un system is invented, the QWERTY will remain highly relevant.

2. There are various modern gadgets that can be traced to earlier machines and centu For example, if you think of the modern mixer-grinder, you can see how it goes b; stone grinders of the past. The ceiling fan goes back to the mechanical fan that us worked by humans who had to keep pulling a string to make it move. The jet plan today go back to the earliest gliders. Think about the gas lighter. It still works by a spark – the same spark which cavemen used to make fire by striking stones toge The modern gas stove goes back to the primitive wick stove.

3. I think the one machine that needs to be made more efficient is the automobile. C; need to be made more fuel efficient and they should be improved in such a way th is zero pollution. Also, I am sure it is possible to design the engine in such a way run on something other than fossil fuels. Air conditioners and refrigerators should designed to make them more energy efficient. They should also cause no pollution

D. 1. unintended   2. unpopular   3. vices
   4. forgettable   5. impersonal   6. illiteracy

E. 1. motor car + cavalcade   2. television + broadcast   3. fantastic + fabul(

Compound interest class 8 SOLVED – Prepared by surendra

Q1.

Answer :

Principal for the first year = Rs. 2500

Interest for the first year = Rs. $\left(\frac{2500 \times 10 \times 1}{100}\right)$ = Rs. 250

Amount at the end of the first year = Rs. $\left(2500 + 250\right)$ = Rs. 2750

Principal for the second year = Rs. 2750

Interest for the second year = Rs. $\left(\frac{2750 \times 10 \times 1}{100}\right)$ = Rs. 275

Amount at the end of the second year = Rs. $\left(2750 + 275\right)$ = Rs. 3025

∴ Compound interest = Rs. (3025 − 2500) = Rs. 525

Q2.

Answer :

Principal for the first year = Rs. 15625

Interest for the first year = Rs. $\left(\frac{15625 \times 12 \times 1}{100}\right)$ = Rs. 1875

Amount at the end of the first year = Rs. $\left(15625 + 1875\right)$ = Rs. 17500

Principal for the second year = Rs. 17500

Interest for the second year = Rs. $\left(\frac{17500 \times 12 \times 1}{100}\right)$ = Rs. 2100

Amount at the end of the second year = Rs. $\left(17500 + 2100\right)$ = Rs. 19600

Principal for the third year = Rs. 19600

Interest for the third year = Rs. $\left(\frac{19600 \times 12 \times 1}{100}\right)$ = Rs. 2352

Amount at the end of the second year = Rs $\left(19600 + 2352\right)$ = Rs. 21952

∴ Compound interest = Rs. (21952 − 15625) = Rs. 6327

Q3.

Answer :

Principal amount $=$ Rs. 5000

Simple interest $=$ Rs. $\left(\frac{5000\times2\times9}{100}\right)=$ Rs. 900

The compound interest can be calculated as follows :

Principal for the first year $=$ Rs. 5000

Interest for the first year $=$ Rs. $\left(\frac{5000\times9\times1}{100}\right)=$ Rs. 450

Amount at the end of the first year $=$ Rs. $\left(5000+450\right)=$ Rs. 5450

Principal for the second year $=$ Rs. 5450

Interest for the second year $=$ Rs. $\left(\frac{5450\times9\times1}{100}\right)=$ Rs. 490.5

Amount at the end of the second year $=$ Rs. $\left(5450+490.5\right)=$ Rs. 5940.5

$\therefore$ Compound interest $=$ Rs. (5940.5 $-$ 5000) $=$ Rs. 940.5

Now, difference between the simple interest and the compound interest $=$ (CI $-$ SI) $=$ Rs. (940.5 $-$ 900) $=$ Rs. 40.5

Q4.

Answer :

Principal for the first year $=$ Rs. 25000

Interest for the first year $=$ Rs. $\left(\frac{25000\times8\times1}{100}\right)=$ Rs. 2000

Amount at the end of the first year $=$ Rs. $\left(25000+2000\right)=$ Rs. 27000

Principal for the second year $=$ Rs. 27000

Interest for the second year $=$ Rs. $\left(\frac{27000\times8\times1}{100}\right)=$ Rs. 2160

Amount at the end of the second year $=$ Rs. $\left(27000+2160\right)=$ Rs. 29160

Therefore, Ratna has to pay Rs. 29160 after 2 years to discharge her debt.

Q5.

Answer :

Principal amount $=$ Rs. 20000

Simple interest $=$ Rs. $\left(\frac{20000 \times 2 \times 12}{100}\right) =$ Rs. 4800

The compound interest can be calculated as follows :

Principal for the first year $=$ Rs. 20000

Interest for the first year $=$ Rs. $\left(\frac{20000 \times 12 \times 1}{100}\right) =$ Rs. 2400

Now, amount at the end of the first year $=$ Rs. $\left(20000 + 2400\right) =$ Rs. 22400

Principal for the second year $=$ Rs. 22400

Interest for the second year $=$ Rs. $\left(\frac{22400 \times 12 \times 1}{100}\right) =$ Rs. 2688

Now, amount at the end of the second year $=$ Rs. $\left(22400 + 2688\right) =$ Rs. 25088

Hence, compound interest $=$ Rs. (25088 $-$ 20000) $=$ Rs. 5088

Now, CI $-$ SI $=$ Rs. (5088 $-$ 4800) $=$ Rs. 288

$\therefore$ The amount of money Harpreet will gain after two years is Rs 288.

Q6.

Answer :

Principal for the first year $=$ Rs. 64000

Interest for the first year $=$ Rs. $\left(\frac{64000 \times 15 \times 1}{100 \times 2}\right) =$ Rs. 4800

Now, amount at the end of the first year $=$ Rs. $\left(64000 + 4800\right) =$ Rs. 68800

Principal for the second year $=$ Rs. 68800

Interest for the second year $=$ Rs. $\left(\frac{68800 \times 15 \times 1}{100 \times 2}\right) =$ Rs. 5160

Now, amount at the end of the second year $=$ Rs. $\left(68800 + 5160\right) =$ Rs. 73960

Principal for the third year $=$ Rs. 73960

Interest for the third year $=$ Rs. $\left(\frac{73960 \times 15 \times 1}{100 \times 2}\right) =$ Rs. 5547

Now, amount at the end of the third year $=$ Rs. $\left(73960 + 5547\right) =$ Rs. 79507

$\therefore$ Manoj will get an amount of Rs. 79507 after 3 years.

Q7.

Answer :

Principal amount = Rs. 6250
Rate of interest = 8% per annum = 4% for half year
Time = 1 year = 2 half years
Principal for the first half year = Rs. 6250
Interest for the first half year = Rs. $\left(\frac{6250 \times 4 \times 1}{100}\right)$ = Rs. 250

Now, amount at the end of the first half year = Rs. $\left(6250 + 250\right)$ = Rs. 6500

Principal for the second half year = Rs. 6500

Interest for the second half year = Rs. $\left(\frac{6500 \times 4 \times 1}{100}\right)$ = Rs. 260

Now, amount at the end of the second half year = Rs $\left(6500 + 260\right)$ = Rs. 6760

∴ Compound interest = Rs (6760 − 6250) = Rs 510
Hence, Divakaran gets a compound interest of Rs 510.

Q8.

Answer :

Principal amount = Rs. 16000
Rate of interest = 10% per annum = 5% for half year
Time = $1\frac{1}{2}$ years = 3 half years
Principal for the first half year = Rs. 16000
Interest for the first half year = Rs. $\left(\frac{16000 \times 5 \times 1}{100}\right)$ = Rs. 800

Now, amount at the end of the first half year = Rs. $\left(16000 + 800\right)$ = Rs. 16800

Principal for the second half year = Rs. 16800

Interest for the second half year = Rs. $\left(\frac{16800 \times 5 \times 1}{100}\right)$ = Rs. 840

Now, amount at the end of the second half year = Rs. $\left(16800 + 840\right)$ = Rs. 17640

Principal for the third half year = Rs. 17640

Interest for the third half year = Rs. $\left(\frac{17640 \times 5 \times 1}{100}\right)$ = Rs. 882

Now, amount at the end of the third half year = Rs. $\left(17640 + 882\right)$ = Rs. 18522

∴ The amount of money Michael has to pay the finance company after $1\frac{1}{2}$ years is Rs 18522.

Exercise - 11B

Q1.

Answer :

Principal amount, P = Rs 6000
Rate of interest, $R = 9\%$ per annum
Time, $n = 2$ years.
The formula for the amount including the compound interest is given below :

A = Rs. $P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow A$ = Rs. $6000\left(1 + \frac{9}{100}\right)^2$

$\Rightarrow A$ = Rs. $6000\left(\frac{100+9}{100}\right)^2$

$\Rightarrow A$ = Rs. $6000\left(\frac{109}{100}\right)^2$

$\Rightarrow A$ = Rs. $6000\left(1.09 \times 1.09\right)^2$

$\Rightarrow A$ = Rs. 7128.6

i.e., the amount including the compound interest is Rs 7128.6.

$\therefore$ Compound interest = Rs $(7128.6 - 6000)$ = Rs 1128.6

Q2.

Answer :

Principal amount, P = Rs. 10000
Rate of interest, $R = 11\%$ per annum.
Time, $n = 2$ years.
The formula for the amount including the compound interest is given below :

A = Rs. $P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow A$ = Rs. $10000\left(1 + \frac{11}{100}\right)^2$

$\Rightarrow A$ = Rs. $10000\left(\frac{100+11}{100}\right)^2$

$\Rightarrow A$ = Rs. $10000\left(\frac{111}{100}\right)^2$

$\Rightarrow A$ = Rs. $10000\left(1.11 \times 1.11\right)^2$

$\Rightarrow A$ = Rs. 12321

i.e., the amount including the compound interest is Rs 12321.

$\therefore$ Compound interest = Rs. $(12321 - 10000)$ = Rs. 2321

Q3.

Answer :

Principal amount, P = Rs. 31250
Rate of interest, R = 8% per annum.
Time, n = 3 years.
The formula for the amount including the compound interest is given below :

$A = \text{Rs. } P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow A = \text{Rs. } 31250 \left(1 + \frac{8}{100}\right)^3$

$\Rightarrow A = \text{Rs. } 31250 \left(\frac{100+8}{100}\right)^3$

$\Rightarrow A = \text{Rs. } 31250 \left(\frac{108}{100}\right)^3$

$\Rightarrow A = \text{Rs. } 31250 \left(1.08 \times 1.08 \times 1.08\right)^3$

$\Rightarrow A = \text{Rs. } 39366$

i.e., the amount including the compound interest is Rs 39366.

∴ Compound interest = Rs. $(39366 - 31250)$ = Rs. 8116

Q4.

Answer :

Principal amount, P = Rs. 10240
Rate of interest, R = $12\frac{1}{2}$ % p. a.
Time, n = 3 years
The formula for the amount including the compound interest is given below :

$A = \text{Rs. } P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow A = \text{Rs. } 10240 \left(1 + \frac{25}{100\times2}\right)^3$

$\Rightarrow A = \text{Rs. } 10240 \left(1 + \frac{25}{200}\right)^3$

$\Rightarrow A = \text{Rs. } 10240 \left(1 + \frac{1}{8}\right)^3$

$\Rightarrow A = \text{Rs. } 10240 \left(\frac{8+1}{8}\right)^3$

$\Rightarrow A = \text{Rs. } 10240 \left(\frac{9}{8}\right)^3$

$\Rightarrow A = \text{Rs. } 10240 \left(1.125 \times 1.125 \times 1.125\right)^3$

$\Rightarrow A = \text{Rs. } 14580$

i.e., the amount including the compound interest is Rs 14580.

∴ Compound interest = Rs $(14580 - 10240)$ = Rs. 4340

Q5.

Answer:

Principal amount, $P =$ Rs 62500

Rate of interest, $R = 12\%$ p.a.

Time, $n = 2$ years 6 months $= \frac{5}{2} = 2\frac{1}{2}$ years

The formula for the amount including the compound interest is given below:

$$A = \text{Rs. } P\left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow A = \text{Rs. } 62500\left(1 + \frac{12}{100}\right)^2 \times \left(1 + \frac{\frac{1}{2} \times 12}{100}\right)$$

$$\Rightarrow A = \text{Rs. } 62500\left(1 + \frac{12}{100}\right)^2 \times \left(1 + \frac{6}{100}\right)$$

$$\Rightarrow A = \text{Rs. } 62500 \times 1.12 \times 1.12 \times 1.06$$

$$\Rightarrow A = \text{Rs. } 83104$$

i.e., the amount including the compound interest is Rs 83104.

$\therefore$ Compound interest $= $ Rs. $(83104 - 62500) = $ Rs. 20604

Q6

Answer:

Principal amount, $P =$ Rs. 9000

Rate of interest, $R = 10\%$ p.a.

Time, $n = 2$ years 4 months $= 2\frac{1}{3}$ years $= \frac{7}{3}$ years

The formula for the amount including the compound interest is given below:

$$A = \text{Rs. } P \times \left(1 + \frac{R}{100}\right)^n$$

$$= \text{Rs. } \left(9000 \times \left(1 + \frac{10}{100}\right)^2 \times \left(1 + \frac{\frac{1}{3} \times 10}{100}\right)\right)$$

$$= \text{Rs. } (9000 \times 1.10 \times 1.10 \times 1.033)$$

$$= \text{Rs. } 11252.9 \approx 11253$$

i.e., the amount including the compound interest is Rs 11253.

$\therefore$ Compound interest $=$ Rs. $(11253 - 9000) = $ Rs. 2253

Q7.

Answer:

Principal amount, P = Rs. 8000
Rate of interest for the first year, p = 9% p. a.
Rate of interest for the second year, q = 10% p. a.
Time, n = 2 years.
Formula for the amount including the compound interest for the first year:

A = Rs. $\left\{ P \times \left(1 + \frac{p}{100} \right) \times \left(1 + \frac{q}{100} \right) \right\}$

= Rs. $\left\{ 8000 \times \left(1 + \frac{9}{100} \right) \times \left(1 + \frac{10}{100} \right) \right\}$

= Rs. $\left\{ 8000 \times \left(\frac{109}{100} \right) \times \left(\frac{110}{100} \right) \right\}$

= Rs. $\{ 8000 \times (1.09) \times (1.1) \}$

= Rs. 9592

i.e., the amount including the compound interest for first year is Rs 9592.

Q8.

Answer:

Principal amount, P = Rs. 125000
Rate of interest, R = 8% p. a.
Time, n = 3 year s
The amount including the compound interest is calculated using the formula,

A = Rs. $P \left(1 + \frac{R}{100} \right)^n$

= Rs. $125000 \left(1 + \frac{8}{100} \right)^3$

= Rs. $125000 \left(\frac{100+8}{100} \right)^3$

= Rs. $125000 \left(\frac{108}{100} \right)^3$

= Rs. $125000 \, (1.08)^3$

= Rs. $125000 \, (1.08 \times 1.08 \times 1.08)$

= Rs. 157464

$\therefore$ Anand has to pay Rs 157464 after 3 years to clear the debt.

Q9.

Answer :

Principal amount, $P = $ Rs. 11000
Rate of interest, $R = $ 10% p. a.
Time, $n = 3$ years
The amount including the compound interest is calculated using the formula,

$A = $ Rs. $P\left(1 + \frac{R}{100}\right)^n$

$= $ Rs. $11000 \left(1 + \frac{10}{100}\right)^3$

$= $ Rs. $11000 \left(\frac{100+10}{100}\right)^3$

$= $ Rs. $11000 \left(\frac{110}{100}\right)^3$

$= $ Rs. $11000 (1.1)^3$

$= $ Rs. $11000 (1.1 \times 1.1 \times 1.1)$

$= $ Rs. 14641

Therefore, Beeru has to pay Rs 14641 to clear the debt.

Q10.

Answer :

Principal amount, $P = $ Rs. 18000
Rate of interest for the first year, $p = $ 12% p. a.
Rate of interest for the second year, $q = 12\frac{1}{2}$ % p. a.
Time, $n = 2$ years
The formula for the amount including the compound interest for the first year is *given below* :

$A = \left\{P \times \left(1 + \frac{p}{100}\right) \times \left(1 + \frac{q}{100}\right)\right\}$

$= $ Rs. $\left\{18000 \times \left(1 + \frac{12}{100}\right) \times \left(1 + \frac{25}{100 \times 2}\right)\right\}$

$= $ Rs. $\left\{18000 \times \left(\frac{100+12}{100}\right) \times \left(1 + \frac{25}{200}\right)\right\}$

$= $ Rs. $\left\{18000 \times \left(\frac{100+12}{100}\right) \times \left(1 + \frac{1}{8}\right)\right\}$

$= $ Rs. $\left\{18000 \times \left(\frac{100+12}{100}\right) \times \left(\frac{8+1}{8}\right)\right\}$

$= $ Rs. $\left\{18000 \times \left(\frac{112}{100}\right) \times \left(\frac{9}{8}\right)\right\}$

$= $ Rs. $\{18000 \times (1.12) \times (1.125)\}$

$= $ Rs. 22680

$\therefore$ Shubhalaxmi has to pay Rs 22680 to the finance company after 2 years.

Q11.

Answer:

Principal amount, P = Rs. 24000

Rate of interest, R = 10% p.a.

Time, n = 2 years 3 months = $2\frac{1}{4}$ years

The formula for the amount including the compound interest is *given below*:

$$A = P \times \left(1 + \frac{R}{100}\right)^n \times \left(1 + \frac{\frac{1}{4}R}{100}\right)$$

$$= \text{Rs. } 24000 \times \left(1 + \frac{10}{100}\right)^2 \times \left(1 + \frac{\frac{1}{4} \times 10}{100}\right)$$

$$= \text{Rs. } 24000 \times \left(\frac{100+10}{100}\right)^2 \times \left(\frac{100+2.5}{100}\right)$$

$$= \text{Rs. } 24000 \times \left(\frac{110}{100}\right)^2 \times \left(\frac{100+2.5}{100}\right)$$

$= \text{Rs. } 24000 \times (1.1 \times 1.1 \times 1.025)$

$= \text{Rs. } 24000 \times (1.250)$

$= \text{Rs. } 29766$

Therefore, Neha should pay Rs 29766 to the bank after 2 years 3 months.

Q12.

Answer:

Principal amount, P = Rs 16000

Rate of interest, R = $\frac{15}{2}$ % p.a.

Time, n = 2 years

Now, simple interest = Rs $\left(\frac{16000 \times 2 \times 15}{100 \times 2}\right)$ = Rs. 2400

Amount including the simple interest = Rs $(16000 + 2400)$ = Rs 18400

The formula for the amount including the compound interest is *given below*:

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$= \text{Rs. } 16000\left(1 + \frac{15}{100 \times 2}\right)^2$$

$$= \text{Rs. } 16000\left(1 + \frac{15}{200}\right)^2$$

$$= \text{Rs. } 16000\left(1 + \frac{3}{40}\right)^2$$

$$= \text{Rs. } 16000\left(\frac{40+3}{40}\right)^2$$

$$= \text{Rs. } 16000\left(\frac{43}{40}\right)^2$$

$= \text{Rs. } 16000\,(1.075 \times 1.075)$

i.e., the amount including the compound interest is Rs 18490.

Now, (CI $-$ SI) = Rs. $(18490 - 18400)$ = Rs. 90

Therefore, Abhay *gains* Rs. 90 as profit at the end of 2 years.

Q13.

Answer :

Simple interest $\left(\text{SI}\right)$ = Rs. 2400

Rate of interest, R = 8%

Time, n = 2 years

The principal can be calculated using the formula :

$$\text{Sum} = \left(\frac{100 \times \text{SI}}{R \times T}\right)$$

$$\Rightarrow \text{Sum} = \text{Rs.} \left(\frac{100 \times 2400}{8 \times 2}\right) = \text{Rs. } 15000$$

i.e., the principal is Rs. 15000.

The amount including the compound interest is calculated using the formula *given below* :

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$= \text{Rs. } 15000 \left(1 + \frac{8}{100}\right)^2$$

$$= \text{Rs. } 15000 \left(\frac{100 + 8}{100}\right)^2$$

$$= \text{Rs. } 15000 \left(\frac{108}{100}\right)^2$$

$$= \text{Rs. } 15000 \left(1.08 \times 1.08\right)$$

$$= \text{Rs. } 17496$$

i.e., the amount including the compound interest is Rs. 17496.

$\therefore$ Compound interest $\left(\text{CI}\right)$ = Rs. $(17496 - 15000)$ = Rs. 2496

Q14.

Answer :

Let Rs P be the sum.

Then SI $= \left(\frac{P \times 2 \times 6}{100}\right) =$ Rs. $\frac{12P}{100} =$ Rs. $\frac{3P}{25}$

Also, CI $= \left\{ P \times \left(1 + \frac{6}{100}\right)^2 - P \right\}$

$=$ Rs. $\left\{ P \times \left(\frac{100+6}{100}\right)^2 - P \right\}$

$=$ Rs. $\left\{ P \times \left(\frac{53}{50}\right)^2 - P \right\}$

$=$ Rs. $\left\{ \left(\frac{2809P}{2500}\right) - P \right\}$

$=$ Rs. $\left\{ \frac{2809P - 2500P}{2500} \right\} =$ Rs. $\frac{309P}{2500}$

Now, (CI $-$ SI) $=$ Rs. $\left(\frac{309P}{2500} - \frac{3P}{25}\right)$

$=$ Rs. $\left(\frac{309P - 300P}{2500}\right)$

$=$ Rs. $\frac{9P}{2500}$

Now, Rs. $90 = \frac{9P}{2500}$

$\Rightarrow P = \left(\frac{90 \times 2500}{9}\right) =$ Rs. 25000

Hence, the *required* sum is Rs. 25000.

Q15.

Answer :

Let P be the sum.

Then $SI = Rs \left(\frac{P \times 3 \times 10}{100}\right) = Rs \frac{30P}{100} = Rs \frac{3P}{10}$

Also, $CI = Rs. \left\{P \times \left(1 + \frac{10}{100}\right)^3 - P\right\}$

$= Rs. \left\{P \times \left(\frac{100+10}{100}\right)^3 - P\right\}$

$= Rs. \left\{P \times \left(\frac{11}{10}\right)^3 - P\right\}$

$= Rs. \left\{\left(\frac{1331P}{1000}\right) - P\right\}$

$= Rs. \left\{\frac{1331P - 1000P}{1000}\right\}$

$= Rs. \frac{331P}{1000}$

Now, $(CI - SI) = Rs \left(\frac{331P}{1000} - \frac{3P}{10}\right)$

$= Rs \left(\frac{331P - 300P}{1000}\right)$

$= Rs \frac{31P}{1000}$

Now, $Rs. 93 = \frac{31P}{1000}$

$\Rightarrow P = \left(\frac{93 \times 1000}{31}\right) = Rs. 3000$

Hence, the *required* sum is Rs. 3000.

Q16.

Answer :

Let P be the sum.

Rate of interest, $R = 6\frac{2}{3}\% = \frac{20}{3}\%$

Time, $n = 2$ years

Now, $A = P \times \left(1 + \frac{20}{100 \times 3}\right)^2$

$= Rs. P \times \left(1 + \frac{20}{300}\right)^2$

$= Rs. P \times \left(\frac{300+20}{300}\right)^2$

$= Rs. P \times \left(\frac{320}{300}\right)^2$

$= Rs. P \times \left(\frac{16}{15} \times \frac{16}{15}\right)$

$= Rs. \frac{256P}{225}$

$\Rightarrow Rs. 10240 = Rs. \frac{256P}{225}$

$\Rightarrow Rs. \left(\frac{10240 \times 225}{256}\right) = P$

$\therefore P = Rs. 9000$

Hence, the *required* sum is Rs. 9000

Q17.

Answer:

Let P be the sum.
Rate of interest, $R = 10\%$
Time, $n = 3$ years
Now, $A = P \times \left(1 + \frac{10}{100}\right)^3$

$= \text{Rs. } P \times \left(\frac{100+10}{100}\right)^3$

$= \text{Rs. } P \times \left(\frac{110}{100}\right)^3$

$= \text{Rs. } P \times \left(\frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}\right)$

$= \text{Rs. } \frac{1331P}{1000}$

However, amount $= \text{Rs. } 21296$

Now, $\text{Rs. } 21296 = \text{Rs. } \frac{1331P}{1000}$

$\Rightarrow \text{Rs. } \left(\frac{21296 \times 1000}{1331}\right) = P$

$\therefore P = \text{Rs. } 16000$

Hence, the *required* sum is Rs. 16000.

Q18.

Answer:

Let $R\% \, p.a.$ be the required rate.
$A = 4410$
$P = 4000$
$n = 2$ years
$Now, \ A = P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow 4410 = 4000\left(1 + \frac{R}{100}\right)^2$

$\Rightarrow \frac{4410}{4000} = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow \frac{441}{400} = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow \left(\frac{21}{20}\right)^2 = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow \frac{21}{20} - 1 = \frac{R}{100}$

$\Rightarrow \frac{21-20}{20} = \frac{R}{100}$

$\Rightarrow \frac{1}{20} = \frac{R}{100}$

$\Rightarrow R = \left(\frac{1 \times 100}{20}\right) = 5$

Hence, the required rate is 5% p.a.

Q19.

Answer:

Let the required rate be $R\%$ p.a.
$A = 774.40$
$P = 640$
$n = 2$ years
Now, $A = P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow 774.40 = 640\left(1 + \frac{R}{100}\right)^2$

$\Rightarrow \frac{774.40}{640} = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow 1.21 = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow (1.1)^2 = \left(1 + \frac{R}{100}\right)^2$

$\Rightarrow 1.1 - 1 = \frac{R}{100}$

$\Rightarrow 0.1 = \frac{R}{100}$

$\Rightarrow R = (0.1 \times 100) = 10$

Hence, the required rate is 10% p.a.

Q20.

Answer:

Let the required time be n years.
Rate of interest, $R = 10\%$
Principal amount, $P = $ Rs. 1800
Amount with compound interest, $A = $ Rs. 2178

Now, $A = P \times \left(1 + \frac{R}{100}\right)^n$

$= $ Rs. $1800 \times \left(1 + \frac{10}{100}\right)^n$

$= $ Rs. $1800 \times \left(\frac{100+10}{100}\right)^n$

$= $ Rs. $1800 \times \left(\frac{110}{100}\right)^n$

$= $ Rs. $1800 \times \left(\frac{11}{10}\right)^n$

However, amount $= $ Rs. 2178

Now, Rs. $2178 = $ Rs. $1800 \times \left(\frac{11}{10}\right)^n$

$\Rightarrow \frac{2178}{1800} = \left(\frac{11}{10}\right)^n$

$\Rightarrow \frac{121}{100} = \left(\frac{11}{10}\right)^n$

$\Rightarrow \left(\frac{11}{10}\right)^2 = \left(\frac{11}{10}\right)^n$

$\Rightarrow n = 2$

$\therefore$ Time, $n = 2$ years

Q21.

Answer :

Let the required time be n years.

Rate of interest, $R = 8\%$

Principal amount, $P = $ Rs. 6250

Amount with compound interest, $A = $ Rs. 7290

Then, $A = P \times \left(1 + \dfrac{R}{100}\right)^n$

$\Rightarrow A = $ Rs. $6250 \times \left(1 + \dfrac{8}{100}\right)^n$

$= $ Rs. $6250 \times \left(\dfrac{100 + 8}{100}\right)^n$

$= $ Rs. $6250 \times \left(\dfrac{108}{100}\right)^n$

$= $ Rs. $6250 \times \left(\dfrac{27}{25}\right)^n$

However, amount $= $ Rs. 7290

Now, Rs. $7290 = $ Rs. $6250 \times \left(\dfrac{27}{25}\right)^n$

$\Rightarrow \dfrac{7290}{6250} = \left(\dfrac{27}{25}\right)^n$

$\Rightarrow \dfrac{729}{625} = \left(\dfrac{27}{25}\right)^n$

$\Rightarrow \left(\dfrac{27}{25}\right)^2 = \left(\dfrac{27}{25}\right)^n$

$\Rightarrow n = 2$

$\therefore$ Time, $n = 2$ years

Q22.

Answer:

Population of the town, $P = 125000$
Rate of increase, $R = 2\%$
Time, $n = 3$ years
Then the population of the town after 3 years is *given by*

$$\text{Population} = P \times \left(1 + \frac{R}{100}\right)^3$$

$$= 125000 \times \left(1 + \frac{2}{100}\right)^3$$

$$= 125000 \times \left(\frac{100+2}{100}\right)^3$$

$$= 125000 \times \left(\frac{102}{100}\right)^3$$

$$= 125000 \times \left(\frac{51}{50}\right)^3$$

$$= 125000 \times \left(\frac{51}{50}\right) \times \left(\frac{51}{50}\right) \times \left(\frac{51}{50}\right)$$

$$= (51 \times 51 \times 51)$$

$$= 132651$$

Therefore, the population of the town after three years is 132651.

Q23.

Answer:

Let the population of the town be 50000.
Rate of increase for the first year, $p = 5\%$
Rate of increase for the second year, $q = 4\%$
Rate of increase for the third year, $r = 3\%$
Time $= 3$ years
Now, present population $= \left\{P \times \left(1 + \frac{p}{100}\right) \times \left(1 + \frac{q}{100}\right) \times \left(1 + \frac{r}{100}\right)\right\}$

$$= \left\{50000 \times \left(1 + \frac{5}{100}\right) \times \left(1 + \frac{4}{100}\right) \times \left(1 + \frac{3}{100}\right)\right\}$$

$$= \left\{50000 \times \left(\frac{100+5}{100}\right) \times \left(\frac{100+4}{100}\right) \times \left(\frac{100+3}{100}\right)\right\}$$

$$= \left\{50000 \times \left(\frac{105}{100}\right) \times \left(\frac{104}{100}\right) \times \left(\frac{103}{100}\right)\right\}$$

$$= \left\{50000 \times \left(\frac{21}{20}\right) \times \left(\frac{26}{25}\right) \times \left(\frac{103}{100}\right)\right\}$$

$$= (21 \times 26 \times 103)$$

$$= 56238$$

Therefore, the present population of the town is 56238.

Q24.

Answer :

Population of the city in 2009, $P = 120000$
Rate of increase, $R = 6\%$
Time, $n = 3$ years
Then the population of the city in the year 2010 is *given by*

Population $= P \times \left(1 + \dfrac{R}{100}\right)^n$

$= 120000 \times \left(1 + \dfrac{6}{100}\right)^1$

$= 120000 \times \left(\dfrac{100+6}{100}\right)$

$= 120000 \times \left(\dfrac{106}{100}\right)$

$= 120000 \times \left(\dfrac{53}{50}\right)$

$= 2400 \times 53$

$= 127200$

Therefore, the population of the city in 2010 is 127200.
*Again, p*opulation of the city in 2010, $P = 127200$
Rate of decrease, $R = 5\%$
Then the population of the city in the year 2011 is *given by*

Population $= P \times \left(1 - \dfrac{R}{100}\right)^n$

$= 127200 \times \left(1 - \dfrac{5}{100}\right)^1$

$= 127200 \times \left(\dfrac{100-5}{100}\right)$

$= 127200 \times \left(\dfrac{95}{100}\right)$

$= 127200 \times \left(\dfrac{19}{20}\right)$

$= 6360 \times 19$

$= 120840$

Therefore, the population of the city in 2011 is 120840.

Q25.

Answer :

Initial count of bacteria, $P = 500000$
Rate of increase, $R = 2\%$
Time, $n = 2$ hours
Then the count of bacteria at the end of 2 hours is *given by*

Count of bacteria $= P \times \left(1 + \frac{R}{100}\right)^n$

$= 500000 \times \left(1 + \frac{2}{100}\right)^2$

$= 500000 \times \left(\frac{100+2}{100}\right)^2$

$= 500000 \times \left(\frac{102}{100}\right)^2$

$= 500000 \times \left(\frac{51}{50}\right)^2$

$= 500000 \times \left(\frac{51}{50}\right) \times \left(\frac{51}{50}\right)$

$= (200 \times 51 \times 51)$

$= 520200$

Therefore, the count of bacteria at the end of 2 hours is 520200.

Q26.

Answer :

Initial count of bacteria, $P = 20000$
Rate of increase, $R = 10\%$
Time, $n = 3$ hours
Then the count of bacteria at the end of the first hour is given by
Count of bacteria $= P \times \left(1 + \frac{10}{100}\right)^n$

$= 20000 \times \left(1 + \frac{10}{100}\right)^1$

$= 20000 \times \left(\frac{100+10}{100}\right)$

$= 20000 \times \left(\frac{110}{100}\right)$

$= 20000 \times \left(\frac{11}{10}\right)$

$= 2000 \times 11$

$= 22000$

Therefore, the count of bacteria at the end of the first hour is 22000.
The count of bacteria at the end of the second hour is given by

Count of bacteria $= P \times \left(1 - \frac{10}{100}\right)^n$

$= 22000 \times \left(1 - \frac{10}{100}\right)^1$

$= 22000 \times \left(\frac{100-10}{100}\right)$

$= 22000 \times \left(\frac{90}{100}\right)$

$= 22000 \times \left(\frac{9}{10}\right)$

$= 2200 \times 9$

$= 19800$

Therefore, the count of bacteria at the end of the second hour is 19800.
Then the count of bacteria at the end of *the* third hour is *is given by*

Count of bacteria $= P \times \left(1 + \frac{10}{100}\right)^n$

$= 19800 \times \left(1 + \frac{10}{100}\right)^1$

$= 19800 \times \left(\frac{100+10}{100}\right)$

$= 19800 \times \left(\frac{110}{100}\right)$

$= 19800 \times \left(\frac{11}{10}\right)$

$= 1980 \times 11$

$= 21780$

Therefore, the count of bacteria at the end of *the* first 3 hours is 21780.

Q27.

Answer :

Initial value of the machine, $P =$ Rs 625000
Rate of depreciation, $R = 8\%$
Time, $n = 2$ years
Then the value of the machine after two years is given by

Value $= P \times \left(1 - \frac{R}{100}\right)^n$

$= $ Rs $625000 \times \left(1 - \frac{8}{100}\right)^2$

$= $ Rs $625000 \times \left(\frac{100-8}{100}\right)^2$

$= $ Rs $625000 \times \left(\frac{92}{100}\right)^2$

$= $ Rs $625000 \times \left(\frac{23}{25}\right)^2$

$= $ Rs $625000 \times \left(\frac{23}{25}\right) \times \left(\frac{23}{25}\right)$

$= $ Rs $(1000 \times 23 \times 23)$

$= $ Rs 529000

Therefore, the value of the machine after two years will be Rs. 529000.

Q28.

Answer :

Initial value of the scooter, $P =$ Rs 56000
Rate of depreciation, $R = 10\%$
Time, $n = 3$ years
Then the value of the scooter after three years is given by

Value $= P \times \left(1 - \frac{R}{100}\right)^n$

$= $ Rs. $56000 \times \left(1 - \frac{10}{100}\right)^3$

$= $ Rs. $56000 \times \left(\frac{100-10}{100}\right)^3$

$= $ Rs. $56000 \times \left(\frac{90}{100}\right)^3$

$= $ Rs. $56000 \times \left(\frac{9}{10}\right)^3$

$= $ Rs. $56000 \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right)$

$= $ Rs. $(56 \times 9 \times 9 \times 9)$

$= $ Rs. 40824

Therefore, the value of the scooter after three years will be Rs. 40824.

Q29.

Answer :

Initial value of the car, $P =$ Rs 348000
Rate of depreciation for the first year, $p = 10\%$
Rate of depreciation for the second year, $q = 20\%$
Time, $n = 2$ years.
Then the value of the car after two years is given by

Value $= \left\{ P \times \left(1 - \frac{p}{100}\right) \times \left(1 - \frac{q}{100}\right) \right\}$

$= \text{Rs. } \left\{ 348000 \times \left(1 - \frac{10}{100}\right) \times \left(1 - \frac{20}{100}\right) \right\}$

$= \text{Rs. } \left\{ 348000 \times \left(\frac{100-10}{100}\right) \times \left(\frac{100-20}{100}\right) \right\}$

$= \text{Rs. } \left\{ 348000 \times \left(\frac{90}{100}\right) \times \left(\frac{80}{100}\right) \right\}$

$= \text{Rs. } \left\{ 348000 \times \left(\frac{9}{10}\right) \times \left(\frac{8}{10}\right) \right\}$

$= \text{Rs. } (3480 \times 9 \times 8)$

$= \text{Rs. } 250560$

$\therefore$ The value of the car after two years is Rs 250560.

Q30.

Answer :

Let the initial value of the machine, P be Rs x.
Rate of depreciation, $R = 10\%$
Time, $n = 3$ years
The present value of the machine is Rs 291600.
Then the initial value of the machine is given by

Value $= P \times \left(1 - \frac{R}{100}\right)^n$

$= \text{Rs. } x \times \left(1 - \frac{10}{100}\right)^3$

$= \text{Rs. } x \times \left(\frac{100-10}{100}\right)^3$

$= \text{Rs. } x \times \left(\frac{90}{100}\right)^3$

$= \text{Rs. } x \times \left(\frac{9}{10}\right)^3$

$\therefore$ Present value of the machine $=$ Rs 291600

Now, Rs 291600 $= \text{Rs } x \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right)$

$\Rightarrow x = \text{Rs } \frac{291600 \times 10 \times 10 \times 10}{9 \times 9 \times 9}$

$\Rightarrow x = \text{Rs } \frac{291600000}{729}$

$\Rightarrow x = \text{Rs } 400000$

$\therefore$ The initial value of the machine is Rs 400000.

Class VIII   Chapter 5: Verbs – Modal

Exercise 1 - fill in the blanks with can, could or may….

1. May
2. Can
3. Can
4. Could
5. May
6. Can

Exercise 3 – Complete these sentences using can or able to…..

1. What she says <u>can</u> be true but I do not really think so.
2. I haven't <u>been able to</u> revise the whole of my syllabus.
3. I don't think I will<u> be able to</u> attend your sister's wedding.
4. Ring up Alok. He might <u>be able to</u> help you.
5. Only your father <u>can</u> help you in this situation.
6. However had I try coma there is nothing I <u>can</u> do to get out of this mess.
7. The light is dim but I <u>can</u> read the book.

Exercise 5 - complete the sentences using could, couldn't or be able to:

1. Couldn't
2. Was able to
3. Couldn't
4. Was able to
5. Couldn't
6. Couldn't ,   was able to
7. Could

Exercise 11. - complete the sentences with must or have to/ had to. ..

1. have to
2. must
3. must
4. must
5. Have to
6. had to
7. must

Exercise 18 - fill in the blanks with mustn't or ought not to:

1. ought not to
2. ought not to
3. ought not to
4. mustn't
5. ought not to

_____ M.L

2

ঈশ্বরচন্দ্র বিদ্যাসাগর

* অতি সংক্ষিপ্ত প্রশ্নউত্তর:

১) রত্নাকর হল মহামুনি বাল্মিকীর পূর্বনাম। সেই সময়ে তিনি দস্যুবৃত্তি দ্বারা জীবন ধারণ করতেন। দস্যু রত্নাকর পরবর্তীকালে বাল্মিকী মুনি হয়ে রামায়ণ মহাকাব্য রচনা করেন।

২) অণুবীক্ষণ হলো গবেষণাগারে বহুল ব্যবহৃত একটি যন্ত্র। এই যন্ত্রের সাহায্যে খুব ছোট জিনিসকে অনেক বড় করে দেখা যায়।

৩) প্রাণীদের মেরুদন্ড দেখে তাঁর সামর্থ্য ও আত্মনির্ভর ক্ষমতা যাচাই করা হয় এবং এই অনুসারে তাদের শ্রেণীবিভাগ করা হয়।

৪) ইউরোপীয়দের যে পৌরুষ দেখা যায়, বিদ্যাসাগরের চরিত্রে তা প্রচুর পরিমাণে ছিল। বিদ্যাসাগর ছিলেন সব বিষয়ে খাঁটি মানুষ।

৫) বিদ্যাসাগর যদি ইংরেজি না শিখতেন, যদি তিনি কলকাতায় না এসে বীরসিংহ গ্রামে থাকতেন, তাহলে তিনি হয়তো একটা বিখ্যাত হতে পারতেন না। কিন্তু নিজের পুরুষসিংহত্ব নিয়ে নিজের গ্রামকে যে বিক্ষোভিত রাখতেন, তাতে কোন সন্দেহ নেই।

৬) ইংরেজি শেখায় বিদ্যাসাগর অনেক ইংরেজের সংস্পর্শে এসেছিলেন এবং তাদের চরিত্রে অনুকরণযোগ্য বহুগুণের সমাবেশ দেখেছিলেন।

* সংক্ষিপ্ত উত্তরধর্মী প্রশ্নাবলি:

১) ঈশ্বরচন্দ্র বিদ্যাসাগরের কথা এখানে বলা হয়েছে।

ঈশ্বরচন্দ্র মানুষটি একদিকে যেমন ছিলেন ঋজু, অন্যদিকে তিনি ছিলেন অনেক বড় মাপের মানুষ। সাধারণ বাঙালির সঙ্গে তার কোনো তুলনাই চলে না। বস্তুতপক্ষে আমরা তার তুলনায় এত ছোট ও এত বাঁকা যে, তার মতো মহাপুরুষের নাম নেবার অধিকার আমাদের আছে বলে লেখক মনে করেন না।

২) দস্যু রত্নাকর পাপ মুখে কিছুতেই রাম উচ্চারণ করতে পারেননি। অগত্যা উল্টোভাবে মরা শব্দটি উচ্চারণ করে পাপের দায় থেকে উদ্ধার পেয়েছিলেন।

দস্যু রত্নাকর দস্যুবৃত্তি করে এবং অপরের জিনিসপত্র ছিনিয়ে নিয়ে জীবন ধারণ করতেন। এভাবে যে কত পাপ করেছিলেন তার সীমাসংখ্যা ছিল না। ঘটনাচক্রে তিনি দস্যুবৃত্তি ছেড়ে দিলেন, পাপের দায় থেকে মুক্ত হতে চাইলেন। ব্রহ্মা এবং নারদ তাকে 'রাম' নাম করতে বললেন। রত্নাকরের মুখ দিয়ে কিছুতেই শব্দটি উচ্চারিত হচ্ছে না দেখে, ব্রহ্মা তাকে 'মরা' শব্দটি বলতে বললেন। এভাবে 'মরা' 'মরা' বলতে বলতে একসময় রত্নাকর 'রাম' নাম নিতে পারলেন।

পাপের দায় থেকে তিনি মুক্ত হলেন এবং পরবর্তীকালে মহামুনি বাল্মিকী হলেন। 'রামায়ণ' মহাকাব্যের রচনাকার তিনিই।

৩) মন্তব্যটি ঈশ্বরচন্দ্র বিদ্যাসাগর সম্বন্ধে।

পর্বতের উচ্চ চূড়াটি সবার চেয়ে মাথা উঁচু করে দাঁড়িয়ে থাকে। ঈশ্বরচন্দ্র বিদ্যাসাগরও ছিলেন অন্য যে কোনো বাঙালির তুলনায় বহুগুণে শ্রেষ্ঠ। তাঁকে স্পর্শ করা অতিক্রম করার সাধ্য কারুর নেই। এজন্যই বিদ্যাসাগরকে লেখক 'উচ্চ চূড়া' বলেছেন।

তিনি উচ্চ চূড়া হওয়ায় যেকোনো বাঙালীকে তাঁর তুলনায় অনেক ছোট বলে মনে হয়। যেসব বাঙালীকে আমরা বড় বলে জানি এবং মানি তাঁরাও তাঁর কাছে অত্যন্ত ক্ষুদ্র বলে বিবেচিত হন।

৪) ঈশ্বরচন্দ্র বিদ্যাসাগর এবং অণুবীক্ষণ যন্ত্রের কথা এখানে বলা হয়েছে।

ছোট জিনিসকে বড় করে দেখার যন্ত্র হলো অণুবীক্ষণ যন্ত্র। এই যন্ত্রের ব্যবহার প্রচুর। কিন্তু এর বিপরীতে বড় জিনিসকে ছোট করে দেখানোর যন্ত্র পদার্থবিজ্ঞানে উল্লিখিত থাকলেও ওই ধরনের যন্ত্রের ব্যবহার আমাদের মধ্যে বিশেষ নেই। ঈশ্বরচন্দ্র বিদ্যাসাগরের জীবন চরিত বড় জিনিসকে ছোট করে দেখানোর যন্ত্রের মত। বিদ্যাসাগর এত বিরাট যে তার সামনে অন্য যেকোনো বড় মানুষকেউ নিতান্ত ছোট বলে মনে হয়। চারপাশের পাহাড়ের মাঝে বিদ্যাসাগর হলেন পর্বতের চূড়া।

৫) প্রাণীতত্ত্ববিদরা এই ভাগ করেন।

তাঁরা প্রাণীর মেরুদন্ড দেখেন। মেরুদন্ড হল প্রাণীর সামর্থের এবং আত্মনির্ভর শক্তির প্রধান পরিচয়। তাই মেরুদন্ড দেখে প্রাণীর শ্রেণীবিভাগ করা প্রাণীতত্ত্ববিদদের পক্ষে সম্ভব হয়।

যে প্রাণীর মেরুদন্ড যত শক্তসমর্থ, সে প্রাণী তত উন্নত শ্রেণীর বলে প্রাণীতত্ত্ববিদরা অভিমত প্রকাশ করে থাকেন। বিদ্যাসাগরের আত্মনির্ভর শক্তি ছিল প্রচণ্ড। প্রাণীতত্ত্ববিদদের উপরোক্ত মন্তব্যকে গ্রহণ করলে বলতে হয় বিদ্যাসাগর ছিলেন দৃঢ় মেরুদন্ডের মানুষ। যিনি সব সময় সোজা ভাবে চলেছেন, যাঁর সামর্থ্য ছিল অতুলনীয়।

৬) বাঙালী জাতির মেরুদণ্ডহীন চরিত্রের উল্লেখ করতে গিয়ে লেখক একথা বলেছেন।

বাঙালী জাতি কঠোর জীবন যুদ্ধে লিপ্ত হতে জানেনা। তারা ভেজালে বিশ্বাসী। তারা চুমুক দিয়ে দুধ খায়, দুধের মাখন তুলে নেয়, তারপর দুধে জল মিশিয়ে সেই ঘাটতি পূরণ করে।

৭) বিদ্যাসাগর মশাইয়ের কতগুলি বিরল চারিত্রিক গুণের উল্লেখ করতে গিয়ে লেখক একথা বলেছেন।

বিদ্যাসাগর ছিলেন সংগ্রামী পুরুষ। সারা জীবন তিনি যুদ্ধ করেছেন। ছেলেবেলায় দারিদ্র ও দুঃখের সঙ্গে লড়াই করেছেন। বড় হয়ে পরের জন্য লড়েছেন। তাঁর চলার পথে বহু বাধাবিঘ্ন এসেছিল। কিন্তু কোনদিনই কোন বিপদকে তিনি আমল দেননি। কন্টকপূর্ণ দুর্গম পথ অনায়াসে হেঁটে গিয়েছিলেন। পথের কাঁটাকে এভাবে ছেঁটে দলে যেতে খুব কম মানুষকেই দেখা যায়।

৮) বালক বয়সে বিদ্যাসাগর বীরসিংহ গ্রাম থেকে কলকাতায় আসার পথে মাইলস্টোনগুলির উপরে লেখা সংখ্যা দেখে ইংরেজি সংখ্যা চিনেছিলেন। এতে তার অদ্ভুত মেধার পরিচয় পাওয়া গিয়েছিল। আবার ছেলেবেলায় পরের ক্ষেতে যবের শীষ খেতে গিয়ে গলায় কাঁটা ফুটলে মৃতপ্রায় হয়েছিলেন। এতে তাঁর চারিত্রিক দুর্দমতার পরিচয় মিলেছিল। বৃদ্ধ বয়সে আহারের সময় পাশের লোকগুলির মনে ঘৃণার উদ্রেক হবে, এই ভয়ে আরশোলা খেয়ে নিয়েছিলেন।

* <u>**শব্দার্থ**</u>

আনুকূল্য - সহযোগিতা; নিষ্প্রভ - ম্লান; দুর্ধর্ষ - বেপরোয়া; বাগযত - মিতভাষী; আস্ফালন - অহংকারসূচক লাফ–ঝাঁপ; অনুকরণ - নকল করা; বেগবত্তা - ক্ষিপ্রতা; পুরুষানুক্রমে - বংশ-পরম্পরায়।

- <u>**বাক্য গঠন করা:**</u>

অহোরাত্র - হরিদাস অহোরাত্র হরিনাম করতেন।

বিবেচিত - আমার নাম বৃত্তির জন্য বিবেচিত হয়েছে।

পৌরুষ - দুষ্টের দমনের মধ্যেই বীরের পৌরুষ প্রকাশ পায়।

বাকসর্বস্ব - বাকসর্বস্ব লোক জীবনে উন্নতি করতে পারে না।

অতিবাহিত - শেষের কটাদিন শান্তিতে অতিবাহিত করতে চাই।

বিরল - পৃথিবীতে বাঘ ও সিংহ প্রায় বিরল হতে চলেছে।

দুর্ধর্ষ - মুঘলরা ছিল এক দুর্ধর্ষ জাতি।

অধিকন্তু - নিজের, অধিকন্তু বংশের গুণগুলি বিদ্যাসাগর চরিত্রকে সমৃদ্ধ করেছিল।

সমাবেশ - সব হয় প্রচুর জনসমাবেশ হয়েছিল।

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<u>Prabal Sarkar</u>

INDIAN HISTORY & POLITICS-8

CH: 2- FEATURES OF THE INDIAN CONSTITUTION

-NORBERT JAMATIA

1. List the fundamental Rights that every citizen of India enjoys.

   Ans- The constitution of India guarantees six fundamental Rights to its citizens. They are :
   1) Right to equality
   2) Right to freedom
   3) Right against exploitation
   4) Right to freedom of religion
   5) Cultural and educational rights
   6) Rights to constitutional remedies

2. What is the importance of the right to constitutional remedy?

   Ans- This right ensures that all citizens are able to utilize their fundamental rights. It states that any citizen can go to a court of law if he / she feels that any of his /her fundamental rights is being denied to him/her.

3. List the features of the right to freedom of religion.

   Ans- This Rights upholds secularism- one of the most important features of the constitution of India. It guarantees every citizen of India freedom to follow and practice any religion of his /her choice.

4. Why doesn't India have a state religion ?

   Ans- India doesn't have a state religion because people belonging to every faith have been living together as part of the same society and contributing to the country's development. Therefore secularism is one of the most important features of Indian constitution.

5. List the various freedoms that the rights to freedom guarantees.

   Ans- The right to freedom in article 19 guarantees the following six freedoms to all the citizens of India:
   a) Freedom of speech and expression
   b) Freedom to assemble peacefully and without arms
   c) Freedom to form union or associations
   d) Freedom to move freely throughout the territory of India
   e) Freedom to reside and settle in part of the country
   f) Freedom to practice any profession or carry out any occupation or trade.

6. What are fundamental duties ? give example.

   Ans- please refer Textbook page 284

7. What are Directive principles of state policy? Give example.

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8. What are the dangers of state not being separate from religion?

Ans- Most countries in the world today have various religious communities. In almost every country where different faiths are practiced there is usually one religious group which is larger than the others. It is likely that this religious group which is in majority secures political power. In such a situation that group might misuse its authority for the benefit of its own people. Other religious group will not be able to influence the policies and strategies of the state. Minority religious group will be dominated and treated unfairly. They might even be coerced into following the religion of the dominant group. Such a situation goes against the basic principles of democracy.

Secularism eliminates religious faith from matters of state and ensures that no one faces discrimination on grounds of religion.

9. Explain how the state implements the policy of interference or intervention at times to bring about Justice.

Ans- ---------------------- Please try reading the textbook

A. Tick the correct answer. (answers)
1) Human rights
2) Equality before law
3) 1976
4) Secularism
5) To come together

B. Fill in the Blanks----- (answers)
   1) Secularism and fundamental Rights
   2) Freedom of Religion
   3) Diversity
   4) Suspended in certain special circumstances such as during a national emergency .
   5) Justiciable

C. State whether the following statements are True or false.
   Ans- Read the text & try yourself.