

# NIOS - TMA - OCT 25'

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Subject : Science and Technology (212)

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Medium : English

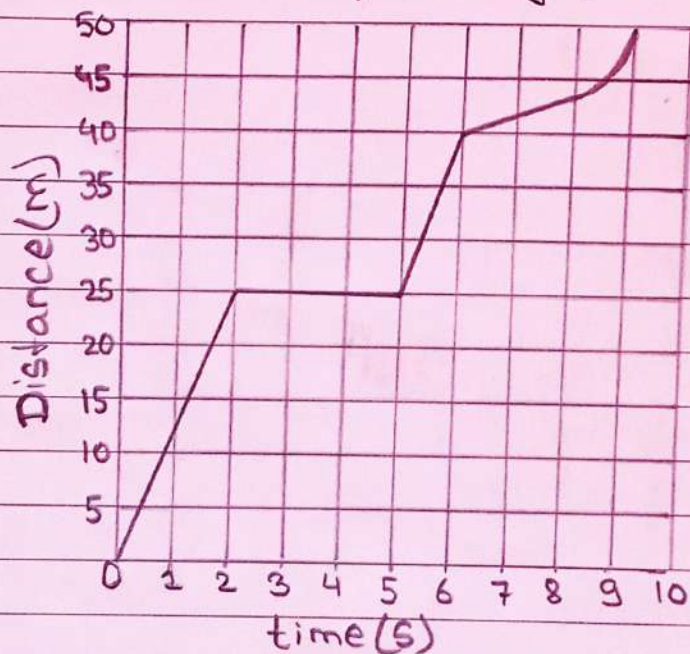
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# SCIENCE AND TECHNOLOGY (212)

## TUTOR MARKED ASSIGNMENT

Q1 Answer any one of the following question in about 40-60 words

(A) The distance-time graph of the motion of an object is given. Answer the following questions based on the graph.



(a) Find the average speed of the object during  
(i) 0-6s (ii) 0-9s

Ans (i) time = 6s, total distance covered = 40m

$$\text{average speed} = \frac{\text{total distance}}{\text{total time}} = \frac{40}{6} = \underline{6.67 \text{ m/s}}$$



Q1(A)(i) time = 9s , total distance covered = 50

$$\text{average speed} = \frac{50}{9} = 5.56 \text{ m/s}$$

Q1(A)(b) Mention the time interval during which the object remained at rest.

Ans The object remained at rest from 2 second to 5 second, as the distance did not change during this time.

Q2(B) Rakesh runs a laundry shop. Water in his locality does not form lather with soap. What is the term given to such water? Suggest some method which can help Rakesh to get rid of this problem.

Ans The water that does not form lather with soap is called hard water. This happens due to the presence of Calcium and magnesium salts. Rakesh can remove hardness by boiling the water or using washing soda or ion-exchange resins to make it suitable for washing clothes.

Q3(B) What kind of disease is COVID-19; Infectious or Non-Infectious? Name its causative agent. What are the ways to prevent COVID-19?

Ans COVID-19 is an infectious disease caused by a virus named Coronavirus (SARS-CoV-2). It spreads through respiratory droplets.

Ways to prevent COVID-19: (1) Wear a mask. (2) Wash hands regularly. (3) Maintain social distancing (4) Take Vaccination (5) Avoid crowded places



Q4 Answer any one of the following questions in 100-150 words.

(B) French Chemist Antoine Lavoiser carefully studied chemical reactions by using a chemical balance in his setup. In an experiment he took a substance which is the only metal which exists in liquid state at room temperature and generally used in analogue thermometer. Then he heated this substance in a sealed flask containing air for several days. He observed a new red-coloured substance was formed. The gas remaining in the flask was reduced in mass.

(a) Write the name of any two of the following:

(i) The substance which was heated in a sealed flask.

Ans: The substance heated in a sealed flask: Mercury ( $\text{Hg}$ )

(ii) New red-coloured substance which was formed after several days

Ans Red-coloured substance formed: Mercuric oxide ( $\text{HgO}$ )

(b) Is the change that took place in the sealed flask: a chemical change or a physical change?

Ans The change is a chemical change because a new substance ( $\text{HgO}$ ) was formed with different properties.

(c) Why the mass of the remaining gas in the flask reduced?

Ans The mass of the remaining gas in the flask was reduced because oxygen from the air reacted with mercury to form mercuric oxide, Hence, some oxygen was used up in the reaction.



Q4)(B)(d) Does reduction in the mass of gas remaining in the flask violate the law of conservation of mass? Explain briefly.

Ans The reduction in the mass of gas does not violate the law of conservation of mass. The total mass before and after the reaction remained the same. The mass of oxygen that reacted became the part of the solid product ( $\text{HgO}$ ), showing that mass is conserved in the closed system.

Q5)(B)(a) "If you consider the 24 hour geological clock with the origin of life set at midnight, we can say that humans have come on this planet just less than a minute ago." Explain the statement in the light of history of life on earth.

Ans The history of life on Earth shows that microscopic prokaryotes existed for nearly 3 billion years. Dinosaurs ruled around 150 million years ago and went extinct 65 millions year ago, Humans, However, arrived only 2 million years ago, which is very recent in Earth's 4.5 billion-year history. If we consider Earth's history as a 24-hour clock, humans appeared just in the last minute, proving how short our presence is on this planet.

Q5)(B)(b) Identify the type of epithelial tissue from its location in human body as given below. Write its name and any one function of each.

(i) Epithelial tissue that forms outermost layer of skin.

Ans Stratified Squamous Epithelium tissue forms outermost layer of skin.

Function: It protects the body from injury, microbes, and water loss.



Q5) (B) (i) Epithelial tissue that forms inner lining of the stomach and the intestine.

Ans The epithelial tissue lining the stomach and intestine is called Columnar Epithelium.

Function: Facilitates absorption and secretion. This tissue contains microvilli to increase surface area for nutrients absorption and goblet cells.

Q6) Prepare any one project as given below.

(B) Explore about the vehicles that run on conventional fossil fuels and the vehicles that run on electricity. Write a report of your findings which should include detailed comparative analysis of the two types of vehicles.

(Hints: Compare about Advantages, disadvantages, impact on environment, limitations, challenges, future perspectives, sustainable development, etc.)

Also, explain how the electric vehicles can be game changer and provide solution to the challenge of fossil fuel dependence.

Ans • Comparative Report on Vehicles using fossil fuels and Electric Vehicles :-

- Introduction - The transport sector is a major energy consumer and polluter. Most vehicles today run on conventional fossil fuels like petrol and diesel. But growing environmental concerns and the need for sustainable development have increased interest in Electric Vehicles (EVs). This report presents a detailed comparison between fossil fuel vehicles and electric vehicles.



Q5) B

- Comparative Table: Fossil Fuel Vehicles vs Electric Vehicles

Aspect	Fossil Fuel Vehicles	Electric Vehicles
* Fuel Used	Petrol, Diesel (non-renewable)	Electricity (can be renewable)
* Pollution	High (CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>x</sub> emissions)	Minimal or zero tailpipe emission
* Running Cost	High (fuel prices are rising)	Low (electricity is cheaper)
* Maintenance	Frequent servicing needed	Low maintenance (no engine oil)
* Noise	Noisy engines	Quiet operations
* Availability	Easily available fuel stations	Limited charging infrastructure (improving and making more stations)
* Initial Cost	Comparatively cheaper	Higher upfront cost
* Refueling time	2-5 minutes	30 minutes to several hours

- Environmental Impact: Vehicles running on fossil fuels emit harmful gases that contribute to global warming, air pollution, and acid rain, while electric vehicles produce zero emissions, running in urban areas and significantly reduce urban pollution. However, the electricity used must come from renewable sources for complete sustainability.

#### Advantages of Electric Vehicles:

- 1) Eco-friendly: No direct emissions of pollutants.
- 2) Economical: Lower running and maintenance costs.
- 3) Energy Efficient: Electric motors are more efficient than combustion engines.
- 4) Government Supports: Subsidies, tax benefits and incentives are being provided.

#### Limitations and Challenges:



Q6(B) Through EVs have many benefits, Some challenges still exist:

- 1) High initial cost due to battery technology
- 2) Limited charging infrastructure in rural and some urban areas
- 3) Battery disposal and recycling concerns
- 4) Lower range compared to petrol/diesel vehicles in some models.

- **Future Perspectives:** The future of EVs is promising due to ongoing research and development. With advancements in battery storage, fast charging and solar charging stations. EVs will become more affordable and accessible. Countries like India are investing heavily in EV infrastructure to meet sustainability goals.
- **Role in Sustainable Development:** Electric vehicles can significantly contribute to sustainable development by reducing carbon footprints and decreasing dependence on depleting fossil fuels. They help in improving air quality and public health by producing no harmful emissions. EVs also promote the use of renewable energy sources like solar and winds, making transportation more eco-friendly and sustainable.
- **EVs as a Game Changer:** Electric vehicles are a true game changer in the global transport system. They provided a practical solutions to the fossil fuel crisis by reducing fuel imports, promoting clean energy and creating green jobs. With strong Policy support and public awareness, EVs can lead the shift towards a clean and sustainable future.



Q6(B) Conclusion: Fossil fuel vehicles have powered transportation for over a century, but their environmental cost is becoming too high. Electric vehicles offer a clean, efficient and sustainable alternative. While EVs face some limitations today, they are improving rapidly. With public awareness and policy support, they can replace fossil fuel vehicles and lead us toward a greener, more sustainable future.