

# Computer Science

## Class-VIII (Jan)

Chapter-24: Computing and the environment

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Class VIII (all sections)

# Computing and the environment

Technology has had an impact on the environment that is both positive and negative. The use of computers affects the environment in different ways, such as energy consumption, technological waste, and the impact of remote working.

## Advantages:

- using email and working electronically means that less printing is required, and so less paper is used
- people can work from home - which reduces commuting (less fuel is used) and means that less office space is needed

## Disadvantages

- **Technology consumes energy**
- **Technological waste** - also known as e-waste - sometimes contains poisonous chemicals and can be an environmental hazard.

# Manufacture

Manufacturing a smartphone, a PC or any other piece of computing technology is a complex process, starting with the extraction of raw material and ending with the finished item being shipped to the customer, With lots of stages in between. This makes it difficult to determine accurately the overall environmental impact, although there's no doubt that it's considerable.

## Raw material extraction

- A number of non-renewable natural resources are used in the manufacture of computer products. They include sand (to make glass for screens), oil (used to make plastics) and various metals used in wiring and circuit boards.
- Some of the metals used, such as silver, gold, copper and palladium, are precious and in short supply. Others, such as arsenic, cadmium and chromium, are hazardous and pose a serious health risk.
- Radioactive metals used in computer products, such as uranium and thorium, can contaminate air, soil and groundwater, and are toxic to human health.
- In some regions of the world, mining of raw materials is poorly regulated. Excavation causes extensive damage to the local environment, scarring the landscape with unsightly holes and waste heaps, contaminating water

# Production

- Once extracted, the raw materials are shipped to factories- often thousands of miles away-to be manufactured into components, such as circuit boards.
- In turn, the components are dispatched onwards for assembly into finished products, The manufacture of computing technology is energy intensive.
- Large amounts of non-renewable fossil fuels, such as coal and oil, are used during the process. Burning fossil fuels produces carbon dioxide (CO<sub>2</sub>) and contributes to global warming.
- Semiconductors are present in every piece of computing technology. Manufacturing semiconductors is highly water intensive.

Most hazardous materials used in the manufacture of computing technology:

- ✓ **Cadmium** (used in the manufacture of rechargeable batteries, printer inks and toners.)
- ✓ **Lead** (used in the manufacture of circuit boards)
- ✓ **Mercury** (used in the manufacture of LCD screens)
- ✓ **Hexavalent chromium** (used to make casings)

# Usages

- The amount of energy consumed in the manufacturing process and insignificance when compared with the energy required to keep mobile phones, computers, networks, telecommunication links, etc.
- The amount of energy they actually consume depends on how they are used and what they are used for.
- High-end applications, complex calculations, 3 D modelling and video games are particularly power hungry.
- Vast amounts of electricity are needed to power and cool all the computer equipment that is needed, putting them ahead of the aviation industry in terms of the energy they consume.
- Energy efficiency measures and the use of renewable energy can significantly reduce the carbon footprint of data centers.

# Disposal

- The disposal of redundant computing technology represents another serious threat to the environment. The quantity of e-waste is growing at a tremendous pace.
- Great efforts are now being made to recycle more e-waste
- E-waste that is not recycled properly can be a serious health and environmental issue As you know, computer products contain a whole host of dangerous materials.

# How computing technology preserving the environment:

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- **Climate change:** measuring sea surface temperatures to learn more about how and why sea levels are rising.
- **Early warning:** Tsunami early warning systems use sensor networks to detect approaching tsunamis and a communications infrastructure to issue timely warnings.
- **Conservation:** Mobile phones are being used to listen out for illegal logging activities in the rainforest and provide rangers with real-time alerts.
- **Energy:** Sensors in each room monitor light levels, temperature, how many people are present and electricity consumption. Real-time analysis of the room data enables automatic adjustment of electricity usage.

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# Thanks