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- **HOME ASSIGNMENT: INDOOR AIR POLLUTION**

I.   Air Pollution in India: Trends and Solutions

1. How many non-attainment cities are there in India, as of 6 August 2020?
   a. 102
   b. 100
   c. 122

   Correct answer: c. 122
   Non-attainment cities are the ones where the prescribed National Ambient Air Quality Standards (NAAQS) are violated as identified by Central Pollution Control Board (CPCB). These cities have been identified based on ambient air quality data obtained (2008-2010) under National Air Quality Monitoring Programme (NAMP). The initially identified 102 cities were increased to 122 to include more cities that remained outside of the list, even though they were highly polluted. National Ambient Air Quality Standards - permissible level for PM 2.5 - 40 µg/m3 (annually) and for PM 10 - 60 µg/m3.

2. What is the full form of NCAP?
   a. National Clean Air Programme
   b. National Combined Air Programme
   c. Nodal Clean Air Programme

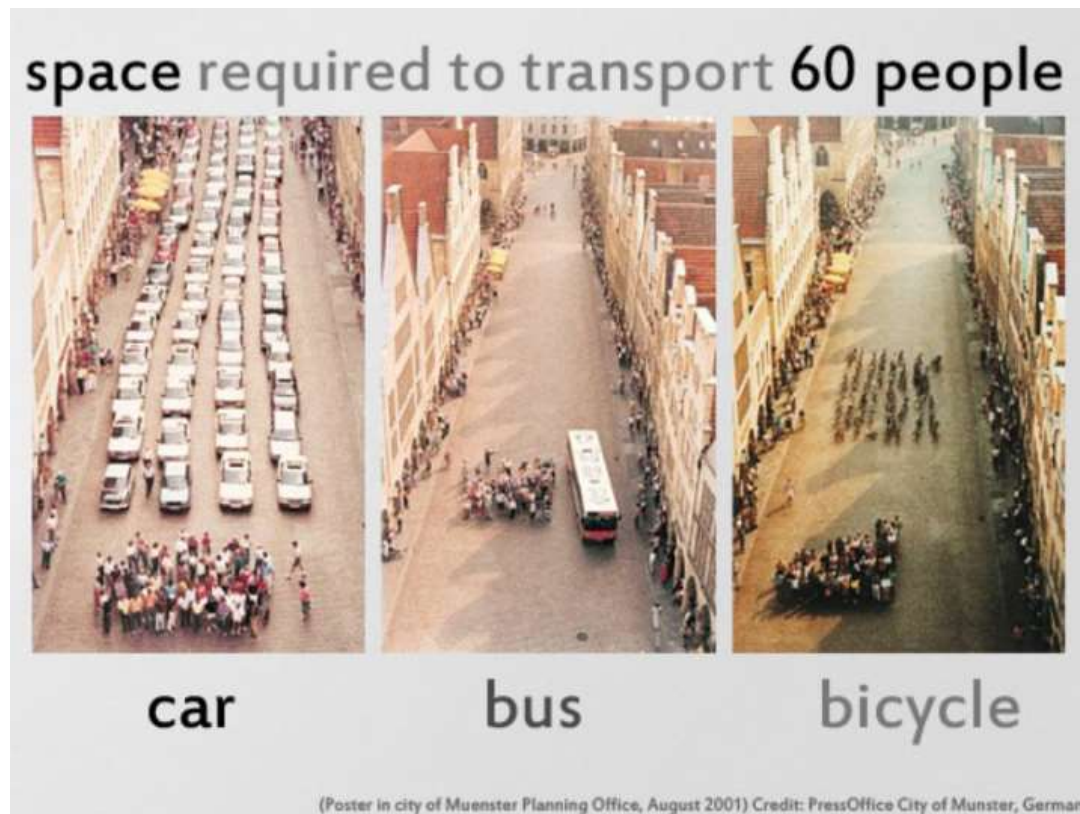   *Correct answer: a. National Clean Air Programme*
   Under the Union Ministry of Environment and Forests and Climate Change's (MoEFCC) National Clean Air Programme (NCAP) launched in January 2019, 122 Indian cities are to reduce particulate pollution by 20-30 per cent by 2024 from 2017 levels.

3. How much space is occupied by cars in Indian cities?
    a. 19 per cent
    b. 60 per cent
    c. 90 per cent

Correct answer: c. 90 per cent
While 40 to 60 per cent use the bus, 10 to 20 per cent use cycle ,20 to 30 per cent walk and only 10 to 20 per cent use car or two-wheeler, cars continue to occupy 90 per cent of road space in cities. This means that cars have not replaced the bus, the bicycle or walking, however, they have successfully managed to marginalise the public or non-polluting modes of transport.

space required to transport 60 people

car   bus   bicycle

(Poster in city of Muenster Planning Office, August 2001) Credit: PressOffice City of Munster, Germany

II.   **Use and Regulation of Diesel Vehicles**
       (based on the video Stopmotion: Why Diesel Vehicles should be Regulated in Delhi)

    1. Per a study commissioned by the Delhi government, diesel vehicles are responsible for
       ____of particulate matter pollution?

        a. 40 to 50 per cent

b. 60 to 70 per cent

c. 16 to 17 per cent

Correct answer: b. 60 to 70 per cent
A 2016 source inventory and apportionment study by the Indian Institute of Technology (IIT), Kanpur, ranked key polluters in the city, and also found diesel cars responsible for 70 to 80 per cent of PM 2.5 from vehicles.

2. What is the full form of IARC?

   a. International Agency for Research on Cancer

   b. Indian Association of Research in Cancer

   c. Institute of Air and its Respirable Constituents

   Correct answer: a. International Agency for Research on Cancer
   The International Agency for Research on Cancer (IARC) is the specialized cancer agency of the World Health Organization (WHO). IARC has been conducting detailed research on Outdoor Air Pollution and its links to Cancer since 2015.
   https://monographs.iarc.fr/list-of-classifications

3. Diesel vehicles are legally allowed to emit how many times more pollutants into the air than petroleum?

   a. 8 to 9 times

   b. 1 to 2 times

   c. 3 to 7 times

   Correct answer: 3 to 7 times
   Diesel vehicles are inherently designed to emit several times more toxic pollution and higher particulate matter compared to most other vehicles on the roads that have petrol and CNG as fuel.

4. According to WHO, which group of carcinogenic substances do diesel fumes come under?

   a.   Group 2B - Possibly carcinogenic to humans

   b.   Group 2A - Probably carcinogenic to humans

c. Group 1 - Carcinogenic to humans

Correct answer: c. Group 1 - Carcinogenic to humans
According to the IARC classification of diesel parts in its carcinogenic groups, diesel emissions are classified in Group 1 and Group 2B. Diesel exhaust from vehicles have been placed under Group 1 since 2014 while diesel fuel left behind from marine is under Group 2B since 1989.

5. In the video, who is shown to be negatively affected by polycyclic aromatic hydrocarbon, air toxin present in diesel fumes?

   a. Elderly

   b. Fetus or the unborn baby of a pregnant mother

   c. Infants

   Correct answer: b. Fetus or the unborn baby of a pregnant mother
   Air pollution kills an average of 8.5 out of every 10,000 children in India before they turn five (WHO, 2018) The risk is higher for girls as 9.6 out of 10,000 girls die before five

6. Bharat Stage (BS) is another name for

   a. Motorized Indian emission standards

   b. Indian mobility standards

   c. India's automobile emission standards

   Correct answer: c. India's automobile emission standards
   Globally, authorities are taking measures to reduce diesel emissions. In India this includes India's automobile emission standards or Bharat stage emission standards that use the same yardstick as the European or the Euro standards. A Bharat stage IV standard, which was the norm for cars in India in 2016, was equivalent to the Euro stage IV. But Europe transitioned to Euro 6 in 2014, however, India too has transferred to BS VI (proposed) that is equivalent to Euro 6 standard, although this was done only this year in April 2020 .

III. **Sustainable Mobility**

1. Which sustainable development goal (SDG) calls for making cities sustainable and inclusive?
    a. SDG 5
    b. SDG 11
    c. SDG 16

Correct answer: b. SDG 11
Sustainable Development Goal 11 calls for making cities and human settlements 'inclusive, safe, resilient and sustainable'. SDG 5 is based on gender equality and SDG 16 on effective and inclusive justice institutions.
https://sustainabledevelopment.un.org/?menu=1300

2. Which is the primary greenhouse gas emitted by burning of fuels in vehicles?
    a. Carbon dioxide
    b. Methane
    c. Nitrogen oxide

Correct answer: a. Carbon dioxide
Slightly varying with the amount and type of fuel used in a vehicle, carbon dioxide remains the principal greenhouse gas emitted from vehicles. According to a CSE study, the overall transport sector in India is estimated to emit about 15 per cent of the CO_2 emissions.

3. What is a system of interconnected modes of transportation called?
    a. Multifunctional integration
    b. Multimodal integration
    c. Multilevel transportation

Correct answer: b. Multimodal integration.
It is the seamless integration of different modes of transportation for better mobility. For instance, integration of public buses with local trains so that interchanging is swift.

4. Which of the following will have the least negative impact on air quality?
    a. Public bus
    b. Personal motor vehicle
    c. Bicycle

Correct answer: c. Bicycle
It is a non-polluting mode of transportation, and hence, more sustainable than any motorised vehicles.

5. Which of these initiatives is NOT likely to improve the sustainable mobility scenario?
    a. Frequent public transport
    b. Increased taxi services
    c. Separate bicycle tracks

Correct answer: b. Increased taxi services
Frequent public transport will reduce reliance on personal vehicles and separate bicycle tracks will promote a zero-emissions mode of transport. Increased taxi services, on the other hand, will result in increased emissions and decreased carpooling.

HOME ASSIGNMENT: INDOOR AIR POLLUTION
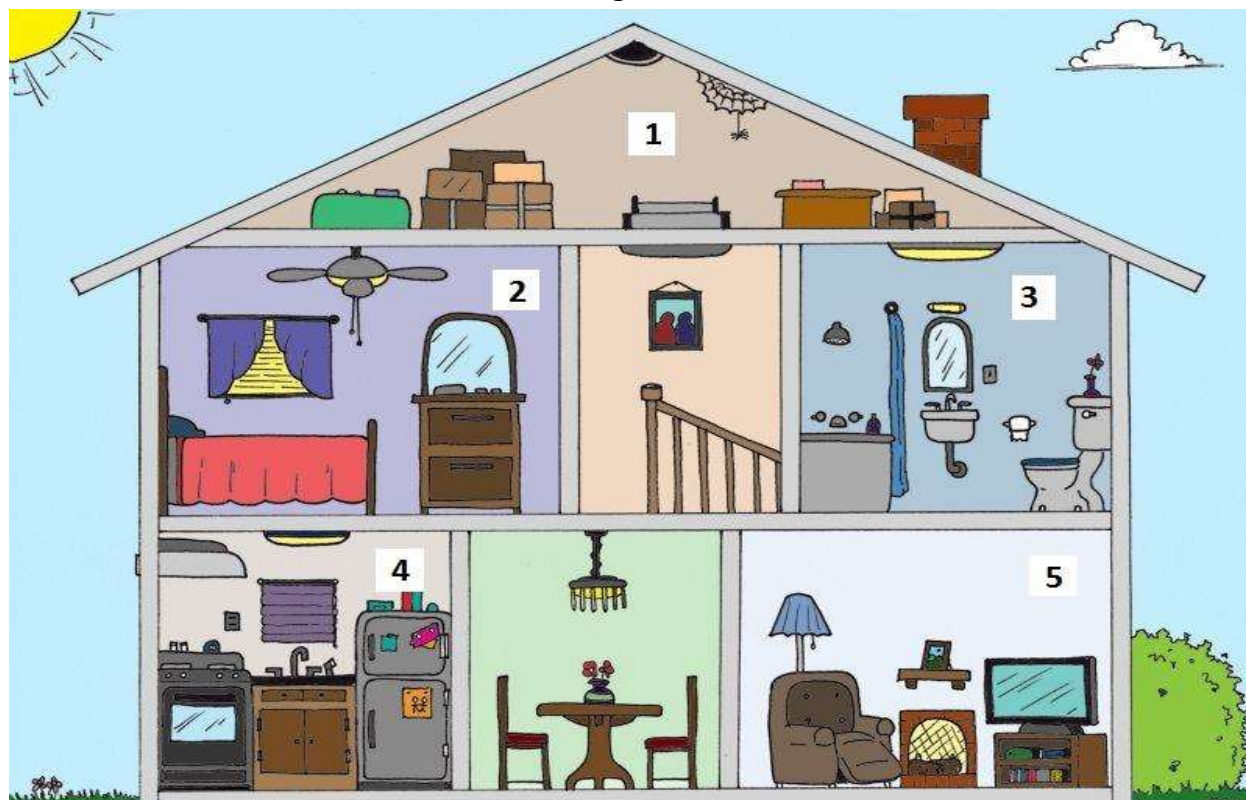
Source: i.pinimg.com

Step 1: Identify the sources of indoor air pollution *that you see around you* in each numbered area of the house

Step 2: List the areas along with the pollutants present there

Example: 3. Bathroom: Aerosol spray (deodorants)

Step 3: Share your responses with us at support@greenschoolsprogramme.org

Collated responses* from the participants:

1. **Storeroom/Attic:** VOCs (volatile organic compounds/gases) from paints, mold, dust; biological pollutants (mites, dust, bacteria)
2. **Bedroom:** VOCs from furniture; mattress dust; aerosols in insect repellents; asbestos and formaldehyde in building material
3. **Bathroom:** Bacteria and mold from humidity; VOCs from cleaning products; aerosol sprays; water leakages
4. **Kitchen:** Particulate matter (PM) from stoves/ *chulhas* and chimneys; VOCs from disinfectants; burning of fuels; gas emissions like CO, CO_2, formaldehyde

5. **Living Room:** Carpet and curtain dust; emissions from paint and furniture; fireplace emissions; tobacco smoke; VOCs like acetone, benzene, formaldehyde from air fresheners; biological pollutants; cooling/heating system

Indoor air pollution sources largely depend on the status of ambient air pollution and the geographic and social factors present in a region.