2025 HCI Prelim H1 Geography ANSWERS

1 Four 17-year old students undertook an investigation about the perception of the elderly population of the level of liveability in Toa Payoh town. They crafted the following hypothesis:

'The elderly aged 65 years and above living in Toa Payoh experience a high level of liveability.'

The students conducted research on Age-Friendly Cities and decided to focus on the following factors that affect liveability of the elderly:

- Community support and health services
- Outdoor spaces and buildings
- Transportation

The students collected primary data by conducting a survey in May in a central area in Toa Payoh town on two weekday afternoons. When they were unable to reach their targeted sample size of 50 respondents, the students decided to expand their number of responses for the survey by asking their peers, who have elderly relatives living in Toa Payoh, to help administer the survey.

In addition to the survey, the students conducted face-to-face interviews with 6 elderly residents in Toa Payoh. The students also collected data by conducting on-site surveys of specific sites and recorded some physical features they observed in Toa Payoh town.

Resource 1 shows sites in Toa Payoh town where the surveys are conducted. Resource 2 shows the data collection sheet used by students for the survey. Resource 3 shows the survey findings. Resource 4 shows physical features observed in Toa Payoh town during the on-site surveys.

(a) Explain why the hypothesis is appropriate for the investigation. **[3]**

Suitable scale:

- The study is based in Toa Payoh town which is manageable for the 4 four students especially when they have narrowed down to one location to administer the survey

Researchable/measureable

- Data can be collected by conducting surveys/interviews with the elderly population

Clearly defined

- Independent variable: Toa Payoh town
- Dependent variable: Level of liveability
- Age group of the population is defined

(b) With reference to Resource 1, suggest the challenges that the students may face when conducting the survey. [**4]**

Ease of communication

- Language barrier can cause issues in communication with survey participants. Some may not be able to converse in or read English, which is the language used in the survey
- Some students may speak too fast and the elderly may not fully understand the purpose of the survey and may choose not to participate

Willingness of passers-by to participate

- Unwillingness of the public to do the survey
- Passers-by who are rude and dismissive who may even be aggressive

Availability of participants

- Lack of passers-by on weekday afternoons in both locations
- The hawker centre seemed closed for cleaning and this may reduce the number of passers-by

(c) With reference to Resource 2, explain one strength and one weakness of the recording sheet. **[5]**

Strengths
- The items are short and written in simple terms, hence is easy to understand
- The survey items are organised in categories which helps the participant focus on the main factors as they read the individual items

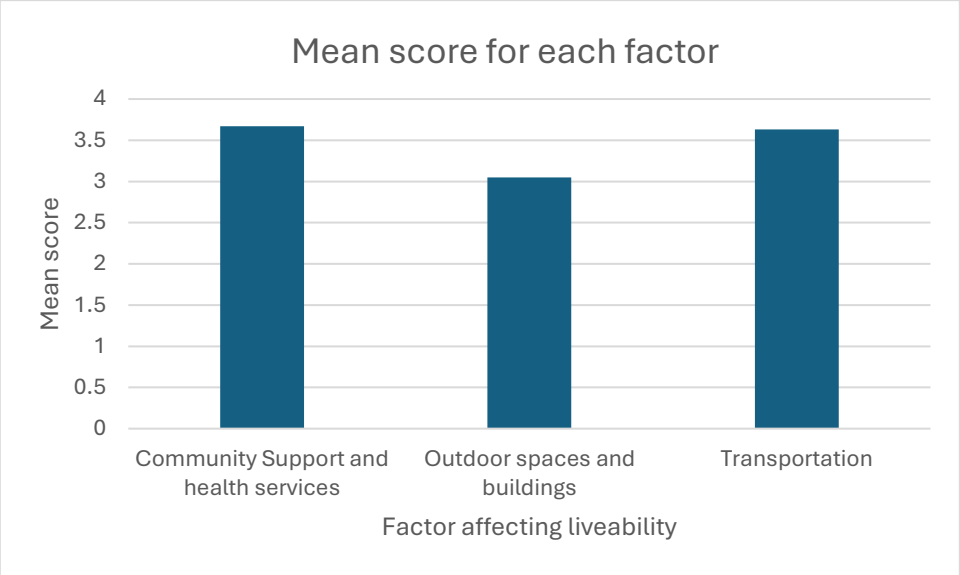
Weaknesses
- Certain terms used such as 'sufficient' and 'easily' may be understood differently by different individuals and this can affect the accuracy of the data collected

Strength/Weakness
- The inclusion of the 'neutral' option may be important, as its absence demands that a respondent with a neutral opinion give a different answer, thus biasing results.
- However, it could also be the case where a middle option is not included to force the respondent to take sides. There is also the issue of a relatively high proportion of participants choosing neutral as an option when they cannot decide or are not forced to choose one side.

(d) Explain the ethical considerations that the students should take note of when conducting interviews with the elderly. **[4]**

- The students should not interrupt the interviewees in their daily activities. They could make an appointment with the interviewees first, ensuring that they can make time and are available for the interview.
- Informed consent must be obtained, typically in written form, ensuring that participants understand what their involvement entails. Participants should be fully informed about the purpose, procedures, and potential risks of the study before they agree to take part. The information should be presented in clear, accessible language, avoiding jargon or technical terms. Participants should be aware that their participation is voluntary, and they can withdraw at any time without penalty.
- Researchers must protect the privacy of participants by ensuring that their personal information and responses are kept confidential. Data should be made anonymous where possible, with the removal of names or other identifying details replaced with pseudonyms. The researcher must ensure that the collected data is stored securely, whether in physical or digital form, to prevent unauthorized access.
- Participants should be treated with respect, and their dignity must be upheld throughout the research process. The students should be sensitive to cultural, social, and personal differences and avoid questions or behaviour that could be considered intrusive, offensive, or disrespectful. The students must take care not to cause physical, psychological, or emotional harm to participants. This includes being mindful of sensitive topics that could trigger distress.
- The students must be aware of potential power imbalances between themselves and participants, especially in contexts involving vulnerable groups (e.g., elderly, children, marginalized communities). Participation must be entirely voluntary, and there should be no pressure or coercion for individuals to take part.
- The students should also be aware of the needs of the elderly participants and cater to them to ensure that they fully understand the questions of the interview and feel comfortable in communicating their views with them. Students should try to translate their interview questions into Chinese dialects or Malay where necessary. A volunteer translator can be recruited to convey the meaning and intent of the interview questions correctly.

(e) Use a sketch graph to represent the 'mean score for each factor' shown in Resource 3. **[4]**



The data representation method should include the following

- Title of diagram
- Labels on axis
- Accurate construction of bar graph

(f) The students concluded that the elderly living in Toa Payoh experience a high level of liveability. With reference to Resources 1, 3 and 4, evaluate the validity of their conclusion. **[10]**

Possible Approaches:
Candidates could refer to Resources 1, 3 and 4 to consider how accurate and reliable the collected data are for drawing conclusion about the level of liveability for the elderly in Tao Payoh. Candidates could look at the way data are collected and assess if the methods used could make accuracy and reliability of the data questionable. For instance, they could look at

- the sample size for the surveys and interviews – the sample size needs to large enough for reliable results but small enough to be manageable for the students. A sample size of 100 may produce more reliable results.
- Some surveys were conducted on behalf of the students by their friends. The use of data collected not by the students themselves may be less reliable as the students would not be present address any questions
- sampling method for the survey participants outside of the MRT station and the hawker centre – convenience sampling is biased. However, the students do not have another option.
- sampling method for the interviews – how the interview participants were selected

Data from Resource 3 ad 4 could be used to support or disprove the conclusion made by the students.

Additionally, candidates could consider what other data would be needed for this investigation. For instance, they could mention that the study could analyse responses by gender, age groups, education level etc to gain a deeper understanding of level of liveability amongst the elderly in Toa Payoh town.

Cluster 1 Sustainable Future and Climate Change

2 Resource 5 shows share of urban population in total (%) in Africa. Resource 6 shows the population pyramid of Ethiopia in 2021. Resource 7A shows the Setegn Meda slum in Addis Ababa, Ethiopia. Resource 7B shows the Integrated Housing Development Programme (IHDP) housing – Jemo condominium - in Addis Ababa, Ethiopia. Resource 8 shows perceptions of residents on comfort and positive characteristics of IDHP housing in three cities in Ethiopia.

(a) Cite data from Resource 5 to describe the changes in urban population across Africa between 1950 and 2010. **[4]**

- Share of urban population has increased overall from 42 countries with <20% in 1950 to 35 countries with >33% in 2010
- Highest levels of share of urbanisation were found in northern Africa with 66-79% in 1950 with only the northern and southern extremes of Africa having >33% share of urbanisation
- Share of urbanisation increased in central and southern Africa but the countries in the Sahel remain the lowest
- Southern areas of Africa came to dominate the share of urbanisation in 2010 with >79%

(b) Suggest how population characteristics shown in Resource 6 may influence urbanisation rates in Ethiopia. **[6]**

The following points show how the population characteristics can lead to rural-urban migration, increasing the rates pf urbanization:

- The population pyramid is broad based which signifies a rapidly growing population. This growth often outpaces the capacity of rural areas to provide sufficient employment, educational opportunities, and essential services.
- The agricultural sector, traditionally the mainstay of rural economies, may not be able to absorb the burgeoning young labour force, leading to underemployment and a search for better prospects elsewhere.
- At the same time, cities attract youths as they are typically centres of economic activity, offering a greater diversity of jobs in manufacturing, services, and the informal sector.
- Young people are also lured by the promise of higher wages and improved quality of life
- Furthermore, the concentration of educational institutions, from universities to vocational training centres, in urban areas presents another significant draw. Young people seeking to enhance their skills and future earning potential are naturally attracted to cities where these opportunities are more readily available.
- With relatively high proportion of the urban population being youthful people, natural increase in cities will contribute to urbanisation rates.

(c) Compare the conditions of the two housing areas in Addis Ababa, Ethiopia shown in Resources 7A and 7B. **[4]**

- Physical environment: 6A show housing that looks very run-down and non-permanent building materials are used such as zinc sheets. 6B shows modern multi-level buildings
- Access to basic needs: 6A shows that water supply is shared and located outside the dwellings while the housing in 6B likely has piped water supply as well as toilets
- Accessibility: 6A does not show any road access to the area while 6B shows relatively wide roads with vehicular access
- Services: No shops/services are evident in 6A while shops are located at the first level of the housing blocks in 6B.

(d) Explain the impact of multiple deprivations experienced by slum dwellers living in Addis Ababa, Ethiopia on sustainable urban development. **[4]**

- Social well-being: Poverty cycle and exclusion
    - Poor Health and Sanitation: Overcrowded living conditions, coupled with a lack of clean water and sanitation facilities, lead to the rapid spread of communicable diseases. This not only results in high morbidity and mortality rates but also places a immense strain on the city's public health system. A sick population is less productive, hindering overall economic growth.
    - Limited Educational Opportunities: Children growing up in slums often lack access to quality education. Overcrowded and under-resourced schools, coupled with the need for children to contribute to household income, lead to high dropout rates. This perpetuates the cycle of poverty, as a lack of education severely limits future employment prospects.
    - Social Exclusion and Crime: The marginalization of slum dwellers from the formal city can breed social unrest and higher crime rates. A lack of social services and economic opportunities can push individuals towards informal and sometimes illegal activities for survival, creating an insecure environment for all urban residents.

- Economic vitality:
    - Informal economy and unstable employment: The majority of slum dwellers work in the informal economy, characterized by low wages, job insecurity, and a lack of social protection. This not only limits their ability to improve their living standards but also means they contribute less to the city's formal tax base, which in turn limits the government's capacity to fund urban development projects.
    - Low Productivity: Poor health and inadequate education directly impact the productivity of the workforce. A population that is frequently sick and lacks essential skills cannot contribute effectively to economic development.
    - Disincentive for Investment: The presence of large, impoverished slum areas can deter both domestic and foreign investment. The social and environmental problems associated with slums can create an unstable and unattractive business environment.

- Environmental integrity
    - Pollution: The absence of proper waste management systems in slums leads to the accumulation of solid waste and the pollution of waterways. This not only poses a direct health risk to residents but also degrades the urban environment. Lack of proper sanitation facilities means that the improper management of human waste also contribute to the polluted urban environment.
    - Inadequate Housing and Infrastructure: Slum housing is often constructed from flimsy, non-durable materials and is highly vulnerable to natural disasters like floods and fires. The lack of proper drainage and road infrastructure exacerbates these risks.

(e) With reference to Resources 7B and 8, suggest why the Integrated Housing Development Programme (IHDP) in Ethiopia may have limited success. **[4]**

Possible content:

- The housing area shown in R6B seem to be located in the outskirts of the city and access to the central city may be limited, affecting access to jobs and services
- Data from R7 generally reflects mainly a sometimes drastic decrease in perception of comfort and positive characteristics:
    - Consistent fall in % residents' perception of 'comfort' e.g. Bahir Dar 90% to 10% is an indication of the residents perceiving that their old housing was more comfortable
    - Characteristics such as 'social life' and 'outdoor space and activities' saw a distinct drop in perception of the positive characteristics with 0% in several of them e.g. 'Childcare' and 'Outdoor space and activities' in Bahir Dar and Gondar.
    - However, there was a consistent increase in % of freedom in all the cities, the most distinct being that of Bahir Dar increasing from 0% to 100%.

3 Resource 9 shows the carbon dioxide emissions per person of various countries in 2023. Resource 10 shows the largest industry of each state in the United States by GDP. Resource 11 shows different ways of adapting to sea level rise.

(a) Contrast the carbon dioxide emissions per person and population of the United States, China and India seen in Resource 9. **[4]**

- USA has the highest per person emissions (14.8 tCO2e) amongst the 3 countries and India has the lowest (2.5 tCO2e)
- China has the largest population (1.5 billion) and USA has the smallest population (0.4 billion)
- Judging by the areas of the rectangles, China has the highest total emissions.
- However, when the per person emissions is multiplied by the population, USA has the highest total CO_2 emissions at 15.2 tCO2e. China has 12 and India 2.6 tCO2e.

(b) Using Resource 10, suggest reasons for United States' carbon dioxide emissions per person in Resource 9. **[5]**

From Resource 10:

- Oil, gas and coal extraction and production industries lead to high CO_2 emissions. These are found in at least 8 states
- The prevalence in fossil fuel extraction in the country would suggest that the US energy mix reflects a high dependency on oil, natural gas and coal, all of which are fossil fuels and produce high levels of CO_2.
- Several states are heavily involved in ambulatory and healthcare services as well as hospital and nursing which can be resource-intensive as well as produce high amounts of waste. Disposal and the subsequent combustion of such waste can lead to CO_2 production.
- The United States' industrial sector is a significant source of greenhouse gas emissions. Resource 10 shows 3 states with Computer and Electronic products production. Many manufacturing processes are inherently energy-intensive with high industrial carbon footprint.

Other reasons:

- High levels of consumption and a preference for spacious living in the US plays a significant role in driving up individual carbon footprints. Larger-than-average homes are more energy-intensive to heat and cool, contributing to higher residential electricity consumption per capita compared to many other developed countries.
- A culture of consumerism fuels demand for a vast array of goods and services, the production and transportation (and disposal) of which are often carbon-intensive.
- American consumers have historically shown a preference for larger vehicles, such as SUVs and pickup trucks, which are generally less fuel-efficient than smaller cars.
- Public transportation infrastructure in the United States is less extensive and widely used compared to other developed countries, hence the dependence on private cars.

(c) Describe how sea level rise induced by climate change may affect coastal regions.**[3]**

Effects on the environment

- Coastal erosion: As sea levels rise, the baseline for high tides and storm surges is elevated, leading to more frequent and extensive inundation of low-lying coastal areas. This increased water presence, combined with enhanced wave action during storms, accelerates the erosion of beaches, cliffs, and deltas. Over time, this can lead to the permanent loss of land, threatening coastal habitats and human settlements.
- Saltwater intrusion: As the sea level rises, saltwater can penetrate further inland into coastal aquifers and estuaries. This contamination of freshwater resources has severe implications for both natural ecosystems and human populations. Freshwater wetlands, which are vital habitats

for a diverse range of flora and fauna, can be transformed into salt marshes, leading to a loss of biodiversity. Furthermore, the salinization of groundwater aquifers can render them unsuitable for drinking and agricultural irrigation, creating significant challenges for coastal communities.

Impacts on People and Coastal Communities

- Displacement of communities: As coastlines erode and low-lying areas become permanently inundated, homes, businesses, and critical infrastructure are threatened. In many parts of the world, entire communities, particularly in small island nations and deltaic regions, are facing the prospect of relocation. This forced migration can lead to significant social and economic disruption, as well as the loss of cultural heritage tied to specific coastal locations.
- Economic impacts: Coastal industries such as tourism, fishing, and agriculture are all at risk. The loss of beaches and damage to coastal infrastructure can devastate tourism-dependent economies. Saltwater intrusion can ruin agricultural land, impacting food security and farmer livelihoods. Fisheries can be affected by the degradation of coastal habitats that serve as breeding grounds for many commercially important species. Furthermore, the cost of protecting coastal communities through the construction of seawalls, levees, and other coastal defenses is enormous, placing a significant financial burden on governments and taxpayers.

(d) With reference to Resource 11, explain the challenges of adapting to sea level rise. **[4]**

Protect
This strategy uses hard structures like seawalls and barriers to block the rising water.

Challenge: The "Protect" strategy faces several hurdles. Firstly, it is extremely expensive to build and maintain these structures. Secondly, they can have negative environmental impacts, such as destroying coastal habitats and causing erosion in adjacent areas—a phenomenon known as coastal squeeze. Finally, they can create a false sense of security, and if they fail or are overtopped during a major storm, the resulting damage can be catastrophic.

Accommodate
This involves modifying buildings and infrastructure to coexist with the rising water, such as elevating houses on stilts.

Challenge: While accommodation protects the structure itself, it doesn't protect the surrounding land and infrastructure. Roads, utilities, and emergency services can become inaccessible during high tides and storm surges. The cost of retrofitting existing homes can be substantial, and this approach is not a permanent solution if sea levels continue to rise significantly.

Advance
This strategy involves reclaiming land from the sea, effectively moving the coastline forward.

Challenge: "Advance" is a highly aggressive and environmentally disruptive strategy. It is the most expensive option, requiring massive engineering projects. It destroys marine ecosystems and creates artificial land that is still highly vulnerable to future sea level rise and extreme weather events.

Retreat
This involves moving homes, communities, and infrastructure further inland to higher ground.

Challenge: Managed retreat presents significant social and economic challenges. The process of relocation is costly and can lead to the loss of community identity and cultural heritage tied to a specific location. There are also complex legal and equity issues regarding land acquisition and compensation for residents. Finding suitable and affordable areas to move to can be a major obstacle.

Retreat + Ecosystem-based Adaptation
This hybrid approach combines moving inland with restoring natural coastal habitats like wetlands or mangroves in the vacated areas.

Challenge: This strategy faces the combined challenges of retreat (high costs, social disruption) and the complexities of ecological restoration. It takes a long time for natural ecosystems to establish and become effective as protective barriers. The success of restoration is not guaranteed and requires specific environmental conditions and long-term management.

(e) Using Resources 9 and 11, explain how adaptation and mitigation measures help manage the impacts of climate change. **[6]**

Resource 9 shows the high amounts of CO_2 emissions per person and mitigation measures need to be in place to reduce carbon emissions and increase carbon sinks.

Mitigation measures help by:

- Reducing Emissions at the Source: The most significant mitigation strategy is transitioning away from fossil fuels (coal, oil, gas) to renewable energy sources like solar, wind, and geothermal power for electricity and transportation.
- Increasing Energy Efficiency: Using less energy to achieve the same result. This includes everything from better-insulated buildings and energy-efficient appliances to more fuel-efficient vehicles.
- Enhancing Carbon Sinks: A "sink" is a natural system that absorbs more carbon than it releases. Protecting and expanding forests through reforestation and preventing deforestation are crucial mitigation efforts. Sustainable farming practices can also help soils absorb more carbon.

Resource 10 shows different ways of adapting to sea level rise to help people cope with the effects of climate change. Adaptation refers to making adjustments in our social, economic, and ecological systems to cope with the climate change impacts that are already happening or are unavoidable.

Adaptation measures help by:

- Protecting Against Sea-Level Rise: Coastal communities can build sea walls, restore protective ecosystems like mangroves, and elevate critical infrastructure like roads and buildings to protect against flooding.
- Building Resilience in Agriculture: Farmers can switch to drought-resistant crops, implement more efficient irrigation techniques, and adjust planting schedules to adapt to changing weather patterns and ensure food security.

Mitigation and adaptation are complementary and equally essential.

- Without mitigation, the impacts of climate change will become so severe that no amount of adaptation will be sufficient to protect us.
- Without adaptation, communities will be unable to cope with the climate impacts that are already occurring and are projected to intensify in the coming decades, regardless of how quickly we reduce emissions.

4 'Achieving a high level of liveability in cities for women is fraught with issues.

Evaluate this statement. [13]

Possible approach:
Candidates can approach the question by making a judgment whether measures taken to achieve a high level of liveability for women in cities is necessarily laden with issues. Candidates can consider how urban environments have largely been designed and managed without adequately considering women's specific needs, experiences, and safety and significant effort is required to identify and design strategies to address these needs and achieve a high level of liveability for women.

Some prevalent and deep-seated issues women face include:

- [Socio-economic] The widespread nature of the issue of safety and security of women in the urban space as public spaces, from transport hubs to parks and streets, are often sites of harassment and violence.

For example, poorly lit alleyways, isolated bus stops, and crowded public transport systems can become no-go zones for women, particularly after dark. A 2021 World Bank report noted that in many cities, women systematically alter their behaviour—avoiding certain routes, travelling in groups, or limiting their activities to daylight hours—due to fear of crime. This restricts their access to employment, education, and leisure, fundamentally undermining urban liveability. This is not just a problem in developing nations; studies in cities like London and Paris have consistently shown high rates of harassment on public transport, demonstrating the universal nature of this issue.

- [Urban environment and structures] - The design of urban spaces fail to address the needs of women who have complex travel patterns as they are disproportionately responsible for caregiving. Women's journeys often involve 'trip-chaining'—linking multiple short trips for school runs, grocery shopping, and caring for elderly relatives. Urban sprawl and rigid zoning that separate residential, commercial, and industrial areas make these essential journeys inefficient and time-consuming. Public transport networks designed for radial commutes, rather than local, multi-stop trips, exacerbate this problem, contributing to 'time poverty' among women and creating barriers to their full economic and social participation.
- [Economic] Restrictions to employment opportunities in due to invisible barriers in most sectors such the tech industry resulting to women gaining employment in less-productive sectors and part-time work.

These issues can be addressed through a range of strategies which, in turn, may achieve a varying level of success as there may be challenges (as well as successes) in the planning/design and execution of these strategies.

Examples of strategies include:

- Gender mainstreaming - Vienna, Austria, is a pioneering example. Since the 1990s, the city has analysed urban life from a gendered perspective and implemented over 60 pilot projects. These include redesigning parks to include more open, well-lit areas to increase feelings of safety, widening pavements to better accommodate prams and pedestrians, and building apartment complexes with improved access to public transport and on-site facilities like childcare. These deliberate design choices demonstrate that when women are included in the planning process, cities can become more liveable not just for women, but for everyone, including children and the elderly.
- The rise of grassroots activism and technology also provides powerful tools to challenge the status quo. Campaigns like the global '#MeToo' movement have highlighted the scale of public harassment, while local initiatives such as 'Reclaim the Night' marches demand safer public spaces. Concurrently, technology offers new solutions. Safety-focused mobile apps like Safetipin use crowdsourced data to rate the safety of public areas based on parameters like lighting, visibility, and the presence of people, empowering women to make informed decisions about their routes. This combination of public pressure and technological innovation is forcing municipal governments to become more accountable and responsive to women's urban experiences, showing that while the issues are deeply entrenched, they can be overcome.

Overall conclusion

- The statement that achieving high liveability for women is fraught with issues is largely accurate. Deep-seated problems related to safety, biased urban design, and a historic lack of representation in planning continue to pose significant barriers. However, this view is not absolute. The tangible success of gender mainstreaming policies in cities like Vienna and the growing influence of activism and technology prove that positive change is possible. Therefore, while the path to creating truly equitable and liveable cities for women is difficult, it is a challenge that is increasingly being met with targeted, effective, and innovative solutions that have achieved some level of success in cities.

5 Evaluate the extent to which impacts of climate change on people and places are similar. [13]

Possible content:
Climate change has to be very clearly defined, and thereafter the broad effects to be explained, i.e. changes in atmospheric temperature and precipitation, sea level rise, increase intensity and frequence of extreme weather events.

Subsequent impacts can be discussed by dimensions, e.g. changes in temperature impacts socially, economically and environmentally, and how these impacts vary spatially.

6 Evaluate the influence of high urbanization rates on contemporary climate change. [13]

Possible approach:
Candidates can approach the question by making a judgment of the extent to which high urbanization rates influence contemporary climate change. Candidates can consider how activities in urban areas such as industrial activity, transportation, production of goods and services and lifestyle of urban population may contribute to high intensity use of energy and the production of greenhouse gases. In turn, the increasing concentration of GHGs are the main cause of contemporary climate change. Candidates should also consider other possible reasons for contemporary climate change such as the destruction of carbon sinks through human activities such as deforestation and destruction of coral reefs. Natural causes of climate change such as sunspot activity and the Milankovitch cycles can also be brought into the discussion to consider the extent and relevance of influence. Criteria to assess the extent of influence include the spatial and temporal scale of the influence of the factors.