Catholic Junior College
JC2 Preliminary Examinations
Higher 2

GEOGRAPHY
Paper 2

9173/02
16 September 2025
3 hours

Additional Materials: Insert

READ THESE INSTRUCTIONS FIRST

An Answer Booklet will be provided with this question paper. You should follow the instructions on the front cover of the answer booklet. If you need additional answer paper, ask the invigilator for a continuation booklet.

Write your Centre number, index number and name on the work you hand in.

Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE ON ANY BARCODES.

Answer Question 1 in **Section A**.
Answer Question 2 in **Section B**.
Answer **one** question in **Section C**.

The number of marks is given in brackets [ ] at the end of each question or part question.

Answer Questions 1 and 2 and
EITHER Question 3 **OR** Question 4

Section A

Cluster 4 Fieldwork

1 A group of four students conducted fieldwork to understand fluvial flood risk in Kuantan Town, Malaysia. They wanted to examine whether certain areas along the river experience different levels of flooding during the monsoon season.

The students selected two sites along public esplanades - Site A at Esplanade Kuantan and Site B at Esplanade Tanjung Api.

Their investigation focused on testing the hypothesis:
'The Esplanade Kuantan area (Site A) has a higher flood risk than Esplanade Tanjung Api (Site B) due to differences in urban development along the river.'

For each site, they created a grid of twenty-five 20m x 20m squares covering an area extending 100m from the river's edge. Using Google Earth imagery, they classified each grid square as either:

- Built-up: Areas covered by buildings, roads, and paved surfaces
- Recreational space: Parks, sports facilities, and landscaped areas
- Natural surface: Undeveloped areas with trees, shrubs, or grass

During their field survey, the students used the public walkways at both sites to collect data. Using measuring tapes, they recorded the distance between the river's edge and the nearest buildings. They also noted the riverbank characteristics and measured the width of public walkways. All measurements were taken between 9am and 11am on a weekday to ensure consistency.

Resource 1 is a location map showing Sites A and B along the Kuantan River. Resource 2 shows photographs of Sites A and B. Resource 3 shows a sample grid classification. Resource 4 shows the data collected by the students at both sites.

(a) With reference to Resources 2 and 3, explain the risks the students might face when collecting data at these sites. [5]

Award 1 mark for each explanation of the risks the students might face, to a maximum of 5 marks.
Award 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- Working near the river is still risky despite safety barriers as Site B shows only poles with chains which could be insufficient protection [1] particularly when students need to lean over to observe or measure river characteristics in these grid squares [1 additional mark].
- Risk of slipping on the walkway as the photographs show paved surfaces that could be slippery when wet [1] especially problematic

when students need to move between multiple grid squares while carrying equipment and recording data [1 additional mark].
- Working in open areas creates risk of heat exhaustion as the photographs show limited shade coverage [1] and the grid indicates large areas of recreational and natural spaces where students need to spend time collecting data [1 additional mark].
- Students handling multiple pieces of equipment (measuring tapes, clipboards, data sheets) near the water's edge risk dropping these items into the river, potentially losing data and equipment [1] particularly when leaning over barriers to measure river characteristics in the grid squares adjacent to the water [1 additional mark].
- Risk of tripping on uneven surfaces as the photographs show different surface materials and levels [1] particularly when moving between different land use types shown in the grid to collect data [1 additional mark].

AO1

(b) With reference to Resources 2 and 3, suggest how the students could minimise their impact at these public spaces during data collection. [5]

Award 1 mark for each suggestion on how the students could minimise their impact, to a maximum of 5 marks.
Award 1 additional mark for further development of each suggestion, where applicable.

Possible responses include:
- Students should split into smaller groups along the walkway rather than working as one large group, which reduces congestion and allows public users to pass through easily [1]. This is particularly important given the narrow walkways visible in the photographs and the need to cover multiple grid squares shown in Resource 3 [1 additional mark].
- Setting up temporary data collection points at wider sections of the walkway minimises disruption as it avoids students constantly moving around and blocking paths [1]. This allows efficient coverage of adjacent grid squares while keeping most of the walkway clear for public use [1 additional mark].
- Conducting fieldwork during early morning hours when there are fewer users reduces interference with recreational activities and normal public use of the space [1]. This is especially important given the photographs show public facilities and the grid shows large areas of recreational space [1 additional mark].

AO1

(c) Explain how the timing of data collection could affect the results of this investigation. [5]

Award 1 mark for each explanation of how the timing of data collection

could affect the results, to a maximum of 5 marks.
Award 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- Taking measurements when water levels are high would affect the visibility of riverbank characteristics, resulting in incomplete assessment of the bank conditions and materials [1]. Lower water levels would allow better observation of the full riverbank structure [1 additional mark].
- Poor lighting conditions early or late in the day would make it harder to accurately distinguish and classify different land use types in each grid square, leading to potential errors in the land use percentages [1]. This is especially significant when trying to differentiate between recreational and natural surfaces where boundaries may be less distinct [1 additional mark].
- Collecting measurements during heavy rain would make it difficult to use measuring tapes accurately for distances from river edge to buildings and walkway widths [1].
- Collecting data during bright midday sun could create strong shadows from buildings and trees, making it challenging to clearly identify boundaries between different land use types [1].

AO1

(d) With reference to Resource 3, explain two problems the students might face when using this method to classify different types of land use. [4]

Award 1 mark for each explanation of the problems the students might face when using this method to classify different types of land use, to a maximum of 4 marks.
Award 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- The grid squares might contain multiple land use types, making it difficult to decide which single category to assign to that square [1]. For example, a square might contain both a paved walkway (built-up) and grass areas (recreational), leading to inconsistent classification between students [1 additional mark].
- The boundaries of different land uses might not align with the grid squares, making classification challenging [1]. A grid square might cut across the edge of a building or recreational space, requiring students to decide how much of a particular land use must be present to classify the entire square as that type [1 additional mark].
- The size of the grid squares might be too large to capture small but significant features [1]. Important elements like narrow walkways or small planted areas could be overlooked when classifying the predominant land use of the entire square [1 additional mark].

AO2

(e) Suggest what other data about the sites the students should collect to better understand flood risk. [5]

Award 1 mark for each suggestion on other data the students should collect, to a maximum of 5 marks.
Award 1 additional mark for further development of each suggestion, where applicable.

Possible responses include:

- Measuring the slope gradient of the land from river to buildings would help identify areas where water would flow faster and potentially accumulate during heavy rainfall [1]. Steeper slopes would indicate areas of rapid water movement while gentle slopes might show where water pools [1 additional mark].
- Recording the height of the riverbank above normal water level would indicate the channel's capacity to contain rising water before overflowing into surrounding areas [1]. This data would show which sections of the riverbank are most vulnerable to being breached during high water events [1 additional mark].
- Collecting data on the location and condition of drainage features would show how effectively excess water can be removed from different areas, helping identify potential flooding hotspots [1]. This information would reveal areas with inadequate drainage infrastructure [1 additional mark].
- Measuring surface permeability would indicate which areas allow water to infiltrate and which areas contribute to surface runoff, helping predict where flooding is more likely [1]. This data would show which surfaces contribute most to flood risk [1 additional mark].

AO2

(f) Suggest three ways the students could improve the reliability of their data collection. [6]

Award 1 mark for each suggestion on the students could improve the reliability of their data collection, to a maximum of 6 marks.
Award 1 additional mark for further development of each suggestion, where applicable.

Possible responses include:

- Creating a standardised classification guide with clear criteria would ensure all students follow the same process when categorising land use in each grid square [1]. For example, establishing specific rules like "if a square contains multiple land uses, classify it based on the dominant type that covers more than 50% of the square" [1 additional mark].
- Having students work in fixed pairs where one measures while the other records would ensure a consistent approach to collecting physical measurements throughout the study area [1]. This systematic division of tasks would help maintain the same data

collection procedure across all measurements [1 additional mark].

- Marking out specific points on a map where all groups must take their measurements would ensure everyone collects data from the same locations [1]. This would prevent different groups from choosing different measuring points and ensure all data is collected consistently across the site [1 additional mark].

AO2

(g) Evaluate the effectiveness of the students' methodology in testing their hypothesis about flood risk at the two sites. [10]

Possible approaches:
Candidates could evaluate whether the method provides comprehensive understanding of flood risk at both sites by referring to all resources. Using Resource 2 (photographs), candidates could identify important features like drainage systems, flood barriers, and channel modifications that the current grid method doesn't capture. They could assess whether simply measuring distances and classifying land use is sufficient when the photographs show more complex flood protection infrastructure.

Candidates could consider scale limitations - whether the 100m x 100m study area shown in Resource 3 is large enough to understand flood risk, given the wider river context shown in Resource 1. They might evaluate if studying these isolated sections provides enough understanding of how upstream and downstream conditions affect flood risk.

Candidates could assess if the quantitative approach (percentages and measurements) needs to be supplemented with qualitative data about site characteristics visible in Resource 2, such as the condition of flood protection measures or signs of previous flooding. They might also evaluate whether the method allows for understanding how different parts of each site interact during flooding, rather than just collecting data about individual grid squares.

Levels marked using Generic Level Descriptors for H2 fieldwork evaluative questions

AO3

Section B

Cluster 3 Sustainable Future and Climate Change

2 Resource 5 shows the gross domestic product (GDP) loss due to climate change in 2050. Resource 6 shows the sources of climate financing from 2013 to 2022. Resource 7 shows an infographic on climate change and cities. Resource 8 shows the ecological footprint of selected countries and cities.

(a) Describe the GDP loss due to climate change in 2050 shown in Resource 5. [5]

Award 1 mark for each description of the GDP loss due to climate change, to a maximum of 5 marks.
Award a maximum of 1 additional mark for further development of each description, where applicable.

Possible responses include:
- South Asia will experience the greatest GDP loss [1] of 15.3% [1 additional mark].
- Europe will experience the least GDP loss [1] of 0.8% [1 additional mark].
- Lower/middle income countries will experience greater GDP loss than upper-middle/upper income countries [1]. Most of the loss in lower/middle income countries will be due to physical events [1 additional mark].

AO2

(b) Describe the changes in the sources of climate financing from 2013 to 2022 shown in Resource 6. [4]

Award 1 mark for each description of the changes in the sources of climate financing, to a maximum of 4 marks.
Award a maximum of 1 additional mark for further development of each description, where applicable.

Possible responses include:
- All sources of climate financing increased from 2013 to 2022. [1]
- Multilateral public had the largest increase [1].
- Multilateral public was the second lowest source in 2013 but became the largest source in 2022 [1]. It increased from 15.5 USD billion to 50.6 USD billion [1 additional mark].

AO2

(c) Explain the role of human activities in accelerating and suppressing warming through feedback mechanisms. [5]

Award 1 mark for each explanation of the role of human activities in accelerating or suppressing warming through feedback mechanisms, to a

maximum of 5 marks.
Award a maximum of 1 additional mark for further development of each explanation, where applicable.
Award a maximum of 3 marks for explanation of either acceleration or suppression of warming only.

Possible responses include:
Accelerating warming (positive feedbacks)

- Human greenhouse gas emissions warm the atmosphere and melt ice sheets, replacing reflective ice with darker water surfaces that absorb more heat, leading to additional warming and further ice melt [1 mark]. This affects both albedo and thermohaline circulations, creating broader climate system changes [1 additional mark].
- Human activities warm and acidify oceans, causing phytoplankton to decay, which reduces the ocean's ability to absorb carbon dioxide, allowing more CO2 to remain in the atmosphere and cause further warming [1 mark]. This diminishes one of Earth's major carbon sinks, accelerating the accumulation of greenhouse gases [1 additional mark].
- Human-induced warming creates drier conditions that increase wildfire frequency, and when these fires burn vegetation, they release stored carbon dioxide that causes additional warming and even more fires [1 mark].

Suppressing warming (negative feedbacks)

- Human activities that increase temperatures lead to greater cloud formation, which reflects more shortwave radiation back to space, helping to reduce the warming effect [1 mark].
- Human-caused warming increases evaporation rates, which removes heat from the surface through latent heat transfer, helping to suppress some of the warming effect [1 mark].

AO1

(d) Cite data from Resource 7 to explain how climate change might impact vulnerable groups living in cities. [6]

Award 1 mark for each explanation using data from Resource 7 of how climate change might impact vulnerable groups living in cities, to a maximum of 6 marks.
Award a maximum of 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- The projected 2°C temperature rise in cities by 2050 will particularly affect those living in informal settlements because their housing lacks adequate cooling systems and insulation [1 mark]. This health risk is amplified as informal settlements often lack green spaces that could help reduce urban heat [1 additional mark].
- Rising sea levels and storm surges from global temperature rise will disproportionately affect the 1 billion people in informal settlements

because many of these settlements are in hazard-prone areas [1 mark]. This vulnerability will worsen as informal settlement populations are expected to reach 2 billion by 2030 [1 additional mark].

- Increasing water stress in cities (affecting 470 million people by 2030) particularly impacts women in vulnerable communities because they bear 72% of the water collection burden [1 mark]. This reduces their ability to participate in education and employment, limiting their adaptive capacity to climate change [1 additional mark].
- Rising temperatures and water stress particularly affect those without proper sanitation (73% of the world's population) because they are forced to use outdoor facilities [1 mark]. This especially impacts women and girls who face increased safety risks when using isolated outdoor areas [1 additional mark].

AO2

(e) With reference to Resource 8, explain the demand placed on the natural environment by urban areas. [5]

Award 1 mark for each explanation of the demand placed on the natural environment by urban areas., to a maximum of 5 marks.
Award a maximum of 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- The city's ecological footprint is larger than its country's footprint, showing how urban areas place disproportionate pressure on natural resources [1 mark]. This reflects the higher consumption patterns and affluent lifestyles in cities that require resources to be drawn from areas far beyond their immediate regions [1 additional mark].
- The breakdown of the ecological footprint shows multiple demands from urban areas including food, housing, transport, and goods, demonstrating how cities require diverse resources to function [1 mark]. These varied demands mean cities must draw upon different types of ecosystems and natural resources, from agricultural land to forests to energy sources [1 additional mark].
- The city's ecological footprint being many times larger than the country’s biocapacity shows how urban areas impact environments far beyond their boundaries [1 mark]. This creates a linear rather than circular urban metabolism where resources are extracted from distant regions and waste is disposed of in areas far from the point of consumption [1 additional mark].
- The comparison between ecological footprints and biocapacity reveals that urban areas contribute to ecological deficits [1 mark]. This indicates that cities are consuming resources at rates faster than natural systems can regenerate them, creating unsustainable pressure on ecosystems [1 additional mark].
- The large proportion of the footprint dedicated to food consumption shows how urban areas create significant agricultural demand [1 mark]. This leads to the conversion of natural landscapes into farmland and the intensification of agriculture in surrounding regions to feed

urban populations [1 additional mark].

AO2

(f) Explain how sustainable urban development can be monitored using relevant indicators. [5]

Award 1 mark for each explanation on how sustainable urban development can be monitored using relevant indicators, to a maximum of 5 marks.
Award a maximum of 1 additional mark for further development of each explanation, where applicable.

Possible responses include:

- The unemployment rate helps monitor sustainable urban development by showing whether a city's economy is providing sufficient job opportunities for its residents [1 mark]. A declining unemployment rate indicates economic vitality and suggests the city can sustain its population's economic needs [1 additional mark].
- The percentage of green space in a city helps monitor sustainable urban development by measuring the preservation of natural areas within urban environments [1 mark]. This indicates whether the city is maintaining environmental integrity while developing, which is crucial for long-term sustainability [1 additional mark].
- Access to water-borne sanitary infrastructure helps monitor sustainable urban development by showing the proportion of population with adequate sanitation services [1 mark]. This indicates whether the city is providing essential services equitably and maintaining public health standards [1 additional mark].
- The recycling rate helps monitor sustainable urban development by measuring how effectively a city manages its waste [1 mark]. This shows whether the city is moving towards a more circular urban metabolism rather than following a linear pattern of resource use and disposal [1 additional mark].
- The percentage of affordable housing helps monitor sustainable urban development by indicating whether residents across different income levels can access adequate housing [1 mark]. This shows if the city is developing inclusively and meeting basic needs of all residents [1 additional mark].

AO1

Section C

Answer **either** question 3 **or** question 4.

Cluster 3 Sustainable Future and Climate Change

3 ‘It is more difficult for cities to adapt to climate change than to manage slums.’

Evaluate this statement. [20]

Possible approaches:
Candidates could approach the question by comparing the challenges cities face in adapting to climate change versus managing slums through examining key aspects of each issue. For climate change adaptation, candidates could analyse challenges like the global nature of the problem, high costs of infrastructure adaptation, and uncertainty in climate projections. For slum management, they could examine challenges like land ownership issues, providing basic services, and social integration. Candidates could evaluate which set of challenges presents greater difficulties for cities based on factors such as scale of impact, resource requirements, and complexity of solutions.

Candidates could also approach the question by analysing how the difficulty of these challenges varies across different contexts. They could examine how cities at different stages of development face distinct challenges. For instance, rapidly urbanising cities in developing nations often struggle with both expanding slum settlements and climate vulnerability, while having limited resources to address either. In contrast, cities in developed nations, having largely addressed historical slum issues through public housing and urban renewal, now face primarily climate adaptation challenges, such as protecting existing infrastructure and adapting to rising sea levels. This approach allows evaluation of how the relative difficulty of these challenges depends on a city's development context, resources, and existing urban conditions.

Levels marked using Generic Level Descriptors for H2 essays

AO3

4 ‘Cities should prioritise sustainable urban development more than liveability.’ [20]

Evaluate this statement.

Possible approaches:
Candidates could approach the question by examining the dimensions of both sustainable urban development and liveability to evaluate their relationship. They could analyse how the three pillars of sustainable urban development (economic vitality, environmental integrity, and social well-

being) interact with aspects of liveability (such as safety, access to services, and quality of life). This would allow evaluation of whether prioritising sustainable development necessarily comes at the expense of liveability, or whether these goals are mutually reinforcing. For instance, environmental initiatives like increasing green spaces can serve both sustainability and liveability goals, while some economic sustainability measures might temporarily reduce liveability through disruption or higher costs.

Candidates could also approach the question through stakeholder analysis, examining how different urban stakeholders are affected by emphasis on either sustainability or liveability. They could evaluate how various groups (residents, businesses, government agencies, vulnerable populations) experience and value these priorities differently. For example, while businesses might benefit from sustainable development initiatives that reduce operating costs, residents might prefer immediate liveability improvements like better public amenities. This approach allows discussion of whose interests are served by prioritising one goal over the other, and how cities might balance competing stakeholder needs.

Levels marked using Generic Level Descriptors for H2 essays

AO3