(a) Identify the limestone feature shown in Fig. 1. [1]

(Collapse) Sinkhole *or* (Collapse) Doline

(b) With reference to Figs 1A and 1B and your own knowledge, explain the factors contributing to the development of the limestone feature you have identified in (a). [5]

- **Mineral Composition**

Presence of calcite would facilitate carbonation and solution

- **Lines of Weaknesses**

Provide sub-surface area for acidulated water to penetrate and attack the rocks chemically. Joints and bedding planes permit sub-surface weathering that would widen caverns and voids within a limestone bed. With continued weathering, the overlying roof will be unable to support itself and collapse, forming a surface depression known as the sinkhole/doline.
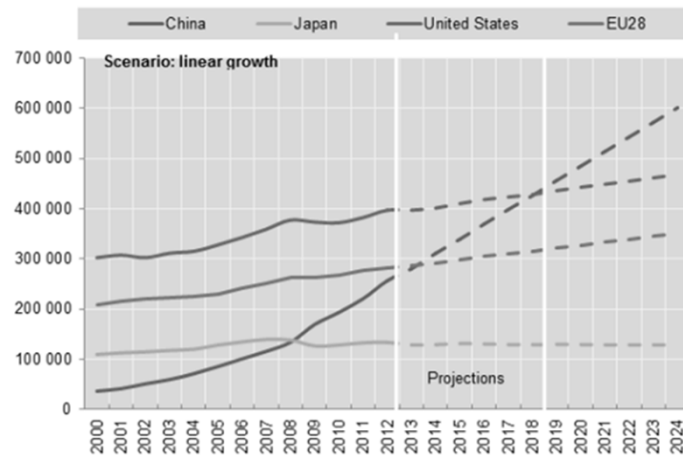
- **Climate**

Precipitation would provide the agent for chemical weathering processes to operate effectively.

Vegetation would produce organic acids, that would serve as a catalyst in chemical reactions. The decomposition of plant matter and respiration process also produce carbon dioxide that would dissolve in water to form carbonic acid – carbonic acid is a key agent in the carbonation and breakdown of limestone to form the sinkhole/doline.

(c) Describe how the form and nature of a tower karst landscape differs from a limestone pavement. [6]

	Tower karst landscape	Limestone pavement
Form : Height [2]	Made up of distinct karsitic features (aka mogotes) which extend to heights of more than 300m in height	less distinct karsitic feature, relatively flat/low feature
Form : Shape [3]	made up of tall isolated masses of limestone separated by flat ground, relatively irregular in profile	small individual masses of limestone (clints) separated by shallow grooves (grykes)
Nature : Other associated features [1]	• Covered by dense vegetation, fluted surfaces, caves • Located in the tropics	• Hardly any presence of vegetation, surfaces relatively even although there might be some solutional features such as runnels, pits and pans. • Located in temperate regions

Scenario: linear growth

— China   — Japan   — United States   — EU28

Projections

(a) Define "research and development". [2]

- Service directed towards the innovation, introduction, and improvement of products and processes

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(b) Using Fig. 2, compare the changes in R&D spending between Asian and non-Asian economies. [5]

- **Similarities**

Both types of economies show an actual and projected increase in spending over time

- **Differences**

Asian economies show a much lower actual level of spending than non-Asian economies.

In terms of projected growth, greater variation exists within Asian economies than non-Asian economies. While non-Asian economies show similar rates of growth, China exhibits much higher rates of projected growth than Japan. [2]

Cite data

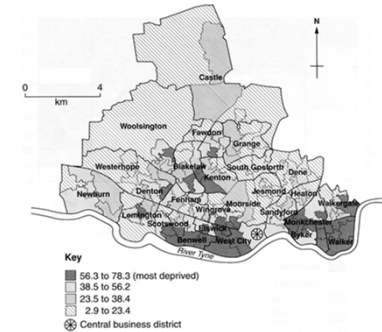# (c) Suggest how globalisation can lead to rise of R&D activities in selected economies. [5]

➤ Global shift leads to deindustrialisation and subsequent reindustrialisation in DCs. Reindustrialisation involves the rise of high-end manufacturing (such as nanotechnology, defence sector, aerospace, pharmaceuticals), which relies heavily on R&D.

➤ In an open economy, there is heightened competition between firms, driving firms to invest in R&D to stay competitive.

➤ With rising levels of deregulation, TNCs may relocate or outsource R&D functions to other countries, leading to higher levels of R&D spending in economies with favourable conditions for R&D.

➤ As relatively more mature NIEs (such as China) lose their comparative advantage in low-end manufacturing, govts may invest more in R&D sector to nurture the growth of high-end manufacturing and service sector.

(a) Give one other variable which could have been used to indicate levels of deprivation. [1]

• Variables other than income, health and education levels:
➢ Unemployment levels
➢ Crime levels
➢ Number of people on welfare benefits

(b) With reference to Fig. 4, describe the distribution of the most deprived districts (those with an index of deprivation of 56.3 or more). [3]

• 'Located to the south along the River Tyne
• Close proximity to the CBD and form part of inner city (cite data)
• Pockets of 'most deprived' districts further north (cite data)

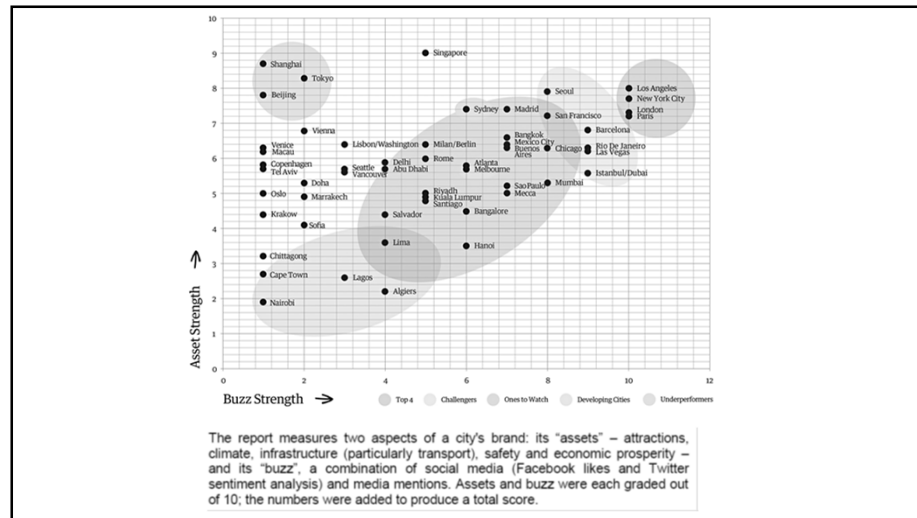(c) Suggest possible reasons for :

(i)   the location of the most deprived districts. [5]

• Most of deprived districts are located in the inner city which has undergone inner city decay
• Likely to be oldest part of city/earliest to be settled. Infrastructure would have aged over time causing them to be derelict, run-down.
• Deindustrialisation in the inner city led to massive unemployment and decentralisation of jobs to the suburbs. Inner city becomes associated with poverty.
• In response to physical and economic decline, wealthy move out, leaving behind the poorer households and immigrants from other countries
• Dominance of poor residents leads to smaller tax base. City government has less funds for maintenance , leading to further physical decline. Investors will be deterred, perpetuating economic and social decline.

(c) Suggest possible reasons for :

(ii)   the location of the least deprived districts such as Woolsington. [3]

• Rich are able to live further away from the Central city as they can afford the commuting costs

• Affluent desire (and are able to afford) a better quality of life in the suburbs : spacious and newer homes, well-kept environment, greenery, lower levels of pollution

• The affluent prefer to put a distance between themselves and the crowded and more polluted environment of the inner city

The report measures two aspects of a city's brand: its "assets" – attractions, climate, infrastructure (particularly transport), safety and economic prosperity – and its "buzz", a combination of social media (Facebook likes and Twitter sentiment analysis) and media mentions. Assets and buzz were each graded out of 10; the numbers were added to produce a total score.

(a) With reference to Fig. 6, describe the relationship between "asset strength" and "buzz strength". [4]

- **Positive relationship** : Higher the asset strength, the higher the buzz strength
- ➤Cities in DCs tend to exhibit higher asset strength and higher buzz strength
- ➤Cities in LDCs lower asset strength and buzz strength
- ➤Cite data

- **Variations in relationship:**
- ➤Relationship between values not as strong when buzz strength values are lower. At lower values for buzz strength, greater variations in values for asset strength
- ➤Cite data (when buzz strength is 1, there are 11 cities whose asset strength vary from 2 to 8.85)

(b) Using examples, explain specific strategies that Singapore has adopted to improve its "Global Brand". [6]

- Singapore has made concerted efforts to improve its "assets" and "buzz factor" to be recognised as cosmopolitan city with exciting global attractions.
- Hosting global events that increase number of visitors to Singapore and showcase Singapore's attractions to the world (Eg: Youth Olympics, FI, SEA Games 2015)
- Nurturing Singapore's arts, cultural scene through providing of grants and creating platforms to showcase work locally and internationally.
- Creating new attractions within the Central City
  > New flagship retail outlets such as Ion and Orchard gateway that showcase international brands
  > Museums that feature an array of internationally recognised exhibits (Eg: Art Science Museum, Lee Kong Chian Natural History Museum)
- Nominating sites to be globally recognised for cultural importance (Eg: SG Botanic Gardens recently inscribed as UNESCO World Heritage Site)

5E (a) Describe the role of plate tectonics in the rock cycle. [9]

- Key Idea: plate tectonic processes (such as subduction and partial melting, uplift and mountain building) drives some of the geological processes in the rock cycle

Body
- Para 1: Formation and extrusion of magma [4]
- Para 2 : Uplift [3]
- Para 3 : Heat and pressure [1]

(b) Compare the volcanic hazards at convergent and divergent plate boundaries. Discuss the challenges associated with managing these hazards at the different plate boundaries. [16]

Introduction
- **Define :** Volcanic hazards
- **Argument :** Both convergent and divergent plate boundaries produce volcanic hazards, however the hazards may differ based on type, composition and explosivity. In response to these volcanic hazards, many strategies have been put in place to reduce casualties and property damages. However the successful management of these hazards has been hindered by various physical and human challenges.

Body

P1: Compare the volcanic hazards at convergent and divergent plate boundaries

P2: Common challenges in managing volcanic hazards at both plate boundaries

P3: Convergent plate boundaries can be more challenging to manage than divergent plate boundaries

P4: However, at selected divergent plate boundaries, there may still be difficulties in management

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(b) "A knowledge of deep weathered profiles enables us to understand the form and formation of granitic landforms." Discuss. [16]

Introduction
- **Define :** Deep weathered profiles
- **Argument :** A knowledge of deep weathered profiles enables us to understand the processes contributing to the form and development of granitic landforms such as tors and inselbergs.
- **Balance argument :** However, to fully appreciate the form and formation of granitic landforms, an understanding of other processes are required.

Body

P1: Description of deep weathered profile (Ruxton and Berry model)

P2: Deep weathered profiles enable to understand the process of deep weathering, which is relevant to understanding the form and formation of tors

P3: Deep weathered profiles enable to understand the process of deep weathering, which is relevant to understanding the form and formation of inselbergs

P4: However, a knowledge of deep weathered profiles is insufficient

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7E(a) With the help of examples, explain the concept of a shrinking world. [9]

Intro
- Define shrinking world
- Overview statement : Shrinking world driven by improvements in transport and communications technologies and deregulation

Body

P1: Improvements in transport technology have led to shrinking world

P2: Improvements in communications technology have led to a shrinking world

P3: Rise of deregulation

7E(b) Examine the role of the state in the location of economic development. [16]

Intro :
- Define state
- Context/argument:
  - → State is a key agent in shaping economic development – state decides the type economic activity, builds relevant infrastructure/services and provides the business environment to attract FDI and spur trade , develops the labour pool to drive economic growth
  - → These actions lead to specific locational consequences on a global and local scale

Body :

P1: Location of economic development on a global and local scale

P2: State influences location of economic devt on a global scale through influencing TNCs investment decisions and improving country's capacity to trade

P3: State influences location of economic devt on a global scale through influencing spatial division of work

P4: State influences location of economic devt on a local scale through influencing selective investment and shaping the spatial division of work

7Or (a) Explain the growth and role of small medium enterprises (SMEs) in the face of global economic change. [9]

Intro
➢Define SME
➢Key Idea : Rise of TNCs have led to the growth of SMEs. In the face of global economic change, SMEs play a key role in supporting the activities of TNCs and driving local economies.

Body
P1: Rise of TNCs have led to growth of SMES as TNCs increasingly outsource/offshore their functions to SMEs
P2: Rise in opportunities for growth of SMEs
P3: Role of SMEs

7Or (b) Discuss the view that supranational bodies have benefited DCs at the expense of LDCs. [16]

Intro
➢Define SNB
➢Argument : SNBs have benefitted DCs at the expense of LDCs when unfair policies prioritize the needs of international community and DCs over the needs of LDCs.
➢Balance argument : SNBs have not benefitted DCs at the expense of LDCs as they provide opportunities for selected LDCs to benefit as well

Body
P1: SNBs have benefitted DCs more than LDCs through the implementation of Structural Adjustment Programmes
P2: SNBs have benefitted DCs more than LDCs through the implementation of free trade policies
P3: SNBs do lend money to LDCs to fund devt projects, but many of these projects brings long-term adverse impacts to LDCs, while DCs benefit
P4: However, while some LDCs have suffered, other LDCs have benefitted from the policies (at the expense of DCs)

8E (a) Give the meaning of the term urbanisation and discuss the relationship between urbanisation and urban growth.   [9]

Intro :
Define
➢Urbanisation (increase in proportion of people in urban areas, rise of urban infrastructure/services/lifestyle)
➢urban growth (increase in absolute number of people in urban areas, physical expansion of an urban area) [1]

Body
P1 : Urban growth leads to urbanisation due to rural-to-urban migration and natural increase [4m]
P2 : Urban growth leads to urbanisation due to economic concentration and spread of urbanism [4m]
P3: Urban growth leads to urbanisation due to urban sprawl [1m]

8E (b) To what extent do you agree that primacy simply represents an early stage in a country's urban development? [16]

Intro
➢Define primacy
➢Argument: Urban primacy is essentially an early stage in a country's urban development because, given time and the spread of economic development across a country, other cities will be able to close the demographic, economic and social gap between themselves and the leading city, erasing the phenomenon of primacy
➢Balance: However, in some urban contexts, primacy has long history and can therefore be considered as a mature or enduring feature of the urban landscape.

Body :
TS1: Primacy, in some urban settings, simply represents an early stage of urban development as the particular country has only recently embarked on industrial development and is focusing its industrial and other investments in one city first.
TS 2: In other urban settings, however, primacy has been long established and shows no sign of being disrupted by the economic and demographic growth of other urban centres.
TS3: In still other settings, primacy is not manifested in the urban history of the country, especially where the country is large and there are multiple economic/cultural centers within the country

8Or (a) With reference to examples, outline the problems cities face from increasing road traffic. [9]

Overview statement

Cities face a variety of environmental, economic and social problems associated with increasing road traffic.

Body

P1: Environmental problems

P2: Social problems

P3: Economic problems

8Or (b) "Although urban areas in DCs and LDCs differ in character, the housing problems they experience are the same." How far do you agree? [16]

Intro

➢ Define : housing problems

➢ Argument/Context : DCs and LDCs both suffer from similar housing problems since they experience the same issues, such as population pressure and shortage of resources.

➢ Balance: However, despite experiencing the same issues, DCs and LDCs experience these issues to a different extent. In addition, the unique factors driving housing problems in each context still differ, thus leading to different types of housing problems experienced in DCs and LDCs.

Body

P1: DCs and LDCs experience the same set of housing problems

P2: LDCs and DCs experience different types of housing problems

P3: LDCs experience these problems to a greater extent

P4: Variations in housing problems exist not just between LDCs and DCs , but within LDCs and DCs due to different policies adopted and unique demographic/economic/social context