

SECTION A

Theme 4: Geographical Investigation

- 1 You and your classmates were tasked to investigate infiltration rates of two sites.

You decided to split yourselves into two groups of four to measure the infiltration rates of soil at each site. Site A is near the river running through Bishan-Ang Mo Kio Park with residential areas approximately 400 metres north and south of it. Site B is at a construction site near the junction of Tanglin Road and Grange Road with commercial and residential areas within its 200 metres radius.

Together with your classmates, you made your own double ring infiltrometers with used aluminium milk powder tins. You decided to use the stopwatch function of your smart phones. Infiltration rates are calculated by a standardised recording sheet prepared by yourselves.

At each site, both groups chose the flattest ground possible and clipped off any existing grass before you gently twist your double-ring infiltrometer into the soil. Both groups poured water into the infiltrometers, the water level dropped faster initially and measurements were taken only when all three members decided the fall in water level slowed down. Both groups started at the same time and completed the task in an hour.

To ensure accuracy, the groups carried out the same steps the next day. Photographs of the exact placement of the infiltrometers were taken to ensure the same spots were utilised.

Resource 1 shows storm hydrographs of Site A and Site B. Resource 2 shows maps with locations of Site A and Site B. Resource 3 shows the consolidated data collected by you and your classmates to calculate infiltration rates.

- (a) With reference to Resource 1, suggest a suitable hypothesis for this geographical investigation. [1]
- (b) Describe **three** potential risks at Site A shown in Resource 2 and explain how each risk could be minimized. [6]
- (c) Explain how you would minimize the impact of your investigation at Sites A and B differently. [4]
- (d) Suggest **two** limitations of Resource 3 in representing the findings and draw bar graphs to represent the infiltration rates of Sites A and B. [5]
- (e) Evaluate this investigation to ascertain the flood risks of Sites A and B, and explain how it could be improved and extended. [9]

SECTION B

Theme 1: Tropical Environments

Plantations in Pahang

- 2 Pahang is a state in Peninsular Malaysia. Two-thirds of Pahang's land is forested and 12.8% of the total land area is used for plantation agriculture. Resource 4 is a climograph of Pahang. Resource 5 shows the vegetation structure, soil profile and mean biomass of a typical forest in Pahang. Resource 6 is the water budget of entire Pahang. Resource 7 is a photograph of a tea plantation in a forest of Pahang.
- (a) Identify the climatic zone of Pahang according to Köppen–Geiger climate classification system. Support your answer with data from Resource 4. [4]
- (b) Describe the vegetation structure and mean biomass of a typical forest in Pahang as shown in Resource 5. [3]
- (c) With the help of Resources 5 and 6, suggest the possible processes that result in the soil profile of a typical forest in Pahang. [6]
- (d) With reference to Resource 7, explain how the landscape was changed to develop a plantation. [4]
- (e) Using Resources 4, 6 and 7, explain why occurrence of mass movements is a major concern of plantation owners in Pahang. Support your response with information from the resources. [8]

Theme 2: Development, Economy and Environment

Resource Extraction in Democratic Republic of Congo

- 3 Resource 8 shows the extraction of various resources in the Democratic Republic of Congo (DRC). Resource 9 shows information on the ownership of copper and cobalt mines operating in Katanga Province of the DRC. Resource 10 shows information on the movement of cobalt from mines in the DRC to global markets.
- (a) Using Resource 8, describe the spatial pattern of resource extraction in the DRC. [3]
 - (b) To what extent does Resource 8 show a core-periphery pattern of development within the DRC. [5]
 - (c) Explain **three** possible impacts of foreign ownership of mines as depicted in Resource 9. [6]
 - (d) Describe the global production network of cobalt as shown in Resource 10. [4]
 - (e) Evaluate the usefulness of Resources 8, 9 and 10 as evidence for the resource curse thesis in the DRC. [7]

Theme 3: Sustainable Development

Needs of the Elderly in Singapore and selected countries

- 4 Resource 11 shows the number of one-person households by age-groups in Singapore from 2000 to 2014. Resource 12 shows the changes in percentage of elderly population (65+ years) from 7 percent to 14 percent for selected countries. Resource 13 depicts a new Silver Zone traffic measure in Bukit Merah View to help the elderly make their way across roads safely. Resource 14 shows the costs for the different aged care options in Singapore.
- (a) Explain **two** limitations of Resource 11 in understanding the needs of the elderly in Singapore. [3]
 - (a) With reference to Resource 12, compare the patterns of Asian countries and non-Asian countries for the change in percentage of elderly population (aged 65+) to rise from 7% to 14%. [4]
 - (c) Using evidence from Resources 11 & 12, outline why the needs of the elderly population would be considered a pressing issue for Singapore? [5]
 - (d) Explain how the mobility of elderly residents may be improved with the new traffic measure depicted in Resource 13. [4]
 - (e) Using Resource 14 and your own knowledge, recommend **one** option for an elderly person who is no longer able to live independently. Justify your decision. [9]

Raffles Institution
2018 Year 6 Preliminary Examination

Level: Year 6

H2 GEOGRAPHY
9751 Paper 2

Time: 3 hours

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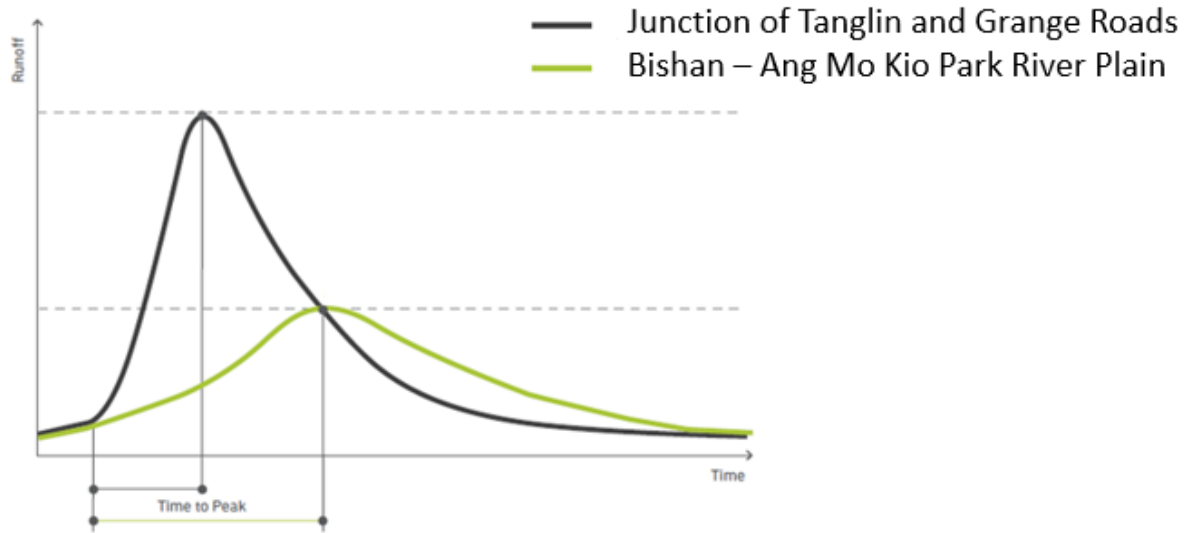
READ THESE INSTRUCTIONS FIRST:

This Insert contains all the Resources referred to in the question paper.

INSERT

Resource 1 for Question 1

Storm Hydrographs



Resource 2 for Question 1

Maps with locations of Site A and Site B



Site A



Site B

Resource 3 for Question 1

Recording Sheet

Sample collection date: *18/8/2018* and *19/8/2018*

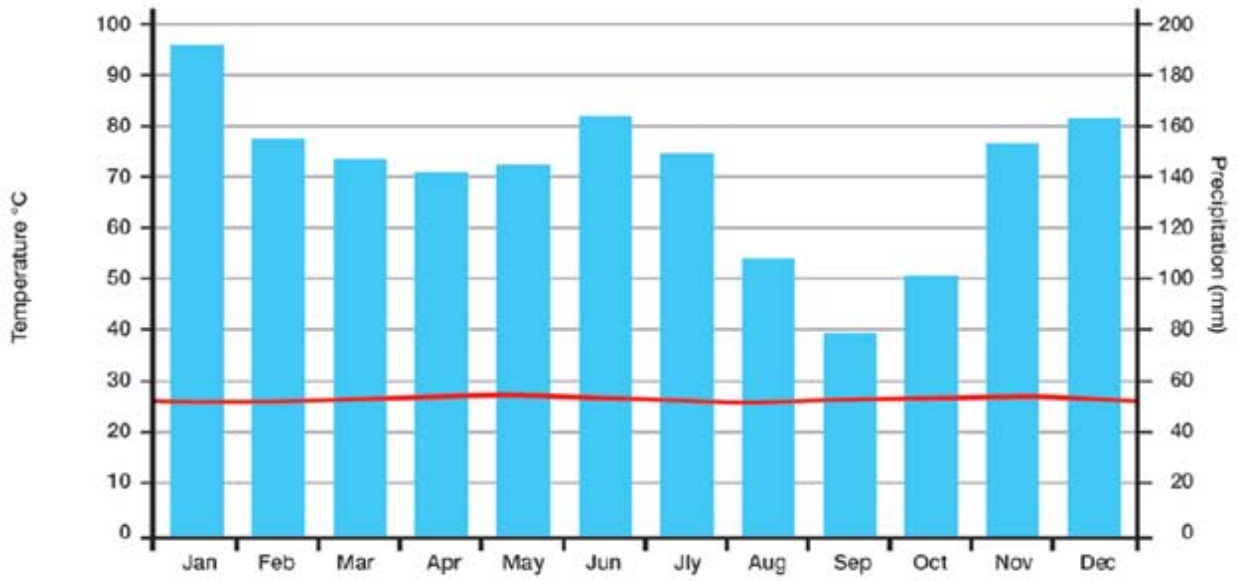
Sample collection time: *8:00am*

Observations:

	Time Taken		Change in water level, Eg 20mm of infiltrometer (mm)	Infiltration Rate (mm/min)
	(min)	(sec)		
Day 1 Site A	<i>2</i>	<i>30</i>	<i>10mm</i>	<i>4 mm/min</i>
Day 1 Site B	<i>4</i>	<i>0</i>	<i>10mm</i>	<i>2.5mm/min</i>
Day 2 Site A	<i>1</i>	<i>25</i>	<i>10mm</i>	<i>7mm/min</i>
Day 2 Site B	<i>2</i>	<i>0</i>	<i>10mm</i> <i>5mm</i>	<i>2.5mm/min</i>

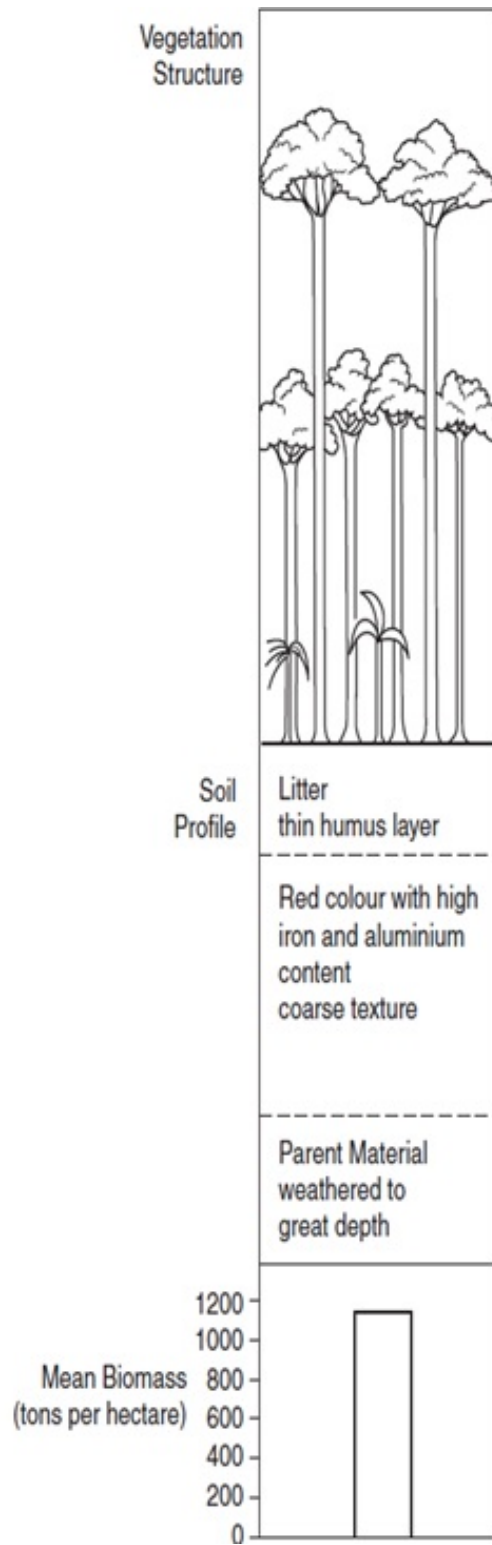
Resource 4 for Question 2

Climograph of Pahang



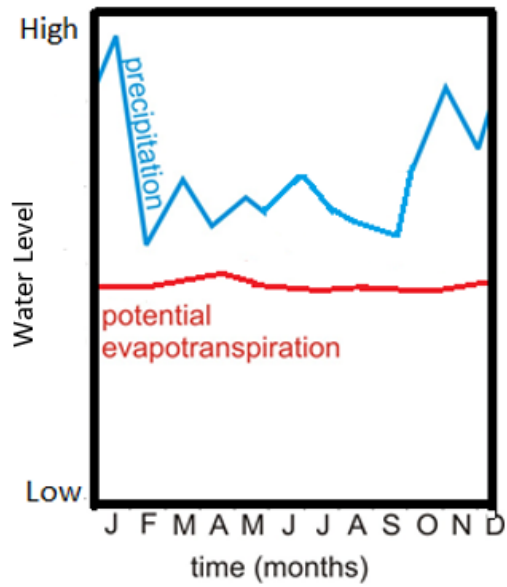
Resource 5 for Question 2

Vegetation structure, soil profile and mean biomass of a typical forest in Pahang



Resource 6 for Question 2

Pahang's water budget



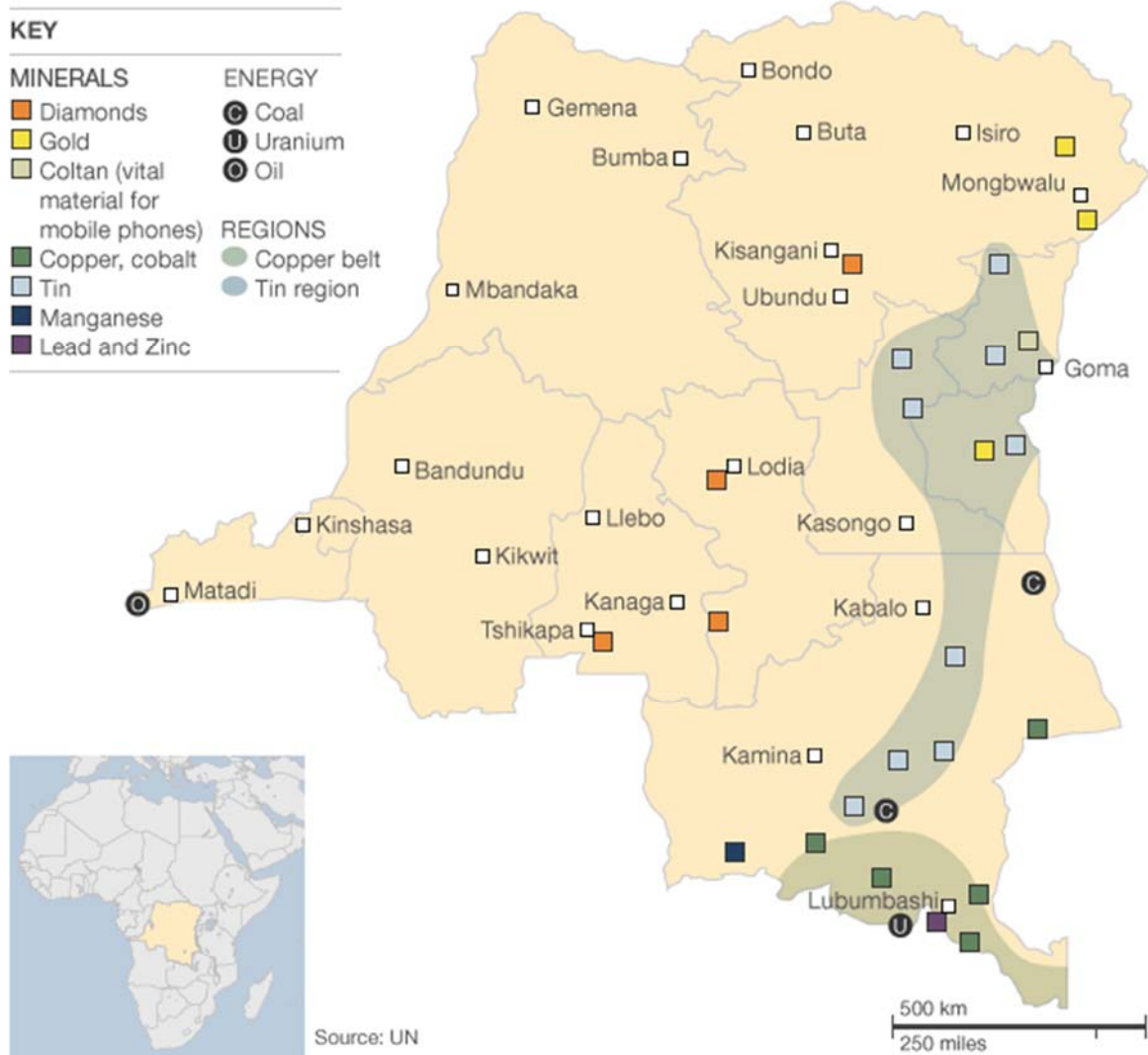
Resource 7 for Question 2

A tea plantation in a forest of Pahang






Resource 8 for Question 3




Locations of resource extraction in Democratic Republic of Congo (DRC)







Resource 9 for Question 3




Ownership of copper and cobalt mines operating in the Katanga Province of the DRC


North America: 3 players, 4 mines	
Private Partner: AFRICAN METALS CORP., Canada Stock Exchange : TSX-V	
Private Partner: IVANHOE MINES, Canada Stock Exchange : TSX	
Private Partner: FREEPORT-McMAHON, USA GECAMINES, DRC Stock Exchange: FCX, NYSE, TSX, OMX	

Asia: 4 players, 5 mines	
Private Partner: JINCHUAN RESOURCES, China. Stock Exchange : SEHK	
Private Partner: FORTUNE AHEAD, Hongkong Stock Exchange : Private	
Private Partner: CHINA RAILWAY ENGINEERING, China Stock Exchange: SEHK, SSE	
Private Partner : NORINCO, China Stock Exchange : SZSE	

Europe: 2 players, 10 mines	
Private Partner: ENRC, Luxembourg Stock Exchange : Private	
Private Partner: GLENCORE, Switzerland Stock Exchange: LSE, JSE, SEHK	

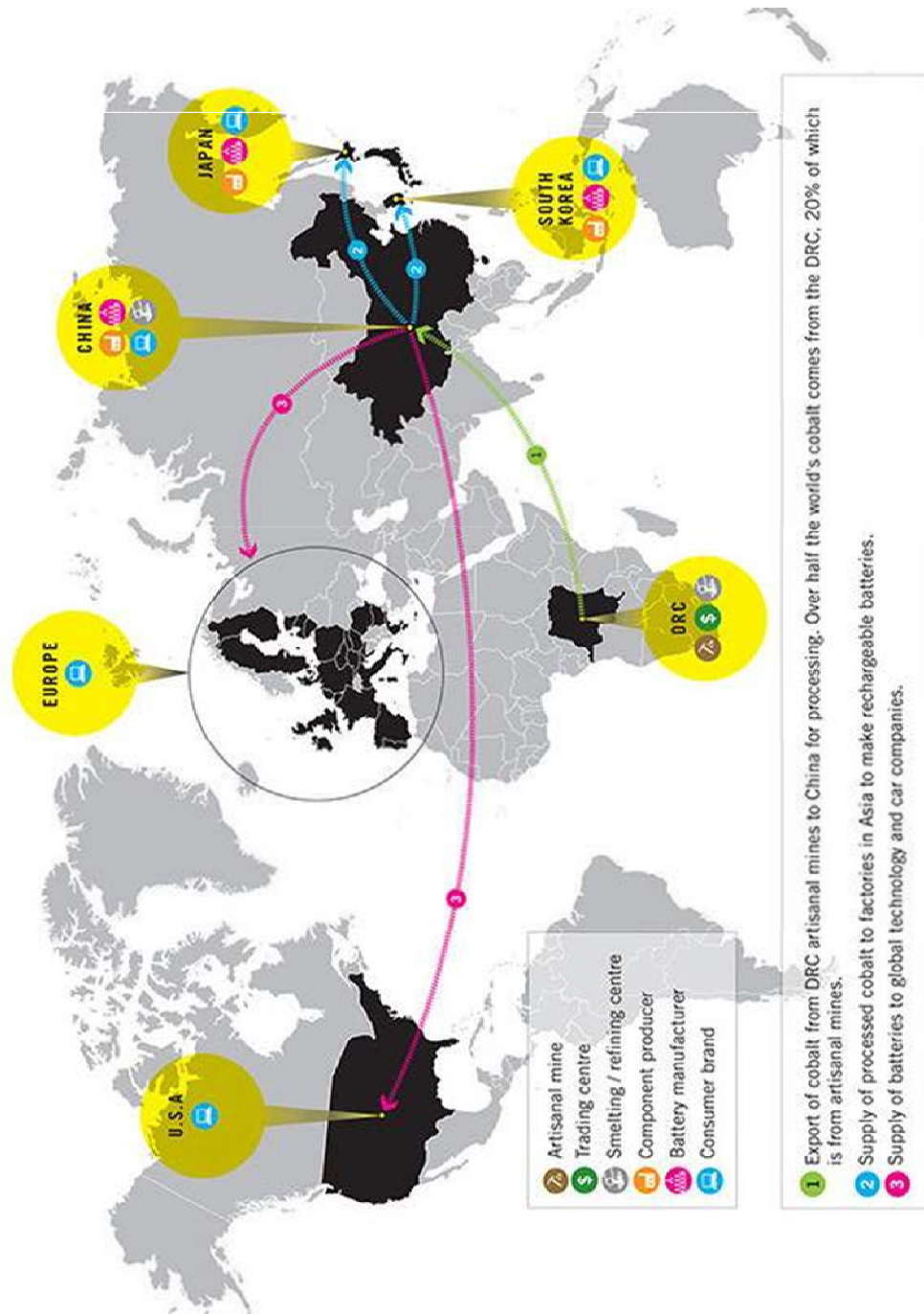
DRC Private: 2 players, 2 mines	
Private Partner: FORREST GROUP, DRC Stock Exchange : Private	
Private Partner: SHALINA, DRC Stock Exchange: Private	

Australia: 3 players, 3 mines	
Private Partner: MAWSON WEST, Australia Stock Exchange : TSX	
Private Partner: TIGER RESOURCES, Australia Stock Exchange : ASX	
Private Partner: MMX, Australia-China Stock Exchange: SEHK	

DRC State-owned: 5 mines	
State-owned : DECAMINES, DRC Stock Exchange: N/A	

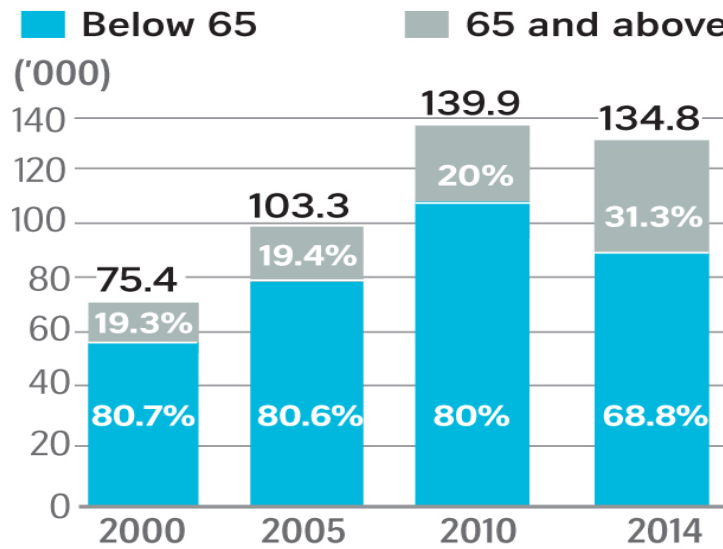
Resource 10 for Question 3

Movement of cobalt from mines in DRC to global markets



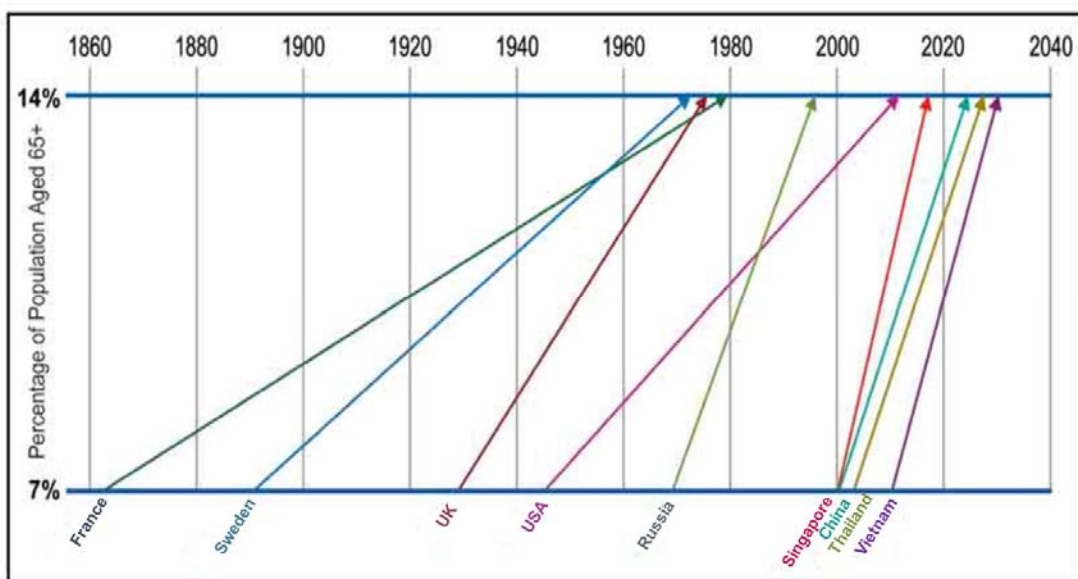
Resource 11 for Question 4

No. of one-person households by age-groups in Singapore.



Resource 12 for Question 4

Changes in percentage of elderly population (65 years and above) from 7 percent to 14 percent



Resource 13 for Question 4

New traffic improvement as part of a “Silver Zone” in Bukit Merah View



Resource 14 for Question 4

Costs for different aged care options in Singapore

<i>AGED CARE OPTIONS IN SINGAPORE</i>	
Not-for-profit Nursing Homes (6 to 8 Bed)	S\$1200-3500
Private Nursing Homes (Single Room)	S\$3600-7000
Private Nursing Homes in Johor Bahru (Single Room)	S\$740-2150
Assisted Living Facility (Single Room)	S\$3500
Care at Home (incl. domestic helper's wages)	S\$2500-3000

Paper 2 Suggested Points

Geographical Investigation

1

- (a) With Reference to Resource 1, suggest a suitable hypothesis for this geographical investigation.**

[1]

The infiltration rates of soil in Bishan-AMK park is higher than soil at junction of Tanglin and Grange roads.

- (b) Describe three potential risks at Site A shown in Resource 2 and explain how each risk could be minimized.**

[6]

Site A is near Kallang river, may have steep or gentle slopes + grass + flora and fauna – wear proper shoes to avoid falling and proper clothing to protect from insect bites etc

Low human traffic esp weekdays as most residents around the area may be working, nearest housing about 400m away and park users may bring pets – go in groups and be aware of strangers, inform teachers and park authority

Increment weather – check forecast, bring umbrella, hot so must be properly hydrated

- (c) Explain how you would minimize the impact of your investigation at Sites A and B differently.**

[4]

A is near walking path/ river / trees / park facilities so avoid unnecessary damage to trees and plants and do not vandalise park facilities and B near construction and offices so do not hinder / get into the way of people who need to work (do not block their way or be in way of construction machines / vehicles)

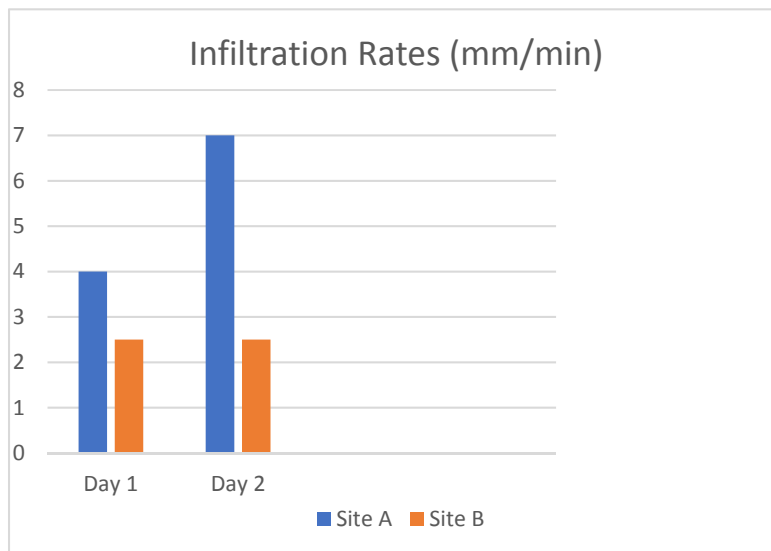
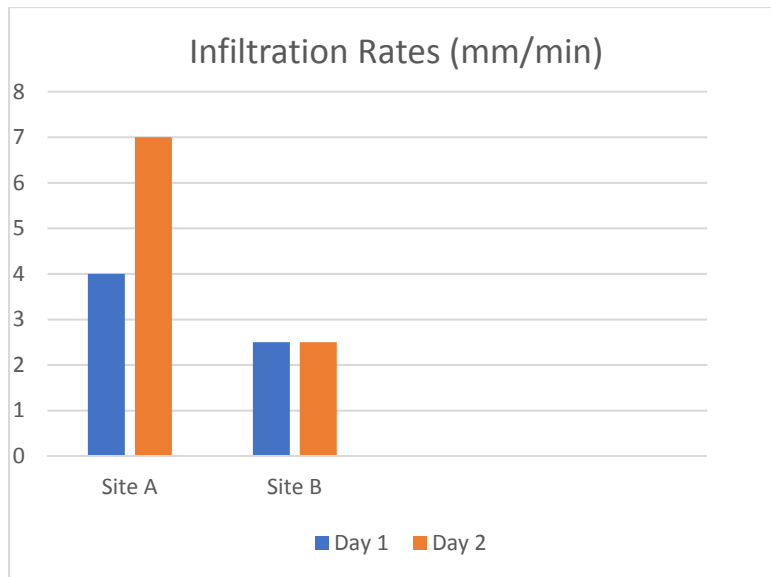
Cannot disturb the people / make unnecessary noise – A – park users who are using the parks , B – residents and construction and office workers from the 200m radius doing their daily activities

- (d) Suggest two limitations of Resource 3 in representing the findings and draw bar graphs to represent the infiltration rates of Sites A and B.**

[5]

Difficulty in seeing the differences in infiltration rates between sites / days (lack of visual comparison)

Extra information / unnecessary info meant for calculation and not for audience



(e) Evaluate this investigation to ascertain the flood risks of Sites A and B, and explain how it could be improved and extended. [9]

Strengths

Choice of 2 distinct sites. Infiltration provides a sense of how different land uses (park vs construction) impact infiltration rates. Construction site has a lower infiltration rates of 2.5 while park 4 to 7.

Problems and improvements

Lack proper sampling method and limited in the number of samples.

Make sure infiltrometer is hammered to 5cm and not gently twist .

Must watch the water levels in both rings to ensure the water will not flow sideways.

Must twist ring deep enough so that water will not leak out

Extension

More sites/ temporal aspects – effects of wind direction on rain so must use rain gauge etc for pluvial rain esp for Site B + coupled with discharge for Site A.

Theme 1: Tropical Environments

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- (a) Identify the climatic zone of Pahang according to Köppen–Geiger climate classification system. Support your answer with data from Resource 4. [4]**

Af

High r/f throughout the year + evidence (lowest 79mm in Sept and highest 97mm in Jan) generally

Consistently high temp + low range (2 deg C) + evidence (26-28 deg C)

- (b) Describe the vegetation structure and mean biomass of a typical forest in Pahang as shown in Resource 5. [3]**

Tall and dense vegetation structure

Presence of emergent and continuous canopies and limited vegetation at the lower level.

Mean biomass of 1100 tonnes per hectare

- (c) With the help of Resources 5 and 6, suggest the possible processes that result in the soil profile of a typical forest in Pahang. [6]**

O - Thin humus in R5 due to rapid decomposition as seen in high precipitation and temp (implied by rather high potential evapotranspiration) in R6 and organic matter from plants in R5.

A/B - R6 – precipitation exceeds evapotranspiration in all months.

Laterisation / leaching with repeated wetting and drying by frequent thunderstorms leading to profile with insoluble and high iron content in R5. The high levels of precipitation given in R6 means that soil water movement is predominantly downward creating intense leaching which explains the red colour of the soil and high aluminium content as seen in R5.

C/R - Deep weathering of parent material in R5 bec of chemical weathering bec high temp and precipitation in R6. The soils are intensely weathered,

hence the great depth of weathered material (regolith), but they supply relatively few nutrients to the vegetation.

- (d) With reference to Resource 7, explain how the landscape was changed to develop a plantation.**

[4]

Terracing
Construction of roads
Land clearance

- (e) Using Resources 4, 6 and 7, explain why occurrence of mass movements is a major concern of plantation owners in Pahang. Support your response with information from the resources.**

[8]

R4 – Heavy, and occasionally continuous, rainfall throughout the year in Pahang can add weight to slope material (increasing shear stress) and create lubrication (decreasing shear strength) on the slope, leading to landslides.

R6 – precipitation is higher than evapotranspiration, therefore vast water surpluses throughout the year and there is no water deficit in Pahang.

With the abundance of water, mass movements are easily triggered because of an increase in shear stress or a reduction in shear strength. Water encourages mass movement by simultaneously increasing the former while decreasing the latter.

Owners are concerned because mass movements are easily triggered due to the presence of water all year round in Pahang. Outcomes will be loss of crops (ec), properties and machineries (ec) and endangered the lives of the people at the plantation (sc). Owners need to be alert to weather changes and mitigate accordingly.

Plentiful rainfall and warm temperatures (R5) are conducive to high levels of vegetation growth in Pahang. If deforestation has taken place (R7), the shear strength of slopes will be reduced because of the removal of the binding properties of the roots, and also exposes the soil to the direct impact of the torrential downpours (R5). However, vegetation in form of crops (tea in R7) may also add weight to slopes, increasing shear stress.

Owners are concerned as vegetation can work both ways. They must be aware of the effects of clearing of trees and well as problems of intensive cultivation.

R7 – Areas of high relief with steep slopes in R7 may experience flows and landslides most frequently, especially when combined with other contributing factors.

- 3a) more in the East (quote some 'stats')
None in the West

Exception is Oil in Matadi

- b) Yes somewhat.
West is the Core with high level of resource extraction
East is the periphery with little activities in resource extraction

However,

Res 8 does not show the economic value of those activities eg. No. of jobs, wages levels, value of production output

development includes more than just resource extraction/ mining activities. Others like manufacturing. Usually measured by economic indicators eg GDPpp, average income

- c) Negative:
econ leakage / profit repatriation
reliance of foreign labour or expat labour
less likely to care about the environment
likely to exploit workers

Positive:

-transfer of technology to local companies

-better financial management/ large capital investments / listed on stock exchanges eg TSX, SEHK

-good practices on the environment

-joint ventures possible between local and foreign companies eg Freeport-McMahon and Gecamines

- d) GPN = production, distribution, consumption
Production = done in DRC
Distribution = sent to China, Japan and SK for processing into components & batteries
Consumption = sent to Europe and USA as batteries for cars and other high-tech products

- e) DRC is rich with natural resources, many mines, huge variety of minerals and fossil fuels
Heavy reliance on foreign TNCs eg from China, Australia, Canada
local players and local govt in DRC – very small proportion

primary sector done in DRC

Secondary and tertiary done in other countries

4a) data shows popn aged 65+

Data does not show breakdown of elderly who can still live independently or those who need assistance

shows data on living alone (may indicate issues of elderly loneliness, emotional needs). Other needs not shown eg financial needs, transport needs, healthcare needs

b) Asian countries –steeper curve ie. increase at a faster rate OR they change from 7% to 14% within a shorter period/ eg S'pore 18 years, China 24 years
Conversely, other countries took longer period to change from 7% to 14% eg France 110 years, Russia 25 years

Other countries started this process from an earlier period eg UK 1930-1975, Sweden 1890-1970

c) Res 11 shows total number of elderly living alone has increased from around 15,000 (2000) to 40,000 (2014). More elderly might be facing loneliness or require assistance in daily life

Singapore has the steepest live, meaning it has the highest rate of increase among those countries, highest rate of ageing. Govt must plan policies to meet needs of ageing popn

d) zig-zagging of roads – slows down the vehicular traffic
single lane road- smaller road width makes it easier to cross
divider in the middle of the road- elderly can cross one side first before negotiating the other side. They can look at one direction at a time

e) issues of costs
issues of privacy/ having private space
familiarity at home
visits by children
proximity to home

Financial needs

-finances and costs –eg use retirement funds or funds from children

Socio-emotional needs

-interaction and group activities
-visits or phone calls from children
-someone to chat with
-religious needs

Safety & security

-issues of crimes
-abuse from carers or others

Healthcare needs

-able to see doctors

- given medication
- costs of healthcare

Mobility and transport

- going for walks
- use of wheelchair or PMDs / barrier free access
- use of technology to keep in touch
- grab bars

Concept of liveability of living space for the elderly

Concept of sustainable development (SD) and the 3 domains, esp balancing ECON domain and SOCIAL domain