Candidate Marks Report

Series : 6 2018

This candidate's script has been assessed using On-Screen Marking. The marks are therefore not shown on the script itself, but are summarised in the table below.

Centre No :		Assessment Code :	H481
Candidate No :		Component Code :	01
Candidate Name :			

Total Marks :

In the table below ‘Total Mark’ records the mark scored by this candidate.
‘Max Mark’ records the Maximum Mark available for the question.

Question	Part	
2	a)	A system can be defined as having inputs, processes and outputs. A system can either be closed or open. A closed system has no energy or materials added to it, while an open system may allow for the addition of energy and materials. Globally the water which supplies and is locked up in glaciers is a closed system as all the water which exists in the world is unchanging. On a more local scale glacial system can be open systems will materials and energy being added to or taken from the system. This is called the mass balance of the glacier. The inputs of a glacier are precipitation primarily falling as snow. This is usually higher in high altitude glaciated areas such as the Rockies in Canada where precipitation can be upto ≥600mm per year while precipitation is lower in high altitude locations like Greenland. The snow is called accumulation to the glacier system and it is what causes glacial advance. The process which operate within a glacier are forms of erosion such as plucking and abrasion or weathering such as freeze thaw. This occurs as the glacier moves downhill due to the force of gravity. Warm based glaciers move, slide on meltwater which produced subglacially and the rate of this is typically faster than cold based glaciers which are frozen to bed

Question	Part	
		rock and only move several cm to m per year. The glacial system also have output of thawing and melting producing meltwater. This is called ablation and leads to glacier retreat. Calving is also an output of the system where by ice bergs or ice shelves come away from the glacier and usually fall into the ocean e.g. the Larsen B ice shelf calving off the Antarctica Penninsula in 2002. The mass balance makes the glacier a system as more accumulation and less ablation, usually in colder seasons creates a positive mass balance and where ablation exceeds accumulation such as in ~~winter~~ summer, the mass balance is negative. An equilibrium line exists between the 2 zones of accumulation & ablation where the 2 variables equal eachothers
2	b)i)	In order of rank: 11, 14, 18, 20, (23), 34, 44, 49, 74 median is 23 m/yr as is middle value.
	ii)	11, 14, (18), 20, 23; 34, (44), 49, 74 ~~IQR = 23 - 11 = 12~~ IQ = 18 ~~UQ = 44 - 23 = 21~~ UQ = 44 ~~IQR = UQ - LQ = 21 - 12 = 39 m/yr~~ IQR = UQ - LQ = 44 - 18 = 26 m/yr

Question	Part	
2	c)	Landform B seems to be a ridge of lateral moraine. As the glacier moves through the U shaped valley, the ice is stuck to the sides of the valley. The process of plucking and abrasion occurs * which means the sides of the glacier are picking up materials (till) and transporting it on the sides of the glacier. When the glacier retreats the moraine is deposited laterally as the glacier ice disperses into meltwater. As the ridge of moraine is 85m high a significant amount of abrasion and plucking must have been done to accumulate the amount of moraine. * As the glacier moves down hill under the force of gravity.
2	d)	PLAN: Minnesota; Laurentide ice sheet. Physical factors: climate, lithology, ~~extent of ice sheet~~ Climate: glacials + interglacials, Pleistocene; 18,000 years ago Size, thickness, erosion, sides of mountains, ellipsoidal basin, ~~when~~ when retreat Lithology: Resistant outcrops: crag & tail, loch & knock topography: Granite & basalt. Scandinavia ice sheet → Scotland slow movement & low temp all year = degrees no erosion = erosion low ppt 60mm/yr

Question	Part	
2	d).	The northern parts of Minnesota are areas which have been shaped by the action of ice sheets. The Laurentide ice sheet which extended over much of North America during the last major glaciation in the Pleistocene around 18,000 years has left several striking features. The physical factor which allowed this ice sheet to advance so far is climate. Glacials and interglacials have allowed ice sheets to advance and erode landscapes. The glacial period allowed for accumulation of snow to exceed ablation as temperatures were more than 6°c colder than now and most of the nothern hemisphere had temperatures below freezing for much of the year. The thickness and so pressure of these ice sheets allowed for heavy erosion of the bed rock essentially shaping mountains and creating depressions. As climate changes and & temperatures increase the ice sheets have retreated which have also shaped the landscape. Retreat of the Laurentide ice sheet has caused isostatic uplift in parts of the Canadian Shield where the rock is rising at 1cm/yr as it recovers from the previous heavy pressure of ice sheets. As ice sheets retreat ellipsodal basins are uncovered which are lakes in the landscape formed from meltwater entering depressions formed

Question Part

by erosion. Now, however, climate less so influences the landscape as due to ice sheet retreat there is less erosional and depositional impact.

Lithology also plays an important role in shaping landscapes. The geology of Minnesota is made up of mostly granite and basalt. This is extremely resistant rock meaning erosion isn't very pronounced. Although the ice does erode ~~the sides of [illegible]~~ some of the rock creating crag and tail features with gently sloping ends where ice sheet have efficiently abraded rock and a jagged edge where ice sheets have plucked away the rock. These crag and tail features along with lakes is called knock & lochan topography which is found in areas affected by ice sheets. In conclusion climate is a much more influential force as even the most resistant rock can be eroded when the size and pressure of the ice sheet is large enough.

Question	Part	
4.	a)i)	The map which shows precipitation totals across the USA indicates that generally there is a high total precipitation in the South East of the USA in states like Florida ~~[illegible]~~ at 330mm in August 2016. Such high precipitation totals will increase runoff overland to rivers which could result in potential flooding of rivers such as the Mississippi river. A high level of ~~runoff~~ rainfall may also saturate the ground increasing runoff even more as it cannot percolate the soil. The West of the USA such as california have precipitation totals of about ~~[illegible]~~ 0mm in August 2016. This would greatly reduce runoff to rivers causing them to dry up, Soil to be eroded and blown away by wind due to dryness and ultimatley cause a drought as no water ~~[illegible]~~ is present to take part in the water cycle.
4.	~~b)~~	
	a)(ii)	The colours of the choropleth map can sometimes be undistinguishable as well as exact precipitation is hard to accuratley identify as the colours flow into eachother so the colour green could indicate precipitation amounts of anything between 0 - 170mm. Additionally it doesn't ~~[illegible]~~ tend to show variation ~~[illegible]~~ of rainfall over time, it only indicates rainfall for

Question	Part	
		one month. The fact it is a precipitation total also does not indicate if most of the precipitation came at the beggining, middle or end of the month or if it is spread out equally.
	b)	Feedback loops can be positive or negative. Positive feed back loops are created when a change to the carbon cycle encourages further change. While negative feedback loops are created when a change leads to the restoration of equilibrium. One positive feedback cycle of which affects the carbon cycle is the release of carbon dioxide (CO_2) into the atmosphere leads to an increased warming of atmospheric temperatures and as CO_2 is a greenhouse gas and contributes to the enhanced greenhouse effect more solar radiation will be trapped creating increased melting of permafrost which is a major store of CO_2 & CH_4. This store of carbon will then be released into the atmosphere yeilding an even larger concentration of greenhouse gases and even more warming. For example in the Arctica tundra permafrost melting has caused a 73% increase of CO_2 in atmosphere which has lead to a 4°C warming of temperature since 2010. A negative feed back loop can also occur when carbon is released into the atmosphere

Question	Part	
		as a higher concentration of carbon dioxide in the atmosphere and increased temperatures can stimulate plant growth as they absorb CO_2 via photosynthesis while they grow resulting in a decrease of carbon dioxide in the atmosphere. Tropical rainforests can sequester upto 8 8t tonnes of carbon per hectare per year. This creates a store of carbon in vegetation as there is a flow from the atmosphere to biomass. This ~~feed~~ negative feedback cycle can however also turn back into a positive feedback as if there is more vegetation, it could lead to more decomposition of the vegetation which results in more CO_2 being released.
4	c)	PLAN:
		DEFORESTATION
		Rate of 17,800km²/yr in 1970 - 2013
		Road building & burning
		CO_2 released as 180 t of CO_2 in Forest trees
		Interception of 15% of water
		FARMING
		- Peatlands - Soya cultivation need 0.6m but 1m - 1.5m = less water = fire
		Irrigation - water drained - Nubian Sandstone aquifer 70% (million) of water/day by Libya for irrigation.

Question	Part	
4	c)	Deforestation and farming can dramatically affect the water and carbon cycles in Tropical Rainforests. These cycles are very delicate and disturbance can cause global as well as local impact. Deforestation is a major issue in the Amazon rainforest as the rate of deforestation was 17,500km² 2 1970-2013 with ⅕ of primary forest being lost. As usually tropical forests intercept 75% of precipitation and 25% is evaporated creating a water cycle which in Amazonia is especially interesting as 80% of water is recycled in 5 days deforestation means more water falls on soil instead of being intercepted and as such runoff and saturation of soil increases as no trees are there to intercept. The runoff then flows to rivers causing them to overflow massively as cause flooding such as in Bolivia flooding of the Madeira river killed 60 people. This is a local scale change but globally the lack of water in the atmosphere of the tropical rainforest as it is all in the rivers causes convection currents to be disrupted and a decrease in precipitation of about 10% from the usual 2000mm

Question Part

per year rainfall. The carbon cycle is affected as there is less vegetation to absorb CO_2 so greater concentration of CO_2 will be present.

Farming can cause changes in the tropical rainforests in Indonesia, peatland is often over drained for soya cultivation to 1m - 1.5m which reduces the water table leading to less effective flood defences influencing water cycles. Additionally these drained peatlands can catch fire which causes the peat to combust and release CO_2 which increases carbon dioxide concentrations in the air. Irrigation can also drain underground aquifers and soil degradation from monoculture of crops can can irreversible nutrient depletion in soils and the soils can no longer support tropical vegetation which also disrupts the carbon and water cycle as vegetation links the 2 cycles.

In conclusion deforestation and farming significantly alter the carbon cycle & water cycle on both local & global scales.

Question	Part	