A Level Geography – Year 13				
Topic: Water				
Week	**Lesson**	**Lesson Title**	**Key concepts**	**Independent Learning** **Student to complete as advised by teacher**
1 The global hydrological cycle is of enormous importance to life on earth	**1**	**The hydrological cycle as a system**	The global hydrological cycle's operation as a closed system (inputs, outputs, stores and flows) driven by solar energy and gravitational potential energy.	
	2	**Water stores and fluxes**	The relative importance and size (percentage contribution) of the water stores (oceans, atmosphere, biosphere, cryosphere, groundwater and surface water) and annual fluxes between atmosphere, ocean and land.	
	3	**The global water budget**	The global water budget limits water available for human use and water stores have different residence times; some stores are non-renewable (fossil water or cryosphere losses).	
2 The drainage basin is an open system within the global hydrological cycle.	**1**	**The drainage basin**	The hydrological cycle is a system of linked processes: inputs (precipitation patterns and types: orographic, frontal, convectional) flows (interception, infiltration, direct runoff, saturated overland flow, through flow, percolation, groundwater flow) and outputs (evaporation, transpiration and channel flow).	
	2	**Physical factors affecting the drainage basin**	Physical factors within drainage basins determine the relative importance of inputs, flows and outputs (climate, soils ,vegetation, geology, relief). -	

	3	**Human disruption to the drainage basin**	Humans disrupt the drainage basin cycle by accelerating processes (deforestation, changing land use) and creating new water storage reservoirs or by abstracting water. **Amazonia case study**	
3 The hydrological cycle influences water budgets and river systems at a local scale.	**1**	**Water budget**	Water budgets which show the annual balance between inputs(precipitation) and outputs (evapotranspiration) and their impact on soil, water availability and are influenced by climate type: **tropical temperate or polar examples**	
	2	**River Regimes**	River regimes indicate the annual variation of discharge of a river and result from the impact of climate, geology and soils as shown in regimes from contrasting river basins. **Yukon, Amazon, Indus**	
	3	**Storm hydrographs**	The shape of storm hydrographs depends on physical features of drainage basins (size, shape, drainage density, rock type, soil, relief and vegetation) as well as human factors (land use and urbanisation). ***(P: the role of planners in managing land use)***.	
4 Deficits within the hydrological cycle result from physical processes but can have significant impacts.	**1**	**Droughts**	The courses of drought, both meteorological and hydrological :short-term precipitation deficit, longer term trends, and ENSO cycles.	
	2	**Human activities causing water deficit**	The contribution human activity makes to the risk of drought: over-abstraction of surface water resources and ground water aquifers. **Sahelian or Australia drought**	
	3	**The impacts of drought on ecosystem**	The impacts of drought on ecosystem functioning (wetlands, forest stress) and the resilience of these ecosystems	
5	**1**	**Meteorological causes of flooding**	Meteorological causes of flooding, including intense storms leading to flash flooding, unusually heavy or	

Surpluses within the hydrological cycle can lead to flooding, with significant impacts for people.			prolonged rainfall, extreme monsoonal rainfall and snowmelt. c.	
	2	**Human actions that can exacerbate flood risk**	Human actions that can exacerbate flood risk (changing landuse within the river catchment, mismanagement of riversusing hard engineering systems.)	
	3	**The impacts of flooding**	Damage from flooding has both environmental impacts (soils and ecosystems) and socio-economic impacts (economic activity, infrastructure and settlement).UK flood events2007 or 2012)	
6 Climate change may have significant impacts on the hydrological cycle globally and locally.	**1**	**Climate change and the hydrological cycle**	Climate change affects inputs and outputs within the hydrological cycle: trends in precipitation and evaporation.	
	2	**Climate change and impacts on stores and flows.**	Climate change affects stores and flows, size of snow and glacier mass, reservoirs, lakes, amount of permafrost, soil moisture levels as well as rates of runoff and stream flow.	
	3	**Enso Cycle**	Climate change resulting from short-term oscillations (ENSO cycles) and global warming increase the uncertainty in the system; this causes concerns over the security of water supplies. ***-projections of future drought and flood***	
7 There are	**1**	**Mismatch between water supply and demand**	The growing mismatch between water supply and demand has led to a global pattern of water stress (below 1,700 m^3per person) and water scarcity (below 1000 m^3 per	

physical causes and human causes of water insecurity.	**2**	**The physical and human causes of water insecurity**	The causes of water insecurity are physical climate variability, salt water encroachment at coast) as well as human (over abstraction from rivers, lakes and groundwater aquifers, water contamination from agriculture, industrial water pollution).	
	3	**Water insecurity**	The finite water resource faces pressure from rising demand(increasing population, improving living standards, industrialisation and agriculture), which is increasingly serious in some locations and is leading to increasing risk of water insecurity. ***projections of future water scarcity***	
8 There are consequences and risks associated with water insecurity.	**1**	**Physical and economic scarcity**	The causes of and global pattern of physical water scarcity and economic scarcity and why the price of water varies globally.	
	2	**Water supply and economic development**	The importance of water supply for economic development (industry, energy supply, agriculture) and human wellbeing (sanitation, health and food preparation); the environmental and economic problems resulting from inadequate water.	
	3	**Conflicts in transboundary water usage**	The potential for conflicts to occur between users within a country, and internationally over local and trans-boundary water sources Nile ***role of different players***	
9 There are different approaches to managing water	**1**	**Hard engineering scheme** **Desalinisation plant in China and Israel**	The pros and cons of the techno-fix of hard engineering schemes to include water transfers, mega dams and desalination plants Water transfers in China. (UNECE), Water Convention, Helsinki, and the Water Framework Directive and Hydropower, Berlin -***role of players in reducing water conflict risk***	

supply, some more sustainable than others.	**2**	**Sustainable water management schemes**	The value of more sustainable schemes of restoration of water supplies and water conservation (smart irrigation, recycling of water Singapore. ***contrasting attitudes to water supply***	
	3	**Integrated drainage basin management**	Integrated drainage basin management for large rivers Nile or Colorado and water sharing treaties and frameworks (United Nations Economic Commission for Europe)	
10	**1**	**Assessment**	Revision	
	2	**Assessment**	Revision	
	3	**Assessment**	Revision	
11	**1**	**Assessment**	Revision	
	2	**Assessment**	Exam	
	3	**Assessment**	Feedback and redraft	