

Unit	Hydrology
Lesson	2.1 Understanding the hydrologic cycle
Essential question	How does water cycle through the environment?
Objective	Students will be able to construct and interpret a model of the hydrologic cycle.
Key words	watershed, precipitation, transpiration, evaporation, runoff, infiltration, groundwater
Related Standards	
NGSS standard	HS-ESS 3 - 6
AP Env Sci topic	1.7
IB Biology topic	
IB ESS topic	4.1
Suggested sequence of learning activities	<ol style="list-style-type: none"> 1. Starter quiz/prior knowledge check 2. Direct instruction (if traditional) or classroom discussion (if flipped). Slides here. 3. Hydrologic cycle analysis questions here. 4. Peer check of results. Answers by request. 5. Individual exit ticket/comprehension check
Assessment	Exit ticket/comprehension check
Possible modifications	<ul style="list-style-type: none"> • Give a keyword list (with or without definitions already included) to students before or during class • Be intentional about student groupings (eg. heterogeneous skill levels)
Resources required	Hard copies of hydrologic cycle analysis questions to students. Students have to label a diagram so might be easier hard copy than digital distribution.
Starter questions	<ol style="list-style-type: none"> 1. What are three places water is stored in the hydrosphere? 2. What are three processes that move water from one storage to another?
Concepts covered in lesson	The hydrologic cycle is the movement of water molecules to and from different storages and the transition between gaseous, liquid and

	<p>solid states powered by the sun. Storages of water include</p> <ul style="list-style-type: none"> ● the ocean ● surface water such as lakes and rivers ● ice such as glaciers and ice caps ● groundwater (underground water contained in the empty spaces between soil particles and rock fissures) ● water vapor in the atmosphere <p>Flows of water include:</p> <ul style="list-style-type: none"> ● precipitation (liquid water condensing from water vapor and falling from the atmosphere to the Earth's surface) ● evaporation (liquid water at the surface becoming water vapor in the atmosphere) ● transpiration (water vapor escaping from plants) ● runoff (water that remains on the Earth's surface and runs downhill such as streams and rivers) ● infiltration (water that soaks into the soil and ends up as groundwater)
Slide presentation	Link here
Activity	Hydrologic cycle analysis questions (link here) completed individually or in groups then checked by peers or teacher. Answer sheet by request .
Exit ticket questions	<ol style="list-style-type: none"> 1. How might climate change affect the hydrologic cycle? 2. How does replacing a grassy field with a parking lot affect the hydrologic cycle? <p><u>Answers:</u></p> <ol style="list-style-type: none"> 1. <i>Higher temperatures mean more evaporation; more water vapor in the atmosphere; stronger storms with more runoff; more droughts with less runoff and infiltration; melting ice</i> 2. <i>Less infiltration, more runoff; less transpiration</i>
Extension questions/activities/resources	<p>Good Khan academy video on the hydrologic cycle here.</p> <p>Good NASA video on hydrologic cycle here.</p> <p>Have students research how scientists estimate the amount of water in a specific storage such as ice sheets or groundwater or the ocean.</p>