



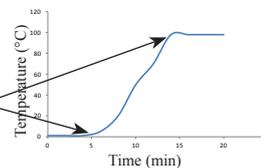
# Answers

# The Water Cycle

## Year 7 Science

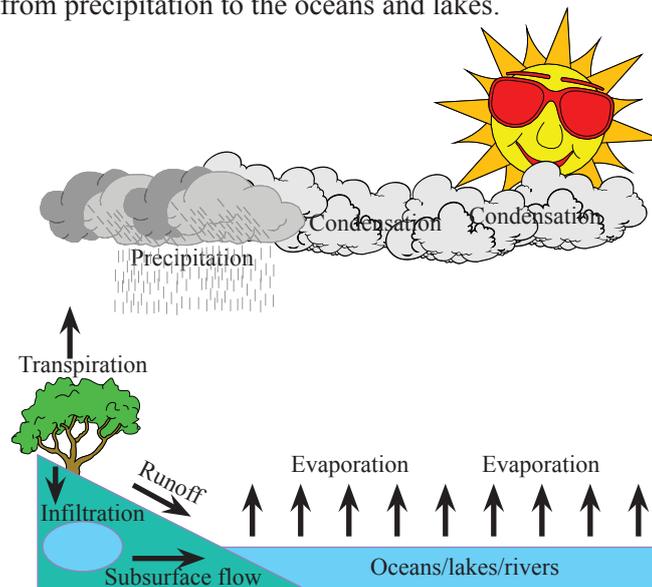
## Chapter 7

<b>p153</b>	<ol style="list-style-type: none"><li>1 Change of state from liquid to vapour happens over the water as liquid water evaporates into water vapour in the atmosphere.</li><li>2 The sun is the source of energy powering the water cycle.</li><li>3 Change of state from vapour to liquid happens in the clouds as atmospheric water vapour condenses into liquid water as rain.</li><li>4 The less water, the less energy needed to change the liquid water into water vapour.</li></ol>
<b>p155</b>	<ol style="list-style-type: none"><li>1 Three states of water are ice (solid), water (liquid), water vapour (gas).</li><li>2 Water in the state of ice has the least energy.</li><li>3 Water in the state of water vapour has the most energy.</li><li>4 Water particles in a solid state (ice) form a geometric pattern.</li><li>5 Clouds will either be composed of ice or water droplets depending on the height of the cloud and the temperature of the atmosphere. Because the droplets are so small, they can remain in liquid form in temperatures as low as <math>-30\text{ }^{\circ}\text{C}</math>. Extremely high clouds at temperatures below <math>-30\text{ }^{\circ}\text{C}</math> are composed of ice crystals.</li><li>6 <ol style="list-style-type: none"><li>a) This part of the graph shows a change of state from solid to liquid</li><li>b) This part of the graph shows a change of state from liquid to gas?</li></ol></li></ol>
<b>p156</b>	<ol style="list-style-type: none"><li>1 Evaporation is the process by which water changes from a liquid to a gas (water vapour).</li><li>2 More water vapour would tend to be found over the ocean?</li><li>3 The energy from the sun crucial to evaporation so that the attraction between the particles are overcome.</li><li>4 Condensation is the process by which water changes from a gas to a liquid (water vapour to liquid water).</li><li>5 Condensation usually happens when water vapour is cooled to its <b>dew point</b> - the temperature at which the water vapour condenses into liquid water.</li><li>6 The cool of the night causes 'dew on the grass' to appear in the early morning. During the day the higher temperatures causes the dew to evaporate.</li><li>7 The cool of the night causes water vapour to condense to fog in the early morning. During the day the higher temperatures causes the fog to evaporate.</li></ol>



**p159**

- 1 Precipitation is the process by which water droplets fall from clouds to Earth. While precipitation is normally rain, hail, sleet and snow is also possible.
- 2 The bottom of clouds are dark because the water droplets in the cloud cast a shadow. The thicker the cloud, the darker the bottom of the cloud.
- 3 'altostratus' = middle level clouds with a flat layer base.
- 4 Surface runoff describes water runoff over the land.
- 5 Vegetation such as trees and bushes can slow the flow of water and reduce surface runoff.
- 6 Infiltration is the process by which water infiltrates into the ground. Some of this water will seep through the ground into a stream and some of this water will move deeper and enter ground-water aquifers. Infiltration of water through the ground into aquifers is often slow.
- 7 Roads and buildings reduce infiltration.
- 8 Subsurface flow is the process by which very large amounts of water in ground-water aquifers (approximately 2% of all water) flows as part of the water cycle.
- 9 Ground-water included in the water cycle it includes large amounts of water, approximately 2% of all water, that cycles from precipitation to the oceans and lakes.
- 10

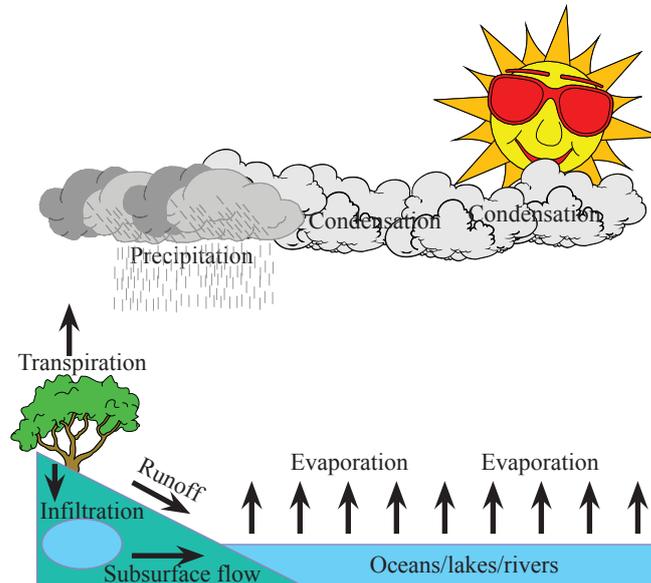


**p161**

- 1 Agriculture uses an estimated 70% of the world's freshwater. The majority of this use is for irrigation in order to grow crops where rainfall is insufficient or unreliable.
- 2 Urbanisation is the physical growth of urban areas. As surfaces such as buildings, roads, homes, parking lots increase, infiltration is reduced. Reduced infiltration increases surface runoff and subsequently flooding and erosion. Construction of networks of drains also increases surface runoff and reduces infiltration.
- 3 Forest clearing increases surface runoff and reduces infiltration. Clearing forests to increase agricultural land also affects the water cycle by reducing transpiration (water vapour released by trees), reducing atmospheric water vapour and subsequently the potential for rain.
- 4 Dams reduce runoff to the sea in many creeks and rivers. The reduced flow is affecting salinity, land surface properties, and ocean levels. The effect on the water cycle and subsequently the climate is not understood.
- 5 The combination of extensive use of water from aquifers and water control measures such as dams is reducing the amount of ground-water.
- 6 Urbanisation, the building of roads and buildings, has increased surface runoff. This surface runoff may be reduced by increasing the amount of vegetation such as trees and bushes.

p164

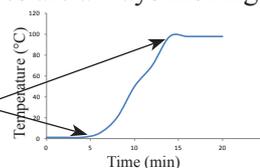
- 1 True or false:
  - a) True - The greater majority of the world's water is in the oceans.
  - b) False - There is more water in the atmosphere than in ground-water.
  - c) True - The main way in which water moves from the atmosphere to the oceans is by precipitation.
  - d) False - Evaporation is the only way in which water gets into the atmosphere.
- 2 Draw a labelled diagram of the water cycle.



- 3 The Sun is vital to the water cycle because it provides the energy to power the water cycle. For example, evaporating water into water vapour.
- 5 Design an experiment to demonstrate transpiration.

p165

- 1 Three states of water are ice (solid), water (liquid), water vapour (gas).
- 2 Water in the state of ice has the least energy.
- 3 Water in the state of water vapour has the most energy.
- 4 b) vacuum is not a state of water.
- 5 Change of state from liquid to vapour happens over the water as liquid water evaporates into water vapour in the atmosphere.
- 6 Change of state from vapour to liquid happens in the clouds as atmospheric water vapour condenses into liquid water as rain.
- 7 Clouds will either be composed of ice or water droplets depending on the height of the cloud and the temperature of the atmosphere. Because the droplets are so small, they can remain in liquid form in temperatures as low as  $-30\text{ }^{\circ}\text{C}$ . Extremely high clouds at temperatures below  $-30\text{ }^{\circ}\text{C}$  are composed of ice crystals.
- 8 The change of state of water from liquid to gas is called d) evaporation.
- 9 Water particles in a solid state (ice) form a geometric pattern.
- 10 The best description of gas particles is: a) The particles are always moving.
- 11 a) This part of the graph shows a change of state from solid to liquid  
b) This part of the graph shows a change of state from liquid to gas?



<p><b>p166</b></p>	<ol style="list-style-type: none"> <li>1 Evaporation is the process by which water changes from a liquid to a gas (water vapour).</li> <li>2 More water vapour would tend to be found over the ocean?</li> <li>3 The energy from the sun crucial to evaporation so that the attraction between the particles are overcome.</li> <li>4 Condensation is the process by which water changes from a gas to a liquid (water vapour to liquid water).</li> <li>5 Condensation usually happens when water vapour is cooled to its <b>dew point</b> - the temperature at which the water vapour condenses into liquid water.</li> <li>6 The cool of the night causes 'dew on the grass' to appear in the early morning. During the day the higher temperatures causes the dew to evaporate.</li> <li>7 The cool of the night causes water vapour to condense to fog in the early morning. During the day the higher temperatures causes the fog to evaporate.</li> <li>8 Precipitation is the process by which water droplets fall from clouds to Earth. While precipitation is normally rain, hail, sleet and snow is also possible.</li> <li>9 Hail, sleet and snow are other forms of precipitation.</li> <li>10 Surface runoff describes water runoff over the land.</li> <li>11 Vegetation such as trees and bushes can slow the flow of water and reduce surface runoff.</li> <li>12 Infiltration is the process by which water infiltrates into the ground. Some of this water will seep through the ground into a stream and some of this water will move deeper and enter ground-water aquifers. Infiltration of water through the ground into aquifers is often slow.</li> <li>13 Roads and buildings reduce infiltration.</li> <li>14 Subsurface flow is the process by which very large amounts of water in ground-water aquifers (approximately 2% of all water) flows as part of the water cycle.</li> <li>15 Ground-water included in the water cycle it includes large amounts of water, approximately 2% of all water, that cycles from precipitation to the oceans and lakes.</li> <li>16 Some soil and water have been put in a clear plastic bag, sealed, and left in the sun. <ol style="list-style-type: none"> <li>a) What processes would be happening: Evaporation, condensation, precipitation, runoff.</li> <li>b) What processes can you see: Condensation on the inside of the plastic bag, Droplets falling from the top of the bag. Droplets running down the side of, the plastic bag.</li> </ol> </li> </ol>
<p><b>p167</b></p>	<ol style="list-style-type: none"> <li>2 Assuming the height of the cars are about 1.4 m, and estimating the height of the electricity poles to be six times the height of the cars (using bluish car on the other side of the road).  Height of electricity poles are estimated to be <math>6 \times 1.4 \text{ m} = 8.4 \text{ m}</math></li> </ol>
<p><b>p168</b></p>	<ol style="list-style-type: none"> <li>1 Agriculture uses an estimated 70% of the world's freshwater. The majority of this use is for irrigation in order to grow crops where rainfall is insufficient or unreliable.</li> <li>2 Urbanisation is the physical growth of urban areas. As surfaces such as buildings, roads, homes, parking lots increase, infiltration is reduced. Reduced infiltration increases surface runoff and subsequently flooding and erosion. Construction of networks of drains also increases surface runoff and reduces infiltration.</li> <li>3 Forest clearing increases surface runoff and reduces infiltration. Clearing forests to increase agricultural land also affects the water cycle by reducing transpiration (water vapour released by trees), reducing atmospheric water vapour and subsequently the potential for rain.</li> <li>4 Dams reduce runoff to the sea in many creeks and rivers. The reduced flow is affecting salinity, land surface properties, and ocean levels. The effect on the water cycle and subsequently the climate is not understood.</li> <li>5 The combination of extensive use of water from aquifers and water control measures such as dams is reducing the amount of ground-water.</li> <li>6 Soils do have different infiltration rates. For example, coarse sand has a higher infiltration rate than clay soil.</li> </ol>

<p><b>p168</b></p>	<p>7 Tightly packed soil would reduce the infiltration rate.</p> <p>8 Increased surface runoff reduces infiltration and increases flooding and erosion.</p> <p>9 If water was unable to infiltrate the soil then subsurface flow and aquifers would be non-existent. This would significantly reduce the amount of water available for agriculture.</p> <p>10 Urbanisation, the building of roads and buildings, has increased surface runoff. This surface runoff may be reduced by increasing the amount of vegetation such as trees and bushes.</p> <p>11 As water moves through land surfaces it collects salts which are carried into water reservoirs.  <b>b)</b> surface runoff would contribute more to increased salts in water reservoirs (infiltration is able to filter salts from the water).</p> <p>12 Suppose the surface of the sea was coated with a material that prevented evaporation. Without evaporation, the water cycle would almost cease to exist. Rain would be virtually non-existent. Lakes and aquifers would dry up and millions of people would perish. Essentially, the only supply of freshwater would be available by processes that separate the salts from the salt water in the oceans.</p>
<p><b>p169</b></p>	<p>1 b) 2 b) 3 d)</p>
<p><b>p170</b></p>	<p>1 Liquids fill the shape of their container because: <b>b)</b> The particles have so much energy that they overcome the inter-particle attraction.</p> <p>2 Rain isn't salty because evaporation changes the water to water vapour. The salt is left behind in the ocean.</p> <p>3 Water gets into an aquifer through infiltration. Infiltration is the process by which water infiltrates into the ground. Some of this water will seep through the ground into a stream and some of this water will move deeper and enter ground-water aquifers. Infiltration of water through the ground into aquifers is often slow.</p> <p>4 Moisture soon forms on the outside of the glass with cold water because the lower temperature causes the water vapour in the atmosphere to condense on the outside of the glass.</p> <p>5 There would be expected to be more clouds in the sky during the warmer times of the year as the warmer temperatures increase the rate of evaporation. However, clouds can increase in cooler times as winds move large amounts of moisture from over a warm ocean to condense as clouds in cooler areas.</p> <p>6 This photo shows the result of large amounts of precipitation over a wide area being collected into a river causing flooding. The large surface runoff is evidenced by the bent over trees and debris high up on riverside trees.</p> <p>7 Evaporation of water from dams may be reduced by using a cover, by making dams deeper and having a lower proportion of surface area. by using wind breaks around the dam to reduce the removal of water vapour and keeping the water cooler.</p> <p>8 An explorer spacecraft returns a photo of an 'Earth type planet'.</p> <ul style="list-style-type: none"> <li>• The planet is almost completely covered with clouds.</li> <li>• The south pole to the equator is covered in ice.</li> <li>• The north pole to the equator appears to be mostly water.</li> </ul> <p><b>a)</b> The almost completely covering of cloud suggests an almost complete covering of water.</p> <p><b>b)</b> The saltiness of the planet's sea would be expected to be less than that of Earth's seas because there possibly less land from which salt would be washed into the sea.</p> <p><b>c)</b> An explanation as to why the planet has ice covering the southern hemisphere and water covering the northern hemisphere is that the planet's northern hemisphere tends to face the Sun. The icy southern hemisphere would mostly face away from the Sun.</p>