

WATER IS LIFE (ALL AGES)

Ages 4 to 7 (Level 1)

Description:	Explore the different uses and sources of water and understand the importance of clean water for living things.
Leading question:	How can we become more mindful of how we use water?
Age group:	4-7
Subjects:	Science, environmental studies
Total time required:	3.4 hours over 3 days
Self-guided / Supervised activity:	High supervision
Resources required:	Paper, pencil, pen or color pens, two cups, sand, pebbles

Day	Time	Activity and Description
1	10 minutes	Introduction: the learner will discover different uses and sources of water. Today, the learner will find out different ways we use water.
	20 minutes	Ask the learner - what happens when you don't drink water for a long time? Can you imagine not drinking water for days or weeks? Explain that all living things need water to survive. This means that humans, animals and plants cannot live without water. Most of the human body is actually made up of water.
	20 minutes	The learner will think about some ways water is used and draw images showing how water is used. For example, he or she can draw a bottle or glass of water to illustrate "drinking water". Older learners should also write it down in addition to drawing.
	20 minutes	Next, the learner will do an experiment to show what happens when something loses water: <ul style="list-style-type: none"> • The learner will place a piece of fruit, vegetable, bread, or cooked rice out in the sun and come back to it at the end of the day or in 2 days to see how it changed. Ask the learner what they think happened. • Explain that almost every living thing contains water and that the object placed in the sun became dry and hard because the heat of the sun caused it to lose water. • The learner will draw a before and after image of the object to show changes.
15 minutes	Numeracy activities: <ul style="list-style-type: none"> • Count how many water bottles or cups are in your house and write the answer. • Draw a water bottle that is half full 	

		<ul style="list-style-type: none"> Draw a water bottle that is one quarter full 												
2	<p>20 minutes</p> <p>30 minutes</p>	<p>Today, the learner will continue to explore how water is used and learn about different sources of water.</p> <p>The learner will think about some examples of water bodies and other sources of water in their home, neighborhood, city, and the world. The learner will draw some of these sources in his or her notebook and label them, e.g. river, sea, lake etc.</p> <p>The learner will find out how much water is being consumed by her or his household daily. The learner will create the following table to track daily water consumption by writing down how many glasses of water each member of the family drinks in a day. The learner can ask each family member or observe their water consumption throughout the day</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Number of glasses (tally)</th> <th>Number of glasses</th> </tr> </thead> <tbody> <tr> <td>Family member 1</td> <td>###</td> <td>5</td> </tr> <tr> <td>Family member 2</td> <td>IIII</td> <td>4</td> </tr> <tr> <td>Family member 3</td> <td>### IIII</td> <td>9</td> </tr> </tbody> </table> <p>The learner can represent this in a pictogram as shown below</p> <ul style="list-style-type: none"> Who drinks the least amount of water? Who drinks the most amount of water? How many glasses of water do all family members drink in total? 	Name	Number of glasses (tally)	Number of glasses	Family member 1	###	5	Family member 2	IIII	4	Family member 3	### IIII	9
Name	Number of glasses (tally)	Number of glasses												
Family member 1	###	5												
Family member 2	IIII	4												
Family member 3	### IIII	9												

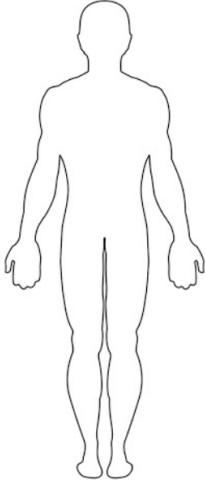
	10 minutes	<p>The learner will reflect on different ways water is used that might be wasteful or unnecessary. Suggestions for prompts:</p> <ul style="list-style-type: none"> • Do you think we need to keep the tap on while we brush our teeth? • Do you think it is ok to throw away water bottles that still have some water in them? • How do you think we can use less water in washing, showering, cleaning etc.? (examples: keep taps turned off when you are not using them, take quick showers that are less than 5 minutes etc.)
	10 minutes	<p>After reflecting on the different water wasting activities, the learner will come up with a few steps his or her family can take to save water. The learner can illustrate or write down some steps everyone in her or his household can take to save water.</p>
3	20 minutes	<p>Today, the learner will explore water pollution.</p> <p>Explain that if we don't save water, we will not have enough of it, and that although so much of the earth is covered in water, not all of it can be used for drinking because it is salty seawater and it is dirty or polluted. Discuss how pollution from human activity makes water bodies like rivers, seas, lakes etc. dirty and how it is important to make sure that water is saved and kept clean.</p> <p>The learner will do an experiment to learn about clean water:</p> <ul style="list-style-type: none"> • The learner will fill a cup with water then find objects to put inside the cup to "pollute" the water. The learner can also make "beach water" by adding dirt/sand and little rocks to the cup. Note: do not use clean water for this experiment. Use water that was already used to wash dishes or clothes so that you do not waste clean water • The learner will examine the cup. Ask the learner if she or he can drink it? What would happen if you drank it? Explain that dirty water can make us sick and that it is important to drink clean water.
	10 minutes	<p>The learner will then try to get clean water:</p> <ul style="list-style-type: none"> • The learner will bring an empty cup. The learner will stir the cup with dirty water and notice how the dirt settles to the bottom. The learner will allow all the dirt to settle for a few minutes then transfer the water from the dirty cup to the clean cup. • Next the learner will try a different method of water purification. Pour the water back into the dirty cup and place a piece of light cloth (like nylon stockings) on top of the other empty cup. Now, pour the dirty water into the empty cup and watch it pass through the cloth filter to become clean. • The learner will reflect on which method worked best <p>The learner will name and draw some examples of animals that live in different water bodies. The learner will reflect on why it is important to keep water bodies clean for ourselves and these animals.</p>

15 minutes	<p>The learner will revisit the steps he or she came up with to reduce water use and think about steps to reduce pollution (such as using glass bottles instead of water bottles, not littering beaches etc.). The learner will then design a poster containing the different steps.</p> <p>The learner can also come up with a week or month-long challenge for his or her family to save water. Examples include:</p> <ul style="list-style-type: none"> ● Use buckets to clean your body instead of shower ● Recycle water used in washing vegetables and use it to water plants ● Keep the tap turned off when you are brushing your teeth, lathering your hands with soap to wash them, or scrubbing the dishes. <p>The learner will then share with his or her family the poster and challenge.</p>
30 minutes	
5 minutes	
Assessment Criteria:	<ul style="list-style-type: none"> - Completed table tracking water consumption with correct use of tally marks - Completed poster with suggested steps to reduce water consumption and pollution - Challenge for family to reduce water waste and pollution - Proper execution of experiments

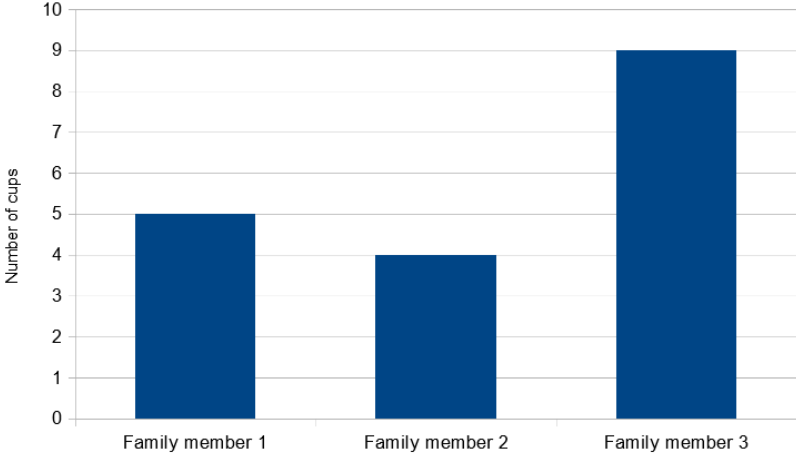
Learning outcomes:	<ul style="list-style-type: none"> - Understanding of the importance of water for living things - Understanding of the need to save water and steps toward that end - Understanding of pollution - Addition within 10 - Number discrimination - Data handling (simple pictograms within 10)
Required previous learning:	Knowledge of numbers and alphabets
Inspiration:	n/a
Additional enrichment activities:	Learners can track water consumption habits for several days and calculate daily consumption for those days
Modifications for simplification	The learner can reduce the number of experiments done

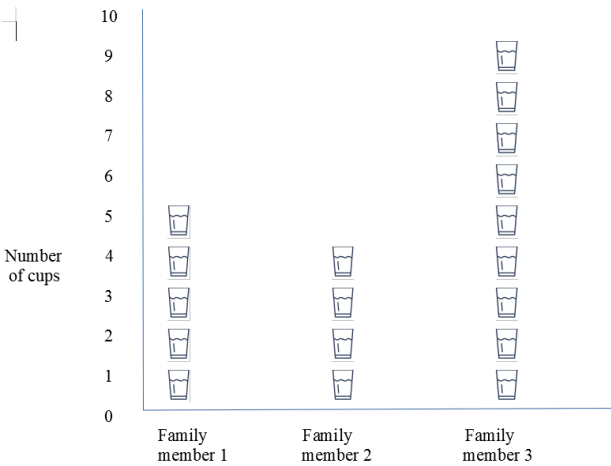
Ages 8 to 10 (Level 2)

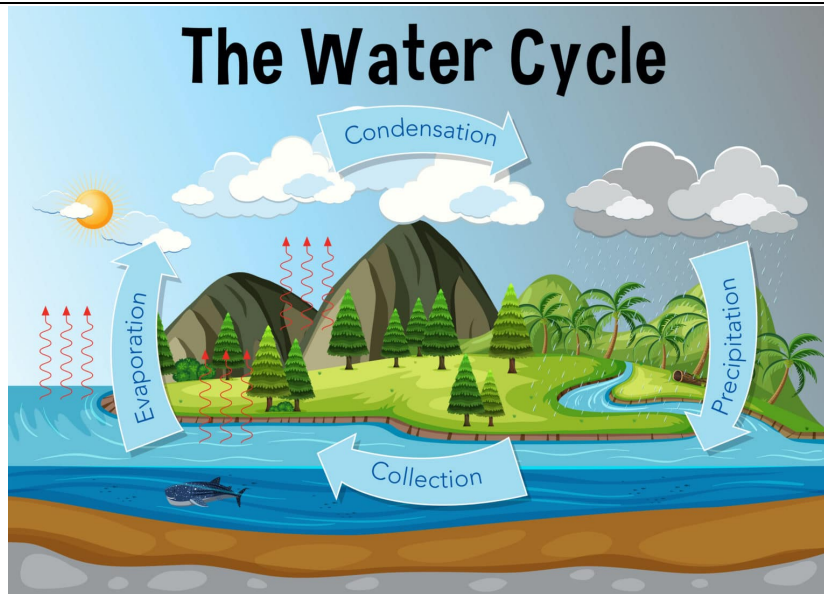
Description:	Explore the different uses and sources of water and understand the importance of clean water for living things.
Leading question:	How can we become more mindful of how we use water?
Age group:	8-10
Subjects:	Science
Total time required:	4.4 hours over 4 days
Self-guided / Supervised activity:	Medium supervision
Resources required:	Paper, pencil, pen or color pens, two cups, sand, pebbles, water, bowl, string, marker (optional)

Day	Time	Activity and Description
1	20 minutes	<p>Introduction: the learner will discover different uses and sources of water. Today, the learner will find out different ways we use water.</p> <p>Ask the learner - what happens when you don't drink water for a long time? Can you imagine not drinking water for days or weeks? Explain that all living things need water to survive. This means that humans, animals and plants cannot live without water. Most of the human body is actually made up of water. The human body is 60% or $\frac{6}{10}$ water. The learner will draw a human body silhouette as shown below and show $\frac{6}{10}$ of it as water using a blue color pen, pencil or crayon.</p>  <p>If the learner is familiar with division or simplification, remind her or him that we get $\frac{6}{10}$ from 60% by simplifying in the following way:</p> <ul style="list-style-type: none"> • 60% can be expressed as a fraction as $\frac{60}{100}$ or $\frac{6}{10}$ • $\frac{6}{10}$ can be further simplified by dividing both the numerator and the denominator by 2 since 6 and 10 are both multiples of 2 • Because $6 \div 2 = 3$ and $10 \div 2 = 5$, the result is $\frac{3}{5}$

	<p>20 minutes</p> <p>20 minutes</p> <p>15 minutes</p>	<p>To show that $\frac{3}{5}$ of the human body is made up of water:</p> <ul style="list-style-type: none"> • The learner can start by visualizing $\frac{3}{5}$ by drawing a circle or other shape divided into 5 equal parts and coloring or shading only 3 parts. • Then, she or he can try to do the same with the human figure above by dividing it into five parts and coloring three of those parts. • The learner can draw lines to show different parts. One part, for example can be the area below the knees. The learner will draw a line below the knees, and this will be part 1. • The learner will then keep drawing lines across the body until she or he has 5 equal parts and will then proceed to color 3 of those in blue to denote $\frac{3}{5}$ water. <p>The learner will think about some ways water is used and draw labeled images showing how water is used. For example, he or she can draw a bottle or glass of water to illustrate “drinking water”.</p> <p>Next, the learner will do an experiment to show what happens when something loses water:</p> <ul style="list-style-type: none"> • The learner will place a piece of fruit, vegetable, bread, or cooked rice out in the sun and come back to it at the end of the day or in 2 days to see how it changed. Ask the learner what they think happened. • Explain that almost every living thing contains water and that the object placed in the sun became dry and hard because the heat of the sun caused it to lose water. • The learner will draw a before and after image of the object to show changes. <p>Numeracy activities:</p> <ul style="list-style-type: none"> • If you had 300 glass bottles and 12 plastic bottles in your house, what is the total number of bottles? • Imagine that your family drank 234 glasses of water last week. Draw a place value chart like the one below and round the ones place digit to the nearest number <table border="1" data-bbox="516 1453 1354 1583"> <tr> <td>Hundreds</td> <td>Tens</td> <td>Ones</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <ul style="list-style-type: none"> • Draw a water bottle that is half full. Write half as a fraction • Draw a water bottle that is one quarter full. Write one quarter as a fraction 	Hundreds	Tens	Ones			
Hundreds	Tens	Ones						
2		<p>Today, the learner will continue to explore how water is used and learn about different sources of water.</p>						

20 minutes	The learner will think about some examples of water bodies and other sources of water in their home, neighborhood, city, and the world. There are different ways we get water - through water bodies like rivers and oceans, through underground drinkable water and through rain. The learner will draw some of these sources in his or her notebook and label them, e.g. river, rain etc.								
40 minutes	<p>The learner will find out how much water is being consumed by her or his household daily. The learner will create the following table to track daily water consumption by writing down how many glasses or cups of water each member of the family drinks in a day. The learner can ask each family member or observe their water consumption throughout the day or week</p> <table border="1" data-bbox="418 703 1101 966"> <thead> <tr> <th>Name</th> <th>Number of glasses on Sunday</th> </tr> </thead> <tbody> <tr> <td>Family member 1</td> <td>5</td> </tr> <tr> <td>Family member 2</td> <td>4</td> </tr> <tr> <td>Family member 3</td> <td>9</td> </tr> </tbody> </table> <p>The learner can represent this in a bar graph or pictogram as shown below</p> <p>Bar graph:</p>  <p>Pictogram:</p>	Name	Number of glasses on Sunday	Family member 1	5	Family member 2	4	Family member 3	9
Name	Number of glasses on Sunday								
Family member 1	5								
Family member 2	4								
Family member 3	9								

		 <p>Number of cups</p> <p>Family member 1 Family member 2 Family member 3</p> <ul style="list-style-type: none"> ● Who drinks the least amount of water? ● Who drinks the most amount of water? ● How many glasses of water do all family members drink in total? ● Subtract the lowest number of cups from the highest ● Multiply the results of any two family members together
3	15 minutes	<p>Today, the learner will continue exploring sources of water through the water cycle and water pollution.</p> <p>The learner will reflect on where all the water he or she drinks and uses comes from with the help of probing from the parent or teacher. If he or she says the tap, ask about the source that supplies tap water through the pipes. Explain that one source is rainwater that we get through the water cycle:</p> <ul style="list-style-type: none"> ● Just like the sun dried up the object we placed outside from our day 1 experiment; the sun causes water from water bodies like the sea to evaporate (this is also what happens when we boil water). The parent or teacher can boil water in a kettle or stove top to demonstrate ● What happens when we boil water? Do you see the steam going up? This is what happens when water from water bodies evaporates, it goes up as water vapour or steam. ● When water vapour goes up, it starts to cool down because the higher we go, the colder the temperature gets. When they cool down, they form clouds! Clouds are made of cooled down water vapour that is floating in the atmosphere. This cooling down of water vapour is called condensation. ● When too many of these water vapour clouds are created in the sky, they become too heavy and fall down as rain! This is called precipitation. ● We call this a cycle because the water that falls lands on seas and other water bodies, which again evaporate, condensate and fall as rain.



source: <https://www.science-sparks.com/make-a-mini-water-cycle/>

20
minutes

The learner will do an experiment to demonstrate the water cycle:

- You will need a pen or marker, plastic bag or saran/plastic wrap, plastic or glass cup or mug, water, and a large bowl or container
- Place the cup at the bottom of the large bowl and fill the bowl with water AROUND the cup so that it submerges two-third of the cup. Make sure that no water gets inside the cup
- Mark where the water reaches on the side of the cup with a pen or marker.
- Cover the bowl tightly with the plastic bag or wrap. You can fasten with tape, rubber band or string to hold it tightly in place. Make sure that the setup is placed in a warm location or at room temperature
- You can also draw a cloud with your pen or marker at the top of the plastic bag right above the cup. Can you guess why? What do you think will happen in this experiment?
- Wait for a few hours and observe what happens. Write a few sentences about your observations. You should see that water drops have formed on the top of the plastic wrap (due to condensation) and that there is less water in the bowl (because of evaporation). The condensation droplets represent clouds. You will see that they are dripping back into both the bowl and cup demonstrating precipitation!

20
minutes

The learner will now learn about pollution. Explain that if we don't save water, we will not have enough of it, and that although so much of the earth is covered in water, not all of it can be used for drinking because it is salty seawater and it is dirty or polluted. Discuss how pollution from human activity makes water bodies like rivers, seas, lakes etc. dirty and how it is important to make sure that water is saved and kept clean.

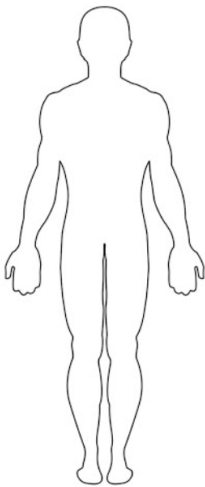
	10 minutes	The learner will do an experiment to learn about clean water: <ul style="list-style-type: none"> • The learner will fill a cup with water then find objects to put inside the cup to “pollute” the water. The learner can also make “beach water” by adding dirt/sand and little rocks to the cup. Note: do not use clean water for this experiment. Use water that was already used to wash dishes or clothes so that you do not waste clean water • The learner will examine the cup. Ask the learner if she or he can drink it? What would happen if you drank it? Explain that dirty water can make us sick and that it is important to drink clean water.
	15 minutes	The learner will then try to get clean water: <ul style="list-style-type: none"> • The learner will bring an empty cup. The learner will stir the cup with dirty water and notice how the dirt settles to the bottom. The learner will allow all the dirt to settle for a few minutes then transfer the water from the dirty cup to the clean cup. • Next the learner will try a different method of water purification. Pour the water back into the dirty cup and place a piece of light cloth (like nylon stockings) on top of the other empty cup. Now, pour the dirty water into the empty cup and watch it pass through the cloth filter to become clean. • The learner will reflect on which method worked best
	10 minutes	The learner will name and draw some examples of animals that live in different water bodies. The learner will reflect on why it is important to keep water bodies clean for ourselves and these animals. Alternatively, the learner can reflect on how pollution affects animals in their natural habitat and draw an image of the “sea after pollution”. They can also do a side-by-side comparison of the sea with and without pollution.
4	10 minutes	The learner will reflect on different ways water is used that might be wasteful or unnecessary. Suggestions for prompts: <ul style="list-style-type: none"> • Do you think we need to keep the tap on while we brush our teeth? • Do you think it is ok to throw away water bottles that still have some water in them? • How do you think we can use less water in washing, showering, cleaning etc.? (examples: keep taps turned off when you are not using them, take quick showers that are less than 5 minutes etc.)
	10 minutes	After reflecting on the different water wasting activities, the learner will come up with a few steps his or her family can take to save water. The learner can illustrate and write down some steps everyone in her or his household can take to save water.
	30 minutes	The learner will then think about steps to reduce pollution (such as using glass bottles instead of water bottles, not littering beaches etc.). The learner will then design a poster containing:

	5 minutes	<ul style="list-style-type: none"> • 3 steps to reduce water use or water wastage • 3 steps to reduce water pollution <p>The steps must be both illustrated in an attractive drawing and written down as a sentence.</p> <p>The learner can also come up with a week or month-long challenge for his or her family to save water based on the steps. Examples include:</p> <ul style="list-style-type: none"> • Use buckets to clean your body instead of shower • Recycle water used in washing vegetables and use it to water plants • Keep the tap turned off when you are brushing your teeth, lathering your hands with soap to wash them, or scrubbing the dishes. <p>The learner will then share with his or her family the poster and challenge. The learner will carry out the challenge for a week or month and reflect with his or her family at the end of the week or month to discuss what they learned and challenges they faced.</p>
Assessment Criteria:	<ul style="list-style-type: none"> - Completed table tracking water consumption - Completed poster with suggested steps to reduce water consumption and pollution - Challenge for family to reduce water waste and pollution - Correct execution of experiments 	

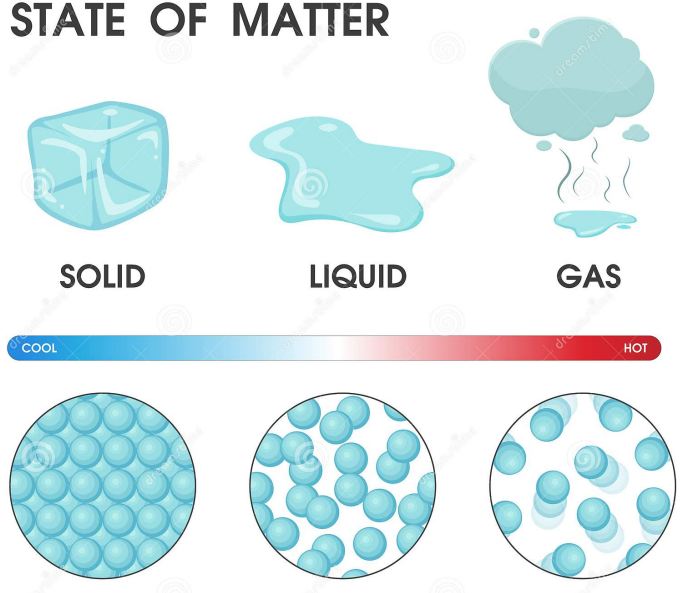
Learning outcomes:	<ul style="list-style-type: none"> - Understanding of the importance of water for living things - Understanding of the need to save water and steps toward that end - Understanding of the water cycle - Understanding water pollution - Multiplication within 10 - Visualizing fractions - Number discrimination - Data handling (simple pictograms within 10)
Required previous learning:	<ul style="list-style-type: none"> - Addition and subtraction within 20 - Fractions - Sentence level reading and writing
Inspiration:	n/a
Additional enrichment activities:	<ul style="list-style-type: none"> - Learners can track water consumption habits for several days and calculate daily consumption for those days - Learners can create a daily, weekly or monthly plan to save water and reduce pollution for their family
Modifications for simplification:	<ul style="list-style-type: none"> - Learners can reduce the number of experiments done - Learners can write down a few steps to save water or reduce pollution in their notebook for the final outcome instead of the poster and challenge

Ages 11 to 14 (Level 3)

Description:	Explore the different uses and sources of water and understand the importance of clean water for living things.
Leading question:	How can we become more mindful of how we use water?
Age group:	11-14
Subjects:	Science, environmental studies
Total time required:	4.75 hours over 4 days
Self-guided / Supervised activity:	Medium supervision
Resources required:	Paper, pencil, pen or color pens, ruler (optional), two cups, sand, pebbles, water, bowl, string, marker (optional), teabag, spray bottle (containing perfume, air freshener etc.), salt

Day	Time	Activity and Description
1	30 minutes	<p>Introduction: the learner will discover different uses and sources of water. Today, the learner will find out different ways we use water.</p> <p>Ask the learner - what happens when you don't drink water for a long time? Can you imagine not drinking water for days or weeks? Remind the learner that all living things need water to survive. This means that humans, animals and plants cannot live without water. Most of the human body is actually made up of water. Human blood is made up of liquid and solid parts - over 90% of the liquid part (called plasma) is made up of water!</p>  <p>The human body is 60% water. The learner will do the following activity to illustrate this:</p> <ul style="list-style-type: none"> ● Express 60% as a fraction (hint: simplify 60/100 to get the answer) ● Draw a human body silhouette as shown above and show that 60% of it is water using a color pen or pencil. You can do this by expressing the 60% as a fraction then dividing the silhouette into the number of parts indicated in

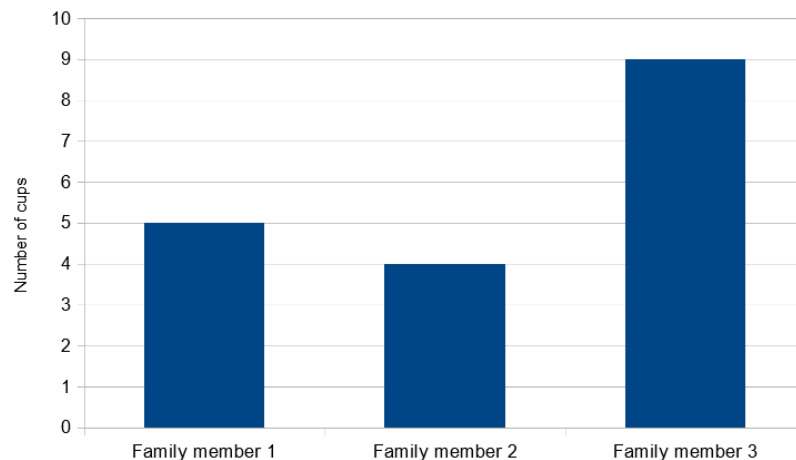
	<p>10 minutes</p> <p>20 minutes</p> <p>5 minutes</p> <p>5 minutes</p>	<p>the denominator of the fraction. Next, color the number of parts indicated in the numerator to show 60%.</p> <ul style="list-style-type: none"> • Draw a rectangle, square or other shape to represent the human body. Calculate the area of this shape using a ruler (e.g. length x width gives you the area of a rectangle, side x side gives the area of a square, and πr^2 gives the area of a circle). Calculate 60% of the result and demonstrate that in your shape by shading or coloring the part that is 60% water. <p>Note: if you do not have a ruler, you can use an object of a known length/size or you can use alternative measures such as the distance between your index and thumb as a unit. You can also simply draw a shape and give it approximate dimensions based on your best guess</p> <p>The learner will think about some ways water is used and draw labeled images showing how water is used in different contexts - in the home, in industries/factories, in nature etc.</p> <p>Next, the learner will do an experiment to show what happens when something loses water:</p> <ul style="list-style-type: none"> • The learner will place a piece of fruit, vegetable, bread, or cooked rice out in the sun and come back to it at the end of the day or in 2 days to see how it changed. Ask the learner what they think happened. • Explain that almost every living thing contains water and that the object placed in the sun became dry and hard because the heat of the sun caused it to lose water. The loss of water from an object due to heat exposure is called evaporation. • The learner will draw a before and after image of the object to show changes. <p>The learner will revisit the three states of matter - solid, liquid, and gaseous:</p> <ul style="list-style-type: none"> • Ask the learner what water looks like in the three states • The learner can boil water to get steam or water vapor, which is the gaseous form of water • Water we consume and that which is in water bodies exists in its liquid state • Water turns into ice when frozen or in nature in cold places (icebergs permafrost etc.) • Adding or removing heat causes water to change states - boiling vs freezing have different effects on water <p>The particles of water are of different density in its three states. Which state do you think the particles are loosely arranged and can move freely? In which state are they tightly packed and cannot move? The learner will draw three diagrams showing how water particles look in all three states (hint: think of which state water</p>
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	<p>20 minutes</p>	<p>moves most freely in. In this state, the particles can be drawn as small balls that are far away from each other)</p> <p>Answer: water particles are compact in its solid form (ice) with high density (how crowded the particles are). In its liquid form, water particles are less dense than solid, but more dense than gas. Density makes something light or heavy.</p> <p>STATE OF MATTER</p>  <p>SOLID LIQUID GAS</p> <p>COOL HOT</p> <p><small>dreamstime.com ID 150525799 © Mrvanuwat</small></p> <p>Source: https://www.dreamstime.com/changing-state-matter-solid-liquid-gas-due-to-temperature-vector-illustration-image150525799</p> <p>Numeracy activity:</p> <ul style="list-style-type: none"> • The Earth is 71% water. Draw a circle representing the earth and using a ruler, find its area using the formula πr^2. Find out the area covered in water - calculate 71% of the area of your earth figure • Color or shade 71% of the earth figure you drew to show how much water covers the earth... • Express 71% as a fraction
	<p>30 minutes</p>	<p>Today, the learner will explore his or her household water consumption and learn about the water and carbon cycles.</p> <p>The learner will find out how much water is being consumed by her or his household daily. The learner will create the following table to track daily water consumption by writing down how many glasses or cups of water each member of the family drinks in a day. The learner can ask each family member or observe their water consumption throughout the day or week</p>

Name	Number of glasses on Sunday
Family member 1	5
Family member 2	4
Family member 3	9

The learner can represent this in a daily or weekly bar graph or pictogram as shown below

Bar graph:



The learner will draw a pie diagram showing the percentage of water consumed by each member:

- Calculate total water consumption
- Find the percentage of each member's water consumption
- Represent each family member's water consumption in a pie diagram showing each member's percentage

Write a report on your findings answering the following questions:

- Who drinks the least amount of water? (percentage)
- Who drinks the most amount of water? (percentage)
- How many glasses of water do all family members drink in total?
- What day was water consumption the highest vs lowest?
- Does drinking more or less water have an impact on health? Ask family members about health problems or experiences after not drinking enough water and write about this in your report

5 minutes		<p>The learner will brush up on the water cycle. Refresh the learner’s memory about the water cycle, if needed or check her/his understanding of the process:</p> <ul style="list-style-type: none"> ● Just like the sun dried up the object we placed outside from our day 1 experiment, the sun causes water from water bodies like the sea to evaporate (this is also what happens when we boil water). What happens when we boil water? Do you see the steam going up? This is what happens when water from water bodies evaporates, it goes up as water vapor or steam. ● When water vapor goes up, it starts to cool down because the higher we go, the colder the temperature gets. When they cool down, they form clouds! Clouds are made of cooled down water vapor that is floating in the atmosphere. This cooling down of water vapor is called condensation. ● When too many of these water vapor clouds are created in the sky, they become too heavy and fall down as rain! This is called precipitation. <p>The learner will draw a labeled diagram explaining the water cycle in different settings (e.g. rainforest, desert etc.)</p>
10 minutes	15 minutes	<p>The learner will explore the role of carbon and diffusion in nature. There is another cycle of carbon dioxide in nature and it interacts with the water cycle in different ways. Carbon dioxide makes earth’s climate warmer, which leads to more evaporation. Carbon dioxide diffuses into water bodies and air. Diffusion is the movement of particles in liquids and gases from areas of high concentration to areas of lower concentration. Gas and liquid particles move more freely than those of solid objects, which allows for diffusion to take place. The learner will do the following experiments to observe diffusion:</p> <ul style="list-style-type: none"> ● Place a teabag (highly concentrated with tea particles) in a cup of boiling water (no concentration of tea) ● Spray a perfume or air freshener in the air ● What do you observe? The particles from the original source mix with the particles of the receiving object and slowly spread throughout the secondary medium. The concentration of tea and perfume in the second object (cup of hot water or air) is lower than the concentration of the items in the original sources. ● This is what happens with carbon dioxide in water and air ● What other items can you do these experiments with? Can you do it with a liquid and solid or gas and solid? <p>The learner will write down his or her observations about diffusion in different states of matter</p>
10 minutes		<p>Note: if the learner is comfortable with the water cycle, he or she can explore the carbon cycle and the interaction between the two cycles further. Please refer to the “additional enrichment activities” section at the bottom of this page.</p>
3		<p>Today, the learner will learn about water pollution.</p>

30 minutes		<p>The learner will now learn about pollution. Explain that if we don't save water, we will not have enough of it, and that although 71% of the Earth is covered in water, not all of it can be used for drinking because it is salty seawater and it is dirty or polluted. Discuss how pollution from human activity makes water bodies like rivers, seas, lakes etc. dirty and how it is important to make sure that water is saved and kept clean.</p> <p>The learner will do an experiment to learn about clean water:</p> <ul style="list-style-type: none"> • The learner will fill a cup with water then find objects to put inside the cup to "pollute" the water. The learner can also make "beach water" by adding dirt/sand and little rocks to the cup. Note: do not use clean water for this experiment. Use water that was already used to wash dishes or clothes so that you do not waste clean water • The learner will examine the cup. Ask the learner if she or he can drink it? What would happen if you drank it? Explain that dirty water can make us sick and that it is important to drink clean water. <p>The learner will then try to get clean water:</p> <ul style="list-style-type: none"> • The learner will bring an empty cup. The learner will stir the cup with dirty water and notice how the dirt settles to the bottom. The learner will allow all the dirt to settle for a few minutes then transfer the water from the dirty cup to the clean cup. • Next the learner will try a different method of water purification. Pour the water back into the dirty cup and place a piece of light cloth (like nylon stockings) on top of the other empty cup. Now, pour the dirty water into the empty cup and watch it pass through the cloth filter to become clean. • The learner will reflect on which method worked best 						
20 minutes		<p>The learner will try to come up with a solution to address water pollution. First, the learner will think of some causes or sources of water pollution from human activity (that are the result of activities carried out by individuals, companies, governments etc.). Next, the learner will think of the effect of this pollution on humans, animals, and the Earth. The learner will then create and fill out the following table in his or her notebook or paper and list his or her recommended solutions for each :</p> <table border="1" data-bbox="418 1524 1354 1856"> <thead> <tr> <th data-bbox="418 1524 732 1591">Source of pollution</th> <th data-bbox="732 1524 1045 1591">Effect</th> <th data-bbox="1045 1524 1354 1591">Potential solution</th> </tr> </thead> <tbody> <tr> <td data-bbox="418 1591 732 1856"> <ul style="list-style-type: none"> • e.g. industrial waste dumped in water bodies </td> <td data-bbox="732 1591 1045 1856"> <ul style="list-style-type: none"> • e.g. polluted drinking water source, which causes waterborne diseases in humans </td> <td data-bbox="1045 1591 1354 1856"> <ul style="list-style-type: none"> • e.g. alternative waste disposal system </td> </tr> </tbody> </table>	Source of pollution	Effect	Potential solution	<ul style="list-style-type: none"> • e.g. industrial waste dumped in water bodies 	<ul style="list-style-type: none"> • e.g. polluted drinking water source, which causes waterborne diseases in humans 	<ul style="list-style-type: none"> • e.g. alternative waste disposal system
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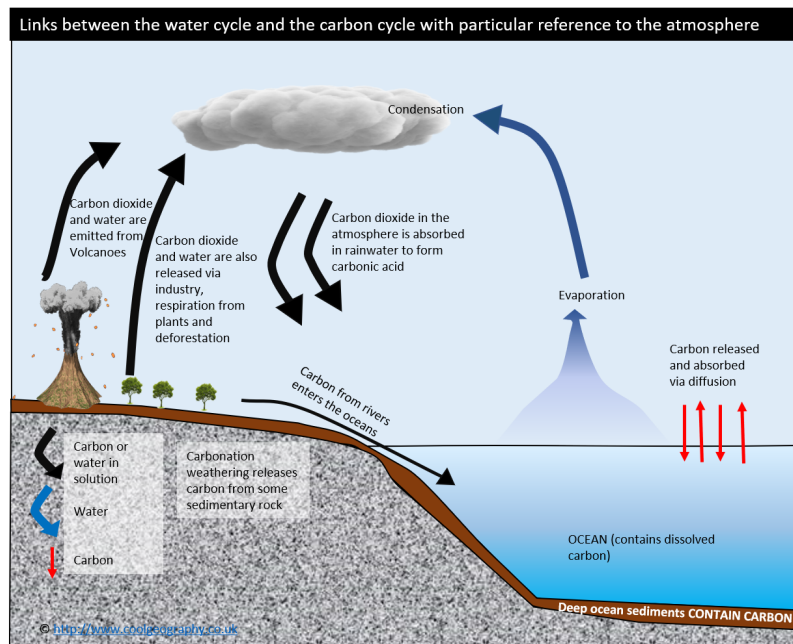
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4	<p>20 minutes</p> <p>10 minutes</p> <p>10 minutes</p> <p>30 minutes</p>	<p>Today, the learner will explore water conservation</p> <p>The learner will reflect on why we need to save water. Explain that, in addition, to pollution, water is also scarce. As discussed on day 3, most of the water on Earth cannot be consumed. The learner can do an experiment to demonstrate this:</p> <ul style="list-style-type: none"> ● Collect some seawater from a nearby water body or add three tablespoons of salt to a cup of water ● Boil the saltwater until all the water evaporates ● What do you observe? You will find that after all the water evaporates, you are left with salt! This is one of the ways salt is made. If you are unable to do this experiment, simply ask the learner what he or she thinks will happen given that seawater contains both salt and water, and that we know that heat exposure through boiling will make water evaporate - what will be left behind? ● What do you think will happen to your body if you drink seawater? Keep in mind that water evaporates from humans in the form of sweat and leaves the body also in the form of urine. If humans drank only seawater, we would have more salt in our bodies than water and would not be able to survive due to dehydration! <p>The learner will reflect on different ways water is used that might be wasteful or unnecessary. Suggestions for prompts:</p> <ul style="list-style-type: none"> ● Do you think we need to keep the tap on while we brush our teeth? ● Do you think it is ok to throw away water bottles that still have some water in them? ● How do you think we can use less water in washing, showering, cleaning etc.? (Examples: keep taps turned off when you are not using them, take quick showers that are less than 5 minutes etc.) <p>After reflecting on the different water wasting activities, the learner will come up with a few steps his or her family can take to save water. The learner can illustrate and write down some steps everyone in her or his household can take to save water.</p> <p>The learner will then think about steps to reduce pollution (such as using glass bottles instead of water bottles, not littering beaches etc.). The learner will then design a poster containing:</p> <ul style="list-style-type: none"> ● 5 steps to reduce water use or water wastage 									

	5 minutes	<ul style="list-style-type: none"> ● 5 steps to reduce water pollution <p>The steps must be both illustrated in an attractive drawing and written down as a sentence.</p> <p>The learner can also come up with a week or month-long challenge for his or her family to save water based on the steps. Examples include:</p> <ul style="list-style-type: none"> ● Use buckets to clean your body instead of shower ● Recycle water used in washing vegetables and use it to water plants ● Keep the tap turned off when you are brushing your teeth, lathering your hands with soap to wash them, or scrubbing the dishes. <p>The learner will then share with his or her family the poster and challenge. The learner will carry out the challenge for a week or month and reflect with his or her family at the end of the week or month to discuss what they learned and challenges they faced.</p>
Assessment Criteria:	<ul style="list-style-type: none"> - Completed table tracking water consumption - Completed poster with suggested steps to reduce water consumption and pollution - Challenge for family to reduce water waste and pollution - Correct execution of experiments 	

Learning outcomes:	<ul style="list-style-type: none"> - Understanding of the importance of water for living things - Understanding of the three states of matter as it relates to the interaction between water and heat - Understanding of the need to save water and steps toward that end - Understanding of the water and carbon cycle - Understanding of pollution - Converting percentages into fractions - Calculating area of a circle - Visualizing fractions - Data handling - creating and interpreting bar graphs and pie charts
Required previous learning:	<ul style="list-style-type: none"> - Division - Sentence level reading and writing
Inspiration:	n/a
Additional enrichment activities:	<ul style="list-style-type: none"> - Learners can track water consumption habits for several days and calculate daily consumption for those days - Learners can create a daily, weekly or monthly plan to save water and reduce pollution for their family <p>The learner can explore the carbon cycle:</p>

Ask the learner what he or she knows about carbon and carbon dioxide? If the learner is familiar with climate change and the effect of higher carbon dioxide in the atmosphere, ask him or her “what could the relationship between carbon and water be”? Explain to the learner that The water and carbon cycles are interconnected in the following ways:

- Carbon dioxide is all around us! It is put into the atmosphere by plants, animals, and human activity. It is also released from water bodies into the atmosphere and absorbed into water bodies from the atmosphere.
- Carbon dioxide along with other gases create what is called a **greenhouse effect** where the sun’s heat is trapped in the atmosphere. We need these gases because without them the earth’s temperature would be -18 degrees Celsius! The problem now is that there is too many of these gases and the earth is hotter than it should be
- Higher temperatures because of higher carbon dioxide leads to more evaporation from water bodies
- This creates more water vapor in the atmosphere, which could make earth even warmer given the general increase in temperature (due to high levels of carbon dioxide in the atmosphere)



source:

http://www.coolgeography.co.uk/advanced/Carbon_water_cycles_Life_Earth.php

	The learner will draw a labeled diagram explaining the water and carbon cycle in a different setting (e.g. rainforest, desert etc.)
Modifications for simplification:	<ul style="list-style-type: none"> - Learners can reduce the number of experiments done - Learners can write down a few steps to save water or reduce pollution in their notebook for the final outcome instead of the poster and challenge