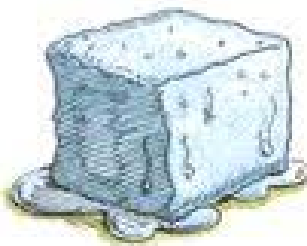


8/1/2012

Assessing with
Learning
Progressions in
Science

FOSS WATER



SOLID



LIQUID



GAS

Instructional Tools | Contributors: Steve Hecimovich, Susan Kruckenberg, Elizabeth Zylstra



**Northwest Educational
Service District 189**
Together We Can

Funding information:
Mathematics & Science Partnership under Title II, Part B
Program Code: 62
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Instructional Tools

In this packet you will find a set of instructional supports for science materials. These documents represent the work-in-progress of teachers in the Assessing with Learning Progressions in Science Project, a Math Science Partnership through the Northwest Educational Service District in Washington State. While we encourage others to use the materials, please know the power of these tools lies in the collaborative discussion and analysis that occurs during their creation. We strongly suggest that anyone utilizing these tools make them your own, adjusting them to fit your teaching context and district priorities. Professional development tools to aid you in this process are available on the ALPS project web page www.nwesd.org/nwalps. For access to editable versions of these documents please contact Nancy Menard nmenard@nwesd.org.

Overview of the Tools (not every unit tool-set will include all of these tools)

Unit Overview

The unit overview grid lays out learning targets or important scientific ideas from Washington State Standards for each investigation in the module and clarifies the success criteria for each learning target. It also details the formative assessments that have been designed to assess each target in the investigation.

Learning Progressions

A learning progression is a graphical representation of the path students take toward mastery of a science “big idea”. The ALPS *Learning Progression* documents include a description of an important big idea from the *Washington State Science Learning Standards* and the progression of building-block learning targets that students master on their way toward an understanding of that big idea. For each building-block learning target the student success criteria is identified and one or more formative assessment tasks to elicit evidence of student understanding are suggested.




Formative Assessment Tasks

The suggested formative assessment tasks are examples of tools used by the teachers in the ALPS project to gather evidence of student understanding. The *Assessment Task Cover Sheet* details each assessment and gives administration tips and suggestions for instructional adjustments based on some of the common student struggles they encountered.

Student Work Samples

Selected student work samples from students in ALPS classrooms give a picture of the range of student responses gathered from sample formative assessments. The *Student Work Sample Cover Sheet* describes the student work samples and the teacher’s interpretation of student understanding.

Water Unit Overview

Lesson	Learning Targets & Success Criteria	Assessment
Inv. 1, Part 1 Water Observations	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); background-color: #cccccc; padding: 2px 5px; font-weight: bold; margin-right: 5px;">States</div> <div> <ul style="list-style-type: none">  Objects have properties. 2-3 PS2B ✓ I can identify and describe the properties of water. </div> </div>	a) Students will individually make a list of the properties of water. Then individuals get together as small groups to build their lists. Groups share one or two of the key properties from the list with the whole class..
Inv. 1, Part 2 Water Observations	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); background-color: #cccccc; padding: 2px 5px; font-weight: bold; margin-right: 5px;">States</div> <div> <p>No target or success criteria in the learning progression.</p> </div> </div>	No assessment available.
Inv. 1, Part 3 Water Observations	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); background-color: #cccccc; padding: 2px 5px; font-weight: bold; margin-right: 5px;">States</div> <div> <p>No target or success criteria in the learning progression.</p> </div> </div>	No assessment available.
Inv. 2, Part 1 Hot Water, Cold Water	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); background-color: #cccccc; padding: 2px 5px; font-weight: bold; margin-right: 5px;">States</div> <div> <ul style="list-style-type: none">  Water in different states (solid, liquid, and gas) has different properties.2-3 PS2C ✓ I can identify the three states of water and explain differences between them. </div> </div>	a) Justified list probe: Students classify solid, liquid, and gas forms of water from a list of water attributes and then justify their answers. (Pg. 123 in Keely book – See SOM #1.)
Inv. 2, Part 1 Hot Water, Cold Water	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); background-color: #cccccc; padding: 2px 5px; font-weight: bold; margin-right: 5px;">Systems</div> <div> <ul style="list-style-type: none">  A thermometer is a system that can be used to determine what happens to water when it is heated and cooled. 4-5 SYSB ✓ I can use a system to observe the effects of hot and cold water. </div> </div>	a) Water: FOSS Science Student sheet #6 (Students build a thermometer and explaining what happens with temperature change.)

Assessing with Learning Progressions in Science

Math Science Partnership
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Lesson	Learning Targets & Success Criteria	Assessment
Inv. 2, Part 2 Hot Water, Cold Water	States No target or success criteria in the learning progression.	No assessment available.
Inv. 2, Part 3 Hot Water, Cold Water	States <ul style="list-style-type: none"> 🎯 The states of water can be changed by heating or cooling.4-5 PS2A ✓ I can describe how temperature affects water. 	a) I Think/We Think. Two-column sheet of paper. Write what you think about how temperature affects water. Then go into groups, have a discussion, and write in the We Think column what the group thinks. (Pg. 117 in Keely book – See SOM #2.)
Inv. 3, Part 1 Water Vapor	States <ul style="list-style-type: none"> 🎯 Two of the changes in the states of water are evaporation and condensation.4-5 PS2A ✓ I can compare and contrast evaporation and condensation. 	a) Draw a Venn Diagram that tells the similarities and differences of evaporation and condensation. (See SOM #3.)
Inv. 3, Part 2 Water Vapor	Systems <ul style="list-style-type: none"> 🎯 Systems have inputs and outputs. Changes in inputs may change the outputs of a system.4-5 SYSC ✓ I can explain how different inputs to a system can change the output. 	a) Predict/Observe /Explain (POE - #43, pg 153 in Keely). See prompt in bold below. This could be completed in student notebooks. What would happen to the evaporation of your system if you put 4 same-sized containers in different locations?
Inv. 3, Part 3 Water Vapor	Systems <ul style="list-style-type: none"> 🎯 Variables (i.e, surface area) may change how a system works. 4-5 SYSC ✓ I can explain how changes in a system can affect outcome. 	a) Water: FOSS Science Student sheet #13 (Students use this chart to record data about the evaporation of water from different sized surface area containers and explain the results.) Add an additional question to Student sheet #13. (See bold below.) This question could be answered on the back of sheet #13. Select two of the four systems and explain how the differences between the two systems affected the rate of evaporation. OR require students use the words “surface area” as they make their explanation to the question on the front side of sheet #13.

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Lesson	Learning Targets & Success Criteria	Assessment
Inv. 4, Part 1 Water Works	States No target or success criteria in the learning progression.	No assessment available.
Inv. 4, Part 2 Water Works	Energy  A water wheel, as a system, can be used to do work. 4-5 SYSC  I can build a system and explain how all the parts work together.	a) Students draw and label a diagram of a waterwheel and write a reflective paragraph about how the water wheel is a system and how all the parts work together. This could be completed in student notebooks.
Inv. 4, Part 3 Water Works	Systems No target or success criteria in the learning progression.	No assessment available.

Assessing with Learning Progressions in Science

Math Science Partnership

File Name: WA_overview

Funding information:

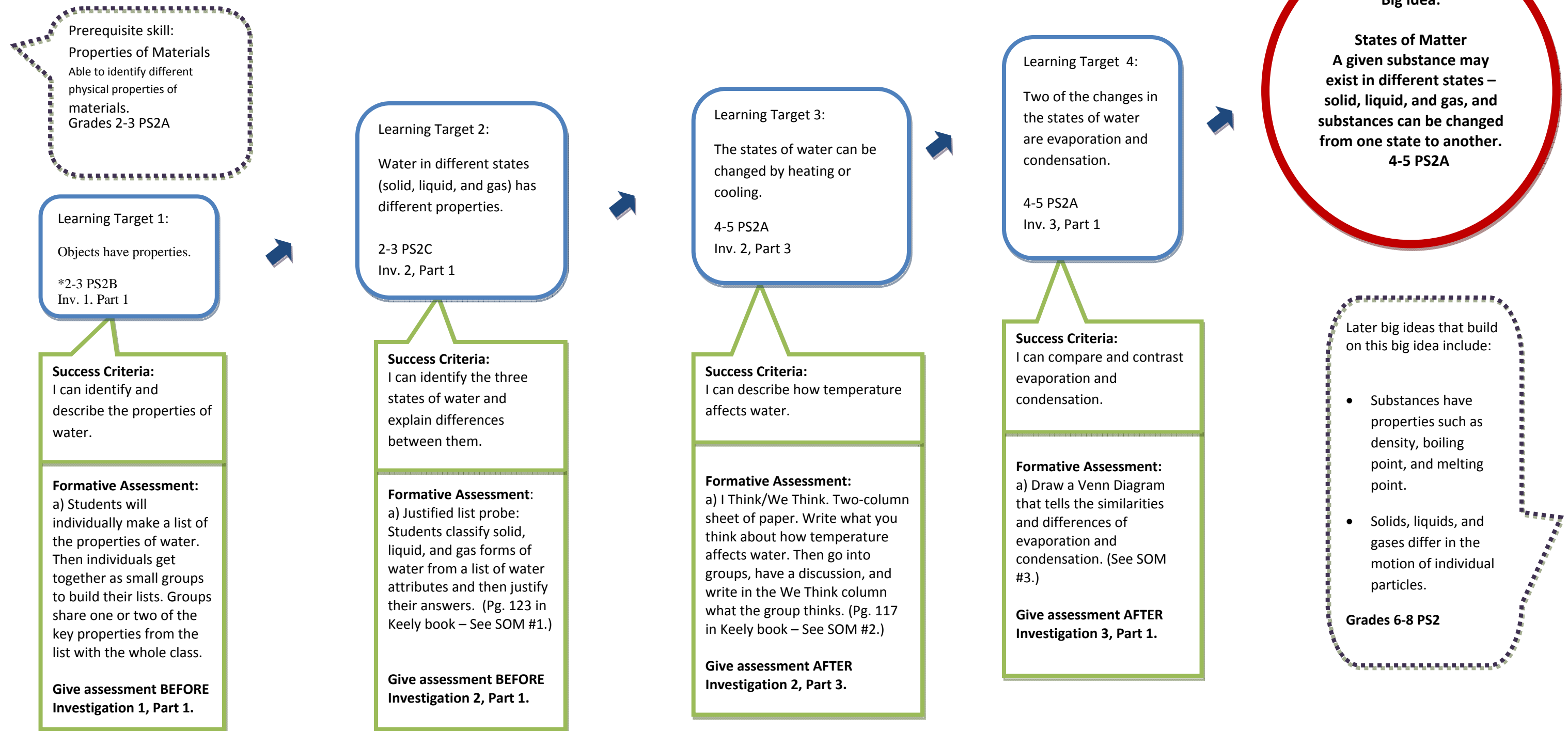
Mathematics & Science Partnership under Title II, Part B

Program Code: 62

CFDA 84.366B

Learning Progression

FOSS Water Investigation 1, 2, 3



*NOTE: This water kit is taught at 4th grade. However, it meets several of the 2-3 grade standards. Our first two learning targets review a couple of these 2-3 standards.

WATER

Big Idea: **States of Matter.** A given substance may exist in different states – solid, liquid, and gas, and substances can be changed from one state to another. 4-5 PS2A

Formative Assessment Task Cover Sheet

Learning Target 1, 1a	
Assessment Task Details	Teacher Background
Brief Description of the Assessment Task: Students will individually make a list of the properties of water. Then individuals get together as small groups to build their lists. Groups share one or two of the key properties from the list with the whole class.	Administration Tips: Give assessment BEFORE Investigation 1, Part 1. Suggestions for Instructional Adjustments: List can be made on a separate piece of paper or in science notebooks.
Learning Target 1: Objects have properties. (2-3 PS2B)	
Success Criteria: I can identify and describe the properties of water.	
Student Task Sheet Included: No Student Work Samples Included: No	

Learning Target 2, 2a	
Assessment Task Details	Teacher Background
Brief Description of the Assessment Task: Justified list probe: Students classify solid, liquid, and gas forms of water from a list of water attributes and then justify their answers. (Pg. 123 in Keely book – See SOM #1.)	Administration Tips: Give assessment BEFORE Investigation 2, Part 1. Suggestions for Instructional Adjustments: This list does not necessarily have definitive answers, but should generate discussion about the properties of water.
Learning Target: Water in different states (solid, liquid, and gas) has different properties. (2-3 PS2C)	
Success Criteria: I can identify the three states of water and explain differences between them.	
Student Task Sheet Included: Yes Student Work Samples Included: Yes	

WATER

Big Idea: **States of Matter.** A given substance may exist in different states – solid, liquid, and gas, and substances can be changed from one state to another. 4-5 PS2A

Learning Target 3, 3a	
Assessment Task Details	Teacher Background
<p>Brief Description of the Assessment Task: I Think/We Think. Two-column sheet of paper. Write what you think about how temperature affects water. Then go into groups, have a discussion, and write in the We Think column what the group thinks. (Pg. 117 in Keely book – See SOM #2.)</p>	<p>Administration Tips: Give assessment AFTER Investigation 2, Part 3.</p> <p>Suggestions for Instructional Adjustments: The I Think/We Think chart will generate discussion and the two questions at the bottom of the page should help evaluate individual student learning.</p>
<p>Learning Target 3: The states of water can be changed by heating or cooling. (4-5 PS2A)</p>	
<p>Success Criteria: I can describe how temperature affects water.</p>	
<p>Student Task Sheet Included: Yes Student Work Samples Included: No</p>	

Learning Target 4, 4a	
Assessment Task Details	Teacher Background
<p>Brief Description of the Assessment Task: Draw a Venn Diagram that tells the similarities and differences of evaporation and condensation. (See SOM #3.)</p>	<p>Administration Tips: Give assessment AFTER Investigation 3, Part 1.</p>
<p>Learning Target 4: Two of the changes in the states of water are evaporation and condensation. (4-5 PS2A)</p>	
<p>Success Criteria: I can compare and contrast evaporation and condensation.</p>	
<p>Student Task Sheet Included: Yes Student Work Samples Included: No</p>	

States of Matter

Name _____

Justified List Probe

Circle whether each property describes a solid, liquid or gas form of **water**. Some properties could have more than one answer.

Properties	Forms of Water		
Feels wet	Solid	Liquid	Gas
Can hold it in my hand	Solid	Liquid	Gas
I can drink it	Solid	Liquid	Gas
Takes the shape of its container	Solid	Liquid	Gas
Has its own shape	Solid	Liquid	Gas
Completely fills its container	Solid	Liquid	Gas
Feels hard	Solid	Liquid	Gas
Can be seen by the human eye	Solid	Liquid	Gas
Expands (gets bigger) or contracts (gets smaller) depending on temperature	Solid	Liquid	Gas
Can change to a different form	Solid	Liquid	Gas
Is able to flow	Solid	Liquid	Gas
Can be absorbed (soaked in) by other materials	Solid	Liquid	Gas
Can make things cold	Solid	Liquid	Gas

Pick one property and explain your answer.

States of Matter
Justified List Probe
SOM#1

Funding information:

Water

Big Idea: A given substance may exist in different states – solid, liquid, and gas, and substances can be changed from one state to another. (4-5 PS2A)

Target 2, Assessment: 2a States of Matter - Justified List Probe

Formative Assessment Student Work Cover Sheet

Student Work Description

Sample 1: Student understands the more commonly observed properties of water. Student has misconceptions about the following items: “shape” and “can hold in hand.” This assessment makes a good foundation for discussion with individual students or in small groups. Having students explain their thinking verbally will help the teacher more accurately assess understanding. This assessment is also a good resource to refer to later on in the investigations.

Sample 2: Student basically understands the properties of water. Student is uncertain (as shown by eraser marks) about the following items: “make things cold” and “able to flow.” This assessment makes a good foundation for discussion with individual students or in small groups. Having students explain their thinking verbally will help the teacher more accurately assess understanding. This assessment is also a good resource to refer to later on in the investigations.

Sample 3: Student understands the properties of water. Student is unclear about the shape of water. Student’s written explanation hints at an understanding that water vapor is a gas. This assessment makes a good foundation for discussion with individual students or in small groups. Having students explain their thinking verbally will help the teacher more accurately assess understanding. This assessment is also a good resource to refer to later on in the investigations.

States of Matter

Justified List Probe

Name #1

Circle whether each property describes a solid, liquid or gas form of water. Some properties could have more than one answer.

Properties	Forms of Water		
Feels wet	Solid	Liquid	Gas
Can hold it in my hand	Solid	Liquid	Gas
I can drink it	Solid	Liquid	Gas
Takes the shape of its container	Solid	Liquid	Gas
Has its own shape	Solid	Liquid	Gas
Completely fills its container	Solid	Liquid	Gas
Hard to the touch	Solid	Liquid	Gas
Can be seen by the human eye	Solid	Liquid	Gas
Expands (gets bigger) or contracts (gets smaller) depending on temperature	Solid	Liquid	Gas
Can change to a different form	Solid	Liquid	Gas
Is able to flow	Solid	Liquid	Gas
Can be absorbed (soaked in) by other materials	Solid	Liquid	Gas
Can make things cold	Solid	liquid	Gas

Pick one property and explain your answer.

can be absorbed (soaked in) by other materials - i picked liquid because i've seen sponges soak in liquid or water.

States of Matter

Name FD

Justified List Probe

Circle whether each property describes a solid, liquid or gas form of water. Some properties could have more than one answer.

Properties	Forms of Water		
Feels wet	Solid	Liquid	Gas
Can hold it in my hand	Solid	Liquid	Gas
I can drink it	Solid	Liquid	Gas
Takes the shape of its container	Solid	Liquid	Gas
Has its own shape	Solid	Liquid	Gas
Completely fills its container	Solid	Liquid	Gas
Hard to the touch	Solid	Liquid	Gas
Can be seen by the human eye	Solid	Liquid	Gas
Expands (gets bigger) or contracts (gets smaller) depending on temperature	Solid	Liquid	Gas
Can change to a different form	Solid	Liquid	Gas
is able to flow	Solid	Liquid	Gas
Can be absorbed (soaked in) by other materials	Solid	Liquid	Gas
Can make things cold	Solid	Liquid	Gas

Pick one property and explain your answer.

has its own shape Liquid
it shapes the cup

States of Matter

Name #3

Justified List Probe

Circle whether each property describes a solid, liquid or gas form of water. Some properties could have more than one answer.

Properties	Forms of Water		
Feels wet	Solid	Liquid	Gas
Can hold it in my hand	Solid	Liquid	Gas
I can drink it	Solid	Liquid	Gas
Takes the shape of its container	Solid	Liquid	Gas
Has its own shape	Solid	Liquid	Gas
Completely fills its container	Solid	Liquid	Gas
Hard to the touch	Solid	Liquid	Gas
Can be seen by the human eye	Solid	Liquid	Gas
Expands (gets bigger) or contracts (gets smaller) depending on temperature	Solid	Liquid	Gas
Can change to a different form	Solid	Liquid	Gas
Is able to flow	Solid	Liquid	Gas
Can be absorbed (soaked in) by other materials	Solid	Liquid	Gas
Can make things cold	Solid	Liquid	Gas

Pick one property and explain your answer.

I think "Feels wet" is a liquid is the answer because wet is liquid. But "Feels wet" could also mean gas because on a foggy day it feels wet.

States of Matter

I Think/We Think

Name _____

How do you think temperature affects water?

I Think	We Think

What happens to water when it boils? Use words and a diagram to explain your thinking?

States of Matter
I Think/We Think
SOM#2

States of Matter

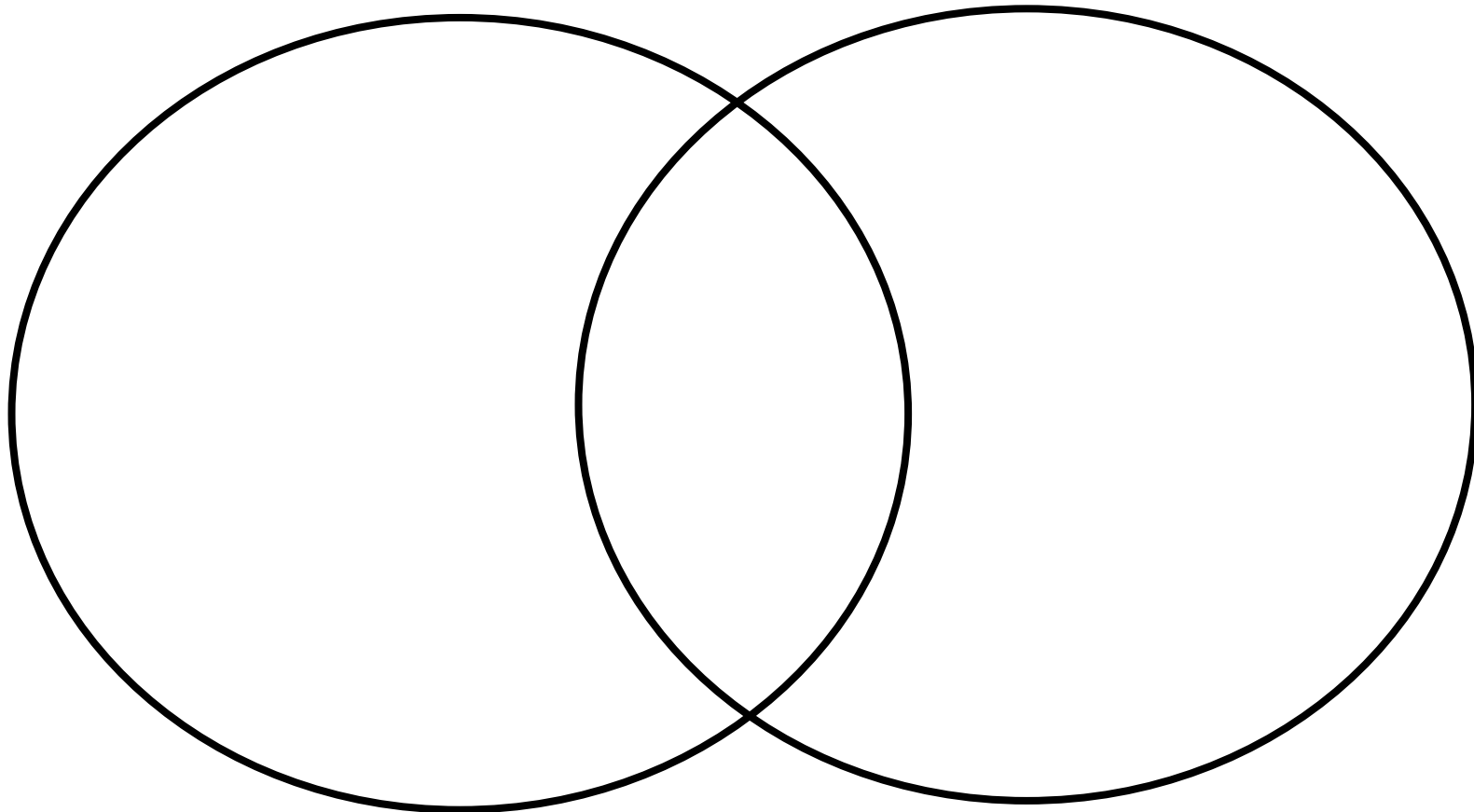
Venn Diagram

Name _____

Write the similarities and differences of evaporation and condensation.

Evaporation

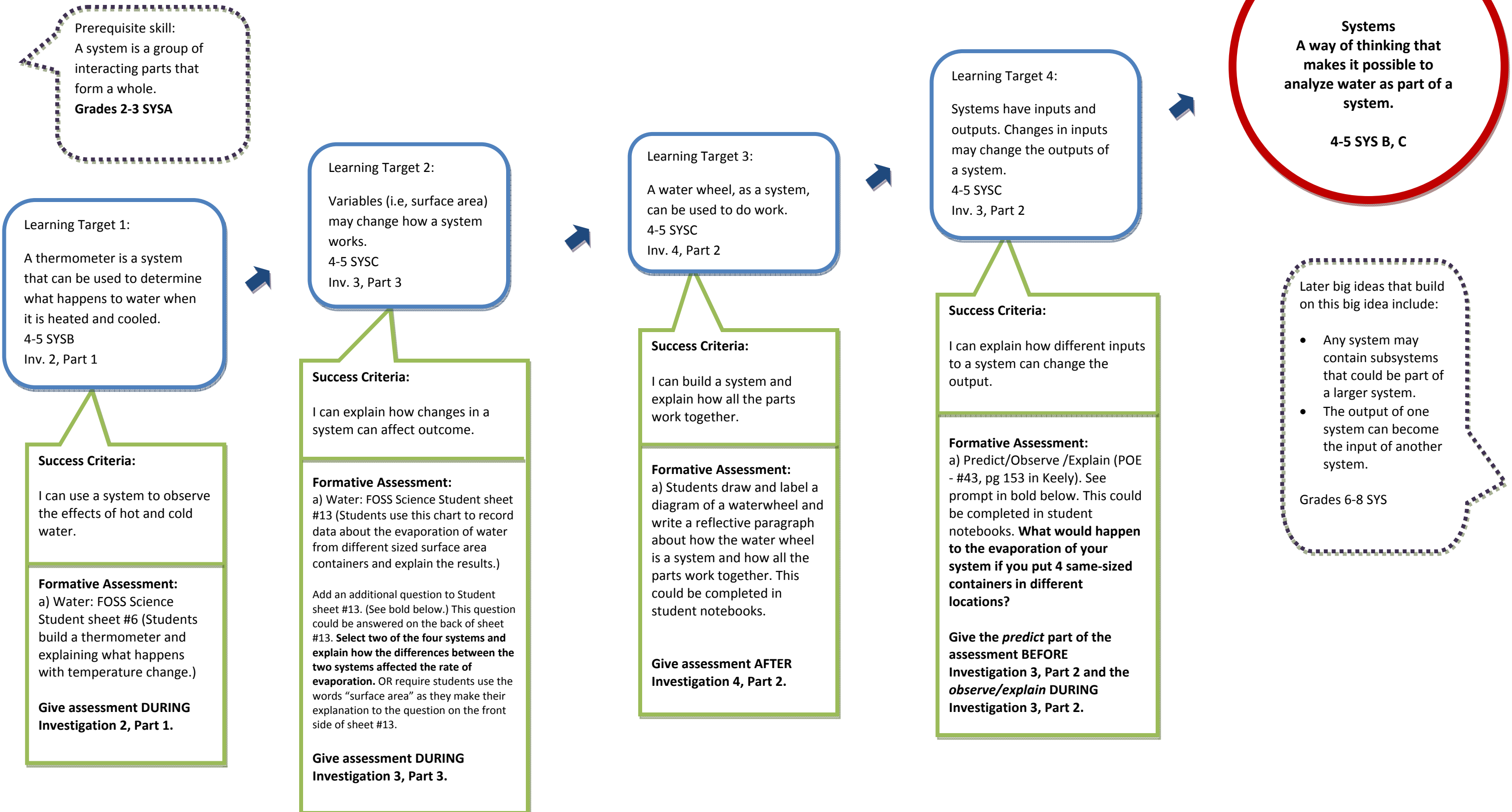
Condensation



States of Matter
Venn Diagram
SOM#3

Learning Progression

FOSS Water Investigation 2, 3, 4



WATER

Big Idea: **Systems.** A way of thinking that makes it possible to analyze water as part of a system.
4-5 SYS B, C

Formative Assessment Task Cover Sheet

Learning Target 1a	
Assessment Task Details	Teacher Background
Brief Description of the Assessment Task: FOSS Science Student sheet #6 (Students build a thermometer and explaining what happens with temperature change.)	Administration Tips: Give assessment DURING Investigation 2, Part 1.
Learning Target 1: A thermometer is a system that can be used to determine what happens to water when it is heated and cooled. 4-5 SYSB	
Success Criteria: I can use a system to observe the effects of hot and cold water.	
Student Task Sheet Included: No Student Work Samples Included: No	

WATER

Big Idea: **Systems.** A way of thinking that makes it possible to analyze water as part of a system.

4-5 SYS B, C

Learning Target 2a	
Assessment Task Details	Teacher Background
<p>Brief Description of the Assessment Task: FOSS Science Student sheet #13 (Students use this chart to record data about the evaporation of water from different sized surface area containers and explain the results.)</p> <p>Add an additional question to Student sheet #13. (See bold below.) This question could be answered on the back of sheet #13. Select two of the four systems and explain how the differences between the two systems affected the rate of evaporation. OR require students use the words “surface area” as they make their explanation to the question on the front side of sheet #13.</p>	<p>Administration Tips: Give assessment DURING Investigation 3, Part 3.</p>
<p>Learning Target 2: Variables (i.e, surface area) may change how a system works. 4-5 SYSC</p>	
<p>Success Criteria: I can explain how changes in a system can affect outcome.</p>	
<p>Student Task Sheet Included: No Student Work Samples Included: No</p>	

WATER

Big Idea: **Systems.** A way of thinking that makes it possible to analyze water as part of a system.

4-5 SYS B, C

Learning Target 3a	
Assessment Task Details	Teacher Background
<p>Brief Description of the Assessment Task: a) Students draw and label a diagram of a waterwheel and write a reflective paragraph about how the water wheel is a system and how all the parts work together. This could be completed in student notebooks.</p>	<p>Administration Tips: Give assessment AFTER Investigation 4, Part 2.</p>
<p>Learning Target 3 A water wheel, as a system, can be used to do work. 4-5 SYSC</p>	
<p>Success Criteria: I can build a system and explain how all the parts work together.</p>	
<p>Student Task Sheet Included: No Student Work Samples Included: Yes</p>	

Learning Target 4a	
Assessment Task Details	Teacher Background
<p>Brief Description of the Assessment Task: Predict/Observe /Explain (POE - #43, pg 153 in Keely). See prompt in bold below. This could be completed in student notebooks. What would happen to the evaporation of your system if you put 4 same-sized containers in different locations?</p>	<p>Administration Tips: Give the predict part of the assessment BEFORE Investigation 3, Part 2 and the observe/explain DURING Investigation 3, Part 2.</p> <p>Suggestions for Instructional Adjustments: Have students predict what would happen to evaporation of the four containers in different locations before the investigation begins. During the investigation, students write notes on their observations. And then they explain the data and write conclusions based on their predictions and observations.</p>
<p>Learning Target 4 Systems have inputs and outputs. Changes in inputs may change the outputs of a system. 4-5 SYSC</p>	
<p>Success Criteria: I can explain how different inputs to a system can change the output.</p>	
<p>Student Task Sheet Included: No Student Work Samples Included: No</p>	

WATER

Big Idea: **A way of thinking that makes it possible to analyze water as part of a system. (4-5 SYS B, C)**

Target 3, Assessment: 3a Waterwheels

Formative Assessment Student Work Cover Sheet

Student Work Description

Sample 1: Student accurately labeled the waterwheel and seems to understand that a system is made of parts and that when one part doesn't work; it affects the system as a whole.

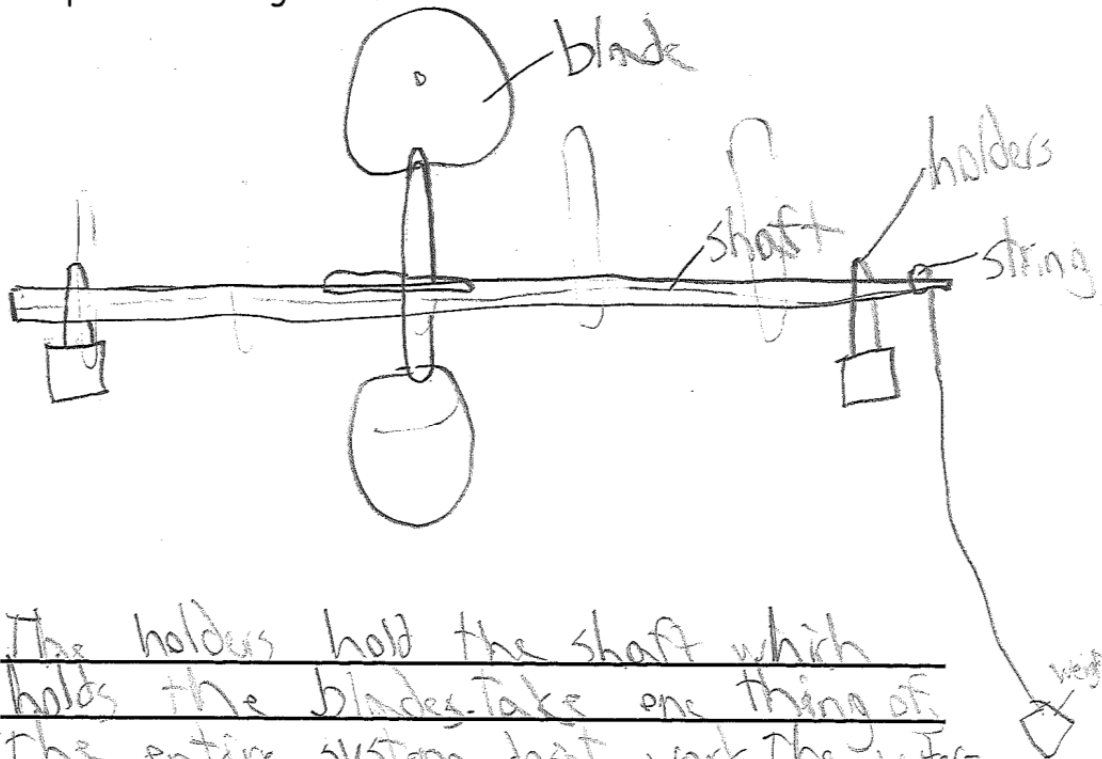
Sample 2: Student accurately labeled the waterwheel (although the shaft label is a little confusing) and seems to understand that a system is made of parts and he/she attempts to explain how the parts interrelate. However, the explanation lacks some clarity and the remark about the "basin carries the water" is confusing.

Sample 3: Student accurately labeled, including a title, the waterwheel (the weight is shown on the diagram, but not labeled) and seems to understand that a system is made of parts and the parts work together. More clarification on how team/teammates works together like a system would be helpful.

Waterwheels

Name #1

Draw and label a diagram of a waterwheel. Write a reflective paragraph about how the waterwheel is a system and how all the parts work together.

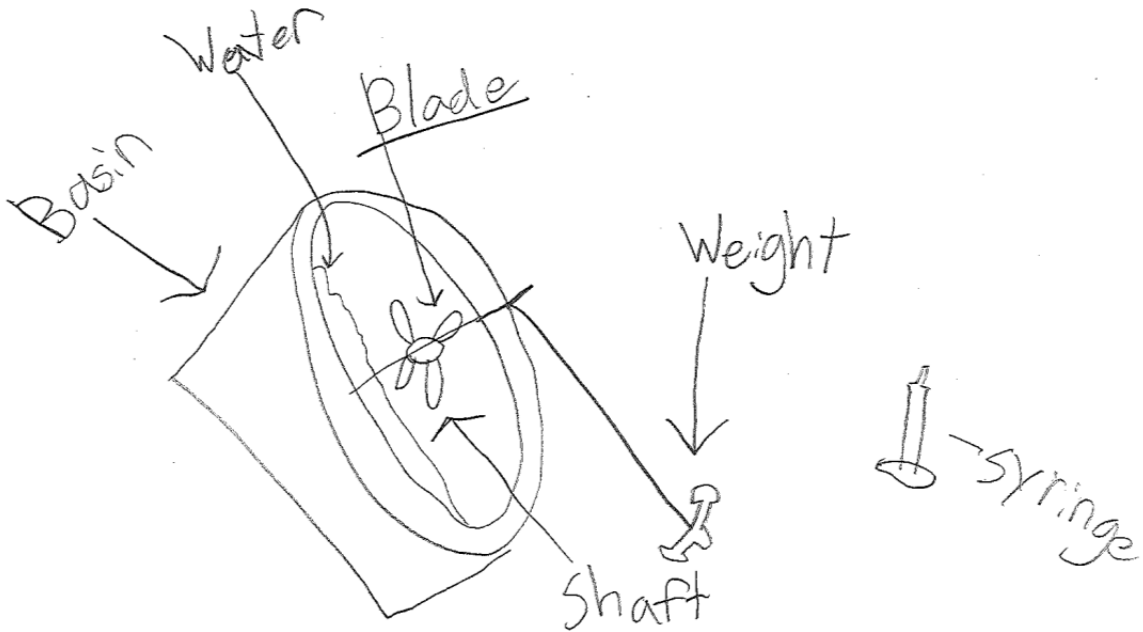


The holders hold the shaft which holds the blades. Take one thing off the entire system doesn't work. The waterwheel is a system of many parts or subsystems. The holders, blades, and the shaft all work together to form the waterwheel.

Waterwheels

Name #2

Draw and label a diagram of a waterwheel. Write a reflective paragraph about how the waterwheel is a system and how all the parts work together.

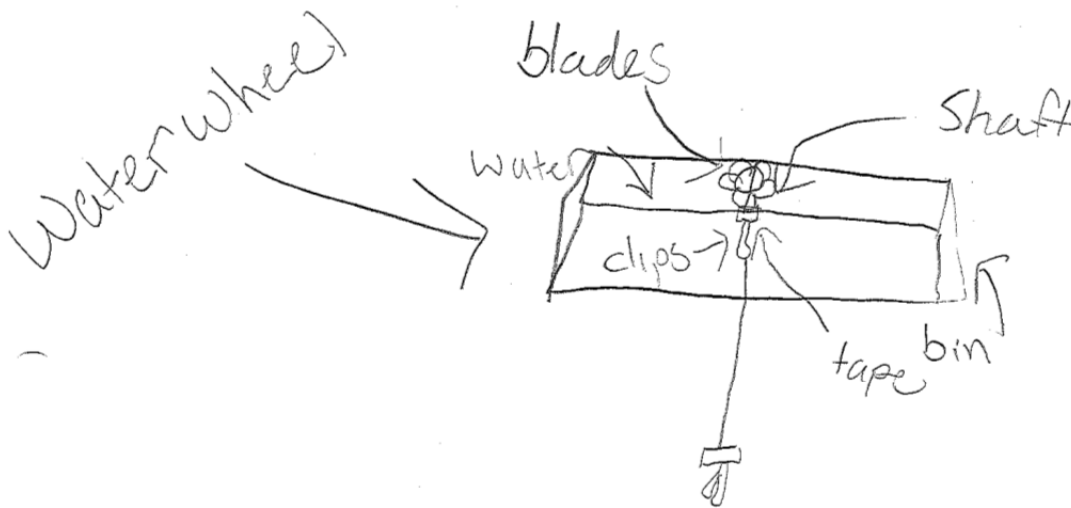


The parts of the water wheel work together as a system because the blades carry the weight, the shaft holds the blades in place, and the basin carries the water.

Waterwheels

Name #3

Draw and label a diagram of a waterwheel. Write a reflective paragraph about how the waterwheel is a system and how all the parts work together.



If the systems parts work together one can't be broken because that would effect the whole thing and all the parts. These parts including the string, shaft blades, and other parts work together like a team as teammates. That is what makes a system.

WATER

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