

# Welcome to Water Wonders!



on view at MOHAI through January 3, 2022

Created by Grande Experiences, *Da Vinci —Inventions* brings to life the genius of Leonardo as an inventor, artist, scientist, anatomist, engineer, architect, and more.

Draw inspiration from Leonardo da Vinci's inventions and explore how we move over, under, and through water with fun activities to do at home and around MOHAI.

*Included in this activity pack:*

- Properties of water
- Buoyancy challenge
- Bridge challenge
- Water wondering walk

Generous support provided by **amazon**



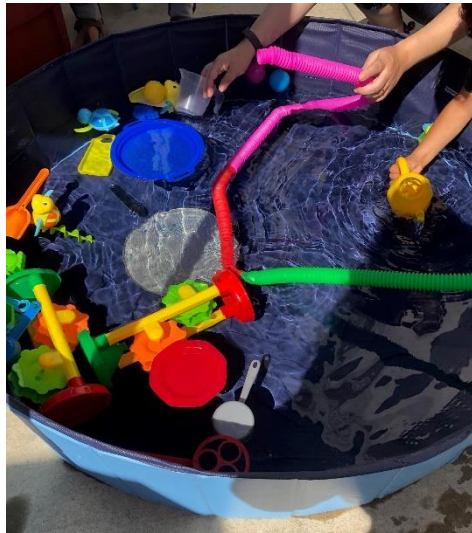
## Water is all around us!

Leonardo da Vinci studied the natural world around him. His experiments and observations helped him design and create all sorts of inventions.

Did you know that water can be found in the three major states of **matter**? Matter can be described as any object that takes up space and has mass.

- Water freezes and becomes ice, **a solid**, at temperatures under 32°F/ 0°C
- Water as **a liquid** feels wet and fluid. It flows and fits the shape of its container.
- Water evaporates into water vapor, **a gas**, at 212°F/110°C

*Where have you seen or felt water in each state?*



## Explore water at home!

Get your hands wet and experience the different ways water moves!

*What you'll need:*

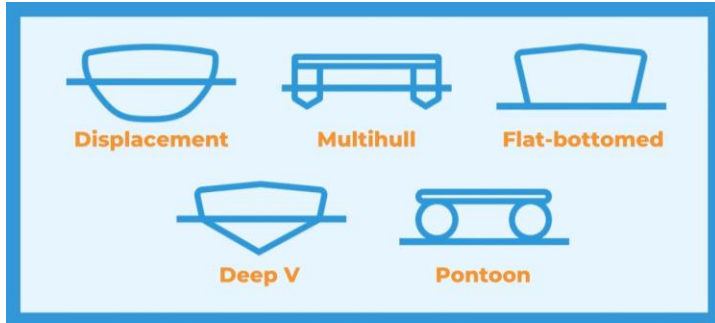
- A kiddie pool, sink, or tub
- A variety of water-proof or -resistant objects of different materials, densities, and shapes: marbles, ping pong ball, ladle strainer, spoons, plastic bowl, measuring cups, plate, drinking straw, whisk, syringe/turkey baster, etc.

*Test out how your objects interact with water:*

- Try using different objects in the tub and see what you notice and feel!
- What do you notice about the water as you fill and pour with different containers?
- How many different ways can you make the water move?
- Are some objects easier to move through the water than others? Why do you think that is?



**Buoyancy** is the ability of an object to float, caused by the upward pressure of the liquid against the submerged object. When an object is submerged in water it moves or **displaces** the water. Water pushes up against the object with a force equal to the weight of the water that is displaced. How much water is displaced is determined by the object's density (the mass of an object relative to its volume).



*Different boat shapes affect both buoyancy and the ability of the boat to move forward through water.*



## Explore buoyancy at home!

Design a boat out of only two (2) sheets of aluminum foil and test its ability to stay afloat as weight is added.

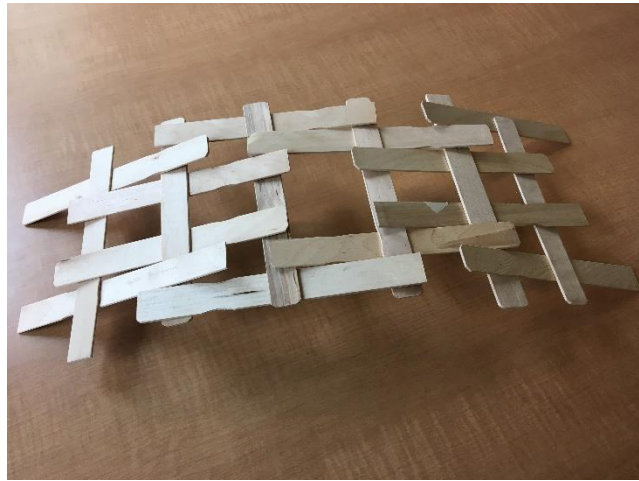
*What you'll need:*

- Aluminum foil sheets or two pieces approximately
- Pennies or any similarly small items of equal weight
- A tub or sink filled with water

*What you'll do:*

- Think about what kind of boat design or shape you would like to make. Draw or sketch your ideas if it helps!
- Build a boat using only the two sheets of aluminum foil and no additional parts – you *can* divide the foil into additional pieces.
- Test your boat prototype in the tub of water. Does it stay afloat? Is it balanced?
- How many washers can you put in the boat before it sinks?
- During testing, observe your boat's strengths and weaknesses. Does the way that the weight is loaded matter? What would you try differently next time?





Leonardo da Vinci designed a bridge that is portable, temporary, and requires no fasteners. Build a version of your own at home!

*What you'll need:*


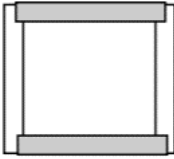
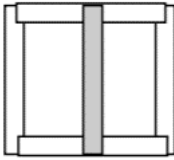
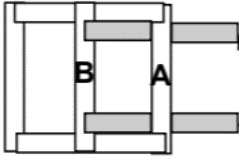
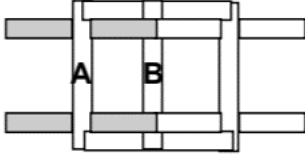
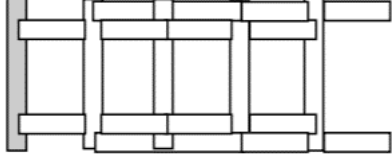
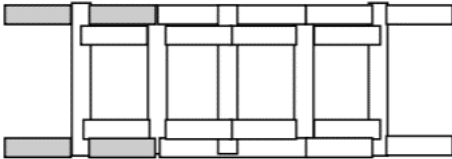
- 18 wooden paint stirrers OR 18 jumbo popsicle sticks

*What you'll do:*

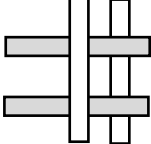
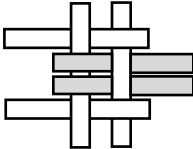
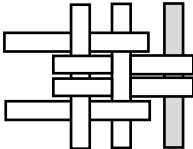
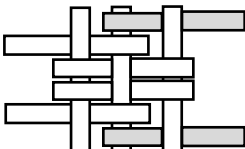
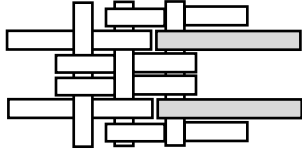
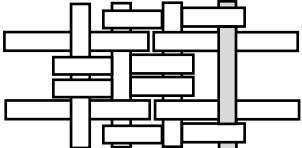
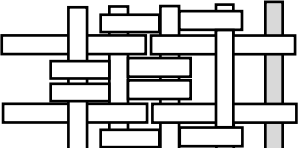
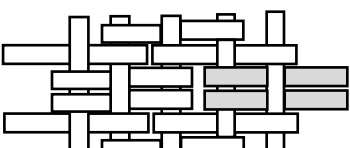
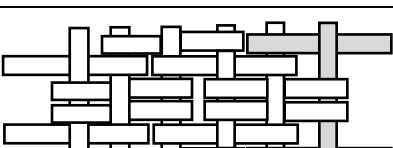
- First, take a look at the above photos. How do you think this bridge is constructed or put together?
- We've included two different step-by-step versions of how to assemble the bridge. The technique is essentially the same, but one version might be easier to follow than the other.
- Want a big challenge? Try figuring out how to put it together without looking at the instructions!



*Build your bridge from the center outward!*

<p>1. Place two beams (paint sticks) parallel to each other like railroad tracks</p>	
<p>2. Place two more beams on top of the first two to form a square</p>	
<p>3. Put the next beam on top of and in the middle of the square, parallel to the first two</p>	
<p>4. Carefully weave two new beams under beam A and over beam B</p>	
<p>5. Repeat on the other side</p>	
<p>6. To make the bridge longer, add another cross beam under the end</p>	
<p>7. Then slide two new beams under and over the new beams A and B (repeat the pattern)</p>	

*Build your bridge left to right!*

<p>1. Weave two horizontal beams under and over two vertical beams</p>	
<p>2. Add two new horizontal beams on the right side by weaving them under the right beam and over the left beam</p>	
<p>3. Add a new vertical beam by sliding it underneath the right ends of the inner-most horizontal beams</p>	
<p>4. Weave two new horizontal beams under and over the right two vertical beams, and sandwiching all other existing horizontal beams</p>	
<p>5. Lay two new horizontal beams on top and just inside the last two horizontal beams</p>	
<p>6. Weave a new vertical beam under the outermost and over the innermost horizontal beams</p>	
<p>7. Slide a new vertical beam under the right end of the bridge</p>	
<p>8. Weave two new horizontal beams under the outermost and over the next vertical beams</p>	
<p>9. Finish the pattern, sliding a new vertical beam underneath the ends and weaving two new horizontal beams under and over the vertical beams</p>	





## **Water is all around us!**

Leonardo da Vinci studied the natural world around him. His experiments and observations helped him design and create all sorts of inventions.

Explore the wonderful world of water in Lake Union Park with the self-guided exploration on the remaining pages.






We recommend printing and cutting the pages in half, laying them on top of each other, then binding the top left corner with a stapler, binder clip, or hole punch plus string.

Suggested stops are included, but the cards can be used in any order and almost anywhere in the park.



# WATER WONDERING WALK

Explore the wonderful world of water in Lake Union Park!  
These cards contain activities, conversation starters, and  
prompts for looking closely at:

-  Water
-  Boats
-  Plants
-  Humans
-  Crittters



Suggested stops included, but the guide can be  
used almost anywhere in the park.





# SUGGESTED

## STOPS



Spray park



Historic Ships Wharf



Center for Wooden Boats



Footbridge



West waterway



# HUMANS

How are people interacting with water?

## ᖃᖆᖅᖅ

The Lushootseed name for this lake used by the Duwamish and other Coast Salish people means Small Lake. Since American settlement, it has been the site of many industries including logging, manufacturing, military, and hi-tech, and its landscape has been drastically altered by the construction of the Lake Washington Ship Canal in the 1910s.

**Observe:** As you walk around the park, which of these activities do you see (or see evidence of)?



Swimming



Industry



Fishing



Leisure boating



Construction



Living (ex: houseboats)



**Wonder:** What impacts do these different activities have on the environment?

**Suggested stop: Footbridge**—What does the bridge feel like as you move across it? How is it supported?



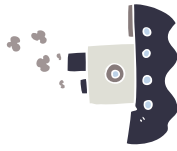
# WATERCRAFTS

How do boats work?

## Helpful word:

- Buoyancy—the ability of an object to float; caused by the upward pressure of the liquid against the submerged object.

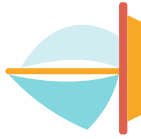
**Observe:** As you take a look at different boats and ships around the park, how are they powered?  
How are they shaped differently?



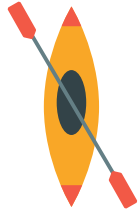
Steam



Gas motor



Wind



Paddle

**It's a boat, it's a plane, it's both!** Boeing's first hangar was located on Lake Union. The B-1 Seaplane in the MOHAI atrium is the oldest Boeing plane that still exists.



**Wonder:** How are the shape, power, and use of a boat related to each other?

**Suggested stop: Historic ships wharf** - Try to figure out the original function/use of each of the ships just by looking at them.



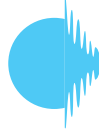
# WATER

How does water move or respond to light?

## Some properties of water:

- Cohesion—water molecules are attracted to each other; cohesion is responsible for water's strong surface
- Adhesion—water is attracted to other substances; it's what makes water seem "sticky"

**Observe:** As you walk around the park, can you spot the following phenomena?



Reflections



Bubbles



Ripples



Splashes



Waves

**Wonder:** Where is the water still vs. moving? Where is it clearest? Why do you think that is?

**Suggested stop: Spray park** - Observe the formation and separation of droplets as water falls.



# PLANTS

*What plants thrive near water?*

## Helpful words:

- Aquatic—relating to water, living in or near water, or taking place in water
- Invasive species—an organism that causes ecological or economic harm in an environment where it isn't native

**Observe:** As you walk around the park, can you spot these water loving plants?



Horsetail



Lily pad



Willow tree



Cattail



Rush



Water milfoil



**Wonder:** What features do these plants have that help them live in or near water?



## Suggested stop: Center for Wooden Boats -

What animals, plants, and physical features make up this ecosystem? How are they connected or interacting with each other?

# CRITTERS

*What animals thrive near water?*

## Did you know?

Migratory salmon and steelhead trout use the lake as a pathway to lakes Washington and Sammamish.

**Observe:** As you walk around the park, can you spot these water loving creatures?



Ducks



Dragonfly



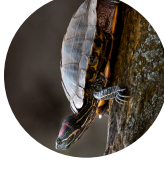
Sea gull



Fish



Geese



Turtle

**Wonder:** What features do these animals have that help them live on, in, or near the water?



**Suggested stop: West waterway -** This area is a favorite of herons and turtles. Why do you think that is?