Lesson Title: Design Challenge: Chairs!
Grades: 2-4
Time Required: 1-2 class periods
Subject Areas: Visual Art, Math

Lesson Overview: Students look at a variety of chairs created at different times, analyzing design considerations for each. Students then measure their classroom chairs and then solve word problems to design a new chair for a specific purpose.

Standards Addressed:

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<th>Common Core Math Standards</th>
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<td>CCSS.MATH.CONTENT.2.MD.A.1</td>
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<td>Brainstorm multiple approaches to a creative art or design problem.</td>
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Speculate about processes an artist uses to create a work of art

Learning Objectives:

Students will be able to:

• Measure the length of an object
• Add and subtract measurements
• Design their own chair according to certain criteria

Artworks in Focus:

Click on the links below to access these images through the Wadsworth’s Public Portal. Once on the portal, click on the image to view the object information. Click on the image again to download a jpeg version of the work. NOTE: The works of art used in this lesson may not currently be on view at the museum.

John H. Most and Charles Burger, Charter Oak Chair, 1857
Turned Chair, 1665-85
Gustav Stickley, Eastwood Arm Chair #2638, 1903
Eero Saarinen, Womb Chair and Ottoman, c.1948

Materials

• Images of a chairs from the museum’s collection (using the above links)
• Projector and screen/ SMART board
• Measuring tapes or rulers
• Variety of materials used to make chairs (i.e. wood, metal, cardboard, types of cloth)
• Copies of the Change Your Chair Worksheet
• Copies of the Draw Your Chair Worksheet

Lesson Procedures

1. Project the images of chairs from the museum’s collection, introducing students to the idea that chairs have some of the same “body” parts as they do. Work together to identify the arms, legs, seats, and backs of the chairs.

2. Discuss what is different and similar about the chairs, using the following suggested questions:
• For each chair, have students identify the arms, legs, seats, and backs of the chair.
• What is this chair made out of? Can you identify the materials used? What would it feel like to touch? What do you think the chair would be like if it was made from a different material?
• When do you think this chair was made? What makes you say that? Imagine trying to make this chair, how would you go about it?
• What shapes, lines, and colors can you see?
• Is this chair decorated? If so, in what way?
• Imagine sitting in this chair. Would it be comfortable? Why or why not?
• Can you imagine where this chair might live? In a house? An office? Somewhere else? Try to imagine the room it lives in, what does it look/sound/smell like?
• Who do you think might own or use this chair? What makes you think that? What do you think they would be doing while sitting in this chair.

3. Conclude by telling students that people who create chairs need certain measurements to do their job. These measurements are called design specifications. Today, they are going to be chair designers, and will be practicing their measuring and addition/subtraction skills to create their very own chair design.

4. Distribute measuring tapes and pair students off to complete the following measurements. You may want to model how to measure each part of a chair first. They can use the Change Your Chair Worksheet to record them.
   • The height of their chair legs
   • The length and width of their seat (at its widest point if irregular)
   • The length and the width of their chair back (at its widest point if irregular)
   • The length of their armrests (if applicable)

5. Next, tell students they are going to imagine changing chairs, and have them adjust their chair’s measurements using addition and estimations according to the prompts on the Change Your Chair Worksheet. Depending on your students’ level of understanding, you may want to complete the worksheet as a class or in small groups.

6. Finally, ask students to draw one of the alternate designs that they planned out in the previous step on The Draw Your Chair Worksheet, completing the design specification table, noting the new measurements, the materials, and the intended use for their chair.

Extension: To connect with social studies, you could add in a discussion of the methods/materials used to make chairs in a particular period or changes in methods/materials used over time.
BACKGROUND INFORMATION

*Turned Armchair*, 1665-1710, Attributed to Ephraim Tinkham II, Maple, ash, and rush, 1926.395

“The earliest European settlers in America arrived with only the most basic provisions to re-create their material existence. Most brought little in the way of furniture beyond a chest, small boxes, and other simple storage containers. Plentiful American timber made it unnecessary to ship bulky furniture across the Atlantic at a great expense: thus, from the beginning, furniture making was an essential trade in the colonies... There were two branches of the furniture-making trade during the seventeenth century: joiners, who “joined” together straight wood that had been shaped with axes and saws and smoothed with planes; and turners, who shaped wood with chisels and gouges while it spun, or turned, on a lathe...Turned chairs were cheaper than joined ones because of the speed with which their component parts could be turned on a lathe and the simple round mortise-and-tenon joints that held them together. By contrast, joined chairs relied on more complicated rectangular mortise-and-tenon joints, which required more time to lay out, saw, and fit.”

Turned chairs were usually simple and only had the basic parts they needed to support a sitter. This chair is special because Tinkham added many extra turned elements to create decorative patterns. He turned thirty-nine separate parts to complete it. Someone looking at this chair would have been impressed by his skills. You may notice that there is a large space between the seat and the rails. This is because chairs like this were meant to have a cushion placed on the seat.

*Charter Oak Chair*, 1857, John H. Most and Charles Bunger, White oak, brass, and modern upholstery, 1905.1579

During the 19th-century in America, furniture makers began looking to nature for inspiration for their designs. This chair is an example of how they made furniture that mimicked the look of objects from nature, in this case, the look of the Charter Oak tree.

This chair was made from the wood of the famous Charter Oak tree. In 1687 the British governor of New England tried to seize the charter that guaranteed Connecticut’s right to self-government. According to legend, Daniel Wadsworth’s ancestor Joseph Wadsworth hid it in the hollow of an oak tree. The tree became known as the Charter Oak and was celebrated across New England as a symbol of American liberty from the 1820s onward. In the 1840s and 1850s, many Connecticut residents, particularly its politicians and businessmen, tried to connect themselves with the Charter Oak because it was such a powerful symbol. After the Charter Oak fell in a storm on August 1, 1856, a seemingly impossible number of objects were carved from its wood as mementos of this Connecticut relic.

The Hartford City Council commissioned John Most, a talented German woodworker, and Charles Burger, his shop carver, to transform remnants of the Charter Oak tree into a chair for the mayor. Its knobby, interwoven shape resembles the ancient tree, and the two carved shields on the back depict the seal of Hartford and the

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1 Unless otherwise noted, text is drawn from label copy produced for the Wadsworth Atheneum exhibition *Simply Splendid: Rediscovering American Design* (May 13 – August 13, 2017).


TEACHER RESOURCE
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coat of arms of Connecticut. The council did not pay Most’s $375 bill, and the chair was subsequently purchased by the firearms manufacturer Samuel Colt for $500. The chair was just one of several objects carved from Charter Oak wood that Colt acquired or commissioned.

*Arm chair, model no. 2638, c. 1903, Gustav Stickley, Oak, leather, and copper, 2009.11.1-2*

During the late 19th- and early 20th-century, many American furniture makers were inspired by the Arts and Crafts movement, which had started a few decades earlier in Great Britain. This art movement promoted furniture that was handmade, had simple, clean lines, and showed evidence of how it was made. Arts and Crafts designers would have thought the Charter Oak chair was gaudy and over the top.

Born in Wisconsin to German immigrant parents, Stickley learned the furniture trade in Pennsylvania and upstate New York through a series of jobs and partnerships. He eventually founded his own furniture company and this is one of the first chairs that he made. His employees used some traditional woodworking techniques that went back to the colonial period. Like other Arts and Crafts chairs, it has simple, clean lines and no added decoration. Stickley thought that the lines of the chair and the grain of the wood are what made it beautiful. Instead of hiding the thin wooden pins that held the chair together, he highlighted them by using a slightly different color of wood. You can see some of them on the front of the chair legs.

*Womb Chair and ottoman, c. 1948, Eero Saarinen, Molded plastic, foam rubber, upholstery, and steel, 1976.93A,B*

In the early and mid-20th century, American furniture makers were exploring how they could use technology to create new furniture forms. They were particularly interested in the possibilities offered by molded plastic and metal. These materials allowed them to make new shapes and to create furniture that was more affordable than traditional wooden furniture. Though their furniture looked very different, they shared 19th-century furniture makers’ interest in nature and used organically-inspired curves and shapes in their work. Part of the appeal of natural forms for the 20-century designers was their ability to fit the shape of the human body. They thought a lot about how furniture could best support our bodies.

Eero Saarinen designed this chair for Knoll Associates, Inc., for whom he designed many pieces of furniture. Like other designers of the time, Saarinen was thinking about the human body when he created it. He made it to fit someone sitting in a relaxed posture and designed an ottoman to go with it. Knoll still sells this design today.
Change Your Chair Worksheet Part A

Instructions: Measure the chair that you usually sit in at school using a ruler or tape measure. Record your answers below.

1. Measure the height of your chair legs. The height is ___________ inches.

2. Measure the length and width of your chair seat. The length is ___________ inches. The width is ___________ inches.

3. Measure the height and width of your chair back. The height is ___________ inches. The width is ___________ inches.

4. If your chair has armrests, measure how the length and width of one of the armrests. The length is ___________ inches. The width is ___________ inches.
Change Your Chair Part B

Now imagine that you could change the measurements and materials of your chair. Answer the questions below using inches.

1. How tall would you make the chair legs if you wanted to sit in your chair with a dog? What if you added a water bowl for the dog? Where would you put it?

   The new height of the legs would be ____________ inches.

   I would put the dog’s water bowl _____________________.

2. How wide would you make your chair seat if you wanted to sit in your chair with your best friend? What if you added a chair cushion, what color would you make it?

   The new width of the chair seat would be ____________ inches.

   The color of my seat cushion would be _________________.

3. How tall would you make your chair back if you wanted to use it to hide in a game of hide-and-seek? What shape would you make your chair back?

   The new height of my chair back would be ____________ inches.

   The shape of my chair back would be_________________.

4. How long would you make your chair’s armrests if you wanted to use them to race toy cars? What material would you use to make the cars go really fast?

   The new length of my armrests would be_______________ inches.

   The material of my arm rests would be _____________________.


Draw Your New Design

Choose one of the chair ideas from the questions and imagine what it would look like. Draw the new chair design below. Use your answers from the Change Your Chair worksheet to help complete the Design Specification Table.

Design Specifications:

Measurements:

a) Height of the legs:

__________ inches

b) Width of the seat:

__________ inches

c) Length of the armrest:

__________ inches

d) Height of the chair back

__________ inches

Materials:

Use: