KIDSPACE

MASS MoCA Teachers' Guide 2014 – 2015

Table of Contents

About Kidspace at MASS MoCA

Staff Contacts

Partnership Programs
Amanda Tobin
Senior Museum Educator
(413) 664.4481 x8154
atobin@massmoca.org

Schedule a Tour
Hilary Knecht
Museum Educator
(413) 664-4481 x8150
hknecht@massmoca.org

Art Assembly
Catherine DeGennaro
Assistant to Director
of Performing Arts
(413) 664-4481 x8109
cdegennaro@massmoca.org

Education Department
Laura Thompson, Ed.D.
Director of Education
& Kidspace
(413) 664-4481 x8154
lthompson@massmoca.org

Kidspace at MASS MoCA is a child-centered art gallery and hands-on studio that presents thematic exhibitions and educational experiences in collaboration with leading artists.

Kidspace at MASS MoCA is an award-winning contemporary art gallery that also features the ArtBar, an art-making studio that The Boston Globe raved "may be the best organized, the best equipped, and the most ambitious space dedicated to children in any New England art museum." In its 15th year, the Kidspace program has annually provided every student in Pre-K – 8th grade in the North Adams Public Schools and North Berkshire School Union with field trips to Kidspace and the museum's main galleries, as well as participation in one Art Assembly performing arts program. Additionally, numerous students are provided with opportunities to work alongside professional artists, 100+ teachers with professional development and classroom curriculum materials, dozens of teens with after-school artist residencies, and over 35,000 visitors with free public gallery hours.

Kidspace's thematically curated exhibitions are designed to explore social issues and topics important to children, and form the basis upon which educational programs are organized. Central to this curatorial vision is the belief that exhibitions should not be "kiddified" or "dumbed-down" for children. Past themes have included gender and identity, the environment, food, freedom, and curiosity.

Other educational initiatives across MASS MoCA
MASS MoCA offers a wide range of learning opportunities for students, teenagers, teachers, adults, and families. Programs include hands-on workshops and art classes, lectures, schooltime performances, artist talks, guided tours, art camps, and after- school activities.

Non-partner schools
Non-partner school teachers can arrange tours of the museum with a focus on STEAM (Science, Technology, Engineering, Arts, and Math), or tours can be tailored to teachers' needs. Art Assembly performances are open to all schools and will be held in December and in the spring.

What is STEAM?

Science
Technology
Engineering
Art
Math

This year's Kidspace curriculum is based on the pedagogical concept of "STEAM." An expansion of STEM (Science, Technology, Engineering, and Math), STEAM believes in the inclusion of the A (Art) as a necessary component for children's development of effective problem-solving, creativity, and critical thinking skills. In the words of former Rhode Island School of Design President John Maeda, a pioneer of the STEM-to-STEAM movement, "whether today's students go on to be artists, doctors or politicians, we know that the challenges their generation faces will demand creative solutions."[1] Therefore, the inclusion of the arts into the core curriculum is essential. It is our hope that through the activities presented in this guide, teachers can direct students toward a STEAM-based understanding of the human body and its beautiful inner workings, and also apply the skills gained through creative and critical thinking in their classrooms and beyond.

---

1. J. Maeda. (2012, Oct. 2) **"STEM to STEAM: Art in K-12 is Key to Building a Strong Economy."** [Web log comment]. Retrieved from http://www.edutopia.org/blog/stem-to-steam-strengthens-economy-john-maeda

About This Guide

This guide is a resource for teachers based on the idea that the STEM disciplines (science, technology, engineering, and math) support arts education and creative development in children. The activities presented here primarily focus on the 2014-15 Kidspace exhibition It's Only Human, which features artists who use medical technology to produce original works of art exploring the human body. Following the artists' examples, the activities in this guide use STEM principles as the basis for understanding and interpreting art and creating art projects. They are aligned with the Common Core standards and can be modified to fit individual classroom goals.

While we encourage those in our area to visit MASS MoCA, it is by no means a prerequisite for using this guide, which can stand alone as an educational resource.

Artists and STEMers*
What do they have in common?

Although our society has long thought of artists and STEMers as working in entirely separate fields, almost as if they are different species with opposite brains, recent trends in education have demonstrated that this dichotomy is inaccurate. While motivations and final products still appear dissimilar, artists and STEMers actually have much in common.

Tools

Both artists and STEMers need an awareness of the tools, materials, and technology available that will best work for their projects. Some artists and STEMers know how to use these tools themselves, while others reach out to experts for support.

Content

Both artists and STEMers need to acquire knowledge of the world around them to include content that makes their work relevant and interesting.

Self-awareness

Both artists and STEMers need to be aware of their own biases, beliefs, and interests that may influence their projects.

Process

Both artists and STEMers follow a similar creative procedure to address the problem at hand. This process roughly takes the following pattern:

- Identification of a Question or Concept to Explore
- Choice of Materials and Tools
- Experimentation / Creation / Tinkering
- Analysis of Process
- Repetition of Process / Modifications
- Critique of Results

---

*STEMers = shorthand for those who work in STEM fields: scientists, IT personnel, engineers, X-ray technicians, inventors, doctors, mathematicians, and so on...

STEAM at MASS MoCA

It's not a coincidence that all of the current MASS MoCA exhibitions have a STEAM connection: expressing or utilizing a variety of disciplines in art is inevitably part of how many artists work today. Plus, MASS MoCA has always presented visitors with ideas and concepts that invite multiple, interdisciplinary responses–it's in our DNA, as a former site of industry and a manufacturer of technological innovations. Many exhibiting artists choose to respond to this history, to employ technological advances in their craft, to address issues relating to the STEM fields, or all of the above.

Furthermore, artists often employ cutting-edge technology and other STEM-based tools in their work. At times, however, rather than operating new technology or acquiring difficult (and time-intensive) skills themselves, they rely on a team of experts (such as the art fabrication crew at MASS MoCA) who are able to contribute these advanced skills to the project. Many contemporary STEAM-friendly artworks, therefore, are the result of a collaborative effort rather than the work of one individual. Knowledge of available tools and the effective collaboration with others are additional techniques that artists must master.

Marilène Oliver, *Grand Finale*, 2007

KIDSPACE
JUN 2014 – MAY 2015

It's Only Human

Marilène Oliver
Nick Veasey

Using the content of human anatomy, Marilène Oliver and Nick Veasey turn traditional medical imaging technology on its head, creating photographs and sculptures that reveal our bodies underneath the surface. Through their use of state-of-the-art tools such as X-ray machines, MRIs, CT scanners, Photoshop, and laser printing, the artists delve into the inner workings of the body in an exploration of our shared humanity and the beauty inside all of us.

Oliver creates three-dimensional sculptures from MRIs and CT scans. By using digitized human bodies as her medium, she reveals the internal organs, bones, and systems of the body, but also explores human issues. In *Protest*, a 3D paper sculpture of a woman whose intestines are spilling out of her stomach, Oliver treats the controversial subject of using the human body as a tool for political protest. Her sculpture *Totems* comprises three towers of heads, derived from MRIs printed on laser-cut wood, that are hollowed out and filled with objects of personal resonance. The sculpture constitutes a metaphor for the treasures contained in our own histories.

Nick Veasey, *Skate Park*, 2013

KIDSPACE
JUN 2014 – MAY 2015

It's Only Human

Marilène Oliver
Nick Veasey

Veasey uses X-ray photography to create unusual images of the human body doing normal, everyday activities. He is known for scanning much more than just bodies: motorcycles, computers, clothing, bicycles, and even a bus appear in Veasey's work. By showing skeletons in the midst of their daily routines, he creates a bridge between our common physical makeup and the human experiences we all share, despite external differences. Visually arresting, Veasey's images invite the viewer to look closely and take the time to recognize the details that are revealed by the X-ray technology.

Teresita Fernández, *Black Sun*, 2014

1ST FLOOR
MAY 2014 – MAR 2015

As Above, So Below

Teresita Fernández

In her work at MASS MoCA, Teresita Fernández chose to use the technological **tool** of a 3D printer to construct her otherworldly, golden landscape sculptures. To create the works on view, Fernández required knowledge of the following **content**: geography (how landscapes look, how they are formed), the mining industry (her use of gold and graphite as materials), and ecology (to understand how people interact with their environments).

Darren Waterston, *Filthy Lucre*, 2014

3RD FLOOR
MAR 2014 – JAN 2015

Uncertain Beauty

Darren Waterston

Originally commissioned to paint a mural at MASS MoCA yet inspired by his research of famous painted rooms in art history, Waterston chose to include the **content** of his field's history as a basis for his own work: a reinterpretation of James McNeill Whistler's Peacock Room. Over the course of an eight-month residency, he collaborated with MASS MoCA's Art Fabrication team to analyze engineering problems throughout the installation **process** and develop creative solutions together.

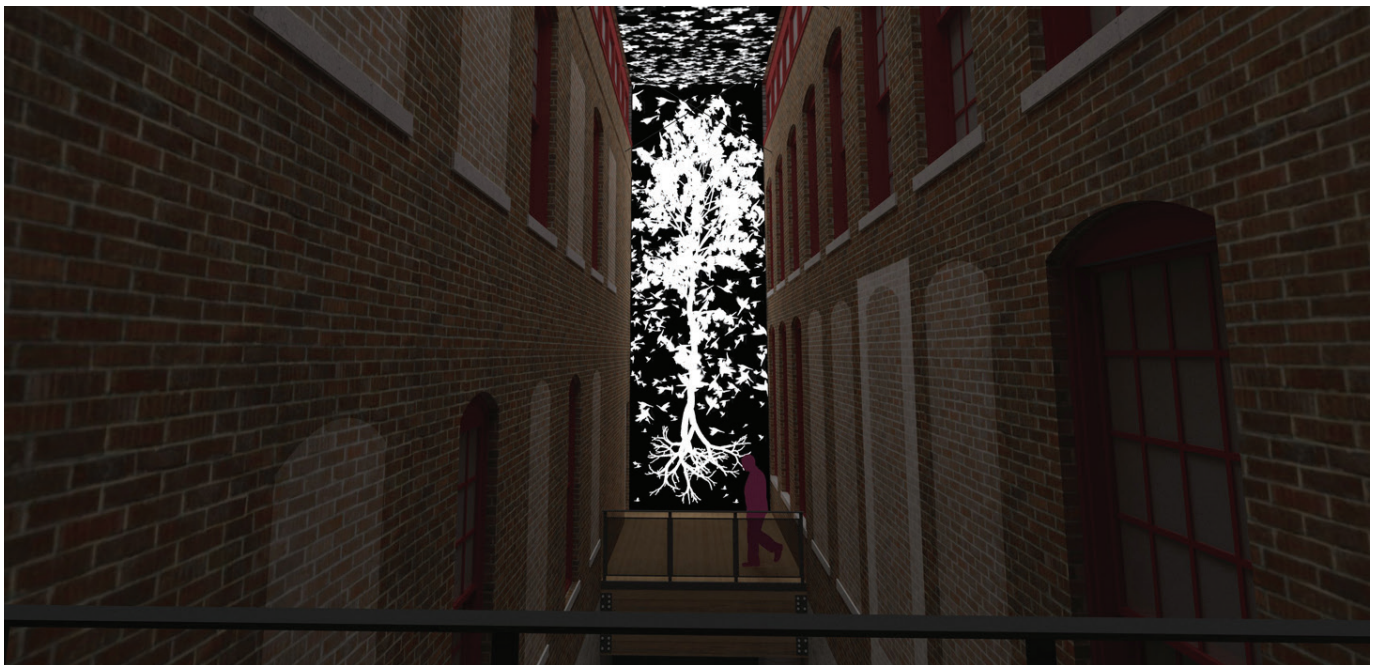
Lee Boroson, *Uplift*, 2013 – 2014

BUILDING 5
OCT 2014 – SEP 2015

Plastic Fantastic

Lee Boroson

Lee Boroson employs plastics to create large-scale, immersive environments that explore the relationship between natural and cultivated landscapes. He uses industrial products, **tools**, and **processes**, such as industrial sergers for sewing, plastic material, and industrial-grade glues and solvents. He incorporates the **content** of geology, natural phenomena, engineering, and weather, as well as a **self-awareness** of his subjective experience of nature and its cultural associations, similar to aforementioned artist Teresita Fernández.



Sayler/Morris , *Eclipse*, 2014

BETWEEN BUILDINGS 5 & 7
SEP 2014 – SEP 2015

Eclipse

Susannah Sayler
Edward Morris

As a commemoration of the extinction of the passenger pigeon (which took place on September 1, 1914), Sayler/Morris employed technological tools of digital video and projectors. They paired these tools with their knowledge (including both **content** and **self-awareness**) of environmental concerns and large-scale extinctions in a work that evokes the memory of this massive population that was destroyed a century ago.

Sol LeWitt, *Wall Drawing 631*, 1990 and *Wall Drawing 614*, 1989

BUILDING 7
ON VIEW THROUGH 2033

Sol LeWitt: A Wall Drawing Retrospective

Using architecture, mathematics, color theory, and design **content**, Sol LeWitt employed–and delegated–a STEM-like **process**. For each wall drawing, LeWitt conceived an idea, written as a set of instructions to be followed by a team of drafters who create the work of art. These artists reproduce the final wall drawings, executing the idea precisely while also being allowed the freedom to experiment with spacing, scale, and other aspects of the work.

A Note to Our Partner Schools

We are thrilled to be continuing our partnership with the North Adams Public Schools (NAPS) and the North Berkshire School Union (NBSU). Each of our program offerings this year will reinforce the concept of STEAM, in order to equip students with the creative skills necessary for 21st-century learning.

- Field trips to both Kidspace and the main MASS MoCA galleries will encourage students to see the connections between the arts and STEM disciplines.
- The art activity that students create during the field trip(s) will give them a hands-on opportunity to engage with STEAM modes of thinking and to produce a STEAM-based work of art.
- The artist residencies, with Nick Veasey and Marilène Oliver (NAPS) and with Lee Boroson (NBSU), will further reinforce how STEAM is used in the professional art world to address questions of personal and cultural significance.
- The residency with Marilène Oliver will be partnered with the November Art Assembly program with dancer Lawrence Goldhuber, which combines the visual arts, the performing arts, and STEAM content.
- The teachers' workshops provide teachers with an opportunity to experiment with STEAM activities for themselves and with the tools to implement these concepts in the classroom.
- Finally, teachers can further support STEAM goals by implementing the activities presented in this teachers' guide in the classroom, both before and after field trips.

Essential Questions & Learner Outcomes

The following questions and learner outcomes are addressed in the teachers' guide and during tours and programs at MASS MoCA.

Essential questions

1. What makes humans similar to each other, even if they are from a different family, race, or nation?
2. How can we use the tools and techniques of a STEMer in the arts? How might we use tools and techniques of an artist in the STEM disciplines?

Learner outcomes

Students will:

1. Describe the commonalities among the creative practices of artists and STEMers.
2. Apply close, careful observations and adopt multiple perspectives and alternative approaches to looking at objects and situations.
3. Articulate ways in which artists conceptualize and make their ideas a reality, and test these techniques in their own art-making practices.
4. Employ mindfulness techniques to tune in to their own body and feelings.

Pre-Visit STEAM Activities

A.

Body Scan

For teachers

Before starting the classroom activities with your students–or whenever you like–take some time to reconnect with your own body. Given the pressures of everyday life, we rarely stop and think about what our bodies need or the importance of simply taking a moment to breathe. Set aside a time for yourself and meditate on what makes you human, with this activity.

Pick a private, quiet spot and sit or lie down. Close your eyes and breathe deeply. Allow yourself some time to become aware of your breath (ten seconds or more). Then, begin to "send your breath" to different parts of your body: your face, nose, eyes, ears; your arms, wrists, fingertips; your stomach; your legs, knees, the tips of your toes; the ends of your hair; and so forth.

How did you feel before the breathing exercise? How do you feel now? Are you more aware of how your body feels?

Try doing this exercise every day for a week, particularly during a stressful time. Take note of the changes in your body mentally, emotionally, and physically. Did your body feel more relaxed before or after the exercise? Did you notice things you had not noticed before?

For your students

We will be leading your students in a similar body scan when they visit Kidspace. This activity will inspire them to think about their bodies before observing Nick Veasey and Marilène Oliver's artwork in our exhibition *It's Only Human*.

You can also lead your own body scan with your class in your classroom, and while on the bus on your way to MASS MoCA for tours and Art Assembly performances. Ask your students how being on a bus made their bodies feel and how being in a moving vehicle affected their perceptions of their body parts. A body scan activity encourages students to visualize sending energy to various body parts, and is helpful for young children who are still building an understanding of their physical makeup.

B.
TECHNOLOGY

Understanding CT Scans, MRIs, and X-rays

Nick Veasey and Marilène Oliver use state-of-the-art medical imaging and digital technology to create the artwork exhibited in It's Only Human. While this technology is used mostly for medical procedures, the artists apply their knowledge of it in unconventional ways by creating art about our inner bodies.

To prepare your students for their visit to Kidspace, show them the YouTube videos below. The videos demonstrate how CT scans, MRIs, and X-rays work and the circumstances in which they are usually used. During your students' visits to the museum, Kidspace educators will focus on the artistic uses of these technologies, so it would be helpful for your students to have some background on the technical specifics about each type of imaging.

MRI
https://www.youtube.com/watch?v=LaAjrPbahBA

CT
https://www.youtube.com/watch?v=XDZR6QPOMiE
https://www.youtube.com/watch?v=A_6A4t8bc3k

X-ray
https://www.youtube.com/watch?v=diKlS-WW5PE
https://www.youtube.com/watch?v=DhVKdhtKBFE

Nick Veasey on his artistic process
http://inspire.adobe.com/2014/7/30/nick_veasey_s_hidden_world.html

X-rays are typically used to check for broken bones and fractures. CT scans are used to detect illnesses in the organs, such as heart disease or colon cancer. MRIs are commonly used to detect brain cancer, since they take very detailed pictures of the brain.

Point out that each of these technologies functions like a camera: they need light in order to work, and they take a picture of the body.

C.
BIOLOGY

Reviewing the Human Body

Before your visit(s) to MASS MoCA, please have your students review their knowledge of the human body, as it will support their understanding of the artworks they will see. Sharing a common ground with the artists and with each other about the parts of the body and the way bodies work will give students a foundation upon which to begin thinking about more complex concepts in the artists' work.

For younger students, review the names of different body parts. Use the song "Head, Shoulders, Knees, and Toes," and/or any of the following picture books to re-familiarize students with the anatomical content they will see at MASS MoCA:

- *All of Me!: A Book of Thanks*, by Molly Bang (PreK – K)
- *From Head to Toe*, by Eric Carle (PreK – K)
- *Bones*, by Steve Jenkins (K – 3rd)
- *The Bones You Own: A Book About the Human Body*, by Becky Baines (K – 3rd)

Older students can build on their understandings of the medical technology discussed in **Activity B** by reviewing what these technologies allow us to study, particularly the body's systems. What do they know about the skeletal system? The circulatory system? The human brain? Additional books that may be helpful include:

- *Inside the Body*, by Anita Ganeri and Giuliano Fornari (4th – 6th)
- *The Way We Work: Getting to Know the Amazing Human Body*, by David Macaulay (4th – 6th)
- *The Skeleton and Muscular System*, by Carol Ballard (7th and up)
- *Your Brain: How You Got It and How It Works*, by Tabitha M. Powledge (7th and up)
- *Medical Technology*, by Lisa Yount (7th and up)

D.
PERFORMING ARTS, VISUAL ARTS

Flesh on the Bones

MASS MoCA's Art Assembly programs offer regional youth the opportunity to experience today's most innovative performing artists in our professional theater spaces. The goal of these educational programs is twofold: to broaden children's experiences with art and to reveal ideas about the world using a multiplicity of modalities and art forms.

About the performance and performers

Body-ody-ody

The November Art Assembly performance, *Body-ody-ody*, features nine vignettes combining sculpture, dance, music, and video that look at the body part-by-part from the inside out. Oliver's visual art, which examines the body from the flesh to the bone, is paired with Lawrence Goldhuber's and Keely Garfield's short dances focusing on diversity and surprising connections. Medical texts recited both live and by computer-generated voices will take us on a journey through the majesty of our corporeal systems. Also joining in with her island rhythms is actress Rhetta Aleong.

Bios

Marilène Oliver works at a crossroads between new digital technologies and traditional print and sculpture, her finished objects bridging the virtual and the real worlds. She uses various scanning technologies, such as MRI and CT, to reclaim the interior of the body and create works that allow us to materially contemplate our increasingly digitized selves. Oliver exhibits internationally in both private and public galleries including the Victoria and Albert Museum, Royal Academy (UK), Frissiras Museum (Greece), Kunsthalle Ahlen (Germany), Casino Luxembourg (Luxembourg), The Glenbow Museum (Canada), and Chelsea Art Museum (New York).

Lawrence Goldhuber is a Bessie Award-winning performer and choreographer, who first came to attention as a long-time principal member of the Bill T. Jones/Arnie Zane Dance Company. In addition to presenting his own work internationally both as a soloist and as the duet team of Goldhuber & Latsky, he has worked with composer Meredith Monk, DV8 Physical Theater, Jerome Bel, Keely Garfield, and most recently the Belgian artist, Jan Fabre.

Rhetta Aleong is from Trinidad and Tobago, where her roots are in community theater, local performance art, and a Catholic all-girls high school. She holds a journalism degree, with an arts bent, from the School of Visual Arts. She has also been in creative process with Patricia Akien, Michael Steele, Helen Camps, Noble Douglas (Trinidad), Anita Gonzalez, Hattie Gossett, Tiye Giraud, Cynthia Oliver, and Reggie Wilson.

D.
PERFORMING ARTS, VISUAL ARTS

Flesh on the Bones

Keely Garfield, originally from London, England, has lived in New York City since 1986. She has received numerous commissions for her work, and has presented at many theaters and festivals both nationally and internationally. Among other endeavors, Garfield has created work for ballet dancers, antique puppets, musical theater, students, and MTV. For more information, visit www.keelygarfield.org.

To ready your students' minds and bodies for the performance, we recommend that you review the About the Performance & Performers section above and complete the following activities a few days prior and/or on the day of the show:

Discuss how to engage with a live performance

Attending a live performance requires mindful participation that is different from watching television or film. The audience plays an active role in the creation of a live performance. Since the performers are aware of the audience's moods and responses and can tell if the audience is paying attention or distracted, it is important to be engaged. Read to your students the following ways that audience members show their respect and appreciation:

Observing
Make sure the performers know you are interested in the performance by focusing your attention on the stage. Don't talk to the person next to you.

Responding
If the action on stage is funny and you feel like laughing aloud or clapping along to the rhythm, go ahead! Performers love to hear the audience respond to the action on stage.

Applauding: To communicate to performers that you are having a good time, you should applaud at the beginning and end of the show or scene. Don't be afraid to applaud after a particularly exciting moment.

D.
PERFORMING ARTS, VISUAL ARTS

Flesh on the Bones

Lead mindful movement activities

Similar to a performer, we should recognize the way in which our bodies move and the sensations experienced when we sit still or expend energy.

Sit silently and breathe
Ask your students to sit in a circle. They should sit comfortably and close their eyes or look down toward the floor. Ask them to take five long, deep breaths. They should pay attention to the feel of the air as it moves through their noses, down into their lungs, fills their bellies, and then travels back out again. They can put their hands on their bellies to feel their breath as they inhale and exhale. Ask them to take note of how they feel in their bodies and if they are thinking about anything in particular.

Free movement to quicken heart rate
The students should stand up and move around freely. They can walk in a circle, jog in place, and make silly movements … anything to get their heart rates moving faster. After two minutes, have your students sit down and talk about how their bodies feel now. Are they tired? Have them feel for their pulse or heartbeais it beating fast?

Repeat
You might do this mindful activity more than one time, even on the bus on your way to the museum. (Instead of standing for free movement, have students move their arms and legs while sitting.)

Stay focused at the performance
Remind your students to play close attention to the movements of the performers, and if they find themselves getting distracted, they can try taking a few deep breaths to bring back their concentration.

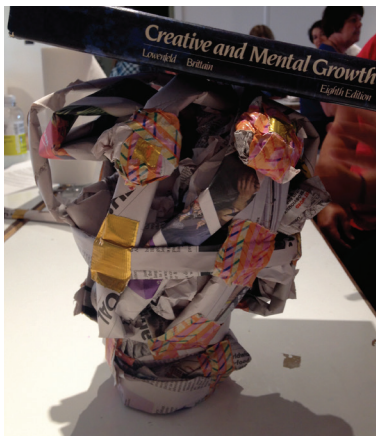
Post-Visit STEAM Activities

A.
ENGINEERING, SCULPTURE

Newspaper Bones

Recommended for Grades 3 – 8

Marilène Oliver, *Totems* (detail), 2010



Newspaper skull, complete with duct-tape eyes, made by partner schoolteachers

In her work, *It's Only Human* artist Marilène Oliver uses MRIs and CT scans, which show a three-dimensional body in a two-dimensional format. She arranges these flat scans to form three-dimensional sculptures in works such as *Totems* (2010). In *Totems*, the two-dimensional scans are constructed in three-dimensional towers that resemble their original form–heads. This work requires Oliver to experiment with the laws of physics as she constructs these towers, ensuring that they are stable and secure.

Materials: Newspaper, duct tape

Challenge your students to be inspired by Oliver's example by creating a 3D work of art that mimics the human body and has a strong, stable structure. They will combine their artistic faculties with their engineering skills to create newspaper bone sculptures.

In small groups, students should roll newspaper into tubes, securing them with duct tape (masking tape will not stick) to form sculptural elements that function as bones. Tell them to consider such aspects as symmetry, flexibility, texture, and shape as they manipulate this two-dimensional material to create three-dimensional sculptures. The newspaper bone sculptures should be engineered so that they can:

- bear the weight of a textbook (as our bones support our bodies)
- protect something soft (as our bones protect our organs)
- allow for movement (as our joints enable us to move)

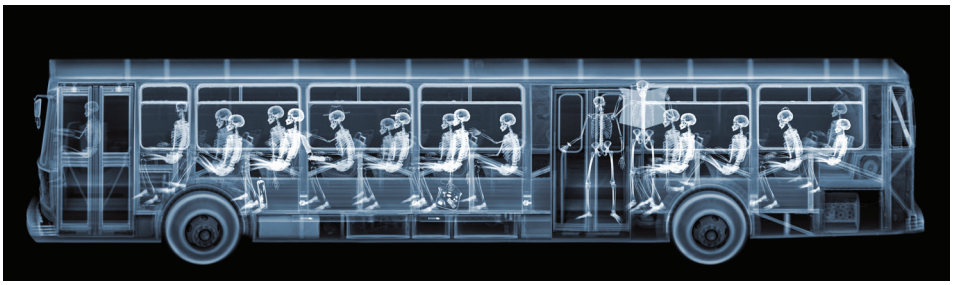
Remind your students that rolled paper and bone are two very different materials–paper is soft, light, and flexible, while bone is hard and dense. Encourage them to experiment as they manipulate, attach, or fold the paper in order to capture the properties of bone.

Once students have created their sculptures, ask each group to present its creation to the rest of the class, complete with the textbook test. Then ask students to compare the newspaper sculptures to actual bones: what are the particular strengths and weaknesses of the paper bones as opposed to real bones? Why?

B.
ENGINEERING, ANATOMY
DRAWING, DANCE

Invertebrates on the Bus

This activity will help students understand the importance of skeletal structures in relation to movement and human-made technology. Using Nick Veasey's *Bus* as a focus point, students will imagine the effects of suddenly being without their bones.



Nick Veasey, *Bus*, 1998

Part 1

Materials: Projector, digital image of Nick Veasey's *Bus*
Project an image of Nick Veasey's *Bus* and ask your students to consider the following questions:

- If the figures on the bus suddenly lost their bones, what would show up in this X-ray? (What objects would still be there?)
- Without any bones, how would these people move? What would it look like when they moved?
- What could they now do that they weren't able to do when they had bones? What would they no longer be able to do?
- What is an example of something without bones (an invertebrate)? Answers may include slugs, worms, jellyfish, sea anemones, starfish, octopus, squid, leeches, hagfish, and cuttlefish.

Part 2

Recommended for Pre-K – Grade 2

Have students create a dance or a dance move that expresses how their bodies would move without bones. Position classroom chairs in rows like a bus to set the stage: How could they climb up the stairs? Find a seat? Hold on if no seats are available?

Recommended for Grades 3 – 8

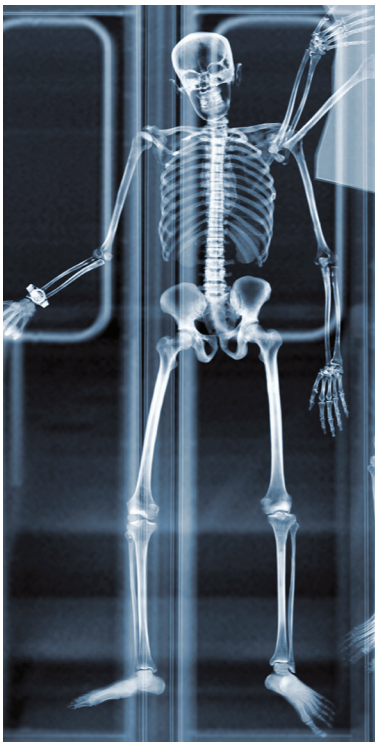
Materials: Paper, pencils

Ask students to design a vehicle that could transport invertebrate humans using paper and pencils. Which bus features, if any, would they be able to keep? What would they have to change or add? What new accommodations would they have to provide for the boneless figures? If designing a totally new kind of vehicle, what would it be called?

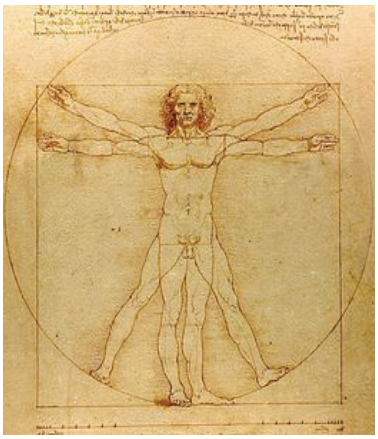
C.
MATHEMATICS, VISUAL ARTS SOCIAL STUDIES

Skeleton Metrics

Recommended for Grades 3 – 8



Nick Veasey, *Bus* (detail), 1998



Leonardo da Vinci, *Vitruvian Man*, ca. 1490 (Wikimedia Commons)

The Renaissance artist Leonardo da Vinci (1452 – 1519), working with the ideas of the Roman architect Vitruvius (ca. 80 – 15 BCE), created a drawing known as the Vitruvian Man to express his conception of scientific proportions in the human body. The drawing shows how different parts of the body relate to each other mathematically, such as:

- The arm span is nearly the same as the height.
- The width of the shoulders is no more than one-fourth of the height.
- The distance from the elbow to the tip of the hand is one-fourth of the height.
- The distance from the elbow to the armpit is one-eighth of the height.
- The length of the foot is one-seventh of the height.
- The distance from below the chin to the top of the head is one-eighth of the height.
- The distances from below the chin to the nose and from the eyebrows to the hairline are each equal to one-third of the face.

While projecting Nick Veasey's Bus, use a ruler to measure the skeleton depicted. Does it reflect Leonardo's measurements of the body? If not, can your students think of any reasons why they might not be the same?

Materials: Rulers, projector, digital image of Nick Veasey's *Bus*

Have your students partner up to measure each other. First, measure height, and then test the other measurements that Leonardo came up with. Did they find that their bodies matched Leonardo's measurements? Again, if they did not match, encourage them to think about why that may not be so (for example, mention that each human body is different from another, or that our rulers may be more precise than the instruments Leonardo used 500 years ago).

D.
VISUAL ARTS, SOCIAL STUDIES
ELA, BIOLOGY

Medium and Metaphor

Marilène Oliver, *Protest*, 2010

Marilène Oliver's sculpture *Protest* uses the human body to express physical pain and emotions such as defiance, defeat, frustration, and power. The sculpture evokes a historical incident in which a physical act of self-inflicted violence was used to make a political statement. In this activity, students will explore other ways in which the body can be used to express an idea.

Materials: Paper, drawing implements

Have your students consider an issue or idea about which they feel strongly. These can range from feelings of loneliness, pride, or excitement, to issues such as academic pressure, bullying, family interactions, or current events.

First, have them write down what happens when they think about this idea. They should use descriptive language to express how they feel and how thinking about this idea affects their bodies. Which body parts are involved– eyes? ears? stomach? brain?

Then ask them to create a picture to express these ideas representing the body parts that are affected. Take bullying, for example. How can students illustrate the whole physical and emotional experience, using the human body as a medium? Their ears hear hurtful words, and their entire body might feel tangled and twisted. Conclude this activity by inviting students to share their images with each other in order to spark discussion.

E.
SCIENCE, VISUAL ARTS

(Un)natural Landscapes

Lee Boroson, *Uplift*, 2013 – 2014

Your STEAM-focused field trips will include a visit to Kidspace and MASS MoCA's main galleries. One gallery exhibition that your students will experience is Plastic Fantastic, an installation by Lee Boroson in Building 5 (MASS MoCA's largest gallery). Boroson uses plastic and other unnatural materials to illustrate natural environmental elements including waterfalls, lava, caves, and foggy scenes. Boroson offers another STEAM connection between the sciences and the arts.

Part 1

Ask your class to create a list of all types of weather events (i.e., snowstorms, floods, heat waves) and habitats/natural environments (i.e., forests, mountains, rivers). Categorize these events and environments into either completely wild and uncontrollable (such as snowstorms) or managed in some way (such as the Hoosic River or the trails on Mount Greylock).

Part 2

Recommended for Pre-K – Grade 3

Lee Boroson is particularly interested in weather events such as fog. For one week, go outside with your class to track weather patterns. Make note of weather events (i.e., rain, snow, fog), as well as the impressions that your students have about the climate, such as the temperature, humidity, quality of the light, and any feeling or mood that the weather evokes. Then, have your students create a picture of the weather that they experienced that day. We recommend using watercolors to capture these scenes. At the end of the week, display the paintings for comparison.

Recommended for Grades 4 – 8

Lee Boroson is also interested in natural environments that overwhelm the senses, such as volcanoes, waterfalls, and caves. Have your students think about where they might see these types of environments, locally or globally. Then have them develop a plan for how they might create a landscape sculpture using unnatural materials that they might find around their houses (i.e., plastic bottles, milk jugs, carpet, old clothes). This could be a conceptualization activity, or students could actually create their sculptures as an at-home art project.

Common Core Curriculum Connections

Reading

Students can analyze the suggested readings in this guide and apply their comprehension and knowledge to the scientific and artistic processes.

Text comprehension and application derived from RI.K.7, RI.1.7, RI.2.7, RI.3.7, RI.4.7, RI.5.7, RI.6.7, RI.7.7, RI.8.7

Speaking and Listening

Students will practice conversational skills and develop further forms of expression through class discussion and collaboration.

Listening and discussion skills derived from SL.K.1, SL.1.1, SL.2.1, SL.3.1, SL.4.1, SL.5.1, SL.6.1, SL.7.1, SL.8.1, SL.K.4, SL.1.4, SL.2.4, SL.3.4, SL.4.4, SL.5.4, SL.6.4, SL.7.4, SL.8.4, SL.K.5, SL.1.5, SL.2.5, SL.3.5, SL.4.5, SL.5.5, SL.6.5, SL.7.5, SL.8.5, SL.K.6, SL.1.6, SL.2.6, SL.3.6, SL.4.6, SL.5.6, SL.6.6, SL.7.6, SL.8.6

Language

Students will understand various modalities for expression using both STEM and the arts.

Words and oral communication derived from K.5, L.1.5, L.2.5, L.3.5, L.4.5, L.5.5, L.6.5, L.7.5, L.8.5

Mathematics

Students will understand various mathematical concepts through their application in the arts.

Problem-solving and quantitative reasoning derived from 3.NF.3, 4.NF.3, 5.NF.2, 3.MD.4, 4.MD.4, 5.MD.2, 6.RP.3, 7.RP.2

Science and Technical Subjects

Students will apply STEM practices in the arts.

Scientific knowledge and application derived from RST.6-8.3, RST.6-8.9

Acknowledgements

Education at MASS MoCA is made possible in part by the Institute of Museum and Library Services. Additional support is provided by the Brownrigg Charitable Trust, the Milton and Dorothy Sarnoff Raymond Foundation, and the Alice Shaver Foundation, all in memory of Sandy and Lynn Laitman; John Hancock; the Amelia Peabody Charitable Foundation; the Anna-Maria and Stephen Kellen Foundation; Holly Swett; the Massachusetts Cultural Council; the Bessie Pappas Charitable Foundation; the Xeric Foundation; the Berkshire Bank Foundation–Legacy Region; Price Chopper's Golub Foundation; the Gateway Fund of the Berkshire Taconic Community Foundation; and an anonymous donor.

This STEAM-focused teachers' guide is funded in part through a Massachusetts Department of Higher Education–Improving Teacher Quality Grant Program, in partnership with the Massachusetts College of Liberal Arts.

Special thanks to Rachel Farkas, Collections Manager at the Boston Children's Museum, for allowing us to use its Bones Teaching Kit as inspiration for some of the activities in this guide.

This teachers' guide was developed by MASS MoCA Senior Education Intern Zorelly Cepeda-Derieux and Education Intern Marjorie Johnson with Director of Education and Kidspace Laura Thompson, Senior Museum Educator Amanda Tobin, and Museum Educator Hilary Knecht.