Strand:	Visual Arts
Level:	Grade 7/8
Content:	45 minute broadcast + hands-on activity

LIVE Arts: Art Meets Science

This session will allow students to participate in a live studio broadcast with guest artists Reilly Forbes and Carla Protsko. Students will be guided through a brief history of cinema, as well as creative activities that touch on themes of biology, optical illusions, and space exploration. Participants will create their own “thaumatrope”, a Victorian-era optical illusion toy. This broadcast will be presented in conjunction with the International Festival of Science, Technology, Engineering and Mathematics (STEMfest) being held in Saskatoon.

Please see page 3 for **Teacher Guided Post-Broadcast Activities.** These activities will give students the opportunity to apply what they have learned during the broadcast.

About the Artists

Reilly Forbes holds a Bachelor of Fine Arts from the University of Regina and certification in Audio Engineering from the Ontario Institute of Audio Recording Technology. He has worked professionally as a sound designer and currently holds the position of Production Center Director at PAVED Arts in Saskatoon. Reilly has extensive experience working with youth in arts education, organizing and hosting workshops. Most recently, Reilly has worked with the Saskatoon Open Door Society and Core Neighbourhood Youth Co-op’s digital story telling project for First Nations and Canadian newcomer youth.

Carla Protsko holds a Bachelor of Science in Biochemistry and a Master of Science in Protein Crystallography from the University of Saskatchewan. She has worked extensively in medical, animal and chemistry research, and as a teaching assistant in undergraduate and graduate courses.

As a creative duo Reilly and Carla have produced several video and sound installation pieces that cross-sect their respective specialties. Most recently, they presented “Mu Arae” at the Mendel Art Gallery during LUGO. The project interpreted concepts of space travel, sound, and physics.

Curriculum Aims & Goals

Creative/Productive:

Students will create a thaumatrope to explore the optical illusion of persistence of vision.

Critical/Responsive:

Students will be asked to identify and imagine ways that science and art can influence each other.

Cultural/Historical:

Students will learn about the history of cinema and how it evolved along with scientific advances. The artists will also discuss the relationship between art and science and how these two creative disciplines can inform one another.

Curriculum Outcomes: www.curriculum. gov.sk.ca

CP7.12
Use image-making skills, tools, techniques, and problem-solving abilities in a variety of visual art media.
CR7.2
Investigate and identify ways that the arts can communicate a sense of place.
CH7.3
Investigate and identify a variety of factors that influence artists, their work, and careers.
CP8.12
Solve visual art problems using a variety of processes and media.
CH8.3
Demonstrate understanding of how contemporary artists use and incorporate new technology into their work.
CH8.4
Examine and respond to the work of artists who incorporate more than one art form in their work (e.g., combining poetry and music).

Broadcast Program (45 min)

Artist Bio

Presentation 1
How are art and science connected?

Activity 1: Pair and Share

With a partner, students will imagine a future technology that would help artists achieve something that is currently impossible.

Materials and resources for broadcast:

Students will need a pen or pencil and paper during the broadcast.

Presentation 2

A brief history of cinema and how science has influenced this art form.

Activity 2: Mini storyboard.

Presentation 3
What is Earth 2.0 and what kinds of organisms might live there?

Activity 3: Brainstorm
Students will invent an organism that may exist on Earth 2.0.

Demonstration: How to make a thaumatrope.

Teacher Guided Post-Broadcast Activities

As a follow up to the broadcast, select one or more of the following activities to continue your students' learning.

Activity 1: Making Thaumatropes (45-60 minutes)

Option 1:
Each student will make his or her own thaumatrope using the ideas generated during Activity 3 of the broadcast. Students should begin by reviewing and adding to the list of characteristics they wrote down. Once the list is complete, students should imagine what the organism would look like. Ask them to create a rough sketch. What is the organism's most interesting feature? Is it in a cage or a jar, or sitting on a tree branch or in a cave?

Materials/ resources

Each student will need:
-The list of characteristics they came up with during the broadcast (Activity 3)
-1 piece of 8.5 x 11 white paper (photocopy or printer paper works well)
-1 piece of stiff cardboard at least 6 x 6 inches in size (bristol board or cardboard from a cereal box)
- a circular object for tracing (8-10 cm in diameter such as a mug or glass) or a protractor
- scissors
- glue stick
-pencil and eraser
- pencil crayons or markers (optional)
- two elastic bands
- access to a hole punch (these can be shared)
Note: If you would like to make a pre-printed thaumatrope as a teaching aid, there is a great printable here:
http://blog.slurpystudios.com/history-of-animation/

Option 2:
Students will form groups of 2-3 and will create a set of thaumatropes that tell a story related to the ideas of Earth 2.0 and the creatures that might live there. They may all illustrate one organism doing several different things, or different organism that interact.
In this option, ask students to create a mini storyboard together, or write a loose outline of the story they want to tell. This will guide them as they create their thaumatropes.

Activity

1. **Trace and cut circles**
   Students may begin by tracing circles 8-10 cm in diameter on paper and cardboard. They will need two paper circles and one cardboard circle. Ask them to cut the circles out carefully so the shapes line up neatly.

2. **Draw organisms**
   Referring to the rough sketch or storyboard sketches (Option1 and Option 2 above), students should create illustrations on their paper circles. While students are drawing,

remind them to think about how these images will combine optically when they put together their optical illusion toy.

*** **Important Note:** It is critical that students pay close attention to the spatial relationships of the two illustrations. For example, if the creature is on one side of the thaumatrope, the image on the other side should not be in the same spot unless this image is translucent. To review examples of thaumatropes that other students have made, try these links:
https://www.youtube.com/watch?v=A_2TW5X4H6E
https://www.youtube.com/watch?v=vypEOfWjzv8
https://www.youtube.com/watch?v=yOLE2OzoIYw

*TIP: To align the drawings, stack the paper circles and press hard with a pencil around the outline of the first image. The image impression will be on the 2nd circle and kids can easily align the images appropriately.

If you would like to make a pre-printed thaumatrope as a teaching aid, there is a great printable here: http://blog.slurpystudios.com/history-of-animation/

3. **Share ideas!**
While students are working on their illustrations, encourage them to walk about and see what others are working on. Share ideas!

4. **Glue paper discs to cardboard**
When students complete their illustrations, it's time to glue them to the cardboard. Remind students that the images must be oriented correctly to achieve the desired effect. Before gluing, ask students hold their illustrations against their cardboard and rotate to get a preview of how it will look.

6. **Make holes and add elastic bands**
Use a hole punch to make two holes near the edge of the circles and on opposite sides from each-other. Try to place the holes along the axis of rotation. Thread an elastic band through one hole and tie a knot to hold the elastic in place. Repeat on the other side so that there is an elastic band in each hole.

7. **Try it out!**
While holding an elastic in each hand, rotate the disc until it is tightly wound. (Students can work in pairs for this, it can be tricky to do alone). Release the disc to see the thaumatrope in action!

8. **Make another or add colour!**
If time permits, encourage students to experiment making a second thaumatrope with an illustration of their choosing. Students may also add colour to their first or second thaumatrope for more striking visuals.

*TIP: If students are running out of ideas for illustrations, they can also build word based thaumatropes.

9. **Show and Tell**
   Have the students demonstrate their thaumatropes to the class. For students working in groups, ask them to share their stories during the performance.

Activity 2 for Grade 7: How Our Place Looks from Space (45-60 minutes)

Materials for Activity 2

Each student will need:
-Several pieces of white paper (no lines) or template such as this one: http://www.rodypolis.com/blog/storyboards-free-template
-Pencil
-Eraser
-Optional: markers, coloured pencils or watercolour to add colour to their storyboard
-For examples of storyboards you can share with the class, see link at the end of #3.

1. Ask students to explain what the "2.0" in "Earth 2.0"means. (The concept is often explained by using software as an example. When new versions of software are released they may use the same name but indicate an update by changing the numerical value following the name. So for example Java becomes Java 2.0 when a new version is released, then Java 3.0, etc.)

2. Ask students to imagine that their imaginary Earth 2.0 organism comes to visit them on our planet. Some questions to ask students may include;
   - What does the organism notice first about the place that you live?
   - What are three things that your organism would tell other aliens about your home, town and province?
   - What is the biggest difference between Earth 2.0 and our planet?

3. Using these ideas, ask students to develop a short story about the organism's encounter with the student's environment. Ask students to draw their story, using the storyboard format described by Reilly and Karla during the broadcast. Storyboards may be done in pencil or marker, adding colour is optional.
   *A storyboard template available here: http://www.rodypolis.com/blog/storyboards-free-template
   *There are also some examples of storyboards here; https://passatdmt.wordpress.com/

Activity 2 for Grade 8: Earth 2.0 Organism Reports Home (45 minutes)

Materials for Activity 2
Each student will need:
-Lined paper for writing
-Pencil or pen

1. Ask students to explain what the "2.0" in "Earth 2.0"means. (The concept is often explained by using software as an example. When new versions of software are released they may use the same name but indicate an update by changing the numerical value

following the name. So for example Java becomes Java 2.0 when a new version is released, then Java 3.0, etc.)

2. Ask students to imagine that their Earth 2.0 organism has spent several weeks on our planet to observe human society. Have them write a report from the organism's point of view describing one or more social issues that they have observed on Earth. How does the organism's view of human behavior compare to the challenges faced on their own planet? For example;

   "Humans have created complex theories about some humans being better than other humans based on their skin colour or the language they speak. This may be similar to the dynamics between the Green Blob People and the Red Tube People on Earth 2.0. Interactions demonstrating this racism on Earth 1.0 include…."

   "Despite scientific evidence that the Earth's resources are finite, humans seem to value the consumption of plastic trinkets above the quality of their air or water. One example is the Great Pacific Garbage Patch located in the North Pacific Ocean….."

3. Ask students to share their reports with the class. You may use drama to make sharing more fun; students can pretend they are television or radio reporters, or space explorers, who are reporting back to Earth 2.0.

Further Learning…

1. **ROVER videos that relate to the broadcast content;**

   *Note: Educators are advised to preview all video programs before using them in the classroom.

   Levers and Pulleys
   Series: The Science of Disney Imagineering
   This video is hosted by a research and development "imagineer" for Disney theme parks who helps to design attractions. He presents an engaging look at how simple machines such as levers and pulleys were used to create attractions such as Dumbo the Flying Elephant and Soarin' Over California. Students will learn how levers and pulleys make work easier by either multiplying or redirecting the effort put into them. The narrator, through graphic animation, explains how levers distribute resistance and effort over a fulcrum.

   Magnetism
   Series: The Science of Disney Imagineering
   In this video, Walt Disney Imagineers demonstrate how they use magnets of all types throughout Disney's theme parks. From magnetic connectors that direct guests through attractions like The Seas with Nemo and Friends to playing back sound through audio speakers in Pirates of the Caribbean, Imagineers employ the forces of magnetism in a variety of ways. Students will learn about the attraction and repulsion of opposite poles, magnetic fields and domains, and electromagnets.

   ROVER videos about animation:

Animate Everything
This video program introduces basic animation to students through four short chapters. Using simple tools, students will learn how to transform everyday objects to create animated pieces. The two narrators, Lindsay and Will, demonstrate animation skills using everyday materials, such as twigs and rocks.

Tying Your Own Shoes
Four budding artists with Down Syndrome express their thoughts regarding art, life, love and their experiences living with Down Syndrome. They express their frustrations, but also discuss their successes, dreams and satisfaction in being able to live independently. The program is animated in part using different techniques mastered by the featured artists including drawing, paint-on-glass, clay-on-glass, and paper cut-out animation.

ROVER stop motion animation example:

A Mother's Earth
This award-winning series, produced in Cree, English and French, uses stop motion animation to portray life in a fictional northern Saskatchewan community. It focuses on issues and events in the lives of children and their supportive families in this traditional Cree community. The adults guide the children to retain their traditional culture and values while living in the modern world. In this episode, six year old Raven must write a report on identity, describing who she thinks she is. Through talking to many people in the community, 10 year old Talon reconciles her Cree-Metis identity as a daughter and sister. Cousin T-Bear and brother Talon are asked to help create a sweat lodge and through their hard work they earn their Indian names. Non-Aboriginal students viewing this film will gain a better understanding of Aboriginal identity and traditional practices. T-Bone's father's role at the band office provides a glimpse into First Nations governance and its complex issues. Educators are advised to preview all video programs before using them in the classroom.

2. Instructions to create more advanced optical illusion toys…

A. Phenakistoscope

http://www.howcast.com/videos/148840-how-to-create-a-phenakistoscope/
template: https://nellisipila.files.wordpress.com/2012/12/phenakistoscope_template.jpg

B. Zoetrope
http://www.howcast.com/videos/169724-how-to-create-a-zoetrope/

C. Flip Book
http://www.howcast.com/videos/1085-how-to-create-a-flip-book/