

ARTS IMPACT PROJECT BASED LEARNING UNIT PLAN

Visual Arts and STEM Infused PBL Unit

Not Everything is What it Appears to Be

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Grade Level: Fourth



Project Idea:

Students will explore optical illusions and how our eyes and brains process what we see. They will look at and then create and present their own optical illusions. Ideas include: Magic eye, how does your eye see (waves, light)? How do HD TV 3D glasses work? Why do the glasses work?

Driving Questions:

How can we use optical illusions to trick our eyes and brain?

How can we make our classroom a better place for learning using optical illusions?

Unit Summary (Completed at end of project. Use for sharing out public product.) Students will learn about why optical illusions work and will create and share their own.

Learning Targets and Assessment Criteria

Target: Creates an optical illusion.

Criteria: Experiments with and uses ideas like parallel lines, curved, and converging lines, gradation, value, diminishing scale, overlapping, etc. to create the illusion of depth.

Target: Creates effective optical illusions using color.

Criteria: Combines complementary colors that are similar in value to deceive the eye.

Target: Understands how images are sent to the brain through our eyes.

Criteria: Creates a diagram, discussion, and/or presentation to explain optical illusions.

Target: Categorizes the different kinds of optical illusions.

Criteria: Groups and labels optical illusions as literal, physiological and cognitive.

Target: Perseveres through creating an optical illusion.

Criteria: Journals about persisting in adapting ideas to work through challenges.

Target: Collaborates to share knowledge, discoveries and outcomes.

Criteria: Collectively curates a presentation of effective optical illusions that have a purpose in the classroom with explanations of brain/eye science.

Vocabulary

Arts:

Color Theory
Complementary Colors
Converging Lines
Diminishing Scale
Gradation
Overlapping
Perspective
Value

Arts Infused:

2D, 3D
Curate
Depth
Illusion
Optical

STEM:

Cognitive
Curves
Literal
Ocular
Parallel Lines
Perpendicular Lines
Physiological
Scale

21st Century Skills:

Critical Thinking
Growth Mindset
Perseverance

Materials

Resources (Websites, experts, texts)

<http://arteascuola.com/2014/11/lines-forming-a-three-dimensional-tree/>
<https://www.pinterest.com/pin/315322411380718777/>
<https://www.pinterest.com/pin/315322411380718777/>
https://menloparkart.files.wordpress.com/2015/03/file_002-4.jpeg?w=652
Surrealist movement with tops, spoke design, etc.

Museum Artworks or Performance

See the artworks on the following pages 4-10

Artists:

Francis Celentano (SAM/TAM collections)
Josef Albers (color studies)

Materials

Paper, pens, sharpies, rulers, paint, brushes, graph paper, chalk,
Class assessment worksheet, used CDs, marbles and hot glue, a
roll of photo back drop paper, pencils.

Standards to Drive the Inquiry

Arts

WA Arts Learning Standards

For the full description of each anchor standard and the grade level performance standards, see:

<http://www.k12.wa.us/Arts/Standards>

Anchor Standard 1: Generate and conceptualize artistic ideas and work.

Performance Standard (VA:Cr1.1.4): a. Brainstorm multiple approaches to a creative art or design problem.

Anchor Standard 2: Organize and develop artistic ideas and work.

Performance Standard (VA:Cr2.1.4): a. Explore and invent art-making techniques and approaches.

Anchor Standard 3: Refine and complete artistic work.

Performance Standard (VA:Cr3.1.4): a. Revise artwork in progress on the basis of insights gained through peer discussion.

Performance Standard (VA:Cr3.1.5): a. Create artist statements using art vocabulary to describe personal choices in artmaking.

Anchor Standard 7: Perceive and analyze artistic work.

Performance Standard (VA:Re7.2.4): a. Analyze components in visual imagery that convey messages.

Math

Common Core State Standards (CCSS) in Math

<http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx>

4.G. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

CCSS Mathematical Practices

MP.4. Model with mathematics.

MP.6. Attend to precision.

Science, Technology, Engineering

Next Generation Science Standards

<http://www.nextgenscience.org/search-standards>

4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Scientific and Engineering Practices

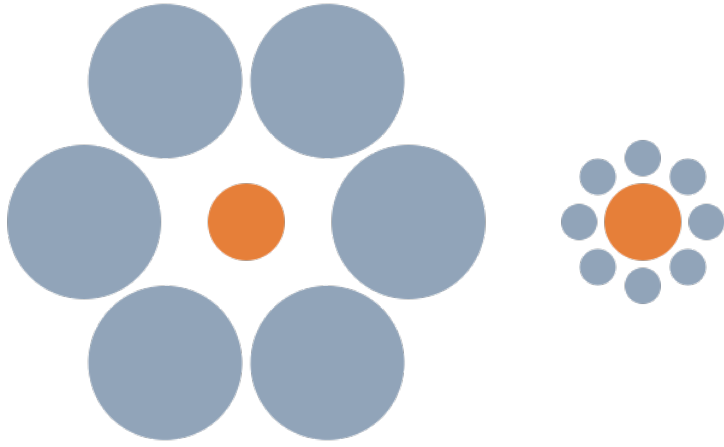
Developing and Using Models

Planning and Carrying Out Investigations

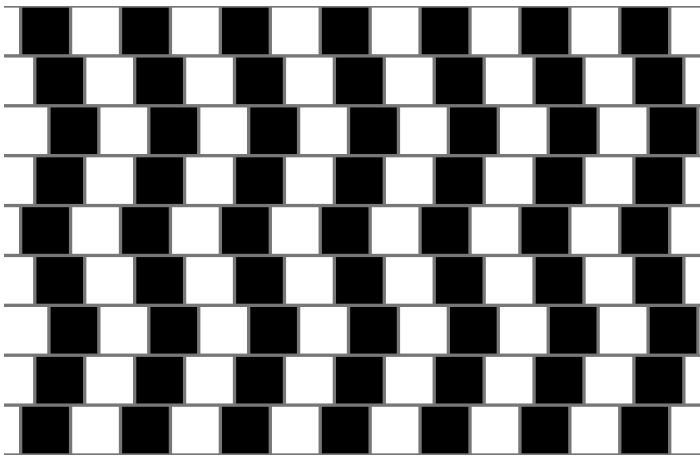
21st Century Skills

<http://www.p21.org/our-work/resources/for-educators>

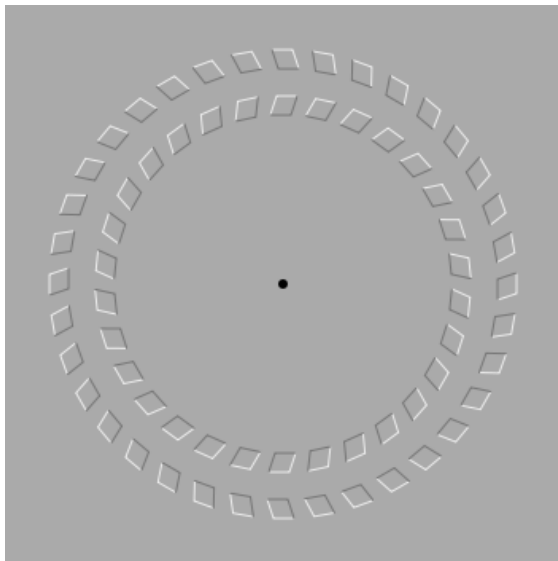
- Critical Thinking: Asks clarifying questions; uses evidence to question or explain creative choices; constructs meaning
- Perseverance: Persists in adapting ideas to work through challenges
- Growth Mindset: Takes risks; embraces alternative possibilities; work develops over time



https://en.wikipedia.org/wiki/Optical_illusion#/media/File:Mond-vergleich.svg



https://en.wikipedia.org/wiki/File:Caf%C3%A9_wall.svg

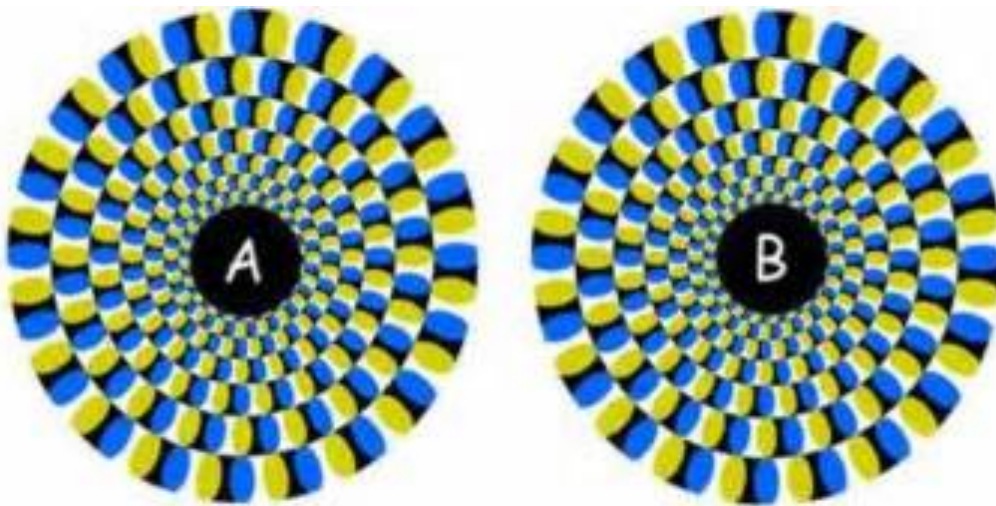


Physiological Illusion

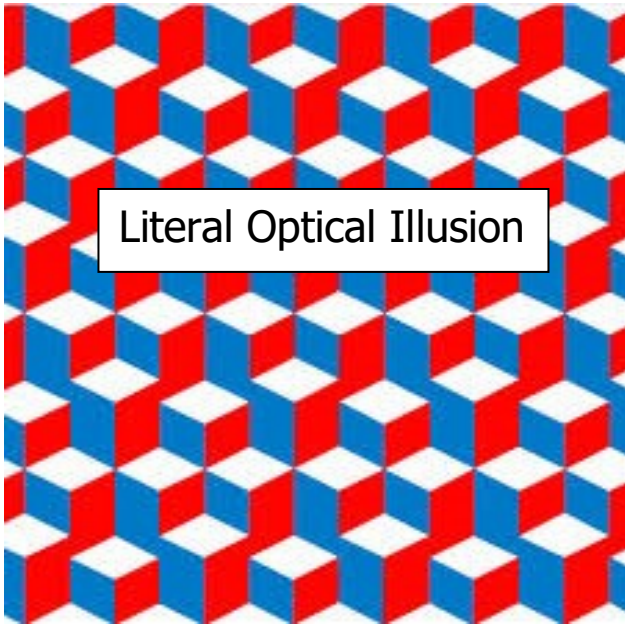
https://en.wikipedia.org/wiki/Optical_illusion#/media/File:Revolving_circles.svg



<https://www.bing.com/images/search?view=detailV2&ccid=jAhjkl6O&id=20EFEF0B344A92AC2A1C5322286CBD0898797BAA&thid=OIP.jAhjkl6Oxklh5UD9m6qfgEsEs&q=spinning+disk+optical+illusion&simid=608021161712943217&selectedIndex=19&ajaxhist=0>



<https://www.bing.com/images/search?view=detailV2&ccid=8mcbMcBJ&id=D835C6701C93C8A1762374A3F102F249FA6C9FBB&thid=OIP.8mcbMcBJNpy2zGGsc1Lz3AEsCV&q=spinning+disk+optical+illusion&simid=607996117762768999&selectedIndex=34&ajaxhist=0>

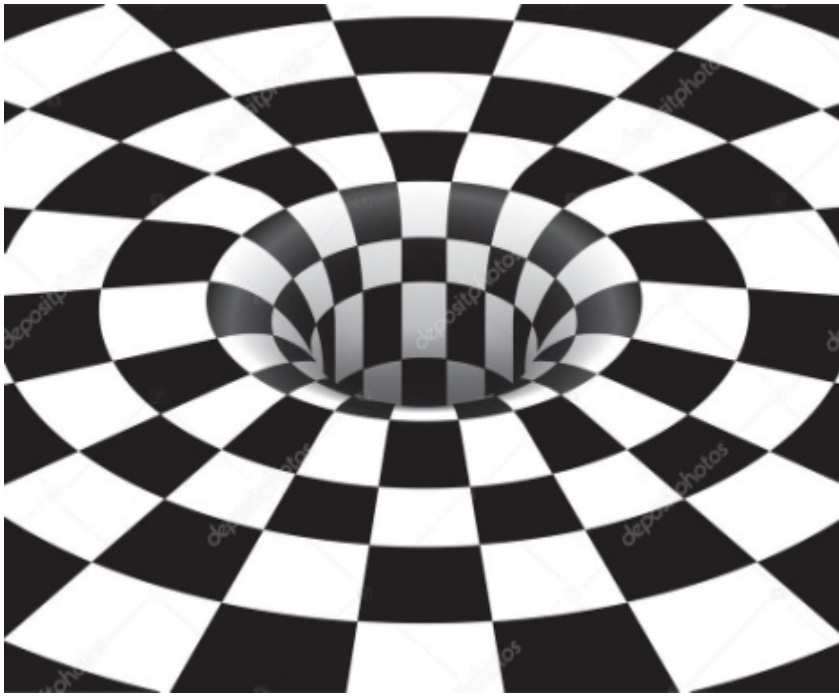


Literal Optical Illusion

<https://www.google.com/search?q=op+art&source=lnms&tbm>



[=isch&sa=X&ved=0ahUKEwjSy9b1jN_VAhVD6mMKHd3dCYwQAUIcigB&biw=1010&bih=615#imgrc=iCNachdW6hQuEM:](https://www.google.com/search?q=op+art&source=lnms&tbm)

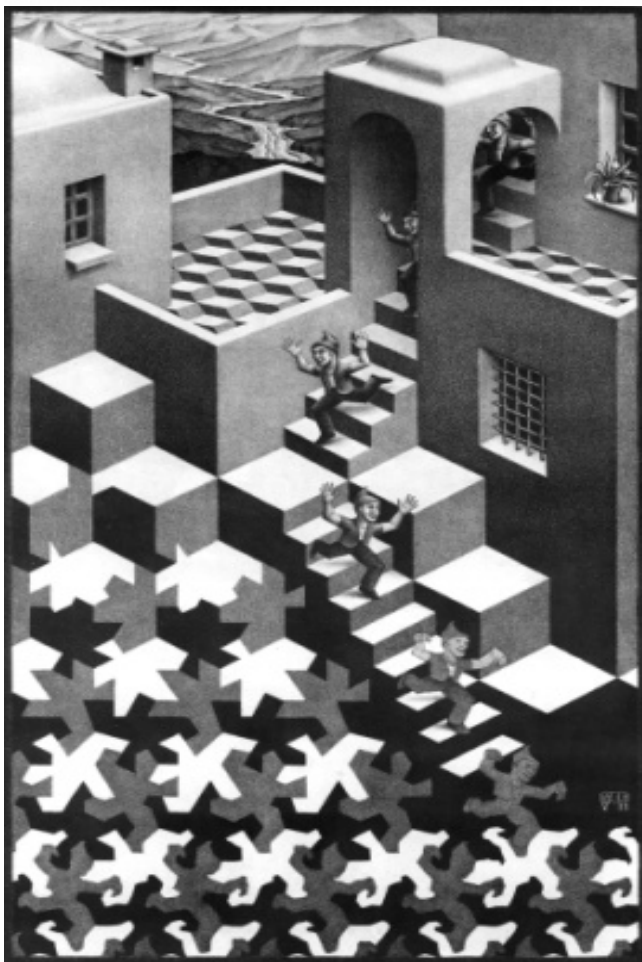
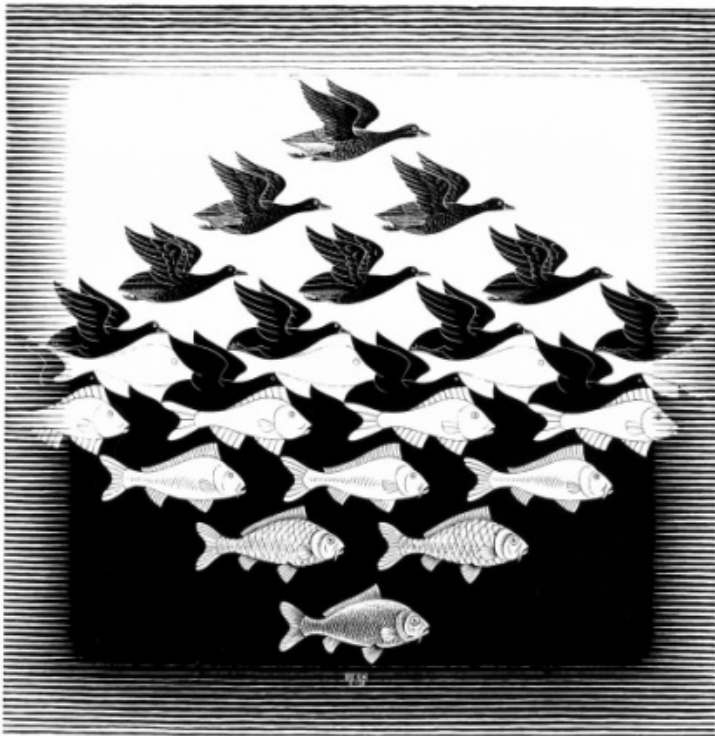


https://www.google.com/search?q=op+art&source=lnms&tbn=isch&sa=X&ved=0ahUKEwjSy9b1jN_VAhVD6mMKHd3dCYwQ_AUICigB&biw=1010&bih=615#imgdii=LU17r5Ru54pkCM:&im_grc=IWXguj5xu-RFSM:



https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwixtfPrjt_VAhXqz1QKHV0uAY4QjRwIBw&url=https%3A%2F%2Ftr.depositphotos.

MC Escher Google Search:





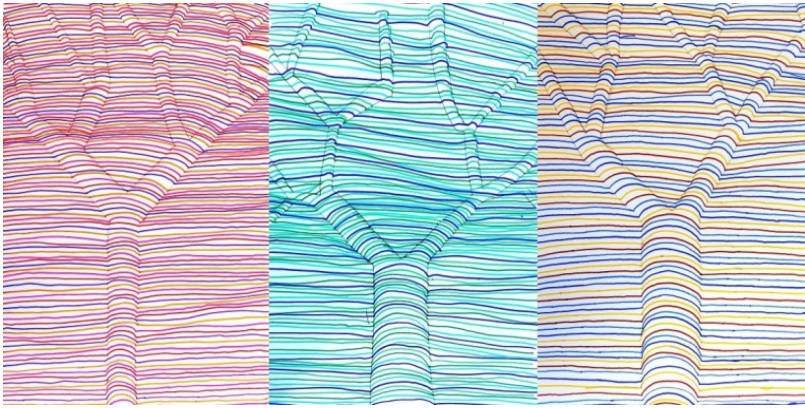
https://www.google.com/search?q=sidewalk+chalk+illusion+art&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjmx_S



<https://www.youtube.com/watch?v=qtmp2lgjr5o>



<https://www.youtube.com/watch?v=s2LrmAThAhk>

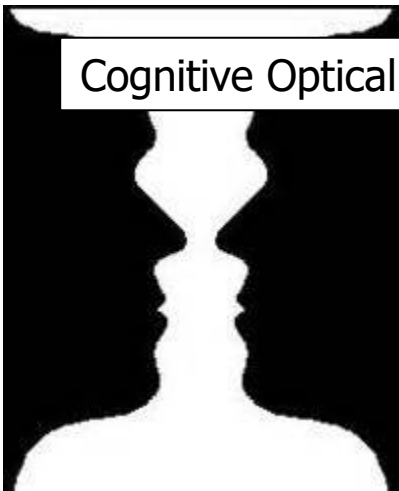


<http://arteascuola.com/2014/11/lines-forming-a-three-dimensional-tree/>



Literal Optical Illusion

<https://www.bing.com/images/search?view=detailV2&ccid=S1Xo5em8&id=9EB80802F163C208115B7BBF706BDF86BF305383&thid=OIP.S1Xo5em8T5U2NkVYCVAtswEsDj&q=literal+optical+illusion&simid=608046222834404206&selectedIndex=5&ajaxhist=0>



Cognitive Optical Illusion

<https://www.bing.com/images/search?view=detailV2&ccid=0sFfld%2bY&id=59EA3279DBEAB86833D546B26ECDCC7BE712FF64&thid=OIP.0sFfldYw6Wadi5uQLCy7wDIDz&q=cognitive+illusion&simid=608005884520826228&selectedIndex=94&ajaxhist=0>

Teacher Project Planning

(Questions for teachers.)

1. *What will the entry event be to launch this unit?*

- Create a large 3D illusion (a hole in the wall of our classroom)
- Students observe several optical illusions, including literal, physiological, and cognitive.
- Students choose an illusion center and create one.

Find 3-D pictures of hole in the wall illusions.

2. *What resources might we need?*

(Experts, fieldtrips, texts, websites, data, equipment, materials)

YouTube videos, experts, magicians/eye doctors/neuroscientists, Pacific Science Center

Exploring optical illusion art and more:

<https://www.pinterest.com/pin/315322411380718777/>

HOW DOES IT WORK?:

A stereogram is an image which, when viewed with two eyes, produces the illusion of depth perception. They were made popular by the Magic Eye book series in the 1990s. These versions were made on computers, and use subtle changes in a repeating pattern to combine depth information for both eyes into one single image. By tricking your eyes into viewing these images a certain way, a three dimensional scene is visible.

Read more:<http://www.dailymail.co.uk/sciencetech/article-3867880/Can-shark-Researchersreveal-magic-eye-illusions-work-not-hidden-3D-images.html> - ixzz4q2uM9t8u

3. *What is the duration of this unit?*

4-8 weeks

4. *What will be group work?*

- Observe and analyze optical illusions as a whole class;
- Small group research and present on how optical illusions work;
- Forming flexible groups to compare and discuss similarities between students' optical illusions.

What will each individual student do?

- create own optical illusion;
- each student will journal about their own journey of perseverance.

5. *What will the formative assessments/moments for reflection be?*

(Journal entries, plans, outlines, rough drafts, sketches, turn and talk, physical brainstorm, idea mapping, diagramming)

- Turn and Talk (similarities and differences between optical illusions, wondering how optical illusions work, questions about the science behind it).
- Journaling (creating optical illusions, evidence for perseverance, wondering and asking questions, drawings a way of thinking, taking notes);
- sharing evidence in small groups for categorizing optical illusions

6. What will the summative assessment/public product be?

(Performance, exhibition, publication, public presentation, website, installation)

- a. Students transforming our classroom into a better place for learning by creating individual and collaborative optical illusions.
- b. Students give a presentation to their parents during Family Night about optical illusions.

Facilitating Student Understanding of the Problem

(Questions to guide student inquiry.)

- 1. What do we know about this problem before we begin?*
- 2. What do we need to learn in order to solve it?*
- 3. Where will we look for resources?*
- 4. Who is our audience? Who will be helped by our solution?*
- 5. How will we share our solution?*
- 6. How will we assess our own learning?*

PBL Unit Outline of Inquiry

(Begin each step with a question. Follow that with a brief description of what students do to address the question.)

1. How many ways can we create optical illusions (through lines, shading/value, depth in space, scale, perspective, color, media, technology)?

- Students will experiment with lines and shadows, color, and media, to create optical illusion artworks.
- Students will use math concepts and practices to create optical illusions. (for example: straight lines, rulers, angles, multiplication).
- The students will research and begin to understand warm and cool colors, bending lines, and the effort of the brain to make sense of the message the eyes are sending.
- The students will experiment with media to create depth in thumbnail (small designs) – trying different ways to make our eyes see 3D.
- The students will combine complementary colors that are similar in value to deceive the eye.

- The students take a gallery walk, observing and discussing how they created optical illusions.

☑ Student reflection and assessment: Experiments with and uses ideas like parallel lines, curved, and converging lines, gradation, value, diminishing scale, overlapping, etc. to create the illusion of depth. Combines complementary colors that are similar in value to deceive the eye.

2. How do different optical illusions work?

- Students will categorize the different kinds of optical illusions by grouping and labelling optical illusions as literal, physiological and cognitive.
- Students will research and discover that an optical illusion is a “brain illusion”.
- Students will view and discuss different types of optical illusions.
- Students explain their understanding of optical illusions (e.g. read and respond, create a graphic organizer, or share what they discovered doing a close reading of an article.)
- Students could read and respond, could create a graphic organizer or do close reading of an article.

☑ Student reflection and assessment: Reacts and responds to optical illusions shown to them. Groups and labels optical illusions as literal, physiological and cognitive. Creates a diagram, discussion, and/or presentation to explain optical illusions.

3. Where could we use optical illusions?

- Students talk to partners about optical illusions in nature and around them, and share with the whole class.
- Students discuss about how to use optical illusions for specific purposes (to hide, for pleasure, etc.).
- Students choose a purpose for and design their own optical illusion accordingly.
- Students journal about their investigative creative/STEM process with emphasis on perseverance.

- Students collaborate to create a section for the Science Fair where they show their optical illusions for the classroom and explain their purpose and why they work.

☑ Student reflection and assessment: Journal about persisting in adapting ideas to work through challenges. Collectively curates a presentation of effective optical illusions that have a purpose in the classroom with explanations of brain/eye science.

Public Product/Sharing

Who is our audience?

Fellow students, teachers, parents, library, science center

Begin with a question, followed by the description of the culminating event that shares the learning from the PBL unit.

How many ways can we create illusion through lines, color, media, and shading/value to deceive the eye/brain to see depth, scale, perspective?

How can we use these optical illusions in our classroom for a specific purpose?

Students create a section for the Science Fair where they show their optical illusions and explain why they work.

ARTS IMPACT LESSON PLAN Visual Arts and STEM Infused PBL Unit

Grade 4: *Not Everything is What it Appears to Be*

CLASS ASSESSMENT WORKSHEET

The following assessment checklist can be used along with other assessment tools developed by teachers and students.

Disciplines	Visual Arts/Math/Science				Visual Arts/ 21 st Century Skills		Total 6
	Optical Illusion, Eye/Brain	Color, Spatial Depth	Optical Illusion, Eye/Brain		Perseverance	Collaboration	
Criteria	Experiments with and uses ideas like parallel lines, curved, and converging lines, gradation, value, diminishing scale, overlapping, etc. to create the illusion of depth.	Combines complementary colors that are similar in value to deceive the eye.	Groups and labels optical illusions as literal, physiological and cognitive.	Creates a diagram, discussion, and/or presentation to explain optical illusions.	Journals about persisting in adapting ideas to work through challenges.	Collectively curates a presentation of effective optical illusions that have a purpose in the classroom with explanations of brain/eye science.	
Student Name							
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25.							
26.							
27.							
28.							
29.							
30.							
Total							
Percentage							

What was effective in the unit? Why?

What do I want to consider for the next time I teach this unit?

What were the strongest connections between arts discipline and STEM?

Teacher: _____

Date: _____

ARTS AND STEM INFUSED PBL UNIT: *Not Everything is What it Appears to Be*

Dear Family:

We are engaged in a visual arts and STEM-infused project based learning unit in which we are trying to solve this challenge:

Driving Questions:

How can we use optical illusions to trick our eyes and brain?
How can we make our classroom a better place for learning using optical illusions?

- We asked, "What is an optical illusion?"
- We discovered that these are actually "brain illusions."
- We created the illusion of depth using color and lines.
- We created a presentation about optical illusions highlighting our own optical illusion artworks.

At home, you could extend the learning by looking for more op art optical illusions and thinking about the connection between our brain and eyes.