Building Mathematics and Science Competencies through an Arts Integration Model
Year Two

Project funded by United States Department of Education, Office of Innovation and Improvement, Arts in Education Model Development & Dissemination Program
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The Philadelphia Arts in Education Partnership (PAEP) is pleased to present this report documenting the second year of Arts Link: Building Competencies in Mathematics and Science through an Arts Integration Model, a research project funded by a four-year $1.1 million grant from the United States Department of Education, Office of Innovation and Improvement, Arts in Education Model Development and Dissemination Program (AEMDD). This support allows PAEP to expand the scope of its research on arts integration best practices and to refine its arts alignment model for future replication.

Arts Link was developed in response to findings from earlier work integrating the arts with elementary grade level reading and writing curricula to promote literacy skill acquisition through an AEMDD grant made to the School District of Philadelphia in collaboration with PAEP in 2006. The most notable success of this prior project, Arts Bridges, reported a 20% increase in reading proficiency among participating students over those in the corresponding control group, a stunning achievement for an urban, inner-city school district. The results of Arts Bridges also indicated that to maximize the impact of an arts integration program, students must be introduced to this learning approach earlier in their educational careers. Therefore, PAEP designed the Arts Link program to reach students as early as second through fifth grade in four School District of Philadelphia schools with a corresponding complement of eight control schools. This school based program is implemented by teaching and learning teams led by the art teacher and comprised of two participating classroom teachers per grade level with a master teaching artist in residence for 8 months during the school year. Each cohort teaching team receives ongoing extensive professional development that explores ways in which to effectively integrate critical grade-level mathematics and science skills with arts curricula, as defined by the District's content area goals. An arts integrated program infrastructure has been established upon which to develop scope and sequence curricula for classroom implementation utilizing PAEP’s skills and concepts alignment and co-teaching model. Continual assessment of instruments developed to facilitate planning and execution of these models has led to their refinement, which improves the ease and effectiveness of their use as collaborative tools by participants in this study.

While mathematics was targeted as the core academic content area with which to integrate an art making project for the first year, science curricula added in year two became a driving force in many of the schools, and a number of the unit projects found ways to significantly integrate mathematics and science with the arts. Working with classroom teachers and art teachers, artists facilitated art making projects tied to curricula required to be learned during each marking period. Thirty sessions with the teaching artists engaged students in very specific skills development. Learning goals based on the mathematics and science curricula for each grade level and activities to support those goals were developed through a collaborative planning process and implemented through a co-teaching model that engaged teachers as partners in the process by highlighting their academic expertise to help students make the skills and concept connections between the arts and the academics being taught.

This program documents for dissemination a model for arts-based teaching and learning collaborations integrating the arts into the core mathematics and science curricula and provides teachers, working under the guidance of the school art teacher and a master teaching artist, with a greater variety of teaching and learning strategies specifically focused on differentiated instruction to enhance learning for all students. A scientifically-based research methodology examines the impact of this teaching and learning model on: strengthening students’ arts, mathematics, and science competencies, improving students’ standardized test scores, pro-social behaviors, and attitudes toward school; and enhancing teacher pedagogy.
Professional Development

A full week of professional development activities for the Arts Link program began the first week in August 2011 with a one-day session for teaching artists and art teachers. These discrete sessions examined school management issues and program logistics with the intent of identifying ways to maximize program success along with strategies for reinforcing the art teachers’ roles as program leaders in their schools. Classroom teachers joined the group the following day and participated in sessions focused on program assessment and reflection. These discussions about program content and structure were led by independent facilitators and included identification of program accomplishments, barriers to program success, and recommendations for program shifts to enhance the upcoming school year’s work. PAEP’s independent evaluation team also discussed program evaluation processes including student data collection and analysis for reporting on established program performance measures.

Subsequent sessions held during the week were structured to include information and discussion of relevant education topics and were tailored to meet the specific needs of both classroom teachers and teaching artists. Brain Based Research, Arts Integration Techniques, Alignment of Art Skills and Concepts across Mathematics and Science Curricula, Instructional Practices including Co-Teaching Methodologies, Student Assessment Methodologies, and Accessing and Using PA State Standards were addressed by experts in the field including curriculum and education consultants brought in specifically to lead these professional development sessions. Afternoon workshops were structured for planning both by grade level cohort teaching teams of classroom teachers, art teachers, and teaching artists as well as planning by grade level across the four schools.

Art teachers and teaching artists worked with classroom teachers to identify specific grade level learning objectives in mathematics and science and aligned concepts and skills necessary to meet those learning objectives to comparable ones in the visual arts. Time was provided for teachers to meet across schools to identify particular curricular issues that surface per grade level and brainstorm ideas for integrating the arts within their units and lesson plans to meet student learning goals. This cross-school approach led to a unanimous request by the teachers to meet again in January for additional professional development and planning sessions.
PAEP conducted two days of professional development in January 2012. A new school to the treatment group, McCall Elementary School, spent one full day with PAEP facilitators to familiarize the grade level teachers and art teachers with the pedagogy and methodology of Arts Link. Following this session, all treatment schools participated in a one-day session that included opportunities for the classroom teachers to experience arts integrated, art making lessons conducted by a master teaching artist and a master teacher/facilitator to model arts integration, co-teaching best practices. The day concluded with grade level cohort unit and lesson planning sessions by school. Facilitators circulated among the groups and provided ongoing feedback throughout the planning sessions.

Survey Results for Professional Development
2011 - 2012

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives clearly defined</td>
<td>94%</td>
</tr>
<tr>
<td>Relevance of activities to professional development goals</td>
<td>94%</td>
</tr>
<tr>
<td>Instructors communicated information effectively</td>
<td>97%</td>
</tr>
<tr>
<td>Transferability of information to the classroom</td>
<td>100%</td>
</tr>
<tr>
<td>Enhanced ability to align math, science, and art skills</td>
<td>97%</td>
</tr>
<tr>
<td>Enhanced confidence in using arts integration strategies</td>
<td>97%</td>
</tr>
<tr>
<td>Enhanced perceived value in collaboration</td>
<td>100%</td>
</tr>
<tr>
<td>Perceived value in using Planning Template</td>
<td>97%</td>
</tr>
<tr>
<td>Perceived value in using Co-Teaching Template</td>
<td>94%</td>
</tr>
</tbody>
</table>
The first full year of Arts Link required teaching artists, classroom teachers, and art teachers from each of the four schools to plan arts integrated projects in mathematics and science, reflecting learning objectives either aligned with the core curriculum for that grading period or selected because students were struggling with a particular mathematics or science concept. At least four unit plans were developed for each grade level. One unit plan per grade level is highlighted in the text. Other selected grade level unit plans can be found in the resource section at the end of this catalog.

Comly teachers, two per grade in second, third, fourth, and fifth grades, led by Art Teacher Ann Akif and Teaching Artist Marie Elcin, began this school year where they left off after a highly successful pilot year. Comly’s principal took notice of the enthused learning environment for both students and teachers created by the Arts Link model. She decided that in those grades where there was a third teacher, she would provide support with school funds to have the Arts Link teaching artist collaborate with each of these teachers on the same grade level projects for 20 of the 30 Arts Link sessions. These teachers also volunteered to attend professional development sessions and after school meetings so that they would be as informed as the participating Arts Link teachers.

Second grade students taught by Classroom Teachers Barbara Drossner and Kenneth Pitt delved deeply into topics such as gravity and balance, life cycle of plants and animals, geometric shapes, and weather. They produced individual and group mobiles demonstrating concepts of gravity and balance. In science, second grade students studied the life cycle of butterflies and created artwork that demonstrates the stages of life a caterpillar undergoes on its journey to become a butterfly. They worked on understanding two dimensional shapes and created abstract art. Finally, through their study of weather and wind patterns, students created a weather patterned windsock that they used to conduct experiments recording wind direction.
## Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Comly Elementary</th>
<th>Big Idea: Two dimensional objects can be described, classified, and analyzed based on their elements.</th>
<th>Essential Question: How do we understand the differences between different shapes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 2</td>
<td>Week(s) of: Jan 23-Feb 13</td>
<td></td>
</tr>
</tbody>
</table>

### Math Content/Performance Descriptor
Name, describe, and draw 2-dimensional shapes

### Art Content/Performance Descriptor
Use color, shape, line, balance, and repetition as the elements and principles in works of art

### Teaching Objective: (What I will teach) (Classroom teachers complete)
- Students will Identify, compare and contrast characteristics of shapes

### Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)
- Students will identify, compare, and contrast characteristic of shapes in works of art
- Students will use shapes, and repetition to create an abstract composition
- Students will use traditional craft tools and materials in the production of a work of art

### Math Learning Activities: (What students will do) (Classroom teachers complete)
- Use pegboards to construct shapes

### Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Use pipe cleaners to "draw" shapes on canvas

### Vocabulary
- 2-dimension, shape
- Color, shape, line, balance, repetition

### Math Standards
- M3.C.1.1.1 Name and complete 2-dimensional shapes

### Art Standards
- 9.1.2. Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts
- 9.1.2.J Analyze and evaluate the use of traditional and contemporary technologies for producing, performing and exhibiting works in the arts or the works of others

### Assessment strategies: Observation, constructed response
Third grade students began Arts Link projects under the direction of Classroom Teachers Sarah DiDonato and Cindy O’Donnell by exploring how we establish and measure the value of objects. This mathematics, science, and art integrated unit looked at igneous, metamorphic, and sedimentary rocks and used the students’ study of these rocks to establish their value in the real world. This included a review of coin values and exchanges and determining coin combinations needed to pay for an item. Not only did students need to determine a value for the rocks they studied, but the artwork they created about the rocks was valued and auctioned off as a real life experience.

A unit on sound and vibration led students to explore how differences in length and tension can vibrate and produce sounds at different pitches. Students illustrated this through line qualities in visual art. The designs students produced were used to decorate the musical instruments, kalimbas, that they created and played.

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### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Comly Elementary</th>
<th>Big Idea: Energy exists in many forms and can change as it moves through a system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 3</td>
<td>Essential Question: How does vibration speed and object size relate to sound?</td>
</tr>
<tr>
<td>Week(s) of: Dec 5- Jan 16 (approximately)</td>
<td></td>
</tr>
</tbody>
</table>

#### Science Content/Performance Descriptor
- Pitch can be determined through length and tension of its source
- Sound moves in waves from its vibrating source to its receptor (our ears)

#### Teaching Objective: (What I will teach)
- Use differences in length and tension of components that can vibrate to produce sounds at different pitches
- Wave lengths change when sounds are high or low

#### Science Learning Activities: (What students will do) (Classroom teachers complete)
- Students will construct a musical instrument that produces tones at multiple pitches

#### Science Standards
- S4.A.3.1.2. Relationships between components in a system

#### Art Content/Performance Descriptor
- Cultures have unique artistic traditions. Artists make art with resources available to them
- Music involves the arrangement of sounds in sequences and rhythms

#### Teaching Objective: (What I will teach)
- Use lines and patterns to create a visual representation of sound waves
- Use alternative materials to reproduce a musical instrument

#### Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Create line drawings to correspond to specific pitches
- Combine decorative and functional components in the construction of a kalimba, an instrument with African origins.
- Create rhythms and musical patterns while playing kalimbas

#### Art Standards
- 9.1.3.B Elements and principles in visual arts and music
- 9.2.3.G Relate works in the arts to geographic regions

#### Assessment strategies: Journal entries, oral response in discussions, in-class performance
Symmetry and asymmetry, elapsed time, and life cycles were other topics undertaken by students. Through exploring their number fact families, they focused on inverse relationships that can be used to determine unknown quantities in equations, and they related that to symmetry and asymmetry in visual art. This was followed by elapsed time, a mathematical concept that many students struggle to grasp.
Fourth Grade

Topics of concern for fourth grade included earth systems, geometric shapes, fractions, and mapping. To begin the school year, Classroom Teachers Nikeeta Yancy and Erin McGinley and Teaching Artist Marie Elcin led students through an arts integration project that incorporated mathematics, science, and visual art making. Students explored the essential question: What predictable patterns of change can be observed on earth?

In math they identified, compared, and contrasted characteristics of polygons, line segments, and rays as part of their exploration of geometric shapes found in the natural environment. In science they explored what happens when water flows over land by stitching an artwork and creating sculptures that display how water flows around land formations. Finally, students examined their own physical environment in a unit on mapping. They used places they knew to create coordinate maps.
<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify properties of polygons, line segments, and rays</td>
<td>Identify earth structures through use of models</td>
<td>Understand the effect of line, repetition, and balance in a composition</td>
</tr>
<tr>
<td>Classify quadrangles and other polygons</td>
<td>Observe natural phenomenon and make predictions</td>
<td>Use multiple styles and methods to express ideas</td>
</tr>
<tr>
<td><strong>Teaching Objective</strong>: (What I will teach)</td>
<td><strong>Teaching Objective</strong>: (What I will teach)</td>
<td><strong>Teaching Objective</strong>: (What I will teach)</td>
</tr>
<tr>
<td><strong>Classroom teachers complete</strong></td>
<td><strong>Classroom teachers complete</strong></td>
<td><strong>Classroom teachers complete</strong></td>
</tr>
<tr>
<td>Students will identify, compare and contrast characteristics of polygons, line segments, and rays</td>
<td>Summarize what happens when water flows over and through land</td>
<td>Use concentric lines to mimic water flow around objects</td>
</tr>
<tr>
<td>Students will identify geometric shapes in the natural environment</td>
<td>Compare and analyze streams</td>
<td>Use subtractive sculptural methods to understand erosion and experiment with form</td>
</tr>
<tr>
<td><strong>Math Learning Activities</strong>: (What students will do)</td>
<td><strong>Science Learning Activities</strong>: (What students will do)</td>
<td><strong>Art Skills &amp; integrated Learning Activities</strong>: (What students will do)</td>
</tr>
<tr>
<td><strong>Classroom teachers complete</strong></td>
<td><strong>Classroom teachers complete</strong></td>
<td><strong>Art teacher/Teaching artist complete</strong></td>
</tr>
<tr>
<td>Name and construct geometric figures</td>
<td>Investigate Streams</td>
<td>Experiment with the concept of water flow in a kinetic activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use embroidery to create concentric lines in a composition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work collaboratively within teams to create large scale erosion models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider point of view in drawing perspectives from sculptural models</td>
</tr>
</tbody>
</table>

**Vocabulary**
- Polygons, line segments, rays
- Natural phenomenon, erosion, deposition
- Line, rhythm, balance, scale, proportion, perspective

**Math Standards**
- M4.C.1.2.1 Describe a line segment
- M4.C.1.2.2 Explain properties of polygons

**Science Standards**
- S4.A.3.2.2 Observe through the use of models
- S4.A.2.1.3 Predict ways a river can alter land

**Art Standards**
- 9.1A Understanding elements and principles of art
- 9.3A Making a critical response to one’s own work

**Assessment strategies**: Journal entries, visual critique, craftsmanship, portfolio
For fifth grade students, Classroom Teachers Sharon Albert and Co-teachers Linda Gelfand and Amy McCaffery integrated projects that reflected their studies on probability, elapsed time, and life cycles, as well as units covering geometric shapes and the physics of motion and force on objects. Beginning first with the reinforcement of the concept of elapsed time, students explored analog and digital time telling with estimations of how long it would take to go from one place to another. They calculated the number of steps and measured to the nearest 1/8th of an inch or 1/2 centimeter. Then they asked the essential question: What is the impact of the sun on an object moving through time? Students responded by examining their own shadows at intervals and keeping a drawing journal that reflected the course of the shadows over time. They also explored materials that were photosensitive and time sensitive processes before creating a collaborative quilt that represented the passage of time as shown by the length of shadows.

This was followed by a unit on geometric shapes. Teaching Artist Marie Elcin helped students to create soft geometric sculptures by sewing shapes together. Another unit integrated mathematics, science, and art using as its basis the essential question: How can we describe the movement of different forces on an object? The mathematics learning objective examined the measurable attributes and the selection of appropriate units, strategies, and tools to solve problems and make estimates. The science learning objective explored an object’s motion as the result of all forces acting on it. Art making provided the vehicle to measure and explore the movement of forces on an object through a drawing machine that students built and then used to create works of art.
The final project was a collaboration between the fourth and the fifth grades to create a game of chance for their playground so that all of the students at Comly Elementary School would have a way of participating in the Arts Link program. This mathematics, science, and art integrated project involved probability and how number sequencing and representation can be used to design games. Various games were created in which the content of the games reflected the students’ study of the life cycles of plants and animals.

### Arts Link: Grade Level Planning Template

| School: Comly | Grade level: 4-5 |
| Big Idea: Math and science used in the design of a game can bring communities of learners together |
| Essential Question: How can the design of games promote learning in mathematics and science? |

| Math Content/Performance Descriptor | Science Content/Performance Descriptor | Art Content/Performance Descriptor |
| Probability, number sequencing, and number representations are all used in the design of games | All animals experience a life cycle and have adaptations for surviving in their environment | Art in public spaces can bring communities together, beautify the environment, and be informative |

| Teaching Objective: (What I will teach) (Classroom teachers complete) | Teaching Objective: (What I will teach) (Classroom teachers complete) | Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete) |
| Students will be able to devise a way to advance across spaces on a game board using probability theory | Students will be able to describe the life cycle of a plant, insect, amphibian, and/or animal | Students will understand the design process for developing and completing a work of public art |
| Students will be able to identify a creature’s adaptations to its environment | Students will be able to describe the habitat of an animal | Students will be able to use measuring and grid enlargement for transferring imagery |
| Students will be able to describe the habitat of an animal | Students will be able to use measuring and grid enlargement for transferring imagery | Students will be able to cut and utilize a stencil |

| Math Learning Activities: (What students will do) (Classroom teachers complete) | Science Learning Activities: (What students will do) (Classroom teachers complete) | Art Skills & Integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete) |
| Test the probability of a number being rolled when using dice or spinners | Observe life cycles of plants and crayfish in school experiments, and other organisms in the wild | Analyze games/game boards to identify successful features |
| Determine symbols/images for representing numbers visually | Examine different habitats at the John Heinz refuge | Design a potential mural combining at least 4 games with imagery related to life cycles and vote on final design |
| | Create a diagram of an organism’s life cycle | Create stencils with plant-inspired imagery |
| | | Collaborate in teams to help complete mural painting on playground |

| Vocabulary |
| Probability, symbol, number sequencing |
| Life cycle, habitat, environment |
| Mural, stencil, labyrinth |

| Math Standards | Science Standards | Art Standards |
| M5.E.3.1.1, M5.E.3.1.2, M6.E.3.1.1 Express probability using fractions and basic probability terms | S4.B.1.1.1 Observe plant structures as they appear during the plant’s life cycle | 9.1.E Demonstrate the ability to illustrate an action or relate an experience through creation of works in the arts |

### The Art Classroom

Among the Arts Link projects in Art Teacher Ann Aki's classroom was one in which third through fifth grade students explored angles and geometric forms with marshmallows, toothpicks, and spaghetti. Second and third graders learned about sedimentary rock and studied geometric form and arrays on a grid through an exploration of Egyptian art and the pyramids. Fourth graders studied Op Art using polygons and creating an Op Art version of water moving around rocks.
Stephen Decatur Elementary School

Art Teacher - Cohort Leader
Marisa Grasso

Teaching Artist
Carol Royer

Classroom Teachers
Jennifer Meisel-Jarema, 2nd Grade
Phyllis Anderson, 2nd Grade
Gayle Torjman, 3rd Grade
Adrienne Wasielewski, 3rd Grade
Shelly Gable, 4th Grade
Megan Kauffman, 4th Grade
Janet Jordan, 5th Grade
Lucia Crosley Marks, 5th Grade

Principal
Genevieve Endy-Okane

In this first full year of Arts Link at Decatur Elementary School, Art Teacher Marisa Grasso, Teaching Artist Carol Royer, and Classroom Teachers from 2nd through 5th grade decided that at least one project per grade level, demonstrating curricular content learning in mathematics and science, would use the principles and elements of visual art to create a school garden. Some of these projects were extended across the entire school year with small steps that contributed to a large, final project. Other projects were self-contained contributions to the garden; still other projects that students undertook solely met the curricular requirements of that marking period.

Second Grade

Second Grade Teachers Jennifer Meisel-Jarema and Phyllis Anderson and Teaching Artist Carol Royer worked with students to explore the life cycle of butterflies from developing a life cycle time line to observing and drawing butterflies, paying special attention to the patterns on their wings. Mathematics was integrated into this unit of study through the exploration of repeated addition and arrays of numbers to demonstrate patterns in multiplication. Students used all of this new knowledge to create books detailing what they learned from their scientific and mathematical explorations. These books were included in a time capsule for the garden.
In a science unit on weather, air, and wind that included a study of balance and weight, students built mobiles and studied how the wind moved them. Among the “big ideas” they pursued, was whether the arms of their mobiles should be balanced or not. Once that decision was made, they needed to calculate how many of the symbols they created for their mobile should be attached to each arm to either balance it or to keep it unbalanced.

Students examined patterns in weather and nature with the intent of creating ceramic tiles for garden benches. Through observational studies, students recorded patterns on butterflies, leaves, snowflakes, clouds, and weather systems. Drawings were transferred to clay slabs, which were fired and glazed. Students continued their exploration of science by creating shoebox universes as part of a study about the phases of the moon.
Third Grade

Combining a study of rocks and minerals in science and symmetry in math, third grade students under the direction of Classroom Teachers Adrienne Wasielewski and Gayle Torjman and Teaching Artist Carol Royer created mosaic square tiles. First, students drew symmetrical shapes. Once they had created a shape that would work well for their individual mosaic, they transferred that drawing to boards. Then, students glued small stones of various colors to the designs they had created. After they were shellacked, the tiles were placed in the garden to create a walking path around the areas to be planted.

Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Decatur</th>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>Measurement/Numeration</td>
<td>Rocks and Minerals</td>
<td>Properties of the earth</td>
</tr>
<tr>
<td>Weeks of: First quarter</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Big Idea:** The properties of rocks reflect the way they are formed and determine how they are used.

**Essential Question:** How can we use measurement as a tool to make sense of the world, and when is estimation more appropriate than the actual measure?

**Teaching Objective:** (What I will teach) (Classroom teachers complete)
- How to use an inch and centimeter ruler to measure to the nearest 1/2 and 1/4 inch and centimeter

**Teaching Objective:** (What I will teach) (Classroom teachers complete)
- How to locate and identify rocks and minerals and understand their formation

**Teaching Objective:** (What I will teach) (Art teacher/Teaching artist complete)
- How to use the principles and elements of visual art to create a design for a rock garden

**Math Learning Activities:** (What students will do) (Classroom teachers complete)
- Students will be able to use objects found in their desks and measure them to the nearest 1/4 and 1/2 inch and centimeter
- Students will be able to read a ruler in inches and centimeters
- Students will estimate an object’s measurement and then use a ruler to measure. (Scavenger hunt)

**Science Learning Activities:** (What students will do) (Classroom teachers complete)
- Students will go on a rock hunt and sort and classify their rocks using their 5 senses
- Students will draw a volcano and its parts in relation to igneous rocks

**Art Skills & integrated Learning Activities:** (What students will do) (Art teacher/Teaching artist complete)
- Measure and plan space for rock garden
- Observe and create rock drawings
- Learn to create scale drawings
- Create a plan/drawing for a rock garden using the principles and elements of art

**Vocabulary**
- Inch, centimeter, estimate
- Rock formation, volcano, igneous rocks
- Design, proportion/scale, space, texture, balance, shape, form

**Math Standards**
- M3.B.2.1.1 Measure line segments to the nearest 1/2 and 1/4 inch and centimeter
- M3.A.3.2.1 Make estimates and record number models

**Science Standards**
- S4.A.1.3.2 Observe and describe the properties of rocks
- S4.A.1.3.2 Identify distinctive properties of minerals and use them to describe the minerals

**Art Standards**
- 9.1.8 Use the principles and elements of visual art to construct works of art

**Assessment strategies:** Vocabulary, journal responses, written explanation of art project, science notebook responses, math tests, drawings
Students explored sound and vibration in their next project. Students researched the work of Ernst Chladni, the “Father of Acoustics” whose experiments resulted in the technique for showing modes of vibration. They viewed an online video showing how sand vibrations make various shapes called Chladni shapes. Using the Chladni shapes as a guide, students drew their own shapes on cellophane, cut them out, and attached them to a frame made from dowels and Styrofoam. The frames became 3 by 3 inch stained glass panels representing the Chladni sound vibrations. Each frame was assembled into a cube and attached to each other creating an abstract design.

The final project was a study of plant life. Students grew plants from seeds for the garden. They recorded their observations of the growth from the seed to a plant until they were able to transfer their plants to the garden. The third grade’s section of the garden was surrounded by the mosaic tiles they had made.
Fourth Grade

Classroom Teachers Shelly Gable and Megan Kauffman began Arts Link year two projects by combining a science unit on land and water with a mathematics unit that discussed measurement and scale. Students worked with Teaching Artist Carol Royer to produce clay topographical maps. This project was followed by a study of the positive and negative forces of magnetism. Students demonstrated their understanding of this science unit through an art project that created tessellation flags using color theory to demonstrate positive and negative space. Continuing with this theme, students explored positive and negative space through patterns creating large M. C. Escher-type artworks.

In the early spring fourth grade students began their garden project by studying life cycles of plants and determining the area and perimeter of their garden plots. Students grew the plants in their classroom from seeds, recording their growth in science journals. As they watched their plants grow, students designed and mapped out how they wanted their garden to look and where the plants would be placed. When the weather warmed enough in the spring, the plants were transferred outside according to the designs the students had created.
## Arts Link: Grade Level Planning Template

### School: Decatur  
Grade: 4  
Week(s) of: 2nd 10 week cycle  
Big Idea: Magnets display forces of attraction and repulsion.  
Essential Question: What is positive and negative in our world?

### Science Content/Performance Descriptor  
Magnetism

### Art Content/Performance Descriptor  
Positive and negative space

### Teaching Objective: (What I will teach) (Classroom teachers complete)
- Describe the positive and negative forces of magnetism

### Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)
- How artists have depicted positive and negative space throughout history

### Science Learning Activities: (What students will do) (Classroom teachers complete)
- Students will determine forces of magnetism  
- Students will understand static electricity, magnet bars, and magnet filings  
- Through conducting experiments students will determine the force of magnetism and electromagnets  
- Students will explore real world application of magnetism

### Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Explore artists who have depicted positive and negative space in their work  
- In particular, explore the artist M. C. Escher  
- Explore material that can be added or subtracted  
- Use positive and negative number rules for measuring to create an artwork  
- Create an artwork that explores positive and negative space

### Vocabulary
- Magnetism, electromagnets, static electricity, magnet bars, magnet filings
- Patterns, line, balance, movement, rhythm, positive and negative space

### Science Standards
- S4.C.1.1.1 Explore properties of permanent magnets  
- S4.A.2.1.2 Use a magnet to detect objects that are made from iron; explore the force of magnetism through a variety of materials

### Art Standards
- 9.1.A Know and use a variety of principles and elements of art to create works of art  
- 9.1.F Identify the works of others

### Assessment strategies: Science notebooks, math tests, journals, open ended responses, vocabulary match up, art work
Fifth Grade

Fifth grade students working with Classroom Teachers Janet Jordan and Lucia Crosley Marks began their science studies exploring various aspects of solar energy. The first Arts Link arts integrated project was to construct a way to measure time through a shadow marker. With Teaching Artist Carol Royer students built clay sundials, firing and glazing them. This led students to study pendulums. They conducted experiments to find out what variables affected the number of cycles a pendulum completes in a unit of time. They followed this by building their own pendulums.

Students then worked on a scientific and mathematics investigation that related the capacity of a boat to the amount of weight it held. Students built their own boats for the experiments determining the amount of weight their boat could hold. During the last quarter, students explored plant life cycles, growing plants from seeds for their part of the garden. Finally, the last project entailed creating clay tile mazes that were assembled and displayed as part of the garden.

### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Decatur</th>
<th>Big Idea: The relationship between the sun, an object, and its shadow. Essential Question: What is the relationship between the sun, an object, and its shadow over a period of time?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 5</td>
<td><strong>Math Content/Performance Descriptor:</strong> Add and/or subtract time</td>
</tr>
<tr>
<td>Week(s) of: 1st 4 weeks</td>
<td><strong>Science Content/Performance Descriptor:</strong> Examine systems changing over time, identifying possible variables, and making inferences about these changes</td>
</tr>
<tr>
<td><strong>Teaching Objective: (What I will teach) (Classroom teachers complete)</strong></td>
<td><strong>Teaching Objective: (What I will teach) (Classroom teachers complete)</strong></td>
</tr>
<tr>
<td>- Teach elapsed time throughout the year</td>
<td>- Relate the position of the sun in the sky to the size and orientation of the shadow cast</td>
</tr>
<tr>
<td><strong>Math Learning Activities: (What students will do) (Classroom teachers complete)</strong></td>
<td><strong>Science Learning Activities: (What students will do) (Classroom teachers complete)</strong></td>
</tr>
<tr>
<td>- Use appropriate strategies to solve elapsed time inquiries</td>
<td>- Trace and measure shadows</td>
</tr>
<tr>
<td>- Compare and contrast shadows at different times of the day</td>
<td>- Journal entries that include descriptions and drawings of shadow changes</td>
</tr>
<tr>
<td><strong>Vocabulary</strong></td>
<td><strong>Science Standards</strong></td>
</tr>
<tr>
<td>Elapse time</td>
<td>S8.A.2.1.1 Use a compass to orient the shadow maker at each reading; relate the position of the sun in the sky to the size and orientation of the shadow that is cast</td>
</tr>
<tr>
<td><strong>Math Standards</strong></td>
<td><strong>Art Standards</strong></td>
</tr>
<tr>
<td>M5.A.1.3.3; M5.A.1.3.2; M5.A.1.3.3; M6.A.1.1.2 Explain the relationship of fractions, decimals, and percentages</td>
<td>9.1.B Use the principles and elements of visual art to create works of art</td>
</tr>
<tr>
<td>9.1.J Apply traditional and contemporary technologies for producing, performing, and exhibiting works in the arts</td>
<td></td>
</tr>
<tr>
<td><strong>Assessment strategies:</strong> Journal entries of scientific descriptions, and drawings of shadow changes over a period of time</td>
<td></td>
</tr>
</tbody>
</table>
Art Teacher Marisa Grasso incorporated mathematics and science into many of her art projects for Arts Link students. Measuring to the nearest 1/2 or 1/4 inch was incorporated into projects across grade levels. Her students practiced measuring and utilizing fractions to solve problems in the creation of their art work. Some Arts Link classes worked with geometric forms creating mixed media baskets of fruits and vegetables.

To connect to the science curriculum, second grade students made lunar calendars specifically relating them to the phases of the moon. They also created a night landscape with a rotating wheel divided into sections detailing what each phase of the moon looked like. Students took this landscape home and turned the dial each week as the moon in the sky changed.

In another project, the science of movement, weight, and balance were employed by students in an experiment in which marbles were placed into paint cups. Students then rolled them around paper lined trays creating visual examples of different movements and how lines were created when shifting the balance of the trays.

Finally, another project involving sound and vibration was particularly successful. Third grade students made maracas. A number of parents assisted in the project allowing the art teacher the opportunity to demonstrate the connections between the core subjects of mathematics, science, and visual art.
In the middle of Arts Link Year II, General George McCall Elementary School came onboard as an Arts Link school. Teachers in grades 2-5 were selected by Principal Carol Domb to participate in this program. A full, intensive day of professional development was provided in January for McCall teachers and new teachers from the other Arts Link schools who had been selected after the August professional development.

In this workshop teachers received training in arts integration and, in particular, PAEP’s Skills Alignment Model that aligns core curricular concepts and skills with art concepts and skills to drive learning from multiple perspectives. Teachers were engaged in art activities that reinforced this model; they were guided through the process in order to have a better understanding of the type and depth of planning and collaboration that would occur between the teaching artist and themselves.

With state standardized testing looming in little more than a month, this first year at McCall Elementary School was proposed as a pilot year, which would focus on one project for each grade level. The month of February provided ample time for Teaching Artist Lisa Volta to meet with grade level teachers, one grade at a time, and develop projects that reflected required curricular content learning in mathematics and science.

**Second Grade**

Collaborating with Second Grade Classroom Teachers, Kueiping Su and Elaine Welles, Teaching Artist Lisa Volta reinforced the mathematics concepts that had recently been presented to students: comparison number stories, rectangular arrays, multiples of a number, and the concept of remainder. Art projects were grouped according to each math concept and then were scaffolded in a way that each previous project was used to construct appropriate knowledge for the current week’s project.

**Third Grade**

Third Grade Teachers Paul Manchin and Marc Falco concentrated their Arts Link project on a unit of science study exploring the life cycle of plants. Starting by dissecting and labeling the parts of a plant and studying botanical drawings, students developed drawings and maintained a science notebook. Over a ten week period, they used art projects to examine fruits, seeds, and symmetry creating a sculpture of a pear. Looking at how seeds disperse, students developed a graphic story about the flight of “their” seed. Finally, they made a series of artworks connecting bees to the plants they pollinate.
### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: McCall</th>
<th>Grade: 2</th>
<th>Week(s) of: March-June</th>
<th>Big Idea: Numbers are governed by rules and patterns.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Essential Question: How can we visualize rules and patterns that govern numbers?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Math Content/Performance Descriptor
- Concepts of arrays, multiples, and remainders

#### Art Content/Performance Descriptor
- Two-dimensional design

#### Teaching Objective: (What I will teach) (Classroom teachers complete)
- Concepts of patterns, rules, and fractions

#### Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)
- How math plays a role in creating art works

#### Math Learning Activities: (What students will do) (Classroom teachers complete)
- Comparison number story – a number story that involves the difference between two quantities.
- Rectangular arrays – an arrangement of objects into rows and columns
- Multiples of a number
- Remainder – the amount left over after one number is divided by another number

#### Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Organizing numbers into arrays to create abstract paintings
- Create and solve comparison number stories
- Draw and color trees that are branching out to visualize halves, quarters, and eighths
- Using a circular model, create fractions based on colors and shapes represented in the model
- Create multiple designs based on the same fractions using graph paper

#### Vocabulary
- Number stories, rectangular array, multiples, remainder
- Hue, transparency, balance, shape, overlapping, glazing, proportion, abstract, primary colors, secondary colors

#### Math Standards
- M3.A.2.1.1 Draw rectangular arrays
- M3.A.3.1.1 Solve addition problems with multiple addends
- M3.A.1.2.1, M3.A.1.2.2 Model fractions as equal parts of a region and name the fraction

#### Assessment strategies: Art products, group critiques, pair-share, math quizzes

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### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: McCall</th>
<th>Grade: 3</th>
<th>Week(s) of: March-June</th>
<th>Big Idea: Plant growth and development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Essential Question: How can we understand and visualize the life cycle of plants?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Science Content/Performance Descriptor
- Plant growth and development

#### Art Content/Performance Descriptor
- Two-dimensional design

#### Teaching Objective: (What I will teach) (Classroom teachers complete)
- Plant science: flower anatomy, fruits and seeds, seed dispersal, roots, leaves

#### Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)
- How math plays a role in creating art works

#### Science Learning Activities: (What students will do) (Classroom teachers complete)
- Students will learn the anatomy of a flower
- Students will explore fruits and seeds and seed dispersal
- Students will understand the root systems and the function of leaves
- Students will record observations by drawing, writing, and graphing

#### Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Students will organizing numbers into arrays to create abstract paintings
- Students will create and solve comparison number stories
- Students will draw and color trees that are branching out to visualize halves, quarters, and eighths
- Using a circular model, students will create fractions based on colors and shapes represented in the model
- Students will create multiple designs based on the same fractions using graph paper

#### Vocabulary
- Flower anatomy, seed dispersal
- Hue, transparency, balance, shape, overlapping, glazing, proportion, abstract, primary colors, secondary colors

#### Science Standards
- S4.B.1.1.4 Observe details of flower anatomy
- S4.A.3.2.1 Draw and label parts of a plant
- S4.B.1.1.5 Observe the completion of the life cycle of a plant

#### Assessment strategies: Art projects, group critiques, pair-share, math quizzes

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Collaborating with Fourth Grade Teachers Andrew Oliver and Meg Merlini on a combined mathematics and science integrated art project, Lisa Volta first guided students through an art making project with multiple facets using fractions and proportion to finally produce and enlarge abstract drawings from students’ studies of magnetism and electricity. Using their fraction designs, students compared the two types of circuits, parallel and series, creating abstract paintings to represent each.

### Fourth Grade

**Big Idea:** Understanding magnetism and electricity

**Essential Question:** How can we understand the electromagnetic forces in nature?

**Math Content/Performance Descriptor**
- Fractions/equivalent fractions

**Science Content/Performance Descriptor**
- Magnetism and electricity

**Art Content/Performance Descriptor**
- Two-dimensional design

### Teaching Objective: (What I will teach)

- **Classroom teachers complete**
  - Review of fractions and equivalent fractions

- **Classroom teachers complete**
  - The critical role of magnetism and electricity in the modern world

- **Art teacher/Teaching artist complete**
  - How concepts in magnetism can be reflected in art through the use of positive and negative space

### Math Learning Activities: (What students will do)

- Students will review fraction facts
- Students will work with equivalent fractions

### Science Learning Activities: (What students will do)

- Students will explore the force of magnetism through a variety of materials
- Students will conduct experiments to discover ways to detect and “see” the magnetic force – positive and negative charges
- Students will compare series and parallel circuits

### Art Skills & integrated Learning Activities: (What students will do)

- Using a circle graph, students will create a design based on their study of fractions by assigning the percentage of each color used according to their fraction worksheet
- Students will enlarge their fraction shape using a 1:4 ratio creating repeating pattern drawings
- Students will create a battery in drawings to explain circuits
- From their study of magnetism and positive and negative charges, students will represent these concepts by creating a painting that denotes positive and negative space

### Vocabulary

- Fractions, equivalent fractions
- Magnetism, electricity, positive and negative charges, series and parallel circuits
- Hue, transparency, balance, shape, overlapping, glazing, proportion, abstract, primary colors, secondary colors

### Math Standards

- M4.A.2.1.1 Solve fraction addition and subtraction problems
- M4.A.1.1.1 Find equivalent fractions

### Science Standards

- S4.C.1.1.1 Explore properties of permanent magnets
- S4.A.2.1.4 Use scientific thinking processes to conduct investigations and build explanations by observation, communication, comparing, and organizing

### Art Standards

- 9.1.A: Know and use the elements and principles of art to make works of art

**Assessment strategies:** Art projects, group critiques, pair-share, math quizzes
Fifth Grade

Fifth grade students, under the guidance of Classroom Teachers Alison Stuart and Jo-anna Bottaro, worked with Teaching Artist Lisa Volta. Art projects began by visually graphing fractions and using color to figure out percentages. Students then wrote out equivalent fractions based on the original shapes and their enlargements using ratios of 1:4 and 1:16 creating a large painting. To create abstract designs, students represented variables with simple shapes and connected them by creating exponent formulas. Students wrote and solved those formulas. The numerical answers were represented by that same number of variables (shapes) in their design. Positive and negative values were presented by complementary colors.
Art Teacher - Cohort Leader
Brad Vena

Teaching Artist
Benjamin Volta

Classroom Teachers
Robert Liptock, 2nd Grade
Sheila Johnson, 2nd Grade
Rose Truscia, 3rd Grade
Tia Elliott, 3rd Grade
James Childs, 4th Grade
Dawn Merritt, 4th Grade
Catherine Nelson, 5th Grade
Lauren Horsey Cherry, 5th Grade
Nicole Buonocore, 5th Grade

Principal
Zena Sacks

Art Teacher Brad Vena and Teaching Artist Ben Volta began year two with intense planning sessions for each grade level art, mathematics, and science integrated curriculum. They collaborated on ideas that would support Ben in the classroom and Brad in the art room.

Second Grade
Second Grade Teachers Robert Liptock and Sheila Johnson and Teaching Artist Ben Volta reviewed types and uses of numbers and taught students how to use a ruler and measure various lengths with it. Students explored whole numbers and skip counting while identifying number patterns on a grid. Students created their own grid and designed polygon shapes using line and color to mark the various polygons they created.

This study was followed by a science unit on weather and wind. Students kept a science journal tracking weather patterns and wind directions. They conducted a variety of weather experiments. Re-employing the polygon shapes they explored in their last project, students turned them into kites of many shapes and forms to test their theories on wind.
School: Morton
Grade: 2          Week(s) of: March-April
Big Idea: Weather experiments use mathematics to collect data.
Essential Question: How can we observe and predict weather patterns?

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data collection and identification of various polygons</td>
<td>Observe natural phenomena, record observations, and make predictions</td>
<td>Functional design</td>
</tr>
</tbody>
</table>

**Math Learning Activities:**
- Students will be able to identify and create various polygons
- Students will accurately measure materials
- Students will make predictions of which kite will fly and record the results using tally marks

**Science Learning Activities:**
- Students will keep track of daily weather
- Students will construct a windsock to record wind direction
- Students will make predictions on which shapes will best suit building a kite that flies

**Art Skills & integrated Learning Activities:**
- Students will explore master kite designs that use geometry
- Students will create a “design plan” drawing
- Students will use popsicle sticks and paper to create their kites

<table>
<thead>
<tr>
<th>Math Standards</th>
<th>Science Standards</th>
<th>Art Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1.H Identify properties of materials and tools</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assessment strategies:** Students will explain the results of simple experiments verbally and through drawing and writing; students will be assessed on their “design plan” and math tally charts

**Vocabulary:**
- Triangle, square, pentagon, hexagon, data, tally mark
- Natural phenomena, prediction, weather patterns
- Functional design, design plan, form/shape, multi-media, craft
Third Grade
The third grade students of Classroom Teachers Rose Truscia and Tia Elliott began the year with a review of math facts. This included measuring and creating individual grids and skip counting on those grids. Working with Teaching Artist Ben Volta, the grids became the vehicle for combining forms to create patterns of both regular and irregular polygons. Transferring their designs to paper, students collaborated to build an artwork that snaked along the hallway of their school.

Students studied the physics of sound and how tension affects the pitch of a sound. In one of their projects studying weather and wind, students created *Shape Invader* kites using regular and irregular polygons. Now their task was to create individual sounds to represent their creatures. First students created and recorded their sounds using Garage Band. Then they drew them as abstract artworks. Finally, they played them as part of a performance flying their kites.

Students concluded their year of Arts Link by examining life cycles of plants. They studied pollination, identified and drew the parts of a flower, and kept a science journal. Finally, students created a garden of imagined flowers.

### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Morton</th>
<th>Grade: 3</th>
<th>Week(s) of: April-June</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Science Content/Performance Descriptor</strong></td>
<td><strong>Art Content/Performance Descriptor</strong></td>
<td></td>
</tr>
<tr>
<td>Determine how different parts of a living thing work together to provide what the organism needs</td>
<td>Craft/Sculpt a 3-dimensional form using mixed media</td>
<td></td>
</tr>
<tr>
<td><strong>Teaching Objective: (What I will teach) (Classroom teachers complete)</strong></td>
<td><strong>Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)</strong></td>
<td></td>
</tr>
<tr>
<td>• Demonstrate how plants are pollinated</td>
<td>• How to craft a sculpture of a flower with all of its parts</td>
<td></td>
</tr>
<tr>
<td><strong>Science Learning Activities: (What students will do) (Classroom teachers complete)</strong></td>
<td><strong>Art Skills &amp; Integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)</strong></td>
<td></td>
</tr>
<tr>
<td>• Students will identify the parts of a flower including: sepal, petals, pistil, and stamen</td>
<td>• Students will create a “magic” flower sculpture using mixed media including: plastic straws, pipe cleaners, paper cupcake holders, card stock, beads, air dry clay, and a foam support.</td>
<td></td>
</tr>
<tr>
<td>• Students will understand the process of how plants are pollinated</td>
<td>• Students will compare their sculpture to botanical drawings that label all of the parts of a flower</td>
<td></td>
</tr>
<tr>
<td>• Students will keep a science journal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vocabulary</strong></td>
<td><strong>Vocabulary</strong></td>
<td></td>
</tr>
<tr>
<td>Nectar, pollen, pollination, pollinator, reproduction, nectar guide</td>
<td>Mixed media, sculpt, bend, support, balance</td>
<td></td>
</tr>
<tr>
<td><strong>Science Standards</strong></td>
<td><strong>Art Standards</strong></td>
<td></td>
</tr>
<tr>
<td>S4.B.1.1.4 Observe details of flower anatomy</td>
<td>9.1.A Know and use the principles and elements of art to create original works of art</td>
<td></td>
</tr>
<tr>
<td>S4.A.1.3.1 Record the growth of plants over time into Science Notebooks</td>
<td>9.3.A Compare and contrast works of art</td>
<td></td>
</tr>
<tr>
<td>S4.A.3.2.1 Draw and label parts of a plant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment strategies: Students will write essays that describe the relationship between plants and pollinators.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fourth Grade

Teaching Artist Ben Volta and Classroom Teachers James Childs and Dawn Merritt began their Arts Link Year Two project working with students to promote an understanding of measurement, grids, and polygon shapes. All students worked to create grids of varying sizes. These grids laid the foundation for understanding and creating regular and irregular polygons. Students collected data about polygons, learned how to use tally marks and graphs to demonstrate the data they collected, and combined their polygon shapes into works of art building an understanding that geometry is all around us in the natural world as well as our created, physical environment.

Using polygons as a consistent structure, students went on to explore fractions, decimals, and percents creating an art project in which all Arts Link classes participated: Space Invaders. Polygons were arranged in an adjacent manner to produce individual alien characters. Using polygon shaped stickers, students then recreated their individual Space Invaders. They continued to collect data as to how many and what types of polygons they used to create their alien.

Using polygon shaped stickers, students then recreated their individual Space Invaders. They continued to collect data as to how many and what types of polygons they used to create their alien.

Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Morton Elementary</th>
<th>Big Idea: Defining and distinguishing area and perimeter as it pertains to measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 4</td>
<td>Essential Question: How do you measure area vs. perimeter?</td>
</tr>
<tr>
<td>Week(s) of: November</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the relationship between area and perimeter of polygons</td>
<td>Generate questions that can be answered through scientific investigation</td>
<td>Measurement and geometric figures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Objective: (What I will teach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classroom teachers complete)</td>
</tr>
<tr>
<td>• How to determine the area and perimeter of a polygon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Objective: (What I will teach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classroom teachers complete)</td>
</tr>
<tr>
<td>• Identify and explain the application of scientific knowledge to possible solutions to problems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Objective: (What I will teach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classroom teachers complete)</td>
</tr>
<tr>
<td>• To understand, draw, and measure geometric shapes and polygons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Learning Activities: (What students will do)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classroom teachers complete)</td>
</tr>
<tr>
<td>• Draw various polygons; define and label them using grid paper</td>
</tr>
<tr>
<td>• Define perimeter and determine the perimeter using the US Metric System</td>
</tr>
<tr>
<td>• Count square units within the polygon to calculate the area</td>
</tr>
<tr>
<td>• Discuss/define parallel, perpendicular, congruency, and/or symmetry</td>
</tr>
<tr>
<td>• Label properties of the polygons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science Learning Activities: (What students will do)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classroom teachers complete)</td>
</tr>
<tr>
<td>• Provide clear written explanations that account for creation of specific polygons</td>
</tr>
<tr>
<td>• Illustrate steps of formation of polygons</td>
</tr>
<tr>
<td>• Generate questions about polygons for peers to answer</td>
</tr>
<tr>
<td>• Record steps that describe how to calculate area and perimeter</td>
</tr>
<tr>
<td>• Create word problems to be solved, and list all steps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Art Skills &amp; integrated Learning Activities: (What students will do)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Art teacher/Teaching artist complete)</td>
</tr>
<tr>
<td>• Draw a grid using a ruler</td>
</tr>
<tr>
<td>• Draw 3, 4, 5, 6-sided polygons on top of the grid</td>
</tr>
<tr>
<td>• Measure the perimeter of the shape</td>
</tr>
<tr>
<td>• Measure the area of the shape</td>
</tr>
<tr>
<td>• Cut their shapes out of art paper to create geometric shapes that will snake around their hallways</td>
</tr>
<tr>
<td>• Use cut out shapes and adhere to three-dimensional polygon sculptures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polygon, perimeter, metric, parallel, perpendicular, congruency, symmetry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation, data, scientific investigation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polygon, shape, line, color, unity, harmony, 2-dimensional, 3-dimensional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4.C.1.1.1, M4.C.1.2.1, M4.C.1.2.2 Explain the properties of polygons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4.A.2.1. Communicate information through writing, drawing, and discussion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Art Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1.3.A Use the principles and elements of art</td>
</tr>
</tbody>
</table>

Assessment strategies: Art project, journal writing, math test, science essays
In science students examined habitats around the world exploring how natural and environmental factors impact the way people live. Art making projects incorporated in this study asked students to produce a variety of landscapes such as deserts, mountains, rain forests, oceans, and their own urban environments. Their drawings were then used to create a 9 inch square open cube diorama, reflecting habitats from around the world.
Fifth Grade

Fifth grade students under the auspices of Classroom teachers Catherine Nelson, Lauren Horsey Cherry, and Nicole Buonocore began the year with a review of measurement and problem solving tactics. Students created rectangular and square arrays using shapes and manipulatives; then they built multiplication number models to represent such arrays. This work was reflected in science as part of a study about solar energy and applying appropriate measurement systems to record and interpret observations. Students created shadow tracings throughout the day. Under Teaching Artist Ben Volta’s guidance, this work was translated into a grid that demonstrated number arrays through primary and secondary colors as well as phases of the moon.

This project was followed by work on determining perimeters of irregular shapes, renaming fractions, and exponential notation. Students collected data from multiple trials using a variety of variables and created graphs to look for relationships among these variables. Their art making experience aligned skills in mathematics, in particular, working with regular and irregular polygons. They used the shapes that they had created on their individual grids to create Space Invaders - first as part of a 2-dimensional project exploring artists who create art works by combining different elements together to create a new whole. Then, as their mathematics study expanded, they created shapes/forms to define what volume is and how to calculate the volume of cubes, tetrahedrons, dodecahedrons, and octahedrons. Students made 3-dimensional Space Invaders learning to fold paper with precision using a straight edge and decorating these forms with stickers created from their own polygon shapes.
Among the many Arts Link projects that Art Teacher Brad Vena facilitated with Arts Link students was a fifth grade project that reinforced learning about grids and scale. Using a Chuck Close portrait as an example, fifth grade students created larger than life-size portraits of their teachers. Each student received a row from a photo of their teacher and enlarged it on a grid by drawing and coloring their selected section. Then, they cut the grids apart and glued them into one long row. Each numbered row was then placed in its specific spot recreating a collaborative portrait of their teachers.
### Arts Link: Grade Level Planning Template

**School:** Decatur  
**Grade:** 2  
**Week(s) of:** Nov 1 to Jan 31  
**Essential Question:** How many different ways can we describe changes in the weather?

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3.A.2.1.1 Write number stories to describe a number sentence and for a number model.</td>
<td>S4.A.2.1.1 Make observations and record data from an experiment.</td>
<td>Art Skills &amp; Integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)</td>
</tr>
<tr>
<td>M3.A.3.1.1 Solve +0 and +1 addition facts</td>
<td>S4.A.2.1.4 Draw conclusions and communicate results.</td>
<td>Experiment with patterning in placing objects of varying colors and shapes.</td>
</tr>
<tr>
<td>M3.D.2.1.1 Write number stories to describe a number sentence and for a number model.</td>
<td></td>
<td>Balance objects for elements in a kinetic sculpture.</td>
</tr>
<tr>
<td>M3.D.2.1.1 Write number stories to describe a number sentence and for a number model.</td>
<td></td>
<td>Use color contrast and inverse positive/negative space to create repetition.</td>
</tr>
<tr>
<td>M3.D.2.1.1 Write number stories to describe a number sentence and for a number model.</td>
<td></td>
<td>Complete existing pattern sequences to balance a composition.</td>
</tr>
<tr>
<td>M3.D.2.1.1 Write number stories to describe a number sentence and for a number model.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assessment strategies:**  
Journal entries, pattern sequence completion.

### Arts Link: Grade Level Planning Template

**School:** Comly Elementary  
**Grade:** 2  
**Week(s) of:** first 5 weeks  
**Essential Question:** How can we create visual and physical balance? How can we make things equal?

<table>
<thead>
<tr>
<th>Math Learning Activities: (What students will do) (Classroom teachers complete)</th>
<th>Science Learning Activities: (What students will do) (Classroom teachers complete)</th>
<th>Science Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore and practice doubles plus 1 and doubles plus 2 facts.</td>
<td>Build structures that balance.</td>
<td>S4.A.2.1.1 Know and use the elements and principles of visual art.</td>
</tr>
<tr>
<td>Review - 0 and -1 shortcuts.</td>
<td>Describe structures and share observations about balancing.</td>
<td></td>
</tr>
<tr>
<td>Practice addition and subtraction facts for sums up to and including 100.</td>
<td>Discuss occurrence/use of weighing and balancing in world around us.</td>
<td></td>
</tr>
<tr>
<td>Math game- domino top it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Math Standards**  
M3.A.2.1.1 Write number stories to describe a number sentence and for a number model.

**Math Learning Activities: (What students will do) (Classroom teachers complete)**  
Read temperatures on a thermometer.

**Science Standards**  
S4.A.2.1.1 Make observations and record data from an experiment.

**Science Learning Activities: (What students will do) (Classroom teachers complete)**  
Describe what meteorologists do and types of weather information they record.

**Science Standards**  
S4.A.2.1.4 Draw conclusions and communicate results.

**Science Learning Activities: (What students will do) (Classroom teachers complete)**  
Use a calendar to monitor daily weather.

**Science Standards**  
S4.A.2.1.4 Conduct an experiment and use written language to describe observations.

**Science Learning Activities: (What students will do) (Classroom teachers complete)**  
Use color contrast and inverse positive/negative space to create repetition.

**Science Standards**  
9.1A Know and use the elements and principles of visual art.

**Science Learning Activities: (What students will do) (Classroom teachers complete)**  
Create a visual weather cycle.

**Science Standards**  
9.1.B Use the principles and elements of art to produce art works.

**Assessment strategies:**  
Unit tests, unit art project, formal and informal assessment, teacher observation.
Arts Link: Grade Level Planning Template

School: Comly Elementary
Grade: 3
Week(s) of: March/April
Big Idea: Time passes in measurable ways.
Essential Question: What do we understand about the passage of time?

Math Content/Performance Descriptor
Time has measurable characteristics, specific units of time, and the passage of time can be calculated

Science Content/Performance Descriptor
Identify observable patterns

Art Content/Performance Descriptor
Identify patterns in art

Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)
- Students will use color, composition, and sequencing choices to create the illusion of the passage of time
- They will transfer the pattern designs to cut paper to create a collaboration pattern that snakes along the hallway walls

Math Learning Activities: (What students will do) (Classroom teachers complete)
- Explain typical daily activities for AM and PM time
- Use count-up methods and subtraction for calculating elapsed time

Science Learning Activities: (What students will do) (Classroom teachers complete)
- Students will observe an event with discrepancies and report what they observed verbally and in written form

Art Skills & integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)
- Students will measure and draw a grid
- They will count boxes to create patterns
- They will create patterns using regular and irregular polygons
- They will transfer the pattern designs to cut paper to create a collaboration pattern that snakes along the hallway walls

Vocabulary
Seconds, minutes, hours, days, months, years

Math Standards
M.3.B.1.1 Determine or calculate elapsed time

Science Standards
S.4.A.2.1.1 Describe objects in the world using five senses

Art Standards
9.1.3.E Illustrate an action
9.4.3.D Recognize artistic choices

Assessment strategies: Preliminary sketches, written response, time story performance
**Arts Link: Grade Level Planning Template**

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition and subtraction facts have an inverse relationship that can be used to determine unknown quantities in equations.</td>
<td>Colors are created by combining primary colors to form secondary colors in additive and subtractive processes.</td>
</tr>
</tbody>
</table>

**Teaching Objective:** (What I will teach) (Classroom teachers complete)
- The order of numbers in an addition and subtraction fact family can be rearranged, but they maintain a predictable relationship.

**Math Learning Activities:** (What students will do) (Classroom teachers complete)
- Fact family drills: a+b=c, b+a=c, c-a=b, c-b=a

**Vocabulary**
- Addition, subtraction, fact families

**Math Standards**
- M3.A.3.1.1 Continue to solve and understand multi-digit addition and subtraction problems

**Assessment strategies:** Group critique for symmetry/asymmetry

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**Arts Link: Grade Level Planning Template**

<table>
<thead>
<tr>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sounds move through space in different directions</td>
<td>Each sound is unique and can be visualized by drawing it</td>
</tr>
</tbody>
</table>

**Teaching Objective:** (What I will teach) (Classroom teachers complete)
- The three characteristics of sound energy: volume, pitch, and frequency

**Science Learning Activities:** (What students will do) (Classroom teachers complete)
- Sound is produced by vibration
- Differences in length and tension produce different pitches
- Sounds that are high and low are reflected in different wave lengths
- Students will explore different materials to see what type of materials can be used to make sounds and what kind of sounds they make

**Vocabulary**
- Sound energy, volume, pitch, frequency, wave length

**Science Standards**
- S4.C.2.1.2 Identify that sounds are produced by vibrations
- S4.C.2.1.4 Identify that sound moves in different directions
- S4.A.2.1.1 Use scientific thinking processes to conduct investigations and build explanations, observations, communication, comparing and organizing

**Assessment strategies:** Use KWL chart for each investigation (science); students critique each other’s drawings to describe the type of sound pictured
### Fourth Grade

#### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Comly Elementary</th>
<th>Big Idea: Some mathematical relationships are always true. Essential Question: How can we model, organize, and compare fractions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 4</td>
<td>Week(s) of: week of Jan 17- Feb 6</td>
</tr>
<tr>
<td>Math Content/Performance Descriptor</td>
<td>Explain that fractions are equal parts of a whole Solve “fraction-of” problems</td>
</tr>
<tr>
<td>Art Content/Performance Descriptor</td>
<td>Use color, form, balance, and proportion in works of art Use traditional and contemporary technologies Compare and contrast characteristics in works of art</td>
</tr>
<tr>
<td>Teaching Objective: (What I will teach) (Classroom teachers complete)</td>
<td>• Find fractional parts of sets • Add and subtract fractions</td>
</tr>
<tr>
<td>Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)</td>
<td>• Design a matrix for printmaking • Use color for balance and proportion to individualize prints in an edition • Describe similarities and differences in each other's works of art</td>
</tr>
<tr>
<td>Math Learning Activities: (What students will do) (Classroom teachers complete)</td>
<td>• Everyday Math 7.2 and 7.5 fractions of sets and addition/subtraction of fractions</td>
</tr>
<tr>
<td>Art Skills &amp; Integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)</td>
<td>• Use Legos to design a print matrix • Create an edition of prints for the Lego matrix • Compare and contrast individualized prints in the edition and among classmates' works</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Fractional parts of sets</td>
</tr>
<tr>
<td>Art Standards</td>
<td>9.1.A Understand and use the elements and principles of visual art 9.1.J Understand and use new technologies 9.3.A Analyze, compare, and contrast art works</td>
</tr>
</tbody>
</table>

#### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Decatur</th>
<th>Big Idea: Life cycle of plants Essential Question: What elements in nature do we need to consider when designing a garden?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 4</td>
<td>Week(s) of: March – April</td>
</tr>
<tr>
<td>Math Content/Performance Descriptor</td>
<td>Graphing a data collection Structures of Life</td>
</tr>
<tr>
<td>Science Content/Performance Descriptor</td>
<td>Use color, form, balance, and proportion in works of art Use traditional and contemporary technologies Compare and contrast characteristics in works of art</td>
</tr>
<tr>
<td>Art Content/Performance Descriptor</td>
<td>Create a design for the environment</td>
</tr>
<tr>
<td>Teaching Objective: (What I will teach) (Classroom teachers complete)</td>
<td>• Create bar graphs and line graphs after collecting data • Identify landmarks in a set of data</td>
</tr>
<tr>
<td>Teaching Objective: (What I will teach) (Classroom teachers complete)</td>
<td>• Compare and contrast different types of seeds • Identify how seeds are spread • Identify the different parts of a seed</td>
</tr>
<tr>
<td>Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)</td>
<td>• Design a garden as a group project</td>
</tr>
<tr>
<td>Math Learning Activities: (What students will do) (Classroom teachers complete)</td>
<td>• Create bar graphs and line graphs • Identify the mode, median, range, minimum, and maximum in a set of data</td>
</tr>
<tr>
<td>Science Learning Activities: (What students will do) (Classroom teachers complete)</td>
<td>• Compare different seed characteristics • Identify the difference between fruits and vegetables • Measure growth of plants • Learn about various scientists and their contribution to agriculture • Learn about hydroponic growing • Identify living and nonliving things in nature</td>
</tr>
<tr>
<td>Art Skills &amp; Integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)</td>
<td>• Design for environment • Graph and map space • Consider different elements of nature • Make drawings based on observation • Consider color, space, drawing, graphs, texture, movement, rhythm, proportion and scale in plan for garden</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Bar graphs, data, data collection, mode, median, range, minimum, maximum</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Seed characteristics, hydro growing</td>
</tr>
<tr>
<td>Art Standards</td>
<td>Color, space, drawing, graphs, texture, movement, rhythm, proportion and scale</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Standards</th>
<th>Science Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4.E.1.2.1</td>
<td>S4.A.2.1.4 Use scientific thinking processes to conduct investigations and build explanations by observation, communication, comparing, and organizing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Standards</th>
<th>Science Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4.E.1.2.1</td>
<td>S4.A.2.1.4 Use scientific thinking processes to conduct investigations and build explanations by observation, communication, comparing, and organizing</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Math Standards</th>
<th>Science Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4.E.1.2.1</td>
<td>S4.A.2.1.4 Use scientific thinking processes to conduct investigations and build explanations by observation, communication, comparing, and organizing</td>
</tr>
</tbody>
</table>

### Assessment strategies: Math test, science notebook, journal responses, math and science vocabulary, design drawings
### Fifth Grade

#### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Morton</th>
<th>Grade: 4</th>
<th>Week(s) of: March-April</th>
<th>Big Idea: Ecosystems of living things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Content/Performance Descriptor</td>
<td>Art Content/Performance Descriptor</td>
<td>Landscape Art / Pictorial Space</td>
<td></td>
</tr>
<tr>
<td>Generate questions that can be answered through scientific investigation</td>
<td>Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain living things and their ecosystems and how they interact in their habitats</td>
<td>Students will learn to interpret landscape art and to compose their own landscape drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science Learning Activities: (What students will do) (Classroom teachers complete)</td>
<td>Art Skills &amp; integrated Learning Activities: (What students will do) (Art teacher/Teaching artist complete)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Explain the needs of living things</td>
<td>Students will study master landscape artists and respond in writing to their work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Describe the nature of their habitats and how they interact</td>
<td>Students will create landscape/habitat drawings on 9” x 9” cardboard squares that in the end will be constructed into a cube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discuss the place of living things in the ecosystem</td>
<td>Students will focus on a new landscape/habitat each week: desert, mountains, rain forest, ocean, city neighborhood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discuss the regions of the Earth in relation to living things</td>
<td>Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composition, pictorial space, line, color, balance, scale, unity, harmony, landscape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science Standards</td>
<td>Science Standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4.A.2.1.4 Use scientific thinking processes to conduct investigations and build explanations by observation, communication, comparing and organizing</td>
<td>9.1.A Know and use principles and elements of art to create works of art</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1.C Know and use the vocabulary of the art form</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Assessment strategies: Each week students will answer questions that address each habitat; student artwork will show whether students understand composition and pictorial space.

---

### Fifth Grade

#### Arts Link: Grade Level Planning Template

<table>
<thead>
<tr>
<th>School: Comly</th>
<th>Grade: 5</th>
<th>Week(s) of: Dec 5 - Jan 16</th>
<th>Big Idea: 2- and 3-dimensional objects can be described, classified, and analyzed by their attributes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Content/Performance Descriptor</td>
<td>Art Content/Performance Descriptor</td>
<td>Understand the difference between 2-Dimensional and 3-Dimensional artworks</td>
<td></td>
</tr>
<tr>
<td>Identify 3-dimensional forms found in picture/environment</td>
<td>Teaching Objective: (What I will teach) (Art teacher/Teaching artist complete)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the properties of geometric solids</td>
<td>Analyze formal qualities in works of art</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Learning Activities: (What students will do) (Classroom teachers complete)</td>
<td>Use craft media and techniques in a 3-D work of art and understand the difference between additive and subtractive sculpture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Review names and properties of geometric solids</td>
<td>Develop craftsmanship in sewing/soft sculpture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sort geometric solids by their attributes</td>
<td>Math Standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Build and use models to describe and compare</td>
<td>M6.C.1.1.1, M6.C.1.1.2, M6.C.1.1.4 Use the relationship between circles and polygons to identify angle measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M5.C.1.1.2 Use attributes to identify polygons</td>
<td>Assessment strategies: Journal entries, successful pattern pieces, craftsmanship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Standards</td>
<td>Art Standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6.C.1.1.1, M6.C.1.1.2, M6.C.1.1.4</td>
<td>9.1.3.B Use elements and principles in visual arts to create works of art</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Arts Link: Grade Level Planning Template

**School:** Comly  
**Grade:** 5  
**Week(s) of:** First 5 weeks  
**Big Idea:** The sun’s role in the passage of time  
**Essential Question:** What is the impact of the sun on an object as it moves through time?

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure the length accurately to the nearest 1/8 inch and/or 1/2 centimeter</td>
<td>Use evidence, such as observations or experimental results to support inferences about a relationship</td>
<td>Use observation in order to understand the function of shadows in a work of art</td>
</tr>
</tbody>
</table>

**Math Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Practice adding and subtracting time using both digital and analog clocks
- Find how many steps or how much time is needed to get to a destination after making an estimate

**Science Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Children observe their shadows outside
- Children practice making various shapes and seeing how that impacts their shadows
- Partners trace each other’s shadow
- Every hour for 3-4 hours students trace the new position of the shadow; before going out to draw shadow children will estimate new position.

**Art Skills & Integrated Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Children will observe and trace various shadows to create abstract compositions
- Students will learn how transparent colors overlap/layer to create mixtures and shadows layer to create abstractions
- Students will work with light-sensitive fabric paint to create shadow silhouettes
- Students will collaborate to create quilt composition to represent passage of time/movement of sun/length of shadows

**Vocabulary**  
Elapsed time, digital, analog

**Science Standards**  
S8.A.2.2.1 Construct and use a shadow tracker to tell time; observe and compare shadows during a school day

**Art Standards**  
9.1B Use of elements and principles to produce works in the arts
9.4D Choices of media form themes to communicate

### Arts Link: Grade Level Planning Template

**School:** Morton  
**Grade:** 5  
**Week(s) of:** September-October  
**Big Idea:** Measurement is important in our everyday life.  
**Essential Question:** How can we measure the impact on an object as it moves through time?

<table>
<thead>
<tr>
<th>Math Content/Performance Descriptor</th>
<th>Science Content/Performance Descriptor</th>
<th>Art Content/Performance Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure the length accurately to the nearest 1/8 inch and/or 1/2 centimeter</td>
<td>Use evidence, such as observations or experimental results to support inferences about a relationship</td>
<td>Standards of measurement used to create works of art</td>
</tr>
</tbody>
</table>

**Math Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Students will create rectangular and square arrays using shapes and manipulatives; then create multiplication number models to represent such arrays
- Find how many steps or how much time is needed to get to a destination after making an estimate

**Science Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Students create shadow tracings throughout the day at various times, then measure them and observe similarities and differences

**Art Skills & Integrated Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Students will measure a grid to create an array
- Students will create patterns using primary and secondary colors within the array
- Students will create an array that exhibits the cycles of the moon

**Vocabulary**  
Elapsed time, arrays, estimation

**Science Standards**  
S8.A.2.2.1 Construct and use a shadow tracker to tell time; observe and compare shadows during a school day

**Art Standards**  
9.1.A Know and use the principles and elements of art to make works of art
9.3.A Compare and contrast elements and principles in works of art

**Assessment strategies:** Journal entries, art project, oral/written explanation of students’ steps and work.

---

**9.3.A  Compare and contrast elements and principles to make works of art**

**Art Standards**

- 9.1.A Know and use the principles and elements of art to make works of art
- 9.3.A Compare and contrast elements and principles in works of art

---

**Art Learning Activities:** (What students will do)  
**Classroom teachers complete**

- To design a workspace with a grid and see how that impacts their shadows
- Students will work with light-sensitive fabric paint to create shadow silhouettes
- Students will collaborate to create a quilt composition to represent passage of time/movement of sun/length of shadows

**Vocabulary**  
Transparency, photosensitivity, abstract art

**Science Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Students will create patterns using primary and secondary colors within the array
- Students will create shadow tracings throughout the day at various times, then measure them and observe similarities and differences

**Science Standards**  
S8.A.2.2.1 Construct and use a shadow tracker to tell time; observe and compare shadows during a school day

**Art Standards**  
9.1.B Use of elements and principles to produce works in the arts
9.4.D Choices of media form themes to communicate

**Assessment strategies:** Journal entries, art project, oral/written explanation of students’ steps and work.

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**9.4.D  Choices of media form themes to communicate**

**Art Standards**

- 9.1.B Use of elements and principles to produce works in the arts
- 9.4.D Choices of media form themes to communicate

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**Arts Link: Grade Level Planning Template**

**Science Learning Activities:** (What students will do)  
**Teaching Objective:** (What I will teach)  
**Classroom teachers complete**

- Students will create rectangular and square arrays using shapes and manipulatives; then create multiplication number models to represent such arrays
- Find how many steps or how much time is needed to get to a destination after making an estimate

**Science Standards**  
S8.A.2.2.1 Construct and use a shadow tracker to tell time; observe and compare shadows during a school day

**Art Standards**  
9.1.B Use of elements and principles to produce works in the arts
9.4.D Choices of media form themes to communicate

**Assessment strategies:** Journal entries, art project, oral/written explanation of students’ steps and work.
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