In the Pipeline Activity Guide

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Our mission

Acting on the principle that learning is a joy, the mission of the Children’s Museum of Phoenix is to provide hands-on exhibits and educational activities to engage the minds, muscles and imaginations of children and the grown-ups who care about them, while promoting cooperative interaction, fostering cultural understanding, and enhancing parenting techniques.

Our vision

The Children’s Museum of Phoenix’s vision is to foster a joy of learning to create an environment for families which captures the interest and enthusiasm of children and their adults and inspires people of all ages to learn, work and play together. Our vision is defined by the following objectives:

• Provide engaging projects, exhibits and programming for young children and their families.
• Educate parents and caregivers about child development and parenting techniques.
• Build cultural understanding, positive social interaction, and celebrate diversity.
• Act as a gateway to other cultural institutions and community programs.

We are a Common Sense Green museum.

The Children's Museum of Phoenix's "Common Sense Green" environmental initiative provides an over-arching roadmap for creating a museum that lives and breathes healthful choices. The Children's Museum supports the healthy minds, muscles, and imaginations of visitors by taking many actions that foster environmental stewardship. Some examples:

• Using non-toxic materials throughout the building and exhibits, including office supplies, select printing materials, and janitorial supplies, creating a healthy and safe environment in the Museum.
• Using materials that are earth-friendly and sustainable throughout their life cycle as in renewable, sustainable, and recycled building materials like wheatboard, and recycled cardboard.
• Choosing materials and practices that are socially responsible. The Museum will choose local vendors whenever possible to cut down on transportation, get to know green industries in the community, and make sure that the materials and services being used are made fair and equitable.
• Offering incentives that support earth-friendly behavior, like carpooling and public transportation benefits, bike racks, and easy recycling throughout the museum.
• Spark ideas, innovation, collaboration, and conversation about sustainability and environmental stewardship.
An Overview of In the Pipeline:

Construction toys capture the interest of children of a variety of ages. When children build, they are constructing unique creations based on their imaginations and experiences. The objectives of “In the Pipeline” are to assist students with:

- Developing and following a plan to its completion
- Strengthening fine and gross motor skills
- Expanding their math, science, and language concepts.
- Developing sharing, interactive and cooperation skills.

Throughout time mankind has built a variety of structures. No doubt the first were shelters. These first shelters were made out of indigenous materials and small in comparison to modern buildings. Some local examples of early structures would be the Navajo Hogan and Hohokam adobe structures. Over time building materials and skills became more diverse and sophisticated.

In much the same way children develop in their constructions. Toddlers and young preschoolers will build small simple structures. This age children stack materials to make towers and place materials end to end to make long lines and roads. As their world expands and imagination and skills grow, children build increasingly complex and purposeful structures.

The Children’s Museum of Phoenix exhibit, “In the Pipeline,” is designed to bring out creativity in children. With this exhibit of pipes, connectors and colorful banners children can construct just about anything they can imagine. Children can build long lines of pipe, towers, shapes, statues, houses, castles and entire skylines. While creating children gain skill in following a mental plan, communicating with others, using spatial relations and gain knowledge of the physics involved in building.

Let the children lead and see what develops. You may find a community of city planners, architects, artists and physicists.
Where Do We Start?

1. Introduction: Explain that the exhibit is on loan from the Children’s Museum of Phoenix and how long it will be available to the class.

2. Briefly explain the Children’s Museum: Ask students if they have ever been to the Children’s Museum of Phoenix. Discuss that a children’s museum has a variety of exhibits where children can play, such as the Market, which is a pretend grocery store. If you are able, this may be a good opportunity to share more information from the Museum website: www.childrensmuseumofphoenix.org.

3. Briefly explain what the students will do: Students use pipes, joints and fabric panels to create anything they wish. You might have a theme, subject, or curriculum purpose for the students’ constructions. Students can work alone on a project or with others.

4. Brainstorm ideas for creation: Where have you seen pipes before? What could you build? Castle, house, school, people, letters, animals, shapes are possibilities. Focus this discussion around your curriculum purpose.

5. Briefly explain the safety guidelines: The materials are to be used for building, not swordplay for example. Discuss any other classroom rules you might have. We ask that you refrain from using the In the Pipeline exhibit in sand or water.

6. Some basic activities to get you started:
   **Language Arts**
   - Take time to have students explain what they built, how, and why to their classmates.
   - Ask children to write a story or poem about their creations.
   - Create a class story about the exhibit with each child contributing a sentence.
   - Act out a story, using their In the Pipeline structure as the stage.
   - Ask the students to make letters using the pipes and connectors. Talk about whether these letters are symmetrical or not.
   - Make a puppet theater and have a puppet show!
   - Invite another class to see your creation by creating an invitation on a poster to advertise.

   **Mathematics**
   - Count the number of pipes you used.
   - Challenge the students to make a structure as tall as they are using the least amount of pieces.
   - Give the students a certain number of pieces and encourage them to create an object with the limited number of pieces.
   - Ask the students to use the pipes and connectors to create numbers and shapes. Again, talk about whether these shapes are symmetrical.
   - As a class, identify the largest and smallest structures.
   - Talk about shapes that you can (and cannot) create using In the Pipeline materials.

7. Keep the learning going: Utilize one of our provided activity lesson plans (on the following pages) to use In the Pipeline materials.
8. Classroom extension suggestions: Utilize these ideas while you still have the exhibit, or keep the excitement going by completing these classroom activities:

- Use straws and clay/play dough to build.
- Use unit blocks or other cube blocks to build geometric structures.

9. Conclusion: As your time with In the Pipeline winds down, consider some of these ideas for students to reflect on the experience and their learning:

- Perform a “gallery walk”—children walk around and look at each other’s creations. The child who made the piece can talk about it.
- Have other children make positive comments about their work. “I like it because …” “I like the way that…” “It is cool/interesting/creative because…”
- “Who worked in a group? How did you help each other?”
- Write stories/poems about their creations. Plan what they would create another time?
- Evaluate the exhibit through discussion or written project
# Early Learning Standards (Preschool)

## Language and Literacy

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1C1c</td>
<td>Demonstrates understanding and follows directions that involve: one step, two steps, and a series of unrelated sequences of action.</td>
</tr>
<tr>
<td>S1C2a</td>
<td>Communicates needs, wants, ideas, and feelings through 3-5 word sentences.</td>
</tr>
<tr>
<td>S1C2b</td>
<td>Speaks clearly and understandably to express ideas, feelings and needs.</td>
</tr>
<tr>
<td>S1C2c</td>
<td>Makes relevant responses to questions and comments from others.</td>
</tr>
<tr>
<td>S1C2d</td>
<td>Initiates, sustains, and expands conversations with peers and adults.</td>
</tr>
<tr>
<td>S1C2e</td>
<td>With modeling and support, uses acceptable language and social rules including appropriate tone, volume and inflection to express ideas, feelings, and needs.</td>
</tr>
<tr>
<td>S1C2f</td>
<td>Uses appropriate eye contact, turn taking, and intonation while having conversations with adults and peers.</td>
</tr>
<tr>
<td>S1C2g</td>
<td>Recognizes when the listener does not understand and uses techniques to clarify the message.</td>
</tr>
<tr>
<td>S1C2h</td>
<td>With modeling and support, uses increasingly complex phrases and sentences.</td>
</tr>
<tr>
<td>S1C3a</td>
<td>With modeling and support, uses age-appropriate vocabulary across many topic areas and demonstrates a wide variety of words and their meanings with each area.</td>
</tr>
</tbody>
</table>

## Mathematics

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3C1a</td>
<td>Sorts and classifies objects by one or more attributes (e.g., size, color, shape, texture, use).</td>
</tr>
<tr>
<td>S3C1b</td>
<td>Explains how items were sorted into groups.</td>
</tr>
<tr>
<td>S3C3a</td>
<td>Compares objects and uses terms such as longer-shorter, hotter-colder, and faster-slower.</td>
</tr>
<tr>
<td>S3C3b</td>
<td>Uses non-standard units of measurement (e.g., hands, bodies, containers) to estimate measurable attributes.</td>
</tr>
<tr>
<td>S3C3d</td>
<td>Orders objects by measurable attributes.</td>
</tr>
<tr>
<td>S4C1a</td>
<td>Uses and responds to positional terms (e.g., between, inside, under, above, behind).</td>
</tr>
<tr>
<td>S4C1b</td>
<td>Describes the position or location of objects in relation to self or other objects.</td>
</tr>
<tr>
<td>S4C2a</td>
<td>Recognizes basic two-dimensional shapes.</td>
</tr>
<tr>
<td>S4C2b</td>
<td>Creates two- and three-dimensional shapes during play.</td>
</tr>
<tr>
<td>S4C2d</td>
<td>Compares and describes attributes of two- and three-dimensional objects in the environment using own vocabulary.</td>
</tr>
</tbody>
</table>

## Science

<table>
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<tr>
<th>Standard</th>
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</tr>
</thead>
<tbody>
<tr>
<td>S1C1a</td>
<td>Exhibits curiosity about objects, living things, and other natural events in the environment by using one or more senses.</td>
</tr>
<tr>
<td>S1C1b</td>
<td>Identifies attributes of objects, living things, and natural events in the environment.</td>
</tr>
<tr>
<td>S1C1d</td>
<td>Begins to describe the similarities, differences and relationships between objects, living things and natural events.</td>
</tr>
<tr>
<td>S1C2b</td>
<td>Makes predictions and checks them through hands-on investigation with adult support.</td>
</tr>
<tr>
<td>S1C2c</td>
<td>Adjusts the experiment if results are different than expected and continues testing.</td>
</tr>
<tr>
<td>S1C2d</td>
<td>Persists with an investigation.</td>
</tr>
<tr>
<td>S1C3b</td>
<td>Identifies cause and effect relationships.</td>
</tr>
<tr>
<td>S1C3c</td>
<td>Constructs explanation about investigations.</td>
</tr>
<tr>
<td>S1C4b</td>
<td>Presents their scientific ideas in a variety of ways.</td>
</tr>
</tbody>
</table>

## Social Studies

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2C2d</td>
<td>Seeks opportunities for leadership.</td>
</tr>
</tbody>
</table>
**Physical Development, Health & Safety**

- **S1C2Ia:** Uses fingers, hands, and wrists to manipulate a variety of tools and materials.
- **S1C2Ib:** Uses eye-hand coordination to perform simple tasks.

**Social-Emotional**

- **S1C2Ia:** Demonstrates self-confidence.
- **S1C2Ib:** Makes personal preferences known to others.
- **S1C3Ia:** Understands and follows expectations in the learning environment.
- **S1C3Ic:** Modifies behavior for various situations and settings.
- **S1C3Id:** Chooses appropriate words and actions.
- **S2C1Ib:** Seeks security and support from familiar adults.
- **S2C1Ic:** Demonstrates the ability to engage with new adults or children with the support of familiar adults.
- **S2C2Ia:** Responds when adults or other children initiate interactions.
- **S2C2Ib:** Initiates and sustains positive interactions with adults and other children.
- **S2C2Ic:** Demonstrates positive ways to resolve conflict.
- **S2C3Ia:** Respects the rights and property of others.
- **S2C3Ib:** Defends own rights and the rights of others.
- **S2C3Ic:** Shows respect for learning materials in the learning environment.

**Fine Arts**

- **S1C1Ic:** Creates art in 2 and 3 dimensions.
- **S3C1Ia:** Assumes roles from daily activities using a variety of props.
- **S3C1Ic:** Pretends an object exists without using a prop.

**Approaches to Learning**

- **S1C1Ia:** Seeks interaction with others.
- **S1C1Ib:** Develops independence during activities, routines and play.
- **S1C1Ic:** Exhibits cognitive flexibility, imagination, and inventiveness when attempting tasks and activities.
- **S1C2Ia:** Shows interest in learning new things and trying new experiences.
- **S1C2Ib:** Expresses interest in people.
- **S1C2Ic:** Asks questions to get information.
- **S2C1Ia:** Displays ability to hold attention when engaged in an activity.
- **S2C1Ib:** Sustains attention for extended periods of time when engaged in an age-appropriate activity despite distractions or interruptions.
- **S2C1Ic:** Increases ability to focus attention, and can return to activities after distractions and interruptions.
- **S2C2Ia:** Pursues challenges.
- **S2C2Ib:** Copes with frustration or disappointment with support.
- **S2C2Ic:** Establishes goals, generates plans and follows through to completion.
- **S3C1Ia:** Expresses opinions or ideas.
- **S3C1Ib:** Views self as competent and skilled.
- **S3C1Ic:** Is willing to take risks and consider a variety of alternatives.
- **S4C1Ia:** Uses imagination to generate new ideas.
- **S4C1Ib:** Engages in inventive social play.
- **S5C1Ia:** Recognizes relationships between cause and effect.
- **S5C2Ia:** Recognizes problems.
- **S5C2Ib:** Seeks adult assistance when support is required.
- **S5C2Ic:** Tries to solve problems.
- **S5C2Id:** Works to solve a problem independently.
## Kindergarten

### English Language Arts

**K.SL.6:** Speak audibly and express thoughts, feelings, and ideas clearly.

### Mathematics

**K.MD.1:** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

**K.MD.2:** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.

**K.G.1:** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

**K.G.2:** Correctly name shapes regardless of their orientations or overall size.

**K.G.3:** Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

**K.G.5:** Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

**K.G.6:** Compose simple shapes to form larger shapes.

### Science

**S1C1PO1:** Observe common objects using multiple senses.

**S5C1PO1:** Identify the following observable properties of objects using the senses: shape, texture, size, color.

**S5C1PO2:** Compare objects by the following observable properties: size, color, type of material.

**S5C2PO1:** Describe spatial relationships (i.e., above, below, next to, left, right, middle, center) of objects.

### Social Studies

**S4C1PO3:** Determine the relative location of objects using the terms near/far, behind/in/front, over/under, left/right, up/down.

### Physical Education

**S5C2PO1:** Works in a diverse group setting without interfering with others.

**S5C2PO2:** Accepts all classmates without regard to personal differences.

**S5C2PO3:** Demonstrate the elements of socially acceptable conflict resolution during class activity.

### Foreign and Native Language Standards

**1FL-R5:** Interpret gestures, information and other visual or auditory cues.

**2FL-R1:** Greet people, make small talk and close conversations.

**4FL-R1:** Use appropriate gestures and oral expressions for greetings, leave-takings and courtesy phrases.
# First Grade

<table>
<thead>
<tr>
<th><strong>English Language Arts</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.L.6: Use words and phrases acquired through conversations, reading, and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mathematics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.MD.1: Order three objects by length; compare the lengths of two objects indirectly by using a third object.</td>
</tr>
<tr>
<td>1.MD.2: Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.</td>
</tr>
<tr>
<td>1.G.2: Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.</td>
</tr>
<tr>
<td>1.G.3: Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases of half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Science</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1C1PO1: Compare common objects using multiple senses.</td>
</tr>
<tr>
<td>S5C1PO1: Classify objects by the following observable properties: shape, texture, size, color, weight.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Physical Education</strong></th>
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</thead>
<tbody>
<tr>
<td>S5C2PO1: Works in a diverse group setting without interfering with others.</td>
</tr>
<tr>
<td>S5C2PO2: Accepts all classmates without regard to personal differences.</td>
</tr>
<tr>
<td>S5C2PO3: Demonstrate the elements of socially acceptable conflict resolution during class activity.</td>
</tr>
</tbody>
</table>
### Second Grade

**English Language Arts**

2.L.6: Use words and phrases acquired through conversations, reading, and being read to, and responding to texts, including using adjectives and adverbs to describe.

**Mathematics**

2.G.1: Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

2.G.3: Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

**Science**

S1C3PO3: Compare the results of the investigation to predictions made prior to the investigation.

S1C4PO1: Communicate the results and conclusions of an investigation.

**Physical Education**

S5C2PO1: Works in a diverse group setting without interfering with others.

S5C2PO2: Accepts all classmates without regard to personal differences.

S5C2PO3: Demonstrate the elements of socially acceptable conflict resolution during class activity.

### Third Grade

**English Language Arts**

3.L.6: Acquire and use accurately grade-appropriate conversational, general academic and domain-specific words and phrases, including those that signal spatial and temporal relationships.

**Mathematics**

3.G.2: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

**Science**

S1C1PO2: Predict the results of an investigation based on observed patterns, not random guessing.

S1C4PO2: Describe an investigation in ways that enable others to repeat it.

**Physical Education**

S5C2PO1: Work cooperatively with a partner, small group, or class.

S5C2PO2: Demonstrate respect and caring for peers through verbal and non-verbal encouragement and assistance.

S5C2PO3: Resolve conflicts in a socially acceptable manner.

S5C2PO4: Participate in establishing rules and procedures that are safe and effective for specific activities.

S5C2PO5: Encourage others and refrain from put-down statements.

**Health Education**

S4C2PO1: Demonstrate nonviolent strategies to manage or resolve conflict.

S5C2PO2: Demonstrate respect and caring for peers through verbal and non-verbal encouragement and assistance.

S5C2PO3: Resolve conflicts in a socially acceptable manner.
### Fourth Grade

**English Language Arts**

4.L.6: Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, and states of being.

**Mathematics**

4.G.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

4.G.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

**Science**

S1C1PO3: Formulate predictions in the realm of science based on observed cause and effect relationships.

S1C4PO1: Communicate verbally or in writing the results of an inquiry.

**Physical Education**

S5C2PO1: Work cooperatively with a partner, small group, or class.

S5C2PO2: Demonstrate respect and caring for peers through verbal and non-verbal encouragement and assistance.

S5C2PO3: Resolve conflicts in a socially acceptable manner.

S5C2PO4: Participate in establishing rules and procedures that are safe and effective for specific activities.

S5C2PO5: Encourage others and refrain from put-down statements.

**Health Education**

S4C2PO1: Demonstrate nonviolent strategies to manage or resolve conflict.

### Fifth Grade

**English Language Arts**

5.L.6: Acquire and use accurately grade-appropriate conversational, general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships.

**Mathematics**

5.MD.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

5.MD.4: Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems including volume.

**Science**

S1C2PO3: Conduct simple investigations based on student developed questions in life, physical and Earth and space sciences.

S1C3PO1: Analyze data obtained in a scientific investigation to identify trends and form conclusions.

S1C3PO2: Analyze whether the data is consistent with the proposed explanation that motivated the investigation.

S1C3PO3: Evaluate the reasonableness of the outcome of an investigation.

**Physical Education**

S5C2PO1: Work cooperatively with a partner, small group, or class.

S5C2PO2: Demonstrate respect and caring for peers through verbal and non-verbal encouragement and assistance.

S5C2PO3: Resolve conflicts in a socially acceptable manner.

S5C2PO4: Participate in establishing rules and procedures that are safe and effective for specific activities.

S5C2PO5: Encourage others and refrain from put-down statements.

**Health Education**

S4C2PO1: Demonstrate nonviolent strategies to manage or resolve conflict.
# Classroom Activity

**Area Mapping**

<table>
<thead>
<tr>
<th>DURATION: 45-50 Minutes</th>
<th>GRADE LEVEL: Pre-K-5th Grade</th>
</tr>
</thead>
</table>

## DESCRIPTION

Students will find the area and perimeter of the classroom or other given space.

## OBJECTIVES

1. Students will demonstrate understanding of the concepts of area and perimeter.
2. Students will make estimations and compare their estimations to the results.

## MATERIALS

- PVC Pipes
- Assorted PVC Connectors
- Recording materials (paper, pencil, camera, etc.)
- Tape measures

## DIRECTIONS

1. Introduction to Pipeline (see pages 5-6 of this guide).
2. Have students estimate how many pieces of each size they will need in order to map out the perimeter.
3. Gather Pipeline materials and begin the layout of pipe around the perimeter of the room/given space.
4. Count the amount of materials used and record by charts. Draw diagram of the layout of the pipeline in their classroom.
5. Have students discuss the methods used for building and deconstruction. Students then could note comparisons between their own classroom and other areas (additional: measurable attributes- use formulas to find the perimeter and/or area of the laid out space).

## ADAPTATIONS

For younger students, use a smaller area to practice on prior to measuring the perimeter of the large classroom space.

## EXTENSIONS

For older grades and to challenge students, have them continue to use the pieces of the pipes to figure out the area of the space.
# Classroom Activity

<table>
<thead>
<tr>
<th>Blindfolded Obstacle Course</th>
<th>DURATION: 20-30 Minutes</th>
<th>GRADE LEVEL: Pre-K-5th Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Students will work together to create an obstacle course to use with a classmate.</td>
<td></td>
</tr>
</tbody>
</table>
| **OBJECTIVES**             | 1. Students will work collaboratively with peers to design and create an obstacle course using the given materials.  
2. Students will develop communication skills in the process of designing, creating, and using the obstacle course.  
3. Students will use positional and spatial terms while using the obstacle course. |
| **MATERIALS**              | • PVC Pipes  
• Assorted PVC Connectors  
• Brightly-colored fabric panels  
• Recording materials (paper, pencil, camera, etc.)  
• Blind folds |
| **DIRECTIONS**             | 1. Introduction to Pipeline (see pages 5-6 of this guide).  
2. Students will discuss what they would like their obstacle course to have. After these elements are discussed students will start the design and construction of their obstacle course making sure to include these movements in their design (over, under, through, between, inside, beside, etc.)  
3. Once the obstacle course is built students will pair up and decide who will play the role of the guide and who will be guided wearing the blindfold.  
4. Next they will complete the obstacle course with their partners. Then they will switch roles.  
5. When they complete the course have students describe and discuss their experiences, challenges and accomplishments. |
| **ADAPTATIONS**            | For younger students, complete the same activity, but without using blindfolds. |
| **EXTENSIONS**             | To further challenge students, create an obstacle course that you design to have them move through. This decrease in familiarity will increase the need for communication, patience, and listening. |
### Classroom Activity

<table>
<thead>
<tr>
<th>Blue Print</th>
<th>DESCRIPTION</th>
<th>Students will try their hand at being architects by creating blueprints of structures they will create.</th>
</tr>
</thead>
</table>
| **DURATION:** | **OBJECTIVES** | 1. Students will correctly use mathematical tools (i.e. ruler) to create their blueprint drawing.  
2. Students will regularly use vocabulary to describe two- and three-dimensional shapes.  
3. Students will implement their plans, creating similar structures. |
| **GRADE LEVEL:** | **MATERIALS** | • Rulers, paper, pencil, shape diagrams  
• Examples of simple blueprint diagrams  
• PVC Pipes  
• Assorted PVC Connectors  
• Brightly-colored fabric panels |
|            | **DIRECTIONS** | 1. Introduction to Pipeline (see pages 5-6 of this guide).  
2. Show students examples of some simple blueprint designs and the significance of their importance in everyday life.  
3. Have them discuss some details that are important to them in their own designs, and list these things.  
4. Next have them do a rough sketch and share these with a partner to do an edited copy. From this edited version have them do a final blueprint.  
5. Once their blueprints are completed have students share their designs with the rest of their classmates in a presentation forum.  
6. Finally when they are all done presenting, have the class vote on one or two design(s) that they will try to construct with pipeline materials based on the winning blueprint designs. |
|            | **ADAPTATIONS** | To assist students with the task of drawing blueprints, the use of graph paper may aid students in this activity.  
For younger children, you may wish to use blue paper and chalk for their blueprint drawings. |
|            | **EXTENSIONS** | As an added challenge, have students complete their drawings, but then have a peer build the structure based on the blueprint. This will demonstrate the importance of understanding details, accuracy, and following directions. |
# Classroom Activity

## Building Budget

<table>
<thead>
<tr>
<th>DURATION: 45-60 Minutes</th>
<th>GRADE LEVEL: Pre-K – 5th Grade</th>
</tr>
</thead>
</table>

### DESCRIPTION

Your class will learn economic skills in addition to the geometry and measurement skills that are developed using In the Pipeline.

### OBJECTIVES

1. Students will gain understanding in economics, including buying, selling.
2. Students will develop skills in counting, adding, and subtracting money amounts (addition/subtraction to two decimal points).
3. Students will create a budget and stick to the budget when purchasing materials for their building project.

### MATERIALS

- Play money
- Price labels
- A predetermined building project and budget based on the created prices
- Accounting sheets
- Recording materials (paper, pencil, etc.)
- PVC Pipes
- Assorted PVC Connectors
- Brightly-colored fabric panels

### DIRECTIONS

1. Introduction to Pipeline (see pages 5-6 of this guide).
2. Have students look at pipeline materials and determine a set price for each piece as a class.
3. Next give student teams the price labels, and label each piece with that price.
4. Then show student teams the imaginary building project for which they will be purchasing for.
5. Finally have them add up the prices of the purchased materials and determine where they placed as far as the budget constraints.

### ADAPTATIONS

For younger students, limit the size of the structure and/or the pricing (based on their knowledge and ability levels).

### EXTENSIONS

For older grades, have students research the cost of various building projects, including materials, labor, and land.

Have students compare how they did at staying within budget in comparison to other groups.

Include skills on percentages and subtraction by creating coupons for the students to use (% off of purchase, $ off of purchase).
## Classroom Activity

<table>
<thead>
<tr>
<th>Directional Sets</th>
<th>DURATION: 40-60 Minutes</th>
<th>GRADE LEVEL: Pre-K – 5th Grade</th>
</tr>
</thead>
</table>

### DESCRIPTION
A team of students will make a written set of directions for another team in order to create a pipeline structure of their own without an example.

### OBJECTIVES
1. Students will develop written or verbal directions to build their structure.
2. Students will follow given directions, exactly as described, to create the structure.
3. Students will understand the importance of details in communication.
4. Students will make comparisons between two structures, noting similarities and differences.

### MATERIALS
- PVC Pipes
- Assorted PVC Connectors
- Brightly-colored fabric panels
- Recording materials (paper, pencil, camera, etc.)

### DIRECTIONS
1. Introduction to Pipeline (see pages 5-6 of this guide).
2. Students will plan and create a structure of their own using the pipeline materials, recording the steps of building along the way (this will help them make their own set of directions to give to the next team, in order to make the same creation as they did).
3. Next have students write the final copy of the directions together.
4. Then these set of directions will be exchanged with another team to build.
5. Finally the teams will share their pictures/documentation to see if the opposing team created the same structure.

### ADAPTATIONS
Have groups create a video version of their structure and directions to share with the other team.

Put a divider between the two groups and have them build the same structure simultaneously with each other. Have one team give the directions verbally while both teams build. Finally, have both groups compare structures when completed!

### EXTENSIONS
Have groups evaluate their structure themselves prior to having the original group (who gave the directions) and discuss if items were missing and/or different than the design.
# Classroom Activity

<table>
<thead>
<tr>
<th>Marshmallow Construction</th>
<th>DURATION: 25-45 Minutes</th>
<th>GRADE LEVEL: Pre-K – 5th Grade</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Children will have as much fun as they design and create structures using toothpicks, spaghetti, and marshmallows!</th>
</tr>
</thead>
</table>
| OBJECTIVES | 1. Students will make connections to their experience with the In the Pipeline materials.  
2. Students will develop fine motor skills, as well as cause and effect, while they create their structure.  
3. Students will use descriptive language as they share and describe their structure. |
| MATERIALS | • Scrap Cardboard or Paper Plates  
• Marshmallows (various sizes)  
• Spaghetti noodles (toothpicks also work) |
| DIRECTIONS | 1. Introduction to Pipeline (see pages 5-6 of this guide).  
2. Give each child a cardboard base or paper plate upon which to construct their 3-D masterpiece. Next have students write the final copy of the directions together.  
3. Provide marshmallows, toothpicks, and spaghetti noodles and encourage the children to create an intricate 3-D structure.  
4. Finally, have students describe the structure they created to their classmates. |
| ADAPTATIONS | Have students work collaboratively on a community structure.  
Talk about the 2-D and 3-D shapes that you are able to make using this method. |
| EXTENSIONS | Use this activity as a writing prompt and have students create a story about their structure. |
Resources

General
DonorsChoose – www.donorschoose.org - teachers can request donations toward specific programming or experiences for their class

Treasures 4 Teachers – www.treasures4teachers.org – school supplies for Arizona educators provided to members free of cost

Read On Arizona – www.readonarizona.org – provides information on literacy, including links to many literacy rich websites

Science Foundation of Arizona – www.sfaz.org – provides information, activities, and research in the areas of STEM