Exploring Math and Science in the Infant and Toddler Classroom

Psalm 65:8 “The whole earth is filled with awe at your wonders; where morning dawns, where evening fades, you call forth songs of joy.”

STEM
- Gives a label to what you may already be doing
- Early childhood is best time to begin with concepts for STEM learning
- Looking at each discipline separately:
  - SCIENCE is nurturing a sense of wonder and curiosity. It's about encouraging investigation and asking “why.”
  - TECHNOLOGY is a fancy word for “tools.” Using tools, being inventive, identifying problems and making things work.
  - ENGINEERING is about identifying a problem, thinking about solutions and trying them out.
  - MATH is more than counting. Mathematics is sequencing, comparing, sorting, patterning, and identifying shapes. Language is a big part of math with building vocabulary.

STEAM
- 21st century learning includes: creativity, innovation, critical thinking, problem solving, communication, and collaboration

Science in the early years is:
- nurturing a sense of wonder and curiosity
- about encouraging investigation and asking “why”
- observing and experimenting, making predictions, sharing discoveries, asking questions and wondering how things work

Cognitive concepts connected to early science learning:
- Object permanence
- Cause and effect
- Spatial awareness
- Symbolic thinking

Invite children to use their senses
- How does it feel?
- What does it look like?
- How does it smell?
- How does it taste?
- How does it sound?

Support early science experiences and allow for:
- Sensory exploration
- Natural curiosity
- Readiness to repeat actions that have an interesting effect
- Use of language – commenting, describing, making comparisons, asking questions
- Connections of experiences to what children have previously experienced
Math in early years includes:

- Sequencing
- Comparing
- Sorting
- Patterning
- Identifying: shapes, sizes, volume

Why include math?

- Math is all around us; creating an environment that supports early math learning and using math talk makes it concrete and visible for infants and toddlers.

Early math concepts

- Numbers and operations
- Geometry and spatial sense
- Measurement and comparison
- Patterns, relationships and change

Support early math

- Emphasize math ideas
- Use mathematical language
- Make comments, ask and answer questions, and pose math-related problems
- Provide a variety of materials and tools for exploration of math ideas

Technology

- Technology began when people began inventing tools and devises that enhance our lives.
- Technology can be integrated with science and math through tools children use for observation such as magnifying glasses or other tools.

Engineering

- Engineering is connected to many concepts in the early education classroom such as problem solving with everyday play such as building with blocks or making ramps

Arts

- Art includes visual arts and creative arts such as music and movement.

Sources

- Teaching Stem in the Early Years, Sally Moomaw
- Nurturing Stem Skills In Young Learners, PreK3, Brief by The National Science Foundation Initiative
- Fred Roger’s Approach to STEM, Hedda Sharapan
- Infant and Toddler STEM, Childcare Quality and Early Learning, University of Washington
- Promoting the Development of Scientific Thinking, Ruth Wilson, PhD.
- www.earlychildhoodnews.com/earlychildhood/article_view.aspx?ArticleId=409

Jeannie Forrest
Jeannie_forrest@acsi.org

Ask me how! If your school is a member of ACSI you can access free early education resources https://www.acsi.org/ee
## Activities to Support Math Development from 4-36 months

<table>
<thead>
<tr>
<th>Age</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-8 mos.</td>
<td>Baby bowls</td>
<td>Provide small bowls or trays with cornmeal, flour, water, etc. for babies to touch. Teachers talk about how the substance feels.</td>
</tr>
<tr>
<td>4-8 mos.</td>
<td>Object bottles</td>
<td>Fill an empty water bottle with one of the following items and seal securely: kernels of corn, uncooked rice, kidney beans, water, coins, vegetable oil, liquid soap, small rocks, baby powder, cotton balls, feathers, dry noodles, rubber bands, paper clips, small toys. Let the babies investigate!</td>
</tr>
<tr>
<td>4-8 mos.</td>
<td>Block towers</td>
<td>Build a tower with a few soft blocks. Let the baby reach out and knock it down. What happened?</td>
</tr>
<tr>
<td>4-8 mos.</td>
<td>Stacking blocks</td>
<td>Teachers show the baby how to stack large blocks on top of one another. Can the baby copy? Later, try stacking smaller blocks.</td>
</tr>
<tr>
<td>4-8 mos.</td>
<td>Feely boxes</td>
<td>Glue textured materials to the inside of small boxes (like tissue or shoe boxes). Cut a hole big enough for a baby’s hand and tape the lid back on. Let babies feel to explore how the inside of each box feels.</td>
</tr>
<tr>
<td>8-12 mos.</td>
<td>Scarf pull</td>
<td>Tie several scarves together. Insert one end into a cardboard tube and let the baby pull the scarves through the tube. Can the baby put the scarves back into the tube?</td>
</tr>
<tr>
<td>8-12 mos.</td>
<td>Obstacle course</td>
<td>Lay out boxes to crawl through, stools to step over, and pillows to jump on, low tables to slither under. Talk about what the child is doing as s/he goes through the course.</td>
</tr>
<tr>
<td>8-12 mos.</td>
<td>Magic cups</td>
<td>Provide large cups. Hide a toy under a cup and ask the baby to find it.</td>
</tr>
<tr>
<td>8-12 mos.</td>
<td>Board books</td>
<td>Make board books with objects to count. (i.e., a book with one item on each page, a book with two items on each page, etc.)</td>
</tr>
<tr>
<td>12-16 mos.</td>
<td>Money bank</td>
<td>Make a “bank” out of a large can or plastic container. Cut a long slit in the cover about ½ inch wide. Provide lids, cardboard circles or chips to drop into the bank.</td>
</tr>
<tr>
<td>16-20 mos.</td>
<td>Making things fit</td>
<td>Provide puzzles and toys/containers/boxes that nest inside each other.</td>
</tr>
<tr>
<td>16-20 mos.</td>
<td>Matching pictures</td>
<td>Take pictures of familiar items in your program. Mount the pictures on tag board cards and laminate. Show a card and let the toddler find the item in the room.</td>
</tr>
<tr>
<td>16-20 mos.</td>
<td>Collections</td>
<td>Provide a small bucket. Collect some small items from around the room. Now, sit down and sort items into two groups.</td>
</tr>
<tr>
<td>20-24 mos.</td>
<td>Scoop and pour</td>
<td>Provide recycled materials in various sizes for children to use in the sand and water table. Use words like: empty, full, pouring, scooping, big, little, more, less.</td>
</tr>
<tr>
<td>Age Range</td>
<td>Activity</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>20-24 mos.</td>
<td>Train tracks</td>
<td>Draw two long lines (about 4 inches apart) on a large sheet of paper. Then, show how to draw lines that connect them. The design will look like a railroad track. Bring out the trains or cars to play on the railroad track.</td>
</tr>
<tr>
<td>20-24 mos.</td>
<td>You stack, I stack</td>
<td>Work together to build a tower. Take turns adding one block at a time. Talk about who added the blocks, and the color and shape of each block. What other objects will stack?</td>
</tr>
<tr>
<td>20-24 mos.</td>
<td>Cars and ramps</td>
<td>Prop up a 3-4” wide board and provide objects for rolling.</td>
</tr>
<tr>
<td>24-30 mos.</td>
<td>1-to-1 cars</td>
<td>Using small boxes, make a set of garages to accompany the toy cars. Encourage the children to park one car in each garage.</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>Super-Big blocks</td>
<td>Collect 6-8 sturdy grocery food boxes. Let the 2’s help to fill them with crumpled newspaper. Pack them tight and tape them shut. Add them to your block area. How do children use them?</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>Build a bridge</td>
<td>When playing with blocks, demonstrate how to make a simple bridge with three blocks. Can the child copy you?</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>From little to big</td>
<td>Show children a beach ball before it is blown up. Talk about how small and flat it is. Then blow it up as the children watch. Talk about how it changed and how big it got. Can the children pretend to be a little beach ball…growing…?</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>Jar lid match</td>
<td>Collect different-sized plastic jars with lids. Encourage your 2’s to match the lids with the correct jars.</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>I Spy</td>
<td>Choose a colorful picture book. Ask the child to point to the color or object you name. As you talk about the pictures, help to make connections to his life.</td>
</tr>
<tr>
<td>30-36 mos.</td>
<td>Color beanbag toss</td>
<td>Cover three or four large cardboard boxes with colored contact paper: red, yellow, blue (and green). Have the child stand a stop or two away from the boxes and toss colored beanbags in to the corresponding box.</td>
</tr>
</tbody>
</table>