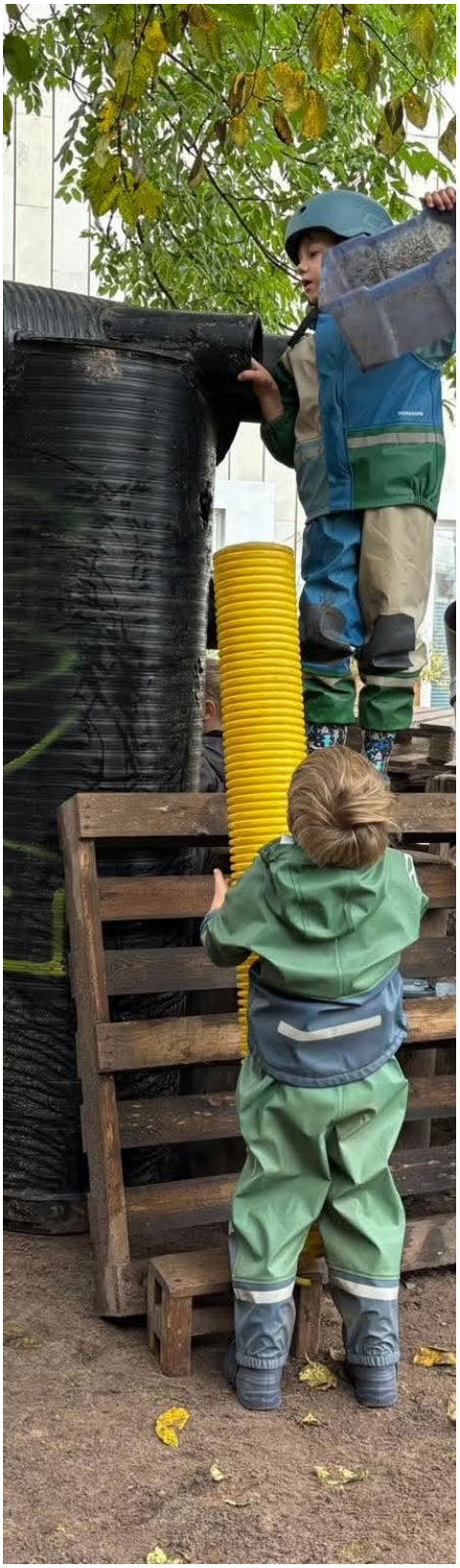
LESSON PLAN

# LITTLE ENGINEERS: TOWERS AND SKYSCRAPERS



**Subjects:** Science, Mathematics, Design and Technology
**Age Range:** 5-7 year olds

**Problem to be solved:** Cities need tall buildings to save space and give people places to live and work. Engineers design skyscrapers that are tall, strong, and safe, so they do not fall over or break when wind, weight, or movement affects them. How can we build a tall structure that stays strong and does not fall down?

**Message for the Child:** Engineers and builders design tall buildings, skyscrapers and towers. We become engineers and build a skyscraper that is tall, strong, and safe for everyone.

**Planned Activities:**
Part 1: Exploring Stability
Part 2: Designing and Building Towers
Part 3: Building for the Outdoors
Part 4: Conclusions

**Knowledge to be acquired:**
- Understanding of stability, balance and strength in structures.
- Understanding that the shape, size, base and arrangement of materials can affect the stability of a structure.
- Recognition of strong and stable shapes, especially triangles, squares and wide bases.
- Understanding how weight and forces, such as gravity and wind, can affect structures.
- Awareness of how real towers and skyscrapers are designed and built to withstand different forces and conditions.
- Understanding that structures can be tested, modified and improved to make them stronger and more stable.
- Awareness of how different building materials have different properties and uses.
- Understanding that height, balance and stability are connected when constructing tall structures.
- Developing an understanding of how engineering and design can respond to real-world challenges, including building safely outdoors.

**Skills to be acquired:**
- Problem-solving and critical thinking when facing construction challenges.
- Planning and designing a structure before building.
- Spatial thinking and understanding relationships between height, width, shape and balance.
- Fine motor skills through handling, connecting and assembling materials.
- Creativity and design thinking through developing and adapting different solutions.
- Observation and investigation through testing how structures behave.
- Making predictions and forming hypotheses about which designs will be stronger or more stable.
- Measuring and comparing height, width, stability and other characteristics of structures.
- Testing, evaluating and improving designs based on observations and results.

- Using materials purposefully and selecting appropriate materials for a particular construction challenge.
- Collaboration and communication through sharing ideas, negotiating solutions and building together.
- Explaining and documenting design choices, observations and conclusions.
- Applying learning to new situations, such as adapting a structure for outdoor conditions.

**Required resources:**
- Recycled and reusable construction materials, for example: wooden or plastic blocks, cardboard tubes and boxes, paper, straws and sticks
- Painter's tape
- Rulers or measuring tape
- Small weights, e.g. toy blocks or bean bags, for testing the strength and stability of structures
- Pictures or short videos of local/famous towers and skyscrapers (some attached to this file)
- Drawing tools: paper and markers
- Optional:
- Computer or tablet for showing photos or short videos
- Internet connection
- Data projector or interactive display for presenting visual materials on a larger display
- Overhead projector for extending children's play and exploration

**Follow up plans:**
- Observe how children apply their new knowledge about structures, stability and construction in free play and other activities.
- Notice whether children begin to use new vocabulary, strategies and ways of thinking when building, testing and solving problems.
- Provide opportunities for children to revisit, extend and further develop their construction ideas through new building challenges.
- Use children's observations and interests to plan further investigations into structures, materials, balance and stability.

**STEAM outdoor activity centre:** outdoor-friendly recycled materials (sticks, blocks, stones, crates, cardboard, tubes, etc).

## Part 1 - Exploring Stability | 2-3 activities

| | |
|---|---|
| **Expected Learning Outcome** | **Children:**<br>• explore different shapes and materials for building;<br>• predict which designs might hold weight safely;<br>• understand what makes a structure stable and strong;<br>• see how these concepts are used in real-world construction and engineering. |
| **Engagement:** | 1. Children look at photos and short videos of real skyscrapers and towers (local or world famous) - optional links attached to this file.<br>2. Go on a walk as a group to find possible skyscrapers, towers and construction sites in the local area.<br>3. The teacher asks: "Why do these towers stand tall? What shapes and materials make them strong?"<br><br>**Teacher-led activity to spark curiosity and exploration (optional):**<br>• Project images of skyscrapers onto a wall using a data projector and invite children to trace their outlines.<br>• Add the outlines to the study wall as a way of documenting children's ideas, observations and learning process.<br>• Encourage children to compare the different shapes, heights and structural features they notice.<br>• Invite children to share their observations and questions about what makes the buildings look different or helps them stand tall. |
| **Making assumptions** | Children may have different explanations for what makes a tower stable, which can be explored, tested and revised throughout the project. |
| **Comparison and evaluation** | • Conduct a mini-experiment: children build towers using different shapes and/or materials and test their stability.<br>• Compare the results: Which towers stayed standing? Which fell? What might have caused the difference?<br>• Encourage children to compare the shape, materials, height and base of the towers and identify what made some structures more stable than others.<br>• Ask children to explain their conclusions using evidence from what they observed and tested.<br>• Revisit children's initial ideas and assumptions: What did we think would happen? What did we discover? What would we change next time?<br>• Discuss how engineers plan, build and test models before constructing real structures, and how testing can help them improve their designs. |

## Part 2 - Designing and Building Towers | 2-3 activities

| | |
|---|---|
| **Expected Learning Outcome** | **Children:**<br>• design a plan for building a tower;<br>• construct a tower based on the design, and using recycled/natural materials;<br>• test towers for stability;<br>• adjust their designs based on results;<br>• work collaboratively to solve problems;<br>• understand how to plan and build safe structures. |
| **Engagement:** | 1. Show examples of real towers or skyscrapers that children may be familiar with, such as the Eiffel Tower or a local TV tower.<br>2. Invite children to first draw or sketch their tower design, choosing the materials and shapes they would like to use.<br>3. Children work individually or in small groups to construct their towers using recycled and natural materials.<br>4. Encourage children to test their towers for stability, observe what happens and identify what could be changed. |

| | |
|---|---|
| **Engagement:** | 5. Invite children to modify and rebuild their designs based on what they discovered during testing.<br>6. Encourage children to compare their structures and explain their design choices, challenges and solutions to others.<br><br>**Teacher-led activity to spark curiosity and exploration (optional):**<br>• Provide large cardboard boxes for children to build structures at a larger scale and experience greater heights.<br>• Encourage children to explore how building higher, wider or on a larger scale affects the stability of their structures. |
| **Choosing the design of the plan** | Children discuss and choose a tower design, considering its shape, height, materials and stability. They sketch their plan and explain their design choices before construction. |
| **Constructing the plan** | Children construct their planned towers using selected materials, working collaboratively and applying their knowledge of shape, balance and stability. They compare the construction with their original plan and adapt it when needed. |
| **Evaluating the work** | Children test and compare their towers, identify what worked and what could be improved, and use their observations to adapt their designs. They explain their findings and reflect on what they discovered. |

## Part 3 — Building for the Outdoors | 1-2 activities

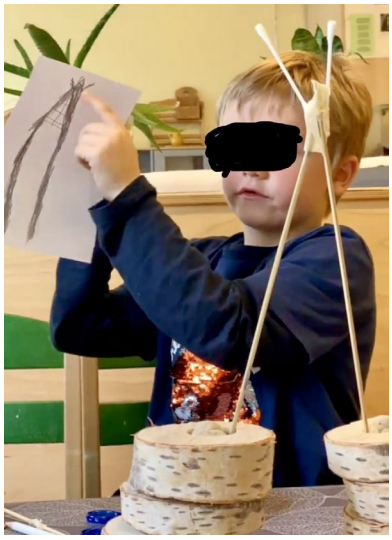
| | |
|---|---|
| **Expected Learning Outcome** | **Children:**<br>• apply their knowledge of structures and stability to construct towers outdoors using different recycled and natural materials;<br>• test the stability of their structures under real-world conditions, such as wind and uneven surfaces;<br>• observe how environmental conditions affect the stability of their structures;<br>• identify and respond to unexpected construction challenges;<br>• adapt and improve their designs based on what they observe and discover;<br>• understand that real-world engineering involves testing, problem-solving and adapting designs. |
| **Engagement** | Introduction of scenario: We are engineers designing observation towers for a city park. The towers need to be tall, strong and stable. But this time, we have to build them outdoors, where we may have wind, uneven ground and other challenges. How can we make our towers stand strong? |
| **Practical part (hands-on activity)** | Build towers outdoors using a range of natural, recycled and reusable materials, such as sticks, blocks, stones, rope, large wooden blocks and crates. Test the towers for stability by adding weight and exposing them to wind. Observe how the materials, design and outdoor conditions affect stability, then adapt and retest the structures. |
| **“Circle” - reflection and discussion** | • Discuss the results: “Which tower was most stable? What helped it stay standing?”<br>• Compare how different materials, shapes and locations affected stability.<br>• Reflect on the outdoor challenges: “What happened when we added weight or introduced wind?”<br>• Connect to real life: “Engineers face similar challenges when designing and building towers, bridges and other structures.”<br>• Children share what they would change or improve if they built their tower again. |

## Part 4 - Conclusions

| | |
|---|---|
| **Feedback** | **Teacher gives feedback on:**<br>• Children's design choices and ability to explain them<br>• Strength and stability of the towers<br>• Ability to test, adapt and improve designs<br>• Collaboration, communication and problem-solving skills<br><br>**Children give feedback on their own and peers' towers:**<br>• What worked well?<br>• What did they like about the design?<br>• What could be improved? |
| **Reflection and improvement** | Introduction of scenario: We are engineers designing observation towers for a city park. The towers need to be tall, strong and stable. But this time, we have to build them outdoors, where we may have wind, uneven ground and other challenges. How can we make our towers stand strong? |
| **Practical part (hands-on activity)** | Build towers outdoors using a range of natural, recycled and reusable materials, such as sticks, blocks, stones, rope, large wooden blocks and crates. Test the towers for stability by adding weight and exposing them to wind. Observe how the materials, design and outdoor conditions affect stability, then adapt and retest the structures. |
| **"Circle" - reflection and discussion** | • Children reflect on the process: "What did we discover about building strong and stable structures?" and "What could we change to make our tower stronger or taller?"<br>• Children compare their final designs with their original plans and discuss how their ideas changed through testing.<br>• Connect the experience to real life: engineers, architects and construction workers use these same skills to design, build, test and improve structures. |

## Photos for inspiration:









**Available resources:**

Youtube link: Top 10 Worlds' Tallest Buildings for Kids - Educational Video about Skyscrapers #kidsvideo

Youtube link: How are skyscrapers built? Cool facts! Skyscrapers explained with LEGO bricks | Activities for home

Youtube link: All About Strong and Stable Structures




Source: ChatGPT