The Mini Time Machine
museum of miniatures

Miniature Mathematics: From Big to Small
The Mini Time Machine Museum of Miniatures Education Outreach
Lesson Plan for 2nd-8th Graders

Rationale:
Museums are an important part of our communities, striving to sustain a beautiful mixture between entertainment, preservation, research cultivation, and education. Because museums have access to wonderful resources, they can be used as supplemental teaching tools to engage learners beyond traditional walls and invite further exploration. This lesson is designed to show students that math can be used to make art and that miniature artists pay very close attention to scale.

Materials:
- Chalkboard or whiteboard and writing utensils
- 12-inch rulers
- Scissors
- Coloring and writing implements
- Images from the Mini Time Machine Museum or TMTM website (scale video)
- Graph paper
- Measuring Tape

Objectives:
The lesson has the following objectives for 2nd – 8th grade students:
- Students will gain an understanding of ratios by discussing their use in miniature scale craft.
- Students will explore and practice the use of scale by producing scaled versions of classroom walls.

Alignment with standards:
This lesson will address the following Arizona College and Career Ready Standards in Mathematics:

3.OA.3. Use multiplication and division (within 100) to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

This lesson will address the following Arizona College and Career Ready Standards for Visual Arts:
Strand 1: Create
Concept 1: Creative Process
PO 101: Contribute to a discussion about ideas for his or her own artwork.
Concept 2: Materials, Tools, and Techniques
PO 101: Identify and experiment with materials, tools, and techniques in his or her own artwork.
PO 102: Use materials, tools, and techniques appropriately in his or her own artwork.
Concept 4: Meanings or Purposes
PO 101: Select and use subject matter and/or symbols in his or her own artwork.
Strand 2: Relate
Concept 1: Artworlds
PO 102: Discuss how artworks are used to communicate stories, ideas, and emotions.
PO 105: Make connections between art and other curricular areas.
Concept 4: Meanings or Purposes
PO 101: Interpret meanings and/or purposes of an artwork using subject matter and symbols.
Concept 5: Quality
PO 102: Demonstrate respect while responding to others' artwork.
Strand 3: Evaluate
Concept 2: Materials, Tools, and Techniques
PO 101: Describe the visual effects created by an artist's use of tools, materials, and techniques in an artwork.
Concept 4: Meanings or Purposes
PO 101: Discuss how an artist communicates meaning and/or purpose in an artwork.

Anticipatory Lesson Sequence:
Intro:
The instructor will describe The Mini Time Machine Museum and will ask if any of the students have visited the museum before. Then, after describing The Mini Time Machine Museum, a brief discussion will establish the idea that a miniature is a small, engineered, and artistically created resemblance of a larger counterpart. Emphasis will be given to the concept of room boxes and dioramas as miniatures that can depict a place and time. As well, the instructor should highlight the importance of the use of artifacts when building knowledge.

Content:
The instructor will share images from TMTM of pieces that display a realistic scene due to a precise dedication to scale (images included below). Other images will provide contrast by showing the effects on a miniature when scale is not used. Instructor will introduce the use of ratios as scale measurements and show images of miniatures that follow 1:6, 1:12, and 1:144 scale. Students and the instructor will discuss other uses for ratios in real world situations and compare these to the use of scale in miniature craft.

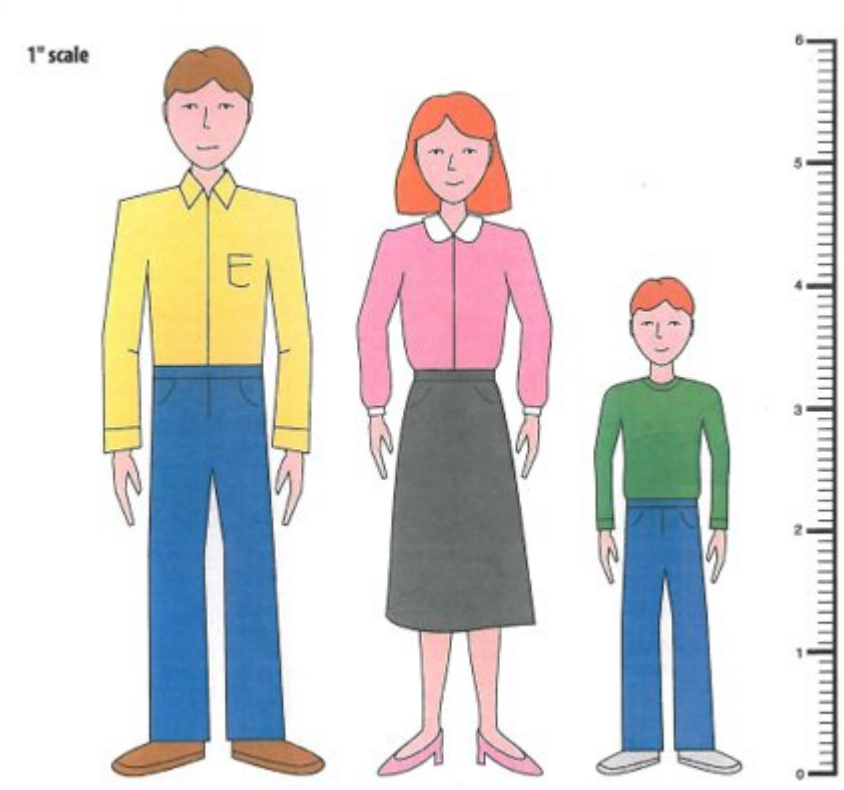
Assessment:
In groups of four or fewer, students will measure one wall in the classroom and use a 1:12 scale to produce a miniature rendering of the wall. Renderings should include at least two features on the wall, such as a door or poster.

Closure:
Students may elect to present their final renderings and explain their drawings. Presenting students will discuss the process and math operations they used to create their scaled drawings.

Extension:
Students may transfer their scaled drawings to cardstock or poster board in order to connect the walls into a miniature version of the classroom. Students may add to the interior of the room by crafting scaled versions of the classroom furniture.

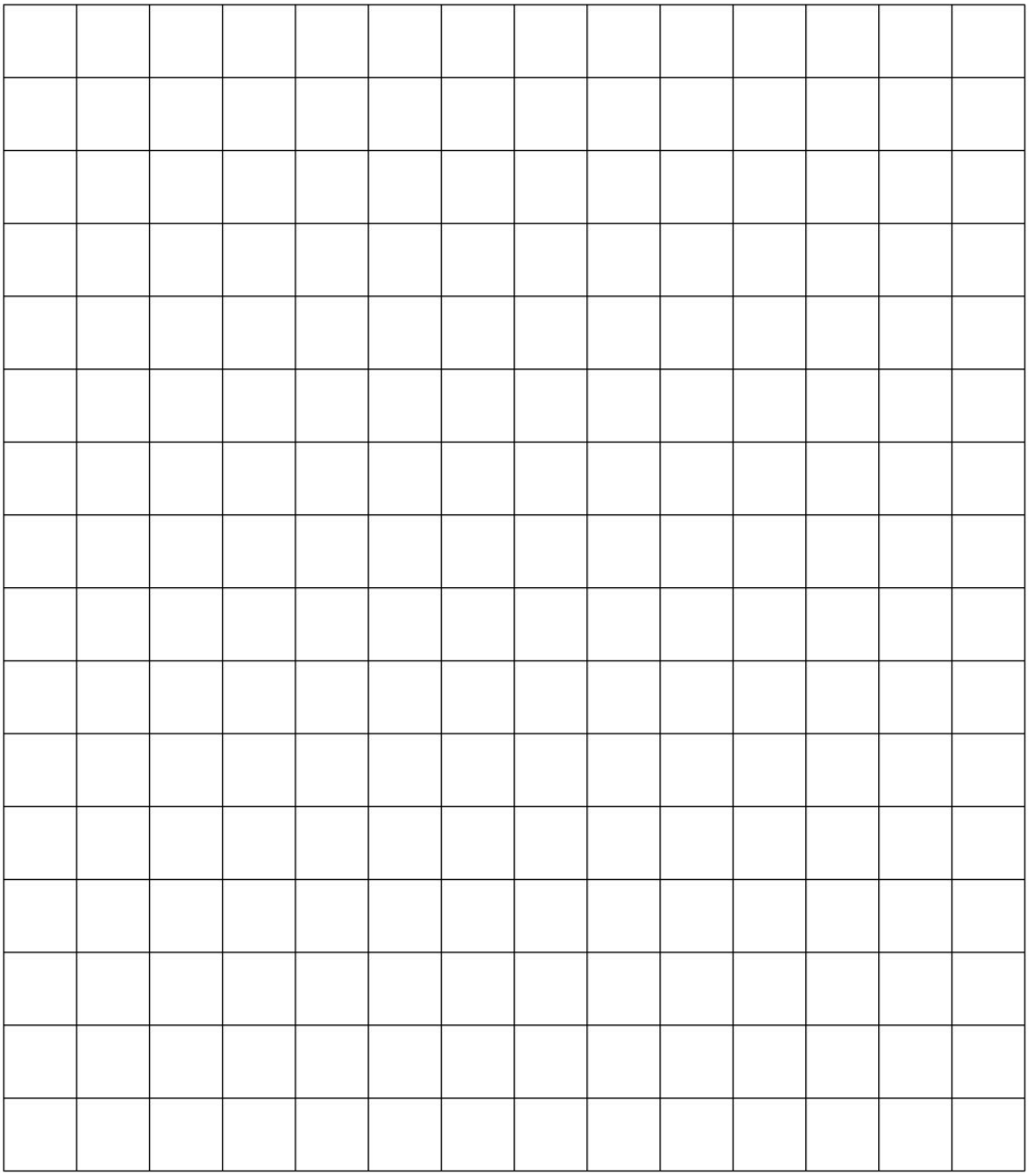

Utensilien
für
DIE PUPPENKÜCHE

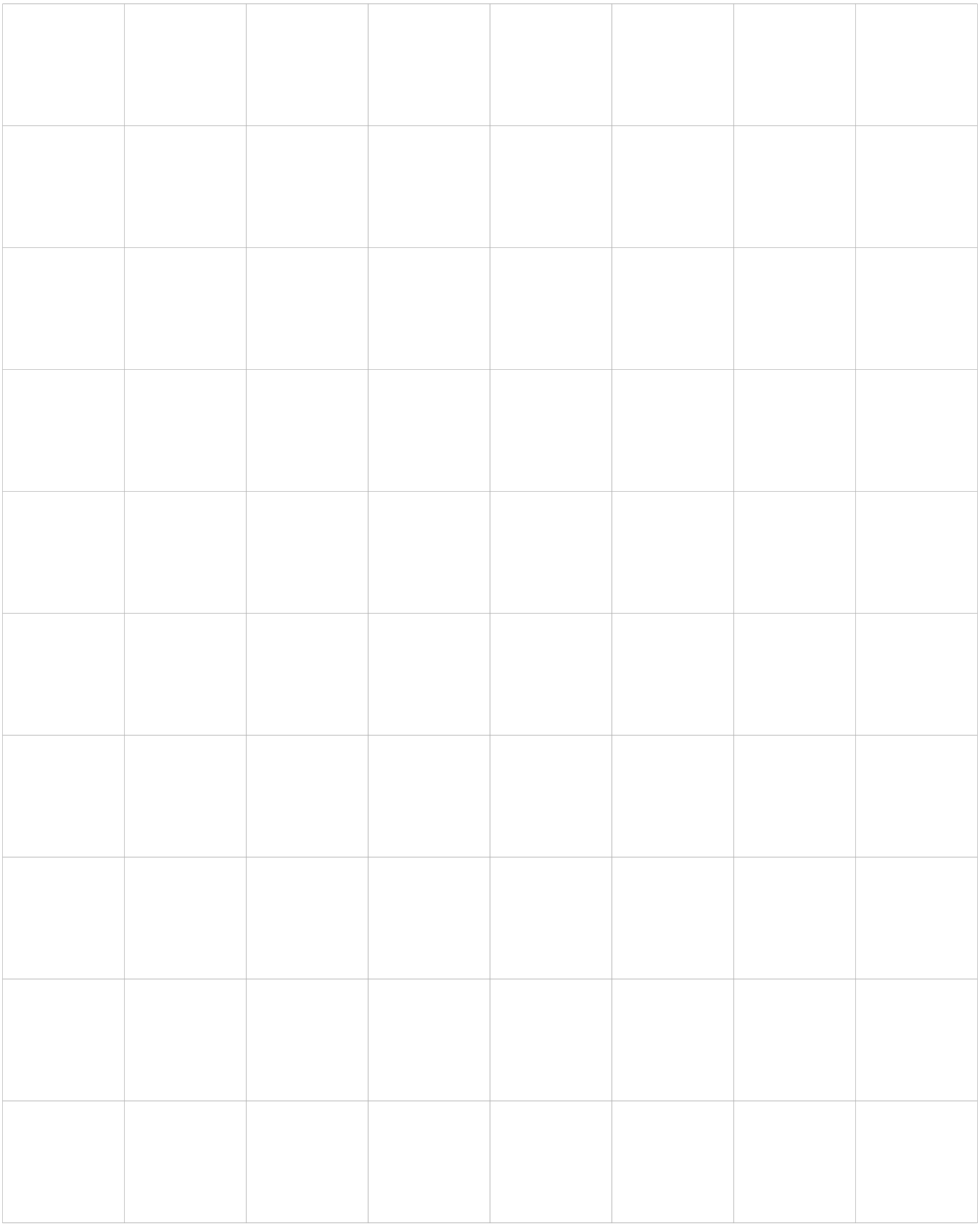

1/144 Scale Houses


1" scale
0
1
2
3
4
5
6

$\frac{1}{2}$ Inch Graph Paper

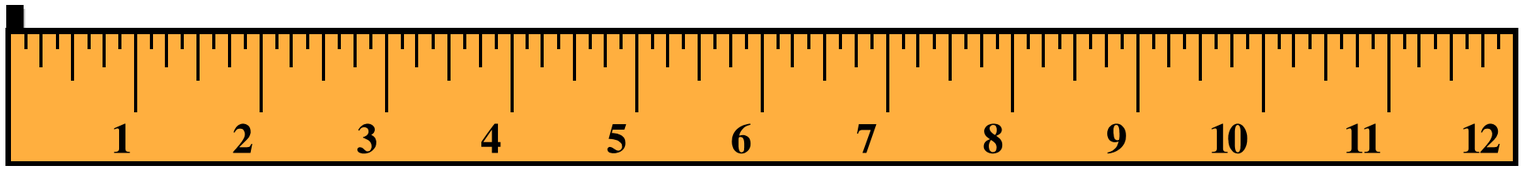
Two lines per inch. Black lines.



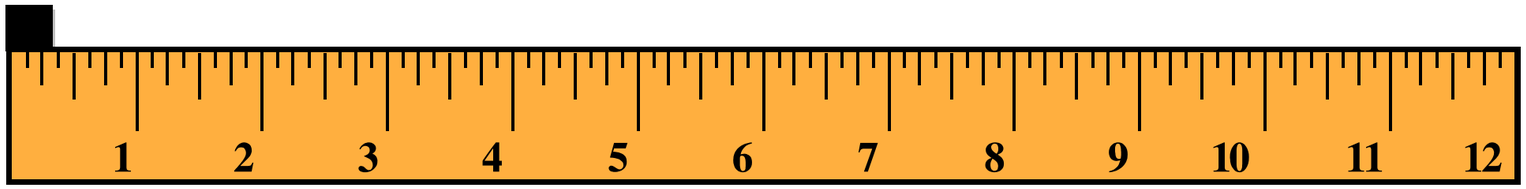


Scale Used in Miniature Roomboxes

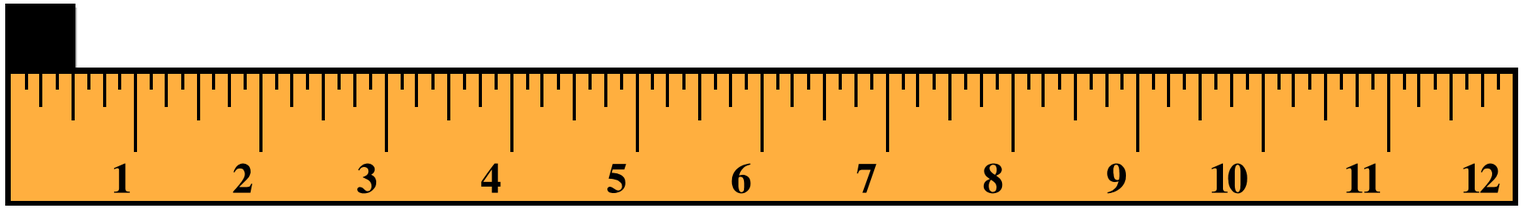
1/8” = 12” 1:96



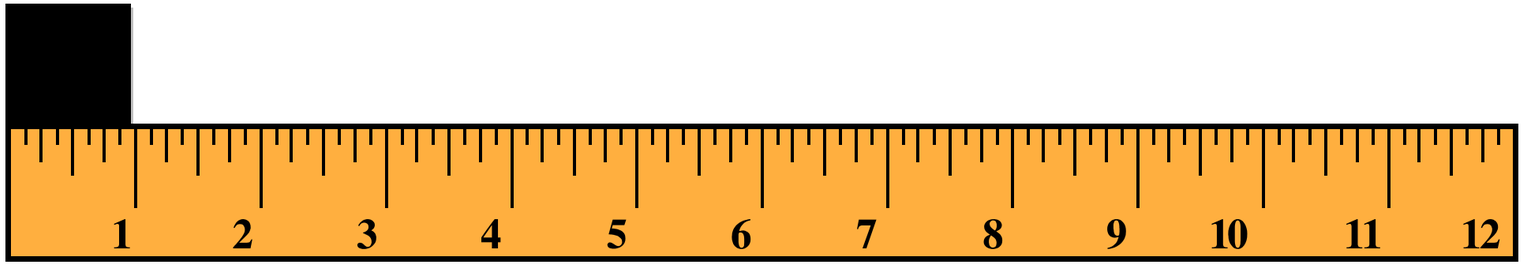
¼” = 12” 1:48



½” = 12” 1:24

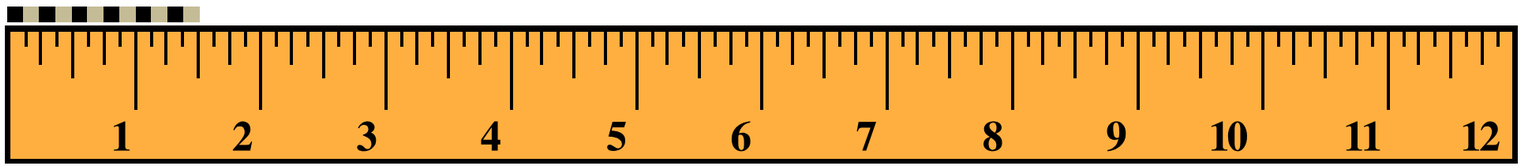


1” = 12” 1:12

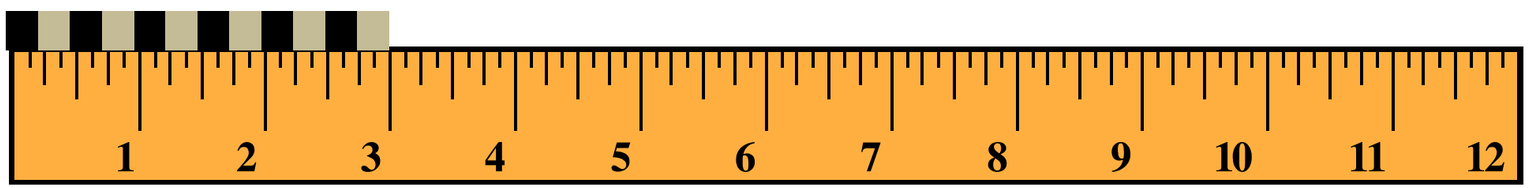


Actual Size of Floor Tile Used in Our Miniature Roomboxes

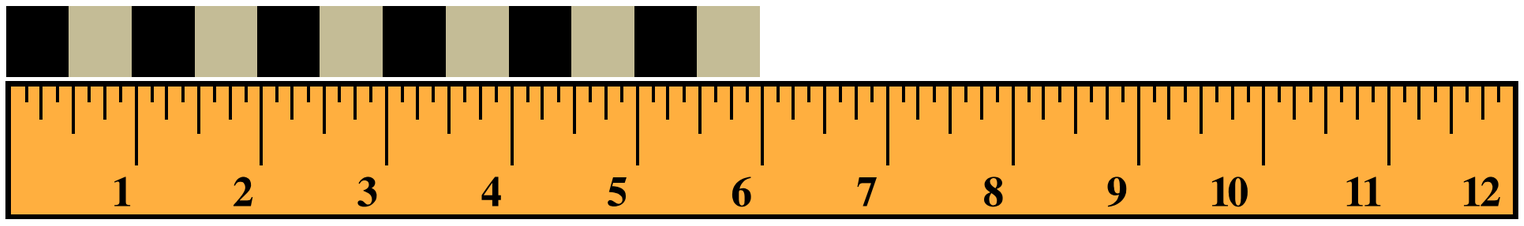
1/8” = 12” 1:96



¼” = 12” 1:48



½” = 12” 1:24



1” = 12” 1:12