National Aeronautics and Space Administration

www.calendarinthesky.org

Make Your Own El Castillo

What You'll Need

- Printouts of the model template
- Foamcore board – at least 24" x 36", 3/16" thickness. *If you get a smaller board, you must get two of them*. Do NOT change the thickness, the scale of the pyramid depends on it!
- X-Acto knife with a new, fresh razors (you may need more than one new blade). This is key to cutting the foamcore cleanly
- Ruler, preferably metal or with a metal edge – the X-Acto knife can cut into a plastic or wooden ruler
- Spray adhesive (preferred option) or glue stick, double-sided tape, or liquid glue
- Scissors
- Scotch tape

About this Activity

In this activity, you will produce a scale model of El Castillo. This model can be used with the activity "Solar Alignments at El Castillo" or on its own. This model of El Castillo is able to produce the Sun Serpent "snake of light" on the west side of the northern staircase, an effect that occurs on the Fall and Spring equinoxes, when a flashlight is used to represent the Sun.


The finished model of El Castillo.

Preparation

Gather all of the materials. You will need a large surface area to cut the foamcore board, and time for the pyramid to dry.

To Do and Notice

1) Trim the templates down to ¼" around all the pieces. Trim the stairs to the lines and set them aside (you will not be gluing them to the foamcore).

2) Glue the template pieces on the foamcore board. Squeegee flat and allow the glue to dry completely. It is important to apply only a very thin layer of glue to prevent bubbling and warping, especially if using liquid glue. *Tip: For optimal results, be sure to apply glue up to the edges of the squares on the template. This is more important than gluing up to the edge of the paper pieces themselves.*

3) Using the X-acto knife, ruler, and cutting mat, carefully cut out all the pieces of the template. Change the razor frequently to avoid tearing the foamcore and to ensure the pieces have a smooth appearance from the sides.

4) Assemble the pyramid, gluing all the layers together. Each level has two layers of foamcore, so glue all 9 layer sets first. Starting with layer set 1, carefully center layer set 2 on top and glue down. Repeat with the rest of the layer sets until you have a basic pyramid.

5) Assemble the temple, gluing all six layers together with the layer labeled "North" on the very top.

6) Assemble the four staircases. Each staircase consists of two stair rails held together with a small blue rectangle on the bottom. Fold the paper staircases backwards on the dotted lines. Glue the stairs to the stair rails, and trim whatever extends beyond the rails. Glue the blue rectangle to the base of the staircase so it is flush to the stairs (Fig.1).

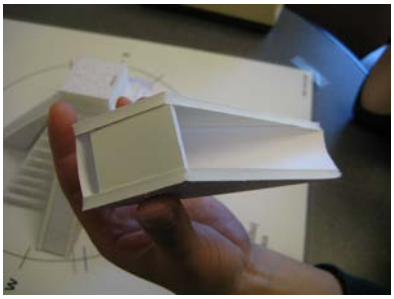


Fig. 1: Underneath an assembled staircase.

- Cutting mat, or large piece of cardboard, to protect your table from the X-Acto knife

Tip: It is okay if the blue piece extends beyond the back of the staircase, it is more important that the base of the staircase is flush to the sides and bottoms of the stair rails.

7) Attach the staircases to the pyramid with a piece of tape under the top of the stairs, centered on one side of the top layer of the pyramid (Fig. 2). Tape the base of the staircases to the bottom layer of the pyramid so it sits flush against all layers of the pyramid. *Tip: It is okay if there is a small gap between the bottom of the stairs and the pyramid, as long as the staircase is flush against the pyramid (Fig. 3).*

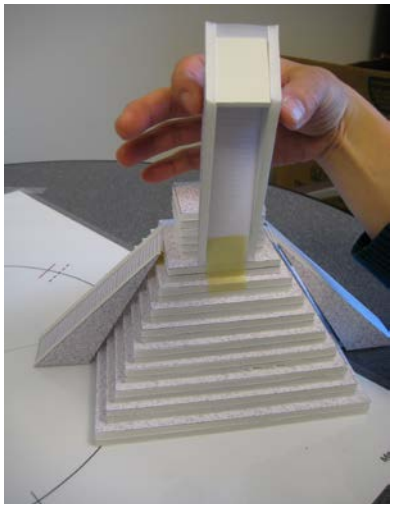


Fig. 2: Attaching the staircase to the pyramid.

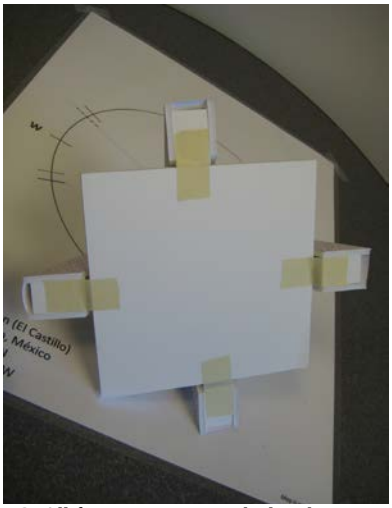


Fig. 3: All four staircases attached to the pyramid.

Activity Notes

Location Info: The Temple of K´uk´ulkán is located in the ancient Maya city of Chichen Itza in the Yucatan peninsula of Mexico. The Temple of K´uk´ulkán is also known in Spanish as El Castillo, meaning "The Castle".

Latitude: 20° 40' 58" N; Longitude: 88° 34' 06" W

About the Pyramid:

- The temple is built on top of a four-sided pyramid. The pyramid has nine platforms that may represent the nine underworlds.

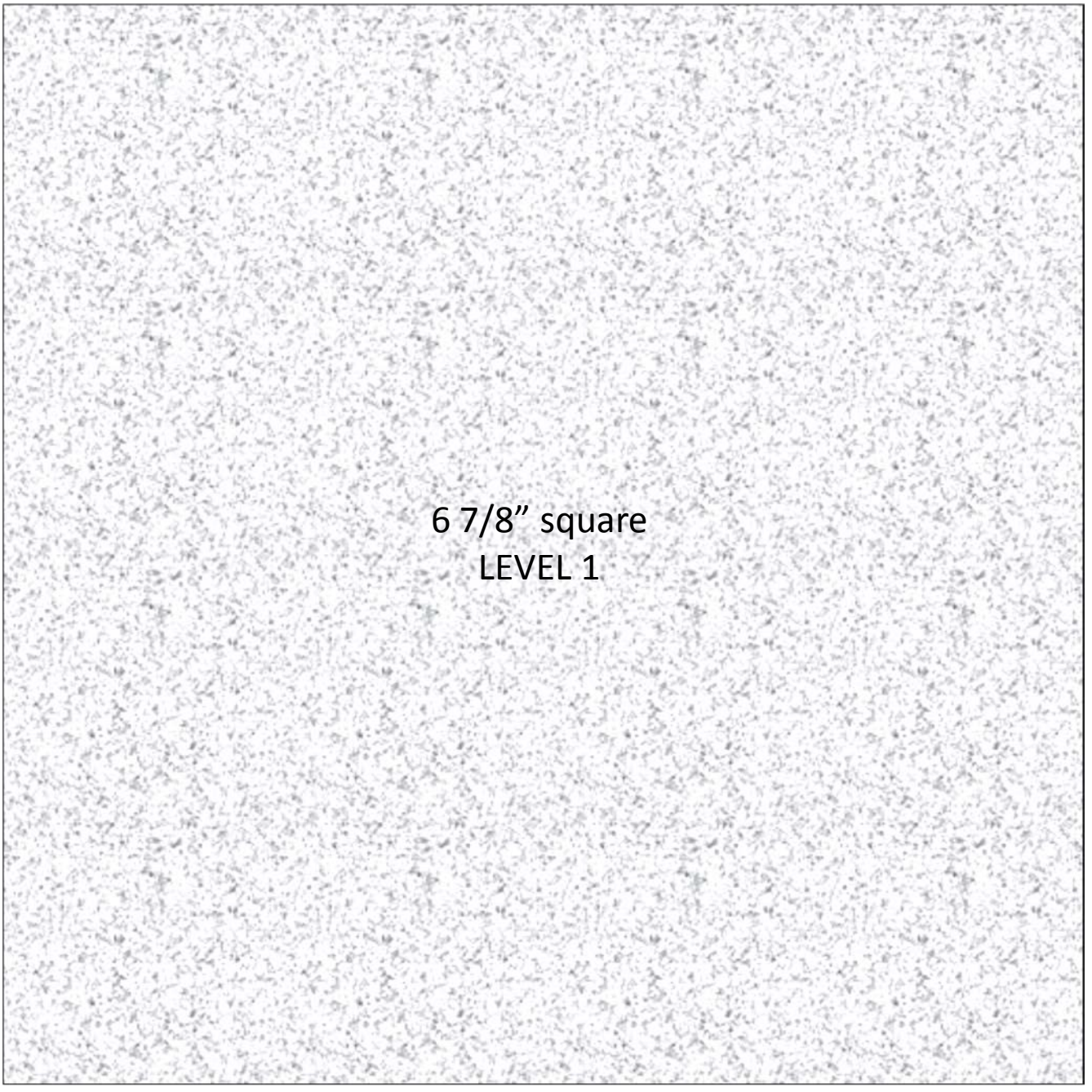
Fig. 4: Image Credit - Bryan Mendez, UC Berkeley

- Each side of the pyramid has a staircase with 91 steps. There are serpent heads at the base of each staircase (Fig. 4). This photo is also available online at: http://calendarinthesky.org/MultimediaResources/Images/Photos.aspx?moid=1086
- When the steps on all four staircases are counted along with the common top step, there are a total of 365 steps. This may symbolize the haab calendar (solar year).
- Inside the temple, there are 18 panels that may represent the 18 months of the t'zolkin calendar.
- The orientation of the pyramid is offset 21° from cardinal points. This means that the pyramid's central axis is aligned along the solar zenith passage sunset and the nadir passage sunrise.

Related Websites

Calendar In The Sky: Time-lapse video
http://calendarinthesky.org/MultimediaResources/Video.aspx?moid=183

Article: The Descent of K'uk'ulkan
http://calendarinthesky.org/Articles/MayaScience/MayaScienceArticleView/tabid/139/ArticleId/8/The-Descent-of-Kukulkan.aspx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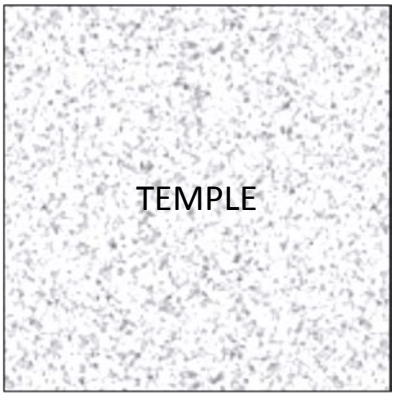
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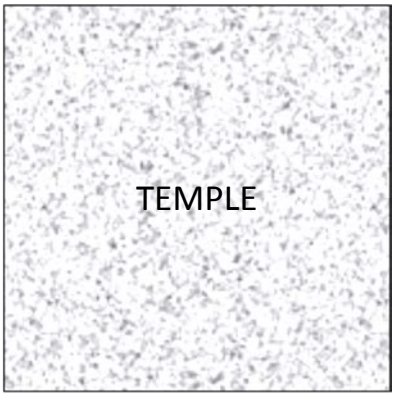
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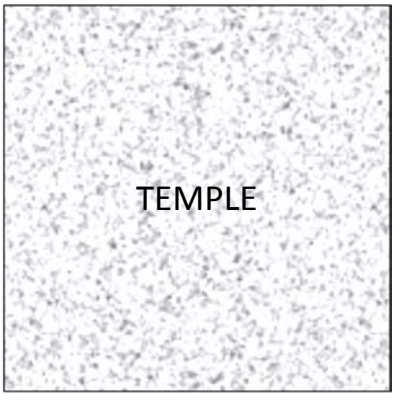
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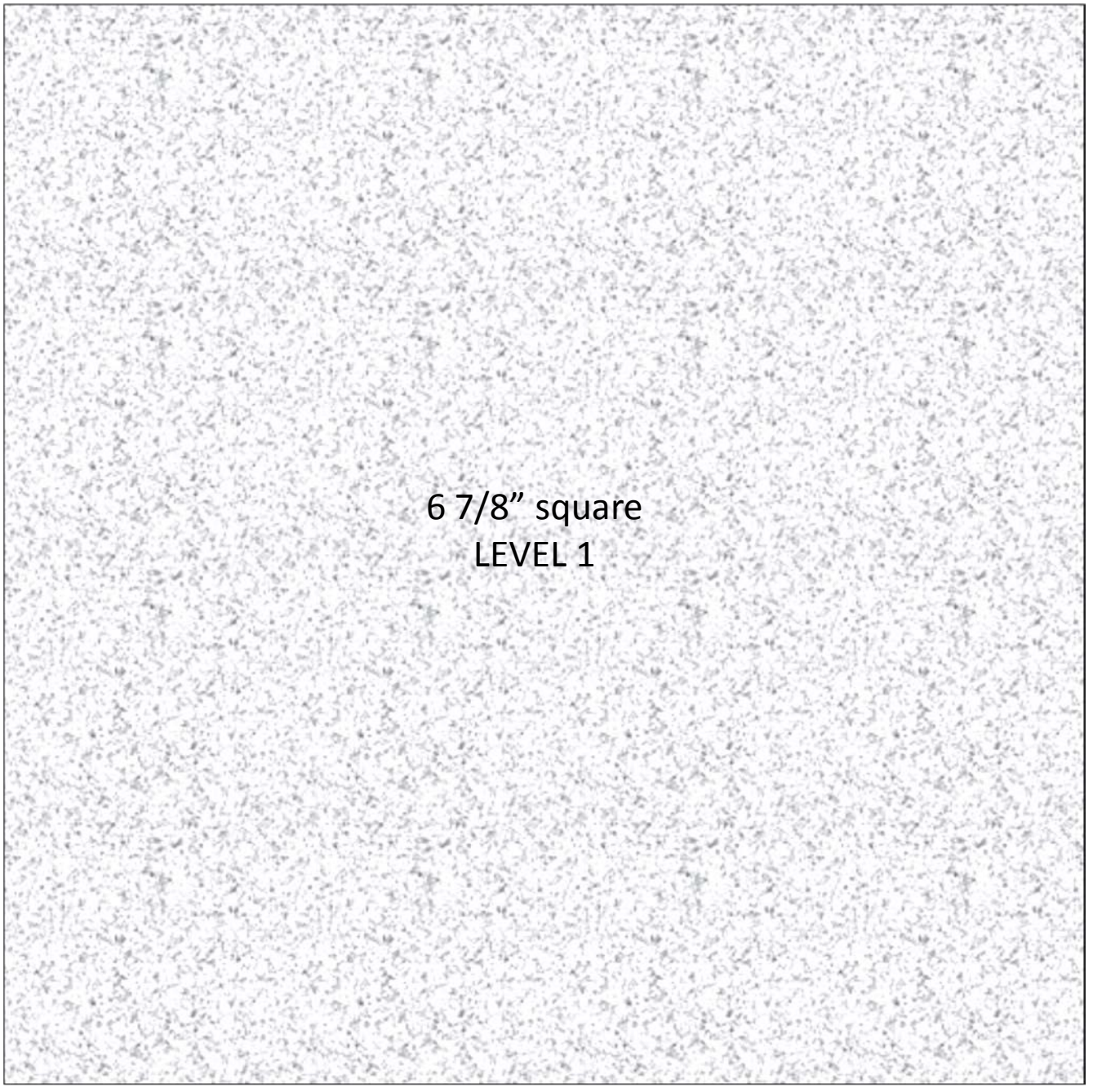
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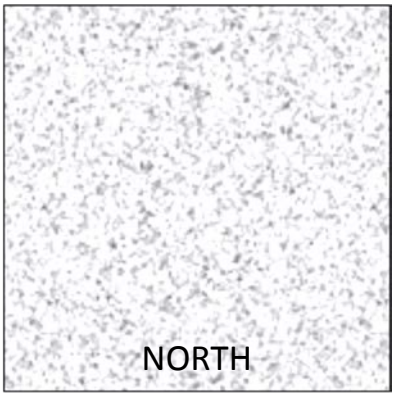
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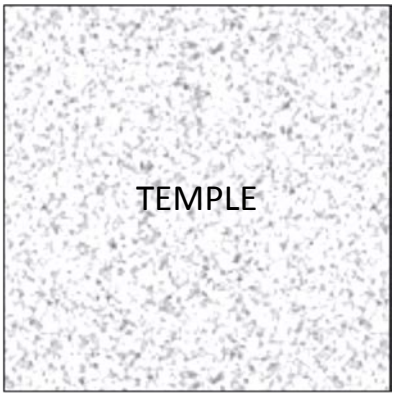
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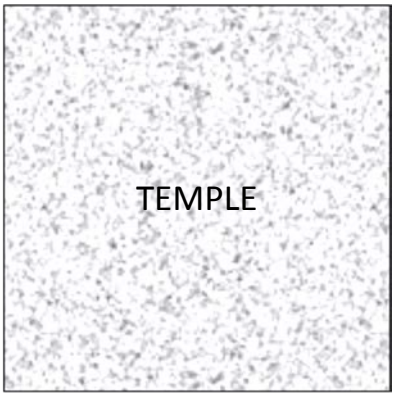
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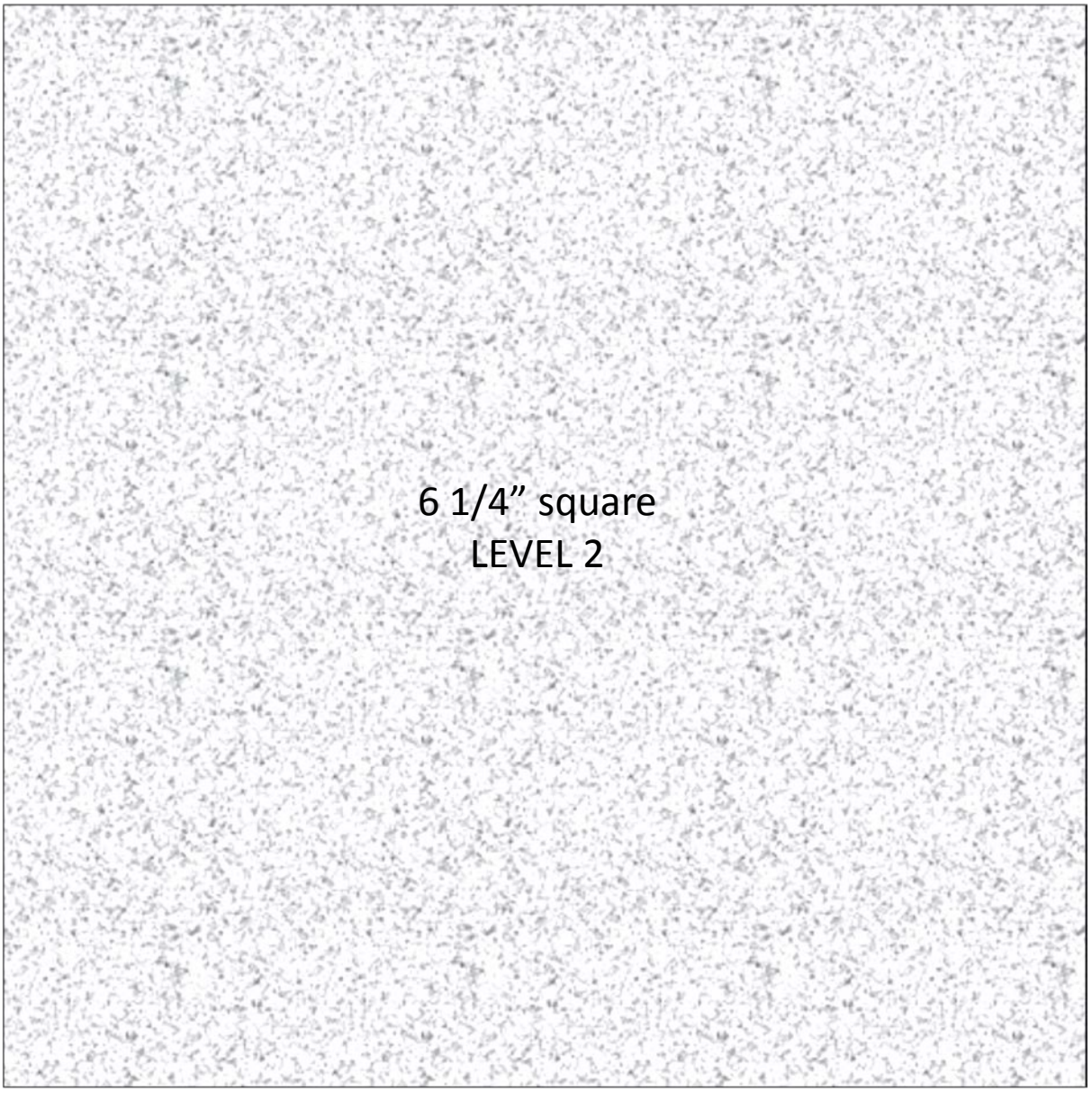
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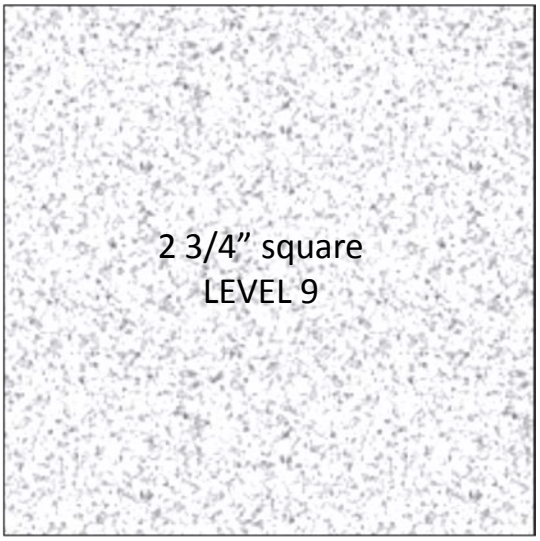
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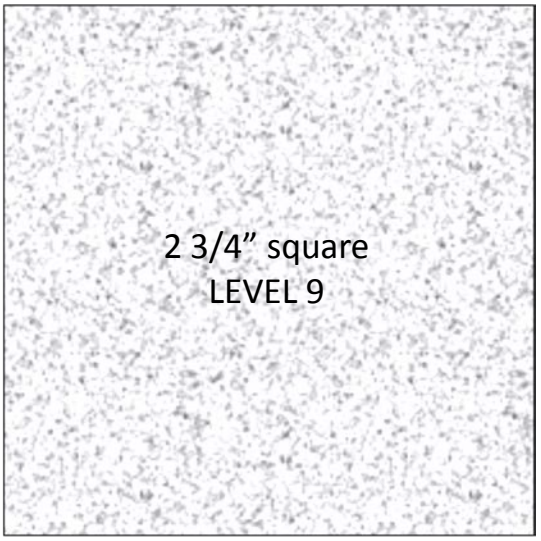
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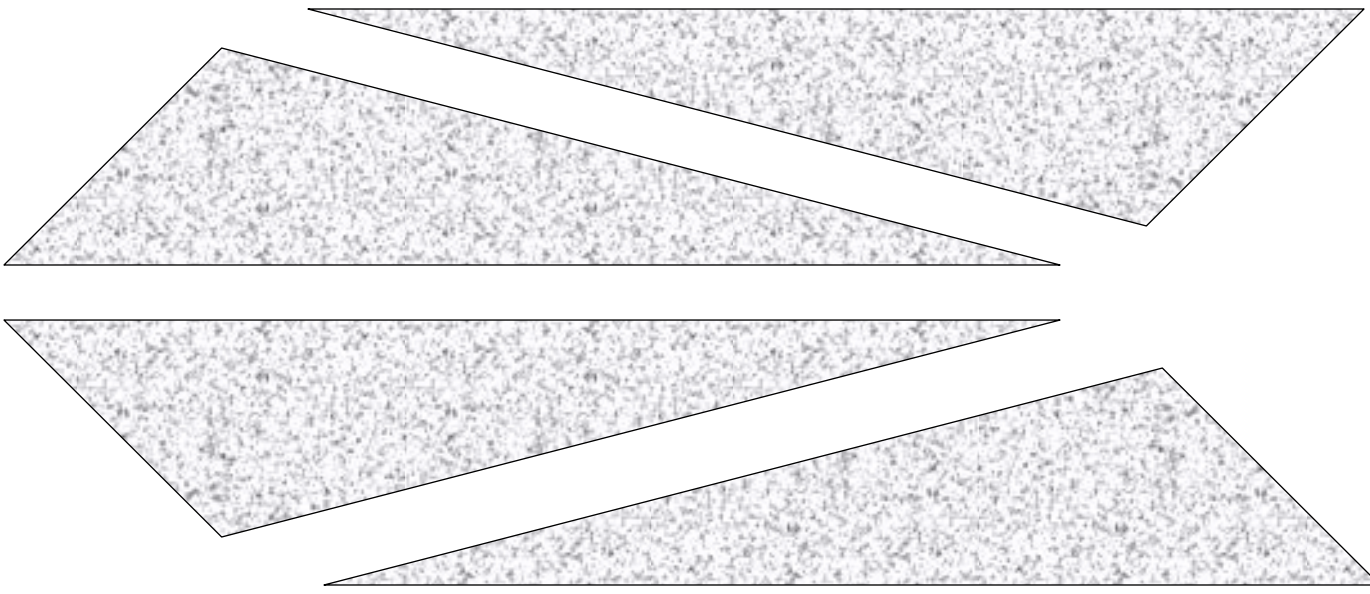

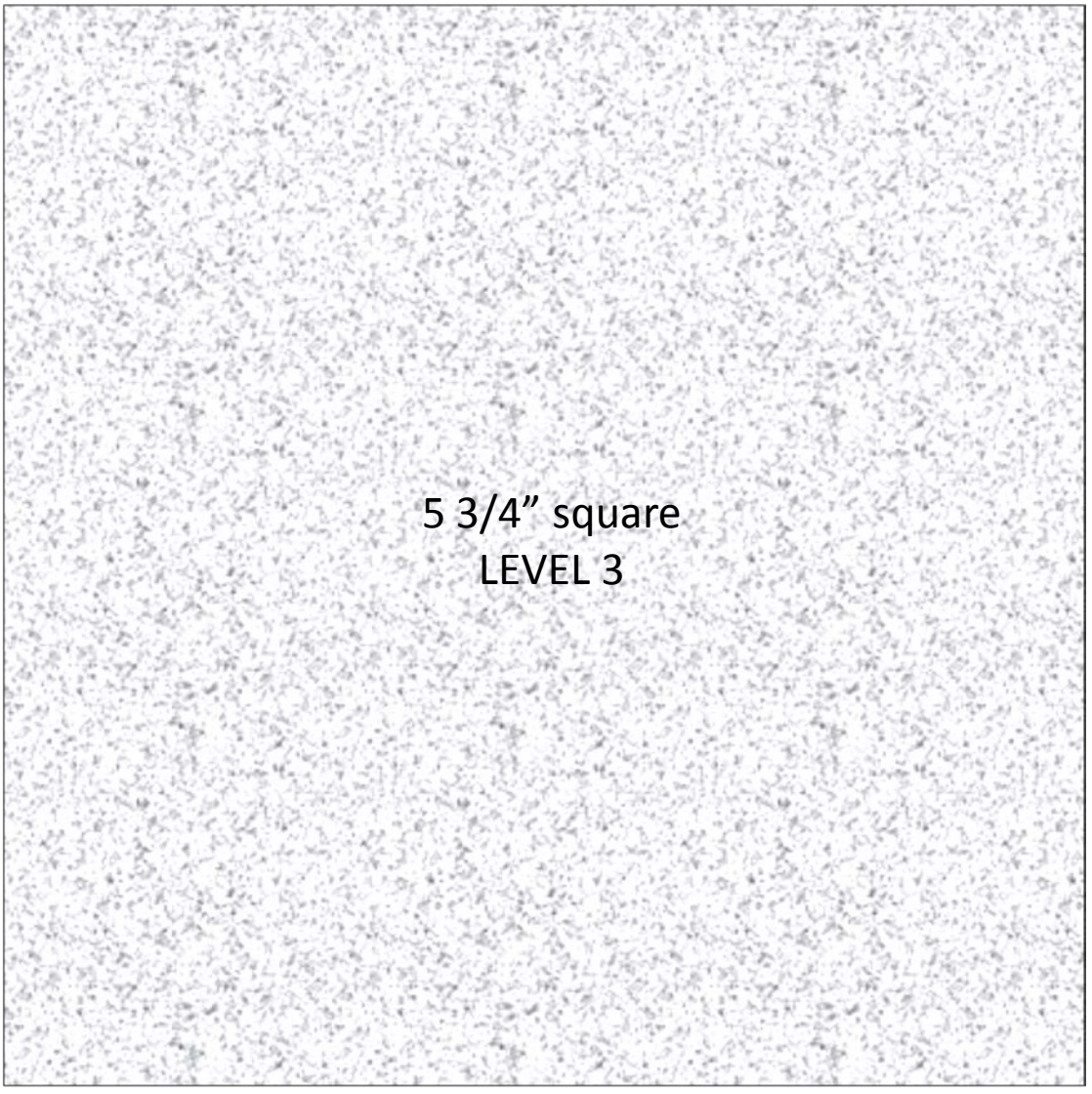
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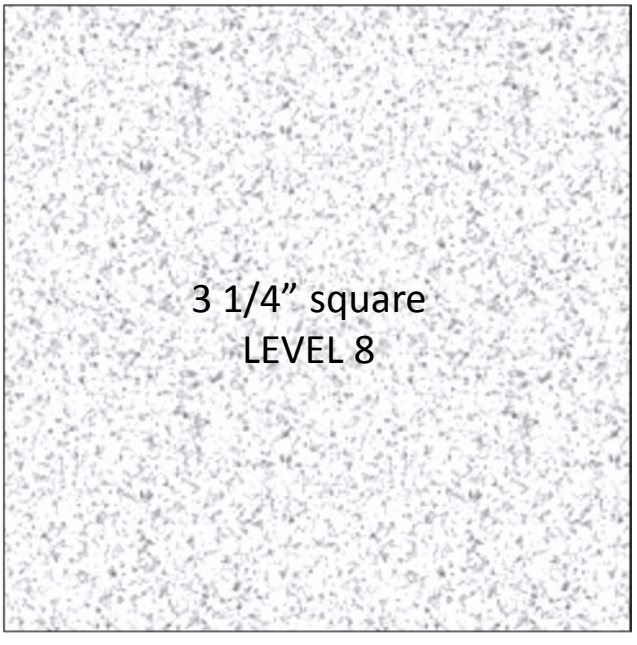
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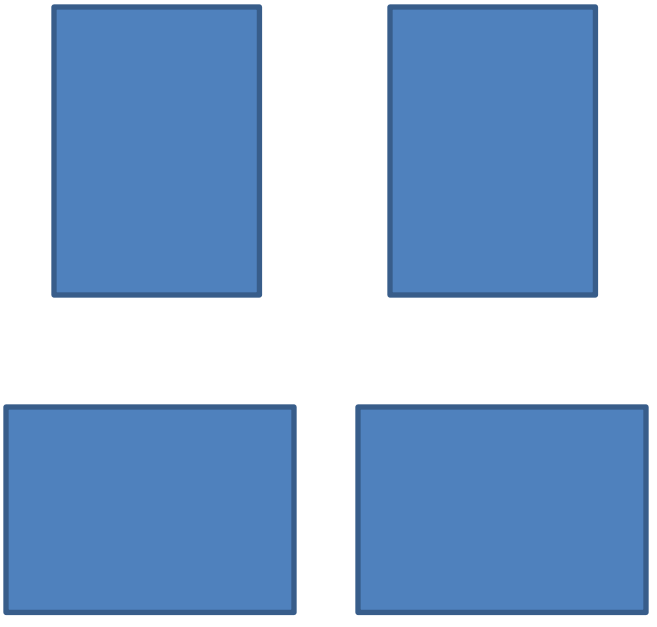

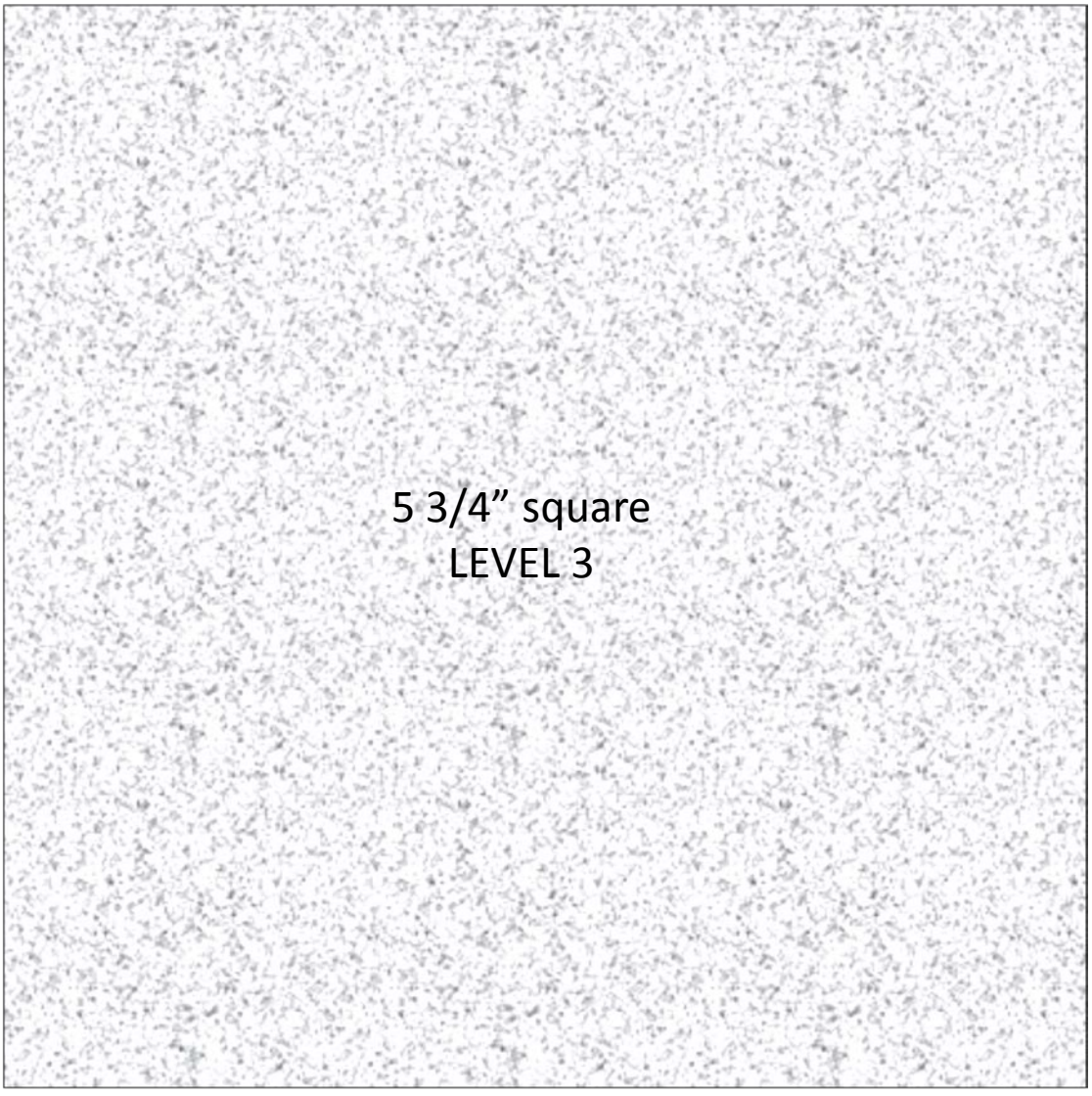
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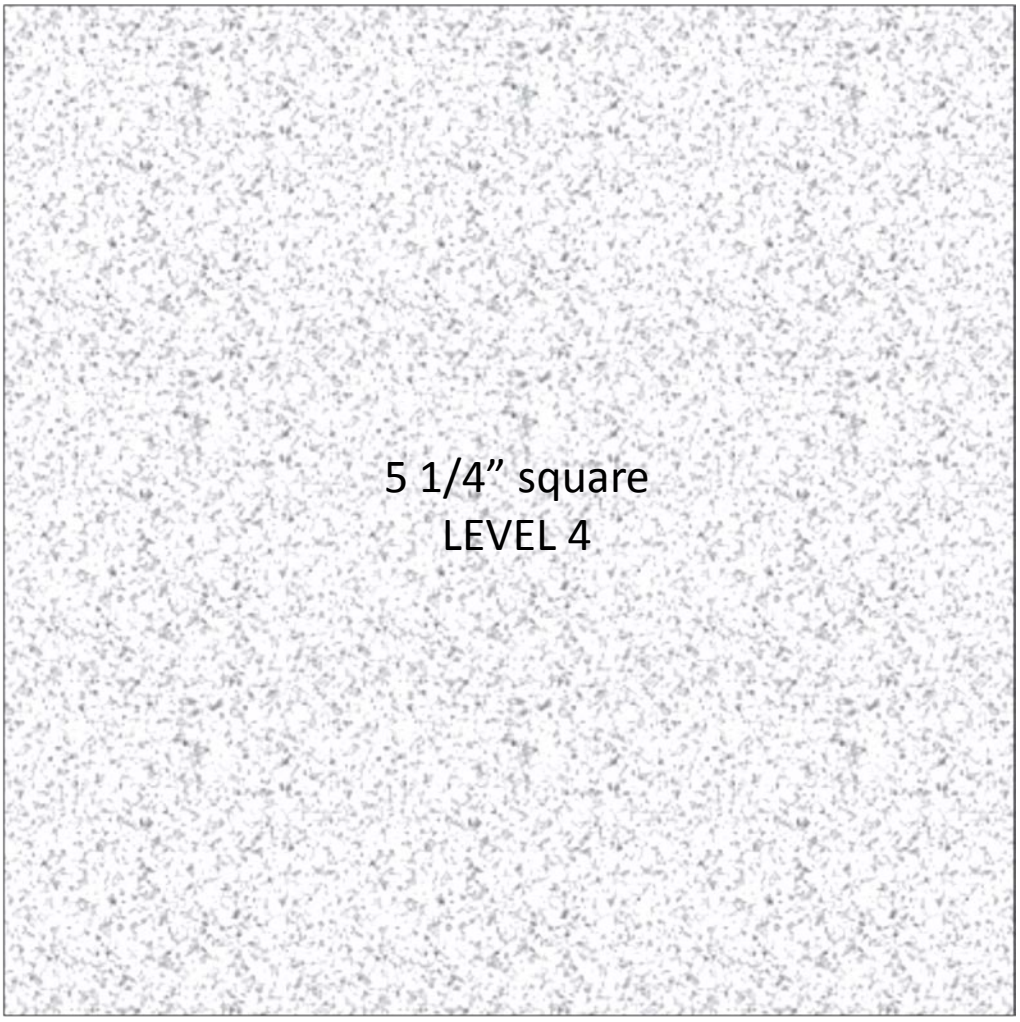
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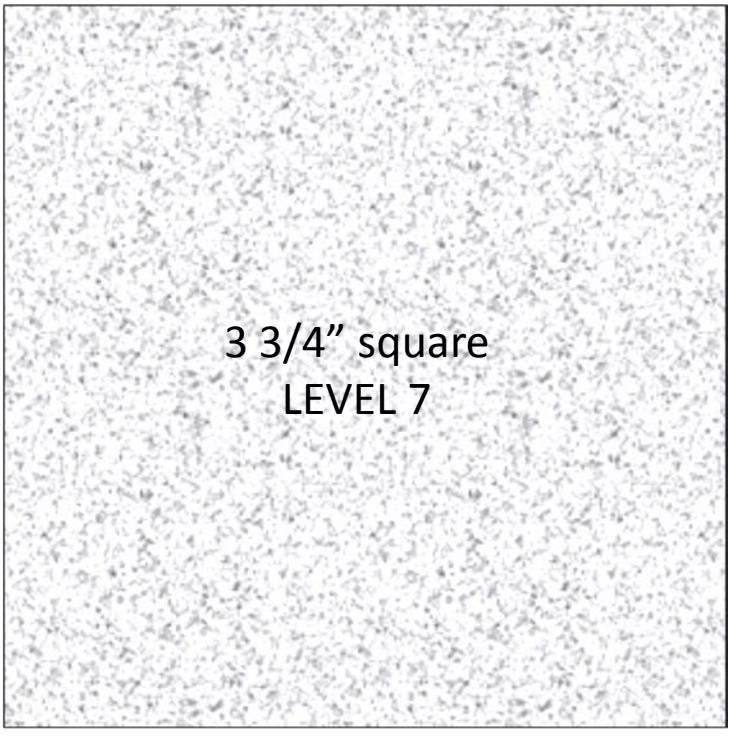
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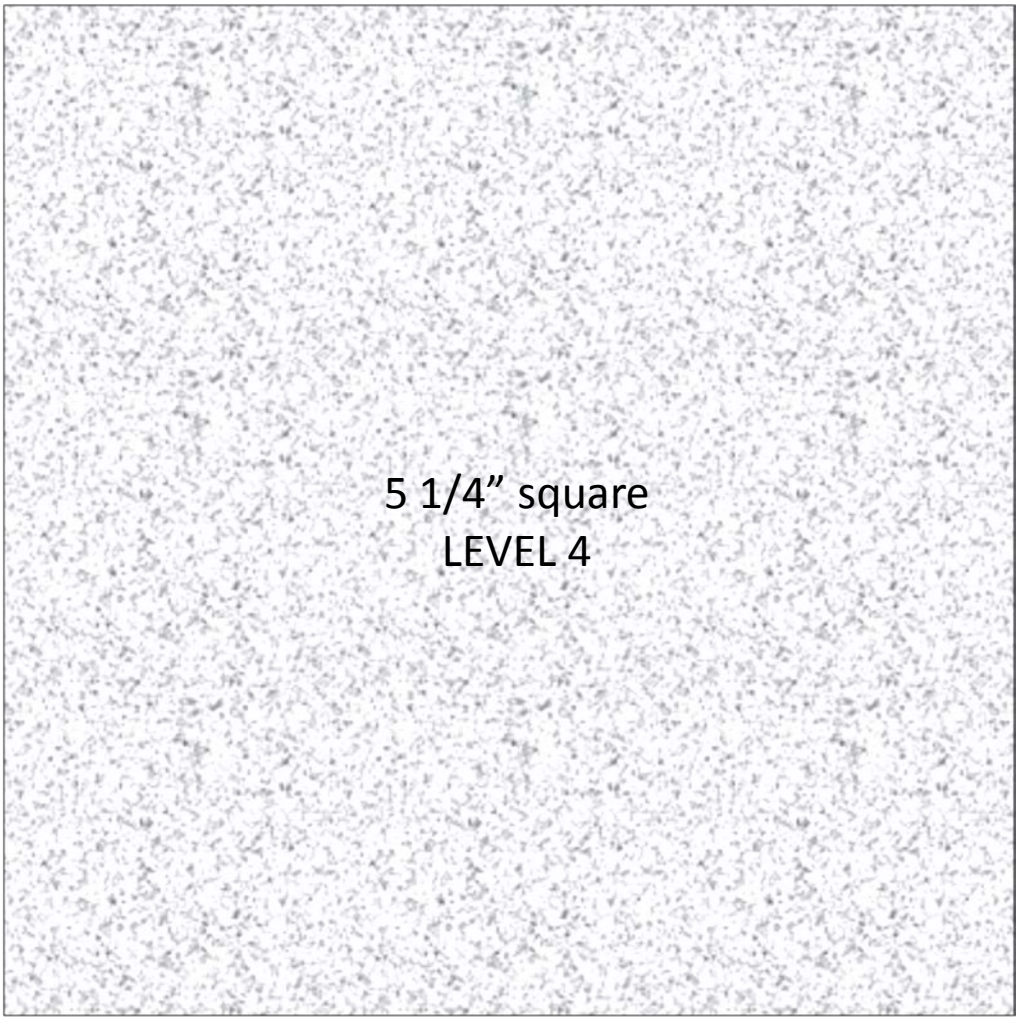
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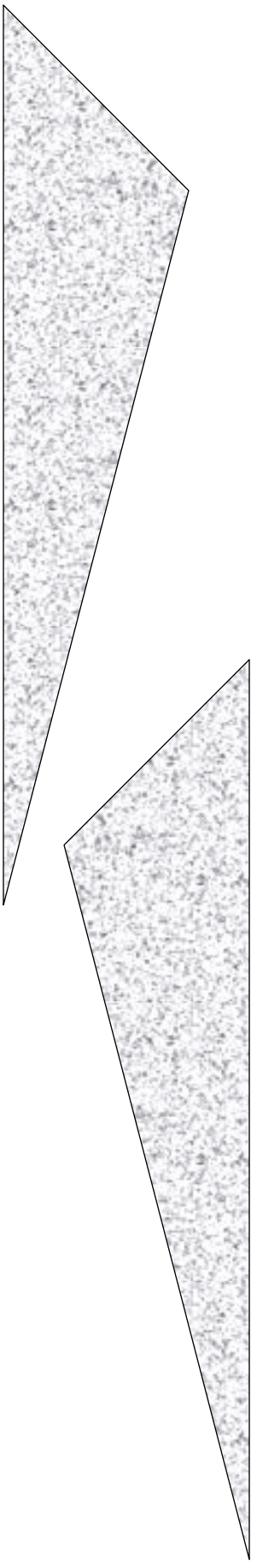
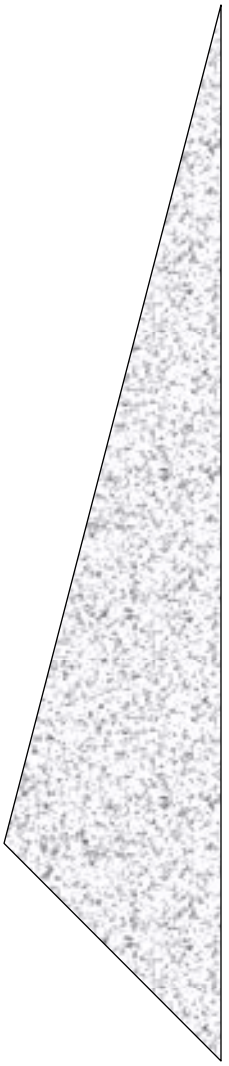
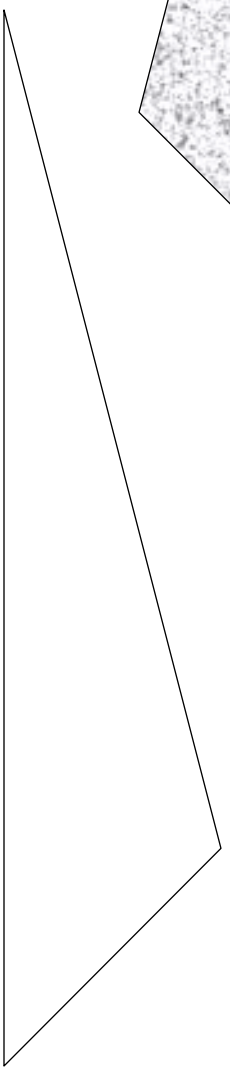



3 3/4” square
LEVEL 7

4 3/4” square
LEVEL 5

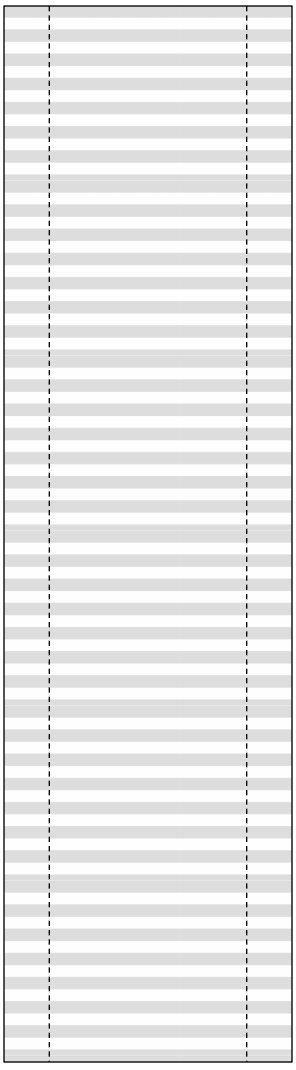




4 1/4” square
LEVEL 6

4 1/4” square
LEVEL 6

STAIRS



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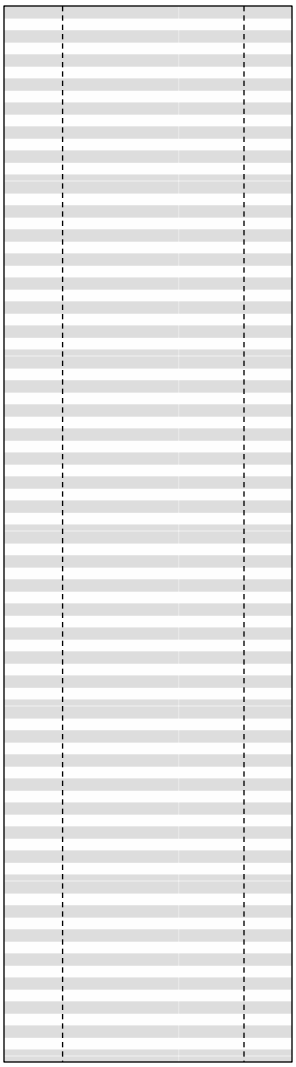

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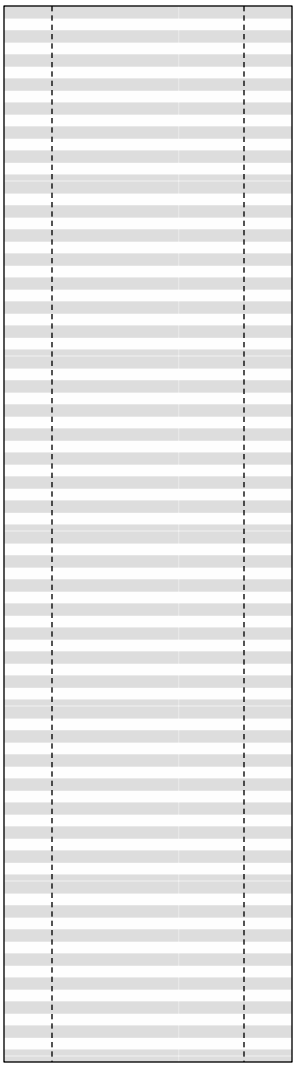

STAIRS