

Dancing Diamonds

Have you ever seen a paper crane or made a paper airplane? Those figures were created using the art of origami! By combining the use of scissors and origami, you can fold and cut paper to create dancing diamonds!

TEKS:

MATH 4.6A: The student is expected to identify points, lines, line segments, rays, angles, and perpendicular and parallel lines.

MATH 4.6B: The student is expected to identify and draw one or more lines of symmetry, if they exist, for a two-dimensional figure.

Materials:

- Cutting mat (if using X-Acto Knife)
- Dancing Diamonds Template (attached below)
- Origami paper or cardstock
- Scissors or X-Acto Knife (adult supervision required)

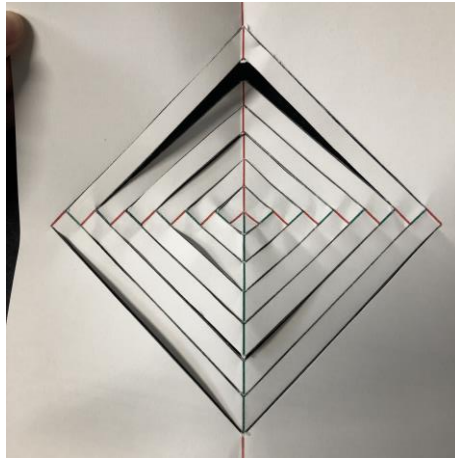
How To:

1. Print the Dancing Diamonds Template onto the origami paper or cardstock, preferably using a color printer. If you do not have a color printer, go over the corresponding lines once the template is printed with a green and red pen, following the template. The colored lines serve as a color code for the remainder of the instructions.
2. Cut through all of the black lines. You can either lay the paper on a cutting mat and use an X-Acto knife to cut out the lines or you can fold the paper like a hotdog along the center line and use scissors to cut the black lines. Try your best to cut straight and follow the lines. Do not cut along any of the colored lines.

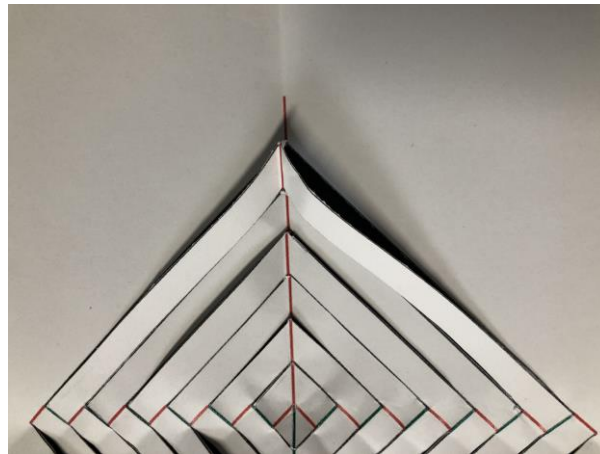
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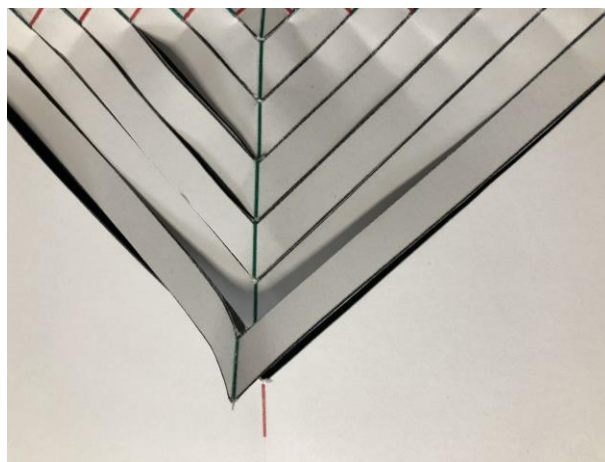
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3. Valley-fold the red lines by creasing the paper along the red line and unfolding it. Repeat this step for all of the red lines on the template. (When creating valley-folds, the lines should be on the inside of the paper and not visible when you crease the paper).



4. Now, mountain-fold the green lines by creasing the paper along the green line and unfolding it. Repeat this step for all the green lines on the template. (When creating the mountain-folds, the lines should be on the outside of the paper, visible when you crease the paper, and in the opposite direction as the valley-folds).

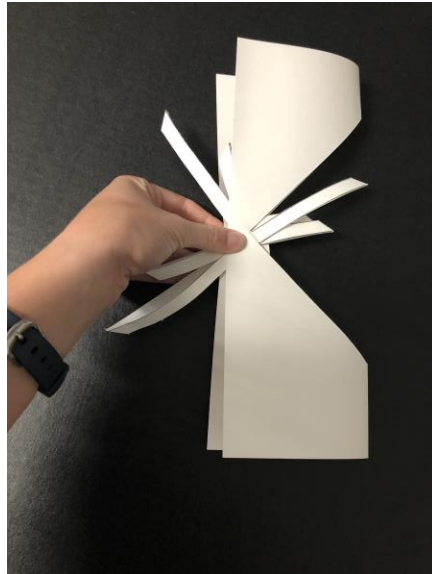


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5. Once the folds are complete, the green folds should be pointed towards you while the red folds are pointed away from you.
6. Now position the dancing diamond with the center green line on top and the center red line on the bottom. Take the center green line and rotate the "diamond" downward. This should pull the rest of the diamonds down and start rotating the diamonds around. Be sure to only fold on the existing creases.



7. As you keep rotating the diamonds, the paper will want to start to pull the edges of the paper together and close like a card. Eventually, you should be able to close the entire sheet along the center with all the diamonds folding on their creases.
8. You've created your dancing diamond! Make them dance by opening and closing the paper like a card!

STEM Explanation:

Origami is the Japanese art of folding paper into shapes and figures. The art of origami has been a subject of mathematical study, including flat foldability, which is whether or not the model can be flattened without damage. Additionally, origami and the folding of paper has been used to solve various mathematical equations. Your dancing diamonds are actually kirigami, a variation of origami that involves cutting paper, rather than only using folding. Each cut and each fold follows exact angle measurements that allow for the design to take a diamond shape. The direction of the folds and the motion of pulling the paper open and close is what makes the diamonds spin.

Career Connection:

Trigonometrists study the mathematics behind triangles and angles to apply them to real-world calculations. They use high-level mathematics, physics, and technologies to problem solve and understand 2-dimensional and 3-dimensional figures. Trigonometry is significant to the engineering design of a variety of products like virtual modeling, civil engineering, video game design, and more.

Resources:

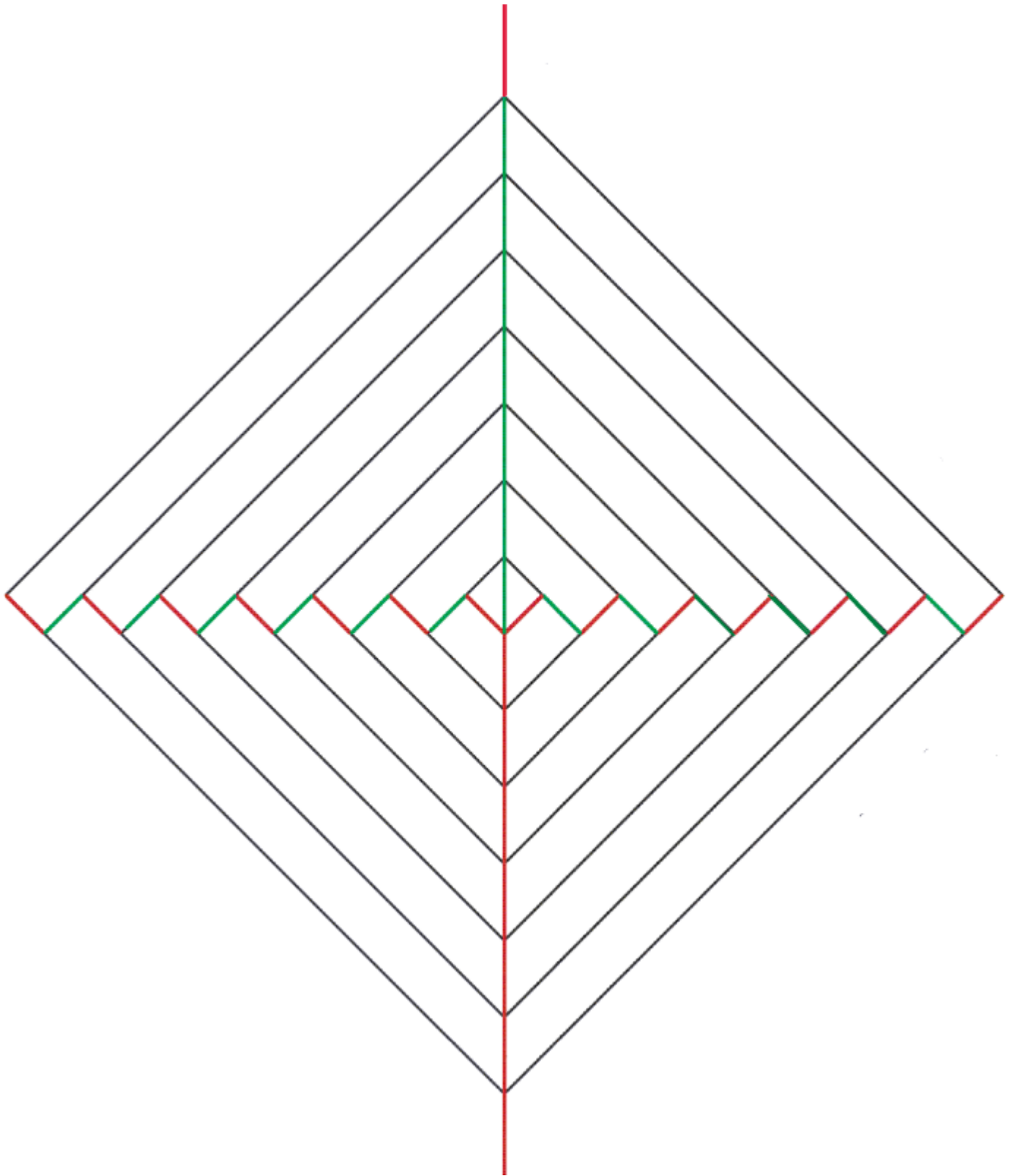
<http://www.arvindguptatoys.com/toys/dancingdiamonds.html>

https://www.youtube.com/watch?v=nJ_OVnHinmM

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