Study of Faults and Earthquakes with Foldable Fault Blocks

Targeted Age: Elementary to High School
Activity Structure: Individual Assignment
Indiana Standards and Objectives: 6.3.22, 7.3.4, ES 6.3
Material Requirements:
Colored pencils or crayons
Scissors
Tape
Printed copies of fault block activity

Introduction
In this lesson, students will create three-dimensional (3-D) blocks out of paper to learn about the types of faulting that occur at the Earth's surface and its interior, and explain how earthquakes are generated by fault movement. Step-by-step directions will provide students with the necessary resources to create the final product.

Background Information
It is expected that students have studied the basics of plate tectonics before attempting this lesson.

What products does the instructor want students to create and in what format?
The foldable fault block activity provides students the ability to create 3-D fault blocks and to demonstrate strata displacement with the fault blocks that they have created. As the instructor, you will need to determine the connections you would like students to focus on during the lesson, based on the curriculum context in your classroom and the outcomes you desire.

Essential Questions to be Addressed
1. Identify the three types of faults generated in the Earth's crust. Use vocabulary terms, such as "hanging wall" and "foot wall," to describe each fault.

2. Explain the relationship between faults and earthquakes.

Closure
Students should have created three fault blocks and actively demonstrated a normal fault, reverse fault, and strike-slip fault. Students should also explain how movement along a fault generates earthquakes because of the sudden release of energy in the Earth's crust.

Extension or Enrichment Ideas
Ask students to investigate fault geometry and the factors that create earthquakes in more detail.

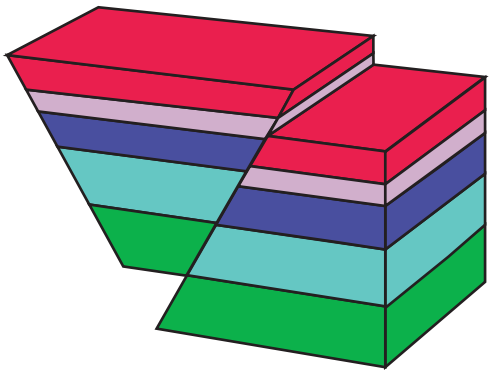
Discuss the effects of erosion on fault scarp surfaces. Ask students how they would identify a fault if the hanging wall and foot wall had been eroded to the same level.

Ask students to identify the relative ages of faulted rocks.

Discuss the compressional forces that influence the interplate earthquakes that occur in Indiana.

The Earth is an ever-changing place. To understand its movements, use this printable fault block activity to demonstrate how the earth can break apart by normal, reverse, and strike-slip faults.

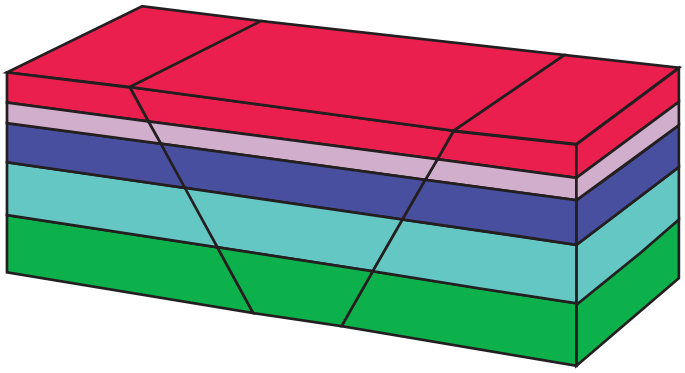
Glossary of Terms



Fault

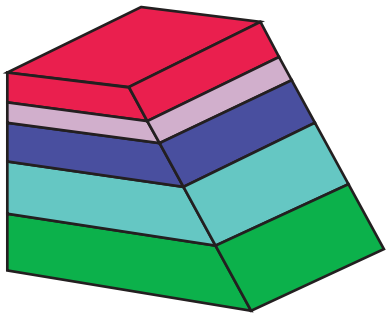
A fracture in the Earth's crust where one side moves relative to the other. Sudden movements in faults cause earthquakes.

The fault plane in this diagram is the area of contact between the two fault blocks. Fault planes may contain striations or slickensides that can indicate the direction of fault motion.



Fault Blocks

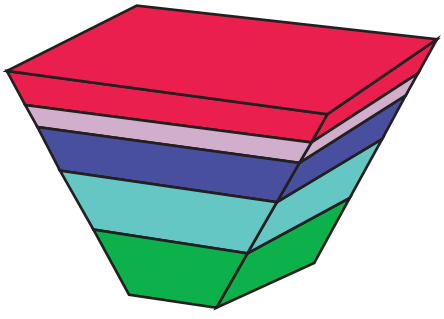
Fault blocks represent blocks of the Earth's crust. Each color represents a layer of the Earth, while the diagonal black lines represent faults in the Earth's crust. In this position, the fault blocks represent unfaulted, or unmoved, crust.



Foot Wall

A foot wall is a block of crust that lies underneath a fault plane.

Hint for Identification: If a person was able to stand on the fault plane, their feet would be on the foot wall.

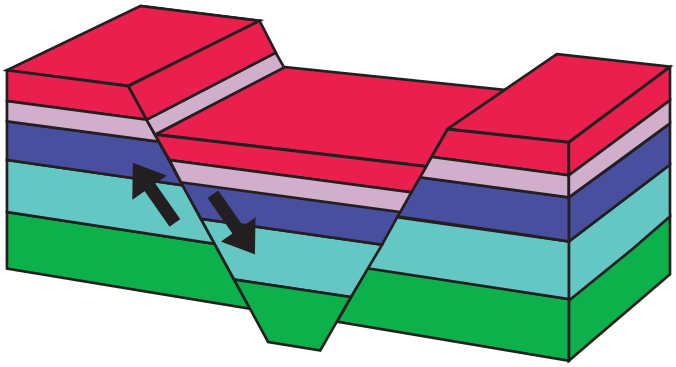


Hanging Wall

A hanging wall is a block of crust that is located above a fault plane. Its shape rests or hangs on the foot wall.

Hint for Identification: If a person was able to stand on the fault plane, they could hang onto the hanging wall.

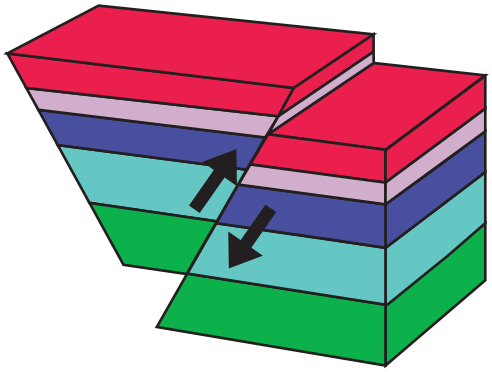
Types of Faults



Normal Fault

In this position, the hanging wall moved down relative to the foot wall, indicating normal fault activity. This picture shows that the central hanging wall moved down relative to the outer foot walls. When a hanging wall moves down, a cliff face is formed, called a "fault scarp."

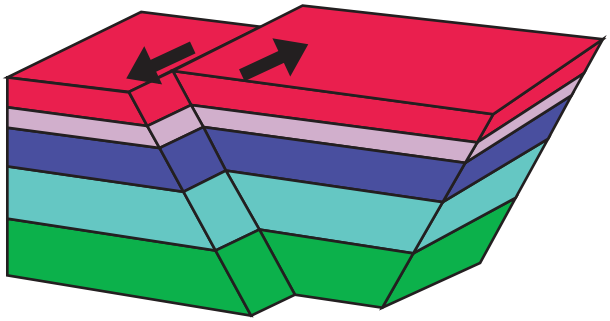
All of the known faults in Indiana are normal faults.



Reverse Fault

In this position, the hanging wall moved up relative to the foot wall, indicating reverse fault activity. This picture shows that the central hanging wall was pushed up relative to the foot wall.

Most of the faults in the Rocky Mountains are reverse faults.



Strike-Slip Fault

In this position, the blocks of crust have laterally moved relative to each other, indicating strike-slip fault activity. Lateral, or side-to-side, motion does not produce a fault scarp but can create weaker areas of rock where fault blocks slide past one another.

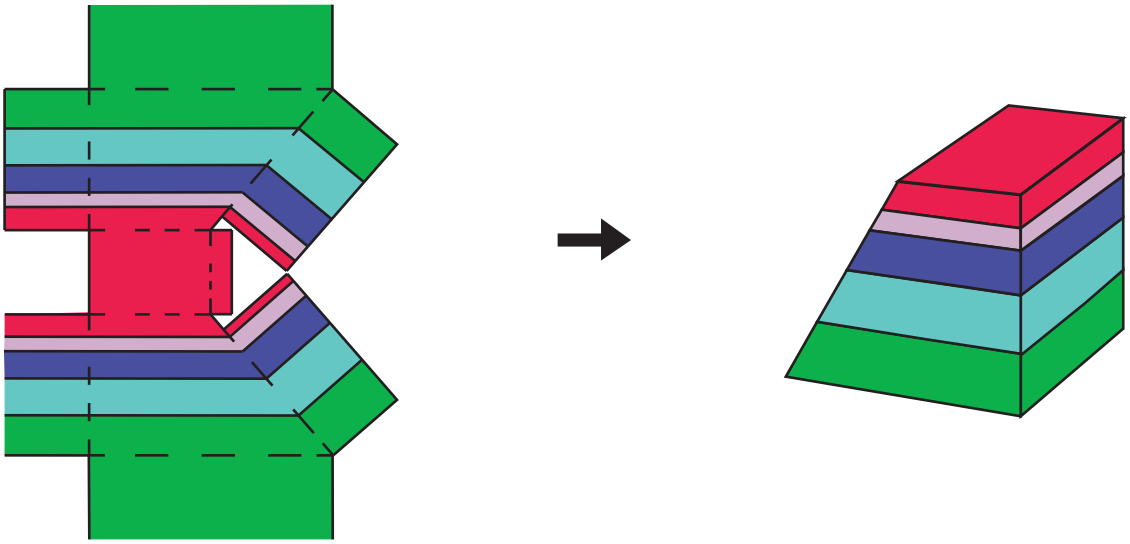
Streams that flow across a strike-slip fault often change their flow to follow the weakened zones.

The Earth is complex! In real life, faults can combine several of these movements. For example, the famous San Andreas Fault in California has a strike-slip motion 95 percent of the time and a reverse fault motion 5 percent of the time.

Instructions

1. Print out each of the three printable fault blocks.

2. Color the fault block. Each block has five layers per side. The printouts feature numbers to guide coloring.

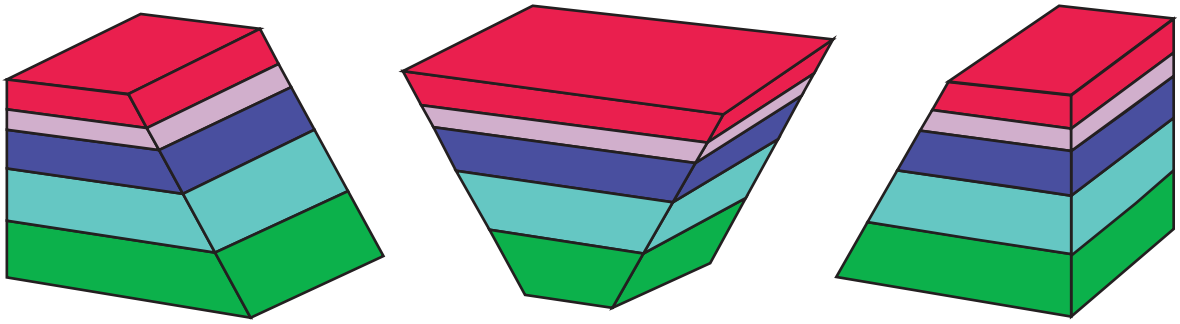


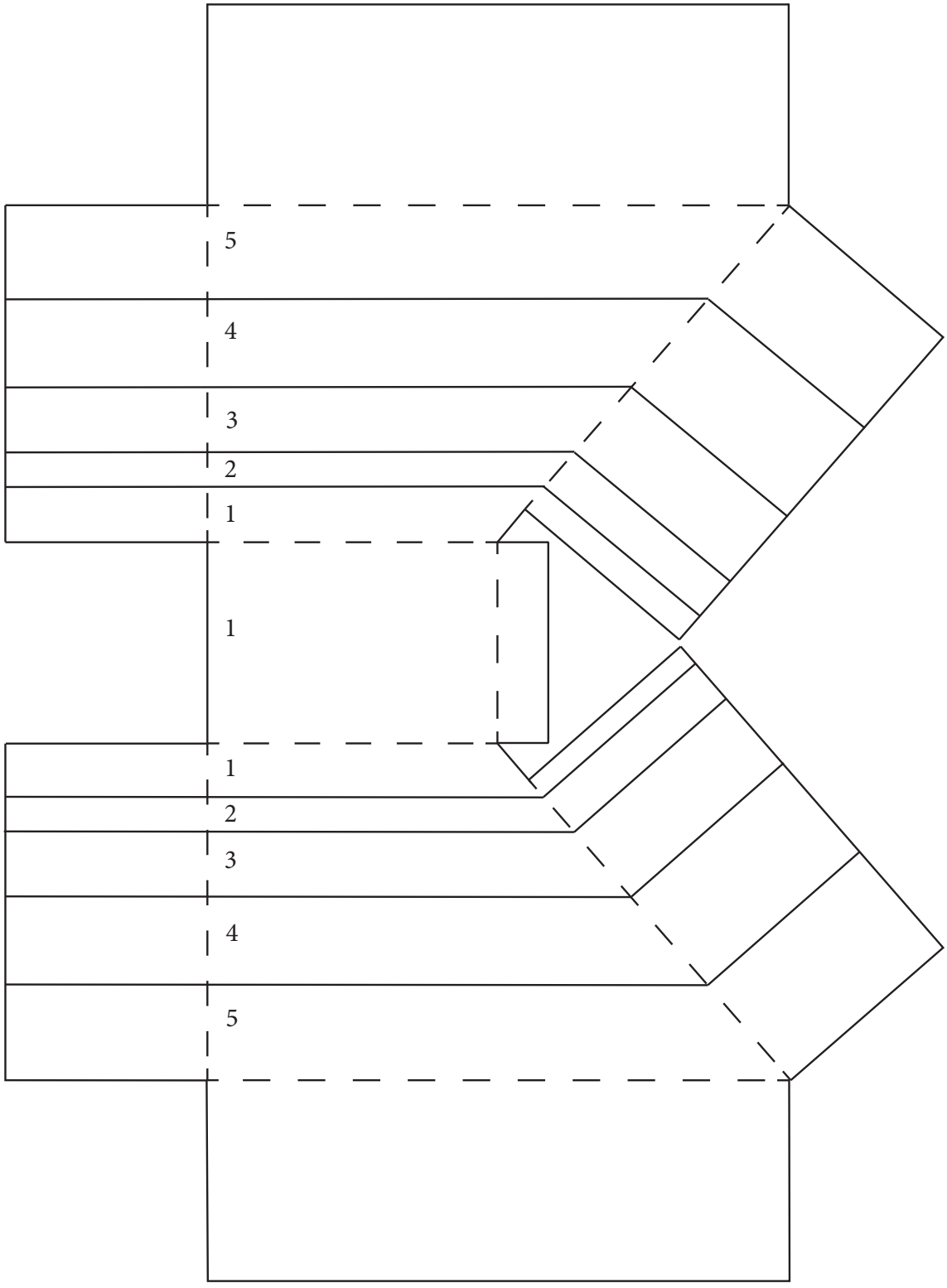
3. Cut out the fault block along the outer solid black lines.

4. Fold on the dotted lines.

5. Once a block is folded, tape the flaps together to make a 3-D fault block.

6. Repeat until all three fault blocks are created.

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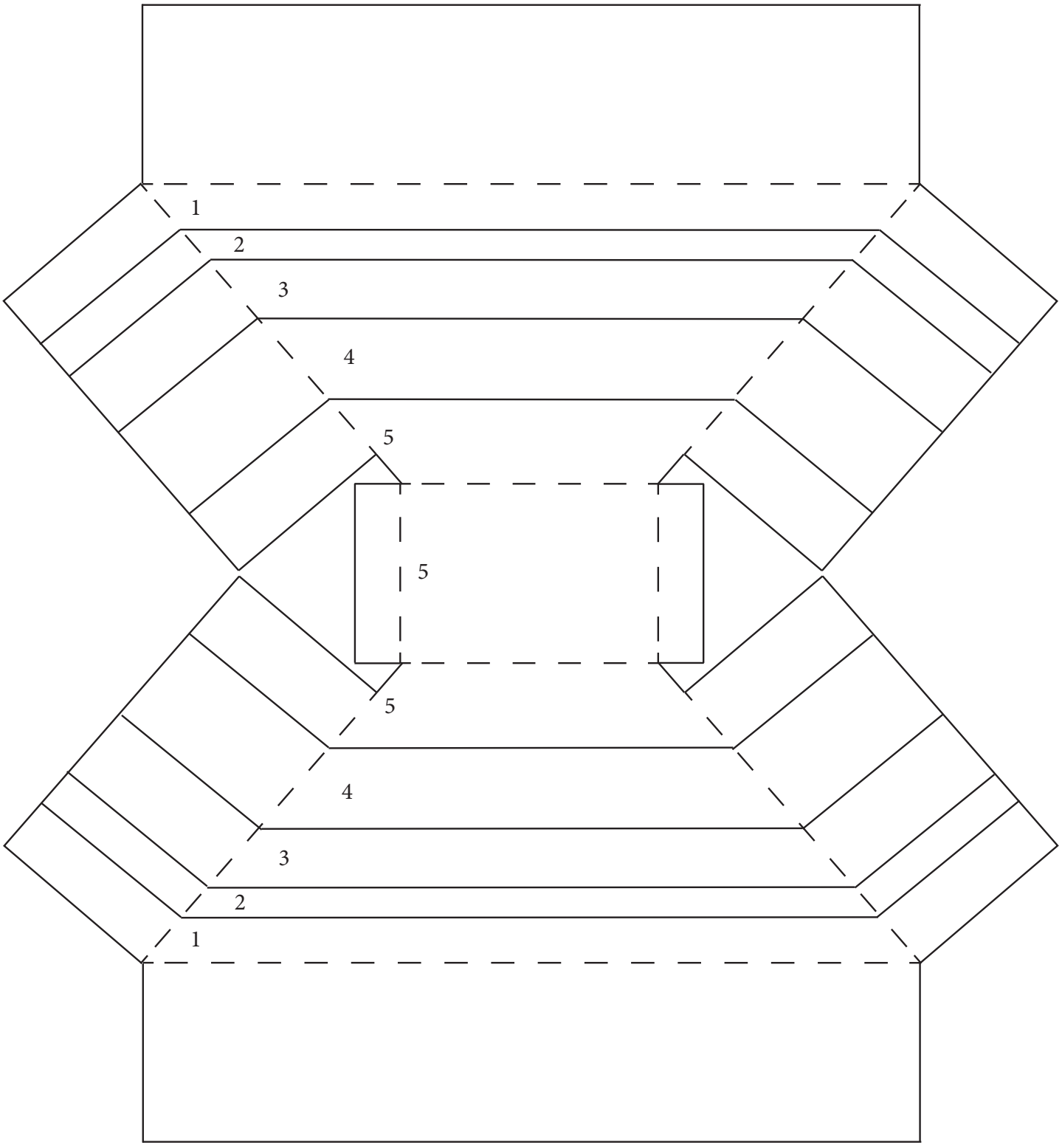
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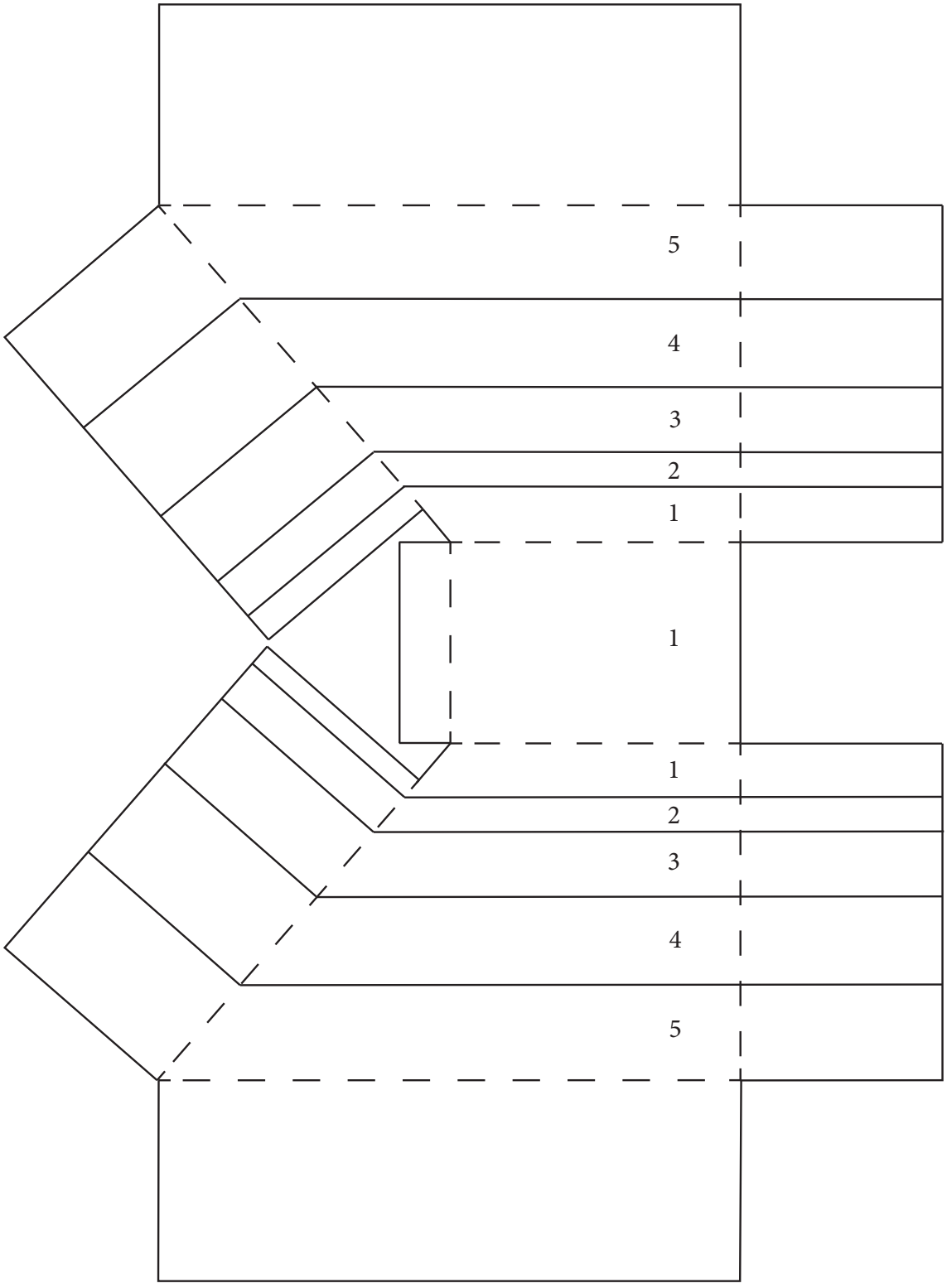
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