

Chapter 7

Transformations

Section 6

Frieze Patterns


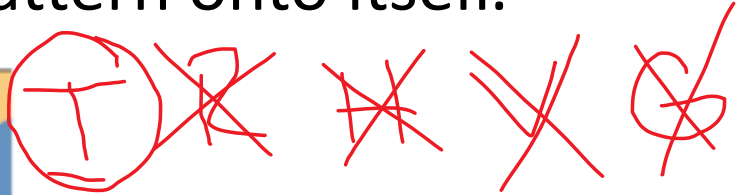
GOAL 1: Classifying Frieze Patterns



A **frieze pattern** or **border pattern** is a pattern that extends to the left and right in such a way that the pattern can be mapped onto itself by a horizontal translation. In addition to being mapped onto itself by a horizontal translation, some frieze patterns can be mapped onto themselves by other transformations.


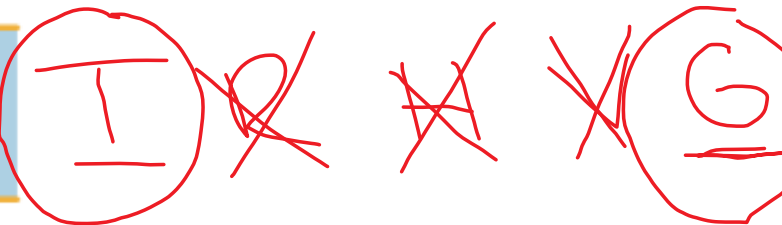
- | | |
|------------------------------------|---|
| 1. Translation | T |
| 2. 180° rotation | R |
| 3. Reflection in a horizontal line | H |
| 4. Reflection in a vertical line | V |
| 5. Horizontal glide reflection | G |

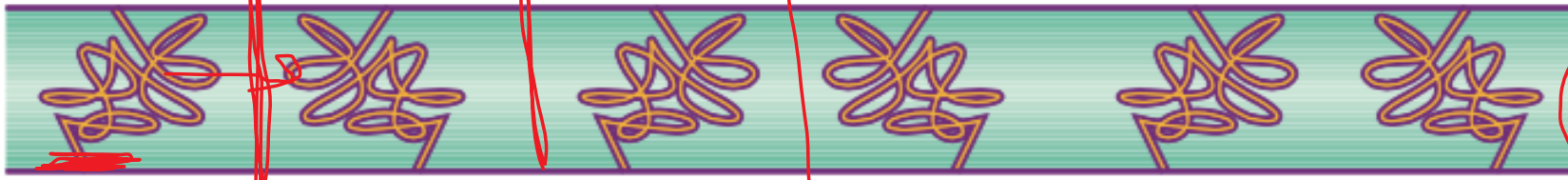
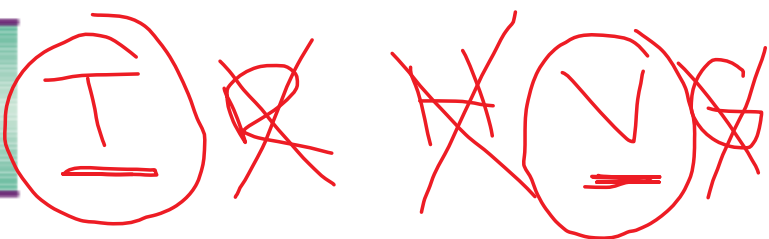
Example 1: Describing Frieze Patterns

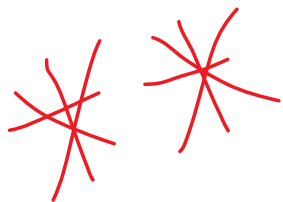
Describe the transformations that will map each frieze pattern onto itself.

a.  

b.  








c.  

d.  



CONCEPT SUMMARY

CLASSIFICATIONS OF FRIEZE PATTERNS

T	Translation	
TR	Translation and 180° rotation	
TG	Translation and horizontal glide reflection	
TV	Translation and vertical line reflection	
THG	Translation, horizontal line reflection, and horizontal glide reflection	
TRVG	Translation, 180° rotation, vertical line reflection, and horizontal glide reflection	
TRHVG	Translation, 180° rotation, horizontal line reflection, vertical line reflection, and horizontal glide reflection	

→ ask about $H \Rightarrow$ ask about V

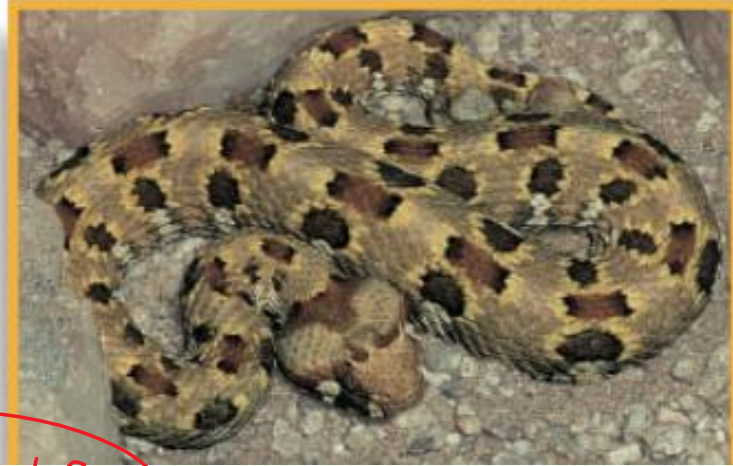
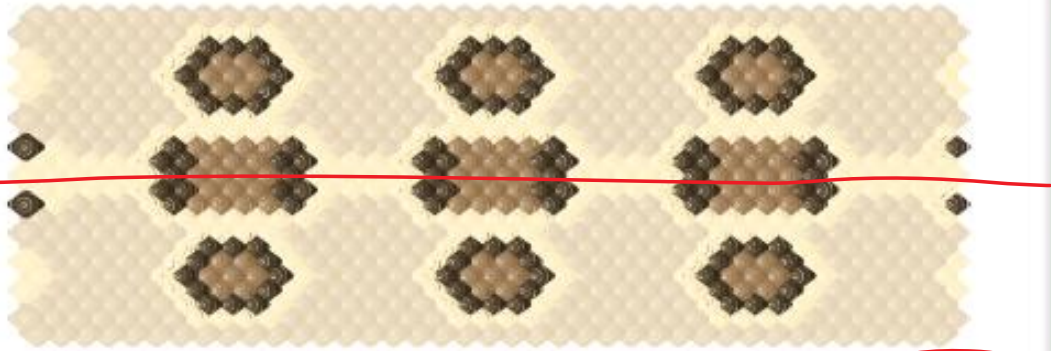
To classify a frieze pattern into one of the seven categories, you first decide whether the pattern has 180° rotation. If it does, then there are three possible classifications: TR, TRVG, and TRHVG.

If the frieze pattern does not have 180° rotation, then there are four possible classifications: T, TV, TG, and THG. Decide whether the pattern has a line of reflection. By a process of elimination, you will reach the correct classification.

→ ask about H or V

Example 2: Classifying a Frieze Pattern

Categorize the snakeskin pattern of the mountain adder.



~~TR~~

~~TRXIG~~

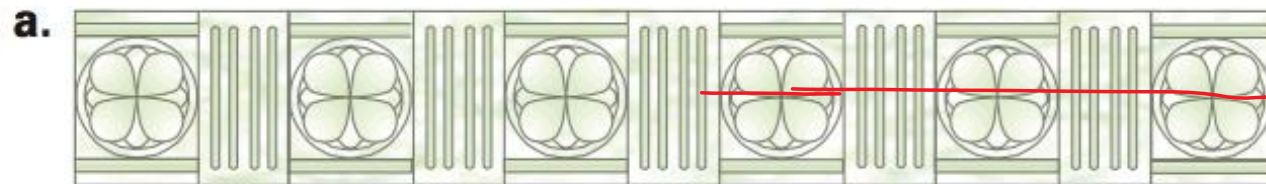
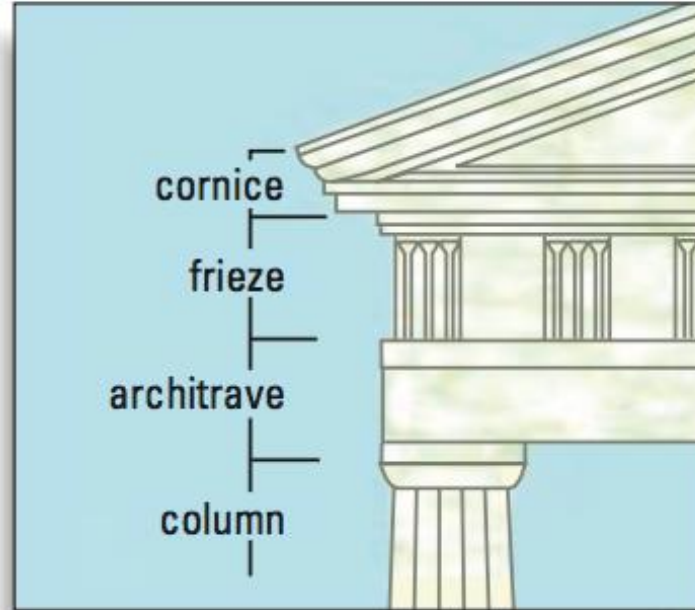
TRHVG

GOAL 2: Using Frieze Patterns in Real Life

Example 3: Identify Frieze Patterns

ARCHITECTURE The frieze patterns of ancient Doric buildings are located between the cornice and the architrave, as shown at the right. The frieze patterns consist of alternating sections. Some sections contain a person or a symmetric design. Other sections have simple patterns of three or four vertical lines.

Portions of two frieze patterns are shown below. Classify the patterns.



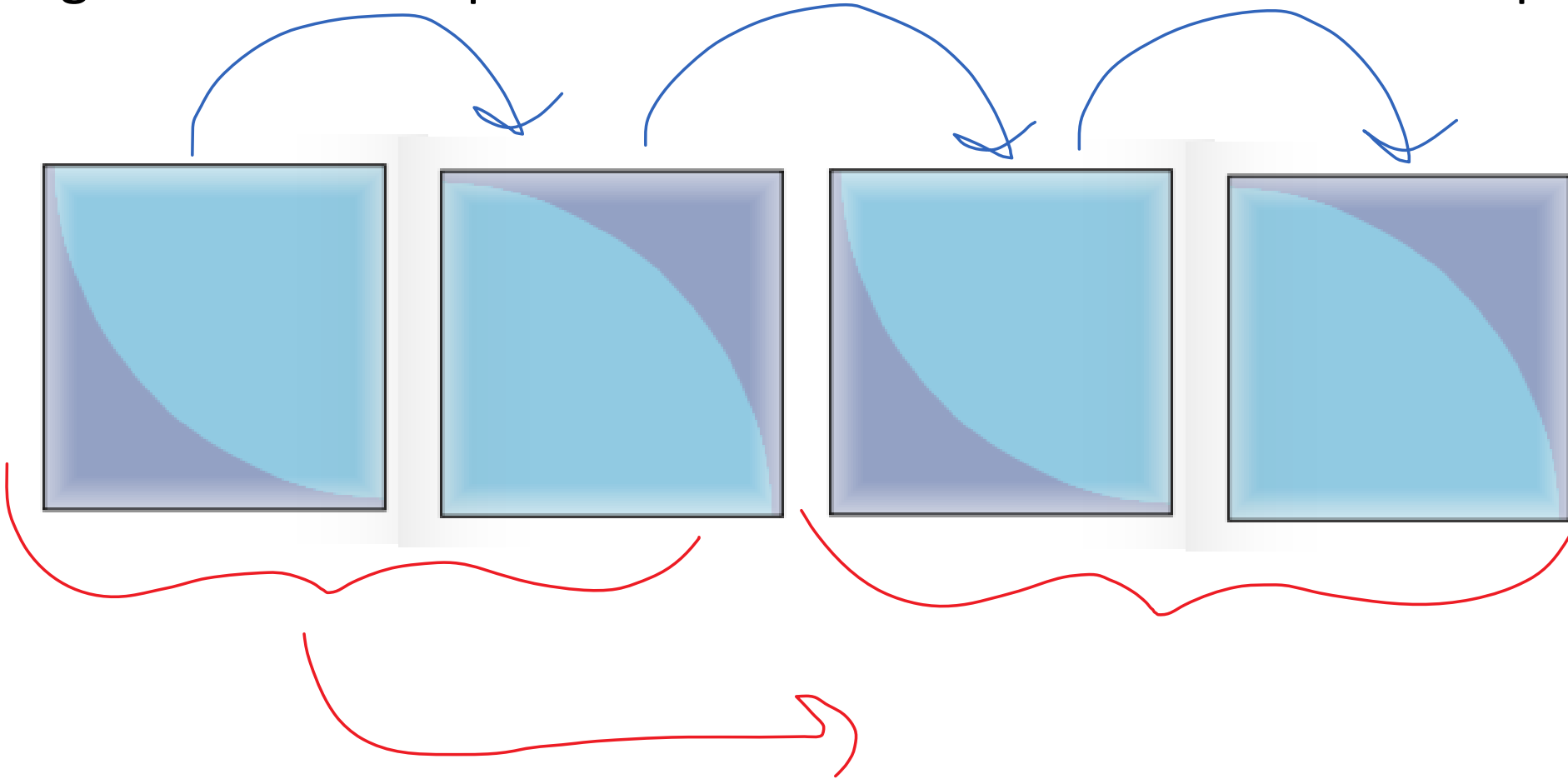
~~TR~~ ~~TRVG~~ TRHVG



T ~~TV~~ ~~TG~~ ~~TAG~~

Example 4: Drawing a Frieze Pattern

TILING: A border on a bathroom wall is created using the decorative tile at the right. The border pattern is classified as TR. Draw one such pattern.



EXIT SLIP