

Vocabulary Review Sheet

Lesson – Transformations and Cultural Art Through Symmetry

How to Use

- Review each vocabulary word and example before your quiz.
- Connect **math definitions** to **real-world cultural art** and **equity insights**.
- Keep this sheet in your *Equity in Numbers Student Journal*.
- Remember: *Math isn't just about shapes — it's about honoring creativity across every culture.*

Transformation

- **Definition:** A change in the position, shape, or size of a figure.
- **Math Examples:** Reflection, rotation, translation, and dilation.
- **Real-Life Example:** Repeating motifs in Islamic tiles or Navajo weavings use geometric transformations.
- **Fairness Example:** Learning about transformations in global art shows that math is universal and belongs to every culture.

Reflection

- **Definition:** A flip of a shape over a line, creating a mirror image.
- **Math Examples:**
 - $(x, y) \rightarrow (-x, y)$ across the y-axis
 - $(x, y) \rightarrow (x, -y)$ across the x-axis
- **Real-Life Example:** Reflected motifs in Adinkra symbols, tribal fabric patterns, or Islamic mosaics.
- **Fairness Example:** Reflection teaches balance — just as equity means seeing all cultures reflected fairly in art and math.

Rotation

- **Definition:** A turn of a shape around a fixed point by a certain degree.
- **Math Example:** $(x, y) \rightarrow (-y, x)$ for a 90° counterclockwise rotation.
- **Real-Life Example:** Mandalas, cathedral rosettes, and Japanese crests show rotation symmetry.
- **Fairness Example:** Rotation reminds us that every perspective matters — turning our view helps us see the beauty in all cultures.

Translation

- **Definition:** Sliding a shape without turning or flipping it.
- **Math Example:** $(x, y) \rightarrow (x + a, y + b)$
- **Real-Life Example:** Repeated border designs in Mayan temples or woven patterns in African kente cloth.
- **Fairness Example:** Translation shows connection — how ideas move and influence across cultures, not just one direction.

Symmetry

- **Definition:** When one part of a figure matches another part exactly through reflection, rotation, or translation.
- **Math Examples:** Line symmetry, rotational symmetry, or translational symmetry.
- **Real-Life Example:** Balanced designs in mandalas, Aztec sun stones, or Moroccan tiles.
- **Fairness Example:** Symmetry represents harmony — fairness means every culture's patterns and math are equally valued.

Line Symmetry

- **Definition:** When a figure can be folded along a line so both halves match perfectly.
- **Math Example:** A heart or butterfly has a vertical line of symmetry.

- **Real-Life Example:** Adinkra stamps and Native American pottery often use line symmetry.
- **Fairness Example:** Line symmetry symbolizes balance — just like giving equal representation to all cultures.

Rotational Symmetry

- **Definition:** A design looks the same after being rotated around a center point.
- **Math Example:** A shape has 4-fold rotational symmetry if it repeats every 90° .
- **Real-Life Example:** Circular Islamic mosaics, Aztec calendar stones, and Indian rangoli patterns.
- **Fairness Example:** Many cultures use rotation in art; studying all of them ensures we see global genius, not just a few examples.

Translational Symmetry

- **Definition:** A pattern repeats in a straight line or direction without rotation or reflection.
- **Math Example:** Borders or rows that repeat across a grid.
- **Real-Life Example:** Mayan borders or tilework on mosques and temples.
- **Fairness Example:** Translational symmetry shows continuity — like passing knowledge between generations and cultures.

Coordinate Plane

- **Definition:** A grid with x- and y-axes used to plot and transform figures.
- **Math Example:** Reflecting a point from $(3, -2) \rightarrow (-3, -2)$.
- **Real-Life Example:** Artists and designers use grids to scale cultural patterns.
- **Fairness Example:** The coordinate plane helps represent all points — a reminder that every culture deserves a place on the map.

Image and Pre-Image

- **Definition:** The pre-image is the original shape; the image is the new shape after transformation.
- **Math Example:** Label points A, B, C (pre-image) \rightarrow A', B', C' (image).
- **Real-Life Example:** When artists repeat a motif, each version is a transformed image of the original.
- **Fairness Example:** Every new image honors its origin — crediting cultural inspiration respects the source of creativity.

Cultural Pattern

- **Definition:** A traditional artistic design that reflects a community's identity, beliefs, or history.
- **Math Example:** Many use geometric repetition, symmetry, and transformations.
- **Real-Life Example:** Kente cloth (Ghana), Islamic tessellations (Morocco), Navajo rugs (USA).
- **Fairness Example:** Studying these patterns shows that math and art are shared human achievements.

Representation

- **Definition:** The fair inclusion and recognition of all people and cultures.
- **Math Example:** Using examples from all continents in geometry lessons.
- **Real-Life Example:** Exhibiting both European and Indigenous mathematical art in a museum.
- **Fairness Example:** Representation ensures students see their culture's beauty — and others' — in math and art.

Summary of Math + Fairness Connections

Concept	Math Focus	Fairness Connection
Transformations	Reflect, rotate, translate	Show shared geometry in global art
Symmetry	Balance through repetition	Symbolizes equity and cultural respect
Coordinate Plane	Models movement and location	Every culture's art has a "place" in math
Cultural Patterns	Use geometry for storytelling	Honors creativity across communities
Representation	Inclusive learning	Builds fairness and appreciation in education