



## COMING AND GOING – Glide Reflection, Tessellation

Students use glide reflection to create a shape that will tessellate and is the profile of a face, and then use the shape to create a design filled with people coming and going.

Required Time

180 Minutes

Grade Level

Grade 4 to Grade 8

Subject

Language Arts  
Mathematics  
Visual Arts

Vocabulary

blended colour  
contrast  
glide reflection  
movement  
reflection  
tessellation  
translation  
vertex

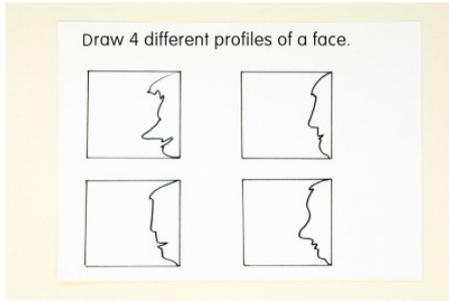
Materials

Crayola Fine Line Markers - 12 Count  
Crayola Marker & Watercolour Paper - 22.9 cm x 30.5 cm (9" x 12")  
Crayola Colours of the World Crayons - 24 Count  
Crayola Mini Twistables Crayons - 24 Count  
Crayola Pointed Tip Metal Scissors  
Clear Tape  
Cardstock Paper - 7.5 cm x 7.5 cm (3" x 3") - 1 per student

Shop Crayola  
Products

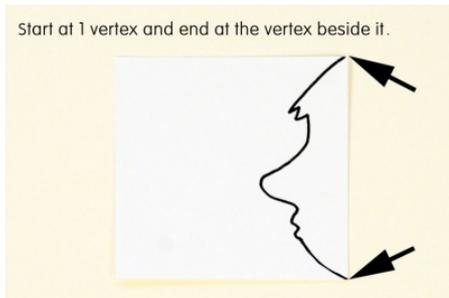
# Steps

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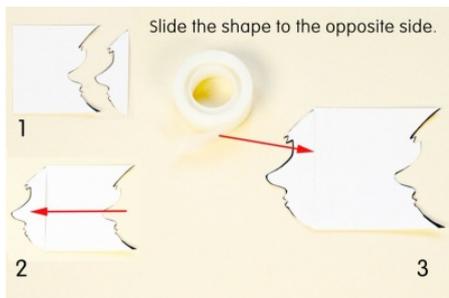
## Step One

1. Draw 4 squares on your paper.
2. Make 4 different sketches of the profile of a face.
3. Experiment with the size and shape of the nose and the slant of the forehead.
4. Pose for each other to see what different profiles look like.



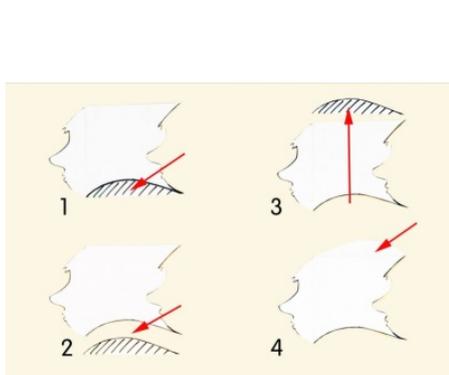
## Step Two

1. Draw your profile on the square of heavy weight paper.
2. Make sure you start at one vertex and end at the vertex beside it.



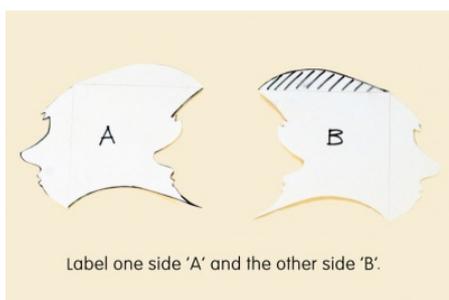
## Step Three

1. Carefully cut out your shape.
2. Translate the shape by sliding it to the opposite side of the square.
3. Tape the shape to the square being sure to fit it right up against the edge of the square.



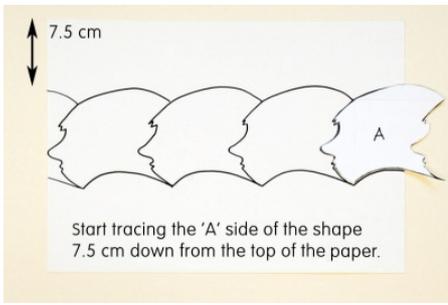
## Step Four

1. Draw a new shape from the straight side of the square, starting at the chin.
  - this will be the top of the head
  - shade it so it looks different than the rest of the shape
2. Carefully cut the shape out.
3. Slide it across to the straight side of the square.
4. Flip the shape over and tape it in place.



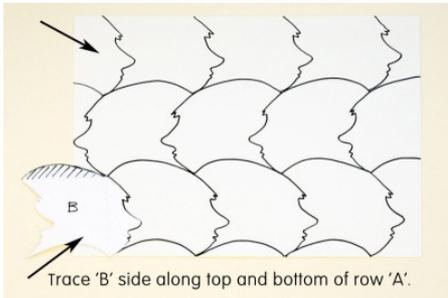
## Step Five

1. Label one side of the template 'A' and the other side 'B'.



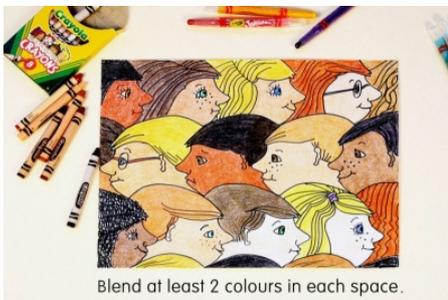
### Step Six

1. Measure down 7.5 cm from the top of the paper.
2. Start there with your first row of drawings.
3. Trace the 'A' side of the template over and over again making sure each shape fits into the previous one.



### Step Seven

1. Trace the 'B' side of the template along the top and bottom of the 'A' row.
2. Make sure each shape fits into the previous one.
3. Fill the entire page.



### Step Eight

1. Use multicultural and twistable crayons to fill in the design.
2. Blend at least 2 colours together in each space.
3. Place colours so they create contrast and lead your eye through the drawing.

# Learning Goals

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Students will be able to:

- use glide reflection to create a shape that will tessellate and is the profile of a face;
- create a design filled with blended colour;
- use colour to create contrast and movement;
- explain why the tessellation works;
- demonstrate technical accomplishment and creativity.

## Extensions

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Have students:

- research M. C. Escher and his work;
- select an art image by M. C. Escher and explain how it works;
- use the work of M. C. Escher as inspiration for their own tessellating artwork.

## Prepare

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1. Prior to this lesson have students do the **Tantalizing Tessellations** lesson available on this website. OR have students use the *Tessellations* worksheet to practice using translation. (Downloads - Tessellations\_worksheet.pdf)
2. Download M. C. Escher images from the Internet that use glide reflection to tessellate, for example, **Den Haag Escher Palace**
3. Gather and make available books and pictures of tessellations, for example, *Toads and Tessellations: A Math Adventure*, by Sharon Morrisette; *An Optical Artist: Exploring Patterns and Symmetry*, by Greg Roza; *Tessellations: The History and Making of Symmetrical Designs*, by Pam Stephens; *Introduction to Tessellations*, by Dale Seymour and Jill Britton.
4. Create a large sample shape in each phase to use as a demonstration.

## Introduction

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1. Review the term tessellation and have students describe the characteristics of a tessellation, e.g.,
  - *patterns of repeated shapes that cover a flat surface with no gaps and no overlaps*
2. Review the kinds of regular shapes that can tessellate and why
  - *regular polygons (triangles, squares or hexagons)*
  - *regular polygons can only tessellate if the sum of the interior angles is 360 degrees*
3. Review how to use translation to create an irregular shape that will tessellate.
  - *a translation is when the shape is slid across the paper and drawn again in another place*
4. View and discuss the images of Escher's art.
5. Introduce the term 'glide reflection' - when reflection and translation are used together to create an irregular shape that will tessellate.
  - *a reflection is when the shape is flipped so you see a mirror image of it*
6. Introduce the challenge.

## Activities

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### The Challenge

1. Use glide reflection to create a shape that will tessellate and is the profile of a face.
2. Create a design filled with blended colour.
3. Use colour to create contrast and movement.
4. Explain why the tessellation works.
5. Demonstrate technical accomplishment and creativity.

### The Process

1. Make sure everyone understands the challenge.
2. Establish success criteria with your students, for example,
  - I know I am successful when:
    - *the shape is a profile of a face*
    - *I used glide reflection to create the shape*
    - *the repeated shape covers the paper without any gaps or overlaps*
    - *the placement of colour creates contrast*
    - *the placement of colour creates movement*
    - *the use of blended colours is effective*
    - *the paper is in good condition*
    - *I can explain why the shape tessellates*
3. Guide students through the steps outlined in this lesson plan.
4. Observe students as they work.
5. Provide individual assistance and encouragement.

# Sharing

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1. Once all the designs are complete display them for a group discussion.
  - *Look closely at the tessellations.*
  - *Choose one that interests you for some reason.*
  - *Share thoughts about the work.*
2. During the discussion include references to:
  - *blended colours - How does the use of blended colours contribute to the effectiveness of the overall design?*
  - *colour - How does the placement of colour help to move the eye through the drawing?*
  - *technique - How and why does the tessellation work?*
3. Have students imagine what they might hear the people in the drawings saying as they hustle along.
4. Display the drawings on a bulletin board and have students write speech bubbles to surround the display.

# Assessment

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1. Observe students as they work – thoughtful focus, discriminating, seeking more information, elaborating, experimenting.
2. Observe students as they discuss the artworks – active listening, insightful contributions, supporting ideas with evidence found in the artwork and from personal experience.
3. Use a checklist to track progress. (Download - [GlideReflectionTessellation\\_tracking.pdf](#))
4. Have students use the self-assessment form to evaluate their work. (Download - [GlideReflectionTessellation\\_self-assessment.pdf](#))