

Integrated Math Assignment: Grade 5 Symmetry and The Arts

Shelley Heaphy and Lauren Delahunt
Section: PJ-4

Grade: 5

Strand: Geometry and Spatial Sense

Expectations:

Math:

Analyze designs by translating and/or reflecting a shape, or shapes, using a variety of tools (e.g., geoboard, grid paper, computer program) (*Sample problem:* Identify translations and/or reflections that map congruent shapes onto each other in a given design.).

Refined Expectation:

- The students will translate, reflect or rotate an object using a line of symmetry on grid paper.
- The students will identify the lines of symmetry per object.
- The students will communicate their knowledge on the subject using proper terminology.

Locate an object using the cardinal directions (i.e., north, south, east, west) and a coordinate system (e.g., “If I walk 5 steps north and 3 steps east, I will arrive at the apple tree.”)

Refined Expectation:

- The students will move their object according to the cardinal direction specified.

Art: Organize their art works to create a specific effect, using the elements of design (e.g., create a still life depicting their favourite foods, and explain how they used colour, texture, and shape to appeal to the viewer’s senses).

Refined Expectation:

- Students will organize their art works to create a special effect, using texture as their element of design.

THINKING

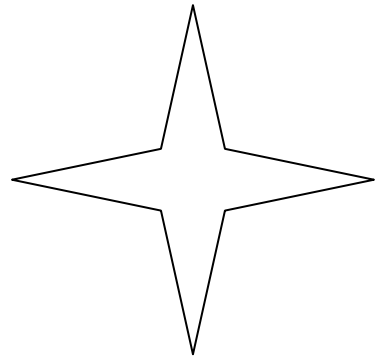
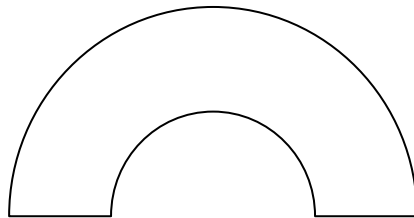
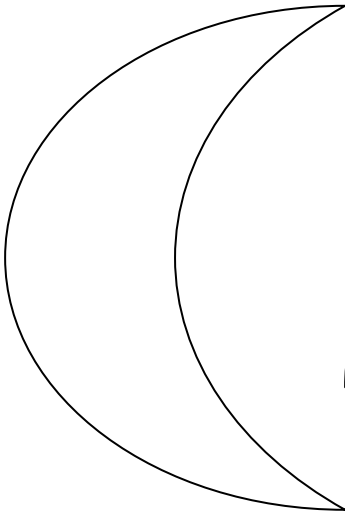
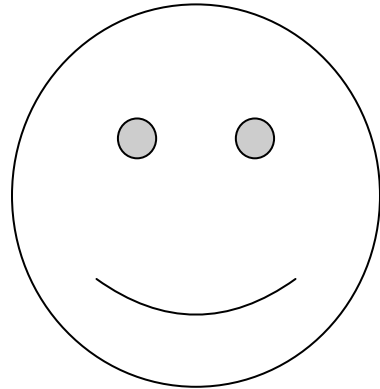
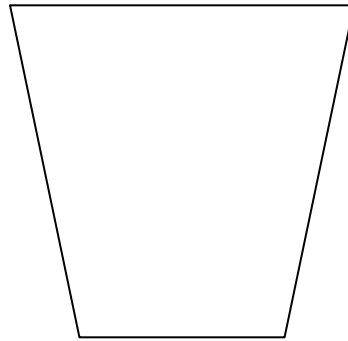
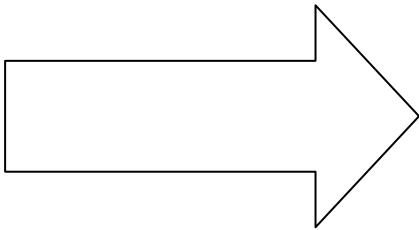
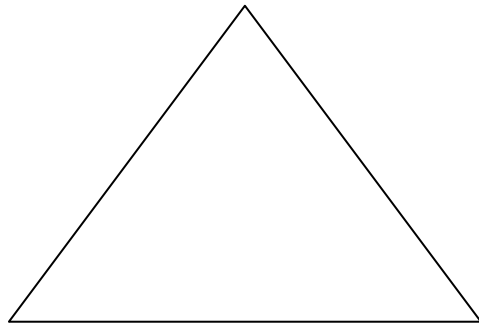
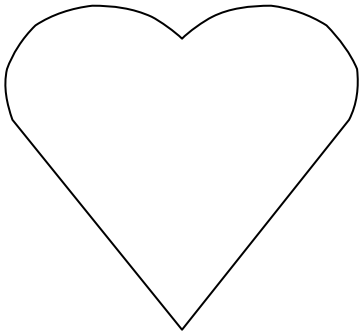
Name: _____

Instructions:

Draw the line(s) of symmetry for each image. (1 mark each line)

Total: _____
15

1.



Draw your own object and indicate the line or lines of symmetry:

2.

a)

b)

c)

d)

e)

3. Go for a walk outside. Pick out two symmetrical animals or plants you see and draw them below. Include their lines of symmetry.

I.

II.

Mathematical Terms:

- 1) **Reflective Symmetry:** _____

- 2) **Line of Symmetry:** _____

- 3) **Cardinal Directions:** _____

- 4) **Reflection:** _____

- 5) **Elements of Design:** _____

- 6) **Texture:** _____

- 7) **Artistic Effect:** _____

- 8) **Viewer's Senses:** _____

- 9) **Rotation:** _____

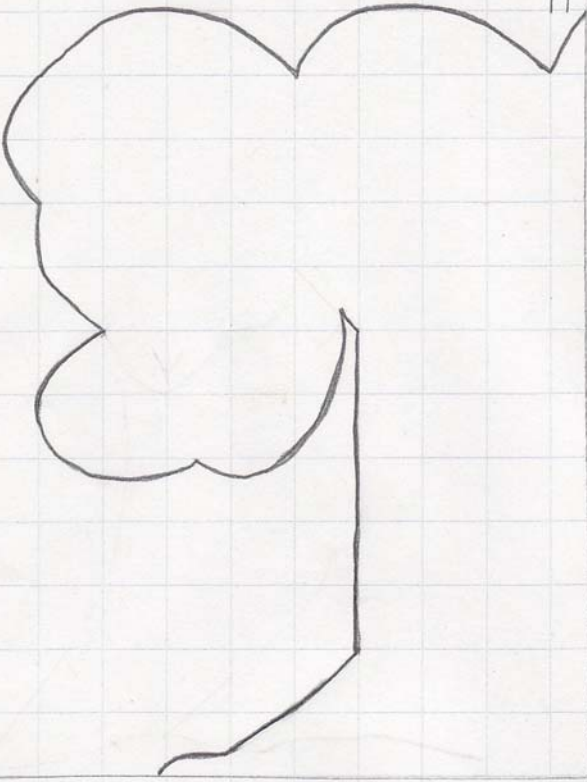
- 10) **Translation:** _____

- 11) **Quadrant:** _____

APPLICATION

1. Use one of the following mathematical transformations to transform the image given below. Ensure that your image begins in one cardinal position and will end in a different cardinal position. You may rotate, reflect or translate your object as you wish.
2. When you have completed this part of the assignment, cut out your finished project along the black line and glue it to the paper provided.
3. Using the element of design and the materials provided complete a finished product that appeals to your audience's senses.

Title



Exemplars:

THINKING

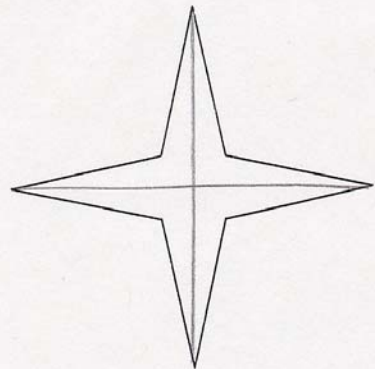
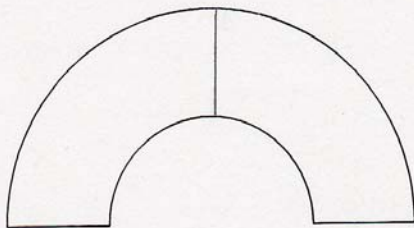
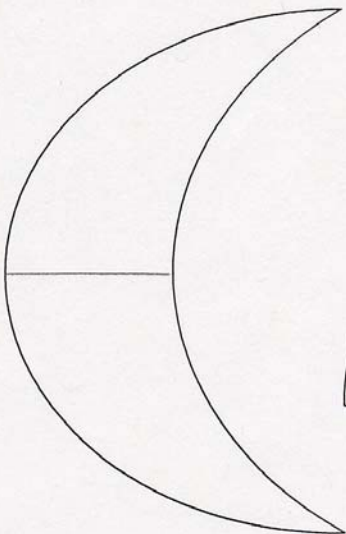
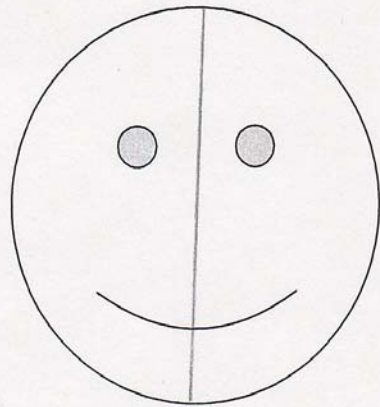
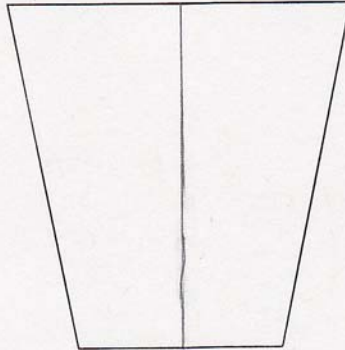
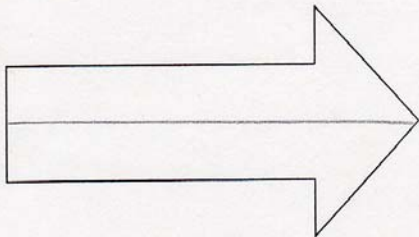
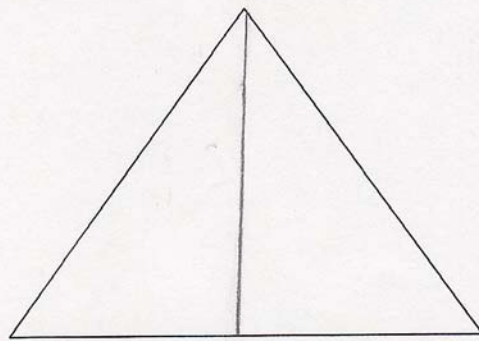
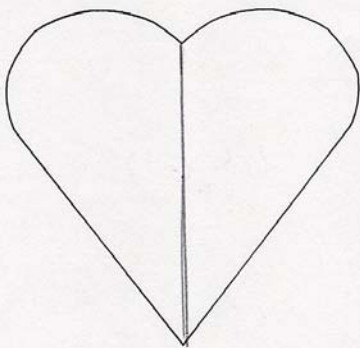
Name: _____

Instructions:

Draw the line(s) of symmetry for each image. (1 mark each line)

Total:
15

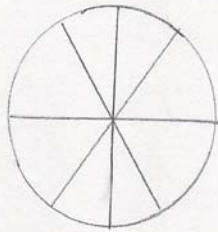
1.



Draw your own object and indicate the line or lines of symmetry:

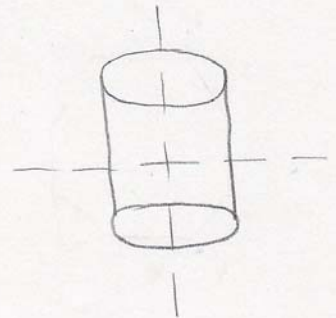
2.

a)



many more possibilities

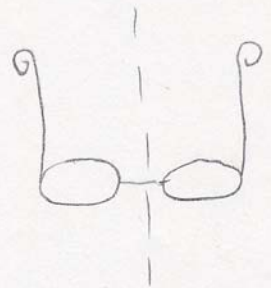
b)



c)



d)

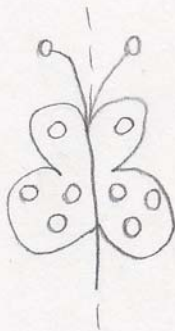


e)

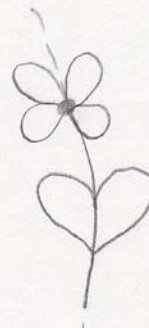


3. Go for a walk outside. Pick out two symmetrical animals or plants you see and draw them below. Include their lines of symmetry.

I.



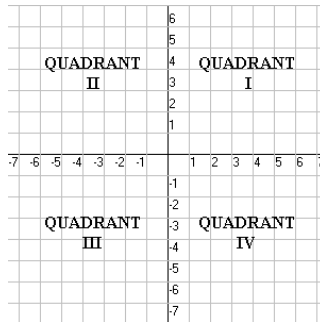
II.



Definitions:

- 1) **Reflective Symmetry:** One half of an object is a reflection of the other half. When one half of the shape reflects onto the other half across the line of symmetry.
- 2) **Line of Symmetry:** The line of symmetry is an object's point of reflection.
- 3) **Cardinal Directions:** A cardinal point on a compass: there are four directions: north, east, west and south. These directions are used in travel.
- 4) **Reflection:** A reflection is the act of picking up a shape/object and turning it over. The image will show the exact opposite of the beginning image. You can also reflect a shape across a line of symmetry.
- 5) **Elements of Design:** The components the artist uses to create their art work. For example: shape, colour and texture.
- 6) **Texture:** The visual and tactile quality of a surface. Different examples include: rough, smooth, shiny, sticky, wet....
- 7) **Artistic Effect:** Creating a specific meaning, illusion, and impression for the artist's audience.
- 8) **Viewer's Senses:** The goal of your artistic design is to appeal to the viewer's five senses: hearing, sight, touch, smell and taste to create a long lasting effect.

- 9) **Rotation:** A rotation around a turning point. a clockwise or direction between 90 –



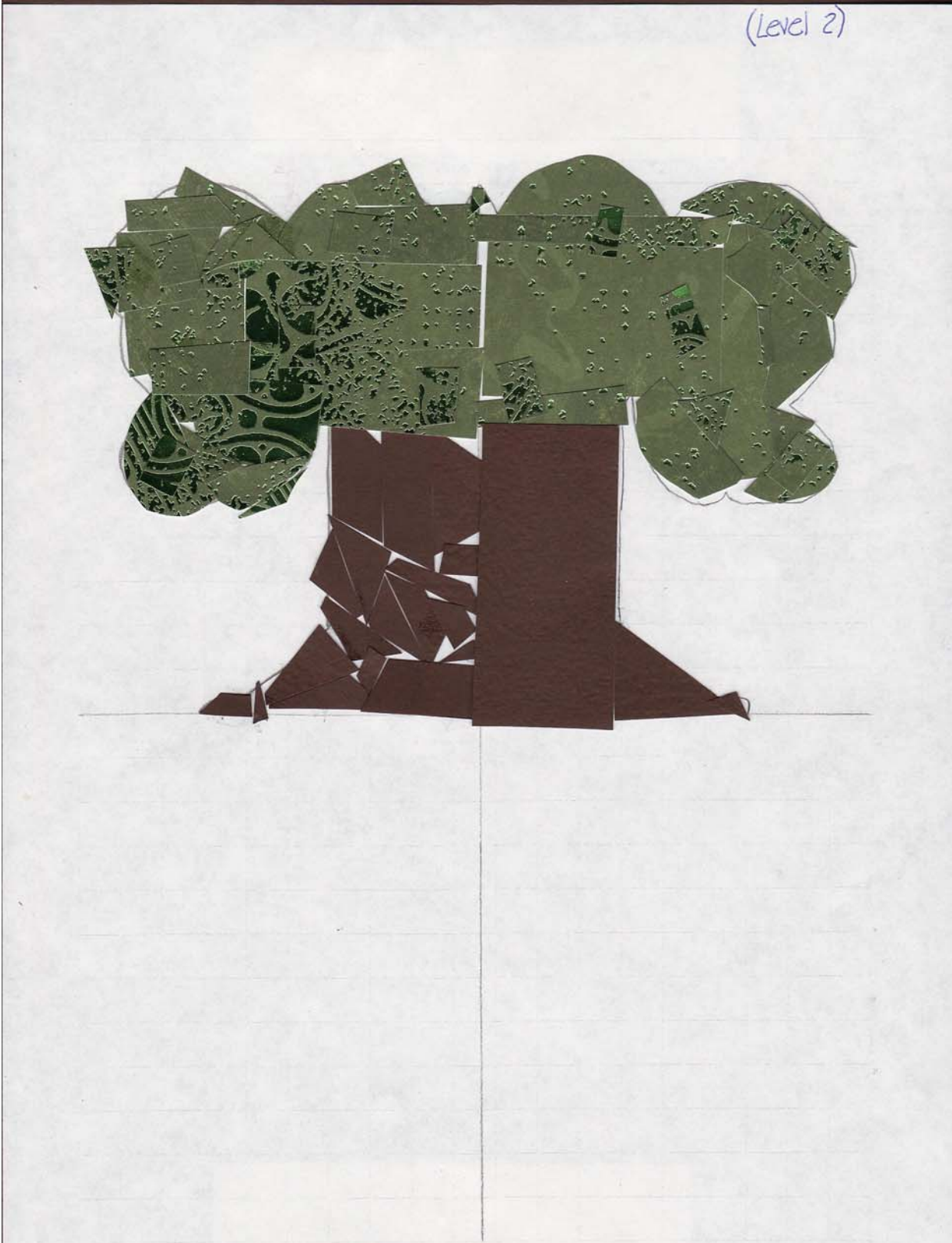
moves an object in a circle
An object can be turned in
counterclockwise
360 degrees.

- 10) **Translation:** A translation up, down or diagonally, direction in which the

moves a shape left, right,
without changing the
object began.

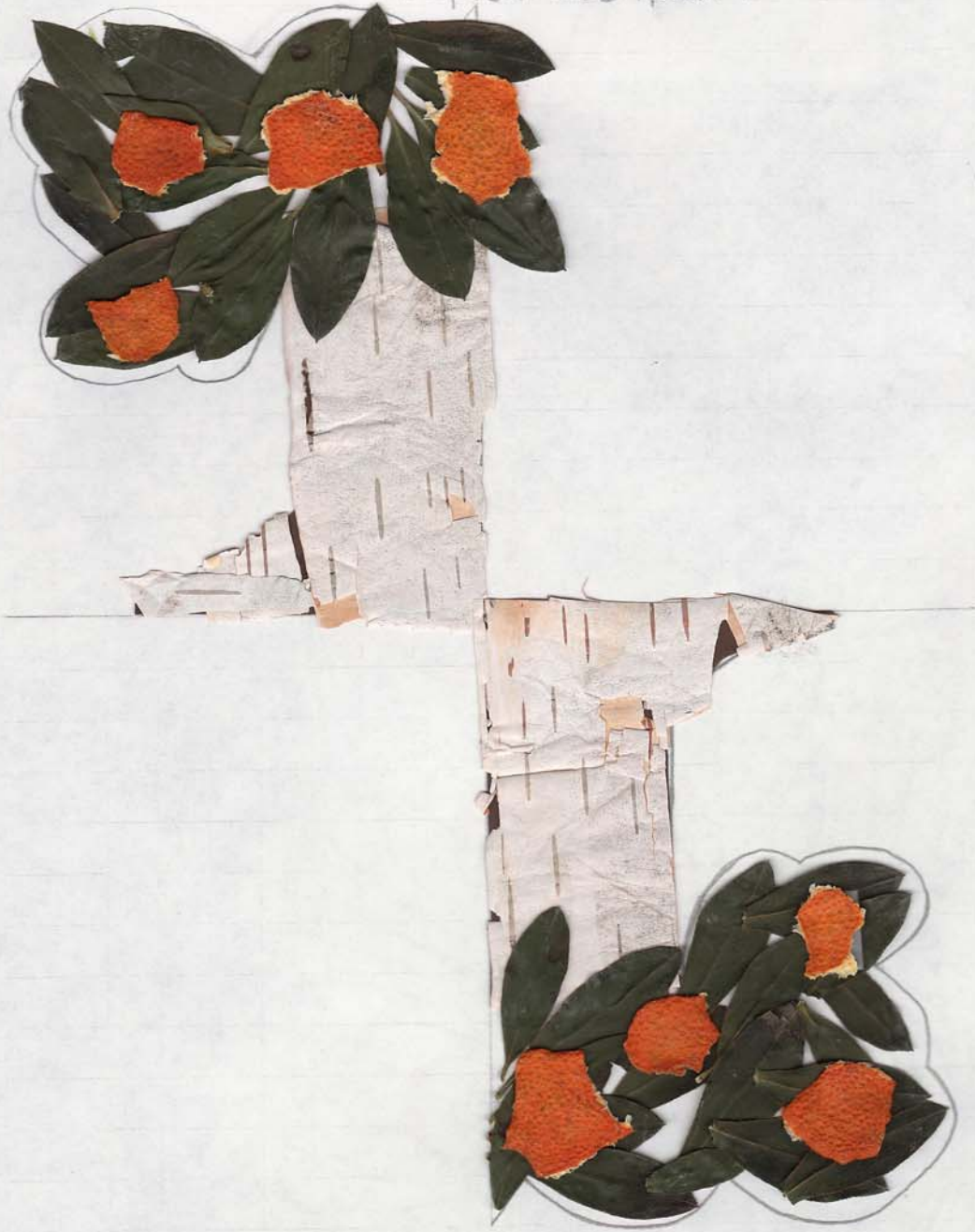
- 11) **Quadrant:** One of the four areas that a surface is divided as indicated by two perpendicular lines. Quadrants are labeled from the upper right hand corner in a counterclockwise motion.

Application:



Tropical Tree Rotation

(Level 4)



Communication:**Level 2:**

In order to achieve my final product, I reflected my shape over the line, and moved one cardinal direction. I decorated my figure with green and brown paper, which feels different. The brown was used for the trunk of the tree and the green pieces are the leaves.

Level 4:

In order to arrive at the final product, I rotated the figure over the line of symmetry and moved it two cardinal directions, arriving at the South-East location. In order to appeal to the viewer's senses I chose many different textured materials. The artistic effect I was trying to accomplish was that of a tropical fruit tree. With this in mind I used plants leaves, tree bark and orange peel. The bark I used was a lighter colour to make my tree look more like a palm tree. I used longer leaves off of a plant so the tree would look like it had palm branches. I paid careful attention to make sure my figure stayed within the appropriate quadrant and kept its reflective symmetry.

Rubric:

Transformations and Elements of Design KUDRIC

Name: _____

Criteria	Level 4	Level 3	Level 2	Level 1
Understanding of concepts construct 2-D shapes with one line of symmetry	demonstrates exemplary ability to construct 2-D shapes with one line of symmetry	demonstrates considerable ability to construct 2-D shapes with one line of symmetry	demonstrates some ability to construct 2-D shapes with one line of symmetry	demonstrates limited ability to construct 2-D shapes with one line of symmetry
demonstrate an understanding of coordinate systems	demonstrates an exemplary understanding of coordinate systems	demonstrates a considerable understanding of coordinate systems	demonstrates an adequate understanding of coordinate systems	demonstrates a limited understanding of coordinate systems
demonstrate knowledge of topic	demonstrates thorough knowledge of topic	demonstrates considerable knowledge of topic	demonstrates some knowledge of topic	demonstrates limited knowledge of topic
understand key concepts in transformational geometry	demonstrates exceptional understanding of key concepts in transformational geometry	demonstrates considerable understanding of key concepts in transformational geometry	demonstrates some understanding of key concepts in transformational geometry	demonstrates limited understanding of key concepts in transformational geometry
select and use correctly, the most appropriate tools, materials, and techniques	consistently selects the most appropriate tools, materials, and techniques, and uses them correctly	often selects the most appropriate tools, materials, and techniques, and uses them correctly	occasionally selects the most appropriate tools, materials, and techniques, and uses them correctly	rarely selects the most appropriate tools, materials, and techniques, and uses them correctly
define and use the elements of design	defines and uses the elements of design with excellent success	defines and uses the elements of design with considerable success	defines and uses the elements of design with some success	defines and uses the elements of design with assistance
Thinking/Performance and Creative Work	always or almost always applies knowledge of topic to task	often applies knowledge of topic to task	sometimes applies knowledge of topic to task	rarely applies knowledge of topic to task
apply knowledge of topic to task	demonstrates an exceptional ability to organize art works to create a specific effect	demonstrates a considerable ability to organize art works to create a specific effect	demonstrates an adequate ability to organize art works to create a specific effect	demonstrates a limited ability to organize art works to create a specific effect
organize art works to create a specific effect	communicates information and details with excellent clarity	communicates information and details with good clarity	communicates information and details with some clarity	communicates information and details with limited clarity
Communication	explains a concept with excellent clarity	explains a concept with good clarity	explains a concept with some clarity	explains a concept with limited clarity
communicates information detailing the procedure	consistently uses vocabulary and art terminology correctly	often uses vocabulary and art terminology correctly	occasionally uses vocabulary and art terminology correctly	rarely uses vocabulary and art terminology correctly
explain a concept	uses vocabulary and art terminology correctly	often uses vocabulary and art terminology correctly	occasionally uses vocabulary and art terminology correctly	rarely uses vocabulary and art terminology correctly
Application	applies translations, reflections, and rotations with excellent success	applies translations, reflections, and rotations with considerable success	applies translations, reflections, and rotations with some success	applies translations, reflections, and rotations with limited success
apply translations, reflections, and rotations	thoroughly describes the effect of a translation, reflection, and rotation	competently describes the effect of a translation, reflection, and rotation	adequately describes the effect of a translation, reflection, and rotation	briefly describes the effect of a translation, reflection, and rotation
describe the effect of a translation, reflection, and rotation	explores transformations of geometric figures with exemplary success	explores transformations of geometric figures with considerable success	explores transformations of geometric figures with some success	explores transformations of geometric figures with assistance
explore transformations of geometric figures	always or almost always interprets and presents information using appropriate terms	usually interprets and presents information using appropriate terms	sometimes interprets and presents information using appropriate terms	rarely interprets and presents information using appropriate terms
interpret and present information using appropriate terms				

Overall Assessment _____/20%

Reflection

We found it difficult to match art expectations and math expectations when we started out on this assignment. The art expectations were very limited, in that there wasn't very much you could do with them. We finally chose texture because we knew that students would be able to find real life, accessible objects to use in their project. We liked how this activity incorporated numerous expectations from two curriculums. It was fun to come up with a project that would extend over a period of weeks and challenge the students in various areas. We also liked how it enabled each student to think outside the box, and change a tree in whichever way they could. Making the rubric was a very difficult task. It was challenging to merge two different lists of expectations and not have an overwhelming rubric to mark each student with. We found this to be the most difficult part of the assignment. Doing the activity was great fun! It showed us how much fun math can be, especially when you allow your creative juices to flow. An assignment of this nature would show students the applicability of math to other subject areas and life in general. It is also beneficial to students that dislike math, because they get to experience it in a different format. This type of assignment might trigger an interest in math for students that look at math in a negative way. This type of assignment is certainly a fantastic way to draw in students!

Shelley Heaphy's Assessment by Lauren Delahunt

Shelley and I completed the project together in a format that left no room individual slacking. We collaborated to successfully develop a final product equally representative of our efforts. Shelley worked hard to follow the outlined expectations as indicated on the rubric to produce a product representative of the level chosen for our exemplar. Shelley was a joy to work with and should receive a mark of 20 to reflect her contributed efforts.

Lauren Delahunt's Assessment by Shelley Heaphy

Lauren worked very collaboratively with me on this assignment. We completed the entire assignment together, including the reflection. Lauren made it very easy to get together to work on this assignment, which makes it more effective in terms of ensuring that we've met all the criteria for this assignment. She and I each completed one exemplar; she followed the rubric accurately to ensure that her exemplar displayed exactly what it needed to be a level four example. Because of the hard work and dedication that Lauren put into this assignment I would like her to receive 20 out of 20 for her assessment grade.