Coordinate Graphing / Geometry Project

**The purpose**: The following activities allow students to demonstrate their understanding of the coordinate system and apply that knowledge to various geometric concepts. This portfolio will enable the Honor student to apply, analyze, evaluate and create a product demonstrating their understanding of middle school math and bring it into the next level, High School Geometry.

**Procedure:** The student will complete all 9 activities. They must graph all activities on regular sized graph paper and answer all questions connected with each activity. Answers must be in complete sentences and in appropriate mathematical terms. Each graph must be drawn using a ruler or straight edge and must be colored.

**Grade:** This packet will be graded in **two parts** according to the grade sheet included in the packet. It will also be submitted in two parts. This portfolio will count as a Test grade for the student. There will be a 5 point deduction for each late school day. The portfolio will be accepted early.

**The Final Project is due\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

*By signing below you have read and understand the directions and expectations of this project. You agree to work to the best of your ability and submit all work by the date written above.*

**Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Key:

Questions: 3 points – Answered all questions accurately.

 2 points – Answered more than half of the questions

 1 point – Answered less than half of the questions or did not answer them at all.

Accuracy: 3 points – Points were graphed correctly.

 2 points – Points were graphed partially accurate

 1 point – Points were graphed incorrectly.

Color: 3 points – Colored all geometric figures and used a straight edge.

 2 points – Only outlined all geometric figures and used a straight edge

 1 point – Only outlined all geometric figures and did not use a straight edge

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| --- | --- | --- | --- | --- |
|  | Questions | Accuracy | Color | Total |
| 1. King Tut(Dilation) |  |  |  |  |
| 2. Your Logo(Dilation) |  |  |  |  |
| 3. Slides(Translation) |  |  |  |  |
| 4. Your Logo(Translation) |  |  |  |  |
| 5. Trapezoid(Reflection) |  |  |  |  |
| 6. Your Logo(Reflection) |  |  |  |  |
| 7. Arrow(Rotation) |  |  |  |  |
| 8. Your Logo(Rotation) |  |  |  |  |
| Part 1- Subtotal |  |  |  |  |
| Writing Component | Has an introduction, body and conclusionPaper has good flow with no grammar errors5 | Has an introduction, body and conclusion. Paper has good flow with many grammar4 errors | Has an introduction, body and conclusion. Paper has no flow and many grammar errors3 | Other |

 Total Points\_\_\_\_\_\_\_\_\_\_\_

Letter Grade\_\_\_\_\_\_\_\_\_\_\_

Dilation – Activity 1: King Tut

1. Use the graph paper vertically. Put the origin in the center
2. Plot and label these points.

A = ( 1, 5 ) B = ( 7, -2 ) C = ( 4, -3 ) D = ( -4, -3 ) E = (-1, -2 )

1. Make solid lines $\overbar{AB}$, $\overbar{AC}$, $\overbar{BC}$, $\overbar{CD}$ and $\overbar{AD}$
2. Make dashed lines $\overbar{AE}$, $\overbar{DE}$ and $\overbar{EB}$
3. Dilate each coordinate of A, B, C, D, E by a scale factor of 2 to get new points A’, B’, C’, D’ and E’. *Remember* ( x, y ) = ( 2x, 2y )

 Rewrite as points: A’ = ( , ) B’= ( , ) C’ = ( , ) D’ = ( , ) E’= ( , )

1. Plot and label A’, B’, C’, D’ and E’ on the same graph.

7. Make solid lines: $\overbar{A’B’}$, $\overbar{A’C’}$,$\overbar{ B’C’}$, $\overbar{C’D’}$ and $\overbar{A’D’}$

8. Make dashed lines: $\overbar{A’E}$’, $\overbar{D’E’}$ and $\overbar{E’B’}$

9. How does the two graphs compare?

10. What did the scale factor of 2 do to the original image?

11. Are they proportional or congruent? Explain.

Activity 2: Create Your Own Dilation

1. Set up an x-axis and y-axis on your graph paper

1. Draw a logo of your own on your graph paper. (minimum 5 points)
2. Make a list of the ordered pairs necessary to create your design. Be sure to include directions that indicate where it is necessary to lift the pencil and where it is necessary to connect each point to the next one in the order that you have them listed.
3. Dilate your points with a growth, locate and label (show your work). Your scale factor is \_\_\_\_\_
4. Color your design.

Activity 3: Translations: Sliding Trapezoids

1. Use the graph paper horizontally. Put the origin in the center. Locate these points.

A = (-4, -2), B = (-2, 2), C = (1, 2), D = (5, -2)

Connect ABCDA. The figure you his called a Trapezoid.

1. Add 10 to each x-coordinate and 5 to each y-coordinate

Rewrite points A’ = ( , ), B’ = ( , ), C = ( , ) and D = ( , )

1. Locate A’B’C’D’ and connect to make a trapezoid
2. Draw a straight arrow from A to A’. How far over and how far up is it from A to A’?
3. Add 10 to each x-coordinate and subtract 5 from each right-hand coordinate in the original set of points.

Rewrite points A” = ( , ), B” = ( , ), C” = ( , ) and D” = ( , )

1. Locate A”B”C”D” and connect to make a trapezoid
2. Draw an arrow from A to A”. How far over and down is tit from A to A”?
3. What type of motion will move the trapezoid ABCD onto A”B”C”D”
4. Suppose you wanted to move the original trapezoid eight units to the right and twelve units up. With out drawing it, give the coordinates of the vertices.

A’” = ( , ), B’” = ( , ), C’” = ( , ), D’” = ( , )

1. Are they proportional or congruent? Explain.

Activity 4: Create Your Own Translation

1. Set up an x-axis and y-axis on your graph paper

1. Draw your logo on your graph paper. (minimum 5 points)
2. Make a list of the ordered pairs necessary to create your design. Be sure to include directions that indicate where it is necessary to lift the pencil and where it is necessary to connect each point to the next one in the order that you have them listed.
3. Translate your points to the right 5 units and down 3 units, locate and label (show your work).
4. Translate your points to the left 5 units and up 3 units, locate and label (show your work).
5. Color your design.

Activity 5: Reflection Trapezoid

1. Use the graph paper vertically. Put the origin in the center. Locate these points.

A= ( 3, 3 ), B= ( 5, 7 ), C= ( 8, 7) and D= (12, 3 )

Connect ABCDA to make a trapezoid.

1. Reflect over the y-axis by multiplying each x-coordinate by -1 to get A’, B’, C’, D’

A’= ( , ), B’= ( , ), C’= ( , ) and D’= ( , )

Locate these points and connect them to make a trapezoid.

How is this trapezoid related to the one you made in part 1?

1. Reflect over the x-axis by multiplying each y-coordinate in A, B, C, D by -1 to get new points

A”= ( , ), B”= ( , ), C”= ( , ) and D”= ( , )

Locate these points and connect them to make a trapezoid.

How this trapezoid is is related to the one you made in part one?

1. Reflect over the origin by multiplying both the x- coordinate and y-coordinate in part 1 by -1 to get new points:

A’”= ( , ), B’”= ( , ), C’”= ( , ) and D’”= ( , )

Locate these points and connect them to make a trapezoid.

How is this trapezoid related to the one you made in part 2?

1. Are they proportional or congruent? Explain.

Activity 6 –Create your own Reflection

1. Set up an x-axis and y-axis on your graph paper.
2. Draw your own logo on your graph paper.. (minimum 5 points)
3. Make a list of the ordered pairs necessary to create your design. Be sure to include directions that indicate where it is necessary to lift the pencil and where it is necessary to connect each point to the next one in the order that you have them listed.
4. Reflect your points over the y-axis, locate and label (Show your work).
5. Reflect your points over the x-axis locate and label. (Show your work).

6. Color your design.

Activity 7: Rotations- Arrow

1. Use the graph paper vertically. Put the origin in the center of the paper.
2. Locate these points: A = ( 0, 0 ), B = ( 5 , 10 ), C = ( 5 , 4 ), D = ( 4, 6 ) and E = ( 1, 0 )

Connect ABCDE to make an arrow.

1. Rotate 900 by switching your x-coordinate with your y-coordinate and multiplying your new x-coordinate by a negative one. **Notation ( x, y) → ( -y, x )**

A’ = ( , ), B’ = ( , ), C’ = ( , ), D’ = ( , ) and E’ = ( , )

1. How is this one related to the original?
2. Rotate 1800 by switching your x-coordinate with your y-coordinate and multiplying your new x-coordinate by a negative one. Notation ( x, y) → ( -x, -y )

A” = ( , ), B” = ( , ), C” = ( , ), D” = ( , ) and E” = ( , )

1. How is this one related to the original?
2. How would you rotate the figure 2700? ( Try to graph it and analyze the two sets of points Notation ( x, y) → ( y , -x )

A’” = ( , ), B’” = ( , ), C’” = ( , ), D’” = ( , ) and E’”= ( , )

1. How is this one related to the original?
2. Are they proportional or congruent? Explain.

Activity 8 –Create your own Rotation

1. Set up an x-axis and y-axis on your graph paper.
2. Draw a design on your graph paper. (minimum 5 points)
3. Make a list of the ordered pairs necessary to create your design. Be sure to include directions that indicate where it is necessary to lift the pencil and where it is necessary to connect each point to the next one in the order that you have them listed.
4. Rotate your points 900, locate and label (Show your work).

5. Color your design.

Pt. 2 Writing Component

**Reflection of concept:**

You are going to write a reflection on the math content of this project:

Compare and contrast two different types of transformations. Give your opinion on which one was more challenging and explain in detail, why it was more challenging.