MATH 8: Week of May 18

- Go through the slides (notes) and work through the examples on a separate piece of paper.
- Do the given practice problems.
- Check your answers with the key given (last slide).
- Take a photo or scan in your work and submit it in Google Classroom. If you have questions or would like feedback on your work, add that as a comment with your submitted work.
- The other option for turn in is to send it in on Monday when the new packet is available.
- Check your school email/google calendar for online help sessions via Zoom.

Day 1: Slides 2-7	Day 3: Slides 17-23
Day 2: Slides 8-16	Answers on Slide 24

Day 1: Lesson 3-O

Transformations & Congruence

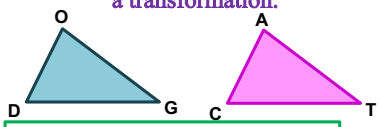
Target: Understand the relationship between the pre-image and the image of a transformation.

Vocabulary

Congruent

Two figures are congruent if they are the exact same shape and the exact same size.

△DOG ≅ △CAT

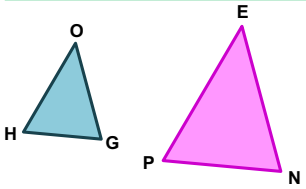


△DOG ≅ △CAT is read "triangle D-O-G is congruent to triangle C-A-T."

Similar

Two figures are similar if they are the same shape but different sizes.

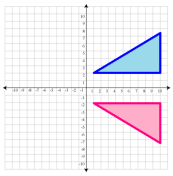
△HOG *is similar to* △PEN



Congruence & Similarity with Transformations

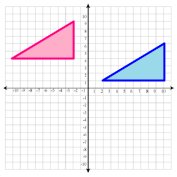
Reflection

The pre-image and its image are congruent.



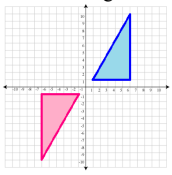
Translation

The pre-image and its image are congruent.



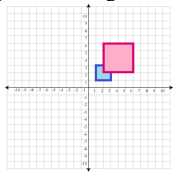
Rotation

The pre-image and its image are congruent.



Dilation

The pre-image and its image are similar.



Example 1

State the type of transformation described using each transformation rule. Then state if the image will be congruent or similar to its pre-image.

a. $(x, y) \rightarrow (x-3, y+4)$

x – 3 means shifting left 3 units and y + 4 means shifting up 4 units.

This is a TRANSLATION. Translations form CONGRUENT figures.

b. $(x, y) \rightarrow (4x, 4y)$

A transformation that multiplies the coordinates of a figure by a scale factor (in this case, 4) is a DILATION. Dilations form SIMILAR figures.

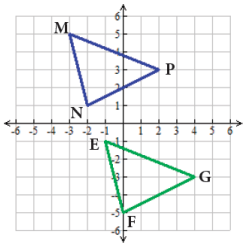
Example 2

ΔEFG was formed by a single transformation of ΔMNP.

a. Are ΔEFG and ΔMNP congruent or similar?

b. Write a translation rule that maps ΔMNP onto ΔEFG.

a. ΔEFG and ΔMNP are congruent because they are the same shape and same size.



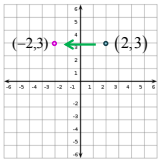
b. ΔMNP is moved 2 units to the right and 6 units down to make ΔEFG.

$(x, y) \rightarrow (x+2, y-6)$

Transformation Rules

Reflection over the y-axis

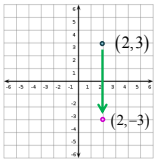
The x-coordinate changes sign.



$(x, y) \rightarrow (-x, y)$

Reflection over the x-axis

The y-coordinate changes sign.



$(x, y) \rightarrow (x, -y)$

Dilation

Shown by multiplying the x- and y-coordinates by the scale factor.

Examples: scale factor of 5 $(x, y) \rightarrow (5x, 5y)$

scale factor of $\frac{1}{2}$ $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

Day 1: LO Practice Problems:

Write the transformation rule for each transformation described below.

1. A translation 2 units right.
2. A reflection over the *x*-axis.
3. A dilation with a scale factor of 0.75.
4. A reflection over the *y*-axis.
5. A translation 3 units left and 1 units up.
6. A dilation with a scale factor of 5.

Describe the transformation given by each rule. State whether the transformation creates similar or congruent figures.

7. $(x, y) \rightarrow (x + 2, y + 5)$
8. $(x, y) \rightarrow (x, -y)$
9. $(x, y) \rightarrow ()$
10. $(x, y) \rightarrow (x - 1, y - 7)$

11. Rachelle was asked to create an image that had a scale factor of 1.5 compared to its pre-image. She predicted that the resulting figure would be congruent to her original shape. Do you agree or disagree? Explain your answer.

12. Write a transformation rule that creates an image that is congruent to its pre-image.

13. Write a transformation rule that creates an image that is similar, but not congruent, to its pre- image.

End Day 1

Day 2: Lesson 3-P

Composition of Transformations

Target: Perform multiple transformations on a figure including a combination of reflections, rotations, translations and dilations.

Vocabulary

Composition of Transformations

A series of transformations that maps one figure onto the other.

Composition of Transformations

A series of transformations.

Good to Know!

- ✓ The transformations that are included in the sequence will determine whether or not the image is similar or congruent to the original figure.
- ✓ If a dilation occurs on a figure during a transformation sequence, the image will be similar to the pre-image.
- ✓ Any combination of translations, reflections and rotations will create an image that is congruent to the original figure.
- ✓ On a coordinate plane, you can prove two figures are similar or congruent if you can write a sequence of transformations that maps one figure onto the other.

Example 1

Use the triangle formed by the points H(−2, 4), K(1,2) and J(0, −3).

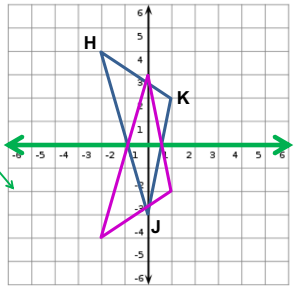
a. Graph ΔH'K'J' by reflecting ΔHKJ over the *x*-axis and then following the translation rule $(x, y) \rightarrow (x - 4, y + 3)$.

Graph the original figure, ΔHKJ

Reflection over the *x*-axis is $(x, y) \rightarrow (x, -y)$.

Use the transformation rule to identify the coordinates of ΔHKJ after it is reflected.

$H(-2,4) \rightarrow (-2,-4)$
$K(1,2) \rightarrow (1,-2)$
$J(0,-3) \rightarrow (0,3)$



Example 1 Continued…

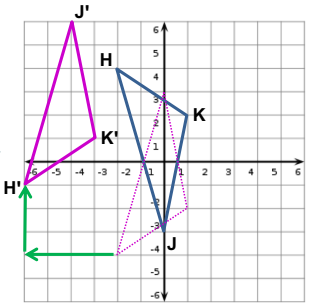
Use the triangle formed by the points H(−2, 4), K(1,2) and J(0, −3).

a. Graph ΔH'K'J' by reflecting ΔHKJ over the *x*-axis and then following the translation rule $(x, y) \rightarrow (x - 4, y + 3)$.

Translation 4 left and up 3.
$(x, y) \rightarrow (x - 4, y + 3)$

Use the transformation rule to identify the coordinates of ΔHKJ after it is translated.

$(-2,-4) \rightarrow H'(-6,-1)$
$(1,-2) \rightarrow K'(-3,1)$
$(0,3) \rightarrow J'(-4,6)$

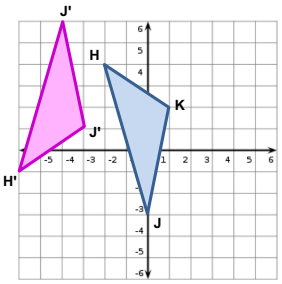


Example 1 Continued…

Use the triangle formed by the points H(−2, 4), K(1,2) and J(0, −3).

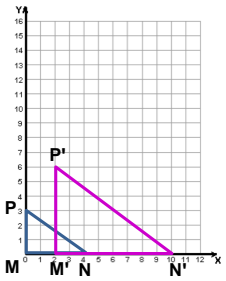
b. Are the figures congruent or similar to each other? How do you know?

The figures are congruent because ΔH'K'J' is a result of two transformations (reflection and translation) on ΔHKJ. This series of transformations creates congruent images.



Example 2

Write a series of two transformations that shows ΔMNP is similar to ΔM'N'P'.



The triangle appears to be enlarged and shifted to the right. This can be done using a dilation and a translation.

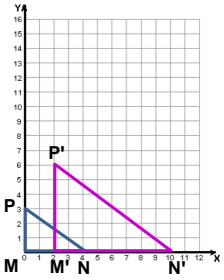
Different combinations of transformations in different orders could create this movement, but one of them must be a dilation.

Record the original coordinates.

M(0, 0), N(4, 0), P(0, 3)

Example 2 Continued…

Write a series of two transformations that shows ΔMNP is similar to ΔM'N'P'.



The image appears to be larger. Find the scale factor using corresponding sides of ΔMNP and ΔM'N'P'.

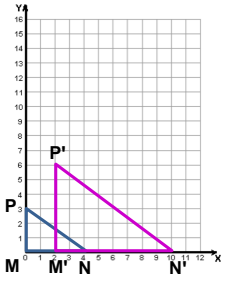
$$\frac{M'N'}{MN} = \frac{8}{4} = 2$$

Multiply each vertex of ΔMNP by a scale factor of 2.

$(x, y) \rightarrow (2x, 2y)$

Example 2 Continued…

Write a series of two transformations that shows ΔMNP is similar to ΔM'N'P'.



The point at the origin is shifted 2 units to the right. Add 2 units to each *x*-coordinate for a translation rule of $(x, y) \rightarrow (x + 2, y)$

M'(2, 0), N'(10, 0), P'(2, 6)

Since these points match ΔM'N'P' on the graph above, the series of transformations maps ΔMNP onto ΔM'N'P'.

dilation $(x, y) \rightarrow (2x, 2y)$

translation $(x, y) \rightarrow (x + 2, y)$

The two figures are similar (not congruent) because a dilation was part of the transformation sequence that made the triangle larger.

Day 2: L3-P Practice Problems:

Use the point P(−6, 1). Write the ordered pair for the final location of the given point after completing the transformations in the order listed.

1. (x, y) → (x – 1, y + 3)
   Reflection over the x-axis

2. Reflection over the y-axis
   (x, y) → (x – 6, y)

3. Dilation with a scale factor of 4.
   (x, y) → (x + 7, y – 2)

4. 180° rotation clockwise about the origin
   Reflection over the x-axis
   Reflection over the y-axis

5. (x, y) → (x + 1, y + 4)
   (x, y) → (x – 5, y + 3)
   (x, y) → $(\frac{1}{2}x, \frac{1}{2}y)$

6. (x, y) → (x – 1, y – 1)
   (x, y) → (2.5x, 2.5y)
   Reflection over the y-axis

7. Which composition of transformations in Exercises #1-6 would form an image that is congruent to its pre-images? Explain how you know.

8. Write a series of two transformations that would form a similar but not congruent image. Explain how you can know the figures will be similar without graphing.

End Day 2

Day 3: DA Lesson 12

Five-Number Summaries of Data

Target: Find the five-number summary of data sets. Find the interquartile range (IQR) of data sets.

Vocabulary

Five Number Summary: Describes the spread of the numbers in a data set.

1st Quartile: Median of the lower half of the data.

3rd Quartile: Median of the upper half of the data.

Interquartile Range (IQR): The difference between the third quartile and first quartile in a set of data.

Five-Number Summary

- Minimum
- 1st Quartile (Q1)
- Median
- 3rd Quartile (Q3)
- Maximum

Interquartile Range

- The interquartile range (IQR) is the difference between the third quartile and the first quartile in a set of data.

IQR = Q3 – Q1

Example 1

Find the five-number summary of the data set.

24, 29, 30, 35, 39, 43, 45, 48, 48, 50

Min = 24 | Q1 = 30 | Median = 41 | Q3 = 48 | Max = 50

- Five-number summary: 24 ~ 30 ~ 41 ~ 48 ~ 50

Example 2

Find the five-number summary of the data set.

9, 10, 7, 19, 17, 8, 20, 12, 23

7, 8, 9, 10, 12, 17, 19, 20, 23

Min = 7 | Q1 = 8.5 | Median = 12 | Q3 = 19.5 | Max = 23

- Five-number summary: 7 ~ 8.5 ~ 12 ~ 19.5 ~ 23

Example 3

The following data lists the average points per game of members of Portland's Trail Blazers in 2006-2007.

2, 3.5, 3.8, 3.9, 4.8, 6.5, 7, 8.4, 8.9, 9, 12, 16.8, 23.6

Find the five-number summary for the data set.

- 2 ~ 3.85 ~ 7 ~ 10.5 ~ 23.6

Find the range and the interquartile range of the averages.

- Range: 23.6 – 2 = 21.6
- IQR: 10.5 – 3.85 = 6.65

Day 3: L12 Practice Problems:

Find the five-number summary for each data set.

1. 21, 22, 25, 26, 30, 32, 35

2. −6, −2, 4, 5, 10, 13, 13, 15, 20

3. 65, 72, 78, 80, 84, 87, 91, 98

4. 20, 22, 30, 16, 18, 20, 16, 26, 27, 28

Given the five-number summaries, find the interquartile range (IQR) for each data set.

5. 10 ~ 12 ~ 16 ~ 19 ~ 25

6. 66 ~ 79 ~ 89 ~ 92 ~ 100

7. 0 ~ 3 ~ 7 ~ 7 ~ 10

Day 3: L12 Practice Problems:

Use the given information to complete the following ordered data sets.

8. 20, ___, 27, 30, 31, 31, ___

Range = 14 IQR = 6

9. ___, 45, 47, 50, 51, ___, 56, 59

Range = 18 IQR = 9

10. ___, 69, 75, 78, 80, ___, 91, ___, 99

Range = 41 Q3 = 94 Mean = 81

11. ___, 73, ___, 74, ___, 81, ___, 96

Five-Number Summary:
71 ~ 73 ~ 77 ~ 83 ~ 96

End Day 3

Answer Page

Day 1:

1. $(x, y) \to (x + 2, y)$
2. $(x, y) \to (x, -y)$
3. $(x, y) \to (0.75x, 0.75y)$
4. $(x, y) \to (-x, y)$
5. $(x, y) \to (x - 3, y + 1)$
6. $(x, y) \to (5x, 5y)$
7. Translation right 2 units and up 5 units. Congruent.
8. Reflection over axis. Congruent.
9. Dilation centered at origin with a scale factor of $\frac{1}{2}$. Similar.
10. Translation left 1 unit and down 7 units. Congruent.
11. Disagree, the dilation will make a larger, similar shape.

Day 1:

12. Answers may vary. Must be a translation, reflection or rotation.
13. Answers may vary. Must be a dilation with scale factor ≠ 1.

Day 2:

1. (−7,−4)
2. (0, 1)
3. (−17, 2)
4. (−6, 1)
5. (−5, 4)
6. (17.5, 0)
7. # 1, 2, 4 … There are no dilations.
8. Answers may vary. Should include dilation.

Day 3:

1. 21 ~ 22 ~ 26 ~ 32 ~ 35
2. −6 ~ 1 ~ 10 ~ 14 ~ 20
3. 65 ~ 75 ~ 82 ~ 89 ~ 98
4. 16 ~ 18 ~ 21 ~ 27 ~ 30
5. 7
6. 13
7. 4
8. 25, 34
9. 41, 54
10. 58, 82, 97
11. 71, 73, 80, 85

MATH 8: FINAL SLIDE for this week!