

Unit 9 Transformations Homework 5

Dilations

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**** This is a 2-page document! ****

Directions: Graph and label each figure and its image under a dilation with the given scale factor. Assume all dilations use the origin as the center of dilation. Give the coordinates of the image.

1. Quadrilateral ABCD with vertices A(-4, 1), B(-3, 3), C(0, -2), and D(-5, -2): $k = 3$

$A'(-12, 3)$
 $B'(-9, 9)$
 $C'(0, -6)$
 $D'(-15, -6)$

2. Triangle LMN with vertices L(2, -8), M(12, 8), and N(14, -4): $k = \frac{1}{2}$

$L'(1, -4)$
 $M'(6, 4)$
 $N'(7, -2)$

3. Quadrilateral PQRS with vertices P(5, 15), Q(15, 10), and S(5, 10): $k = \frac{4}{5}$

$P'(4, 12)$
 $Q'(12, 8)$
 $R'(4, 8)$
 $S'(0, 8)$

4. Rhombus WXYZ with vertices W(2, -4), X(6, -4), Y(10, -4), and Z(6, -6): $k = \frac{3}{2}$

$W'(3, -6)$
 $X'(9, -6)$
 $Y'(15, -6)$
 $Z'(9, -9)$

5. Quadrilateral MNPQ with vertices M(-7, -4), N(-4, -7), O(-6, -7), and P(-6, -7): $k = 2$

$M'(-14, -8)$
 $N'(-8, -14)$
 $O'(-12, -14)$
 $P'(-12, -14)$

6. Trapezoid DEFG with vertices D(-5, 15), E(10, 10), F(10, 5), and G(-5, 0): $k = \frac{1}{5}$

$D'(-1, 3)$
 $E'(2, 2)$
 $F'(2, 1)$
 $G'(-1, 0)$

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Unit 9 Transformations Homework 5 Dilations: Mastering the Art of Scaling

Are you wrestling with Unit 9 Transformations, Homework 5, specifically the section on dilations? Feeling lost in a sea of scale factors and center points? Don't worry, you're not alone! This comprehensive guide breaks down the complexities of dilations, providing clear explanations, practical examples, and tips to help you conquer your homework and master this essential geometric concept. We'll walk you through the process step-by-step, ensuring you understand not just how to solve dilation problems, but why the methods work.

Understanding Dilations: The Basics

Before diving into the homework problems, let's solidify our understanding of dilations. A dilation is a transformation that changes the size of a figure, but not its shape. It's essentially an enlargement or reduction, centered around a specific point called the center of dilation. The scale factor determines the amount of enlargement or reduction.

Scale Factor (k): This number dictates the size change.

$k > 1$: The figure is enlarged (gets bigger).

$0 < k < 1$: The figure is reduced (gets smaller).

$k = 1$: The figure remains the same size (no change).

$k < 0$: The figure is enlarged or reduced and reflected across the center of dilation.

Center of Dilation: This is the fixed point around which the dilation occurs. All points of the original figure are scaled proportionally relative to this center.

Steps to Solve Dilation Problems

Solving dilation problems typically involves these key steps:

1. Identify the Center of Dilation: Locate the point specified as the center of the dilation.
2. Determine the Scale Factor: Calculate the scale factor (k) by comparing corresponding distances in the original figure and the dilated image. This often involves dividing the distance from the center of dilation to a point in the dilated image by the corresponding distance to the same point in the original figure.
3. Apply the Scale Factor: Multiply the coordinates of each point in the original figure by the scale factor. Remember to do this relative to the center of dilation; if the center is not the origin (0,0), you will need to adjust coordinates accordingly. This often involves translating the figure so that the center of dilation is at the origin, performing the dilation, and then translating back.
4. Plot the Dilated Image: Using the new coordinates calculated in step 3, plot the points of the

dilated image.

5. Connect the Points: Connect the points of the dilated image to form the complete dilated figure.

Common Mistakes to Avoid

Several common pitfalls can trip up students working on dilation problems. Let's address them proactively:

Incorrect Scale Factor Calculation: Double-check your calculations when determining the scale factor. A small error here can lead to significant inaccuracies in the final dilated image.

Ignoring the Center of Dilation: Remember that the dilation is performed relative to the center of dilation. Failing to account for this point will result in an incorrect dilated image.

Incorrect Coordinate Transformation: When the center of dilation is not at the origin, ensure you correctly translate the coordinates, perform the dilation, and then translate back.

Advanced Dilation Concepts

While Unit 9 Transformations Homework 5 might primarily focus on basic dilations, understanding more advanced concepts will improve your overall geometric reasoning:

Dilations of Geometric Shapes: Practice dilating various shapes, such as triangles, squares, and circles, to solidify your understanding of how dilations affect different geometric properties.

Composition of Transformations: Understanding how dilations interact with other transformations, such as translations, rotations, and reflections, is crucial for more advanced geometry problems.

Dilations and Similarity: Dilations create similar figures; they preserve the shape but change the size. Understanding this relationship is fundamental to many geometric proofs and theorems.

Practice Makes Perfect

The best way to master dilations is through practice. Work through numerous problems from your textbook, online resources, or create your own. The more you practice, the more comfortable you'll become with the concepts and techniques involved. Don't be afraid to seek help from your teacher, classmates, or online tutors if you encounter difficulties.

Conclusion

Successfully navigating Unit 9 Transformations Homework 5 on dilations requires a thorough understanding of scale factors, centers of dilation, and the steps involved in calculating and plotting dilated images. By carefully following the steps outlined above and practicing consistently, you can build your confidence and achieve mastery of this important geometric concept. Remember to identify potential pitfalls and use available resources to aid in your understanding.

FAQs

1. Can a dilation change the shape of a figure? No, a dilation only changes the size of a figure, not its shape. The dilated image is similar to the original figure.
2. What happens if the scale factor is negative? A negative scale factor indicates a dilation and a reflection across the center of dilation.
3. How do I handle dilations with centers of dilation not at the origin? You need to translate the figure so the center of dilation is at the origin, perform the dilation, and then translate it back to its original position.
4. Are there online resources that can help me visualize dilations? Yes, many online interactive geometry tools allow you to manipulate figures and visually see the effects of dilations.
5. What if I get a different answer than the answer key? Carefully review your calculations, ensuring you've correctly identified the scale factor and center of dilation. If the error persists, seek clarification from your teacher or tutor.

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