LESSON MAKER PRO

Same Shape, Different Size?

Compare what transformations keep and what they change.

HIGH SCHOOL · GDA.GM.D.21.b

GDA.GM.D.21.b "Compare transformations which preserve distance and angle measure to those that do not."

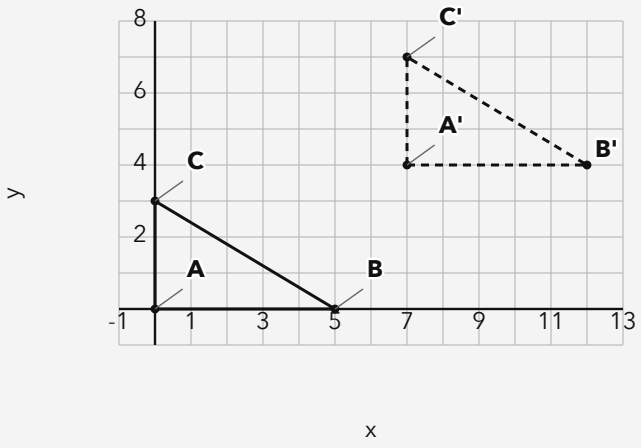
NAME _____ DATE _____

LENGTHS AND ANGLES

Translations, rotations, and reflections preserve every distance and angle measure. A dilation preserves angles, but it changes distances when its scale factor is not 1. To decide whether a transformation preserves both, compare matching sides and angles.

WORKED EXAMPLE

The solid triangle moves to the dashed triangle. Compare AB with A'B' and angle A with angle A'. Does this transformation preserve distances and angles?

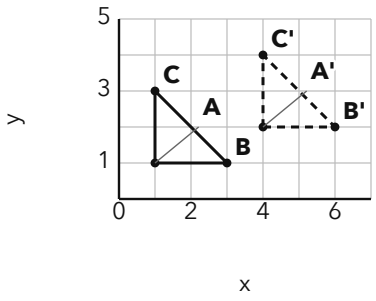


1. AB runs from x = 0 to x = 5, so AB = 5.
2. A'B' runs from x = 7 to x = 12, so A'B' = 5.
3. The sides at A are perpendicular, as are the sides at A'. Both angles measure 90°.

Answer: AB = A'B' = 5, and angle A = angle A' = 90°. The translation preserves distances and angles.

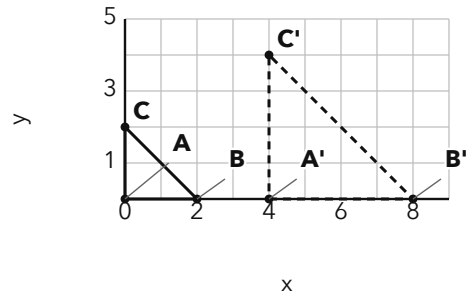
PRACTICE 6 problems

1 The solid triangle moves to the dashed triangle. Find AB and A'B'. Does this translation preserve distances and angles?



ANSWER _____

2 The dashed triangle is a dilation of the solid triangle. Find AB and A'B'. Are distances preserved? Are angles preserved?

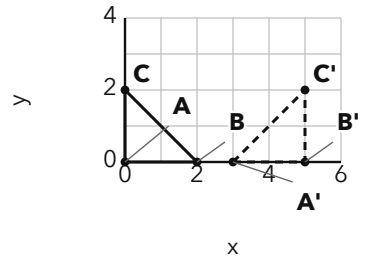


ANSWER _____

3 A 90° counterclockwise rotation sends (x, y) to (-y, x). Segment PQ has P(1, 2) and Q(1, 6). Find P' and Q'. Does the rotation preserve distances and angles?

ANSWER _____

4 Compare angle A in the solid triangle with angle A' in the dashed triangle. Is this a rigid transformation? Explain.



ANSWER _____

5 A shape is dilated by a scale factor of 3/2. One side is 8 cm long, and one angle measures 50°. Find the matching side length and angle measure after dilation. Does the dilation preserve both distances and angles?

ANSWER _____

6 Compare T(x, y) = (-x, y) with S(x, y) = (x, 2y). Which transformation preserves both distances and angles? Check by finding the image length of the segment from P(1, 1) to Q(1, 4) under each transformation.

ANSWER _____

APPLY IT Show your work

1 A designer enlarges a video thumbnail logo by a scale factor of 3/2. An edge is 12 pixels long, and an angle measures 60°. Find the matching edge length and angle measure in the enlarged logo. Does the enlargement preserve both distances and angles?

WORK SPACE

ANSWER _____

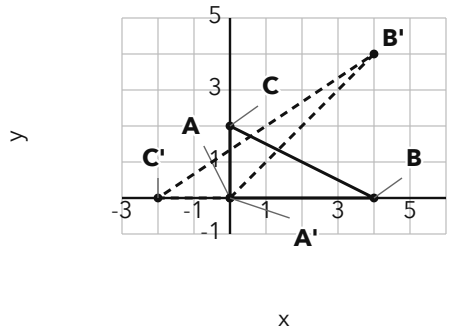
2 In a game, a portal moves every point on a map 6 units right and 2 units down. Two players start at (1, 3) and (1, 7). Find their new positions and their distance before and after the move. Does the portal preserve distances and angles?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The solid triangle becomes the dashed triangle. AC and A'C' have the same length. Is that enough to say the transformation preserves distances and angles? Compare AB with A'B', then compare angle A with angle A'.



WORK SPACE AND ANSWER

ANSWER KEY

Same Shape, Different Size?

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The solid triangle moves to the dashed triangle. Find AB and A'B'. Does this translation preserve distances and angles?	**AB = 2 and A'B' = 2. Yes, the translation preserves distances and angles.**
2	The dashed triangle is a dilation of the solid triangle. Find AB and A'B'. Are distances preserved? Are angles preserved?	**AB = 2 and A'B' = 4. Distances are not preserved; angles are preserved.**
3	A 90° counterclockwise rotation sends (x, y) to (-y, x). Segment PQ has P(1, 2) and Q(1, 6). Find P' and Q'. Does the rotation preserve distances and angles?	**P' = (-2, 1) and Q' = (-6, 1). Yes, the rotation preserves distances and angles.**
4	Compare angle A in the solid triangle with angle A' in the dashed triangle. Is this a rigid transformation? Explain.	**Angle A = 90° and angle A' = 45°. No, a rigid transformation must preserve angles.**
5	A shape is dilated by a scale factor of 3/2. One side is 8 cm long, and one angle measures 50°. Find the matching side length and angle measure after dilation. Does the dilation preserve both distances and angles?	**The matching side is 12 cm, and the angle is 50°. No, it preserves angles but not distances.**
6	Compare T(x, y) = (-x, y) with S(x, y) = (x, 2y). Which transformation preserves both distances and angles? Check by finding the image length of the segment from P(1, 1) to Q(1, 4) under each transformation.	**T preserves both. PQ = 3, its image under T is 3, and its image under S is 6.**

PART 2 · APPLY IT

1. **The edge is 18 pixels, and the angle is 60°. The enlargement preserves angles but not distances.** Multiply 12 by 3/2 to get 18. A dilation keeps angle measures unchanged.
2. **The new positions are (7, 1) and (7, 5). The distance is 4 units before and after; the translation preserves distances and angles.** Add 6 to each x-coordinate and subtract 2 from each y-coordinate. Both pairs of positions are 4 units apart vertically.

CHALLENGE

No. AB = 4, but A'B' = 4√2. Angle A = 90°, but angle A' = 135°. One matching side length does not show that all distances and angles are preserved.

Accept √32 for 4√2 in the challenge. A rigid transformation preserves every distance and angle, not just one matching side.