Congruent Figures

Investigate mistakes and missing measures

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Congruent figures have equal corresponding lengths and angles and can be matched by rigid motions. In $\triangle ABC \cong \triangle DEF$, the order pairs $A \leftrightarrow D$, $B \leftrightarrow E$, $C \leftrightarrow F$; thus $AB = DE$ and $\angle B = \angle E$. Similar figures can have scale factor $k \neq 1$, so equal shape alone does not establish congruence. Compare every stated correspondence, not just appearance.

Worked example

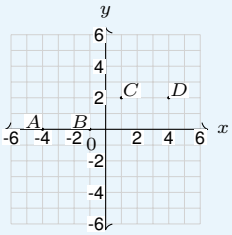
Segment AB has $A(-4, 0), B(-1, 0)$. Segment CD has $C(1, 2), D(4, 2)$. Show congruence using one translation.

1. The required change from A to C is $(1 + 4, 2 - 0) = (5, 2)$.

2. The same vector sends $B(-1, 0)$ to $(-1 + 5, 0 + 2) = (4, 2) = D$.

3. Both segments have length 3 units. One rigid motion matches both endpoints, so the segments are congruent.

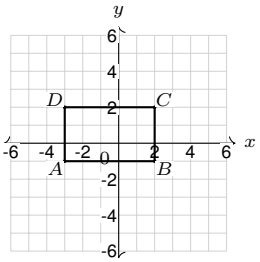
Answer: $(x, y) \mapsto (x + 5, y + 2)$; $AB \cong CD$.



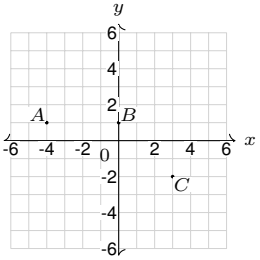
Practice Problems

Show your thinking.

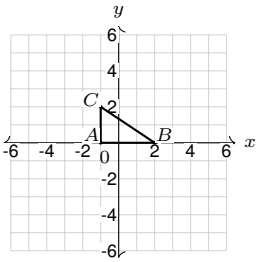
1. Mia says two rectangles are congruent because both have perimeter 16. Compare shown $ABCD$ with a 2 by 6 rectangle.



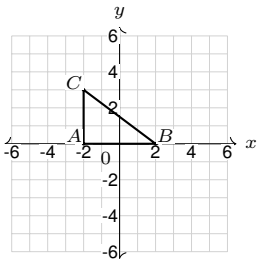
2. AB is congruent to a vertical segment CD with $C(3, -2)$ and $D(3, t)$, where $t > -2$. Find and plot D.



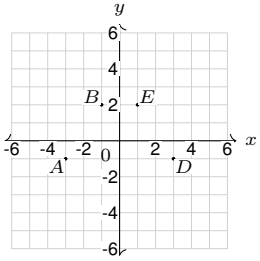
3. A student dilates the shown triangle by $k = 2$ and calls the image congruent. Use AB to evaluate the claim.



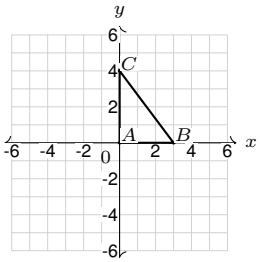
4. $\triangle ABC \cong \triangle XYZ$. A student pairs AB with YZ. Correct the pair and find XZ from the grid.



5. A reflection matches $A(-3, -1)$ to $D(3, -1)$ and $B(-1, 2)$ to $E(1, 2)$. Identify the axis and check both pairs.



6. Two right triangles have corresponding legs $3, 4$ and $3, 5$. Could they be congruent despite equal right angles? Use the plotted first triangle.



Answer Key

1. Not congruent; equal perimeter is insufficient.
2. $D = (3, 2)$
3. Similar, not congruent; $AB = 3$, $A\prime B\prime = 6$.
4. $AB \leftrightarrow XY$; $XZ = 3$.
5. The y-axis.
6. No: $4 \neq 5$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The shown rectangle measures 5 by 3, giving perimeter $2(5 + 3) = 16$.

2. The other perimeter is $2(2 + 6) = 16$, but its side lengths are $2, 6$, not $3, 5$.

3. No rigid motion changes 5 into 6. Equal perimeters do not establish equal corresponding lengths.

Problem 2

1. The shown segment has length $AB = 0 - (-4) = 4$ units.

2. The upward vertical length is $t - (-2) = t + 2$. Congruence requires $t + 2 = 4$, giving $t = 2$.

3. Plot $D = (3, 2)$. The condition $t > -2$ selects the point above C, not the equally distant point below it.

Problem 3

1. The original horizontal side is $AB = 2 - (-1) = 3$ units.

2. Dilation multiplies it by 2, so $A\prime B\prime = 2(3) = 6$ units.

3. Since $6 \neq 3$, the image cannot be congruent. The equal-angle, proportional-side relationship establishes similarity instead.

Problem 4

1. The ordered vertices pair $A \leftrightarrow X$, $B \leftrightarrow Y$, $C \leftrightarrow Z$. Thus $AB = 4$ corresponds to XY, not YZ.

2. Therefore AB matches XY and AC matches XZ. The vertical length $AC = 3 - 0 = 3$.

3. So $XZ = 3$ units. Use both endpoint correspondences before choosing the matching side.

Problem 5

1. The rule $(-x, y)$ sends $(-3, -1)$ to $(3, -1)$ exactly.

2. It also sends $(-1, 2)$ to $(1, 2)$. Pair midpoints are $(0, -1)$ and $(0, 2)$, both on the y-axis.

3. The segment changes are $(2, 3)$ and $(-2, 3)$; both squared lengths are $2^2 + 3^2 = 13$. The matching reflection establishes congruence.

Problem 6

1. The plotted triangle has horizontal leg $3 - 0 = 3$ and vertical leg $4 - 0 = 4$.

2. The second triangle has corresponding vertical leg 5, so the required equality would be $4 = 5$, which is false.

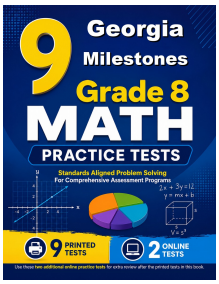
3. An equal 90° angle does not repair unequal corresponding sides. These right triangles are not congruent.

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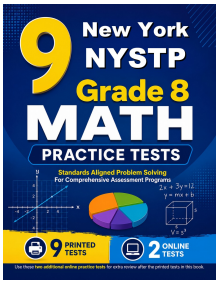
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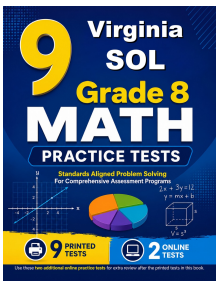
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