

Possible transformation questions for the test, with answers

1. Show the result of composing a translation and a reflection, where the translation vector is perpendicular to the reflection line. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original vector and reflection line.

If the vector \vec{v} is perpendicular to line ℓ then the result of first translating by \vec{v} and then reflecting across ℓ is the same as reflecting across the line you get by translating ℓ by $-\frac{1}{2}\vec{v}$

(Note: there may be a different correct answer if you reflect first and then translate. You may use patty paper to draw an example to help yourself figure out/remember this solution)

2. What is the special case where a translation and reflection composition is the same as a single reflection? Describe the case with a sentence and draw out an example.

If the translation vector is perpendicular to the reflection line, then the composition will have the same result as a single reflection. (You may use patty paper to help you draw an accurate example).

~~3. What is the special case where a translation and reflection composition is commutative (where you get the same result in both orders)? Describe the case with a sentence and draw out an example.~~

4. Show the result of composing two reflections, where the reflection lines intersect **and are perpendicular**. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original reflection lines.

The composition of two reflections in perpendicular lines is a rotation by 180° around the intersection of the two lines.

5. Show the result of composing two reflections, where the reflection lines are parallel. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original reflection lines.

The result of reflecting across two parallel lines is a translation, where the translation vector is perpendicular to the reflection lines, goes in the direction from the first line to the second, and is twice as long as the distance between the two lines.

6. In what special case is the composition of two reflections a translation? Describe the case with a sentence and draw out an example.

Two reflections gives the same result as a translation when the reflection lines are parallel (You may use patty paper to draw an accurate example)

7. In what special case is the composition of two reflections a rotation? Describe the case with a sentence and draw out an example.

Two reflections is a rotation when the reflection lines intersect. (Use patty paper to draw an example)

8. Give a patty paper explanation of how to know that the composition of two reflections will never be a reflection.

If you start with the smooth side up for the patty paper, when you do one reflection, the smooth side will be down. When you do two reflections the smooth side will be back up again. Two reflections ends with smooth side up. One reflection ends with smooth side down, so you can't get the same thing with 2 reflections as you do with 1 reflection.

9. In what special case is the composition of two reflections commutative (you get the same result doing the reflections in either order)? Describe the case with a sentence and draw out an example.

Two reflections are commutative if the reflection lines are perpendicular. (Use patty paper to draw an example)

~~10. Show the result of composing two rotations: the first around point P by angle x and the second around point Q by angle y , where $x+y=180^\circ$. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original rotation points and angles.~~

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Two reflections gives the same result as a translation when the reflection lines are parallel (You may use patty paper to draw an accurate example)

7. In what special case is the composition of two reflections a rotation? Describe the case with a sentence and draw out an example.

Two reflections is a rotation when the reflection lines intersect. (Use patty paper to draw an example)

8. Give a patty paper explanation of how to know that the composition of two reflections will never be a reflection.

If you start with the smooth side up for the patty paper, when you do one reflection, the smooth side will be down. When you do two reflections the smooth side will be back up again. Two reflections ends with smooth side up. One reflection ends with smooth side down, so you can't get the same thing with 2 reflections as you do with 1 reflection.

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Possible transformation questions for the test, with answers

1. Show the result of composing a translation and a reflection, where the translation vector is perpendicular to the reflection line. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original vector and reflection line.

If the vector \vec{v} is perpendicular to line ℓ then the result of first translating by \vec{v} and then reflecting across ℓ is the same as reflecting across the line you get by translating ℓ by $-\frac{1}{2}\vec{v}$

(Note: there may be a different correct answer if you reflect first and then translate. You may use patty paper to draw an example to help yourself figure out/remember this solution)

2. What is the special case where a translation and reflection composition is the same as a single reflection? Describe the case with a sentence and draw out an example.

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4. Show the result of composing two reflections, where the reflection lines intersect **and are perpendicular**. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original reflection lines.

The composition of two reflections in perpendicular lines is a rotation by 180° around the intersection of the two lines.

5. Show the result of composing two reflections, where the reflection lines are parallel. Describe the result as a single translation, rotation or reflection and explain how to get that description by using the original reflection lines.

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