Grade 6: Arithmetic Study Guidance Plan

Teacher: Takashi AOYAMA

University of Tsukuba Elementary School

Research Subjects	A group of "perfectly overlapping" figures - with a focus on connections with congruence and symmetry.

1 Unit Name

Symmetric Figures

2 About the Unit

A figure with "line symmetry" is a figure that "overlaps perfectly" when folded by a straight line. A "point-symmetrical" figure is one that "overlaps perfectly" when rotated 180 degrees around a point. The aim of this unit is to deepen students' understanding of shapes through activities such as observation, composition, drawing, and discrimination.

Students have experienced the "perfect overlap" of figures through concrete operations such as folding origami since the lower grades. In the 5th grade, students have studied "congruence" as a basic relationship between two shapes that "overlap perfectly".

However, even though the same keyword "overlap perfectly" is used in this unit, is not this unit "symmetrical figures" introduced without touching the systematics with "congruent figures" in the 5th grade? Also, after making a distinction, are we not treating the two symmetries as two different things and teaching them as such?

Linearly symmetrical figures are exactly opposite each other across the axis of symmetry. That is, if one of the two congruent figures is turned flipped over and stacked on top of the other, it will perfectly overlap the other. In addition, for a figure with point symmetry, if one of the two congruent figures is rotated 180 degrees on the plane without flipping either of them, it will overlap perfectly with the other one. Considering the systematics from "congruent figures" in teaching "symmetrical figures," it would be better to make use of the similarity of "congruence" and clarify the differences, rather than teaching the two symmetrical figures separately.

Based on the above, in this practice, we will try to introduce the definition of two symmetries by using the "exactly overlapping" system and composing a figure using two "congruent" figures.

3 Unit Structure (All 10 hours included)

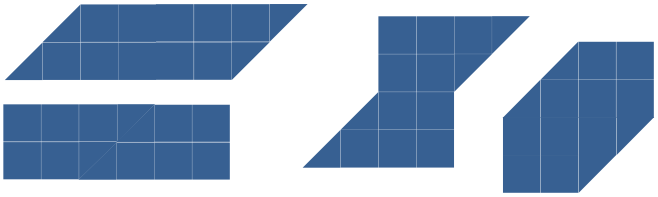
① Combining congruent figures (2 hours – today's lesson is the first of these).
② Linear symmetry (3 hours) ③ Point symmetry (3 hours) Polygon and symmetry ④ Polygon and symmetry (2 hours)

4 About this lesson

(1) Aim

Understanding the meaning of line symmetry and point symmetry through the observation of figures formed by combining two congruent figures.

(2) Deployment

Main Learning Activities	○ Guidance notes ◎Evaluation [Perspective]
1 Understanding the Problem T: (presenting figure)  C: They are congruent trapezoids. T: Let's make a shape by fitting the corresponding edges together.	○ The congruent figures to be presented should be of different colours when turned over.
2 Activities to compose a figure C: I can do four kinds of trapezoids because there are four pairs of corresponding sides.	○ Identify the meaning of "corresponding edges" and where they are and where they are not.
 C: If you turn one side over, you can make four other kinds. C: If you turn the trapezoid over, the colours are different.	◎I am trying to compose the figure at my own initiative.
 	○Evaluate statements that predict how many different shapes can be formed from the corresponding pairs of edges.
3 Comparative study C: The one attached upside down is a different colour. C: It looks like a mirror and overlaps perfectly when folded at the colour border. C: Shapes attached without turning over remain the same colour. C: Because one side is attached upside down, they overlap perfectly when it is rotated.	○The corresponding sides attaching the two figures together constitute the axe of symmetry (line-symmetry), and the midpoint of the corresponding sides attaching the two figures together constitute the point of symmetry (point-symmetry).
4 Conclusion A figure that overlaps exactly when folded by a straight line is called a line-symmetric figure. A figure that overlaps exactly when rotated 180 degrees around a point is called a point-symmetric figure.	◎Explain that combinations of the same colours overlap perfectly when folded and that combinations of different colours overlap perfectly when rotated. [thought].