July 3

Research Theme :

Designing lessons that enhance the quality of mathematical activities

7th Grade Lesson Plan for Mathematics

Date : July 3rd, 2012(Tuesday) 14 : 20～
Class : Grade 7 Class C（20Boys・20Girls）
Instructor : Koganei Junior High School KABASAWA, Kouichi

1. Title of Unit　Plane Figures

2. Theme　Construction of Bisectors of Angles

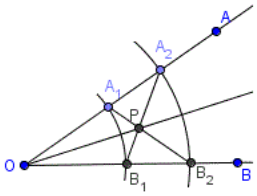
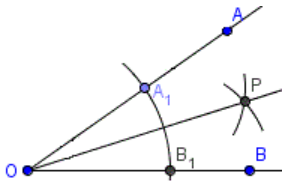
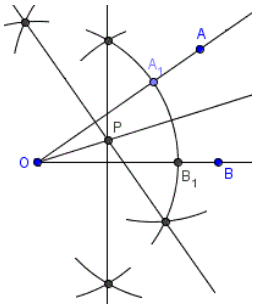
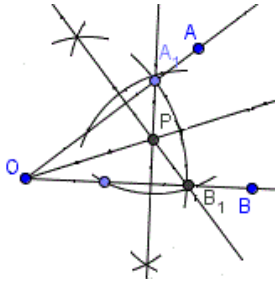
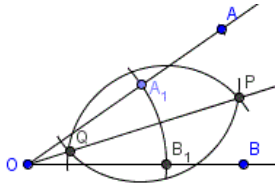
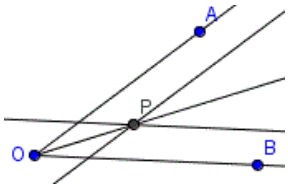
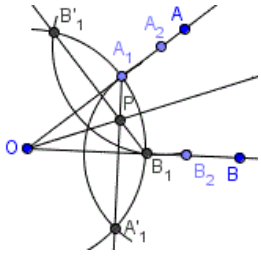
3. Goals of the Unit
   - Students will be able to construct bisectors of angles using points of symmetry.
   - Students will be able to explain the steps of construction indicating the center of circle, the radius, and the two points through which a straight line passes.
   - Students will deepen their understanding about thinking behind each method and about bisectors of angles through examination of various ways of construction.

4. Unit Plan

   Construction of Regular Hexagons
   Set of points that are equidistant from a given point
   Set of points that are equidistant from two given points（Perpendicular bisector）
   Set of points that are equidistant from three given points
   Set of points that are equidistant from a given line（Construction of parallel lines, transformation of angles, construction of perpendicular lines）
   Consolidation of basic construction ①（Basic construction, organizing the terms）
   Set of points that are equidistant from a pair of given lines (Construction of bisectors of Angles) ←Today's lesson
   Set of points that are equidistant from three given lines; Construction of a perpendicular line that passes through a point on the line; Construction of tangents
   Various construction
   Transformations of figures

5. Flow of the lesson

Steps of instruction	Students' anticipated responses	○Points of considerations ☆Evaluation Criteria
Introduction : Presentation of problem ・"What can you say about a set of points that are equidistant from two given lines?" ・"Construct the bisector of an angle.	・It will be the bisector of an angle. ・It will be an axis of symmetry.	○ Re-consider the set of points that are equidistant from two given lines as the bisector of an angle. ☆Students try to re-examine the results of construction and try to express them using words.

Development : Independent problem solving ・Ask students to demonstrate their constructions on the black board. ・Compare and contrast various methods of construction and discuss them.	・Sharing and discussion of various methods of construction （Examples of students' anticipated responses） （Ⅰ）  （Ⅱ）  （Ⅱ）is the method of construction written in the text book. （Ⅲ）  （Ⅳ）  （Ⅴ）  （Ⅵ）  （Ⅶ）  	○ Have students explain the method of construction in words, and the teacher constructs on the black board according to the explanation. ○ Have students discuss characteristics of each method, good points about them, and points in common. ○Confirm especially about the points below ・Excess lines ・Position of the point of intersection ・How to pick the center and the radius ○ When taking up the construction method Ⅱ in the whole class, it is expected that students will construct point P differently. We will discuss whether all of the points can be looked at as the same. ○The construction method of Ⅱ will be taken up in the whole class. Discuss 2 or 3 more other methods and compare and contrast. ☆Students are able to construct in their own methods. ☆Students are motivated to work on construction and try to think of different methods.
Development : Compare and contrast ・"Are there ways of looking at various construction methods as the same?"	• They are all constructing congruent triangles (or other figures). ・ They are taking a point on each side of the angle of the bisector.（Simple expressions such as "I did the same thing on this side and the other side," is also expected.） ・They are based on the fact that the circle is	○When discussing what makes these methods the same, display the circle that has been implicit in students' presentations. ○If any of these ideas do not come from the students,

・"If we look at the points we summarized, can't we try other methods of construction?"	line-symmetric. ・They constructed several pairs of points that are positioned symmetrically from the angle of bisector (the axis of symmetry) and constructed 2 lines using those points. Then, they found the point of intersection of the 2 lines. ・By drawing the whole circles instead of just arcs, select other combinations of symmetric points on the circle to construct the bisector. ・Construct the bisector using other symmetric points.	the teacher will, after giving time to think, organize these ideas and summarize. ○ If there is extra time, construct the bisector using other methods. ○ Think about other methods of construction not to find a better method but to help students experience the merit of the idea that are in common with all of the methods of construction.
Summary 「Let's summarize what we learned from today's lesson.」	・We used the symmetry around the angle bisector. ・We used the fact that the segments connecting points that are symmetric around the axis of symmetry will intersect on the axis of symmetry. ・Each method can be explained in various ways but there is only one way to construct the angle bisector.	○ If there is enough time, have students write what they thought about today's lesson and share.