賽馬會「知優致優」計劃
Jockey Club "Giftedness Into Flourishing Talents" Project

Area and Perimeter

Mathematics Secondary 1

Level 1: School-based Whole-class Teaching

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Background and Notes

The design of the learning and teaching plan reflects the actual circumstances of the particular school at the time of implementation. As it is developed and tailor-made to meet the specific cognitive and affective needs of students, all learning and teaching resources are for reference only.

When adapting the materials, curriculum, instructional and assessment modifications can be made in accordance with the diverse needs and abilities, learning styles and aspirations of students, professional competence of teachers, and gifted education development of the schools.

Teachers are strongly recommended to read the introduction, theoretical background and summary of the resource package to have a better understanding of the principles of Gifted Education and strategies for implementation.

This unit includes 1 lesson plan, 3 worksheets and 1 GeoGebra folder.

With reference to our resources, educators can design suitable learning activities and implement the elements of Gifted Education, based on students' needs and interests, and teaching experience, so as to unfold students' potentials to the fullest.

Topic —— Area and Perimeter

Subject: Mathematics
Grade: Secondary 1
No. of Lessons (Learning Time): 1 Lesson (40 minutes)

Prior Knowledge	Students know how to measure the perimeter and area of triangles and quadrilaterals.	
Learning Objectives	- Students should be able to understand if the perimeter of a figure is fixed, area of a regular polygon must be greater than that of an irregular polygon - Students should be able to understand if the perimeter of a figure is fixed, the maximum area can be found in circle - Students should be able to develop collaboration skills through working with others	
Intended Learning Outcomes	- Students are able to answer challenging questions - Students are able to show their problem-solving skills in conducting the activity - Students are willing to share and show their work to their classmates - Students show motivation and are highly engaged in learning - Students show togetherness when doing the learning tasks	
Learning & Teaching Strategies	Questioning, Pair Work, Group Activity, Presentation, Peer Feedback	
Operation Mode of Gifted Education	Level 1: School-based Whole-class Teaching	
Core Elements of Gifted Education	Higher-order Thinking Skills	Personal-social Competence

Lesson 1

Procedure

Learning Focus (Time)	Activity / Content	Learning & Teaching Strategies	Elements of Gifted Education	Learning & Teaching Resources
Comparing areas of different triangles (5 minutes)	Students work in pairs to compare the areas of different triangles under given condition(s): using GeoGebra to compare the area of different types of triangles provided that their perimeter is fixed.	Questioning Pair Work	 	Tablets with GeoGebra Lesson Worksheet 1
Comparing areas of different shapes, all with fixed perimeter (20 minutes)	Students work in groups to use GeoGebra to compare areas of: - *rectangles and squares* - *different quadrilaterals (pre-set)* - *different polygons (pre-set one to two polygons with different number of sides)* Students are given different instructions: - *For higher and average ability students, they can draw one polygon using GeoGebra.* - *For lower ability students, they are provided with pre-set polygons.*	Group Activity	 	Tablets with GeoGebra Lesson Worksheet 2 Lesson Worksheet 3
Students' presentation (10 minutes)	Students report what they found in the group activity. Teacher and other students provide feedback.	Presentation Peer Feedback	 	
Conclusion (5 minutes)	Expected conclusion from students: *Area of regular polygons is larger than that of irregular polygons, with same number of sides, when the perimeter is fixed.* (Hints may be given to students before reaching the conclusion)			

Extended Learning Activity

Extension Worksheet: Using algebraic method to prove the area of regular polygon is larger than that of irregular polygons under fixed perimeter.

Task

Other than using GeoGebra to help compare the area of different polygons, students can use algebraic method called “Completing the square” to prove that the area of regular polygons is larger than that of irregular polygons, with squares and rectangles as a pair of example.

Required Knowledge

1. *quadratic function*
2. *factorization by using identities*
3. *adding the constant term by considering the coefficient of* x