香 港 資 優 教 育 學 苑
The Hong Kong Academy for Gifted Education

Quadratic Functions and Standard Conics (MATS2610)

Introduction	In 17th century, Descartes has introduced the rectangular coordinate system. With this concept, a curve can be considered as a collection of points (x,y) on the coordinate plane and we can set up an equation which can help us to find out some geometric properties of the curve and to solve problems of analytical geometry by algebraic method. In this course, some standard quadratic functions (or conics) like parabola, circle, ellipse and hyperbola will be introduced and the properties will be explored. This is the last programme in the **_Subject Core Series_** which is comprised of four level 2 programmes. They are namely 1. Equations and Identities 2. Handling Sequences and Series 3. Plane Geometry 4. Quadratic Functions and Standard Conics
Programme Type / Level	Analytical Study Course (Level 2) ([Token-required](#))
Instructor(s)	Mr Tse Siu On
Pre-requisites	Students should be able to: 1. Basic skills in handling quadratic equations. 2. Basic idea of function and graph. 3. Basic knowledge on coordinate geometry such as distance formula, slope of straight line, etc. 4. Basic properties of circle like chords and tangents.
Target Participants	➢ S1 to S3 HKAGE student members ➢ Class size: 30
Medium of Instruction	Cantonese with English Handouts
Certificate	**E-Certificate** will be awarded to participants who have: ❖ Attended **AT LEAST 3 sessions** AND ❖ Attained **satisfactory performance** in all assessments
Intended Learning Outcomes	Upon completion of the programme, participants should be able to: 1. Evaluate competently the optimal value of a quadratic function through graph sketching; 2. Analyze the natures of loci; 3. Construct accurately equations of circles with given information; and 4. Understand the definition of conics and their equations in standard position
Screening	Please answer the screening question in the online application form. *The screening question is designed to help the applicant understands the course level and the course content. The question must be answered by the student applicant and it can only be attempted once. The answer cannot be changed once the application is submitted. Selection is based on students' performance in answering the question. Only students who can demonstrate **motivation and problem-solving skills** in the screening question can be enrolled in the programme.

Application Deadline	**11 Nov 2019** **12:00 n.n.**	**Application Result Release Date**	**22 Nov 2019**

If student members withdraw from the programme after the Application Deadline, the token will be deducted.

| Session	Date	Time	Venue (HKAGE)
1	7 Dec		
2	14 Dec	2:00 p.m. – 5:00 p.m.	Room 303
3	21 Dec		
4	28 Dec		

Schedule

Remarks: For any assessment to be held in the programme, no make-up will be arranged.

Sample Examples for the Programme

- --- Optimal values of quadratic functions

  Given the function $y = a(x - h)^2 + k$. We have

  (a) The vertex (h, k)

  (b) The axis of symmetry which is the line $x = h$.

  (a>0)

  (h,k)

- --- Different forms of straight line
  Point-slope form

  The equation of the line with slope m and passes through the point (x_1, y_1) is $\dfrac{y - y_1}{x - x_1} = m$
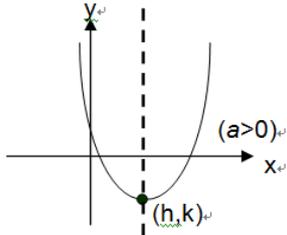
- --- Example

  Given the circle (C) $x^2 + y^2 - 2x - 4y - 4 = 0$,

  (a) Find the centre and radius of (C).

  (b) Show that $B(4, 6)$ lies outsides (C).

  (c) Find the equation of the circle centre at B and touches (C)

      (i)   externally

      (ii)   internally

  B(6,4)

  (C) $x^2 + y^2 - 2x - 4y - 4 = 0$
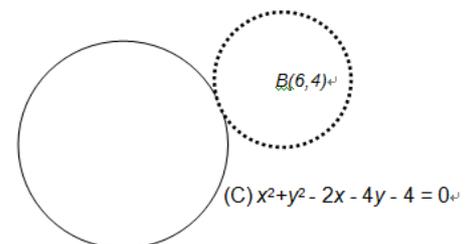
Enquiries For enquiries, please contact us at 3940 0101 after language selection, press "1".