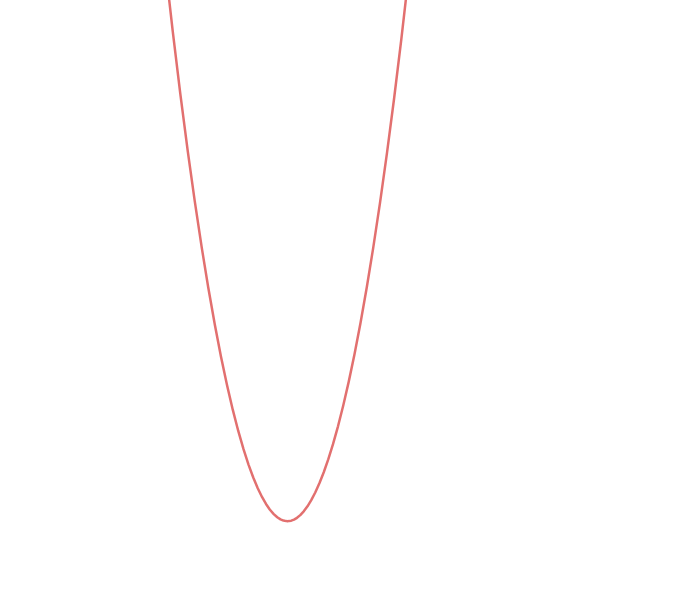
** **

GCE/IAL applicable



**Quadratic Functions and equations**

**For C1(GCE)/C12(IAL)**

**Content**

|  |  |
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| Main Concept 1: Completing the square | **p.4** |
| Main Concept 2: Finding the axis of symmetry | **p.7** |
| Main Concept 3: Finding the vertex of the curve | **p.12** |
| Main Concept 4: Solving the quadratic equations | **p.15** |
|  |  |
|  |  |

**Quadratic Function and equation**

**Introduction to quadratic function**

**where**

**There are some main points to explore**

**Complete the square**

**Find the axis of symmetry**

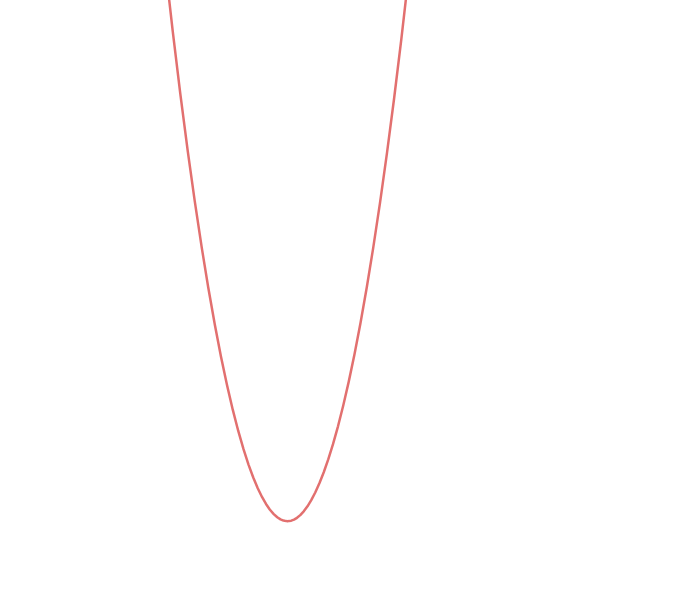
**Find the coordinates of minimum/maximum points**

**Find the solutions when , if any.**

**Main Concept 1:**

**Completing the square**

**Given a graph of the quadratic function, what can you see?**

****

**It is a curve, with specific minimum/maximum point,**

**and there is a axis of symmetry for the graph.**

**Why?**

**When we complete the square, we will understand them all.**

**Given**

**Exercise 1**

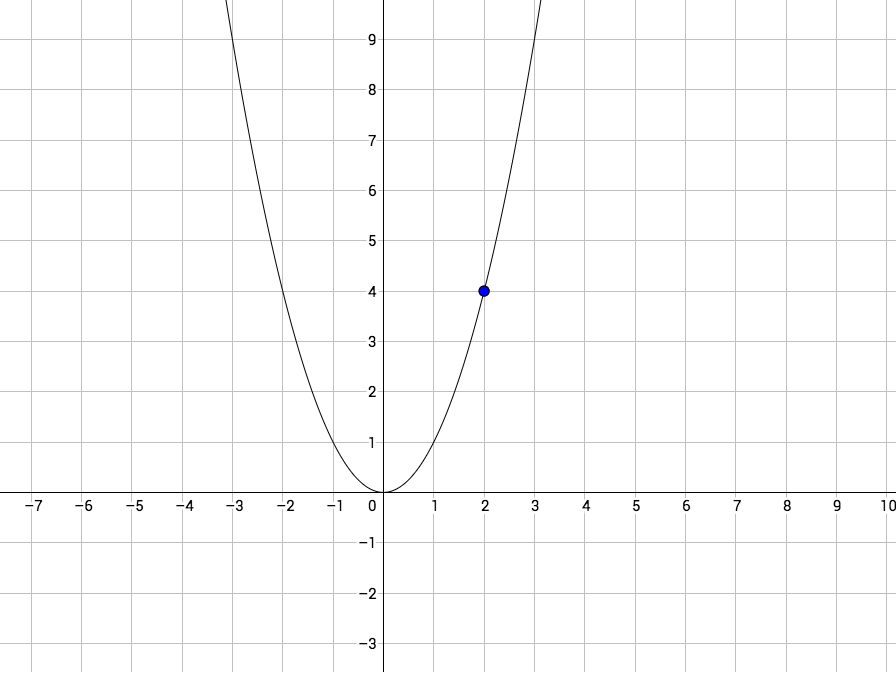
**Complete the square of the following functions**

**Easy parts Challenging part**

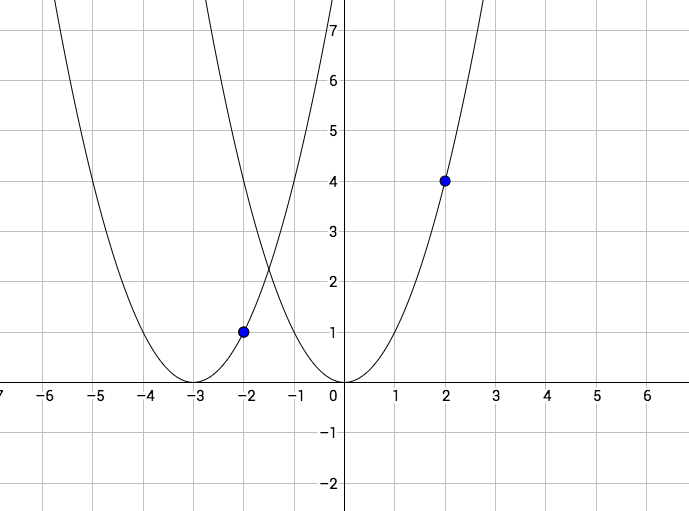
**Main Concept 2**

**Finding the axis of symmetry**

**As we can see from the above deduction, , so the axis of symmetry is . We shall visualize it as follows.**

****

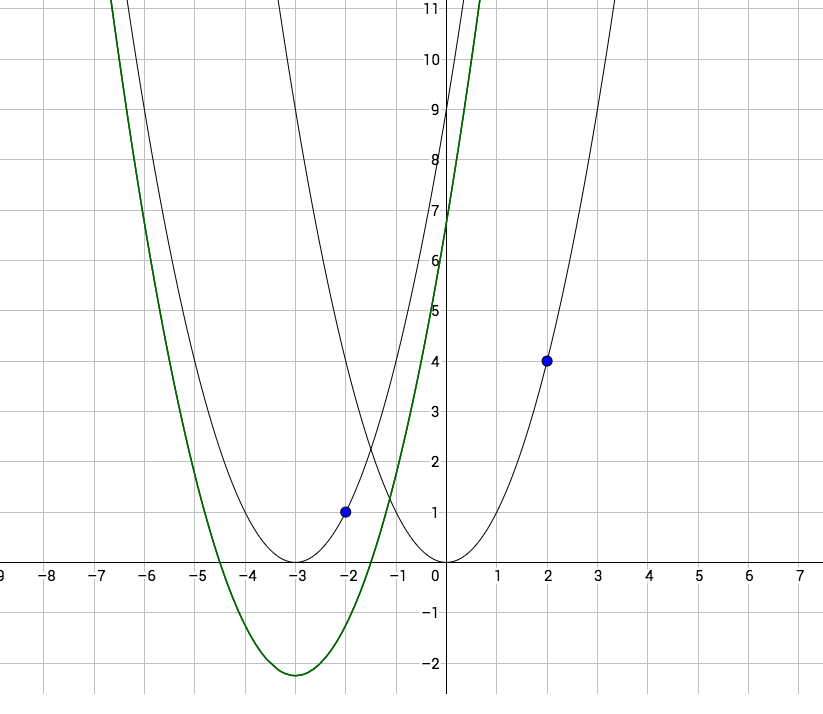
**This is the curve of an ordinary quadratic graph,**

****

**This is the curve of another graph,**

**So the axis of symmetry of the graph is which is**

**Remember, the constant c is independent in founding the positions axis of symmetry.**

****

**This is a graph of , by completing square, it is**

**Exercise 2**

**Find the following axes of symmetry of the following function.**

**Main Concept 3**

**Finding the vertex of the curve**

**When , then put it into the equation, we get**

**Therefore, the minimum/maximum point is given by or**

**Exercise 3**

**Main Concept 4**

**Solving the quadratic equations:**

**The ability to solve equations concerning the quadratic functions are important topics of this chapter.**

**Usually, we will have two sides, could be a quadratic function, and g(x) could be a constant including 0, a linear function or a quadratic function.**

**Let us explore more about quadratic equation, but first please remind the below contents**

**,**

**if f(x)=0, then ,**

**where the is called the determinant.**

**Note that there are some possible cases happened,**

1. **Distinct real roots**
2. **Repeated roots**
3. **No solutions (no real roots)**

**1 happens when the determinant**

**2 happens when the determinant**

**3 happens when the determinant**

**Exercise 4**

Find the solutions of the following equations