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M YEAR 12 ATHEMATICS

EXTENSION 2
COMPLEX NUMBERS

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Chapter 1. Introduction to Complex Numbers

1.1 Arithmetic of Complex Numbers

Introduction

Consider a quadratic equation $x^2 + 2x + 3 = 0$

$$\because x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (Q.F)$$
$$= \frac{-2 \pm \sqrt{4 - 4(1)(3)}}{2}$$
$$= \frac{-2 \pm \sqrt{-8}}{2}$$

We cannot go further because there is a negative number inside the square root. In order to solve such a quadratic equation completely, we need the negative square.

$$\boldsymbol{i = \sqrt{-1} \quad \text{or} \quad i^2 = -1}$$

And this negative square root i is called ______________________________

Hence, the solutions to the quadratic equation above are,

$$x = \frac{-2 \pm }{2}$$
$$= \frac{-2 \pm }{2}$$
$$=$$

And these roots are called ____________________________

The Number System