

**NATURE OF ROOTS**

**03 MARCH 2014**



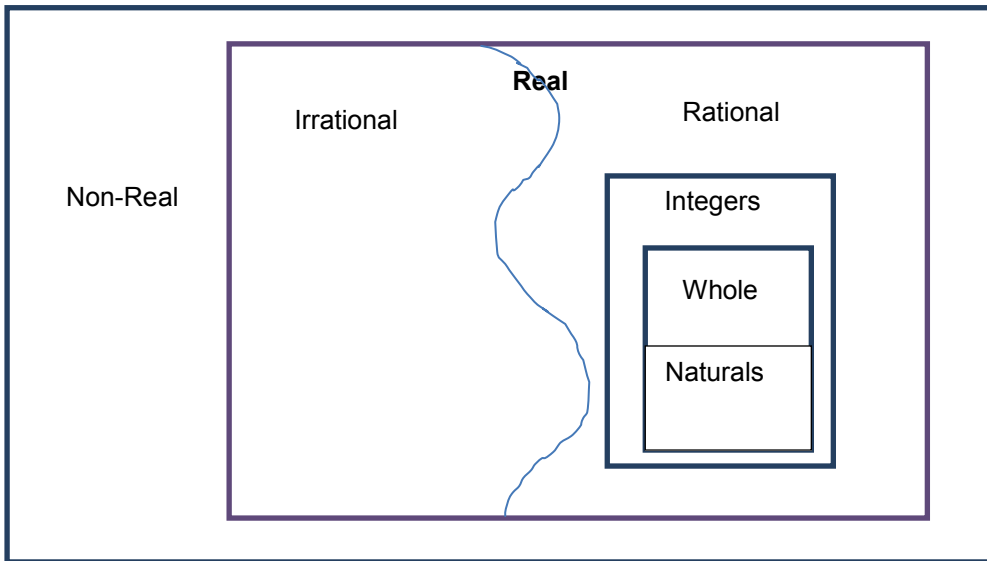
**Lesson Description**

In this lesson we:

- Revise the Number Systems.
- Revise the use of the quadratic formula.
- Revise the nature of roots



**Summary**



**Quadratic Formula:**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Nature of the Roots:**

$$\Delta = b^2 - 4ac$$

$\Delta < 0$	$\Delta = 0$	$\Delta > 0$
Roots are non real	Roots are Real ,Rational and Equal (Same)	Roots are Real and different, but if $\Delta$ is a perfect square it is rational. Or if $\Delta$ is a non perfect square it is irrational.



## Test Yourself

### Question 1

Which one of the following numbers is irrational?

- A.  $\sqrt{16}$
- B.  $\sqrt{1,6}$
- C.  $\sqrt{1\ 600}$
- D.  $\sqrt{0,16}$

### Question 2

The roots of the equation  $x^2 + 3x = 4$  are

- A. Non-real.
- B. Real, rational and equal.
- C. Real, rational and unequal.
- D. Real, irrational and unequal.

### Question 3

The roots of the equation  $\frac{x^2}{3} + 3 = 2x$  are

- A. Real, rational and equal.
- B. Real, rational and unequal.
- C. Real, irrational and unequal.
- D. Non- real.

### Question 4

The roots of equation  $\frac{1}{x} + 2x = 5$  are

- A. Real, rational and unequal.
- B. Real, irrational and unequal.
- C. Non- real.
- D. Real, rational and equal.

### Question 5

The roots of the equation  $x^2 - 4x + 13 = 0$  are

- A. Non-real.
- B. Real, rational and equal.
- C. Real, rational and unequal.
- D. Real, irrational and unequal

**Question 6**

The roots of the equation  $(x - 3)^2 = 4$  are

- A. Unequal and irrational.
- B. Equal and rational.
- C. Equal and irrational.
- D. Unequal and rational.

**Question 7**

How many x - intercepts will  $y = 3x^2 - 6x + 3$  have

- A. None
- B. One
- C. Two
- D. Three

**Question 8**

How many x - intercepts will  $y = 2x^2 + x + 3$  have

- A. None
- B. One
- C. Two
- D. Three

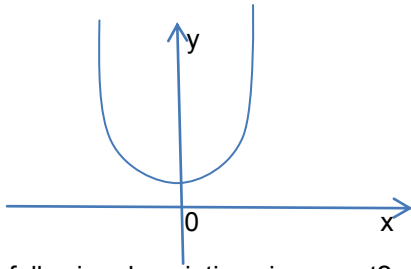
**Question 9**

For which values of k are the roots of  $x^2 + 2x + k = 0$  real?

- A.  $k \leq 1$
- B.  $k < 1$
- C.  $k \geq 1$
- D.  $k > 1$

**Question 10**

The graph of the parabola  $y = ax^2 + q$  is drawn below



Which of the following descriptions is correct?

- A.  $a > 0 ; q < 0$  and  $\Delta > 0$
- B.  $a > 0 ; q > 0$  and  $\Delta > 0$
- C.  $a > 0 ; q < 0$  and  $\Delta < 0$
- D.  $a > 0 ; q > 0$  and  $\Delta < 0$



**Improve your Skills**

**Question 1**

If  $x \in \{0; 1; 2; 3; 4; 5\}$  determine the value(s) of  $x$  for which the expression  $\sqrt{\frac{9}{4-x}}$  is

- a) Not defined.
- b) Rational
- c) Irrational

**Question 2**

Without solving the equation, determine the nature of the roots of each of the following equations:

- a)  $x^2 = 5x - 4$
- b)  $(x - 3)(x + 2) = 3x + 6$
- c)  $\frac{4x^2 + 2x + 1}{4x^2 - 2x + 1} = 2$

**Question 3**

If  $b^2 - 4ac = 7k^2$  determine the nature of the roots if

- a)  $k = 0$
- b)  $k = \sqrt{7}$

**Question 4**

Calculate the value(s) of  $p$  for which the equation  $2px^2 - 4x + 3 = 0$  has real roots. Hence find one value for  $p$  where the roots will be real and rational.

**Question 5**

Show that the roots of  $x^2 + 2ax + 3a^2 = 0$  are non-real if  $a \in R$  and  $a \neq 0$