Reminder: *Postulate*

Since the square of	-1 & $+1$	is equal to	1	then	-1 & $+1$	are called the square roots of	1

What is a radical?

We define the **radical** of a number by the **positive square root** of a positive real number.

Eg: $Radical(4) = 2$ $Radical(9) = 3$

1) Observe the above and compute the following:
   - $Radical(121) =$…….. - $Radical(81) =$……..
   - $Radical(225) =$…….. - $Radical(49) =$……..

Instead of writing radical (25) we can use the symbol, $\sqrt[2]{25}$ or simply $\sqrt{25}$.

Reading: $\sqrt{7}$: we read it as radical 7 or square root of 7

Terminology: $^{index\rightarrow 2}\sqrt{a}^{\leftarrow radical\ sign}_{\leftarrow radicand}$ *where a is any positive real number*

2) Use your calculator to calculate the following:

✓ $\sqrt{16} =$……..	☆ $(16)^{\frac{1}{2}} =$……..	a) What do you notice? ……
✓ $\sqrt{25} =$……..	☆ $(25)^{\frac{1}{2}} =$……..	……
✓ $\sqrt{64} =$……..	☆ $(64)^{\frac{1}{2}} =$……..	b) What do you conclude? ……
		……

Conclusion: radicals are nothing but fractional powers

To calculate the radical of a positive real number, we have two cases:

Observe and learn

Case-1: If the number can be written in form of even exponent:

Process	Examples		
Express number in form of	$\sqrt{64} =$	$\sqrt{10000} =$	$\sqrt{0.04} =$
1) Even exponent	$= \sqrt{8^2}$	$= \sqrt{10^4}$	$= \sqrt{2^2 \times 10^{-2}}$
2) Divide exponent by 2 to get radicand out	$=8$	$= 10^2$	$= 2 \times 10^{-1}$

Case-2: If number can be not be written in form of even exponent:

Process	Examples	
Express number in form of	$\sqrt{8} =$	$\sqrt{100000} =$
1) A product of even exponent and exponent (1)	$= \sqrt{2^2 \times 2^1}$	$= \sqrt{10^4 \times 10^1}$
2) Divide even exponent by 2 to get radicand out and keep radicand of power 1 inside radical sign	$= 2\sqrt{2}$	$= 10^2\sqrt{10^1}$

3) Correct the following false statements:

a) A non-zero real number admits two square roots. ……

b) To find the square root of a number, we divide it by 2. ……

c) 2 is the square root of -4. ……

4) Determine the following: (show your work)

$\sqrt{0} =$	$\sqrt{12} =$	$\sqrt{100} =$
$\sqrt{1} =$	$\sqrt{18} =$	$\sqrt{0.0001} =$
$\sqrt{4} =$	$\sqrt{27} =$	$\sqrt{10^7} =$
$\sqrt{49} =$	$\sqrt{24} =$	$\sqrt{10^{-5}} =$
$\sqrt{169} =$	$\sqrt{48} =$	$\sqrt{900} =$
$\sqrt{144} =$	$\sqrt{225} =$	$\sqrt{40000} =$
$\sqrt{81} =$	$\sqrt{56} =$	$\sqrt{1200} =$

Radicals and calculators:

Definition: An irrational number is a number whose decimal part is unlimited and not periodic

Eg: $3.\underbrace{2157987115683452\ldots}_{not\ limited\ \&\ non-periodic}$

5) Use your calculator to find:

Numbers	$\sqrt{2}$	$\sqrt{4}$	$\sqrt{8}$	$\sqrt{16}$	$\sqrt{13}$
Describe the decimal part					
Is it a rational number?					

Conclusion: if radicand can not be written in form of an even power then its outcome is called an irrational number.