Complex numbers

chapter 3

Section 3.1 Irrational numbers

PROJECT MATHS
Text & Tests 6

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Number Systems

Letter	Name	Example / meaning
$\mathbb{N}$	Natural No.s	"counting nos", positive & whole
		eg.. $1, 2, 3 \ldots$
$\mathbb{Z}$	Integers	whole nos
		eg.. $-10, 0, 201$
$\mathbb{Q}$	Rational	a rational no. $= \frac{a}{b}$
	(Quotients)	where $a, b \in \mathbb{Z}$
$\mathbb{R} \setminus \mathbb{Q}$	Irrational	$\neq a/b$ where $a, b \in \mathbb{Z}$
		eg.. π, surds eg. $\sqrt{2}, \sqrt{3}, \sqrt{5}$
$\mathbb{R}$	Real No.	Any no. on no. line
Im	Imaginary No	Square root of a negative no.
		eg.. $\sqrt{-1} = \sqrt{1}\,i$, $\sqrt{-3} = \sqrt{3}\,i$
$\mathbb{C}$	Complex No.	all no.s are complex! it has a
		real part and an imaginary part.
		eg.. $2 = 2 + 0i$, $\sqrt{-3} = 0 + \sqrt{3}i$
		$3 + 2i$, $-4 - 5i$

Example 1

Simplify each of the following, giving your answers in the form $a\sqrt{b}$, $a, b \in Z$.

(i) $\sqrt{48} + \sqrt{75}$ (ii) $\sqrt{180} - \sqrt{20}$

Calculator (i) $\sqrt{48} + \sqrt{75} = 9\sqrt{3}$

Perfect squares ⇒ 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225 ...

$48 = 3 \times 16 \Rightarrow \sqrt{48} = \sqrt{16(3)} = \sqrt{16}\sqrt{3} = 4\sqrt{3}$

$75 = \Rightarrow \sqrt{75} = \sqrt{25(3)} = 5\sqrt{3}$

add $9\sqrt{3}$

3. Given that N is the set of natural numbers,
Z is the set of integers,
Q is the set of rational numbers,
and R is the set of real numbers, give two elements of each of the following sets:

(i) Z \ N (ii) Q \ Z (iii) R \ Q

(i) Z\N eg.. -1

(ii) Q\Z eg.. $\frac{1}{2}$

(iii) R\Q eg.. $-\sqrt{2}$, π, $\sqrt{2}$

Attachments

Construct root 2 units on a number line.avi