UNIT 1: ROOTS AND POWERS

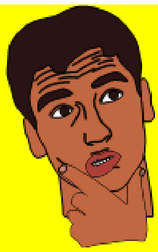
SECTION 4.2: IRRATIONAL NUMBERS (continued)

K. Sears
NUMBERS, RELATIONS AND FUNCTIONS 10

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the NRF 10 Specific Curriculum Outcome (SCO) "Algebra and Numbers 2" OR "AN2" which states:

"Demonstrate an understanding of irrational numbers by representing, identifying, simplifying and ordering irrational numbers."

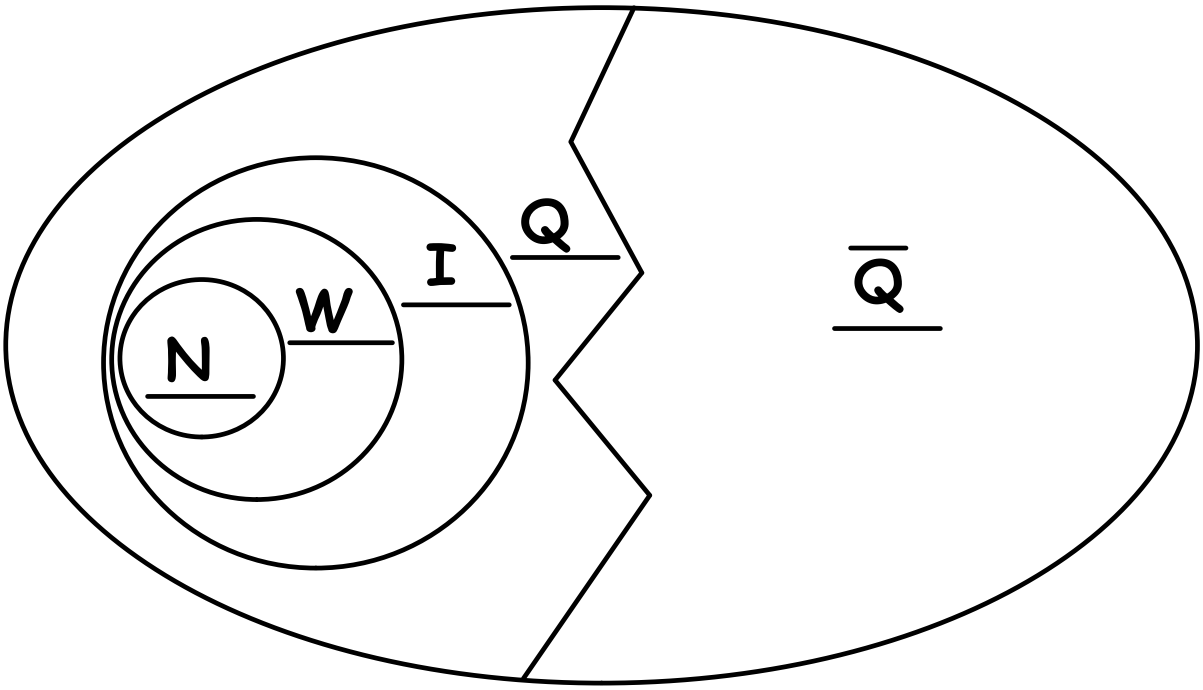


What does THAT mean???

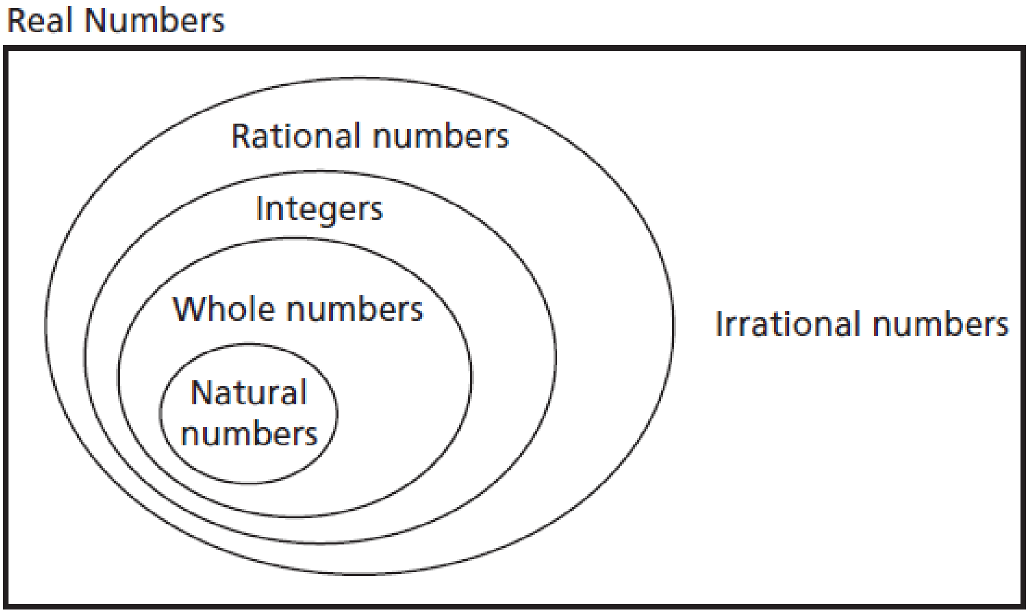
SCO AN2 means that we will:

* represent the relationships among the subsets of the real numbers (N, W, I, Q, $\overline{Q}$) using a graphic organizer
* identify irrational numbers in a group of numbers based on their specific properties
* express radicals ($\sqrt{\ }$) as mixed radicals in simplest form [especially square roots ($\sqrt{48}$) and cube roots ($\sqrt[3]{54}$)]
* compare and order (largest vs smallest) irrational numbers

TITLE: R



TEXTBOOK, PAGE 209:



PLEASE TURN TO PAGE 207 IN YOUR TEXTBOOK. WORK WITH PARTNER TO DETERMINE HOW RADICALS THAT <u>ARE</u> RATIONAL NUMBERS ARE DIFFERENT FROM RADICALS THAT <u>ARE NOT</u> RATIONAL NUMBERS.

These are rational numbers.	These are not rational numbers.
$\sqrt{100}$ 10, $\sqrt{0.25}$ 0.5, $\sqrt[3]{8}$ 2, 0.5	$\sqrt{0.24}$ 0.4898..., $\sqrt[3]{9}$ 2.0800..., $\sqrt{2}$ 1.41421...
$\frac{5}{6}$ $0.8\overline{3}$, $\sqrt{\frac{9}{64}}$ $\frac{3}{8}$, 0.8^2 0.64, $\sqrt[5]{-32}$ -2	$\sqrt{\frac{1}{3}}$ 0.57735..., $\sqrt[4]{12}$ 1.861...

Q - RATIONAL NUMBERS
A number that can be expressed as the quotient of two integers; in other words, a rational number is any number that can be expressed as a fraction. The denominator cannot be 0. This includes all terminating and repeating decimal numbers.

Ex: 0.2 , -0.2 , $0.\overline{3}$, 4 , -4 , 0 , $\frac{1}{2}$, $-\frac{1}{2}$, $\sqrt{4}$, $\sqrt{9}$, $\sqrt[3]{64}$…

$\overline{Q}$ - IRRATIONAL NUMBERS
A number that <u>cannot</u> be expressed as a quotient of integers; in other words, an irrational number is any number that <u>cannot</u> be expressed as a fraction. This includes all non-terminating and non-repeating decimals.

Ex: π (3.141592…) , 1.23456738… , $\sqrt{15}$, $-\pi$, …

R - REAL NUMBERS
All rational and irrational numbers.

CONTINUE WORKING WITH YOUR PARTNER.
WHICH OF THE FOLLOWING RADICALS ARE:
RATIONAL? **IRRATIONAL?**

$$\sqrt{1.44},\ \sqrt{\frac{64}{81}},\ \sqrt[3]{-27},\ \sqrt{\frac{4}{5}},\ \sqrt{5}$$

1.2 $\frac{8}{9}$ -3 0.894427… 2.236…

Q Q Q $\overline{Q}$ $\overline{Q}$

IMPORTANT POINT - PAGE 208:

When an irrational number is written as a radical, the radical is the *exact value* of the irrational number; for example, $\sqrt{2}$ and $\sqrt[3]{-50}$. We can use the square root and cube root keys on a calculator to determine *approximate values* of these irrational numbers.

EXAMPLE:

Tell whether each number is rational or irrational. Explain how you know.

a) $-\frac{3}{5}$

$\mathbb{Q}$

b) $\sqrt{14}$

3.7416...

$\bar{\mathbb{Q}}$

c) $\sqrt[3]{\frac{8}{27}}$

$\frac{2}{3}$

$\mathbb{Q}$

YOU TRY!

Tell whether each number is rational or irrational. Explain how you know.

a) $\sqrt{\frac{49}{16}}$ b) $\sqrt[3]{-30}$ c) 1.21

$\frac{7}{4}$ $-3.107...$

Q $\bar{Q}$ Q

EXAMPLE:

Order the following radicals from least to greatest.

$$\sqrt[3]{13},\ \sqrt{18},\ \sqrt{9},\ \sqrt[4]{27},\ \sqrt[3]{-5}$$

$2.351...$ $4.2426...$ 3 $2.2795...$ $-1.7099....$

$\sqrt[3]{-5}$ $\sqrt[4]{27}$ $\sqrt[3]{13}$ $\sqrt{9}$ $\sqrt{18}$

YOU TRY!

Order the following radicals from least to greatest.

$$\sqrt{2},\ \sqrt[3]{-2},\ \sqrt[3]{6},\ \sqrt{11},\ \sqrt[4]{30}$$

1.4142... −1.2599... 1.8171... 3.3166... 2.3403...

$\sqrt[3]{-2}$ $\sqrt{2}$ $\sqrt[3]{6}$ $\sqrt[4]{30}$ $\sqrt{11}$

CONCEPT REINFORCEMENT:

FPCM 10:

page 211: #3 TO #5, #7, #8, #10, #12 and #13 TO #15
page 212: #16a