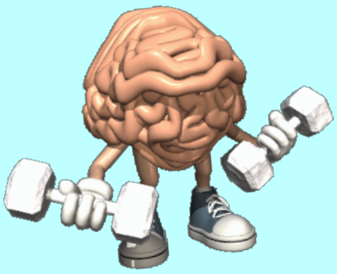
Sept. 15, 2016



Warm Up

1) Simplify the radical:

a) $\sqrt[4]{1250} = \sqrt[4]{625 \times 2}$

$\sqrt[4]{625}\ \sqrt[4]{2}$

$= 5\sqrt[4]{2}$

b) $\sqrt[3]{192} = \sqrt[3]{64 \times 3}$

$= \sqrt[3]{64} \times \sqrt[3]{3}$

$= 4\sqrt[3]{3}$

Change the radical from mixed to entire:

a) $7\sqrt[4]{2}$

$= \sqrt[4]{7^4 \times 2}$

$= \sqrt[4]{2401 \times 2} = \sqrt[4]{4802}$

b) $6\sqrt[3]{4} = \sqrt[3]{6^3 \times 4}$

$\sqrt[3]{216 \times 4}$

$= \sqrt[3]{864}$

Simplify each: from grade 9

3) a) $(3x^6)^3 \Rightarrow (3x^6)(3x^6)(3x^6)$

$3^3\, x^{6 \cdot 3} = 27x^{18}$

b) $\sqrt{144} = 12$

c) $\dfrac{36x^7y^9}{12x^5y^3}$

$3x^{7-5}\ y^{9-3}$

$3x^2\ y^6$

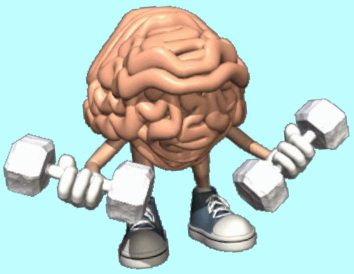
d) $\left[\dfrac{(12x^2)(4x^{-5})}{(16x^{12})}\right]^0$

$= 1$

$\dfrac{48x^{-10}}{16x^{12}}$

$(3x^{-22})^0$

1



Warm Up

1) Simplify the radical:

a) $\sqrt[4]{1250}$ b) $\sqrt[3]{192}$

2) Change the radical from mixed to entire:

a) $7\sqrt[4]{2}$ b) $6\sqrt[3]{4}$

3) Simplify each:

a) $(3x^{6})^{3}$

b) $\sqrt{144}$

c) $\dfrac{36x^{-7}y^{-9}}{12x^{5}y^{3}}$

d) $\left[\dfrac{(12x^{2})(4x^{-5})}{(16x^{12})}\right]^{0}$

Homework Solutions

Pg 218 - 219 7b, 8b, 10ace, 11egi, 12acegi, 13,14,15,17ac, 18ac

4.2 Irrational Numbers

LESSON FOCUS Identify and order irrational numbers.

Make Connections

The formulas for the area and circumference of a circle involve π, which is not a rational number because it cannot be written as a quotient of integers.

What other numbers are not rational?

TRY THIS

Work with a partner.

These are rational numbers.	These are not rational numbers.
$\sqrt{100}$ $\sqrt{0.25}$ $\sqrt[3]{8}$ 0.5	$\sqrt{0.24}$ $\sqrt[3]{9}$ $\sqrt{2}$
$\frac{5}{6}$ $\sqrt{\frac{9}{64}}$ 0.8^2 $\sqrt[5]{-32}$	$\sqrt{\frac{1}{3}}$ $\sqrt[4]{12}$

How do these rational radicals compare to these not rational numbers

Which of these radicals are rational numbers?
Which are not rational numbers? How do you know?

$\sqrt{1.44}$ $= \sqrt{\frac{144}{100}} = \frac{\sqrt{144}}{\sqrt{100}} = \frac{12}{10} = 1.2$ ← stops

$\sqrt{\frac{64}{81}} = \frac{\sqrt{64}}{\sqrt{81}}$ $= \frac{8}{9}$

$\sqrt[3]{-27}$ $= -3$

$\sqrt{\frac{4}{5}}$ $=$ $\frac{\sqrt{4}}{\sqrt{5}}$ ← can ← not

Irration

$\sqrt{5}$ Irrat

Write 3 other radicals that are rational numbers. Why are they rational?

Write 3 other radicals that are not rational numbers. Why are they not rational?

How are radicals that are rational numbers different from radicals that are not rational numbers?

Rational numbers terminate (end) or repeat

Irrational numbers do not terminate (end)

When an irrational number is written as a radical, the radical is the exact value.

Examples: $\sqrt{2}$ $\sqrt[3]{-50}$ **exact**

When we use the square root or cube root key on our calculators we are obtaining approximate value of irrational numbers.

$\sqrt{2} \approx 1.4142$

Example 1 Classifying Numbers

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

a) $-\frac{3}{5}$ Fraction always b) $\sqrt{14}$ No Irrational c) $\sqrt[3]{\frac{8}{27}}$ $= \frac{\sqrt[3]{8}}{\sqrt[3]{27}} = \frac{2}{3} = 0.\overline{666}$ Rational

SOLUTION

-0.6 Rational

a) $-\frac{3}{5}$ is rational since it is written as a quotient of integers.

Its decimal form is -0.6, which terminates.

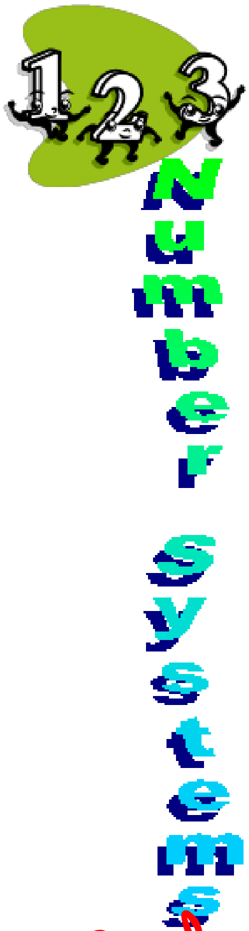
b) $\sqrt{14}$ is irrational since 14 is not a perfect square.

The decimal form of $\sqrt{14}$ neither repeats nor terminates.

c) $\sqrt[3]{\frac{8}{27}}$ is rational since $\frac{8}{27}$ is a perfect cube.

$\sqrt[3]{\frac{8}{27}} = \frac{2}{3}$ or $0.\overline{6}$, which is a repeating decimal

CHECK YOUR UNDERSTANDING



Natural Numbers N

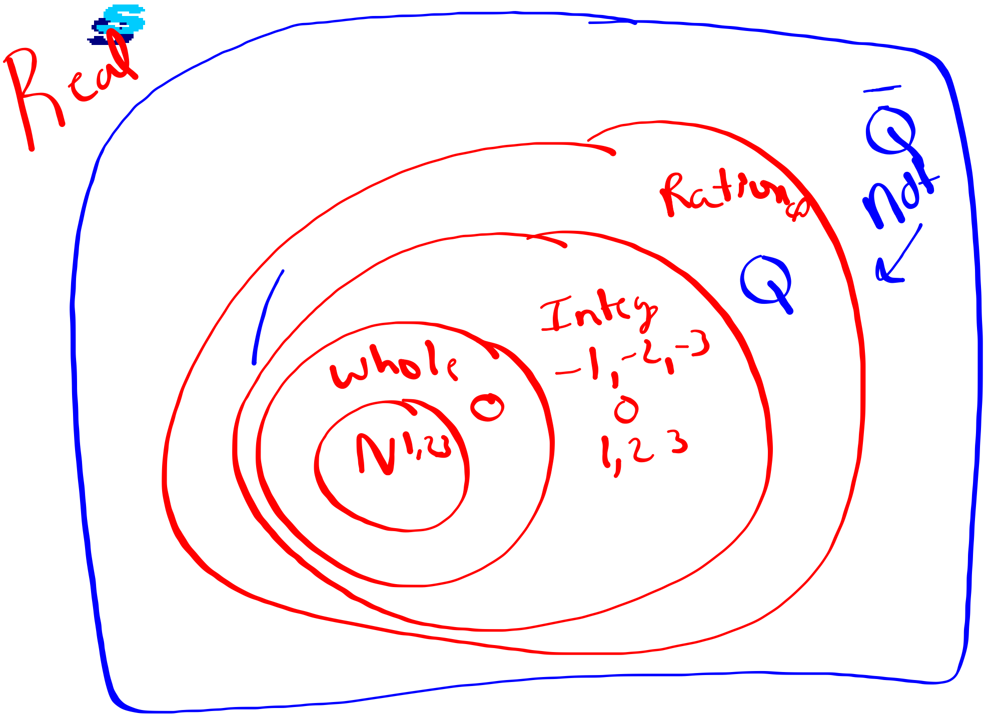
Whole Numbers W

Integers I

Rational Fraction Decimals (stop) Q

Irrational √, don't stop decimal $\overline{Q}$

Real R



Natural Numbers : Ex. 1, 2, 3 etc

Whole Numbers: Counting numbers including zero.
Ex. 0, 1, 2, 3, etc

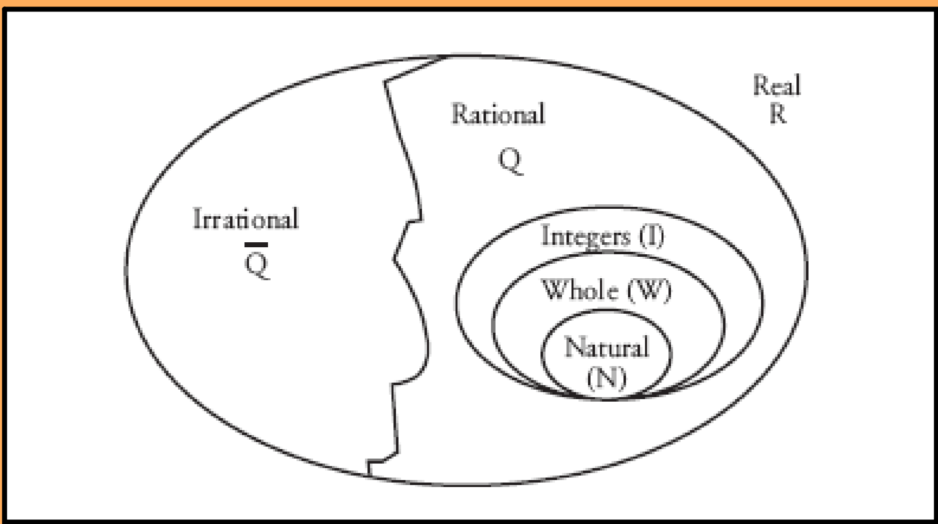
Integers: Are all positive and negative whole numbers.
(Remember zero is neither negative or positive)
Ex: ....3,2,1,0,-1-2,-3...

Rational Numbers: All whole numbers, fractions, mixed numbers, decimals and their negatives
The decimal must repeat or terminate also.
Ex: 1/3, 4, 3/4

Irrational Numbers: Decimals that never terminate or repeat.
Ex: $\sqrt{2}$

Real Numbers: All rational and irrational numbers are real numbers
Ex: All possible numbers

Review of Types of Number Systems



Exercise

Complete the table

	N	W	I	Q	$\bar{Q}$	R
5	✓	✓	✓	5.0 = 5 ✓	✗	✓
-2	✗	✗	✓	✓	✗	✓
$\frac{3}{4}$	✗	✗	✗	✓	✗	✓
-1.3	✗	✗	whole ✗	✓	✗	✓
$\sqrt{7}$	✗	✗	✗	✗	✓	✓
$\sqrt{95}$	✗	✗	✗	✗	✓	✓

Example 2 Ordering Irrational Numbers on a Number Line

Use a number line to order these numbers from least to greatest.

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

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

≈ 2.35, ≈ 4.1, 3, ≈ 2.3 (2.27), ≈ -1.7

SOLUTION

13 is between the perfect cubes 8 and 27, and is closer to 8.

$\sqrt[3]{8}$	$\sqrt[3]{13}$	$\sqrt[3]{27}$
↓	↓	↓
2	?	3

Use a calculator.

$\sqrt[3]{13} = 2.3513\ldots$

3∜(13)
2.351334688

18 is between the perfect squares 16 and 25, and is closer to 16.

$\sqrt{16}$	$\sqrt{18}$	$\sqrt{25}$
↓	↓	↓
4	?	5

(Solution continues.)

Classwork/Homework

Quiz Tomorrow

Textbook:

Page 211

Questions 3, 4, 10(just use your calculator),

13, 14, 20

Attachments

Day 6 Entire to mix (Homwork Solutions to Day 5 Pg 218_219).notebook