

KEY

0-2: Real Numbers

Natural Numbers: 1, 2, 3, ...
 Whole Numbers: 0, 1, 2, 3, ...
 Integers: ... -3, -2, -1, 0, 1, 2, 3, ...

Rational Numbers: Every number in the previous three categories, as well as all fractions, decimals that end (such as 0.23) and decimals that repeat (such as $0.\overline{61}$).

Irrational Numbers: Non-perfect squares (such as $\sqrt{10}$) and π .
 Basically, decimals that continue forever, without any pattern.

Real Numbers: All rational and irrational numbers.

Ex #1: Please name the set or sets of numbers that apply to each real number.

- | | | | |
|-----------------------|-----------------------------------|---------------------|---|
| (a) 8 | Natural, Whole, Integer, Rational | (b) $\frac{3}{7}$ | Rational |
| (c) -2 | Integer, Rational | (d) $\sqrt{25} = 5$ | so... Natural, Whole, Integer, Rational |
| (e) $3.\overline{14}$ | Rational | (f) $\sqrt{24}$ | Irrational |

Ex #2: Please order the following numbers from least to greatest.

- | | |
|---|---|
| (a) $\frac{3}{5}, -\frac{1}{5}, \frac{2}{5}, 0, -\frac{3}{5}$ | (b) $\sqrt{2}, 0.\overline{8}, -0.7, \frac{3}{10}, -\sqrt{3}$ |
| (general rule: negative #'s will be to the left of 0) | \downarrow 1.something \downarrow 0.3 \downarrow -1.something |
| $-\frac{3}{5}, -\frac{1}{5}, 0, \frac{2}{5}, \frac{3}{5}$ | $-\sqrt{3}, -0.7, \frac{3}{10}, 0.\overline{8}, \sqrt{2}$ |

Ex #3: Please make a list of the first twelve perfect squares. Remember that a perfect square is defined as a number times itself.

1 4 9 16 25 36 49 64 81 100 121 144
 (1x1) (2x2) (3x3) (4x4)...

Ex #4: Between which two Natural Numbers are the following square roots located?

For example, $\sqrt{6}$ is more than 2, and less than 3.

(a) $\sqrt{17}$ is more than 4, and less than 5.

$\sqrt{17}$ is slightly above $\sqrt{16}$, which is 4.

(b) $\sqrt{40}$ is more than 6, and less than 7.

$\sqrt{40}$ is between $\sqrt{36} = 6$ and $\sqrt{49} = 7$

(c) $\sqrt{85.5}$ is more than 9, and less than 10.

$\sqrt{81} = 9$ $\sqrt{100} = 10$

(Hint: what perfect square is 80-something?)

Ex #5: Please simplify the following square roots.

(a) $\sqrt{1} = 1$

(b) $\sqrt{64} = 8$

(c) $\sqrt{.04} = 0.2$
(since $0.2 \times 0.2 = 0.4$)

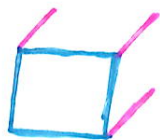
(d) $\sqrt{\frac{9}{25}} = \frac{3}{5}$
(because $\frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$)

Now my favorite doodle since childhood... the cube!

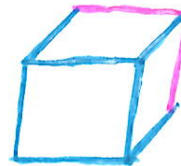
step 1: front square



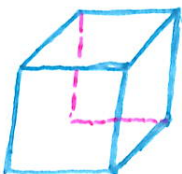
step 2: diagonals



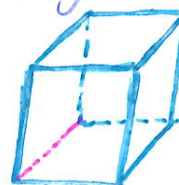
step 3: connect diagonals



step 4: dotted back square



step 5: dotted back diagonal



YAY!