Homework explanations

LESSON 1.1 / Real numbers and the number line

Use after a complete first attempt. Check the reasoning as well as the final statement.

QUESTION 1

Classify $-18, 0, \frac{7}{2}, \sqrt{49}$ by their most specific sets, then list all larger applicable sets.

-18: integer, rational, real. 0: whole, integer, rational, real. 7/2: rational, real. √49=7: natural, whole, integer, rational, real.

QUESTION 2

Explain why $0.\overline{6}$ is rational. Classify $\sqrt{5}$ and the exact decimal 2.236, and use the correct comparison symbol between them.

0.666…=2/3 is rational. √5 is irrational; 2.236=559/250 is rational. √5≈2.236, but they are not equal.

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QUESTION 3

Order $-\frac{7}{8},\ -0.9,\ -\frac{4}{5}, 0$ from least to greatest. Show an exact comparison and a scaled sketch.

-0.9<-7/8<-4/5<0. The plotted positions must agree with that left-to-right order.

QUESTION 4

Evaluate $|-12|$, $|5-13|$, $|-6|-|2-9|$ and $-|-6|$. Explain the role of each pair of bars.

12; 8; 6-7=-1; -6. Each absolute value itself is non-negative, but a difference of absolute values or an outside negative can make the entire expression negative.

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QUESTION 5

A submarine moves directly from height -25 m to height -7 m relative to sea level. Find signed change and endpoint distance. Then reverse the trip.

Upward trip: -7-(-25)=+18 m; distance 18 m. Reversed: -25-(-7)=-18 m; distance 18 m.

QUESTION 6

Find every position 6 units from zero. Find every position 3 units from coordinate -2. Check each answer.

From zero: -6 and 6. From -2: -5 and 1. Each absolute difference from its reference point is the stated distance.

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QUESTION 7

Correct these claims with reasons: every square root is irrational; every nonterminating decimal is irrational; absolute value is always positive.

$\sqrt{36}=6$ is rational. $0.333\ldots=1/3$ is nonterminating but rational. $|0|=0$, so absolute value is non-negative rather than always positive.

QUESTION 8

Create a rational sum from two irrational numbers, then give an irrational sum from two irrational numbers. Explain why one example cannot establish an “always” rule.

$\sqrt{2}+(-\sqrt{2})=0$ is rational. $\sqrt{2}+\sqrt{2}=2\sqrt{2}$ is irrational: if $2\sqrt{2}$ were rational, dividing by 2 would make $\sqrt{2}$ rational. A single successful example does not cover every allowed pair.