

Algebra 1
Ordering and Estimating Real Numbers

Ordering and Estimating Real Numbers | A1-U01-P02

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for allowed integer radicands, allowed integer radicands; justified checking-strategy choice, allowed real radicands, exact consecutive-integer bounds, justified strategy choice, relation symbol and exact justification and least-to-greatest list.

8 PDFs and a README; 53 buyer pages.

Algebra 1

Ordering and Estimating Real Numbers

Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Use the trial-square table to estimate $\sqrt{17}$ to the nearest tenth. Explain how the midpoint row determines the rounding direction. Table: $4.1^2 = 16.81$; $4.15^2 = 17.2225$; $4.2^2 = 17.64$.

Trial	Exact square
4.1	16.81
4.15	17.2225
4.2	17.64

Bank label: _____

Order these exact rational numbers from least to greatest. Use an equals sign for any tie: $-\frac{23}{41}$, -1.5 , 0 , $\frac{39}{24}$.

Bank label: _____

Order these exact real numbers from least to greatest, showing equality if needed: $-\sqrt{39}$, -3 , 0 , $\sqrt{10}$. Use exact integer bounds and squared comparisons to justify the radical placements.

Bank label: _____

Order these exact real numbers from least to greatest, showing equality if needed: $-\sqrt{8}$, -2.8 , $\sqrt{4}$, 2 . Use exact integer bounds and squared comparisons to justify the radical placements.

Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Assume n is a nonnegative integer and $\frac{3}{2} < \sqrt{n} \leq 4$. Determine every possible value of n, preserving the endpoint conditions exactly. _____ _____	Assume n is a nonnegative integer and $1 < \sqrt{n} \leq \frac{7}{2}$. Determine every possible value of n, preserving the endpoint conditions exactly. _____ _____
Assume n is a nonnegative integer and $\frac{3}{2} \leq \sqrt{n} < \frac{9}{2}$. Determine every possible value of n, preserving the endpoint conditions exactly. _____ _____	Assume n is a nonnegative integer and $\frac{5}{2} \leq \sqrt{n} \leq \frac{9}{2}$. Determine every possible value of n, preserving the endpoint conditions exactly. _____ _____
Assume n is a nonnegative real number and $\frac{3}{2} \leq \sqrt{n} < 3$. Determine every possible value of n, preserving the endpoint conditions exactly. _____ _____	Without rounding either number, insert $<$, $>$, or $=$ between $\sqrt{11}$ and $\frac{10}{3}$. Justify the comparison using signs and exact squares. _____ _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Evaluate this reasoning: From $3 < \sqrt{10} < 4$, a student reports $\sqrt{10} = 3.2$ to the nearest tenth. State whether the conclusion and evidence are valid, then repair the justification with exact comparisons.

Evaluate this reasoning: A calculator shows $\sqrt{2}$ as 1.41, so a student concludes $\sqrt{2} = 1.41$ exactly. State whether the conclusion and evidence are valid, then repair the justification with exact comparisons.

Evaluate this reasoning: A student says $\sqrt{20}$ is halfway between $\sqrt{16}$ and $\sqrt{25}$, so $\sqrt{20} = 4.5$. State whether the conclusion and evidence are valid, then repair the justification with exact comparisons.

Evaluate this reasoning: A student writes $-\sqrt{12} > -3$ because $\sqrt{12} > 3$. State whether the conclusion and evidence are valid, then repair the justification with exact comparisons.

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Full Worked Solutions - excerpt

Worked example

Problem. Use the trial-square table to estimate $\sqrt{17}$ to the nearest tenth. Explain how the midpoint row determines the rounding direction. Table: $4.1^2 = 16.81$; $4.15^2 = 17.2225$; $4.2^2 = 17.64$.

Trial	Exact square
4.1	16.81
4.15	17.2225
4.2	17.64

Answer. $\sqrt{17} \approx 4.1$

Explanation and check.

The table brackets the root between 4.1 and 4.2. Since 17 is below the midpoint square 17.2225, round to 4.1.

Worked example

Problem. Order these exact rational numbers from least to greatest. Use an equals sign for any tie: $-\frac{23}{41}$, -1.5 , 0 , $\frac{39}{24}$.

Answer. $-1.5 < -\frac{23}{41} < 0 < \frac{39}{24}$

Explanation and check.

Writing the values as exact fractions gives the order $-1.5 < -\frac{23}{41} < 0 < \frac{39}{24}$.