Comparing and Ordering Rational Numbers

Comparing and ordering rational numbers: Mistakes and missing information

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

For an exact comparison, rename decimals as fractions and use the same denominator. Then compare the signed counts of equal-sized parts. On a number line a value farther left is smaller; $-6 < -2$ even though $6 > 2$.

Worked example

Order $-\frac{5}{6}, -0.8, 0.1$ from least to greatest.

1. Rename the given values exactly: $-0.8 = -\frac{8}{10} = -\frac{4}{5}$, $0.1 = \frac{1}{10}$.
2. Use denominator 30 for equal-sized parts: $-\frac{5}{6} = -\frac{25}{30}$, $-\frac{4}{5} = -\frac{24}{30}$, $\frac{1}{10} = \frac{3}{30}$.
3. Compare signed numerators: $-25 < -24 < 3$.
4. In the original notation: $-\frac{5}{6} < -0.8 < 0.1$.
Answer: $-\frac{5}{6} < -0.8 < 0.1$.

Practice Problems

Show your thinking.

1. Correct the claim $-7 > -2$ because $7 > 2$.

2. Correct $-\frac{2}{3} > -\frac{1}{2}$ using a common denominator.

3. Place -0.25 into the increasing chain $0 < \frac{1}{2}$.

4. A student says $0.45 > 0.5$ because $45 > 5$. Correct it.

5. Find the middle value among $-1.25, -0.75, -0.25$ and show the order.

6. Use exact values to decide whether $-\frac{3}{5}$ or -0.4 is larger.

7. A student treats -1.8 as greater than $-\frac{7}{4}$. Repair the order.

8. Three numbers are spaced by $\frac{1}{2}$ in increasing order. The first is $-\frac{3}{4}$ and the last is $\frac{1}{4}$. Find the middle and write the chain.

Answer Key

1. $-7 < -2$.
2. $-\frac{2}{3} < -\frac{1}{2}$.
3. $-0.25 < 0 < \frac{1}{2}$.
4. $0.45 < 0.5$.
5. $-1.25 < -0.75 < -0.25$. The middle value is -0.75.
6. $-\frac{3}{5} < -0.4$. The greater value is -0.4.
7. $-1.8 < -\frac{7}{4}$.
8. Middle $-\frac{1}{4}$; $-\frac{3}{4} < -\frac{1}{4} < \frac{1}{4}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Start at -2 on a number line. Move 5 units to the left to reach -7.

2. Numbers get smaller to the left, so $-7 < -2$. The sign matters, not just distance from zero.

Problem 2

1. Use denominator 6 for equal-sized parts: $-\frac{2}{3} = -\frac{4}{6}$, $-\frac{1}{2} = -\frac{3}{6}$.

2. Compare signed numerators: $-4 < -3$.

3. In the original notation: $-\frac{2}{3} < -\frac{1}{2}$.

Problem 3

1. Rename the given values exactly: $-0.25 = -\frac{25}{100} = -\frac{1}{4}$.

2. Use denominator 4 for equal-sized parts: $-\frac{1}{4}$, $0 = \frac{0}{4}$, $\frac{1}{2} = \frac{2}{4}$.

3. Compare signed numerators: $-1 < 0 < 2$.

4. In the original notation: $-0.25 < 0 < \frac{1}{2}$.

Problem 4

1. Rename the given values exactly: $0.45 = \frac{45}{100} = \frac{9}{20}$, $0.5 = \frac{5}{10} = \frac{1}{2}$.

2. Use denominator 20 for equal-sized parts: $\frac{9}{20}$, $\frac{1}{2} = \frac{10}{20}$.

3. Compare signed numerators: $9 < 10$.

4. In the original notation: $0.45 < 0.5$.

Problem 5

1. Rename the given values exactly: $-1.25 = -\frac{125}{100} = -\frac{5}{4}$, $-0.75 = -\frac{75}{100} = -\frac{3}{4}$, $-0.25 = -\frac{25}{100} = -\frac{1}{4}$.

2. Use denominator 4 for equal-sized parts: $-\frac{5}{4}$, $-\frac{3}{4}$, $-\frac{1}{4}$.

3. Compare signed numerators: $-5 < -3 < -1$.

4. In the original notation: $-1.25 < -0.75 < -0.25$.

5. The middle value is -0.75.

Problem 6

1. Rename the given values exactly: $-0.4 = -\frac{4}{10} = -\frac{2}{5}$.

2. Use denominator 5 for equal-sized parts: $-\frac{3}{5}$, $-\frac{2}{5}$.

3. Compare signed numerators: $-3 < -2$.

4. In the original notation: $-\frac{3}{5} < -0.4$.

5. The greater value is -0.4.

Problem 7

1. Rename the given values exactly: $-1.8 = -\frac{18}{10} = -\frac{9}{5}$.

2. Use denominator 20 for equal-sized parts: $-\frac{9}{5} = -\frac{36}{20}$, $-\frac{7}{4} = -\frac{35}{20}$.

3. Compare signed numerators: $-36 < -35$.

4. In the original notation: $-1.8 < -\frac{7}{4}$.

Problem 8

1. Use fourths: each step is $\frac{1}{2} = \frac{2}{4}$.

2. Add one step to the first value: $-\frac{3}{4} + \frac{2}{4} = -\frac{1}{4}$.

3. Check the second step: $-\frac{1}{4} + \frac{2}{4} = \frac{1}{4}$, which matches the last value.

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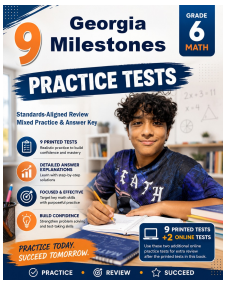

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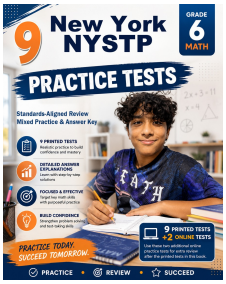

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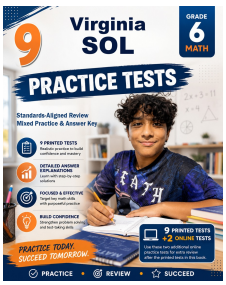

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