Comparing and Ordering Rational Numbers

Comparing and ordering rational numbers: Models and calculations

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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. Compare -0.6 and $-\frac{3}{4}$.

2. Order $-1\frac{1}{4}, -1, \frac{1}{4}$ from least to greatest.

3. Order $\frac{2}{3}, 0.7, \frac{3}{5}$ from least to greatest.

4. Which is smaller, -8 or -3? Justify.

5. Order temperatures $-1.2, -0.9, 0$ degrees Celsius from coldest to warmest.

6. Write an increasing chain using $-\frac{1}{2}, \frac{1}{4}, -\frac{3}{4}$.

7. Compare $-\frac{7}{10}$ and $-\frac{2}{5}$.

8. Build an increasing chain for $\frac{1}{5}, 0.25, \frac{3}{10}$.

Answer Key

1. $-\frac{3}{4} < -0.6$.
2. $-1\frac{1}{4} < -1 < \frac{1}{4}$.
3. $\frac{3}{5} < \frac{2}{3} < 0.7$.
4. $-8 < -3$.
5. $-1.2 < -0.9 < 0$ (in degrees Celsius).
6. $-\frac{3}{4} < -\frac{1}{2} < \frac{1}{4}$.
7. $-\frac{7}{10} < -\frac{2}{5}$.
8. $\frac{1}{5} < 0.25 < \frac{3}{10}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Rename the given values exactly: $-0.6 = -\frac{6}{10} = -\frac{3}{5}$.
2. Use denominator 20 for equal-sized parts: $-\frac{3}{5} = -\frac{12}{20}$, $-\frac{3}{4} = -\frac{15}{20}$.
3. Compare signed numerators: $-15 < -12$.
4. In the original notation: $-\frac{3}{4} < -0.6$.

Problem 2

1. Rename the given values exactly: $-1\frac{1}{4} = -(1 + \frac{1}{4}) = -\frac{5}{4}$.
2. Use denominator 4 for equal-sized parts: $-\frac{5}{4}$, $-1 = -\frac{4}{4}$, $\frac{1}{4}$.
3. Compare signed numerators: $-5 < -4 < 1$.
4. In the original notation: $-1\frac{1}{4} < -1 < \frac{1}{4}$.

Problem 3

1. Rename the given values exactly: $0.7 = \frac{7}{10}$.
2. Use denominator 30 for equal-sized parts: $\frac{2}{3} = \frac{20}{30}$, $\frac{7}{10} = \frac{21}{30}$, $\frac{3}{5} = \frac{18}{30}$.
3. Compare signed numerators: $18 < 20 < 21$.
4. In the original notation: $\frac{3}{5} < \frac{2}{3} < 0.7$.

Problem 4

1. Start at -3 on a number line. Move 5 units to the left to reach -8.
2. Numbers get smaller to the left, so $-8 < -3$. The sign matters, not just distance from zero.

Problem 5

1. Rename the given values exactly: $-1.2 = -\frac{12}{10} = -\frac{6}{5}$, $-0.9 = -\frac{9}{10}$.
2. Use denominator 10 for equal-sized parts: $-\frac{6}{5} = -\frac{12}{10}$, $-\frac{9}{10}$, $0 = \frac{0}{10}$.
3. Compare signed numerators: $-12 < -9 < 0$.
4. In the original notation: $-1.2 < -0.9 < 0$ (in degrees Celsius).

Problem 6

1. Use denominator 4 for equal-sized parts: $-\frac{1}{2} = -\frac{2}{4}$, $\frac{1}{4}$, $-\frac{3}{4}$.
2. Compare signed numerators: $-3 < -2 < 1$.
3. In the original notation: $-\frac{3}{4} < -\frac{1}{2} < \frac{1}{4}$.

Problem 7

1. Use denominator 10 for equal-sized parts: $-\frac{7}{10}$, $-\frac{2}{5} = -\frac{4}{10}$.
2. Compare signed numerators: $-7 < -4$.
3. In the original notation: $-\frac{7}{10} < -\frac{2}{5}$.

Problem 8

1. Rename the given values exactly: $0.25 = \frac{25}{100} = \frac{1}{4}$.
2. Use denominator 20 for equal-sized parts: $\frac{1}{5} = \frac{4}{20}$, $\frac{1}{4} = \frac{5}{20}$, $\frac{3}{10} = \frac{6}{20}$.
3. Compare signed numerators: $4 < 5 < 6$.
4. In the original notation: $\frac{1}{5} < 0.25 < \frac{3}{10}$.

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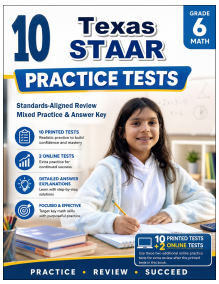

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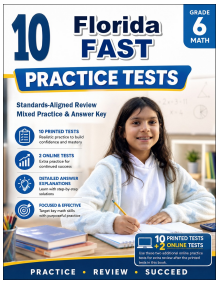

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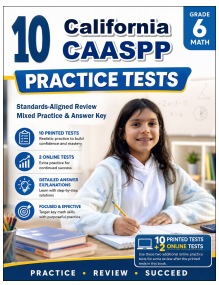

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