Comparing and Ordering Rational Numbers

Comparing and ordering rational numbers: Applications and decisions

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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. Order freezer readings $-2.5, -\frac{9}{4}, -2$ degrees Celsius from coldest to warmest.

2. Rank run times $1.2, \frac{5}{4}, 1.15$ minutes from fastest to slowest.

3. A platform at -1.5 m and one at -1.4 m are compared. Which is lower?

4. Choose the greatest fill level among $0.8, \frac{7}{10}, \frac{3}{4}$ by ordering all three.

5. A balance of -0.75 dollars is claimed to exceed -0.50 dollars. Repair the comparison.

6. Place the signed trail marker -2 km in an increasing chain with the markers -2.5 km and -1.5 km.

7. Rank fill fractions $0.35, \frac{2}{5}, 0.38$ from least to greatest.

8. Explain which platform, at -2.1 m or $-\frac{9}{4}$ m, is higher.

Answer Key

1. $-2.5 < -\frac{9}{4} < -2$ (in degrees Celsius).
2. $1.15 < 1.2 < \frac{5}{4}$ (in minutes).
3. $-1.5 < -1.4$ (in meters). The lower platform height is -1.5 (in meters).
4. $\frac{7}{10} < \frac{3}{4} < 0.8$. The greatest fill level is 0.8.
5. $-0.75 < -0.50$ (in dollars).
6. $-2.5 < -2 < -1.5$ (in kilometers).
7. $0.35 < 0.38 < \frac{2}{5}$.
8. $-\frac{9}{4} < -2.1$ (in meters). The higher platform height is -2.1 (in meters).

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Rename the given values exactly: $-2.5 = -\frac{25}{10} = -\frac{5}{2}$.
2. Use denominator 4 for equal-sized parts: $-\frac{5}{2} = -\frac{10}{4}$, $-\frac{9}{4}$, $-2 = -\frac{8}{4}$.
3. Compare signed numerators: $-10 < -9 < -8$.
4. In the original notation: $-2.5 < -\frac{9}{4} < -2$ (in degrees Celsius).

Problem 2

1. Rename the given values exactly: $1.2 = \frac{12}{10} = \frac{6}{5}$, $1.15 = \frac{115}{100} = \frac{23}{20}$.
2. Use denominator 20 for equal-sized parts: $\frac{6}{5} = \frac{24}{20}$, $\frac{5}{4} = \frac{25}{20}$, $\frac{23}{20}$.
3. Compare signed numerators: $23 < 24 < 25$.
4. In the original notation: $1.15 < 1.2 < \frac{5}{4}$ (in minutes).

Problem 3

1. Rename the given values exactly: $-1.5 = -\frac{15}{10} = -\frac{3}{2}$, $-1.4 = -\frac{14}{10} = -\frac{7}{5}$.
2. Use denominator 10 for equal-sized parts: $-\frac{3}{2} = -\frac{15}{10}$, $-\frac{7}{5} = -\frac{14}{10}$.
3. Compare signed numerators: $-15 < -14$.
4. In the original notation: $-1.5 < -1.4$ (in meters).
5. The lower platform height is -1.5 (in meters).

Problem 4

1. Rename the given values exactly: $0.8 = \frac{8}{10} = \frac{4}{5}$.
2. Use denominator 20 for equal-sized parts: $\frac{4}{5} = \frac{16}{20}$, $\frac{7}{10} = \frac{14}{20}$, $\frac{3}{4} = \frac{15}{20}$.
3. Compare signed numerators: $14 < 15 < 16$.
4. In the original notation: $\frac{7}{10} < \frac{3}{4} < 0.8$.
5. The greatest fill level is 0.8.

Problem 5

1. Rename the given values exactly: $-0.75 = -\frac{75}{100} = -\frac{3}{4}$, $-0.50 = -\frac{50}{100} = -\frac{1}{2}$.
2. Use denominator 4 for equal-sized parts: $-\frac{3}{4}$, $-\frac{1}{2} = -\frac{2}{4}$.
3. Compare signed numerators: $-3 < -2$.
4. In the original notation: $-0.75 < -0.50$ (in dollars).

Problem 6

1. Rename the given values exactly: $-2.5 = -\frac{25}{10} = -\frac{5}{2}$, $-1.5 = -\frac{15}{10} = -\frac{3}{2}$.
2. Use denominator 2 for equal-sized parts: $-\frac{5}{2}$, $-2 = -\frac{4}{2}$, $-\frac{3}{2}$.
3. Compare signed numerators: $-5 < -4 < -3$.
4. In the original notation: $-2.5 < -2 < -1.5$ (in kilometers).

Problem 7

1. Rename the given values exactly: $0.35 = \frac{35}{100} = \frac{7}{20}$, $0.38 = \frac{38}{100} = \frac{19}{50}$.
2. Use denominator 100 for equal-sized parts: $\frac{7}{20} = \frac{35}{100}$, $\frac{2}{5} = \frac{40}{100}$, $\frac{19}{50} = \frac{38}{100}$.
3. Compare signed numerators: $35 < 38 < 40$.
4. In the original notation: $0.35 < 0.38 < \frac{2}{5}$.

Problem 8

1. Rename the given values exactly: $-2.1 = -\frac{21}{10}$.
2. Use denominator 20 for equal-sized parts: $-\frac{21}{10} = -\frac{42}{20}$, $-\frac{9}{4} = -\frac{45}{20}$.
3. Compare signed numerators: $-45 < -42$.
4. In the original notation: $-\frac{9}{4} < -2.1$ (in meters).
5. The higher platform height is -2.1 (in meters).

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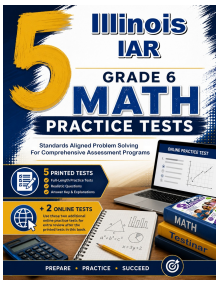

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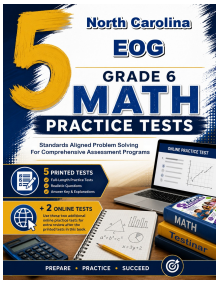

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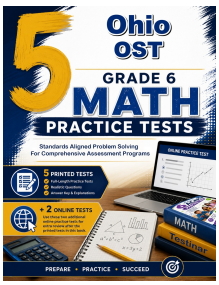

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