

Number Line Detectives

Compare rational and irrational numbers in many forms.

GRADE 8 • MA.8.NSO.1.2

MA.8.NSO.1.2 "Plot, order and compare rational and irrational numbers, represented in various forms."

NAME _____

DATE _____

LOCATE AND COMPARE

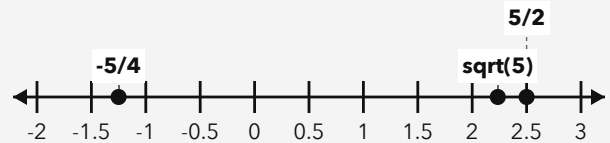
Rewrite rational numbers in a form that is easy to compare, such as a fraction or decimal. To locate a square root that is not a perfect square, find the two nearby perfect squares. Numbers farther left on a number line are less than numbers farther right.

WORKED EXAMPLE

Use the number line to order the three labeled numbers from least to greatest.

1. Rewrite $-5/4$ as -1.25 .
2. Since $2 < \sqrt{5} < 2.5$, $\sqrt{5}$ is between 2 and 2.5.
3. Read the labeled points from left to right.

Answer: $-5/4 < \sqrt{5} < 5/2$



PRACTICE 7 problems

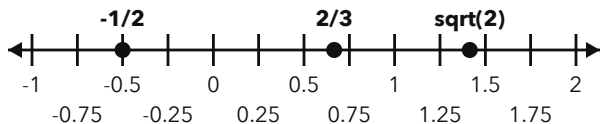
- 1** Write $<$, $>$, or $=$ to compare: $-\sqrt{9}$ ____ -2.9

ANSWER _____

- 2** Order 0.48 , $1/2$, and $\sqrt{1/3}$ from least to greatest.

ANSWER _____

- 3** Use the plotted points. Name the irrational number, then list the rational numbers from least to greatest.



ANSWER _____

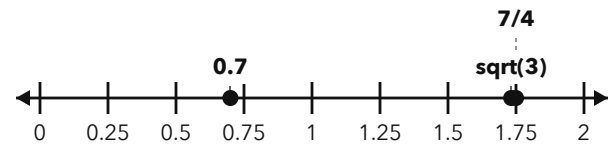
- 4** Order 6.1×10^{-2} , 0.06 , and $1/16$ from least to greatest.

ANSWER _____

- 5** Which number is irrational? $-7/12$, 0.125 , $\sqrt{49}$, $\sqrt{18}$

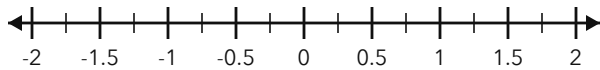
ANSWER _____

- 6** Use the number line to list the labeled numbers from left to right.



ANSWER _____

- 7** Plot and label $-\sqrt{2}$, $-3/2$, and $7/4$ on the blank number line. Then write their order from least to greatest.



ANSWER _____

APPLY IT Show your work

- 1** For a game design, three square map zones have side lengths of 1.4 km, $\sqrt{2}$ km, and $3/2$ km. Order the side lengths from shortest to longest. Which zone has the longest side?

WORK SPACE

ANSWER _____

2

Three audio clips have file sizes of 6.4×10^{-2} GB, 0.063 GB, and $\sqrt{1/250}$ GB. Order the file sizes from smallest to greatest.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Without converting to decimals, order $\sqrt{12}$, $7/2$, and $\sqrt{13}$ from least to greatest. Explain how you know.

WORK SPACE AND ANSWER

PRACTICE 1

Write $<$, $>$, or $=$ to compare: $-\sqrt{9}$ ____ -2.9

$-\sqrt{9} < -2.9$

PRACTICE 2

Order 0.48 , $1/2$, and $\sqrt{1/3}$ from least to greatest.

$0.48 < 1/2 < \sqrt{1/3}$

PRACTICE 3

Use the plotted points. Name the irrational number, then list the rational numbers from least to greatest.

Irrational: $\sqrt{2}$. Rational order: $-1/2 < 2/3$.

PRACTICE 4

Order 6.1×10^{-2} , 0.06 , and $1/16$ from least to greatest.

$0.06 < 6.1 \times 10^{-2} < 1/16$

PRACTICE 5

Which number is irrational? $-7/12$, 0.125 , $\sqrt{49}$, $\sqrt{18}$

$\sqrt{18}$

PRACTICE 6

Use the number line to list the labeled numbers from left to right.

0.7 , $\sqrt{3}$, $7/4$

APPLY IT 1

$1.4 < \sqrt{2} < 3/2$. The zone with side length $3/2$ km is longest. Since $1.4 < \sqrt{2} < 1.5$ and $3/2 = 1.5$, place the lengths in that order.

APPLY IT 2

$0.063 < \sqrt{1/250} < 6.4 \times 10^{-2}$ Compare squares: $0.063^2 = 0.003969$ and $0.064^2 = 0.004096$, while $1/250 = 0.004$. Therefore $\sqrt{1/250}$ is between 0.063 and 0.064 .

CHALLENGE

$\sqrt{12} < 7/2 < \sqrt{13}$. Since $12 < (7/2)^2 = 49/4 = 12.25 < 13$, taking square roots gives the order.

Accept equivalent decimal or fraction forms when they preserve the correct comparisons. For square-root estimates, accept a correct justification using nearby perfect squares or squared comparison values. Practice 7 requires plotted, labeled points as well as the correct order. Accept a reasonable estimate of $-\sqrt{2}$ between -1.5 and -1.4 .

PRACTICE 7

Plot and label $-\sqrt{2}$, $-3/2$, and $7/4$ on the blank number line. Then write their order from least to greatest.

**$-3/2 < -\sqrt{2} < 7/4$. Approximate locations:
 -1.5 , -1.414 , and 1.75 .**

