

Bellringer

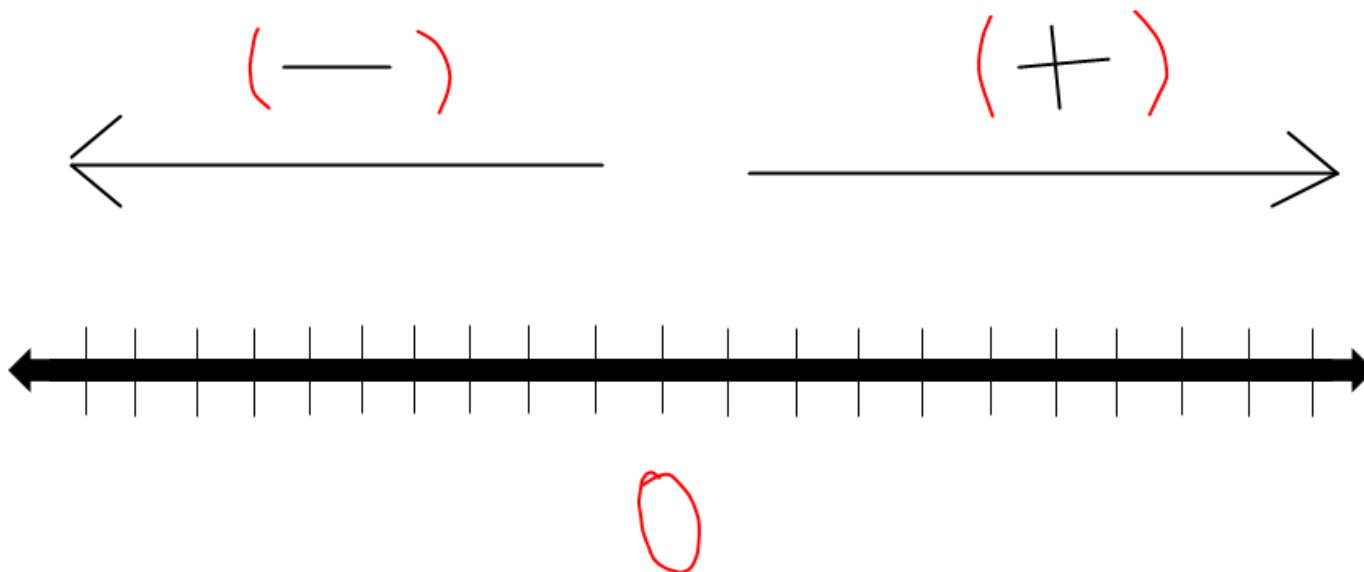
1. What is one name that describes all types of numbers?
2. Usain Bolt's record breaking 100 meter time is 9.58 seconds. Please convert this into a mixed number.
3. The $\sqrt{2}$ is a rational or irrational number? If it is irrational, please write down the numbers that it falls between.

1.3 Ordering Real Numbers

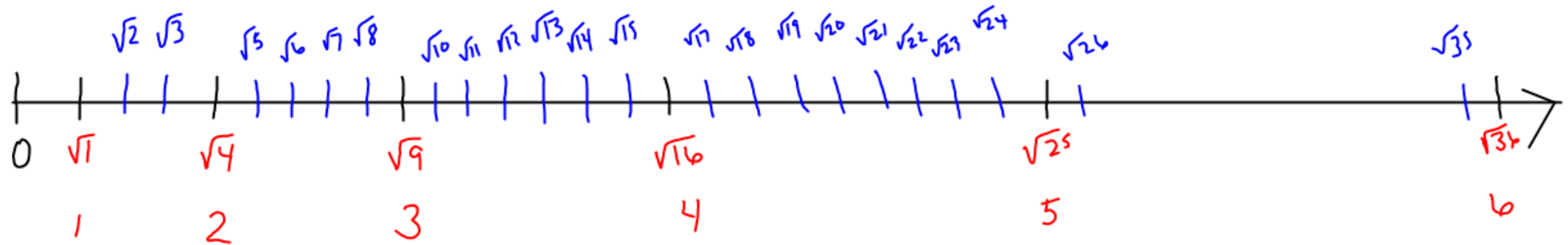
8.NS.2

Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of the expressions

The Number Line



Irrational Numbers



Perfect Squares/
Whole Numbers

$<$ less than

$>$ greater than

$=$ equal to

Read from left to right

$$2 < 3 \rightarrow 2 \text{ is less than } 3$$

$$5 > 4 \rightarrow 5 \text{ is greater than } 4$$

$$3 = \frac{9}{3} = 3$$

$$4 < \sqrt{25}$$

Perfect Squares

$$\sqrt{1} = 1$$

$$\sqrt{4} = 2$$

$$\sqrt{9} = 3$$

$$\sqrt{16} = 4$$

$$\sqrt{25} = 5$$

$$\sqrt{36} = 6$$

$$\sqrt{49} = 7$$

$$\sqrt{64} = 8$$

$$\sqrt{81} = 9$$

$$\sqrt{100} = 10$$

* Use Perfect Squares

EXAMPLE 1

Compare $\sqrt{3} + 5$ $\left\} \right.$ $3 + \sqrt{5}$. Write $<$, $>$, or $=$.

STEP 1

Approximate using perfect squares

Approximate $\sqrt{3}$; $\sqrt{3}$ is between 1 and 2Approximate $\sqrt{5}$; $\sqrt{5}$ is between 2 and 3**STEP 2**

Use approximations to simplify expressions

 $\sqrt{3} + 5$ is between 6 and 7 $3 + \sqrt{5}$ is between 5 and 6

ADDITIONAL EXAMPLE 1Compare. Write $<$, $>$, or $=$.

$$\text{A } \underline{\sqrt{8}-2} < \underline{4-\sqrt{8}}$$

$\sqrt{8}$ is btwn. 2 and 3

$$\begin{array}{l} 2-2=0 \\ 3-2=1 \end{array} \begin{array}{l} \text{between } 0 \text{ and } 1 \end{array}$$

$$\begin{array}{l} 4-2=2 \\ 4-3=1 \end{array} \begin{array}{l} \text{between } 1 \text{ and } 2 \end{array}$$

$$\text{B } \underline{\sqrt{20}+1} > \underline{3+\sqrt{2}}$$

$\sqrt{20}$ is btwn. 4 and 5

$\sqrt{2}$ is btwn. 1 and 2

$$\begin{array}{l} 4+1=5 \\ 5+1=6 \end{array} \begin{array}{l} \text{between } 5 \text{ and } 6 \end{array}$$

$$\begin{array}{l} 3+1=4 \\ 3+2=5 \end{array} \begin{array}{l} \text{between } 4 \text{ and } 5 \end{array}$$

YOUR TURN

Compare. Write $<$, $>$, or $=$.

3. $\sqrt{2} + 4$ $>$ $2 + \sqrt{4}$

$\sqrt{2}$ is between 1 and 2

$\sqrt{4}$ is 2

$1 + 4 = 5$ $>$ between 5 and 6
 $2 + 4 = 6$

$2 + 2 = 4$

4. $\sqrt{12} + 6$ $<$ $12 + \sqrt{6}$

$\sqrt{12}$ is between 3 and 4

$\sqrt{6}$ is between 2 and 3

$3 + 6 = 9$ $>$ between 9 and 10
 $4 + 6 = 10$

$12 + 2 = 14$ $>$ between 14 and 15
 $12 + 3 = 15$

EXAMPLE 2

COMMON CORE 8.NS.2

Order $\sqrt{22}$, $\pi + 1$, and $4\frac{1}{2}$ from least to greatest.**STEP 1**

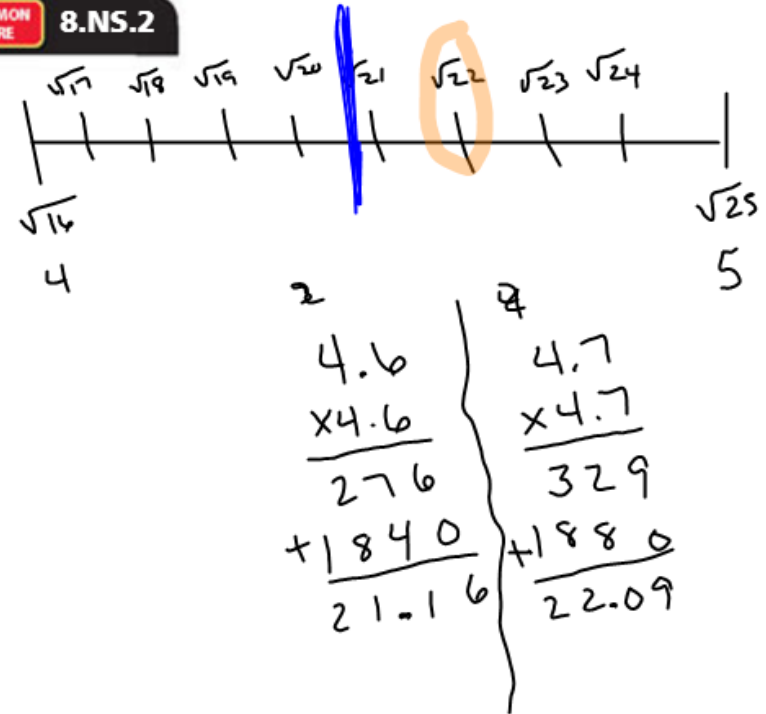
Approximate $\sqrt{22}$ btwn. 4 and 5
 ≈ 4.6 to 4.7

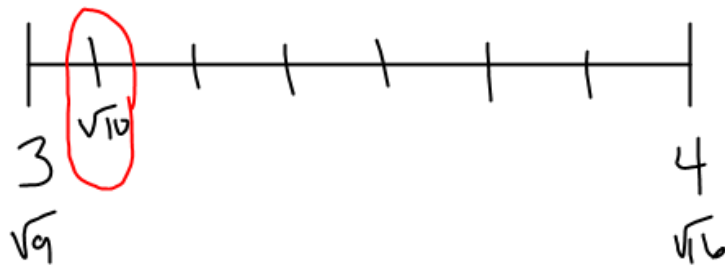
$$\pi + 1 \approx 4.14$$

$$4\frac{1}{2} = 4.5$$

STEP 2

$$\pi + 1, 4\frac{1}{2}, \sqrt{22}$$



**ADDITIONAL EXAMPLE 2**

Order 3π , $\sqrt{10}$, and 3.25 from greatest to least.

$$3\pi, 3.25, \sqrt{10}$$

$$3\pi \approx \frac{3.14}{\times 3} \approx 9.42$$

$$\sqrt{10} \approx \text{btwn. } 3 \text{ and } 4 = 3.1 \text{ and } 3.2$$

$$3.25$$

$$\begin{array}{r} 3.1 \\ \times 3.1 \\ \hline 31 \\ + 930 \\ \hline 9.61 \end{array} \quad \left\{ \begin{array}{r} 3.2 \\ \times 3.2 \\ \hline 64 \\ 960 \\ \hline 10.24 \end{array} \right.$$

Guided Practice



Personal
Math Trainer

Online Assessment
and Intervention.

Guided Practice



Selected
Answers

See all the
selected answers.



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Compare. Write $<$, $>$, or $=$. (Example 1)

1. $\sqrt{3} + 2$ $\sqrt{3} + 3$

3. $\sqrt{6} + 5$ $6 + \sqrt{5}$

5. $\sqrt{17} - 3$ $-2 + \sqrt{5}$

7. $\sqrt{7} + 2$ $\sqrt{10} - 1$

2. $\sqrt{11} + 15$ $\sqrt{8} + 15$

4. $\sqrt{9} + 3$ $9 + \sqrt{3}$

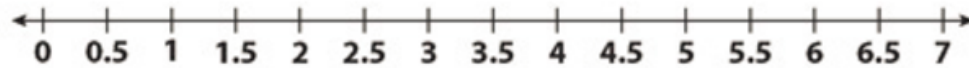
6. $10 - \sqrt{8}$ $12 - \sqrt{2}$

8. $\sqrt{17} + 3$ $3 + \sqrt{11}$

9. Order $\sqrt{3}$, 2π , and 1.5 from least to greatest. Then graph them on the number line. (Example 2)

$\sqrt{3}$ is between _____ and _____, so $\sqrt{3} \approx$ _____.

$\pi \approx 3.14$, so $2\pi \approx$ _____.



From least to greatest, the numbers are _____, _____,
_____.

- 10.** Four people have found the perimeter of a forest using different methods. Their results are given in the table. Order their calculations from greatest to least. ([Example 3](#))

| Forest Perimeter (km) | | | |
|-----------------------|---------------------|----------------|--------|
| Leon | Mika | Jason | Ashley |
| $\sqrt{17} - 2$ | $1 + \frac{\pi}{2}$ | $\frac{12}{5}$ | 2.5 |



GP p24 1-10

IP p25 12-15, 17, 18