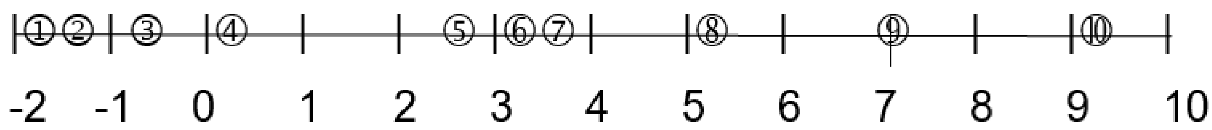
<u>I Am The Irrational Number System Practice</u>

Use the following information to answer the first question.

Consider the number line below.



1. Complete the following table.

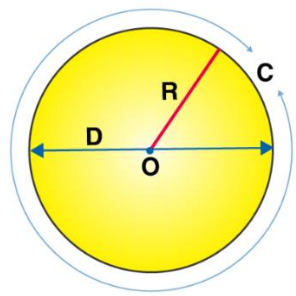
Number	Rational or Irrational	Numbered Position on the Number Line
$\sqrt{27}$		
-1.48		
π		
$9.176243968\ldots$		
$\sqrt{49}$		
$-1\frac{9}{10}$		
$\sqrt{14}$		
$\frac{1}{3}$		
$-\sqrt{0.72}$		
$\sqrt{8}$		

2. When estimating the value of $\sqrt{150}$ using benchmarks, the most accurate statement is

A) $\sqrt{150}$ is between $\sqrt{130}$ and $\sqrt{170}$.
B) $\sqrt{150}$ is between $\sqrt{144}$ and $\sqrt{200}$.
C) $\sqrt{150}$ is between $\sqrt{144}$ and $\sqrt{169}$.
D) $\sqrt{150}$ is between $\sqrt{130}$ and $\sqrt{200}$.

3. The irrational number, $\sqrt{K175}$, rounded to 3 decimal places is 56.347. If K is an integer, the value of K is ___.

Use the following information to answer the next question.



The circumference of the circle above is (6π) cm.

4. The length of the radius of the circle is

A) 1.5 cm B) 3 cm C) 6 cm D) 12 cm

5. Which of the following statements is true?

A) A number can be both rational and irrational at the same time.
B) Both $\sqrt{9}$ and $\sqrt{20}$ are irrational numbers.
C) 11.7 > $\sqrt{129}$
D) An irrational number can be written in the form $\frac{a}{b}$, where a and b are integers and b $\neq$ 0.

Use the following information to answer the next question.

Consider the following list of real numbers.

E. π	**F.** $\sqrt{12}$
G. $4\frac{1}{2}$	**H.** $\sqrt{16}$

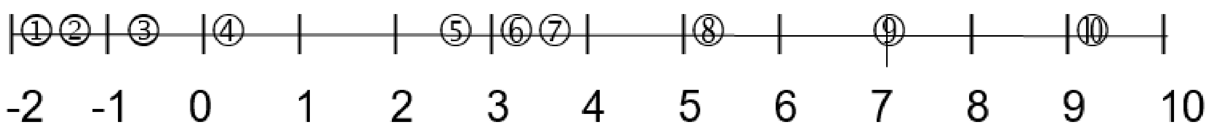
6. Using the letters E, F, G, or H, the largest **irrational** number is ____.

7. Use benchmarks to **explain** how to estimate $\sqrt{8}$, to one decimal, without using a calculator.

<u>I Am The Irrational Number System Practice Solutions</u>

Use the following information to answer the first question.

Consider the number line below.



1. Complete the following table.

Number	Rational or Irrational	Numbered Position on the Number Line
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π		
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$-1\frac{9}{10}$		
$\sqrt{14}$		
$\frac{1}{3}$		
$-\sqrt{0.72}$		
$\sqrt{8}$		

Solution

Number	Rational or Irrational	Numbered Position on the Number Line
$\sqrt{27}$	Irrational	8
-1.48	Rational	2
π	Irrational	6
$9.176243968\ldots$	Irrational	10
$\sqrt{49}$	Rational	9
$-1\frac{9}{10}$	Rational	1
$\sqrt{14}$	Irrational	7
$\frac{1}{3}$	Rational	4
$-\sqrt{0.72}$	Irrational	3
$\sqrt{8}$	Irrational	5

The **irrational numbers** are either imperfect square roots ($\sqrt{27}$, $\sqrt{14}$, $-\sqrt{0.72}$, $\sqrt{8}$), repeating decimals without a period (9.176243968…), or π.

The **rational numbers** can all be written in the form $\frac{a}{b}$, where a and be are integers and

b $\neq 0$.

For example,

$$-1.48 = -\frac{148}{100}$$

$\sqrt{49}$ = 7 = $\frac{7}{1}$

$$-1\frac{9}{10} = -\frac{19}{10}$$

$\frac{1}{3}$ is an integer divided by an integer, and b $\neq 0$.

2. When estimating the value of $\sqrt{150}$ using benchmarks, the most accurate statement is

   $A)$ $\sqrt{150}$ is between $\sqrt{130}$ and $\sqrt{170}$.
   $B)$ $\sqrt{150}$ is between $\sqrt{144}$ and $\sqrt{200}$.
   $C)$ $\sqrt{150}$ is between $\sqrt{144}$ and $\sqrt{169}$.
   $D)$ $\sqrt{150}$ is between $\sqrt{130}$ and $\sqrt{200}$.

Solution

The closest perfect square less than $\sqrt{150}$ is $\sqrt{144}$. The closest perfect square greater than $\sqrt{150}$ is $\sqrt{169}$. Thus, we know that $\sqrt{150}$ is between 12 and 13.

The correct answer is C.

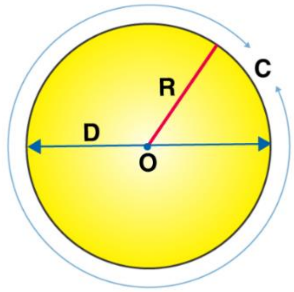
3. The irrational number, $\sqrt{K175}$, rounded to 3 decimal places is 56.347. If K is an integer, the value of K is _3_.

Solution

Squaring 56.347 will result in the radicand. 56.347^2 = 3174.9844…or rounded up to 3175.

The value of K is 3.

Use the following information to answer the next question.



The circumference of the circle above is (6π) cm.

4. The length of the radius of the circle is

A) 1.5 cm B) 3 cm C) 6 cm D) 12 cm

Solution

We know that $\frac{circumference}{diameter} = \pi$. The radius is half of the diameter.

$$\frac{6\pi}{diameter} = \pi$$

$$\frac{6\pi}{\pi} = diameter$$

6 = diameter

The radius is 3 cm.

The correct answer is B.

5. Which of the following statements is true?

A) A number can be both rational and irrational at the same time.
B) Both $\sqrt{9}$ and $\sqrt{20}$ are irrational numbers.
C) 11.7 > $\sqrt{129}$
D) An irrational number can be written in the form $\frac{a}{b}$, where a and b are integers and b ≠ 0.

Solution

Statement A

This is **false** because a number cannot be both a rational number and an irrational number at the same time. They are mutually exclusive.

Statement B

This is **false**.

$\sqrt{9} = 3$, which is a rational number.

$\sqrt{20}$ is an imperfect square root, which is an irrational number.

Statement C

Using the calculator, $\sqrt{129} = 11.357 \ldots$

Since 11.7 > 11.357…, this statement is **true.**

Statement D

This statement is **false**. An irrational number *cannot* be written in the form $\frac{a}{b}$, where a and b are integers and b $\neq 0$.

The correct answer is C.

Use the following information to answer the next question.

Consider the following list of real numbers.

E. π	**F.** $\sqrt{12}$
G. $4\frac{1}{2}$	**H.** $\sqrt{16}$

6. Using the letters E, F, G, or H, the largest **irrational** number is _F_.

Solution

When comparing numbers from different systems, it is usually helpful to convert to the same type of number. In this case, we will convert all to their decimal equivalents.

$\pi = 3.14$ ... (E – which is irrational)

$\sqrt{12} = 3.46$ ... (F – which is irrational))

$4\frac{1}{2} = 4.5$ (G – which is rational)

$\sqrt{16}$ = 4.0 (H – which is rational)

The largest irrational number is $\sqrt{12}, or\ 3.46$ ...

The largest irrational number is F.

7. Use benchmarks to **explain** how to estimate $\sqrt{8}$, to one decimal, without using a calculator.

Solution

Perfect square roots are used as benchmarks because they simplify to integers.

The closest perfect square root below $\sqrt{8}$ is $\sqrt{4}$, which is equal to 2.

The closest perfect square root above $\sqrt{8}$ is $\sqrt{9}$, which is equal to 3.

Using the benchmarks of $\sqrt{4}$ and $\sqrt{9}$, we know that $\sqrt{8}$ is a number between 2 and 3.

Comparing the radicands of 4, 8, and 9, since 8 is much close to 9, our estimation should be closer to 3.

Thus, a reasonable approximation for $\sqrt{8}$ would be either 2.8 or 2.9.