Wednesday, September 11, 2019 4:23 PM

Warm up

① State is the following are Natural, whole, integer, rational, irrational or real numbers. (Some might have more than one answer or None!)

a) $4.87325\ldots$

Irrational

Real

b) $-0.\overline{423}$

Rational

Real

c) $\sqrt{-50}$

None

$\emptyset$

d) $-\sqrt{9} = -3$

Integer

Rational

Real

② Find a number that is a whole number, but not a natural number

0, 1, 2, 3, 4, . . .

1, 2, 3, 4, . . .

1l) $\overset{\text{Ir}}{3.141592\ldots} + \overset{\text{Ra}}{2}$

T

$5.141529\ldots$

1m) $3.141592\ldots + \sqrt{5}$

F

$\sqrt{5} \times \sqrt{5} = (\sqrt{5})^2$

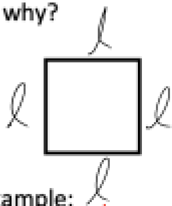
$= 5 \leftarrow$ not irrational

When we went over the grade 8 exam, I told you that:

$(\sqrt{a})^2 = a$	$\sqrt{a^2} = a$

In other words, Squaring and Square rooting are opposites!
(Like adding/subtracting or multiplying/dividing)

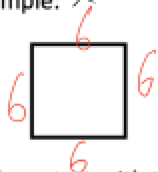
... But why?



Area = A = base × height $= l \times l = l^2$

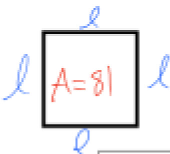
Perimeter = P = $l + l + l + l = 4l$

For example:



Area = A = $6^2 = 36$

What if we start with the area?



Area = A = $81 = l^2$

what number squared gives 81?

$l = \sqrt{A} = \sqrt{81} \Rightarrow l = 9$ because $9 \times 9 = 81$, $9^2 = 81$

In Summary: #1. $A = l^2$ **AND** #2. $l = \sqrt{A}$

#1. → #2.	#2. → #1.
$l = \sqrt{A} \Rightarrow \boxed{l = \sqrt{(l^2)}}$	$A = l^2 \Rightarrow \boxed{A = (\sqrt{A})^2}$

This shows that, Squaring and Square rooting are opposites!

Perfect Squares – Any whole **number squared!**

$0^2 = 0$	$\sqrt{0} = 0$
$1^2 = 1$	$\sqrt{1} = 1$
$2^2 = 4$	$\sqrt{4} = 2$
$3^2 = 9$	$\sqrt{9} = 3$
$4^2 = 16$	$\sqrt{16} = 4$
$5^2 = 25$	$\sqrt{25} = 5$
$6^2 = 36$	$\sqrt{36} = 6$
$7^2 = 49$	$\sqrt{49} = 7$
$8^2 = 64$	$\sqrt{64} = 8$
$9^2 = 81$	$\sqrt{81} = 9$
$10^2 = 100$	$\sqrt{100} = 10$

Let's try some problems with roots…

$\sqrt{\frac{49}{121}} = \frac{\sqrt{49}}{\sqrt{121}} = \boxed{\frac{7}{11}}$

$\sqrt{\frac{7\times 7}{11\times 11}} = \sqrt{\frac{7}{11}\times\frac{7}{11}}$

$= \sqrt{\left(\frac{7}{11}\right)^2} = \frac{7}{11}$

$\sqrt{16+9} \neq \cancel{\sqrt{16}+\sqrt{9}}$

Simplify first

$\sqrt{25} = \boxed{5}$

$\sqrt{16}+\sqrt{9} \neq \cancel{\sqrt{16+9}}$

$4+3 = \boxed{7}$

$\sqrt{-100} = \boxed{\varnothing}$

$(\ \_\ )^2 = -100$

$(-10)^2 = +100$

$-\sqrt{100} \neq \varnothing$

$-(\sqrt{100})$

$-(10) = \boxed{-10}$

$\sqrt{0.81}$

For decimals, use calculator

$= 0.9$

check:

$(0.9)^2 = 0.81$ ✓

What happens if we take the square root of a number that isn't a perfect square?

$\sqrt{12}$

$= 3.4641016\ldots$

$3 < \sqrt{12} < 4$

$\sqrt{9} < \sqrt{12} < \sqrt{16}$

$\sqrt{78}$

$= 8.8317608\ldots$

$8 < \sqrt{78} < 9$

$\sqrt{64} < \sqrt{78} < \sqrt{81}$

$\sqrt{78}$ closer to 9

because 78 is closer to 81

$-\sqrt{97}$

$= -9.8488578$

$-9 > -\sqrt{97} > -10$

$-\sqrt{81} > -\sqrt{97} > -\sqrt{100}$

$-\sqrt{97}$ close to -10

because 97 is close to 100