Warm up

① State if 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 $-\frac{423}{999}$
Real

c) $\sqrt{-50}$

Not real
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 . . .

<u>Pg. 6</u>

1g) $-3 = \frac{-3}{1}$

T

1j) F

1m) $5.37295 83\ldots$

F $\times\ 0.85123 81\ldots$

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

Ir

$$= 5$$

Math 9 Section 1.2 – Square Roots

Homework: Section 1.2 on Pg. 10; 1-2all, 3 Left, 4ab, 6, 7, 8, 10, 12, 13 – Answers on Pg. 361

(Use calculator for questions with decimals)

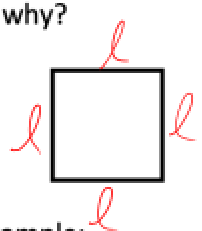
When we went over the grade 8 exam, I told you that:

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

In other words, Squaring and Square rooting are opposites!

(Like adding/subtracting or multiplying/dividing)

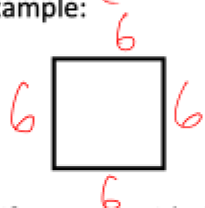
... But why?



Area = A = length x width = $\ell \times \ell = \ell^2$

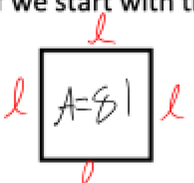
Perimeter = P = $\ell + \ell + \ell + \ell = 4\ell$

For example:



Area = A = $\ell^2 = (6)^2 = 36$

What if we start with the area?



what number squared gives 81?

Area = A = $81 = \ell^2$

$\ell = \sqrt{A} = \sqrt{81} \Rightarrow \ell = 9$

because $9^2 = 81$

In Summary:

#1. $A = \ell^2$	**AND**	#2. $\ell = \sqrt{A}$

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

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…

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

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

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

$$\sqrt{16+9} = \sqrt{25}$$

simplify

$$= 5$$

$$\sqrt{16} + \sqrt{9} = 4 + 3$$

$$= 7$$

$$\sqrt{-100} = \emptyset$$

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

$$(-10)^2 = +100$$

$$-\sqrt{100} = -[\sqrt{100}]$$

$$= -[10] = -10$$

$$\sqrt{0.81} = 0.9$$

check

$$(0.9)^2 = 0.81 \checkmark$$

use calculator for decimal

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

$$\sqrt{12} = 3.464101\ldots$$

$$3 < \sqrt{12} < 4$$

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

$$\sqrt{78} = 8.8317\ldots$$

$$8 < \sqrt{78} < 9$$

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

$$-\sqrt{97}$$

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

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

$$-9.85\ldots$$