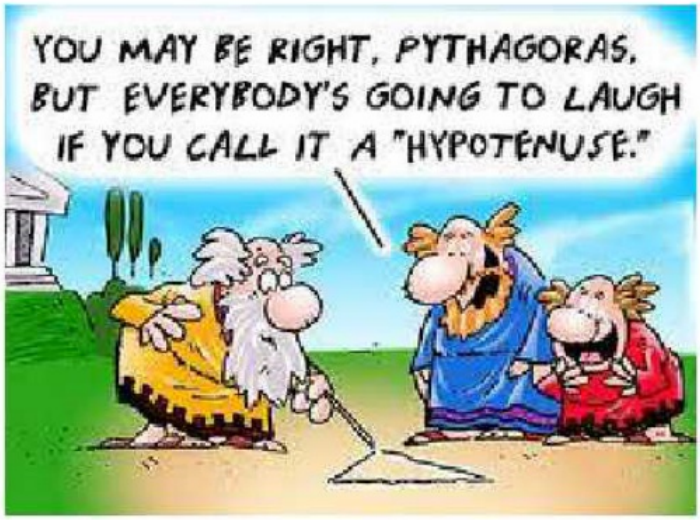
The Pythagorean Theorem

Date	*Topic*	*Homework*	*IXL*	√
6/3	*Perfect Squares and Square Roots & Classification of Real Numbers*	*Worksheet 1*	*Grade 8 O.1*	
6/4	*The Pythagorean Theorem – proof*	*Worksheet 2*	*Grade 8 O.2*	
6/5	*Missing Sides – Case 1 & 2*	*Worksheet 3*	*Grade 8 O.4*	
6/6	*Proving a Triangle is Right*	*Worksheet 4*	*Grade 8 O.5*	
6/7	*Word problems*	*Worksheet 5*	*Grade 8 O.3*	
6/10	*Cube Roots*	*Review Packet*		
6/11	*Review & All IXL is due today*	*Study for Test*		
6/12	*TEST*	*Study for final*		



Name. _____

$\frac{1}{7} = 0.142857143$ $\frac{3}{7} = 0.428571429$

$\frac{2}{7} = 0.28571428$ $\frac{4}{7} = 0.571428571$

$\frac{5}{7} = .714285\ldots$

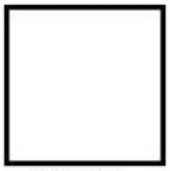
$\frac{6}{7} = .857142\ldots$

Day 1 – Perfect Squares and Square Roots

Find the areas of the squares below.

$3 \cdot 3$

10^2 $10 \cdot 10$



7^2

Side = 3 cm *Side = 10 ft* *Side = 7 m*

$A =$ 9 cm^2 $A =$ 100 ft^2 $A =$ 49 m^2

$A = S^2$

Formula $A = S \cdot S$ OR $A = S^2$

So, s is the square root *of A because* $S \cdot S = A$

$\sqrt{A} = S$ because $S \cdot S = A$ or $S^2 = A$

If the radicand *is a* perfect square*, the answer will be a* whole number.

-15^2

$(-15)^2$

Root	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Square	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225

Find the square root of 225. 15 or -15 because $-15 \cdot -15 = 225$

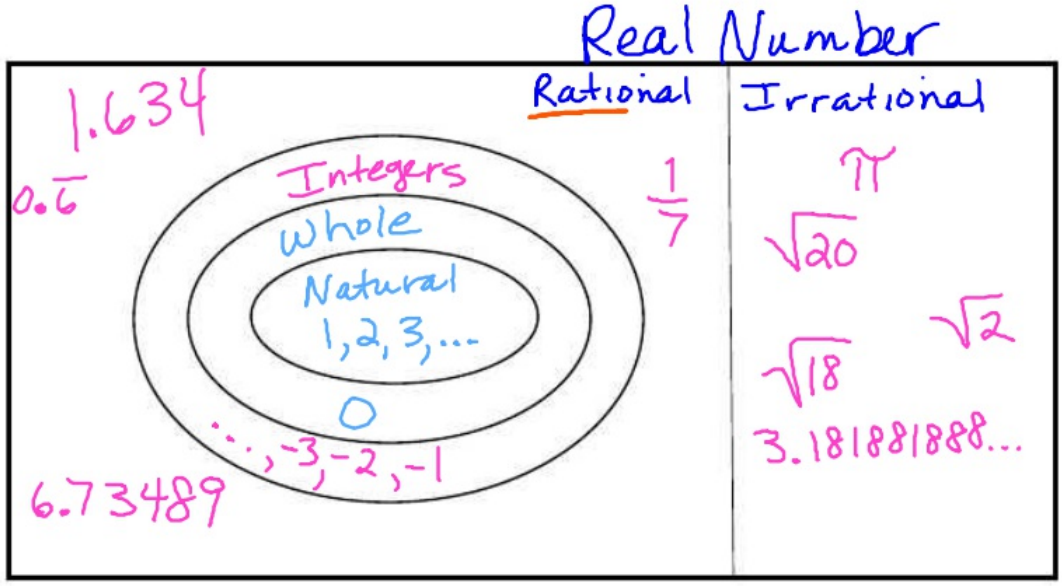
If the radicand is not *a perfect square, the square root will be a* nonterminating & nonrepeating *decimal (irrational).*

$\sqrt{226} \approx 15.03329638$

Plot the following numbers on the number line below: $\sqrt{3}, \sqrt{5}, \sqrt{8}, \sqrt{16}$, *and* $\sqrt{20}$.

Between which 2 whole numbers does $\sqrt{20}$ lie? 4 and 5.

Classification of Real Numbers



Natural: Counting

Whole: Natural numbers and 0.

Integers: Whole numbers and their opposites.

Rational: any numbers that can be written as fractions.
(terminating or repeating decimals)

Irrational: "not" rational
can't be written as a fraction
(nonterminating & nonrepeating decimals)

square

square

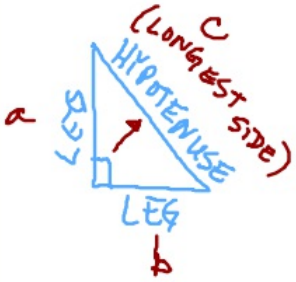
square root

Day 2 – The Pythagorean Theorem

Side a	Side b	Area of Square On Side a		Area of Square On Side b		Area of Square on Side C	Side C
1	2	1	+	4	=	5	$\sqrt{5}$
1	3	1	+	9	=	10	$\sqrt{10}$
1	4	1	+	16	=	17	$\sqrt{17}$
2	2	4	+	4	=	8	$\sqrt{8}$
2	3						
4	5	16		25		41	$\sqrt{41}$

If we have a right triangle, then the sum of the squares of the legs is equal to the square of the hypotenuse.

$a^2+b^2=c^2$



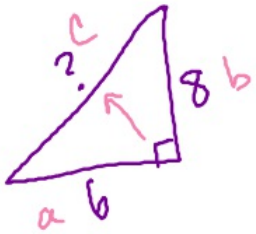
$a^2+b^2=c^2$

$6^2+8^2=c^2$

$36+64=c^2$

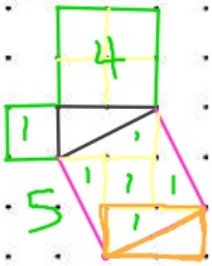
$\sqrt{100}=\sqrt{c^2}$

$c=\sqrt{100}=10$

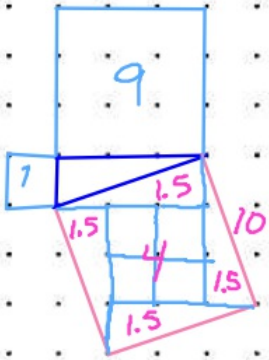


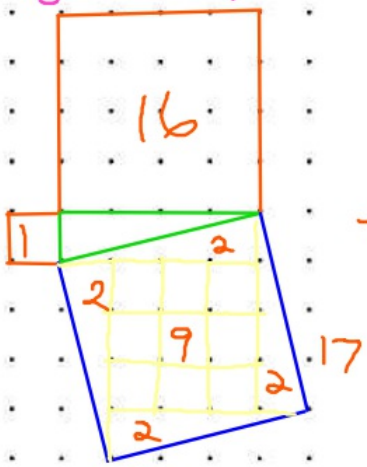
parallel lines → same slope $\frac{1}{3}$

perpendicular lines → slopes are negative reciprocals $-\frac{3}{1}$

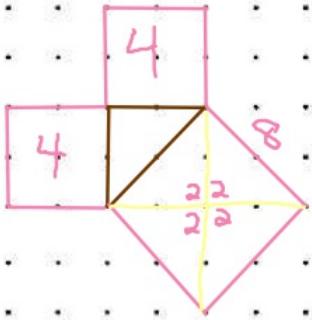


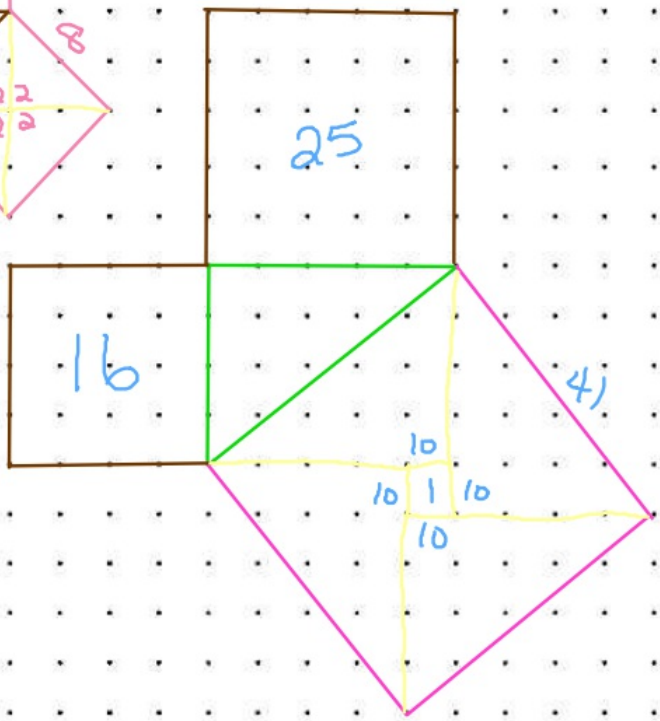
$\frac{1}{2}$ $-\frac{2}{1}$





$\frac{1}{4}$ $-\frac{4}{1}$

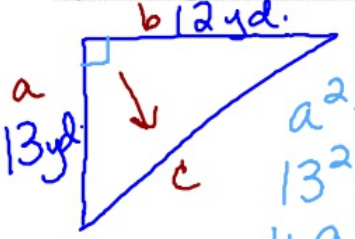




$\frac{4}{5}$ $-\frac{5}{4}$

Day 3 – Missing Sides Case 1 & 2

Case 1 - Missing Hypotenuse



$a^2+b^2=c^2$

$13^2+12^2=c^2$

$169+144=c^2$

$313=c^2$

$c=\sqrt{313}\approx 17.7$ yd.

Case 2 - Missing Leg

$a^2+b^2=c^2$

$34^2+b^2=45^2$

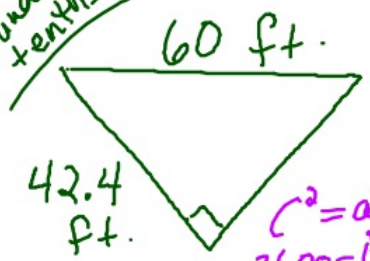
$1156+b^2=2025$

$-1156 \quad -1156$

$b^2=869$

$b=\sqrt{869}\approx 29.5$ in

Round to tenths



$60^2=3600 \quad 42.4^2\approx 1797.8$

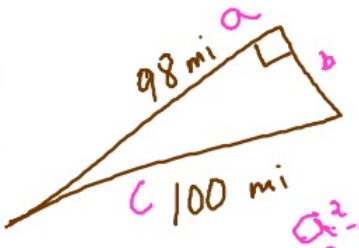
$c^2=a^2+b^2$

$3600=1797.8+b^2$

$-1797.8 \quad -1797.8$

$1802.2=b^2$

$42.5\approx b$ ft



Round to nearest hundredth

$a^2+b^2=c^2$

$98^2+b^2=100^2$

$9604+b^2=10,000$

$-9604 \quad -9604$

$b^2=396$

$b\approx 19.90$ mi

P.T.

If the triangle is a right triangle,
Then the sum of the squares of the legs is equal to the square of the hypotenuse.

Converse: If the sum of the squares of the two shorter sides of a triangle equal the square of longest side,
Then the triangle is a right triangle.

$a^2+b^2=c^2$
$33^2+44^2=55^2$
$1089+1936=3025$
$3025=3025$ ✓

Yes

$27, \sqrt{2026}, 36$

$a^2+b^2=c^2$
$27^2+36^2=(\sqrt{2026})^2$
$729+1296=2026$
$2025 \neq 2026$

NO

$2, 2, \sqrt{8}$

$a^2+b^2=c^2$
$2^2+2^2=(\sqrt{8})^2$
$4+4=8$
$8=8$

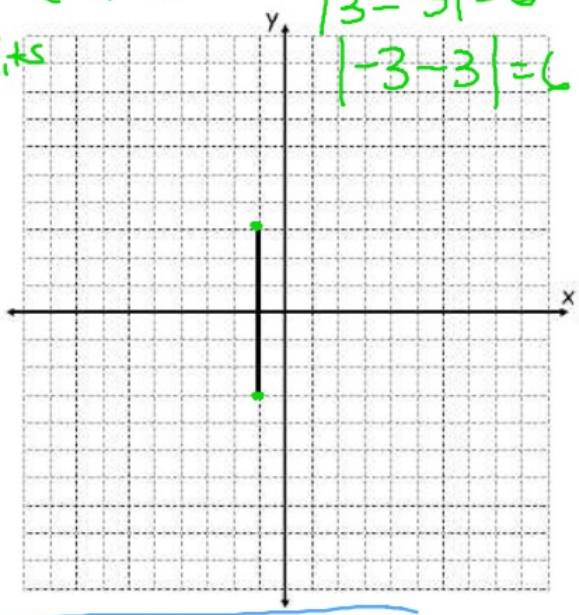
Yes

Day 5 - Word Problems

$(-1, 3)$
$(-1, -3)$

$|3| + |-3| = 6$
$|3 - -3| = 6$
$|-3 - 3| = 6$

6 units



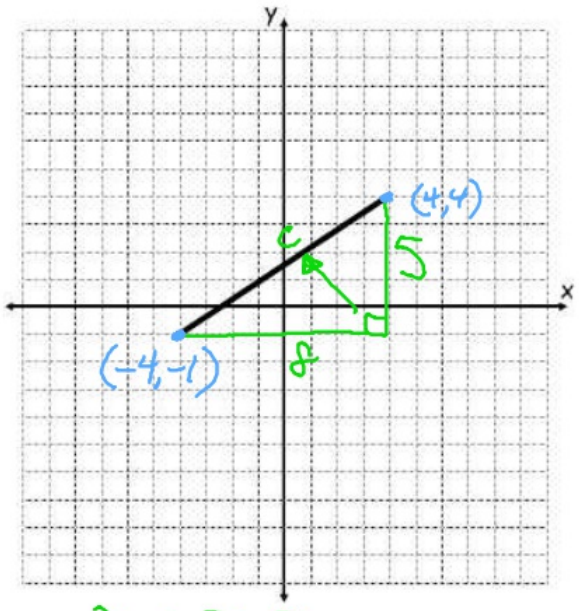
$$\sqrt{(4 - -4)^2 + (4 - -1)^2}$$

$(-4, -1)$ #1 $(4, 4)$ #2

(x_1, y_1) (x_2, y_2)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The distance formula

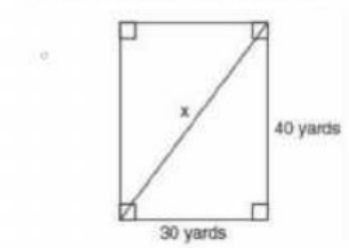


$a^2 + b^2 = c^2$
$8^2 + 5^2 = c^2$
$64 + 25 = c^2$
$\sqrt{89} = \sqrt{c^2}$
$c = \sqrt{89}$

$(20, 5)$ $(-2, -12)$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$d = \sqrt{(-2 - 20)^2 + (-12 - 5)^2}$
$d = \sqrt{(-22)^2 + (-17)^2}$
$d = \sqrt{484 + 289} = \sqrt{773}$

1 Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.

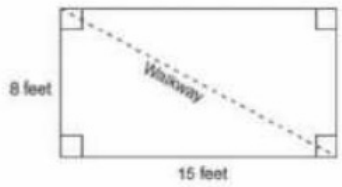


What is the length of the diagonal, in yards, that Tanya runs?

1) 50
2) 60
3) 70
4) 80

$a^2+b^2=c^2$
$30^2+40^2=c^2$
$900+1600=c^2$
$\sqrt{2500}=\sqrt{c^2}$
$c=50$

2 Nancy's rectangular garden is represented in the diagram below.

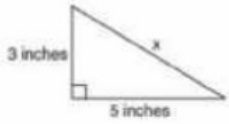


If a diagonal walkway crosses her garden, what is its length, in feet?

1) 17
2) 22
3) $\sqrt{161}$
4) $\sqrt{529}$

$a^2+b^2=c^2$
$8^2+15^2=c^2$
$64+225=c^2$
$\sqrt{289}=c$
$17=c$

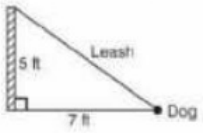
3 What is the value of x, in inches, in the right triangle below?



1) $\sqrt{15}$
2) 8
3) $\sqrt{34}$
4) 4

$a^2+b^2=c^2$
$3^2+5^2=c^2$
$34=c^2$
$\sqrt{34}^{in}=c$

4 The end of a dog's leash is attached to the top of a 5-foot-tall fence post, as shown in the diagram below. The dog is 7 feet away from the base of the fence post.



How long is the leash, to the *nearest tenth of a foot*?

1) 4.9
2) 8.6
3) 9.0
4) 12.0

$a^2+b^2=c^2$
$5^2+7^2=c^2$
$\sqrt{74}=\sqrt{c^2}$
$8.6\approx c$
ft

$(5,4)\ (-2,9)$
$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$d=\sqrt{(-2-5)^2+(9-4)^2}$
$d=\sqrt{49+25}$
$d=\sqrt{74}$

Day 6 – Cube Roots

Cube Roots:

When you cube a number, you raise it to the third *power. The* Cube root *is the inverse operation.*

Root	1	2	3	4	5	6	7	8	9	10
Cube	1	8	27	64	125	216	343	512	729	1000

Find each of the following: (Round to the nearest thousandth if necessary)

1) $(14)^3$ = $14 \cdot 14 \cdot 14 = 2744$

2) $(-4)^3$ = $-4 \cdot -4 \cdot -4 = -64$

3) $\left(\frac{2}{3}\right)^3$ = $\frac{8}{27}$ $\quad \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} =$

4) $\sqrt[3]{343}$ = 7

5) $\sqrt[3]{-125}$ = -5

6) $\sqrt[3]{-43}$ ≈ -3.503

7) $\sqrt[3]{100}$ ≈ 4.642

B **1.** What is the volume of a cube with an edge length of 5 units? What is the volume of a cube with an edge length of 2.5 units?

$V = e^3$ $\quad V = 5^3 = 125$ units^3

$V = (2.5)^3 = 15.625$ units^3

2. Find the missing numbers.

a. $\sqrt[3]{125} = 5$ (125: Volume; 5: edge length)

b. $\sqrt[3]{\square} = 2.5$ (□: 15.625)

3. Find x.

a. $x^3 = 27$

$\sqrt[3]{x^3} = \sqrt[3]{27}$

$x = 3$

b. $x^3 = -27$

$\sqrt[3]{x^3} = \sqrt[3]{-27}$

$x = -3$

c. $x^3 = \frac{1}{8}$

$\sqrt[3]{x^3} = \sqrt[3]{\frac{1}{8}}$

$x = \frac{1}{2}$

d. $(\sqrt[3]{x})^3 = (27)^3$

$x = 19{,}683$

e. $\sqrt[3]{x} = -27$

$x = -19{,}683$

f. $\sqrt[3]{x} = -\frac{1}{8}$

$x = -\frac{1}{512}$

C **1.** Between which two consecutive whole numbers does $\sqrt[3]{10}$ lie? Explain.

2 and 3