Warm-Up

March 30, 2017

Get out your phones and go to:
kahoot.it

Get into groups of no more than 4 people.

Identity

↳ True no Matta' wut.

		L	R
x	y	x^2-y^2	$=(x+y)(x-y)$
16	0	16^2-0^2 $256-0$ 256	$(16+0)(16-0)$ $(16)(16)$ 256 ✓
-3	-2	5	5 ✓
0	14	-196	-196 ✓

	x	y	x^2-y^2	$(x+y)(x-y)$
0	0	27	$0-729$ -729	$(0+27)(0-27)$ $(27)(-27)=-729$
+	1	−2	$1^2-(-2)^2$ $1-4$ -3	$(1+-2)(1--2)$ $(-1)(3)$ -3
−	−2	0	$(-2)^2-0^2$ $4-0$ 4	$(-2+0)(-2-0)$ $(-2)(-2)$ 4

$L = R$ Identity

	x	y	$x^2 - y^2$	$(x+y)(x-y)$	
0	0	1	$0^2 - 1^2$ $0 - 1$ -1	$(0+1)(0-1)$ $(1)(-1)$ -1	✓
+	5	0	$5^2 - 0^2$ 25	$(5+0)(5-0)$ $(5)(5)$ 25	✓
−	−3	−4	$(-3)^2 - (-4)^2$ $9 - 16$ -7	$(-3 + -4)(-3 - -4)$ $(-7)(1)$ -7	✓

$$x^2 - y^2 = (x+y)(x-y)$$

x	y
6	4
-2	-5
0	3

$x^2 - y^2$	$(x+y)(x-y)$
$(-2)^2 - (-5)^2$	$(-2+(-5))(-2-(-5))$
-21	$-7(3)$
	-21

a-h

Plug in pos, neg, and zero

if L = R → identity

if L ≠ R → not identity

a. $(x-5)(x+5) = x^2 - 25$

yes

b. $(x+5)^2 = x^2 + 25$

no

c. $\sqrt{x^2} = |x|$

yes

d. $\sqrt{x^4} = x^2$

yes

e. $\sqrt{x^6} = x^3$

no

f. $\sqrt{x^2+y^2} = x+y$

no

g. $(a+b)(a^2-ab+b^2) = a^3+b^3$

yes

h. $\dfrac{x+y}{x} = y$ no

$$(a+b)(a^2-ab+b^2)=a^3+b^3$$

$$(2+7)(2^2-(2)(7)+7^2)=2^3+7^3$$

$$9(4-14+49)=8+343$$

$$9(39)=351 \checkmark$$

$$351 \checkmark$$

a Yes

b NO

$x=3$

$(3+5)^2 = 3^2+25$

$8^2 = 9+25$

$64 \neq 34$

c Yes

d Yes

e NO

$x=3$

$\sqrt{3^6} = 3^3$

f NO

$\sqrt{729} = 27$

$27 = 27$ ✓

g YES

h NO

$x=-3$

$\sqrt{(-3)^6} = (-3)^3$

$\sqrt{729}$

$27 \neq -27$

Identity: $x^2 - y^2 = (x-y)(x+y)$

x	y	$x^2 - y^2$	$(x-y)(x+y)$
6	4	$36-16=20$	$(6-4)(6+4)=2(10)=20$
-2	5	-21	-21
0	1	$0-1=-1$	$(0-1)(0+1)=-1$

$$(x+5)^2 = x^2 + 25$$

$$(5+5)^2 = 5^2 + 25$$

$$10^2 = 25 + 25$$

$$100 \neq 50$$

$$\sqrt{x^2} = |x|$$

$$\sqrt{2^2} = |2|$$

$$\sqrt{4} = 2$$

$$2 = 2$$

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

$$\sqrt{4} = |-2|$$

$$2 = 2$$

$$\sqrt{x^6} = x^3$$

$$\sqrt{3^6} = 3^3$$

$$\sqrt{729} = 27$$

$$27 = 27$$

$$\sqrt{(-3)^6} = (-3)^3$$

$$\sqrt{729} = -27$$

$$27 = -27$$

NOTES

Identity: $x^2 - y^2 = (x-y)(x+y)$

x	y	$x^2 - y^2$	$(x-y)(x+y)$
6	4	$36-16=20$	$2(10)=20$
-2	5	$4-25=-21$	$(-2-5)(-2+5)$ $-7 \cdot 3$ -21

c) $\sqrt{x^2} = |x|$

$\sqrt{2^2} = |2|$

$\sqrt{4} = 2$

$\pm 2 = 2$

F) $\sqrt{x^2+y^2} = x+y$

$\sqrt{2^2+3^2} = 2+3$

$\sqrt{4+9} = 5$

$\sqrt{13} = 5$

g) $(a+b)(a^2-ab+b^2)=a^3+b^3$

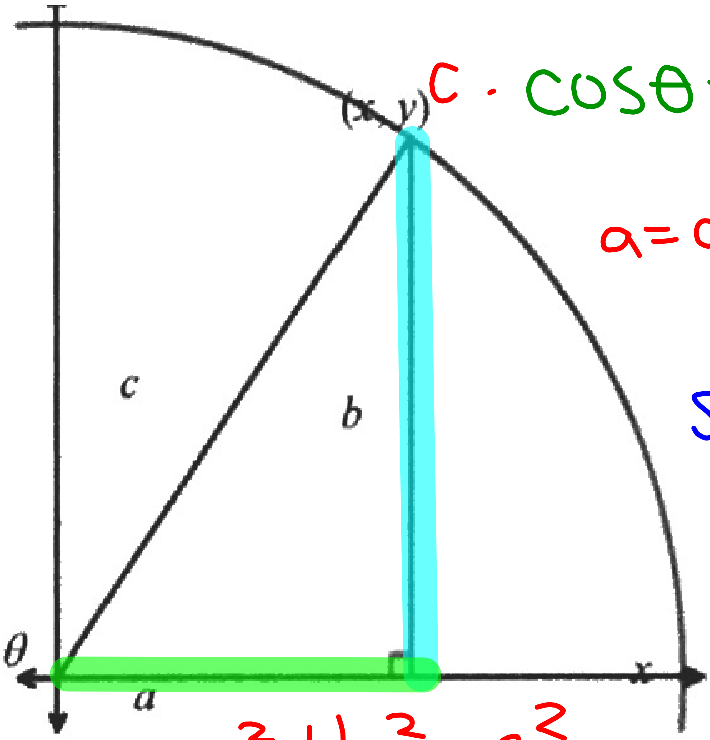
$(2+3)(4-(2)3+9)=2^3+3^3$

$5(7)=8+27$

$35=35$

$$\sqrt{x^6} = x^3$$
$$\sqrt{2^6} = 2^3$$
$$\sqrt{64} = 8$$
$$8 = 8$$

$$\sqrt{(-2)^6} = (-2)^3$$
$$\sqrt{64} = -8$$
$$8 = -8$$



$$c \cdot \cos\theta = \frac{A}{H} = \frac{a}{c} \cdot c$$

$$a = c \cdot \cos\theta$$

$$\sin\theta = \frac{O}{H} = \frac{b}{c}$$

$$b = c \cdot \sin\theta$$

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

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

$$(c\cdot\cos\theta)^2+(c\cdot\sin\theta)^2=c^2$$

$$c^2\cdot\cos^2\theta+c^2\cdot\sin^2\theta=c^2$$

$$\frac{\cancel{c^2}(\cos^2\theta+\sin^2\theta)}{\cancel{c^2}}=\frac{\cancel{c^2}}{\cancel{c^2}}$$

$$\boxed{\cos^2\theta+\sin^2\theta=1}$$

$$\frac{\cos^2\theta}{\cos^2\theta} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

$$\boxed{1 + \tan^2\theta = \sec^2\theta}$$

$$\frac{\cos^2\theta}{\sin^2\theta} + \frac{\sin^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

$$\boxed{\cot^2\theta + 1 = \csc^2\theta}$$

$\left(\frac{1}{\cos^2\theta}\right)$ $\left(\frac{1}{\cos\theta}\right)^2$

	θ	$1+\tan^2\theta$	$= \sec^2\theta$	$\cot^2\theta+1$	$= \csc^2\theta$
QI	$22°$				
QII	$135°$				
QIII	$200°$				
QIV	$350°$				

$\sin(\ \ )^2 \quad \cos(\ \ )^2$

	θ	$\sin^2\theta$	$\cos^2\theta$	$\sin^2\theta+\cos^2\theta$
QI	22°	.1403	.8597	1
QII	135°	1/2	1/2	1
QIII	200°	.1169	.883	1
QIV	350°			1

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

$$(c \cdot \cos\theta)^2 + (c \cdot \sin\theta)^2 = c^2$$

$$c^2 \cdot \cos^2\theta + c^2 \cdot \sin^2\theta = c^2$$

$$\frac{\cancel{c^2}(\cos^2\theta + \sin^2\theta)}{\cancel{c^2}} = \frac{\cancel{c^2}}{\cancel{c^2}}$$

$$\boxed{\cos^2\theta + \sin^2\theta = 1}$$

$$\frac{\cos^2\theta}{\cancel{\cos^2\theta}} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

$$\boxed{1 + \tan^2\theta = \sec^2\theta}$$

$$\frac{\cos^2\theta}{\sin^2\theta} + \frac{\sin^2\theta}{\cancel{\sin^2\theta}} = \frac{1}{\sin^2\theta}$$

$$\boxed{\cot^2\theta + 1 = \csc^2\theta}$$

$(\sin(\ )^2 + (\cos(\ )^2)$

	θ	$\sin^2\theta$	$\cos^2\theta$	$\sin^2\theta+\cos^2\theta$
QI	45°	$1/2$	$1/2$	1
QII	130°	.5868	.4131	1
QIII	220°			1
QIV	310°			1

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

$$(c \cdot \cos\theta)^2 + (c \cdot \sin\theta)^2 = c^2$$

$$c^2 \cdot \cos^2\theta + c^2 \cdot \sin^2\theta = c^2$$

$$\frac{\cancel{c^2}(\cos^2\theta + \sin^2\theta)}{\cancel{c^2}} = \frac{c^2}{c^2}$$

$$\boxed{\cos^2\theta + \sin^2\theta = 1}$$

$(\sin(\quad))^2$

	θ	$\sin^2\theta$	$\cos^2\theta$	$\sin^2\theta+\cos^2\theta$
QI	72°	0.904	.0954	1
QII	133°	.5348	.4651	1
QIII	205°			1
QIV	300°	$\frac{3}{4}$	$\frac{1}{4}$	1

$$\frac{\cos^2\theta}{\cos^2\theta} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

$$\boxed{1 + \tan^2\theta = \sec^2\theta}$$

$$\frac{\cos^2\theta}{\sin^2\theta} + \frac{\cancel{\sin^2\theta}}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

$$\boxed{\cot^2\theta + 1 = \csc^2\theta}$$

	θ	$1+\tan^2\theta$	$\sec^2\theta$	$1+\cot^2\theta$	$\csc^2\theta$
QI	72°				
QII	133°				
QIII	205°				
QIV	300°				

3.

a. Use the Pythagorean Theorem to describe the relationship that exists between a, b, and c.

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

b. What ratio is equal to $\cos\theta$?

$$\cancel{c} \cdot \cos\theta = \frac{a}{\cancel{c}} \cdot \cancel{c}$$

$$a = c \cdot \cos\theta$$

c. What ratio is equal to $\sin\theta$?

$$\cancel{c} \cdot \sin\theta = \frac{b}{\cancel{c}} \cdot \cancel{c}$$

$$b = c \cdot \sin\theta$$

d. Using substitution and simplification, combine the three equations from parts a-c into a single equation that is only in terms of θ. This equation is the first of the three Pythagorean identities.

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

$$(c \cdot \cos\theta)^2 + (c \cdot \sin\theta)^2 = c^2$$

$$c^2 \cdot \cos^2\theta + c^2 \cdot \sin^2\theta = c^2$$

$$\frac{\cancel{c^2}(\cos^2\theta + \sin^2\theta)}{\cancel{c^2}} = \frac{\cancel{c^2}}{\cancel{c^2}}$$

$$\boxed{\cos^2\theta + \sin^2\theta = 1}$$

	θ	$\sin^2\theta$	$\cos^2\theta$	$\sin^2\theta + \cos^2\theta$
QI	2	.0012	.9988	1
QII	91	.9997	.0003	1
QIII	250	.8830	.1170	1
QIV	328	.2808	.7192	1

$\sin(328)^2$

5.

a. Divide both sides of the first Pythagorean identity by $\cos^2\theta$ and simplify. The result is the second Pythagorean identity.

$$\frac{\cancel{\cos^2\theta}}{\cancel{\cos^2\theta}} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

$$\boxed{1 + \tan^2\theta = \sec^2\theta}$$

b. Divide both sides of the first Pythagorean identity by $\sin^2\theta$ and simplify. The result is the third and final Pythagorean identity.

$$\frac{\cos^2\theta}{\sin^2\theta} + \frac{\cancel{\sin^2\theta}}{\cancel{\sin^2\theta}} = \frac{1}{\sin^2\theta}$$

$$\boxed{\cot^2\theta + 1 = \csc^2\theta}$$

QII : 135°

$1+\tan^2\theta$	$\sec^2$
$\dfrac{\sin 135}{\cos 135} = \dfrac{\sqrt{2}/2}{-\sqrt{2}/2}$	$\sec = \dfrac{1}{\cos 135}$
$\tan\theta = -1$	$\sec = \dfrac{1}{-\dfrac{\sqrt{2}}{2}}$
$1+1$	$= -\dfrac{\cancel{2}}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\cancel{\sqrt{2}}}$
2	$= (-\sqrt{2})^2$
	$= 2$

QI: 30°

$\sin^2\theta$	$\cos^2\theta$	
.25	.75	1

150: Q2

$\sin^2\theta$	$\cos^2\theta$	
.25	.75	1

QI : 30°

$\sin^2\theta$	$\cos^2\theta$	$\sin^2\theta + \cos^2\theta$
$\frac{1}{4}$	$\frac{3}{4}$	1