Name: _____

Horace Greeley High School
Mathematics Department

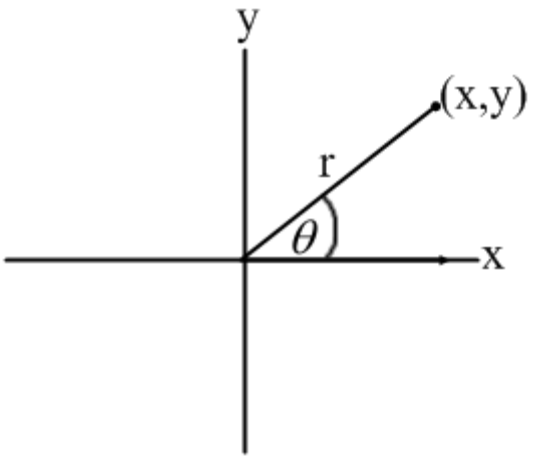
This is recommended summer work for students entering

Enriched Pre – Calculus (M4407) or
Advanced Pre – Calculus and Calculus A (M4408)

This work should be done
without the aid of a calculator.

Summer Review for Advanced & Enriched Pre-Calculus

Trig Fundamentals



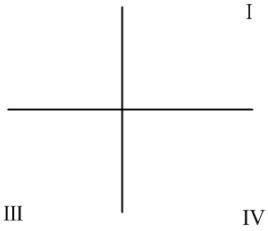
1. Define the trig functions in terms of x, y, and r.

$\sin\theta =$ $\csc\theta =$

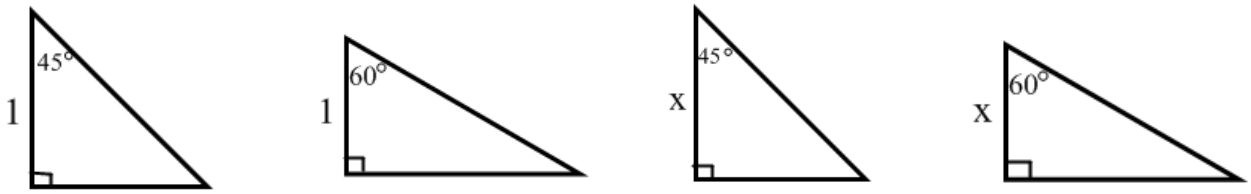
$\cos\theta =$ $\sec\theta =$

$\tan\theta =$ $\cot\theta =$

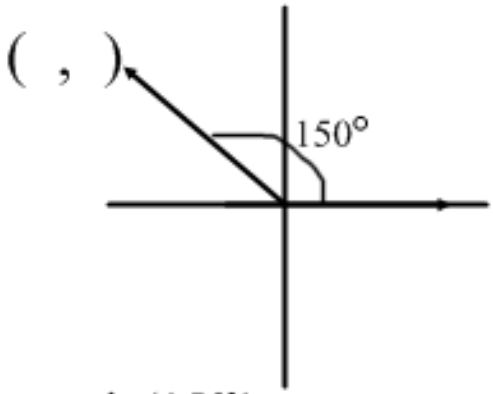
2. Place the names of the trig functions in the quadrants in which their range is **POSITIVE**:



3. Fill in the lengths of the sides of the special right triangles:

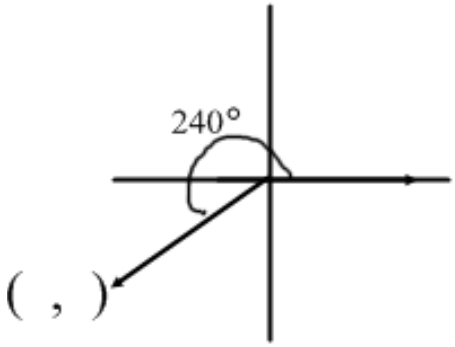


4. Fill in the coordinates given r = 1 then evaluate.



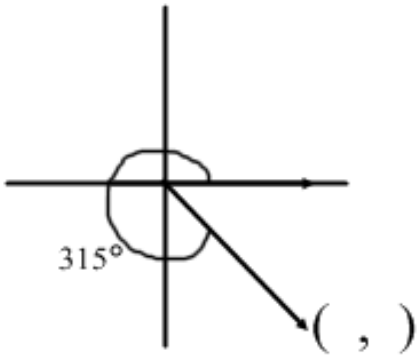
$\sin(150^\circ) =$

$\tan(150^\circ) =$



$\cot(240^\circ) =$

$\sec(240^\circ) =$



$\cos(315^\circ) =$

$\csc(315^\circ) =$

5. Complete the table:

Radian Measure	Degree Measure
π	
	270°
$\frac{\pi}{6}$	
	–90°
$\frac{5\pi}{3}$	
$\frac{\pi}{4}$	
	210°

6. True or False: (If false, correct the statement so it is true without changing the angle measures)

a) $\sin(225) = \sin(45)$

b) $\cos(120) = \cos(60)$

c) $\tan(-45) = \tan(315)$

d) $\sec(240) = \sec(60)$

7. Complete the following statements: (Notice the first is given to model the answers)

RECIPROCAL IDENTITIES:

$\sin\beta = \frac{1}{\csc\beta}$ $\quad \csc\beta =$ ——

$\cos\beta =$ —— $\quad \sec\beta =$ ——

$\tan\beta =$ —— $\quad \cot\beta =$ ——

Tan A $= \frac{\sin A}{\cos A}$ $\quad$ Cot A = ——

PYTHAGOREAN IDENTITIES:

$\sin^2\theta + \cos^2\theta = 1$

$1 - \cos^2\theta =$ _____

$1 - \sin^2\theta =$ _____

$\tan^2\theta + 1 =$ _____ $\quad 1 + \cot^2\theta =$ _____

$\sec^2\theta - 1 =$ _____ $\quad \cot^2\theta =$ _____

DOUBLE ANGLE IDENTITIES

$\sin 2A =$ _____

$\cos 2A =$ _____

SUM/DIFFERENCE IDENTITIES

$\sin(A+B) =$

$\cos(A+B) =$

$\sin(A-B) =$

$\cos(A-B) =$

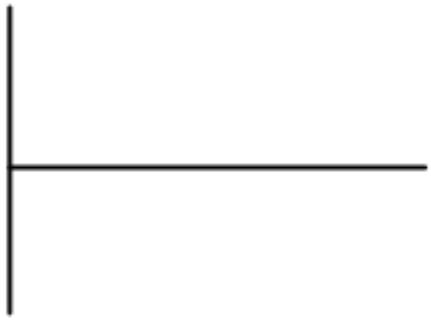
8. The expression $\dfrac{\tan A}{\sec A}$ simplifies to ?

9. Express $\dfrac{\dfrac{1}{\cos A} - \cos A}{\dfrac{\sin A}{\cos A}}$ as a single function

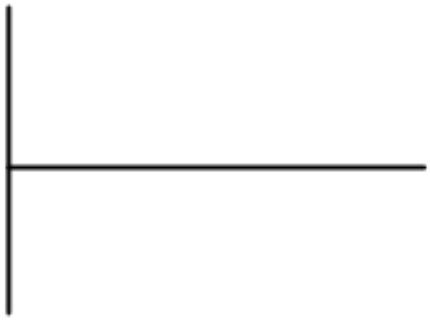
10. Simplify: $\tan(\pi - \theta)$

11. Sketch one cycle of each. Label quadrantal angles.

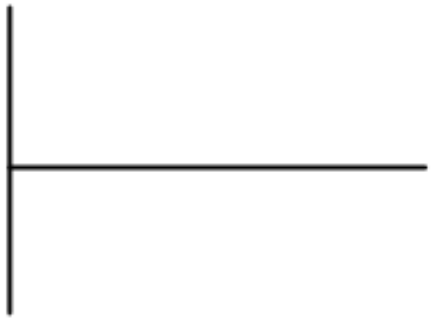
y = sin (x)



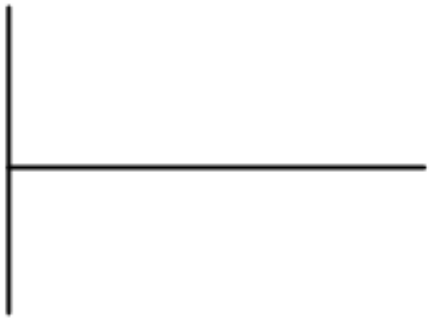
y = cos (x)



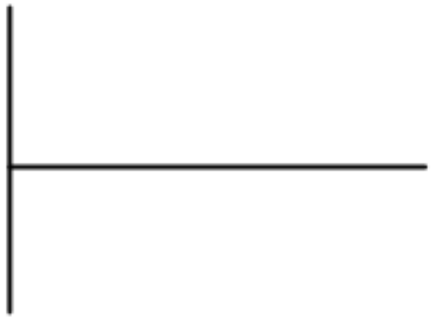
y = tan (x)



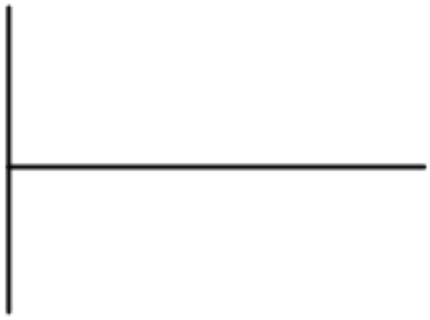
y = cot (x)



y = csc (x)

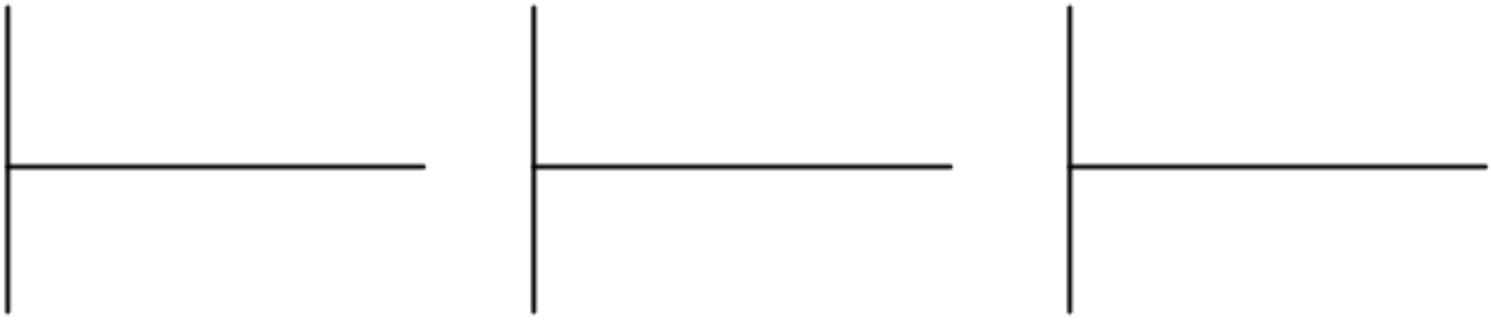


y = sec (x)



12. Graph one cycle of each of the following. Label all important points:

$y = 2\cos 4\theta - 5$ $y = -4\sin 3\theta + 1$ $y = -\tan\theta$



Reference Section to be memorized…OR ELSE!

Trig. Values of Special Angles

θ (degrees/radians)	$30/\frac{\pi}{6}$	$45/\frac{\pi}{4}$	$60/\frac{\pi}{3}$
$\sin\theta$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
$\cos\theta$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
$\tan\theta$	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$
$\csc\theta$	2	$\sqrt{2}$	$\frac{2\sqrt{3}}{3}$
$\sec\theta$	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2
$\cot\theta$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$

Inverse Trigonometric Functions

$y = Arc\sin x$ or $y = \sin^{-1} x$ $y = Arc\cos x$ or $y = \cos^{-1} x$ $y = Arc\tan x$ or $y = \tan^{-1} x$

Evaluate:

$Arc\sin\frac{\sqrt{3}}{2} =$ $Arc\cos(-1) =$ $Arc\tan\left(-\sqrt{3}\right) =$

$Sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) =$ $Cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) =$ $\cos\left(Arc\tan\frac{4}{3}\right) =$

$\tan\left(\sin^{-1}-\frac{5}{13}\right) =$ $\tan\left(Arc\cos\frac{4}{5}\right) =$ $\sin\left(\tan^{-1}-\frac{5}{12}\right) =$

$\csc\left(Arc\sin\frac{1}{3}\right) =$ $Arc\tan 1 =$ $\csc\left(\sin^{-1}\frac{3}{2}\right) =$

Domain Practice

Find the domain of each function. Use interval notation:

1.) $y=\dfrac{3}{x^2+4}$

2.) $y=\dfrac{x-4}{x+2}$

3.) $y=\sqrt{2x-3}$

4.) $y=\dfrac{3x}{\sqrt{x}-5}$

5.) $y=\dfrac{23}{|x|-4}$

6.) $y=\dfrac{\sqrt{x}}{x-3}$

7.) $y=\sqrt{\dfrac{x-3}{x+5}}$

8.) $y=\dfrac{3}{\sqrt{x^2-4}}$

9.) $y=\dfrac{\sqrt{x-5}}{|x|-7}$

10.) Create the inverse of $y=\sqrt{x+5}-3$

11.) Create the inverse of $y=(x+4)^2+10,\ x\le -4$

12.) Given the functions: $f(x)=\dfrac{x}{x+6}$ AND $g(x)=\dfrac{-6x}{x-1}$

a.) State the domain of f(x)

b.) State the rage of g(x)

c.) Find the domain of $\dfrac{f(x)}{g(x)}$

d.) Prove that f(x) and g(x) are inverses of each other.

Factoring Sum/Difference of Cubes

Sum: x^3+27 Difference: x^3-8

Signum

S ame
O pposite
A lways
P ositive

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

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

Try: x^3+27 x^3-8

Practice:

1.) $a^3 + 64$ 2.) $y^4 - 125y$ 3.) $27 - x^3$

Representing Complex Numbers Graphically

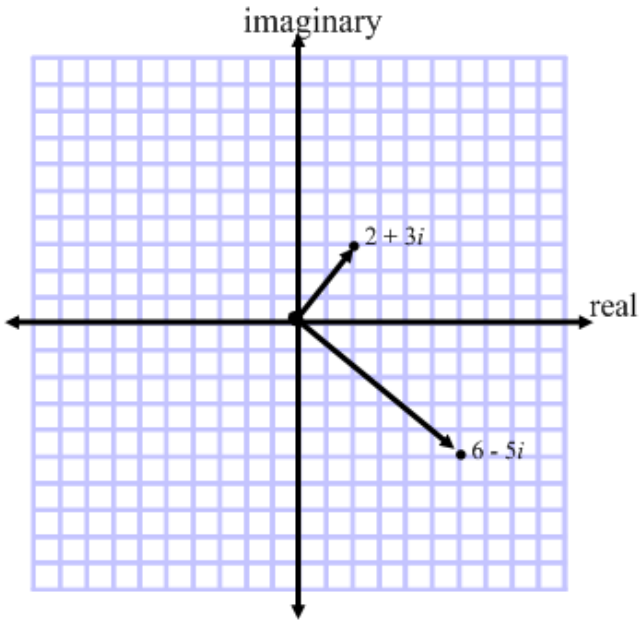
The xy plane transforms into the real and imaginary plane

x - Real y - imaginary

**plot the complex number using x as the real and y as the imaginary. Then draw a vector (arrow) to that point

You can find the "length of the complex number by using the Pythagorean theorem

Graph: $2 + 3i$
$6 - 5i$



Sketch the following complex numbers and find their lengths:

a.) -3 + 4i b.) 5 – 12i c.) -6 – 3i d.) 9i

On the same set of axes, sketch each complex number AND their sum: -9 + 4i and 10 – 7i