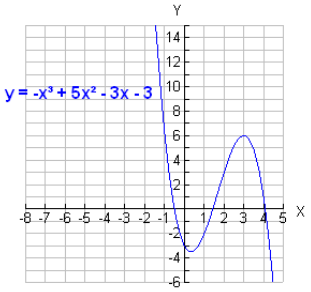
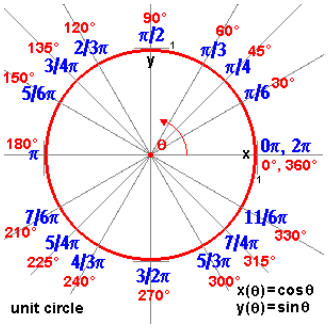
Algebra II & Trigonometry

{Wrap your brain and hands around it!}





Gary Kubina

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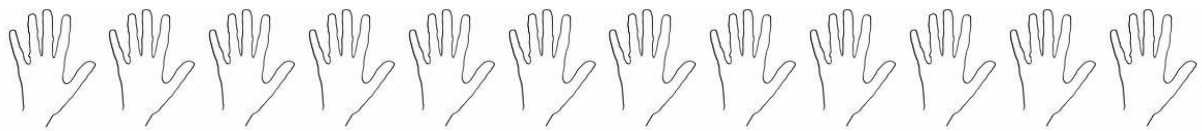

Hello Math Friends,

This worksheet does not provide a lot of details. I design my workshops so that you have to be **present** and **do** the activities to **understand** what they are all about. We move quickly and introduce the activities to whet your appetite. It's up to you to explore thoroughly and tweak the ideas to make them your own so they are effective (and fun) for your students.

If you have Professional Development funds and want me to come to your area, send me an email for details. I have lots of hands-on workshops and also some non-math workshops that appeal to all subject areas.

Have a mathtastic day!

Gary K.
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Gary Kubina

- Taught Algebra I, Geometry, Algebra II & Trig., Precalculus & Calculus for 27 years.
- Currently serves as a consultant for K – 12 Mathematics
- Won the Mobile County Teacher of the Year
- Won the Outstanding Instructor Award for the University of South Alabama
- Won the ACE Scholar Award to study math in Hawaii
- Won the Presidential Award for Excellence in Mathematics Teaching
- Won the Radio Shack/Tandy Scholar Award
- Picture in Time magazine as one of the "Brightest, Most Industrious Minds in America Today"
- Won the Toyota International Teacher Award to study in Japan
- Presents numerous workshops around the U. S.

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ACTIVITIES

The manipulatives needed are listed in the brackets.

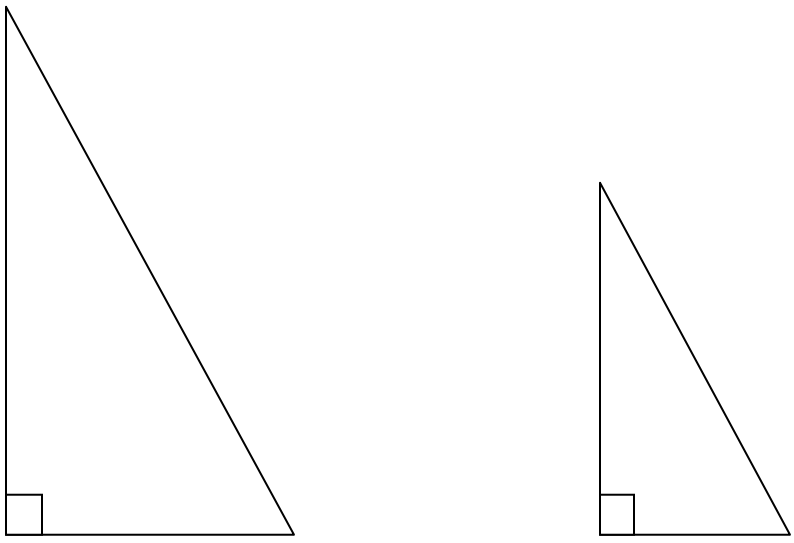
- Preactivities/Table talk/Beach ball toss [Clever Catch Trig. Ball]
- Introduction
- Draw family of functions [dry erase graph mat]
- End behavior of polynomial functions [arms]
- Relations/functions [lids and rope]
- Human number line [cards]
- Matrix multiplication [2 toothpicks]
- Doubling function [paper]
- Word problems (chickens & dogs)
- Quadratic formula song
- Half-life [m & m's, paper plate]
- Be a function/Math aerobics/Be a mathlete [yourself]
- Trig. circle [paper plate]
- Trig. hand jive [hand]
- Make a sin, cos, and tan graph [Ultra-flex ruler]
- Trig. chart [index cards, ruler, tape]
- Trig. ratios/Ambiguous case for Law of Sines [AngLegs]
- Trig. tattoos/inverse functions [patty paper, Miniplot post-it]
- Exponent cheer
- Clean up

12 of each length, 2 snap-on protractors

Orange	5	cm
Purple	7.07	cm
Green	8.66	cm
Yellow	10	cm
Blue	12.24	cm
Red	14.14	cm

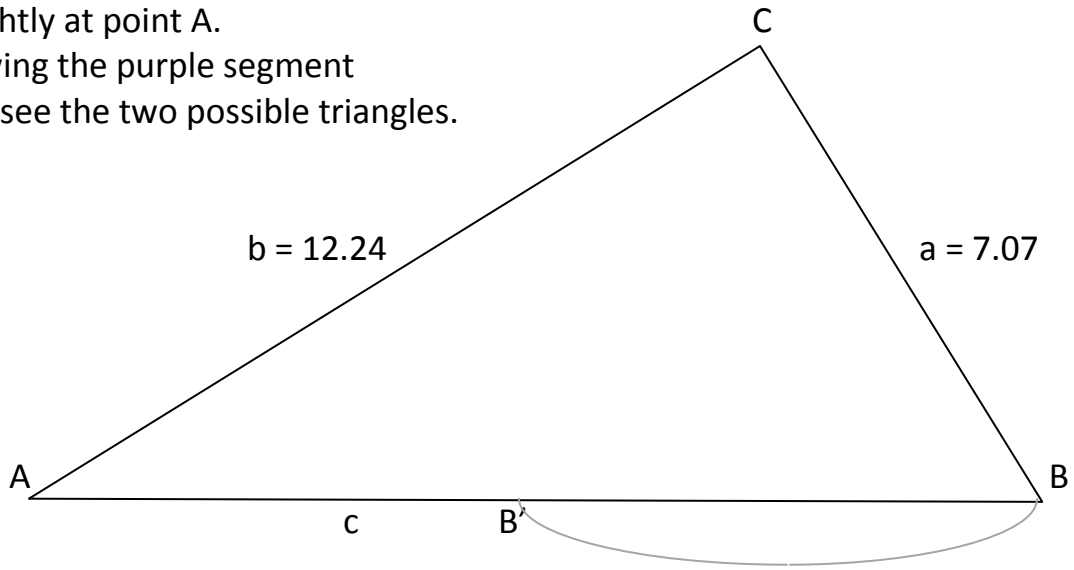
Trig. Ratios

Build two 30-60-90 triangles (red, blue, purple and yellow, green, orange)
Measure angles and sides to verify
Draw and label angles and sides
Determine trig. ratios (sine, cosine, tangent) for each triangle



Ambiguous case for Law of Sines (Two solution case)

Build a triangle (red, blue, purple)
Hold the blue and red segments
tightly at point A.
Swing the purple segment
to see the two possible triangles.



$$\frac{\sin 30°}{7.07} = \frac{\sin B}{12.24}$$

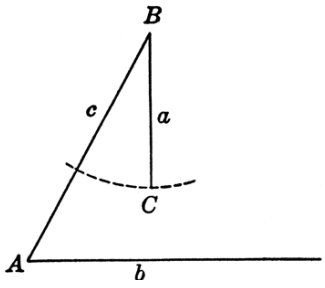
$$\sin B = \frac{12.24 \sin 30°}{7.07}$$

$B = 60°$ (first quadrant answer)

Since sine is also positive in the second quadrant

$B = 180° - 60° = 120°$ (second quadrant answer)

<u>Ambiguous case for Law of Sines (No solution case)</u>



Human Number Line

$\sqrt{-16}$	i	$\frac{1}{0}$	-3^2
$-\sqrt{16}$	$\log_3 \frac{1}{27}$	$\log \frac{1}{100}$	i^2
$\log_5 1$	5^{-3}	2^{-3}	4^{-1}
$\tan 45^0$	$\sqrt{2}$	$\sqrt{3}$	$9^{\frac{1}{2}}$
3.14	π	$(-3)^2$	$(2\sqrt{3})^2$

Matrix Multiplication
(with toothpicks)

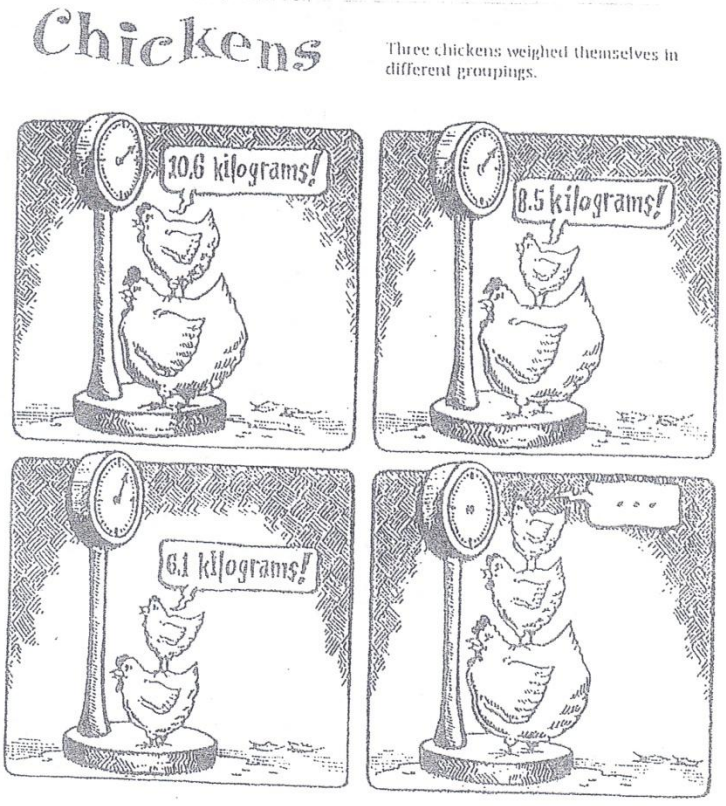
$$\begin{bmatrix} 7 & 3 & -9 \\ 0 & 5 & 7 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

DOUBLING FUNCTION

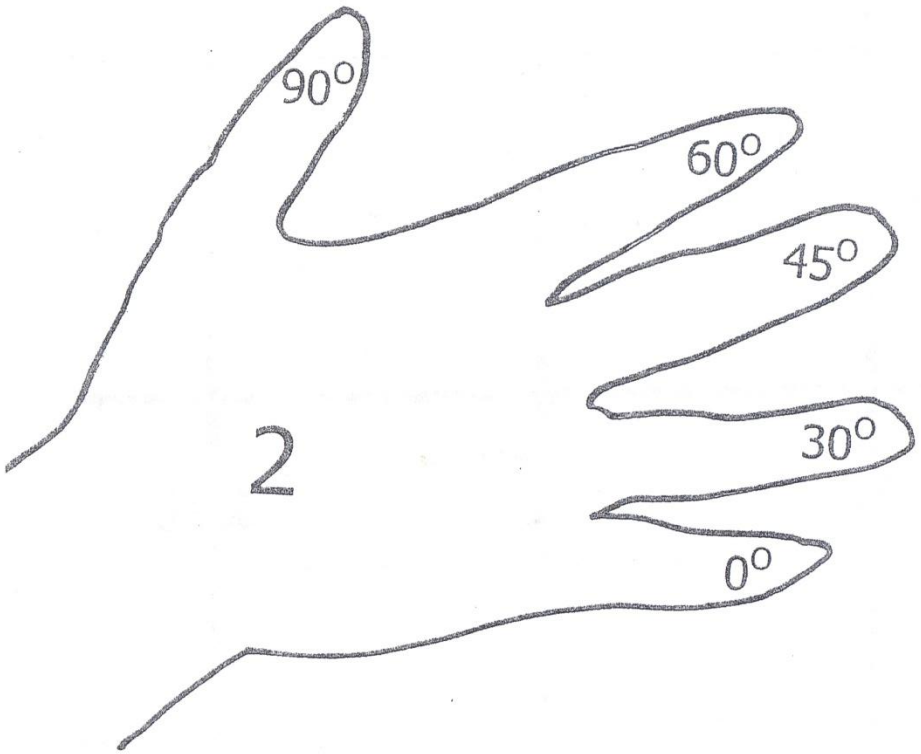
Take the largest thinnest sheet of paper you can find. Fold it in half. Fold it in half again. After seven or eight folds, you will be unable to fold it by hand, as the sheet will have become as thick as a book. If 20 folds were possible, the stack of paper would dwarf your house. At 40, it would be well on its way to the moon. Seventy folds would take it to the nearest star and on as far again. Light would take eight years to go from top to bottom. After 100 folds, the paper would be more than 10 billion light years across and span the known universe.

This is the essence of exponential growth: Very small amounts rapidly become astronomically large through simple doubling.

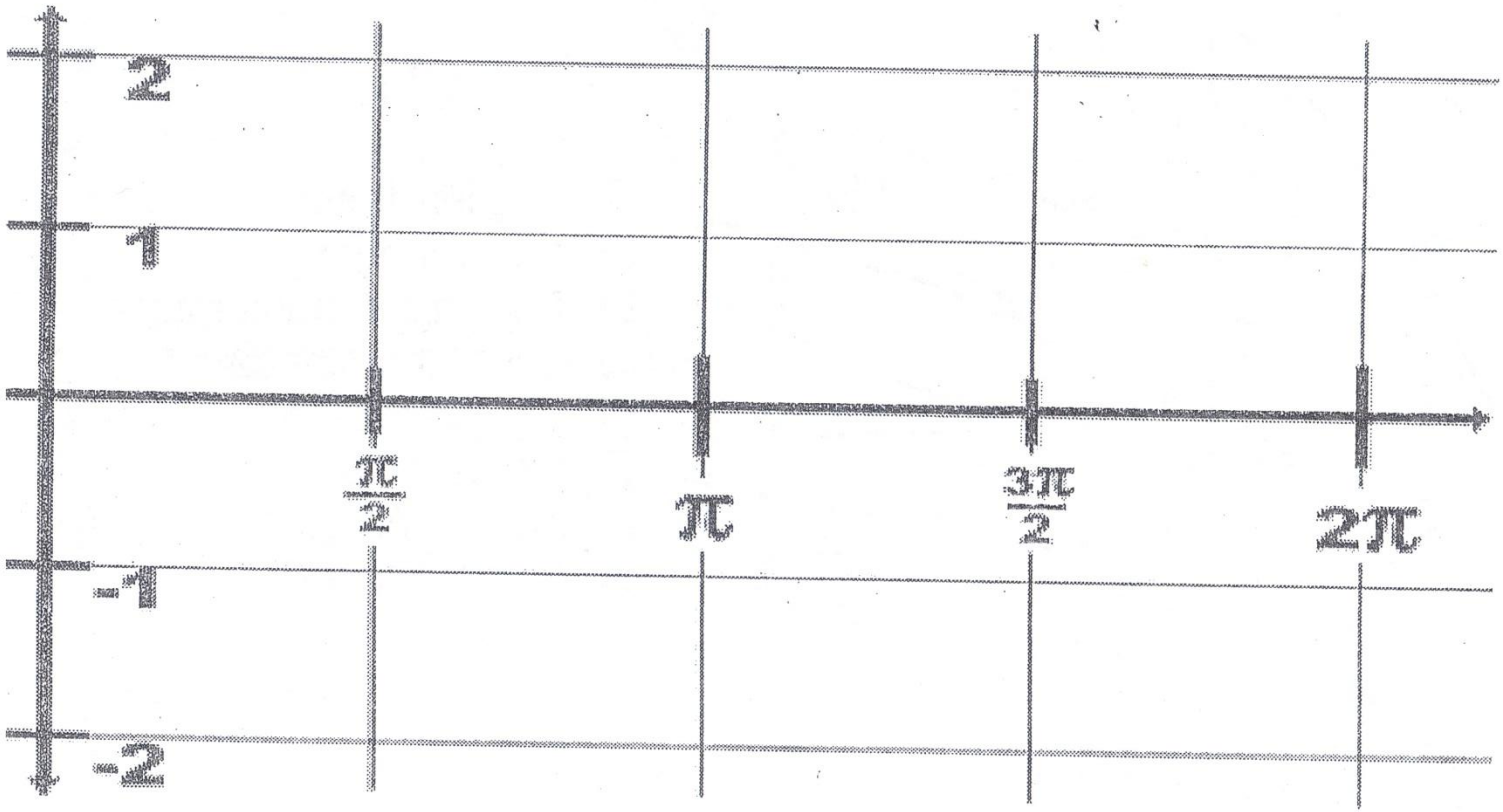
Excerpt from The Mathematics Teacher
Originally from The Globe and Mail, July 29, 1995



Trig. Hand Jive



- ❑ Use left hand
- ❑ Pull in finger
- ❑ Radicals in numerators
- ❑ 2 in denominators
- ❑ Cos on top
- ❑ Sin on bottom
- ❑ Tan on flip side
- ❑ Carpal tunnel?

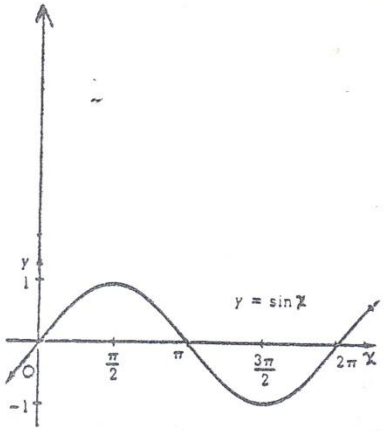

2
1
-1
-2
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π

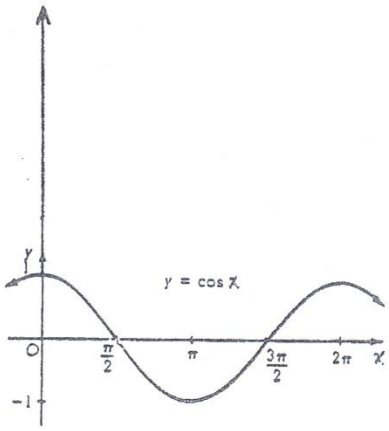
TRIGONOMETRY TABLE

DEGREES																	
RADIANS																	
Sin θ																	
Cos θ																	
Tan θ																	
Cot θ																	
Sec θ																	
Csc θ																	

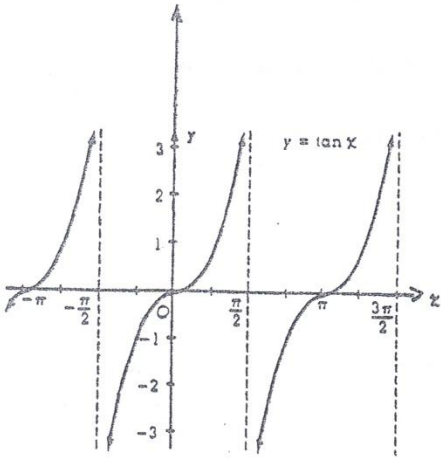
TRIGONOMETRIC INVERSES NAME_____

1. The equation of the line for finding an inverse is: _____
2. Place a piece of tracing paper over the sine graph; using a pencil, trace the x and y axes and the sine curve.
3. Flip the tracing paper and line up the axes. Trace the sine curve, leaving a light impression on the worksheet.
4. Draw the inverse of the sine curve.
5. Highlight the section of the curve that will determine a function. Complete the information in the chart.
6. Repeat for cosine and tangent.





y = sin x	y = arcsin x	y = cos x	y = arccos x
D:	D:	D:	D:
R:	R:	R:	R:



y = tan x	y = arctan x
D:	D:
R:	R: