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ABSTRACT:

ONE HIGH SCHOOL MATHEMATICS TEACHER'S PERSONAL ATTEMPTS TO INTEGRATE COMPUTER GRAPHING TECHNOLOGY INTO THE ALGEBRA I THRU A. P. CALCULUS CURRICULUM WITHOUT A CLASSROOM SET OF COMPUTERS OR GRAPHING CALCULATORS.

I call my application the **M. A. R. V. Method** which stands for **M** athematics **A** chievement **R** ealized thru **V** iewing!

During the 1987-88 school year, this teacher of Algebra I, Advanced Algebra II, Precalculus, and A. P. Calculus, introduced students at Fairview High School to the graphing software of Bert Waits and Frank Demana of OSU (Now Addison Wesley Publishing Co.).

The main thrust of my use of the computer graphing technology was to look at specific topics and determine how computer technology could give students meaningful mathematical experiences. Next I designed complete step-by-step handout instructions for students to follow in each "experiment" or assignment. I also had my A. P. Calculus students design and field test individual lessons!

Thus each lesson was a stand alone "mathematical experience" to achieve a certain objective. One illustration in Algebra I was to examine the slope intercept form of a line, $y = mx + b$. Students were to determine the effect of changing the values of b (e.g. from -4 to 4 step 2) while holding m constant. Next the values of m were changed and b was held constant. Another example in trigonometry involved the graph of $f(x) = A*\sin(Bx + C)$. Alternately changing the values of A (from -4 to 4 step 2) then B, and finally C, illustrated the concepts of amplitude, period, and phase shift.

A. P. Calculus used the graphing package mostly for limits of a function. The Zoom In feature, and Zoom Out feature were most helpful!

Each particular software package has it's own unique strong points. One program allowed entire functions to be entered by striking a single key (e.g. "S" gave you the sine function.)

In summary, the effort and time in rounding up hardware and overhead projection devices was well worth the educational advantages in preparing my students for future school and job opportunities.

Sources of Computer Software

Franklin Demana or Bert K. Waits
Department of Mathematics
The Ohio State University
231 West 18 th Avenue
Columbus, OH 43210

(The Computer Graphing Laboratory Manual and PreCalculus Mathematics A Graphing Approach by Franklin Demana and Bert K. Waits is now available from Addison Wesley Publishing Co.)

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Many textbook publishers offer computer graphics packages
Example:

Addison-Wesley Publishing Company
Calculus and Analytic Geometry, Sixth Edition
George B. Thomas, Jr. and Ross L. Finney

Toolkit programs (Derivative Grapher, Super#Grapher, etc.)

Have fun exploring the possibilities of this new technology! Share these ideas with a fellow teacher and let me know how you might use this computer software in the classroom or as a special project!

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COMPOSITION OF FUNCTIONS

Name _____
Date _____

Sketch the following composition functions f(g(x)) giving the domain and range. You may use a computer graphing program to assist you. There are 100 composition functions in all! Your evaluation will be three of these composition functions. Mastery will be two or more correct.

g(x) = 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

f(x) =

1. 2*x-5

2. x^2

3. x^2 - 4

4. abs(x)

5. sgn(x)

6. sin(x)

7. cos(x)

8. exp(x)

9. ln(x)

10. INT(x) or [x]

GRAPHING REVIEW

Name _____
Date _____

A Computer Assisted Activity

Load a computer graphing program into your computer. By uning your knowledge of domain of a function (and trial and error), determine the domain, estimate the range, and sketch the given curve. Your evaluation will be to sketch five (5) related graphs, giving the domain and range. Mastery level is 80% or 4 correct.

	FUNCTION	DOMAIN	RANGE
A.	absolute value	ABS(X)	
1.	f(x) = abs(x)		
2.	f(x) = abs(x) + 2		
3.	f(x) = abs(x+3)		
4.	f(x) = abs(x) - 4		
5.	f(x) = abs(x-5)		
6.	f(x) = 2*abs(x)		
B.	greatest integer function	INT(X)	
1.	g(x) = [x]		
2.	g(x) = [x+3]		
3.	g(x) = [x-1]		
4.	g(x) = [x] + 2		
5.	g(x) = [x] - 5		
6.	g(x) = 3*[x]		
C.	signum function	SGN(X)	
1.	h(x) = sgn(x)		
2.	h(x) = sgn(x+2)		
3.	h(x) = sgn(x-3)		
4.	h(x) = sgn(x) + 4		
5.	h(x) = sgn(x) - 5		
6.	h(x) = 4*sgn(x)		
D.	linear function	y = m*x+b	
1.	i(x) = 3*x-4		
2.	i(x) = x		
3.	i(x) = -x		
4.	i(x) = 4		
5.	i(x) = -2x + 3		
E.	exponential function	EXP(X)	
1.	j(x) = e^(x)		