

**Calculators in the
Classroom: Where We've
Been, Where We're Going**

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Slide 1 of 13

Where We've Been

- ❖ Cannon Inc. introduces first hand-held electronic calculator in 1970.
- ❖ Hewlett-Packard introduces first scientific calculator in 1972.
- ❖ Last slide rule manufactured in the United States in 1975.
- ❖ Casio introduces first graphing calculator in 1986.

What is a calculator?

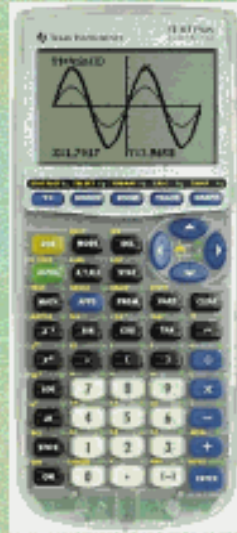
A usually
electronic device
for performing
mathematical
calculations



*Merriam-Webster's Collegiate
Dictionary Online*

Progression of Calculators

- ❖ Arithmetic
- ❖ Scientific
- ❖ Graphing
- ❖ Algebraic



How have calculators changed mathematics?

More important

- ❖ discrete mathematics
- ❖ data analysis
- ❖ parametric representations
- ❖ non-linear mathematics

Less important

- ❖ paper and pencil arithmetic
- ❖ symbolic manipulation



How have calculators changed mathematics teaching?

- ❖ **Teachers can focus on conceptual development.**
- ❖ **Data collection devices allow for connections between mathematics and the sciences.**
- ❖ **Data analysis tools allow for connections between mathematics and the social sciences.**

Pedagogical Responses to Calculators

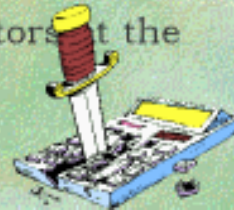
- ❖ **Prohibition of use**
- ❖ **To check pencil and paper calculations**
- ❖ **To substitute for pencil and paper calculations**
- ❖ **Simultaneous use of calculator, pencil and paper AND mental math**

The Call to Use Calculators

- ❖ **NCTM's *An Agenda for Action* (1980) & *Standards* (1989,1991,1995,2000) call for the use of calculators at ALL grade levels.**
- ❖ **Texas Essential Knowledge and Skills call for appropriate technology use at all grade levels.**

Obstacles to Calculator Use

- ❖ Debate on the nature of mathematics
- ❖ Fear of student dependence on calculators
- ❖ Equity issues
- ❖ Lack of training on appropriate calculator use
- ❖ Lack of acceptance of calculators at the university level
- ❖ Assessment issues



More Thoughts on Assessment

- ❖ **If calculators change teaching, they must change assessment as well.**
- ❖ **Calculators are required on Advanced Placement Calculus and Statistics Exams.**
- ❖ **Calculators are required on Algebra I End-of-Course Exam.**
- ❖ **Calculators will be required on Grade 9, Grade 10 and Exit Level TAKS.**

Where are we going?



- ❖ **Computer-upgradable calculators can have their functionality upgraded with the latest software.**
- ❖ **Application software can extend calculator use outside of the realm of mathematical computations.**
- ❖ **Calculators are serving many of the same purposes as computers.**

Many calculators today are computers.

Computer-
a programmable
electronic
device that can
store, retrieve
and process data



Where might we be going?



- ❖ **Increased acceptance and assessment with calculators at lower grade levels**
- ❖ **Increased use of algebraic calculators in the instruction of algebra**
- ❖ **Even less distinction between calculators and computers**