Technology for Middle Grade Classrooms

presented by Heather Sparks, NBCT

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AGENDA

I. Importance of Technology in the Classroom
II. Integration of Technology
    A. Graphing Calculators
    B. Small Robots
    C. Interactive Whiteboards
    D. Classroom Response Systems
III. Questions

Web Sources:

Small Robots:
www.smallrobot.com/school.htm

SmartBoards:
www.smarttech.com

Classroom Response System:
www.einstruction.com

Notes:

Institute of Human Study **Researcher:** _____
Center for Teen Research

Your task: To analyze the data of three formulas given to unruly teens to determine which one is most effective at eliminating or reducing office referrals.

Formula 1

Day	# of O.R.
1	2
2	4
3	6
4	8
5	10
6	12

Sketch Resulting Graph

Formula 2

Day	# of O.R.
1	10
2	7
3	6
4	3
5	2
6	1

Sketch Resulting Graph

Formula 3

Day	# of O.R.
1	12
2	8
3	11
4	9
5	8
6	12

Sketch Resulting Graph

Which formula is most effective at reducing or eliminating poor teen behavior that results in Office Referrals? _____ How do you know? _____

_____

Here Comes Halley!

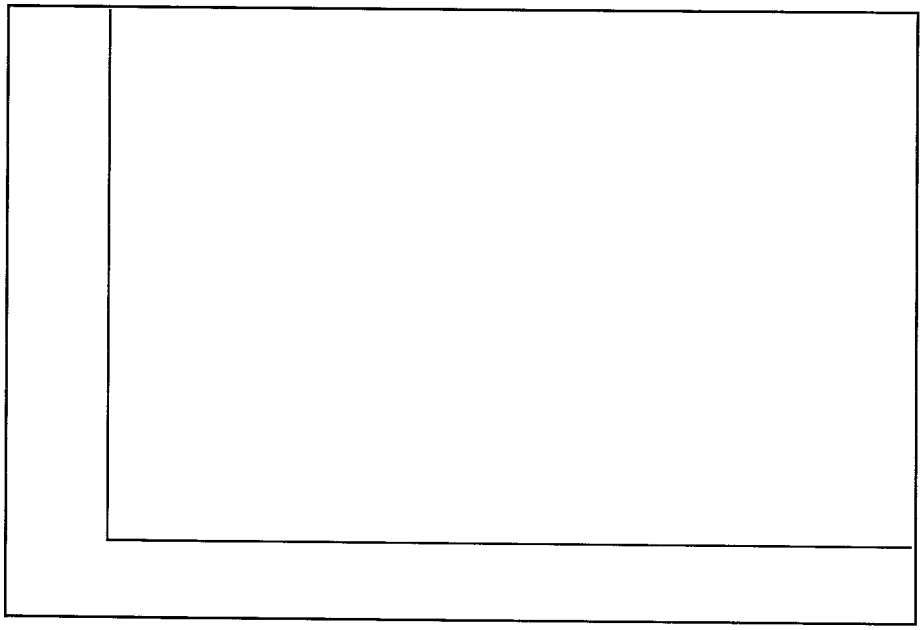
Name: _____

Halley's Comet zooms by Earth regularly, and so it has a chance--a tiny one--of colliding with our planet. During a flyby, the famous chunk of ice is easy to spot, even without a telescope. For example, there are reports from 240 B.C., when ancient Chinese stargazers saw it without any problems.

Here's a timeline that shows some of the world-changing events that happened between Halley's visits. As you will see, Halley doesn't appear at exactly even intervals. By utilizing a scatter plot of the dates in the timeline, what year would you expect the comet to turn up next?_____ Use a line of best fit to justify your answer.

1301	**1387**	**1456**	**1531**	**1607**	**1682**	**1759**	**1835**	**1910**	**1986**
-Aztecs built Tenochtitlan (now Mexico City) 1325	-Gutenburg invents the printing press. 1455	-Columbus sets sail to find a water route to Asia. 1492	-Copernicus developes theory of sun-centered solar system. 1542	-Pilrims arrive in Plymouth, MA on the Mayflower. 1607	-Salem witch-craft trials. 1692	-American Revolution begins. 1776	-Civil War begins. 1861	-World War I begins. 1915	-Space Shuttle Challenger expodes. 1986

Author Mark Twain was born in 1835 when Halley's Comet was shooting across the sky. He said, "It will be the greatest disappointment of my life if I don't go out with Halley's Comet." On April 21, 1910, the day after the comet returned, Twain died.



Buying a Ford Mustang

Name: _____

You are using the newspaper to shop for a Ford Mustang. Below are today's classified ads .

00 Ford Mustang V6, auto, alloys, great milage, $6988.	**02 FORD MUSTANG** Excellent condition low miles, $10,100	**01 Ford Mustang** convertible, auto, leather, white, tan leather $9488
2001 Ford Mustang 71,000 miles, gray, V-6, auto, Excellent cond., One owner. $8,500	**98 Mustang Convert** Auto, Whte w/Balck Top,New Tires $6,000	**05 Ford Mustang** low, low miles, auto V6, CD, Shaker sound system $18,888
04 40th Anniversary Mustang, V6, 9K miles, Mach Stereo, $14,499	**04 Mustang Auto V6** Competition Orange 21K $13, 988	**99 Mustang LX conv** auto V6 $7,250

Make a table to represent the data above.

Sketch a scatter plot for the given data using dollars (in thousands) and years (1998-2005) as your axes.

1. Describe the data correlation. _____
2. Using the scatter plot, predict what a 2003 Mustang would cost. _____
3. What might a 2006 Mustang cost? _____ Explain your reasoning:

_____

4. If you had $11,000 to spend, what year model could you afford to buy? _____
5. (Algebra) Write an equation to represent the line of best fit._____

Explain your strategy. _____

_____

Name _____ **Date** _____

Measure Mission 1

Your first mission, should you decide to take it (and you will), is to measure the width of the hallway outside your classroom using only a robot and a graphing device.

YOU NEED:

1 Norland Calculator Robot (Your wheels for this adventure)
1 TI-83 or TI-84 Graphing Calculator (Robot brains)
1 Meter Stick
Program: **GO**

INSTRUCTIONS:

Write a simple program (see **PROGRAMMING INSTRUCTIONS** if needed) for your robot on a TI-83/TI-84 calculator named **GO**:

```
PROGRAM: GO
: Send ({222})
: Get (R)
: Disp R
: Stop
```

This will instruct the robot to move forward until its bumper runs into something. Attach your TI-83/TI-84 to the robot and run **GO**. You have fifteen minutes to experiment using the robot and a meter stick before you measure the hallway. Remember the meter stick cannot leave the classroom and the width of the hallway must be measured using the movement of the robot. Time will be displayed in centiseconds on the graphing calculator's screen after each run, i.e. 524=5.24 seconds. On the following page are tables to help you record your data. Decide ahead of time how to label the columns and rows.

Accuracy of Measurement Grading Scale:

Within 0 to ≤10 cm A
>10 to ≤20 cm B
>20 to ≤30 cm C

Off by more than 30 cm (or messing around): Long boring assignment in textbook

Who will be closest to the actual measurement?

Mission Data:

Inside the classroom:

Trials		
Total		
Average		

Outside the classroom:
(No meter sticks allowed)

Trials		
Total		
Average		

RESULTS:

1. What is your estimate of the width of the hallway in centimeters?

2. What was the speed or rate of your robot?

3. The bumper is at the front of the robot. How did you account for this in your measurement of the hallway?

4. What calculations did you use to determine the width of the hallway?

EXTENSION:
(Answer on a separate sheet.)

Using the speed of the robot, determine your height in centimeters. Write your results with initials on the board. When the entire class has their measurements displayed, determine the mean, mode, median, and range for the data.

Convert your height to feet and inches. How tall are you?

Design an advanced robot program to automatically measure distance.

Measure Mission 1

PROGRAMMING INSTRUCTIONS:

Turn on TI graphing calculator. Press the **PRGM** button, then use the arrow to highlight "NEW". Press the **ENTER** button, then spell out **GO** by pressing the appropriate keys. Press the **ENTER** button and you're ready to enter the first command for the program.

Line 1: Press the **PRGM** button, then use the arrow to highlight "I/O". Use the arrow to scroll down to "B: Send (". Press the **ENTER** button. Press the **2nd** button and then press { for an open brace. Type in 222. Close the braces and parentheses by pressing the **2nd** button, the } button, and then the) button. Press the **ENTER** button. The first line should appear as:
:Send ({222})

Line 2: Press the **PRGM** button, then use the arrow to highlight "I/O". Use the arrow to scroll down to "A: Get (". Press the **ENTER** button. Press the **ALPHA** button, then press **R**. Press) then **ENTER**. The second line should appear as:
:Get (R)

Line 3: Press the **PRGM** button, then use the arrow to highlight "I/O". Use the arrow to scroll down to "3: Disp". Press the **ENTER** button. Press the **ALPHA** button, then press **R**. Press the **ENTER** button. The third line should appear as:
:Disp R

Line 4: Press the **PRGM** button and "CTL" will be highlighted. Use the arrow to scroll down to "F: Stop". Press the **ENTER** button. The fourth line should appear as:
:Stop

Press the **2nd** button, then **QUIT.**

To run the program, attach the TI-83/TI-84 calculator to your robot and connect link cable. Make sure the robot and handheld are both switched on. Press the **PRGM** button and use the arrow to scroll down to ": GO". Press the **ENTER** button. Place the robot on the floor, then press the **ENTER** button again and the robot will move forward until the bumper hits something.

Teacher Notes

Measure Mission 1

ACTIVITY NOTES:

Measure the hallway yourself with a metric tape measure or meter stick. Students work well in pairs for this activity. If robots veer to one side or the other, adjust the rubber bands on the wheels or download the Calibrate Program from: http://www.smallrobot.com/school.htm.

Data tables are left partially blank for students to choose their own labels and methods. A more directed approach would be to label the first table across the top with TRIALS, 100 CENTIMETERS, 200 CENTIMETERS. Number of trials could be listed down the first column. TRIALS, TIME, and DISTANCE could be used in the second table with the first column again labeled with number of trials.

Students can be left to discover ways to solve this problem on their own or they can be given some review on proportions or the DERT formula (distance = rate X time or d=rt). After the initial use of the meter sticks, it's helpful to store them away to avoid other creative, but less mathematical solutions.

When measuring the hallway, the length of the robot (from the front bumper to the back) needs to be taken into account. This can be measured beforehand, calculated out in the hallway by running the robot the short distance of its own length, or sometimes an adjusted starting point can be used.

In the extension activity, one way to measure height is to have students lie on the floor with their feet against the wall and use the robots to measure how many seconds tall they are. Then use the DERT formula to convert to distance/height.

Using the software

(Examples are for the 83 plus, see our web page for other examples)

Warning, back up all your installed software with a Graph-link to you computer first!

All you need to send commands to the robot processor is the Send (command built in to your Texas Instruments calculator basic programming. See your guidebook that came with your calculator or go on line at: http://education.ti.com/product/prselect.html
Always follow the Send(command with a Get(command. Depending on the command sent, the Get variable might contain important data from the built in touch sensors and timing.

Command	Left direction	Right direction
1=timed movement only	0=backward	0=backward
2=move till switch is hit	1=no motion	1=no motion
3=time or until switch	2=forward	2=forward

The first number sent, is the command. The movement commands format is CLR. Where C is the command, L is the direction of the left servo motor, and R is the direction of the right servo motor.

Format for CLR
C = command
L= left
R=Right
Format for C
1xx goes for certain time (requires second variable 1-65535)
2xx goes till switch is hit
3xx goes until switch or time (requires second variable 1-65535)
Format for L or R servo motor
0 = backwards
1 = stop
2 = forward

Examples:
Send({122,500})
Get(R)
(this will move the robot forward for approx 500 centiseconds)
Send({100,45})
Get(R)
(this will move the robot backward for approx 45 centisecond)
Send({221})
Get(R)
(this will allow the robot to rotate until the front contacts are hit
Send({322,500})
Get(R)
(this will allow the robot to go forward approx 500 centiseconds or until a switch is hit) (R will contain the time traveled)

The variable from the Get(R) command will contain the time the robot moved.
To display this amount, just use the Disp R command

Switch status command

Command	Switch action
5=check switch	1=check for switch that stopped robot
	2=check for switches as they are now

You have two contact switches on the robot.
If no switches are pressed, you will get the value of zero.
If the right switch is pressed, you will get a value of 1.
If the left switch is pressed, you will get a value of 2.
If both switches are pressed, you will get a value of 3.

Example:
Send({51})
Get(R)
(R will contain a 0, 1, 2, or 3, depending on the switch pressed)

Other valid commands are:

Command	Action
4=calibrate	21=calibrate left forward pulse length
	01=calibrate left backward pulse length
	10=calibrate right backward pulse length
	12=calibrate right forward pulse lengh
	99=reset all settings to default

421 - calibrate left forward
401 - calibrate left backward
410 - calibrate right backward
412 - calibrate right forward
499- resets all settings to default

These commands are for advanced use. To control the servo motor, we just send a pulse of 1-2 milliseconds. Full speed one way is 1 millisecond; full speed the other way is 2 milliseconds. This command gives you speed control on the servos. A 1.5 millisecond should be stop or very slow. Use this value(127) to calibrate the pot on the servo motor.

Right backwards is a 255 default
Right forward is a 0 default
Left backwards is a 0 default
Left forward is a 255 default
Valid values are 0-255

Example:
Send({421, 200})
Get(R)
(this will slow down the left forward speed)
Send({401, 75})
Get(R)
(this will slow down the left backwards speed)

Note: These setting will be reset when the robot is shut off. Calculators will shut off after a period of time, allow for this in your application.

Visit our website for updates and examples for other models www.smallrobot.com

Norland Research

Norland Research

Direct Connect Calculator Kit

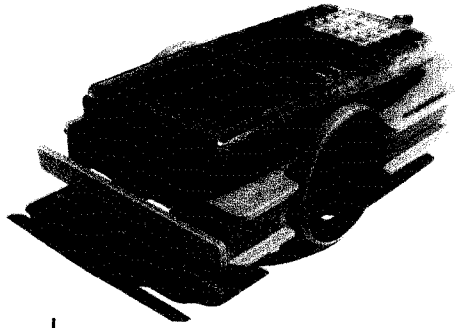


Photo by Rebbecca Rowland

A great new application for your Texas Instruments Graphing Calculator
(calculator not included)

Complete Kit $99.95

Options
Slide Cover $4.95
Link cable $4.95
Pen Holder $19.95

Order On line at
www.smallrobot.com
Or visit our website for a mail or fax

Calculator Robot

Tel: 702-498-5799
Fax: 702-435-9437

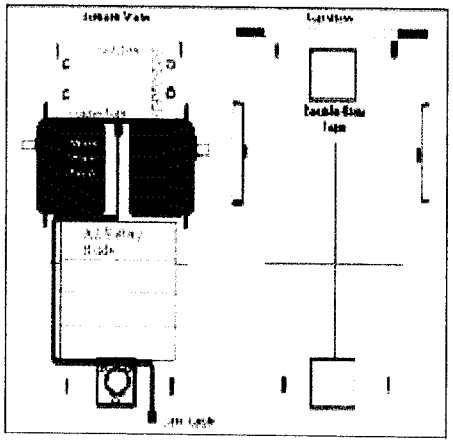
Calculator Instructions www.smallrobot.com

Congratulations on your purchase of the Calculator Robot from Norland Research. Please read all these instructions before beginning. By accepting this kit you will assume all responsibility and damages that may occur.

If not, please return this kit for a full refund.

This kit has been fully tested. But, as with any electronic product it may at times produce undesired effects. You will be adding motion to your calculator and this could result in loss of control and damage. We recommend that you secure any area that you will operate your robot in to be free of objects that can damage it, and add barricades to prevent it from falling. Also, do not operate your robot in a crowd as it could be stepped on. Always use tools as designed, wear eye protection and no loose clothing. Children should always have adult supervision when using tools and operating moving devices. Moving items can become tangled in clothing or hair. Always use caution when soldering, using electricity, and connecting batteries and chargers. Since Norland Research does not control the final product, the kit owner/assembler will assume the safety considerations and responsibility of the final product. The kit owner/assembler will also be responsible for any damage to the products connected to the Norland Research robot kit.

Specifications subject to change without notice.



Tools required or helpful

Tape measure or ruler
Small phillips screwdriver
Wire cutters
Sand paper or file

Items needed but not included in kit

Texas Instrument graphing calculator (73, 82, 83, 83plus, 85(CBL Model), 86, 89, 92*)
Slide case
Link Cable
4 AA batteries

Items useful, but not necessary

Texas Instrument TI-GRAPH LINK TM

Assembly Time

Allow approximately one hour to assemble your Calculator Robot. Be sure to understand the operation of your Calculator and the Graph Link procedures. These instructions are provided from the calculator manufacture. Skills and techniques used in model building are useful. Some edges may need cleaning due to the cutting process. Care in measurement will improve the operation of this kit. E-mail us if you have any questions.

Where to operate the robot

The best place to operate the robot is a table with barriers to prevent it from falling off. You can also use the robot on the floor. We recommend a hard surface. If you plan on using the robot on carpet, be sure to spray if with anti static spray or a static charge could damage the electronics.

Inspection first

Look closely at the robot chassis. Inspect it for any shipping damage. Also look at all edges. If there are any sharp edges from the cutting process, just sand or file them smooth. The link cable should come out and tuck next to the battery holder, through the caster wheel and out the hole at the back of the robot.

Step one, Install the wheels

Take the rubber traction band and stretch it over the wheel and work it around until it is centered and even all the way around. Plan on spending a few minutes making this fit on both wheels. Once the band is installed, remove the Phillips screw from the servo motor, push the wheel on and reinstall the screw. Repeat this on the other servo motor.

*92 will not fit on robot base

Step two, Install the bumper

Remove the backing on the ½ inch double side tape and place on the two contact switches. Place the bumper on these making sure it is level, square and centered. Use the "X" to line up the switches.

Step three, Install the slide cover

You will find (2) ¾ inch double-sided tape squares provided in the kit. Mount the 2 tape squares on the 2 spots as shown on top. Do so by removing the backing to expose the adhesive. Remove the backing on the other side of the tape squares. Now place the slide cover on top of these, being careful to be behind the bumper and center between the wheels. The slide cover will allow the calculator to slide out the rear. If you do not wish to use your slide cover, replacements are available from Texas Instruments or Norland Research. They are also available in colors to give your robot a custom look

Step four, install the calculator

Slide in your calculator (display and keypad up) until you hear a click. Plug in the link cable. Make sure the cable is secured and will not tangle in a wheels or the caster. Also, secure the cable to prevent it from dragging on the ground.

Step five, install the batteries

Install 4 AA Batteries in the Norland Research battery holder on the bottom as marked. We recommend using good quality batteries. Do not mix types and we do not recommend some rechargeable batteries, as they only provide 12 volts each. Please check the voltage on your batteries to insure they are rated at 1.5 volts. Now, slide the switch on the circuit board to on. The red LED light should come on. If not, check the battery installation, voltage and connections. A small jump from the servos is normal. Low batteries will cause unpredictable results

Norland Research
8475 Lisa Lane
Las Vegas, NV 89113

Phone: 702-498-5799
Fax: 702-435-9437
Email: sales@smallrobot.com
Website: www.smallrobot.com

Mail or Fax in Order Form

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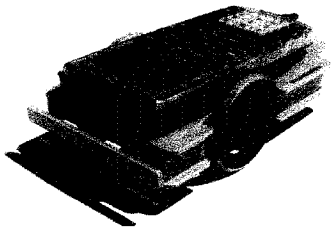

(702) 263-7932
fax: (702)876-9231
email robot@smallrobot.com

Name: **School:**

Address:

Address (line 2)

City, State, Zip:

Email address(must have):

Phone Number:

Contact name for school PO:

School PO number (attach copy of purchase order):

Full Name on charge card:

Charge card type **Mastercard____ Visa____**

Charge card Number

Charge card Expires

Qty	Product	Price	Total
	TI graphing Calculator Robot Kit	$99.95	$
	TI Slide cover 73, 83x, 86, and 89	$4.95	$
	TI Link cable 12 inch	$4.95	$
	Pen Holder	$19.95	$
	Other		$
		Sub Total |	$
		Nevada sales tax if in Nevada 7.50%|	$
Shipping and handling (US) $6.00 Priority mail for one |			$6.00
robot, add $3.00 for each additional robot. Qty. ____ X $3.00 =$			
		Total due|	$