GRAPHING CALCULATORS 1

Participants are introduced to various math activities on the graphing calculator. They are shown how to use TI Connect to paste calculator screen shots into Word documents.

Lesson Goals

- Learn ways to integrate a graphing calculator into a mathematics classroom
- Learn how to draw pictures using Cartesian Coordinates in a graphing calculator
- Familiarity with TI's website
- Learn how to insert Screen Shots into a Word document

Word Bank

- factor
- divisor
- product
- quotient
- Cartesian Coordinates
- transformations
- TI Connect
- Screenshot
- Scatterplot

ISTE National Educational Technology Standards

- I-A: Demonstrate introductory knowledge, skills, and understanding of concepts related to technology
- II-A: Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners
- II-D: Plan for the management of technology resources within the context of learning activities
- II-E: Plan strategies to manage student learning in a technology-enhanced environment
- III-B: Use technology to support learner-centered strategies that address the diverse needs of students
- III-C: Apply technology to develop students' higher order skills and creativity

CA Mathematics Standards – In Brief

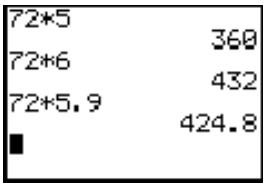
- Develop strategies for finding factors and divisors with 2- and 3-digit numbers
- Plotting points on the coordinate plane
- Transformations of pictures on the coordinate plane

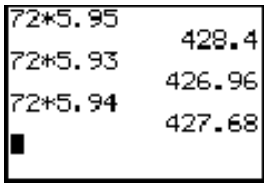
MULTIPLICATION/DIVISION ESTIMATION GAME DIRECTIONS

The Multiplication/Division Estimation Game is designed to help students develop a rational number sense with the operation of multiplication and division. Teams of students (n>2) use the calculator to compute answers to multiplication and division problems where the teams use estimation and mental arithmetic skills to cause the calculator display to show a product or quotient that is within 5 numbers (or closer) to a given number, the Target Number, chosen by one team at the start of play.

Have students give a two-digit factor (i.e. 72), the Start Number, and a three-digit product (i.e. 427), the Target Number. The goal is to give a factor to multiply the Start Number by to get as close to the Target Number as possible.

- **Version 1:** Start by entering the Start Number into the calculator followed by a times sign (72*). Have students give a factor that you can enter that they think will get you the closest to the Target Number.
  - ***Do we want to try again?*** Continue reentering the Start Number and trying out the new guesses.

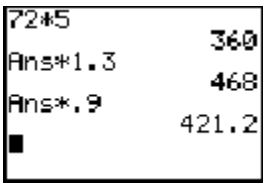


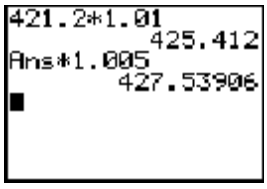


This game can be modified by how far you take the guesses. If you want it to be easy, just ask to get within 5 numbers of the Target Number. The further you take the guesses, the more number sense comes into play. You can also adapt the lesson for lower grades by using addition and subtraction.

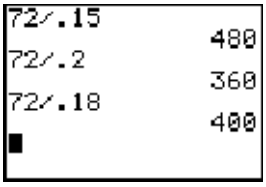
Overview of all versions:
In all versions participants pick a 2-digit 'Start Number' (a factor or divisor) and a 3-digit 'Target Number' (a product or quotient) before the game begins.
Start Number: 72; Target Number: 427

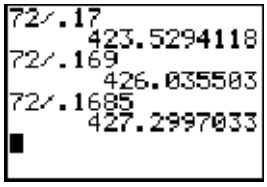
- **Version 1:** Multiplication; Use the Start Number with each new guess (see above)
- **Version 2:** Multiplication; Same as Version 1, but now start each new guess with the previous answer.



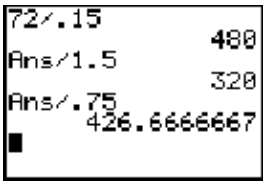


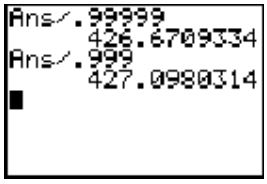
- **Version 3:** Division; the Start Number is a dividend and the Target Number is a quotient. Participants guess divisors that will get them to the Target Number. Start each new guess with the Start Number.





- **Version 4**: Division; Same as Version 3, but now start each new guess with the previous answer.





Summary Questions:

- ***What strategies were helpful to get the fewest number of guesses with the multiplication game?***

- ***What strategies were helpful to get the fewest number of guesses in the division game?***

ESTIMATION GAME RECORDING SHEET

Target Range: Selected by Team:	**Start Number:** Selected by Team:
Factor or Divisor	Product or Quotient

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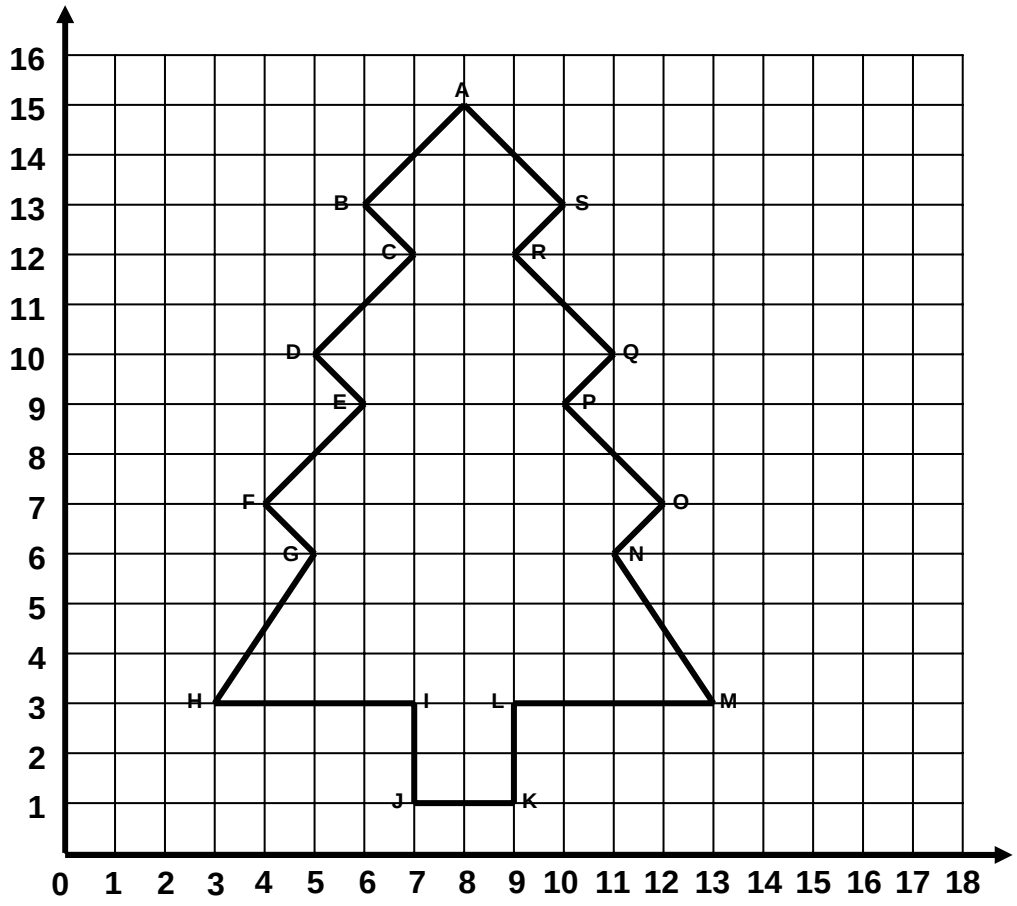
TREE GRAPH



List the ordered pairs for the tree:

A (,)	K (,)
B (,)	L (,)
C (,)	M (,)
D (,)	N (,)
E (,)	O (,)
F (,)	P (,)
G (,)	Q (,)
H (,)	R (,)
I (,)	S (,)
J (,)	A (,)

TREE GRAPH TRANSFORMATIONS

1. Changing the *x*- and *y*-coordinates:

   When I _____ the *x* values, the graph changed by _____.

   When I _____ the *y* values, the graph changed by _____.

2. What made the tree tall and narrow?

3. What made the tree short?

4. What made the tree wider?

MY CALCULATOR SCREEN SHOTS

GRAPHING CALCULATOR CHEAT SHEET

Saving Lists

- If you want to archive data stored in lists so that you can clear out your lists for new data without losing the original data.
- 2nd MEM → 8:Group → 1:Create New → Name = (enter name here, i.e. TREES) → Enter → 4:List → Press Enter next to the lists that you want to select (i.e. L1, L2). A square will appear next to the selected lists → Right arrow to DONE → 1:Done

To Retrieve Saved Lists

- 2nd MEM → 8:Group → Right arrow over to UNGROUP → Select Saved list that you want to call up (i.e. TREES) → 3:Overwrite All (will replace anything already in the lists you are putting it in)

To Delete a Saved Group

- 2nd MEM → 2:Mem Mgmt/Del.. → C:Group → Take the cursor to the saved group that you want to delete → Press DEL → 2:Yes

Saving Pictures

- If you have a picture graphed you can save it as a pic file. When you retrieve the picture, you will not be retrieving the information that created it (i.e. the list and/or equation(s)).
- Start with picture up on the GRAPH window → 2nd DRAW → Right arrow over to STO → 1:StorePic → Enter a number (0-9) next to StorePic (i.e. StorePic 1) → Enter → You should now return back to the saved picture.

To Retrieve a Saved Picture

- 2nd DRAW → Right arrow over to STO → 2:RecallPic → Enter the number of the picture you want to retrieve (i.e. RecallPic 2) → Enter → Picture should appear

To Erase a Saved Picture from Graph Window

- From the home screen: 2nd DRAW → 1:ClrDraw → Enter
- From the GRAPH screen: 2nd DRAW → 1:ClrDraw (do not press enter)

Directions for Downloading TI Connect

- **Note:** TI often changes the layout of their webpage so the specific location of the items might change.
- On your computer, go to education.ti.com
- Find the drop down window titled "Know what you're looking for?" → Select TI Connect
- In the left blue column select Downloads
- Select Download Latest TI Connect for Windows (or Macs) → TI Connect English (or whatever language you would like) → Save to desktop → When done, close the window
- On your desktop (or wherever you chose to save it) click on ticonnect_eng → Run → Follow prompts
- TI Connect icon should appear on your desktop
- When done, drag ticonnect_eng to the trash or right click the icon and select "Delete."
- Restart your computer

Directions for Creating Screen Shots

- BE SURE THAT THE TI CONNECT SOFTWARE IS INSTALLED BEFORE STARTING.
- With your calculator off, plug in the cord to both the calculator and your computer. Your calculator should automatically come on.

> At this point my computer had an Install Software box pop up. I chose to install the software (I did not need to put any disk in) and followed the prompts. At first I did not do this and the USB option did not appear inside TI Connect. Once I did it, the USB option did appear. You may not need to do this.

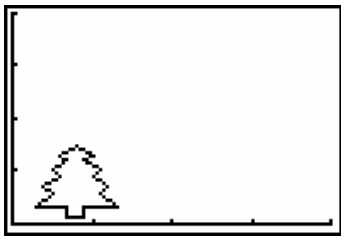
- Click on the TI Connect icon → Select TI Device Explorer
- A box will come up trying to find what calculator you have, what cord you are using, and where the cord is connected. If it is unable to find a connection, select Communication Settings and make sure it has the proper calculator, cord, and port selected. Then press Refresh
- Press Select when the proper port and calculator is highlighted → TI Device Explorer Window will open → Click on the picture of the camera on the toolbar → TI Screen Capture window will pop up with a screen capture box showing whatever is on your calculator
- On your calculator, bring up whatever you want a screen shot of (i.e. the picture of your graph on the GRAPH screen)
- In the TI Screen Capture window, press the picture of the camera. Another Screen Capture box will pop up.
- Continue this process for however many screen shots you want.

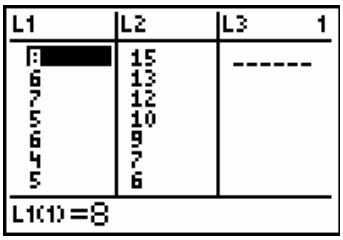
To Put a Box Around a Screen Shot

- Click on the Screen Shot box that you want to place a box around → Press the picture of a box on the toolbar

To Place a Screen Shot in a Word Document

- Click on the Screen Capture box that you want to insert → Edit → Copy → Open up a Word document and place the cursor where you want the Screen Capture box → Edit → Paste
- Continue repeating this process for each Screen Capture box that you want to insert
- Example of pasting two Screen Capture Boxes from TI Connect (this is what you should have for POW#4 but with your own picture):





PROBLEM OF THE WEEK

Create a picture on graph paper that contains at least 10 sets of coordinates.
Then, on your calculator, graph the picture. You can leave the coordinates in your calculator but you should also save your picture as a pic on your calculator. Finally, you need to download the TI software and send your instructor (via email) screen shots of both your table and your picture embedded into a Word document. Include a reflection on the assignment in the document.