Number Line / Fraction Line for the TI-73

Getting Started

Start here

How To...

- Find Installation Instructions
- Start Number Line
- Enter expressions
- Trace the vector history
- Start Fraction Line
- Enter Fraction Line Data
- Adjust window values
- Convert Fraction Line labels

More Information

- Uninstalling the Application from the TI-73
- Error Recovery
- Customer Support

FXAS

RUMENTS

Important Information

Texas Instruments makes no warranty, either expressed or implied, including but not limited to any implied warranties of merchantability and fitness for a particular purpose, regarding any programs or book materials and makes such materials available solely on an "as-is" basis.

In no event shall Texas Instruments be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials, and the sole and exclusive liability of Texas Instruments, regardless of the form of action, shall not exceed the purchase price of this product. Moreover, Texas Instruments shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.

This graphing product application (APP) is licensed. See the terms of the <u>license agreement</u>.



Copyright © 1999, 2001 Texas Instruments Incorporated.

Where to Find Installation Instructions

You can find detailed instructions on installing Flash applications at <u>education.ti.com/guides</u>.

What is Number Line / Fraction Line?

This application contains two parts: **Number Line** and **Fraction Line**.

Number Line gives a dynamic, electronic representation of a number line. It includes three data representations — an entry line, a vector history, and the number line itself with an indicator showing the current position of the entry.

Use Number Line when you want to create a numerical expression by adding and/or subtracting positive and/or negative whole numbers. You can then view the vector history. You can also see where the ending point (result of the expression) falls on a number line. As you edit an entry, the vector history and ending point adjust, as necessary.

Fraction Line gives a dynamic, electronic representation of a double-sided number line. Each side of the number line may be configured to represent numbers as decimals, fractions, or percentages.

Use Fraction Line when you want to label a number line with a fraction, decimal, percent, or whole number. You can then use the labels to compare between many types of numbers at the same time.

Number Line

Starting Number Line

1. Press APPS.

The **APPLICATIONS** menu is displayed.

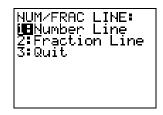
- 1:Link… 2:NUMLINE
- 2. Select **NUMLINE** from the menu. (Press the number corresponding to the menu option, or press the down arrow key until the number is highlighted, then press [ENTER].)

An information screen is displayed.

3. Press any key to continue.

The NUN/FRAC LINE menu is displayed.

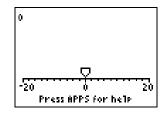




4. Select **1:Number Line** from the menu.

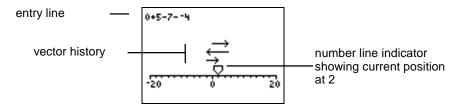
The Number Line application screen and any previous entries are displayed.

If necessary, press <u>CLEAR</u>, and then select **1:Yes** from the menu to clear previous entries.



Number Line Options

With Number Line, you can add and subtract positive and negative values on a number line. After entering the numerical expression on the entry line, you can then edit or clear the entry, trace the vectors, adjust the appearance of the number line, and label various points on it. The first time the Number Line runs, the line indicator is shown at the default starting point, o. No previous entries are shown arithmetically or in vectors, since no previous information has been entered. Below is a screen with an example of the equation 0 + 5 - 7 - 4 = 2.



The default **WINDOW** values: **Min**=-20, **Max**=20, **Scale**=2, **Start**=0. For more information, see section entitled, Adjusting the Number Line **WINDOW** Values.

Entering an Expression

Enter the numerical expression on the entry line. The expression can consist of positive and/or negative whole numbers that are added or subtracted. Therefore, you can use the following keys: all number keys, +, - and -. Enter the values as you would on the Home screen of the TI-73.

You can add a positive value in two ways:

- Use + to add a positive number. Example: 10 + 5 = 15.
- Use - to subtract a negative number.
 Example: 10 -5 = 15

Pressing a number without pressing an operator (+ or -) defaults to a positive number (+) and adds an entry to the expression. **Example**: Pressing 6 defaults to +6.

You can negate a number in two ways:

- Use (-) to add a negative number. **Example**: 10 + -5 = 5
- Use to subtract a positive number. Example: 10 5 = 5

When you finish entering the expression, press ENTER. The numerical result is displayed at the end of the expression on the entry line, the vector history is also displayed, and the indicator is adjusted so that it points to the result on the number line.

Note You can press ENTER after a single entry or after multiple entries.

Editing Entries

To edit the expression, press ENTER or Y= to move the cursor to the entry line and enter Edit mode. Edit the entry using the following edit keys.

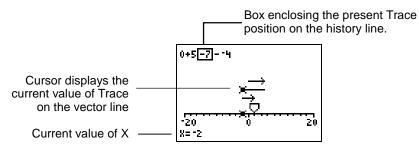
Press:	То:
ENTER	Move to the beginning of the entry line to start editing
✓ or 	Move between characters on the entry line
2nd •	Move to the beginning of the entry line from another position
2nd 🕨	Move to the end of the entry line
DEL	Delete character at the cursor
[2nd] [INS]	Insert a character in front of the cursor
(CLEAR)	Clear all entries (If you are not in Edit mode, you will be asked to confirm that you want to clear the entire expression. Press 1 to select Yes .)
(ENTER)	Finish editing and update the expression, vector, and number line

Tracing the Vector History

You can trace the vector history just as you would trace a function graph on the TI-73.

Press TRACE to enter Trace mode. You see two cursors: a vector cursor and a corresponding number line cursor. As both cursors move simultaneously, the exact corresponding x-value is displayed at the bottom left corner of the screen. The entry line only displays the expression without its numerical result.

The cursor traces in increments according to the **Scale** value set on the **WINDOW** screen. For more information on **WINDOW** values, see the section entitled, Adjusting the Number Line Window Values. A maximum of 5 vectors display on the screen at all times. To see undisplayed vectors, press
 until they appear.

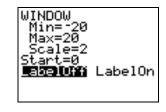


Press:	То:
Image: Image: Image:	Move the vector cursor along a vector as well as the number line cursor along the number line
I and I	Move between vectors
DEL	Delete a vector when its representative value is enclosed in a box
[2nd] [INS]	Insert a character in front of the cursor
(CLEAR)	Clear the entire entry
Y= or Enter	Edit the entry while in Trace mode
GRAPH	Exit Trace mode

Adjusting the Number Line WINDOW Values

To adjust the appearance of the number line, press WINDOW.)

- To change the settings, enter a new value for Min, Max, Scale, and Start.
- To change the LabelOff and LabelOn settings, position the cursor over the desired setting and press ENTER. Your choice stays highlighted. Press
 or ENTER to move to the next item.
- To exit the **WINDOW** screen and return to the Number Line application, press <u>GRAPH</u>, or press <u>2nd</u> [QUIT].



Setting	Definition	Example
Min Max	The minimum or maximum value displayed on the number line. Min must be less than Max, or you will get a WINDOW RANGE error. Min default=-20. Max default=20.	0 - <u></u>

Setting	Definition	Example
Scale	The distance between each mark on the number line. In Trace mode, Scale determines the movement of the trace on the vector. Default= 2 .	0 - <u></u>
Start	Specifies where the indicator appears when the number line is first displayed. Default= 0 .	0 - <u></u>
LabelOff	If selected, only 0 , the minimum, and the maximum numbers are labeled on the number line. Default= LabelOff .	0 - <u></u>
LabelOn	If selected, other marks on the number line are labeled. LabelOn overwrites any labels drawn with the DrawLabel option.	°
	Note: LabelOn works only within the range of -1000 to 1000.	-20 -12 -4 4 12 20

Using ZoomFit and ZStandard to Adjust Window Values

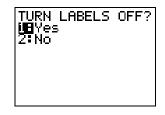
- 1. To display the **ZOOM** menu, press ZOOM.
- 2. Select **ZoomFit** or **Zstandard.**
 - ZoomFit adjusts Min and Max so that all vectors in the current expression are displayed within the viewing screen. If you have entered a large range of numbers, all vectors may not fit the viewing window. If this occurs, increase the Scale (WINDOW) value.
 - ZStandard returns the window to the default settings: Min=-20, Max=20, Scale=2, Start=0, LabelOff.
- 3. To exit **ZoomFit** or **ZStandard**, press the GRAPH key, or press 2nd [QUIT].

ZOOM MEZoomFit 2:ZStandard	

Drawing Labels on the Number Line

Use **DRAW** to label numbers along the number line. Label numbers when you want to show the relationship between numbers, or when you want to see how labels correspond to the vectors. The label must fall between the current **Min** and **Max** (<u>(WINDOW</u>)) values.

- To access the **DRAW** menu, press **DRAW**.
- To exit **DRAW** without making changes, press <u>GRAPH</u>, or press <u>[2nd]</u>[QUIT].
- To clear the labels, press DRAW and select 2:CIrDraw. The labels are also cleared if you press WINDOW or select a ZoomFit or ZStandard.
- Press DRAW. If you have selected the LabelOn option from the WINDOW menu, a screen displays prompting you to turn labels off.



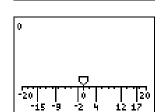
 Select 1:Yes to continue with the DRAW menu. (Select 2:No to exit the DRAW menu and return to the Number Line application.)

The **DRAW** menu is displayed.

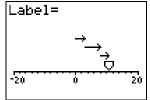
- Select 1:DrawLabel. The Number Line screen is displayed with the Label= prompt at the top.
- 4. Enter the number to label and press ENTER.

The Label= prompt reappears. Continue labeling numbers at this prompt.

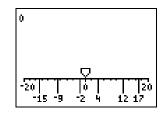
Note The labels may overlap each other when displayed if they are very close together.







5. When finished, press ENTER at the Label= prompt (with a blank value) to exit labeling mode. The Number Line screen displays, showing labels for each number you entered.

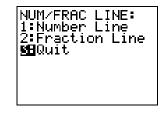


Note If you specify a number outside the window range, it will not be labeled.

Quitting Number Line

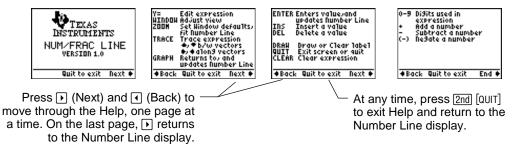
To leave the Number Line application, press [2nd] [QUIT].

- To return to Number Line, select **1:Number Line**.
- To go directly to Fraction Line, select **2:Fraction Line**.
- To quit the Number Line/Fraction Line application and return to the TI-73 Home screen, select **3:Quit**.



Viewing Online Help

To view online Help, press <u>APPS</u> while Number Line is running. Press • and • to navigate between the help screens. Press 2nd [QUIT] to quit the online Help and return to the Number Line display.



Fraction Line

Starting Fraction Line

With Fraction Line, you can enter and compare decimal numbers, fractions, and percents on a two-sided number line.

1. Press APPS.

2. Select **NUMLINE** from the menu.

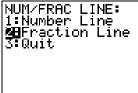
An information screen is displayed.

3. Press any key to continue.

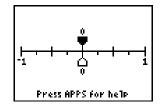
The Num/Frac Line menu is displayed.







 Select 2:Fraction Line from the menu. (Press the number corresponding to the menu option, or press the down arrow key until the number is highlighted, then press ENTER.)

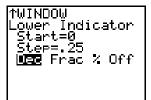


The Fraction Line application screen is displayed.

Adjusting the Fraction Line WINDOW Values

- To change the settings, enter a new value for Min, Max, Start, and Step.
- To change the Dec, Frac, %, and Off settings, position the cursor over the desired setting and press ENTER. Your choice stays highlighted. Press
 or ENTER to move to the next item.
- To exit the **WINDOW** screen and return to the Number Line application, press <u>GRAPH</u>, or press <u>2nd</u> [QUIT].





Setting	Definition
Min	The minimum value displayed on the fraction line. Default=-1. If you are using percent values, Min must be ≥ 0 (zero).
Max	The maximum value displayed on the fraction line. Default = 1. Max > 0.
Dec Frac	Specifies whether the calculator displays the Min and Max values as decimals or fractions. Default=
Start	Specifies where the upper or lower indicator appears when the fraction line is first displayed. Default = 0. If the indicator is a percent, Start > 0.
Step	The distance the upper or lower indicator moves along the fraction line when you press (and). Define the upper or lower indicator step as a decimal, fraction, or percent, or turn the step off.
Dec Frac % Off	Specifies whether the calculator displays the values on the fraction line as a decimal, fraction, percent, or exactly as entered.

When you select percent values (in the **WINDOW** settings) for the upper or lower indicator, Fraction Line uses 100% to equal 1 at all times. All values greater than 1 will be over 100%. Min must always be ≥ 0 (zero). If you select % and enter a negative Min or Max, you will receive a WINDOW RANGE error. Select 1:Reset to reset the WINDOW settings to an indicator value other than percent. Select 2:Goto to go to the error and enter a new value.

Entering Fraction Line Data

On the Fraction Line screen, two indicators are displayed: one above the number line and one below. You can enter values as decimals, fractions, or percentages.

Before you enter the value you want displayed on the fraction line, select one of the two indicators. Press → and → to switch between the upper and lower indicator. The selected indicator is solid.

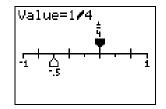
The entries move the indicator along the selected side of the fraction line.

- Select the indicator above the number line if you want your upper indicator to move to the entry value.
- Select the indicator below the number line if you want your lower indicator to move to the entry value.

Press
 and
 to scroll the fraction line with the selected indicator. You can scroll past the initial window range so that the deselected indicator no longer shows on the screen.

To enter a value, follow these steps:

- Select the desired indicator: upper (
) or lower (
).
- 2. Enter a value. A Value= prompt displays at the top of the screen, along with the value you have entered.



Note To enter a negative number or value, press [-]. Press ENTER to accept this value or CLEAR to clear the entry line.

If the values that you enter are so far enough apart that both indicators cannot show on the screen at the same time, the screen adjusts to the last value you entered. The **WINDOW** settings also change to reflect what is currently displayed on the screen. (See the section entitled, Adjusting the Fraction Line **WINDOW** Values.)

Note For **Min** and **Max** > -1000 and <1000, any fraction is converted to decimal.

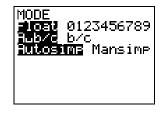
Fraction Line accepts decimal, fraction, or percent values.

To enter:	Press:
Decimal	whole_# \odot decimal_part Example: 4.25 = 4 \odot 2 5
Fraction/ Mixed Number	whole_# UNIT numerator b_{c} denominator Example: $4^{2}/3 = 4$ UNIT 2 b_{c} 3
Percent	# % Example: 75% = 7 5 %

Fraction Line Mode Settings

To select mode settings that control how Fraction Line interprets and displays numbers and fractions, press <u>MODE</u>.

• To select a mode setting, highlight the one you want using the cursor keys, and then press ENTER. Your choice is now highlighted.



• To return to Fraction Line, press GRAPH.

Numeric Notation Mode

Float	Floating decimal point; displays up to ten digits.
0123456789	Fixed decimal point; specifies the number of digits (0 through 9) to display to the right of the decimal.

Display Format Mode	
A_b/c	Displays result as a mixed number, if applicable.
b/c	Displays result as a simple fraction.
Simplification Mode	
Autosimp	The calculator automatically simplifies fractional entries.
Mansimp	The user simplifies a selected fraction entry manually to its lowest form with the SIMP key. \downarrow next to a fraction signifies that it can be simplified.
	Note: Mansimp does not work for labels.

Using ZoomFit and ZStandard to Adjust Window Values

- 1. To display the **ZOOM** menu, press ZOOM.
- 2. Select ZoomFit or ZStandard.
 - ZoomFit adjusts the Min and Max so that all vectors in the current expression are displayed within the viewing screen.
 - ZStandard returns the window to the default settings: WINDOW: Min= -1, Max=1, Dec (decimal value), Upper Indicator: Start = 0, Step = 1/2, Frac (fraction value); Lower Indicator: Start = 0, Step = .25, Dec (decimal value).
- 3. To exit **ZoomFit** or **ZStandard**, press GRAPH, or press 2nd [QUIT].



Drawing Labels on the Fraction Line

Use **DRAW** to label numbers along the number line. Label numbers when you want to show the relationship between numbers.

To clear the labels, press DRAW and select 2:CIrDraw.

- Changing the **WINDOW** settings also clears the labels.
- Scrolling an indicator outside of the window settings displayed on the screen or entering a new value for the indicator also clears the labels.
- 1. Press DRAW, then select **1:DrawLabel**.

To exit **DRAW** without making any changes, press the **GRAPH** key, or press 2nd [QUIT].

DRAW M B DrawLabel Z:ClrDraw	

The Fraction Line screen is displayed.
 A Label= prompt is displayed. Enter the number to label and press ENTER.

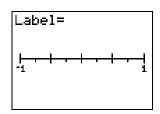
The prompt reappears. Continue labeling numbers at this prompt.

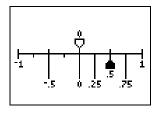
Note: If you label numbers that are very close together, the labels may overlap each other when they display.

3. When you are finished, press ENTER at the Label= prompt to exit labeling mode.

The Fraction Line screen displays, showing labels for each number you entered.

Note If you specify a number outside the window range, it will not be labeled.

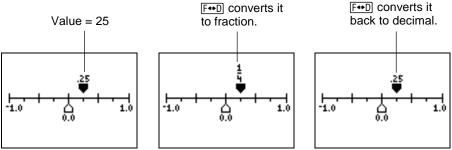




Converting Fraction Line Labels

You can convert entries using TI-73 calculator keys.

- Press F••D to convert between a fraction and decimal.
- Press Aber a simple fraction and a mixed number.
- Press % to convert between current form and a percent. (You cannot convert between fraction and percent. Instead, convert from fraction to decimal and then to percent.)
- Press <u>SIMP</u> to convert an unsimplified fraction to its simplified form.



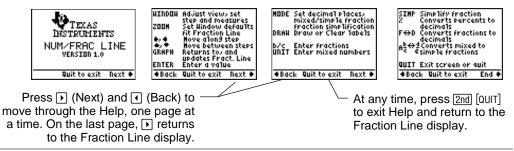
Quitting Fraction Line

Press [2nd] [QUIT].

- To return to Fraction Line, select **2:Fraction Line**.
- To go directly to Number Line, select 1:Number Line.
- To quit the Number Line/Fraction Line application and return to the TI-73 Home screen, select 3:Quit.

Viewing Online Help

To view online Help, press <u>APPS</u> while Fraction Line is running. Press • and • to navigate between the help screens. Press 2nd [QUIT] to quit online Help and return to the Fraction Line display.



NUM/FRAC LINE: 1:Number Line 2:Fraction Line 98 Quit

Uninstalling the Application from Your TI-73

To uninstall the application and delete it from the calculator's memory:

- 1. Quit the Number Line/Fraction Line application ([2nd] [QUIT]).
- 2. Press 2nd [MEM].
- 3. Select **4:Delete**.
- 4. Select 8:Apps.
- 5. Select **NUMLINE** and press ENTER.
- 6. Select **2:Yes** to confirm that you want to delete the application.

If you retained the application file on your computer, you can reinstall it later.

Error Recovery Instructions

Low Battery Condition

Do not attempt a Flash download if the low-battery message appears on the calculator. Low battery indication is shown on the initial screen. If you receive this error during an installation, change the batteries before trying again.

Check Amount of Flash Application Free Space

On the TI-73, select 2nd [MEM] 3:Check APPs.... The number to the right of **Spaces Free**: indicates the number of spaces available for applications. The Matrices application requires one space. There are a maximum of four spaces.

Communication Error

This error indicates the Flash installer is unable to communicate with the TI-73. The problem is usually associated with the TI-GRAPH LINK[™] cable and its connection to the TI-73 and/or to the computer. Make sure the cable is firmly pushed in to the calculator and the computer.

If this does not correct the problem, try a different TI-GRAPH LINK cable and reboot your computer. If you continue to get this error, please contact <u>TI-Cares™</u> Customer Support for assistance.

Memory is Full

This download error appears when the TI-73 contains one to four applications that occupy the available 64K of space. To make room for another application, you must delete one from the TI-73. Before deleting an application, you can back it up to your computer so that you can reload it later as necessary.

Syntax Error

QUIT ignores the last transaction and displays the last results.

GOTO displays the screen with the error highlighted. Make any necessary correction and press [ENTER].

Miscellaneous Error Received

Write down the error code displayed in the dialog box and contact <u>TI-CARES</u>.

Checksum Error

Exit the installation and try it again. If this problem persists, contact $\underline{\text{TI-CARES}}$.

Miscellaneous

If you obtain new or upgraded software for your TI-73, you may need to provide your current software version and/or the serial number of your unit. It is also good to know your version number in case you have difficulties with your TI-73 and need to contact technical support. Knowing the software version may make it easier to diagnose the problem.

Knowing the available number of application spaces in advance helps you better manage your application downloads.

Verify Maintenance Upgrade Version

On the TI-73, enter 2nd [MEM] 1:About. The version number has the format x.yy or x.yyyy.

Verify Flash Application Version

On the TI-73, select <u>APPS</u>. Select the appropriate application and press <u>ENTER</u>. The version number of the application appears on the initial screen.

Verify Serial Number

On the TI-73, enter 2nd [MEM] 1:About. The serial number appears on the line beneath the product ID number.

Texas Instruments (TI) Support and Service Information

For general information

E-mail:	ti-cares@ti.com
Phone:	1-800-TI-CARES (1-800-842-2737) For US, Canada, Mexico, Puerto Rico, and Virgin Islands only

Home page: education.ti.com

For technical questions

Phone: 1-972-917-8324

For product (hardware) service

Customers in the US, Canada, Mexico, Puerto Rico, and Virgin Islands: Always contact TI Customer Support before returning a product for service.

All other customers: Refer to the leaflet enclosed with your product (hardware) or contact your local TI retailer/distributor.

End-User License Agreement

BY INSTALLING THIS SOFTWARE YOU AGREE TO ABIDE BY THE FOLLOWING PROVISIONS.

- LICENSE: Texas Instruments Incorporated ("TI") grants you a license to use and copy the software program(s) ("License Materials") contained on this diskette/CD/web site. You, and any subsequent user, may only use the Licensed Materials on Texas Instruments calculator products.
- 2. **RESTRICTIONS:** You may not reverse-assemble or reverse-compile the Licensed Materials. You may not sell, rent, or lease copies that you make.
- 3. **COPYRIGHT:** The Licensed Materials and any accompanying documentation are copyrighted. If you make copies, do not delete the copyright notice, trademark, or protective notices from the copies.
- 4. WARRANTY: TI does not warrant that the Licensed Materials or documentation will be free from errors or that they will meet your specific requirements. THE LICENSED MATERIALS ARE PROVIDED "AS IS" TO YOU OR ANY SUBSEQUENT USER.
- LIMITATIONS: TI makes no warranty or condition, either expressed or implied, including but not limited to any implied warranties of merchantability and fitness for a particular purpose, regarding the Licensed Materials.

IN NO EVENT SHALL TI OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, LOSS OF USE OR DATA, OR INTERRUPTION OF BUSINESS, WHETHER THE ALLEGED DAMAGES ARE LABELED IN TORT, CONTRACT, OR INDEMNITY.

SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY.

IF YOU AGREE TO BE BOUND BY THIS LICENSE, CLICK ON THE "ACCEPT" BUTTON; IF YOU DO NOT AGREE TO BE BOUND BY THIS LICENSE, CLICK ON THE "DECLINE" BUTTON TO EXIT THE INSTALLATION.

Page Reference

This PDF document contains electronic bookmarks designed for easy onscreen navigation. If you decide to print this document, please use the page numbers below to find specific topics.

Important Information	2
Where to Find Installation Instructions	3
What is Number Line and Fraction Line?	4
Number Line	5
Fraction Line	19
Uninstalling the Application from Your TI-73	32
Error Recovery Instructions	33
Miscellaneous	36
Texas Instruments (TI) Support and Service Information	37
End-User License Agreement	38