

## Getting Started

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## Where to Find Installation Instructions

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

## 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.

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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.

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4. Select 1:Number Line from the menu.

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

If necessary, press CLEAR, 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 $0+5-7-\mathbf{- 4}=\mathbf{2}$.


The default WINDOW values: $\mathbf{M i n}=-20$, $\boldsymbol{M a x}=20$, $\mathbf{S c a l e}=2$, 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, $\square, \square$ and $(-)$. Enter the values as you would on the Home screen of the $\mathrm{TI}-73$.

You can add a positive value in two ways:

- Use $\dagger$ to add a positive number. Example: 10 +5 = $\mathbf{1 5}$.
- Use $\square(-)$ to subtract a negative number.

Example: 10 - $\mathbf{- 5}=15$

Pressing a number without pressing an operator ( $\boxplus$ or $\square$ ) defaults to a positive number (+) and adds an entry to the expression. Example: Pressing 6 defaults to $\mathbf{+ 6}$.

You can negate a number in two ways:

- Use $₫$ to add a negative number. Example: $10+-5=5$
- Use $\square$ 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: | To: |
| :---: | :---: |
| ENTER | Move to the beginning of the entry line to start editing |
| $\square$ or $\square$ | Move between characters on the entry line |
| 2nd $\square^{\text {a }}$ | Move to the beginning of the entry line from another position |
| 2nd $\square^{\square}$ | 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 $\Delta$ until they appear.


| Press: | To: |
| :--- | :--- |
| $\square$ or $\square$ | Move the vector cursor along a vector as well as the <br> number line cursor along the number line |
| $\square$ and $\square$ | Move between vectors |
| DEL | Delete a vector when its representative value is <br> enclosed in a box |
| 2nd [INS] | Insert a character in front of the cursor |
| CLEAR | Clear the entire entry |
| Y orENTER | 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 LabeIOn 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 GRAPH, or press 2nd [QUIT].

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


| 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. |  |
| Start | Specifies where the indicator appears when the number line is first displayed. Default=0. |  |
| LabelOff | If selected, only $\mathbf{0}$, the minimum, and the maximum numbers are labeled on the number line. Default=LabelOff. |  |
| LabelOn | If selected, other marks on the number line are labeled. LabelOn overwrites any labels drawn with the DrawLabel option. <br> Note: LabelOn works only within the range of -1000 to 1000. |  |

## 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: $\mathbf{M i n}=-20$, Max=20, Scale=2, Start=0, LabelOff.

3. To exit ZoomFit or ZStandard, press the GRAPH key, or press 2nd [QuIT].

## 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 (WINDOW) values.

- To access the DRAW menu, press DRAW.
- To exit DRAW without making changes, press GRAPH, or press [2nd[auit].
- 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.

1. Press DRAW. If you have selected the LabelOn option from the WINDOW menu, a screen displays prompting you to turn labels off.

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2. 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.
3. 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.

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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 APPS while Number Line is running. Press $\square$ and $\square$ to navigate between the help screens. Press [2nd [QUIT] to quit the online Help and return to the Number Line display.

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Press $\square$ (Next) and (Back) to move through the Help, one page at a time. On the last page, $\square$ returns 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．

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2．Select NUMLINE from the menu．
An information screen is displayed．

3．Press any key to continue．
The Num／Frac Line menu is displayed．

| NDP／FRAC LINE： 1：Hamber：Line 2\＃Fract ion Liヶた SHDut |
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4. 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 adjust the appearance of the fraction line, press WINDOW. Press (as necessary)

- 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 GRAPH, or press 2nd [QUIT].

|  |
| :---: |
|  |


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

1. Select the desired indicator: upper ( $\triangle$ ) or lower ( $\square$ ).
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_\# $\square$ decimal_part Example: $4.25=\mathbf{4} \square \mathbf{2 5}$ |
| Fraction/ | whole_\# UNIT numerator $\square$ 因 denominator |
| Mixed Number | Example: 4 2/3 $=\mathbf{4}$ UNIT $\mathbf{2}$ 因 3 |

## Fraction Line Mode Settings

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

- 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.
$0123456789 \quad$ Fixed decimal point; specifies the number of digits (0 through 9) to display to the right of the decimal.

## Display Format Mode

A $\quad \mathrm{b} / \mathrm{c}$
Displays result as a mixed number, if applicable.
b/c
Displays result as a simple fraction.

Simplification Mode

Autosimp
Mansimp

The calculator automatically simplifies fractional entries.

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].

2. 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 $E \nleftarrow D$ to convert between a fraction and decimal.
- Press $A \frac{A_{c}^{b} * \frac{d}{e}}{}$ to convert between 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 SIMP to convert an unsimplified fraction to its simplified form.



## Quitting Fraction Line

## Press [nd [aut].

- 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 $\mathrm{TI}-73$ Home screen, select 3:Quit.


## Viewing Online Help

To view online Help, press APPS while Fraction Line is running. Press $\square$ and to navigate between the help screens. Press 2nd [QUIT] to quit online Help and return to the Fraction Line display.


Press $\square$ (Next) and $\square$ (Back) to move through the Help, one page at a time. On the last page, $\square$ returns to the Fraction Line display.

## Uninstalling the Application from Your Tl-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 ${ }^{\text {TM }}$ 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 Tl-Cares ${ }^{T M}$ Customer Support for assistance.

## Memory is Full

This download error appears when the Tl-73 contains one to four applications that occupy the available 64 K of space. To make room for another application, you must delete one from the Tl-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 TI-CARES.

## Checksum Error

## Exit the installation and try it again. If this problem persists, contact 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 APPS. Select the appropriate application and press ENTER. 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

$$
\text { Phone: } \quad 1-972-917-8324
$$

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.

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