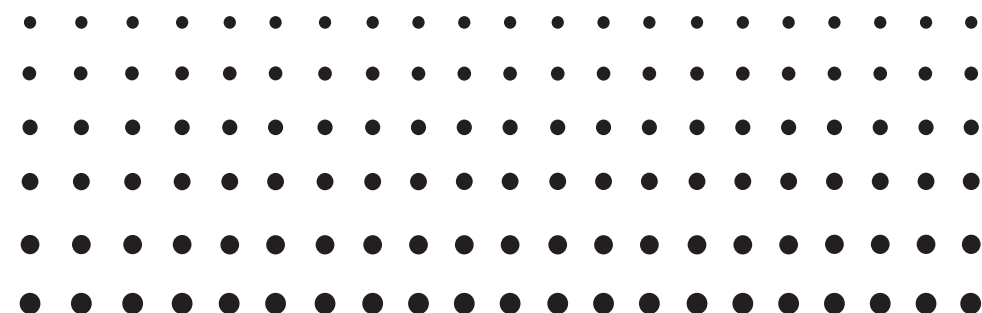


For fx-CG Series/fx-9860G Series

GRAPH 75/85/95 Series

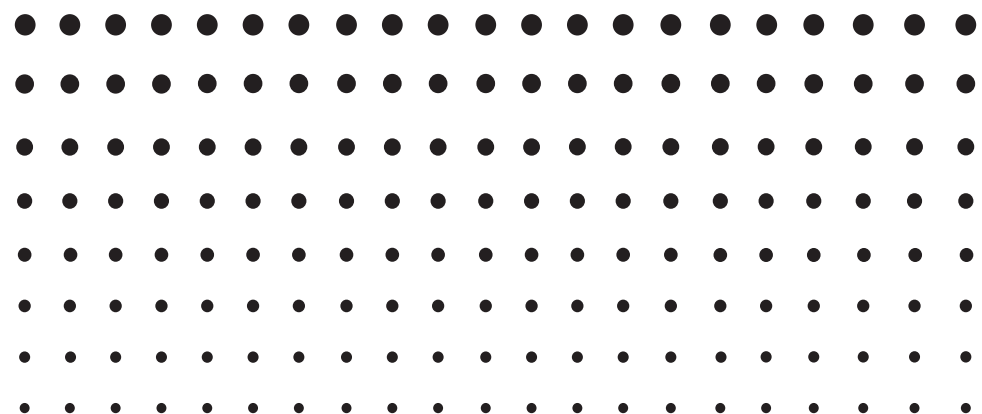
fx-9860GIII/fx-9750GIII/GRAPH35+ E II

EN



Probability Simulation

User's Guide



CASIO Worldwide Education Website

<https://edu.casio.com>

CASIO®

1. Introduction

1-1. Probability Simulation Overview

- This application performs the six types of simulations described below.

Coin Toss

Dice Roll

Spinner

Marble Grab

Card Draw

Random Numbers (Random Integers)

1-2. Using This Manual

- The procedures shown in this manual use the CASIO fx-CG Series calculator.
- You can use the same operations to perform the operations in this manual using a CASIO fx-9860G Series/GRAPH 75/85/95 Series/fx-9860GIII/fx-9750GIII/GRAPH35+ E II calculator, but the appearance of the display will be different.
- The screen shots shown in this manual are for explanatory purposes only. The actual calculator display may appear different from what is shown here.

2. Performing Probability Simulation Operations

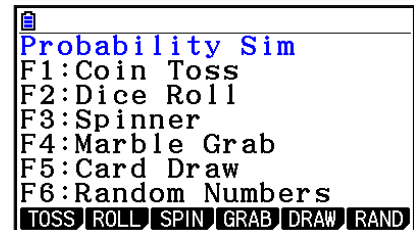
This section uses Coin Toss to explain how to perform a simulation.

Operations for other simulations are identical.

2-1. Using Coin Toss

1. From the Main Menu, enter the **Probability Simulation** mode.

- This displays the simulation selection menu.



2. Press a number button from **[F1]** to **[F6]** to select the simulation you want to use.

- Here, press **[F1]**(TOSS).
- This displays the initial Coin Toss screen.

3. Press **[F1]**(TOSS). Note that you need to press **[F1]** to execute other simulations as well.

- This executes the simulation and display the applicable results.
- For Coin Toss results, ○ indicates heads while ● indicates tails.
- The appearance of the screen depends on the number of coins.
- Use the set up screen to specify the number of coins and the number of executions.
- Coins: 1, Executions: 1



[F1](TOSS) Executes the simulation the number of times specified by “Attempts”.

[F2](+n)..... Displays a dialog box for specifying the number of executions. The simulation is executed the specified number of times.

[F3](STORE).... See “2-3. Writing Simulation Results into List Memory”.

[F4](CLEAR).... Clears the result screen.

[F5](TABLE)..... Displays a table in full-screen view.

[F6](GRAPH) ... Displays a graph in full-screen view.

- The table below explains the result displayed for each type of simulation.

		Table	Graph
Coin Toss	1 coin	Cumulative number of heads over multiple tosses	Head/tail percentages over multiple tosses
	2 coins/ 3 coins*	Number of heads for a single toss	Cumulative percentages of number of heads over multiple tosses
Dice Roll	1 die	Number produced by a single roll	Percentages of each number over multiple rolls
	2 dice/ 3 dice*	Total of numbers produced by a single roll	Percentage of roll totals over multiple rolls
Spinner		Spinner number by a single spin	Percentages of each number over multiple spins
Marble Grab		Types of marbles for a single grab	Percentages of each type of marble over multiple grabs
Card Draw		Rank and suit of drawn card	No graph
Random Numbers		Generated random integer	No graph

* For information about how to configure settings, see “3-1. Set Up Screen”.

The leftmost column of the table shows the number of tries up to 999.

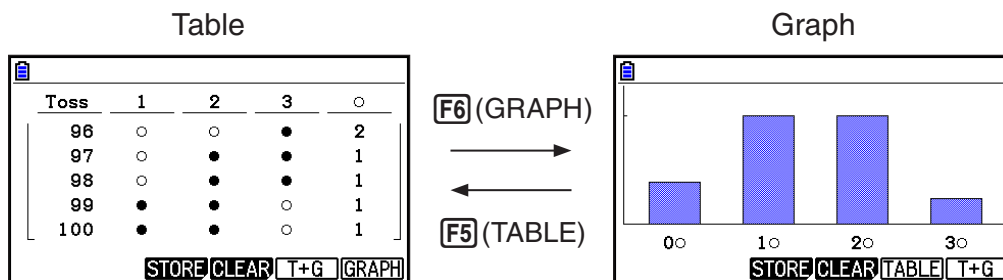
You can use ▲ and ▼ to scroll a table up and down. You can use ◀ and ▶ to scroll a graph left and right.

- To return to the simulation selection screen, press **EXIT**.

2-2. Table and Graph Full-screen Views

Pressing **F5** (TABLE) while a result screen is displayed will display a full-screen view of the table. Pressing **F6** (GRAPH) will display a full-screen graph view.

Example: Using three coins for Coin Toss

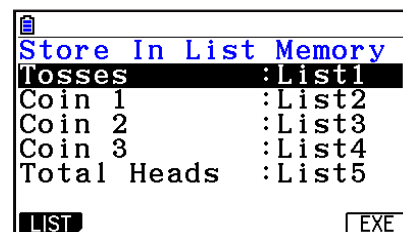


- While the full-screen graph view is displayed, pressing **SHIFT F1** (TRACE) will enable use of the trace function.
- Press **F5** (T+G) or **F6** (T+G) to return to the result view.

2-3. Writing Simulation Results into List Memory

Example: Coin Toss

1. On the Coin Toss result display, press **[F3]** (STORE).
 - This will display a screen like the one shown below. (The appearance of the screen depends on the simulation type.)



2. For information about what you should do from here, refer to "6. **Spreadsheet** Mode Memory" in "Chapter 9 Spreadsheet" of the calculator software user's guide.
- For information about List Memory, refer to "Chapter 3 List Function" in the calculator software user's guide.

3. Configuring Simulation Settings

3-1. Set Up Screen

While a result screen is displayed, perform the following operation to display the applicable set up screen: **[SHIFT]** **[MENU]** (SET UP).

[F1] (ADV) Display the Advantage set up screen (Coin Toss, Dice Roll, Spinner, and Marble Grab only).

[F6] (INITIAL)... Returns all items to their initial defaults.

Press **[EXIT]** to return to the screen you started from.

Coin Toss Set Up Screen

```

Settings
Attempts      :1
Coins         :1
Max. Scale    :Off
Animation     :On
Refresh Freq  :1
Random Seed   :1
ADV          INITIAL
  
```

You can use the set up screen to configure settings for the items described below. The items that appear depend on the simulation type.

Item	Description	Setting*1	Coin Toss	Dice Roll	Spinner	Marble Grab	Card Draw	Random Numbers
Attempts	Specifies the number of attempts (executions) of each simulation.	<u>1</u> to 999	●	●	●	●	●	●
Coins	Specifies the number of coins.	<u>1</u> , 2, 3	●	—	—	—	—	—
Dice	Specifies the number of dice.	<u>1</u> , 2, 3	—	●	—	—	—	—
Die Sides	Specifies the number of faces for each die.	4, <u>6</u> , 8, 12, 20	—	●	—	—	—	—
Sections	Specifies the number of divisions on the spinner.	2, 3, <u>4</u> to 8	—	—	●	—	—	—
Marble Types	Specifies the types of marbles. Selecting 2 for this setting will specify A, B for the marble types, while selecting 5 will specify A, B, C, D, E.	2, 3, 4, <u>5</u>	—	—	—	●	—	—
Decks	Specifies the number of card decks.	<u>1</u> , 2, 3	—	—	—	—	●	—
Deck Size	Specifies the number of cards in a deck.	32, <u>52</u>	—	—	—	—	●	—
Numbers Gen	Specifies the number of random numbers to be generated.	1 to <u>6</u>	—	—	—	—	—	●
Range Start	Specifies the lower limit of the random number generation range.	0, <u>1</u> to 98	—	—	—	—	—	●
Range End	Specifies the upper limit of the random number generation range.	1 to <u>40</u> to 99	—	—	—	—	—	●

Item	Description	Setting* ¹	Coin Toss	Dice Roll	Spinner	Marble Grab	Card Draw	Random Numbers
Replacement	Specifies whether a drawn marble or card is replaced (On) or not (Off) after being drawn. “[On]” is displayed in the upper left corner of the result screen when On is selected for replacement.	<u>On</u> , Off	–	–	–	●	●	–
Repeat	Specifies whether the same value can be repeatedly generated (On) or not (Off). “[On]” is displayed in the upper left corner of the result screen when On is selected for repeat.	<u>On</u> , Off* ²	–	–	–	–	–	●
Max. Scale	Specifies whether the graph’s maximum value scale is displayed (On) or not (Off).	On, <u>Off</u>	●	●	●	●	–	–
Animation	Specifies whether animation display is turned on (On) or off (Off) during execution of a simulation.	<u>On</u> , Off	●	●	●	●	●	●
Refresh Freq	Specifies how often (in terms of the number of results) the result screen should be refreshed. Specifying “Last” here causes the screen to be refreshed only for the final result.	<u>1</u> , 20, 50, Last	●	●	●	●	●	●
Random Seed	Specifies a seed value to use for generation of pseudo random numbers.	<u>1</u> to 99999	●	●	●	●	●	●

*1 Underlined settings indicate initial defaults.

*2 When Off is specified for the Repeat setting, the random number range must be set to a value that is greater than the number of random numbers to be generated.

3-2. Advantage Set Up Screen

You can use the Advantage set up screen to specify occurrence ratios.

Advantage Set Up Screen Examples

Coin Toss			Marble Grab		
Side	Weight	Prob	Marbles		
Tails	1	0.5	Marble A	10	
Heads	1	0.5	Marble B	10	
			Marble C	10	
			Marble D	10	
			Marble E	10	
		1			10
		INITIAL			INITIAL

Use the cursor keys to highlight the item whose setting you want to change.

Weight Specify the occurrence ratio weight in a range of 0 to 999.
Initial Default: 1

Changing the Weight setting recalculates the Prob value.

Prob (Probability) ... Specifies probability as a four-digit decimal value.
Examples: 0.5, 0.125, etc.

Changing any Prob setting causes all the Weight and Prob values to be recalculated so the Prob total becomes 1.

Marbles Specifies the number of marbles of each marble type in the range of 0 to 999. Initial Default: 10

F6 (INITIAL) Returns all items to their initial defaults.

Press **EXIT** to return to the set up screen.

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