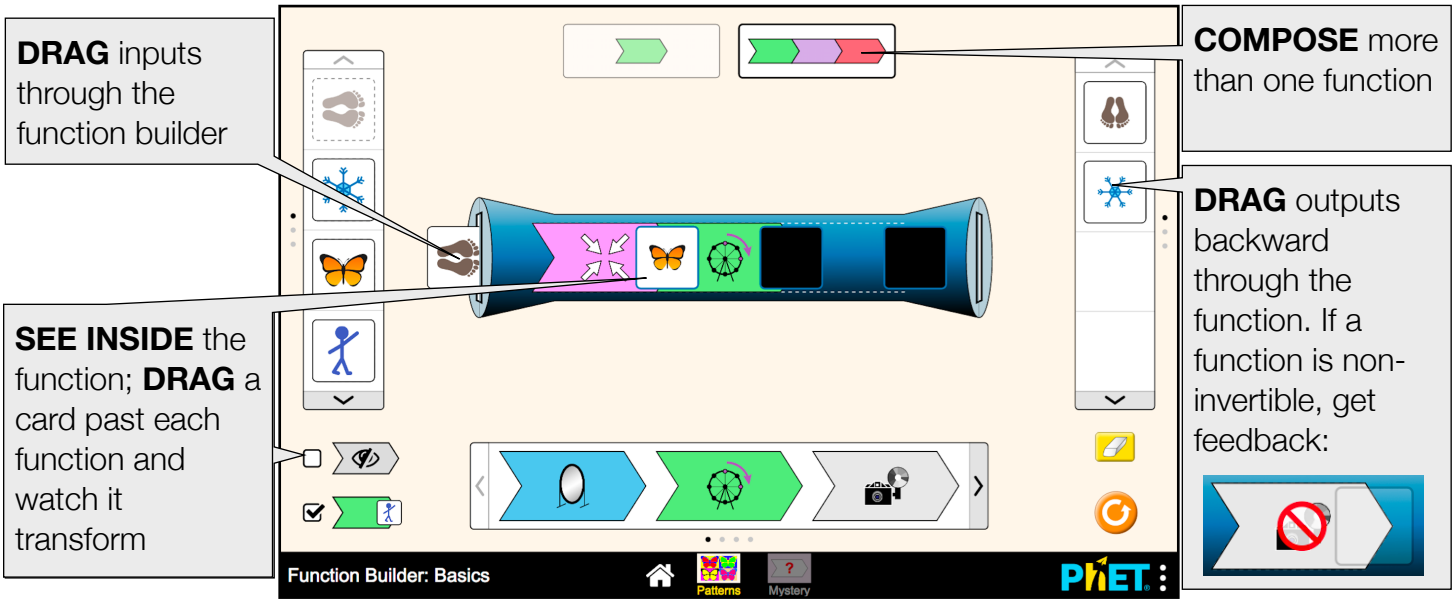
PhET Tips for Teachers

# Function Builder: Basics

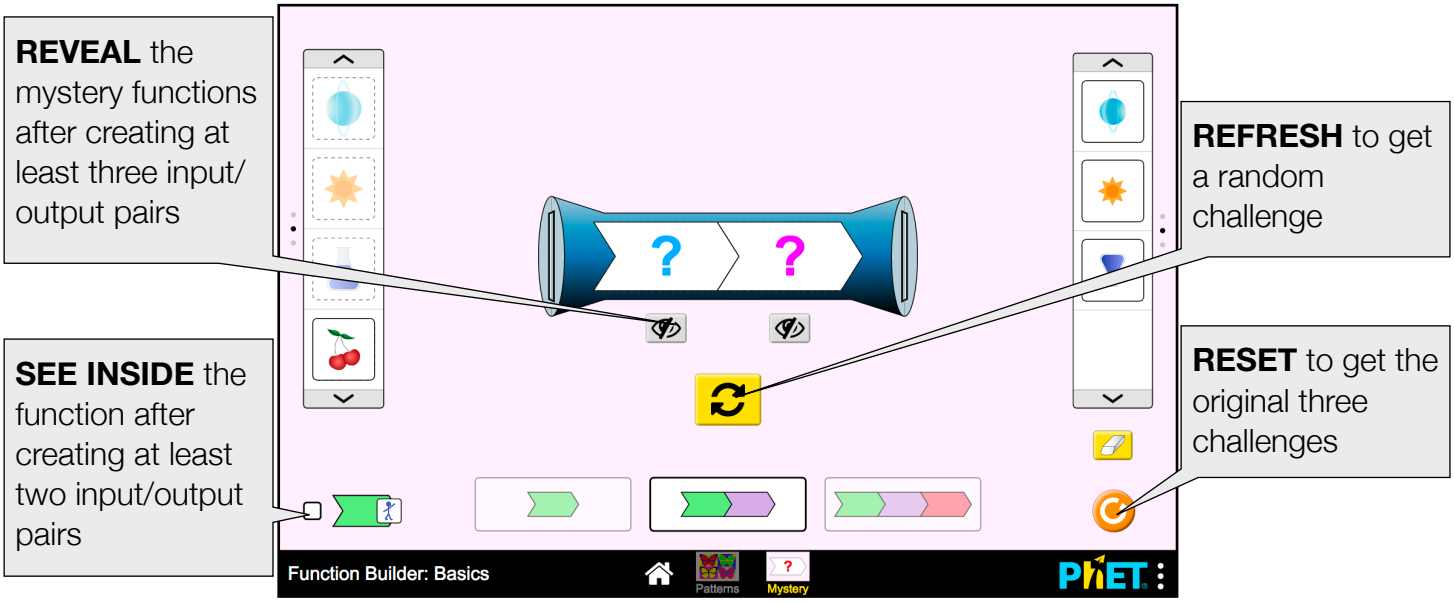
## Patterns Screen

In the Patterns screen, students explore a variety of functions, make predictions, compose functions, and define a function.




## Mystery Screen

In the Mystery screen, students can play detective to determine the hidden functions.




McGarry, August 2023

## Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '`?`' to the sim URL, and separating each query parameter with a '`&`'. The general URL pattern is:
`…html?queryParameter1&queryParameter2&queryParameter3`

For example, in Function Builder: Basics, if you only want to include the 1st screen (`screens=1`), with pan and zoom disabled (`supportsPanAndZoom=false`) use:
https://phet.colorado.edu/sims/html/function-builder-basics/latest/function-builder-basics_all.html?screens=1&supportsPanAndZoom=false

To run this in Spanish (`locale=es`), the URL would become:
https://phet.colorado.edu/sims/html/function-builder-basics/latest/function-builder-basics_all.html?locale=es&screens=1&supportsPanAndZoom=false

| Query Parameter and Description | Example Links |
|---|---|
| `screens` - specifies which screens are included in the sim and their order. Each screen should be separated by a comma. For more information, visit the Help Center. | `screens=1`<br><br>`screens=2,1` |
| `initialScreen` - opens the sim directly to the specified screen, bypassing the home screen. | `initialScreen=1`<br>`initialScreen=2` |
| `locale` - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab. Note: this only works if the simulation URL ends in "_all.html". | `locale=es` (Spanish)<br>`locale=fr` (French) |
| `allowLinks` - when `false`, disables links that take students to an external URL. Default is `true`. | `allowLinks=false` |
| `supportsPanAndZoom` - when `false`, disables panning and zooming using pinch-to-zoom or browser zoom controls. Default is `true`. | `supportsPanAndZoom=false` |

## Insights into Student Use

- Students really enjoy composing multiple functions on the Patterns screen. If you have an objective around defining what a function is, you may want to use the single function scene.

## Suggestions for Use

- Explore geometric transformations on the Patterns screen. Determine which functions are dilations, rotations, reflections, translations, or a combination. Determine which functions are not geometric transformations.
- Check both "hide functions" and "see inside." Advance a card through the builder and determine which functions are in the builder.

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### Sample Challenge Prompts

- Choose a function for your function machine. After you drag cards through the function, discuss with your partner what you think a function is.
- Which function on the Patterns screen appears to "do nothing"? Which arithmetic functions also "do nothing"?
- Why can you drag a card backward through some functions and not others? Make up your own function that has the same quality and explain why you could not drag a card backward through it.
- Using two functions in your function machine, find an example of when the order in which you place them matters. Describe your findings. Find a different example of when the order does not matter. Summarize when the order does and does not matter.
- Create a function whose outputs appear unchanged when compared to the inputs.

See all published activities for Function Builder: Basics here.
For more tips on using PhET sims with your students, see Tips for Using PhET.