

Understand the Main Idea

Objective Describe different ways to show number patterns and functions.

30 minutes



Teach this lesson:

- **Before** introducing lessons on number patterns, ordered pairs, and functions in the grade-level math textbook
- **Before** students complete the activities on page 117 of the student worktext

You need these materials:

- Worksheet 30

Prerequisite Background Knowledge

- Ability to add, subtract, multiply, and divide
- Concept of variables
- Ability to write and solve equations

BP 3 ELL BEST PRACTICE #3: Performance Assessment

English language learners often know more than they demonstrate on traditional paper-and-pencil assessments. As a result, it is often more effective to evaluate their progress based on observations of their performance on standard classroom tasks. Make note of how well students use and manipulate function tables, number patterns, and ordered pairs as they work their way through the material in this module. Use checklists, rubrics, and casual conversation with students to determine how well they are doing.

Throughout this module, when you see **BP 3**, you will find an example of how you can include performance assessment in the curriculum.

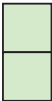
Module 30: Functions and Ordered Pairs

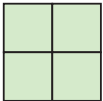
Understand the Main Idea

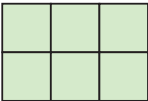
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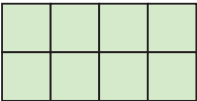
Learn the Main Idea

Look for a pattern in the pictures.

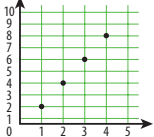
1. 

2. 

3. 

4. 

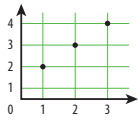
You can show number patterns in different ways.

You can make a function table. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Picture (x)</th> <th style="text-align: center;">Number of Squares (y)</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">1</td><td style="text-align: center;">2</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">4</td></tr> <tr><td style="text-align: center;">3</td><td style="text-align: center;">6</td></tr> <tr><td style="text-align: center;">4</td><td style="text-align: center;">8</td></tr> </tbody> </table>	Picture (x)	Number of Squares (y)	1	2	2	4	3	6	4	8	You can write an equation. <p style="font-size: small; margin-top: 10px;">The value of y (the number of squares) is always two times greater than the value of x (the picture number).</p> <p style="font-size: small;">The equation is $y = 2x$.</p>	You can show the pattern on a graph. 
Picture (x)	Number of Squares (y)											
1	2											
2	4											
3	6											
4	8											

MAIN IDEA Function tables show number patterns. You can also show number patterns in equations or in graphs.

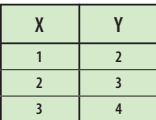
Practice Applying the Main Idea

Directions Draw a line to connect each picture with the word that describes how it shows number patterns. Answer number 4 in a complete sentence.



1 equation

$y = x + 1$



3 function table

2 graph

4 Write a sentence to tell why it is good to have more than one way to show number patterns. Possible answer: Some people work best with numbers and some people like pictures and diagrams better.

Introduce

Write the word *pattern* on the board and have students say it aloud. Ask students to write about patterns. Encourage them to write a simple definition and give an example using words or pictures. Then have them share their ideas with a partner.

Establish that patterns are sequences that repeat or make a predictable order. Then explain that there are lots of different types of patterns. Ask students to raise their hands if they wrote about shape patterns. Choose one or two of these students and have them describe their examples for the class. Repeat with color patterns and sound patterns (such as clapping rhythms).

• **Then ask if students wrote about number patterns.** As above, ask students for examples of what number patterns are like.

Read aloud the Lesson Objective with students. Point out that this lesson will deal with functions. Say the word *functions* slowly and explain that a function is a way of describing some kinds of number patterns.

Highlighted words and phrases may affect student comprehension.

Call students' attention to the direction *Look for a pattern in the pictures at the top of page 117*. Read the direction aloud and say: *These pictures go in an order. If you look carefully, you can tell what the next picture will look like.* Have students talk about the sequence of pictures with a partner and then have volunteers describe the pattern to the class. Elicit that the number of squares increases by two each time.

- **BP 3 Check students' understanding of the pattern.** Ask them to hold up the number of fingers that shows how many squares there would be in the fifth picture of the sequence (10). Sum up by saying: *The numbers go 2, 4, 6, 8, 10. The pattern counts by ____.* Pause and have students complete the sentence by saying *twos*.

Read aloud the text about showing number patterns in different ways. Emphasize that the text shows three important ways to show these patterns besides drawing pictures (as in the first example in the text) or simply listing the numbers (as you just did orally).

- **BP 3 Highlight the terms *function table, equation, and graph*.** Instruct students to discuss the pictures with a partner. Take notes as you listen to students' conversations to get a sense of how well students understand the concepts and how comfortable they are using the language of the module. Wrap up this section by reading aloud the Main Idea with students.

Note: If your grade-level math textbook uses a different term for *function table* (*input/output table, table of values*), please use this term instead of *function table* throughout this module.

B Teach and Learn

Return to the pictures of the squares at the top of page 117. Go around the room, having each student make one statement about the pictures that is either true (such as *The pattern is add two*) or false (such as *The pattern is subtract 12*). Have students classify each statement as true or false. Write the true statements on the board.

Then indicate the three pictures below the sequence of squares. Say: *These are all ways of showing the number pattern 2, 4, 6, 8, 10, . . .*

Explain that the first picture shows a *function table*. Remind students that the math meaning of *table* is *chart*. Say: *The function table has two columns. The columns are labeled picture number (X) and number of squares (Y).* Point out that these letters are variables.

Briefly review that variables are symbols that stand for numbers. Ask students what numbers appear in the columns. Point out that function tables can also be horizontal, so you would have two rows instead of two columns.

- **Say:** *The numbers in the X column are the numbers of the pictures.* Point out that each picture in the sequence at the top of the page is numbered. Have students touch picture number 2, then picture number 4. Then have them touch the line in the table where X is 2, then where X is 4.

Have students look at the function table and find Y. Say: *When X or the picture number is 1, Y is ____.* (2) Then have students formulate similar sentences for other numbers in the table.

Ask students what they know about equations. Then read aloud the text and the number sentence that relate the values of X and Y. Say: *The number of squares is 2 times the number of the pictures. Y is the same as 2 times X. If you know the value of X, you can find the value of Y.* Show how the equation fits the pictures of the squares.

- **Have students work with a partner.** Have one student say a number for X, such as 10. Have the other student say: *If X is 10, then Y is 20.* Switch roles and repeat. Wrap up this part of the lesson by saying: *You can write an equation to show number patterns.*

Move on to the information about graphs. Have students tell what they know about graphs; don't be concerned if their knowledge is limited at this point. Say: *The numbers on the bottom give values for X, or the picture numbers. The numbers on the side give values for Y, or the number of squares. The dots show how X and Y are related.* Have students find 1 at the bottom and 2 on the left; show them how the two lines connect at the point (1, 2). Repeat with (2, 4) and (3, 6). Show that the graph describes the relationship of X and Y shown in the visual of the squares at the top of page 117.

- **BP 3 Distribute a copy of Worksheet 30 to pairs of students.** Have pairs complete the three webs on the page. Then have them talk about their work with a different pair.

C Review and Practice

Write function table and equation on the board. Have students suggest ways in which these two ways of showing patterns are alike and different. List their ideas on the board.

- **BP 3 Repeat with function table/equation and equation/graph.** Have students make lists of their own with a partner and share the highlights with the rest of the class.

Read aloud the directions for Practice Applying the Main Idea. Have students solve the problems on their own. Point out that the number pattern shown here is different from the example above.

D Assess and Intervene

Can students identify ways of showing number patterns, based on Practice Applying the Main Idea on page 117? Use the rubric to identify students who need extra support through additional help and the Intervention activity.

Intermediate

- Connects all terms to the correct pictures.
- Writes a reasonable phrase or short sentence for number 4, with some errors, to explain why it is good to have various ways to show number patterns.

Example of a sentence a student might write: *People like numbers or like pictures.*

Advanced

- Connects all terms to the correct pictures.
- Writes a reasonable complete sentence for number 4, with minimal errors, to explain why it is good to have various ways to show number patterns.

Example of a sentence a student might write: *Some people likes numbers more, and some people likes charts more.*

INTERVENTION

5 minutes



Use chanting to help students relate words to concepts. Chant *WHAT IS an e-QUA-TION?* and have students respond *An e-QUA-tion HAS an E-quals SIGN*, drawing an equals sign in the air as they speak. Use similar chants for *graph* and *function table*: *WHAT IS a GRAPH? A GRAPH SHOWS LOTS of POINTS. WHAT IS a FUNC-tion TA-ble? A FUNCTION Table IS a CHART.* Repeat several times.