

## Grade 8 Mathematics

### Patterns, Relations, and Functions: Lesson 2

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol ( $\Rightarrow$ ) by them.

#### *Purpose of Lesson 2:*

- In this lesson, the tutor and the students will
  - ✓ identify missing numbers in a number sequence; and
  - ✓ continue a given pattern or sequence of numbers involving addition, subtraction, multiplication, fractions, decimals, and negative numbers.

#### *Equipment/Materials Needed:*

- Copies of Student Sheet 60
- Paper and pencils

#### *Preparations before beginning Lesson 2:*

- Run off one copy of Student Sheet 60 for each student.
- Get paper and pencils.

## *Lesson 2: Patterns, Functions, and Relations*

⇒ Write these numbers on a piece of paper or on the board. 4, 6, 8, 10

Say:

**Remember in our last lesson, we looked at repeating patterns with figures and pictures. The pattern repeated itself over and over. We also began looking at growing patterns with geometric figures. In this lesson, we will look at growing patterns with numbers. Look at the numbers I have written on the board. Each number is 2 more than the one before it. What would the next number be? (12) Why? (because 12 is 2 larger than 10) What number would come after 12? (14) Why? (because 14 is 2 larger than 12) What is happening to the numbers? (The numbers are growing by 2, or each number is 2 more than the one before it.)**

⇒ Write these numbers on a piece of paper or on the board: 50, 40, 30, 20

Say:

**Look at the numbers I have written on the board. This pattern is still a growing pattern, but the numbers are growing smaller. Each number is 10 less than the one before it. What would the next number be? (10) Why? (because 10 is 10 smaller than 20.) What number would come after 10? (0) Why? (because 0 is 10 smaller than 10.) What number would come after 0? (-10) Why? (because -10 is 10 smaller than 0.)**

⇒ Write these numbers on the paper or board: -4, -3, -2

Say:

**Look at the numbers I have written on the board. What is happening to the numbers? (They are growing larger by one each time.) What would the next number be? (-1) Why? (-1 is one larger than -2.) What would the next two numbers be? (0, 1)**

⇒ Write these numbers on the paper or board:  $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}$

Say:

**Look at the numbers I have written on the board. What is happening to the numbers?** (They are growing by  $\frac{1}{4}$  each time or the numerator is growing by one.) **What would the next number be?** ( $\frac{5}{4}$  or  $1\frac{1}{4}$ ) **Why?** (It is  $\frac{1}{4}$  larger than  $\frac{4}{4}$ .) **What would the next two numbers be?** ( $\frac{6}{4}, \frac{7}{4}$  or  $1\frac{2}{4}, 1\frac{3}{4}$ )

⇒ Write these numbers on a piece of paper or on the board:  
10.8, \_\_\_\_, 11.2, 11.4, 11.6

Say:

**Look at the numbers I have written on the board. One number is missing? How can we find the missing number?** (Look at the other numbers. Each number is .2 more than the one before it. So 11.0 or 11 would be .2 more than 10.8.)

⇒ Write these numbers on a piece of paper or on the board:  
\_\_\_\_\_, 120, 125, 130, 135

Say:

**Look at the numbers I have written on the board. One number is missing? How can we find the missing number?** (Look at the other numbers. Each number is 5 more than the one before it. So 120 would be 5 more than 115. The answer is 115.)

⇒ Write these numbers on a piece of paper or on the board:  
25, 29, 33, \_\_\_\_\_

Say:

**Look at the numbers I have written on the board. How can we find the next number in the pattern?** Look at the other numbers. Each number is 4 more than the one before it. **What is the next number in the pattern?** (37)

⇒ Write these numbers on a piece of paper or on the board:  
156, 153, 150, 147, \_\_\_\_

Say:

**Look at the numbers I have written on the board. How can we find the next number in the pattern?** (Look at the other numbers. Each number is 3 less than the one before it.) **What is the next number in the pattern?** (144)

⇒ Write these numbers on paper or on the board: 1, 2, 4, 8, \_\_\_\_\_

Say:

**Look at the numbers I have written on the board. How can we find the next number in the pattern?** (Look at the other numbers. Each one is twice the one before it, or each number doubles.) **What is the next number in the pattern?** (16)

⇒ Write these numbers on paper or on the board: 1,  $\frac{1}{10}$ ,  $\frac{1}{100}$ , \_\_\_\_\_

Say:

**Look at the numbers I have written on the board. How can we find the next number?** (Look at the other numbers. Each number is multiplied by  $\frac{1}{10}$  or divided by 10.) **What is the next number in the pattern?** ( $\frac{1}{1000}$ )

⇒ Give Student Sheet 60. Discuss each problem with the students.

Answers:

- |         |                        |         |         |
|---------|------------------------|---------|---------|
| 1) 51   | 2) 80                  | 3) 125  | 4) 404  |
| 5) 80   | 6) 70                  | 7) 105  | 8) 100  |
| 9) 1    | 10) $\frac{5}{5}$ or 1 | 11) 768 | 12) 222 |
| 13) 5.1 | 14) 0.0001             |         |         |

⇒ Have one student summarize today's lesson. Looking for missing numbers in a pattern is often on standardized tests.

**Student Sheet 60 (Patterns: Lesson 2)**

**Find the missing numbers in the following sequences.**

1) 43, 45, 47, 49, \_\_\_\_\_

2) 78, \_\_\_\_\_, 82, 84, 86

3) 50, 75, 100, \_\_\_\_\_, 150

4) \_\_\_\_\_, 406, 408, 410, 412

5) 64, 68, 72, 76, \_\_\_\_\_

6) \_\_\_\_\_, 79, 88, 97, 106

7) \_\_\_\_\_, 99, 93, 87, 81

8) \_\_\_\_\_, 120, 140, 160, 180

9) -2, -1, 0, \_\_\_\_\_, 2

10)  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , \_\_\_\_\_

11) 3, 12, 48, 192, \_\_\_\_\_

12) 888, 444, \_\_\_\_\_, 111

13) 4.3, 4.5, 4.7, 4.9, \_\_\_\_\_

14) 10, 1, 0.1, 0.01, 0.001, \_\_\_\_\_