

Grade 4 Mathematics

Patterns, Relations, and Functions: Lesson 7

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 () by them.

Purpose of Lesson 7:

- In this lesson, the tutor and the students will
 - ✓ complete input/output tables, and
 - ✓ generalize rules for input/output or function tables.

Equipment/Materials Needed:

- Copies of Student Sheet 120
- Paper and pencils
- Chalkboard

Preparations before beginning Lesson 7:

- Run one copy of Student Sheet 120 for each student.
- Have paper and pencils available.

Lesson 7: Patterns

Say:

In this lesson, I will give you information in tables. Look for patterns in the information so that you can answer the questions. The number in the first column is the number you put in or your *input* number. The number in the second column is the number that comes out, or your *output* number. Remember that the output number is related in some way to the input number.

 Give students Student sheet 120. Have the students discuss how they found the answers.

1. seconds
2. inches
3. 4 inches
4. 3 seconds
5. 20 inches
6. 24 inches
7. 80 inches
8. 9 seconds
9. 10 seconds
10. For every second, the beetle crawls 4 inches. The distance crawled is four times the number of seconds. The output number is four times the input number.
11. minutes
12. 15 copies
13. 2 minutes
14. 3 minutes
15. 60 copies
16. 75 copies
17. six minutes
18. 135 copies
19. 8 minutes
20. It takes one minute for every 15 copies. The number of copies is 15 times the number of minutes. The machine runs 15 copies each minute.

 Have one student summarize today's lesson. Generalizing a rule for a function table requires that students see patterns or relationships in the table.

Student Sheet 120 (Patterns: Lesson 7)

Look for patterns in the data in the tables.

A. Beetles are some of the fastest moving insects. The table shows how fast one type of beetle can crawl.

Input Numbers	Output Numbers
Time (seconds)	Distance (inches)
1	4
2	8
3	12
4	16
5	?
?	?
?	36

1. In what units is time measured?
2. In what units is distance measured?
3. How far can this beetle crawl in one second?
4. How long does it take this beetle to move 12 inches?
5. How far could this beetle crawl in 5 seconds?
6. How far could this beetle crawl in 6 seconds?
7. How far could this beetle crawl in 20 seconds?
8. If the beetle needed to crawl 36 inches to get to food, how long would it take the beetle to get there?
9. If the beetle needed to crawl 40 inches to get to food, how long would it take the beetle to get there?
10. What rule could you write to show how distance is related to time in this problem?

Student Sheet 120 (Patterns: Lesson 7) continued

B. Tina has a copy machine. The table shows how long it takes the machine to make copies.

Time (minutes)	Number of copies
1	15
2	30
3	45
4	60
5	?
?	?

11. In what units is time measured?
12. How many copies does the machine make in 1 minute?
13. How long does it take the machine to make 30 copies?
14. How long does it take the machine to make 45 copies?
15. How many copies does the machine make in 4 minutes?
16. How many copies could the machine make in 5 minutes?
17. How long would it take the machine to make 90 copies?
18. How many copies could the machine make in 9 minutes?
19. How long would it take the machine to make 120 copies?
20. What rule could you write to show how the number of copies is related to time?