

Learn About

Using Algebra: Patterns

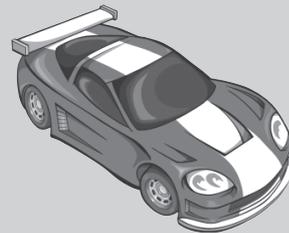
Number patterns follow *rules*. The rules control how the numbers in a pattern increase or decrease. Increasing patterns follow addition or multiplication rules. Decreasing patterns often follow subtraction or division rules. Sometimes there is a missing number in a pattern. The pattern rule can be used to find the missing number.

To find the rule, compare the consecutive numbers in a pattern. Ask these questions:

- Are the numbers increasing or decreasing?
- What operation is being used to increase or decrease the numbers?

Look at the pattern. Try to find the rule and the missing number.

Jack owns a large toy car collection. The missing number in this pattern is the same as the number of cars in Jack's collection. How many toy cars are in Jack's collection?



2, 6, 18, ___, 162

Find the rule. The numbers in the pattern are increasing. Each number is multiplied by the same factor to find the next number. Compare the consecutive numbers to find the pattern rule.

$$2 \times 3 = 6 \quad 6 \times 3 = 18 \quad 18 \times 3 = 54 \quad 54 \times 3 = 162$$

The rule is **multiply by 3**, and the missing number is **54**.



Number patterns follow rules. Most number patterns follow addition, subtraction, multiplication, or division rules. You can compare the consecutive numbers in a pattern to find the rule.

*Look at the answer choices for each question.
Read why each answer choice is correct or
not correct.*

1. The missing number in this pattern is the same as the number of fish caught by Jasper and his dad. How many fish did Jasper and his dad catch?

0, 1, 3, 7, ____, 31, 63

- Ⓐ 9 fish

This answer is not correct because the pattern is to multiply by 2 and then add 1. $7 \times 2 + 1 = 15$, not 9.

- Ⓑ 11 fish

This answer is not correct because the pattern is to multiply by 2 and then add 1. $7 \times 2 + 1 = 15$, not 11.

- Ⓒ 14 fish

This answer is not correct because the pattern is to multiply by 2 and then add 1. $7 \times 2 + 1 = 15$, not 14.

- 15 fish

This answer is correct because the pattern is to multiply by 2 and then add 1. $7 \times 2 + 1 = 15$.

2. Jasper's largest fish weighed five kilograms. His dad's largest fish weighed two kilograms less. Which equation can help you find the weight of Jasper's dad's largest fish?

- Ⓐ $5 + 2 = y$

This answer is not correct because Jasper's dad's fish is smaller than Jasper's fish. Adding 2 will create a sum greater than 5.

- $5 - 2 = y$

This answer is correct because Jasper's dad's fish is 2 kilograms less than 5. This equation represents 2 less than 5.

- Ⓒ $2 \times y = 5$

This answer is not correct because the equation represents a number multiplied by 2 equals 5. The equation needs to represent 2 less than 5.

- Ⓓ $5 \div 2 = y$

This answer is not correct because the equation represents how many groups of 2 there are in 5. The equation needs to represent 2 less than 5.

Lesson

6

*Read the passage.
Then do Numbers 1–5.*

The Basketball Game

The score is 47 to 46, and the Brumbies are behind. Joshua is their only hope. He dribbles the ball down the court with only five seconds left in the game. Two defenders are chasing him and time is running out! Joshua takes another dribble toward the basket, . . . four seconds . . . three seconds . . . another dribble . . . two seconds . . . he goes for the lay-up . . . one second . . . BASKET! The game is over. Joshua made the shot! The Brumbies win!



1. Aaron plays for the Brumbies with Joshua. All of the baskets that Aaron made in the game were worth two points. Which of the following could be the number of points that Aaron scored in the game.

- Ⓐ 5 points
- Ⓑ 7 points
- Ⓒ 14 points
- Ⓓ 19 points

2. The Brumbies made eight free throws and missed x free throws. Which expression can help you find the number of free throws the Brumbies attempted during the game?

- Ⓐ $8 - x$
- Ⓑ $x - 8$
- Ⓒ $x \div 8$
- Ⓓ $x + 8$

Lesson 16

Read the passage.
Then do Numbers 1–5.

The Goldfish Bowl

Ella has two goldfish named Goldie and Lucky, and she enjoys watching them swim around the bowl. Taking care of the fish is plenty of work, but Ella doesn't mind. She feeds Goldie and Lucky every morning. She changes the water in the fishbowl once a week. She also cleans the bowl every time she changes the water. Ella goes to the petshop once a month with her dad to buy food for Goldie and Lucky. She works hard to take care of Goldie and Lucky because she cares about them very much.



1. Ella bought Goldie and Lucky at the petshop. She chose them from a tank filled with 25 goldfish. Each of the fish was four centimetres long. Suppose that the fish in the tank all formed a straight line, nose to tail. Which expression can help you find how many centimetres long the line would be?

- (A) $25 + 4$
- (B) $25 \div 4$
- (C) 25×4
- (D) $25 - 4$

2. The water for the fishbowl costs \$0.19 per litre. Ella uses 25 litres of water each month. How much does she spend on water each month?

- (A) \$2.50
- (B) \$4.75
- (C) \$5.75
- (D) \$47.50

Self-Assessment 2

Lessons 6–10

Answer these questions after you have completed Lessons 6–10. Before you begin, re-read what you wrote in Self-Assessment 1.

FOCUS on Using Algebra, Book E

Name _____ Date _____

1. Rate your work in Lessons 6–10. Circle your answer.

successful

somewhat successful

needs improvement

2. Did any of the questions give you trouble? _____

If so, what kind of trouble did you have?

Is this the same kind of trouble you had in Lessons 1–5? _____

3. Did you find the questions easier or more difficult than those in Lessons 1–5?

Why do you think this is so?

4. Did you meet the goal you set for yourself for Lessons 6–10? _____

Why or why not?

5. What is your goal for Lessons 11–15?

Cut along the dotted line.