

# Mid-Chapter Review



## Frequently Asked Questions

**Q: What is a variable?**

**A:** A variable is a quantity that varies, or changes. In the algebraic expression  $8h$ , the symbol  $h$  is a variable. In the example  $8h$ , the variable might be number of hours worked, and the expression might represent the number of hours worked at \$8 per hour.

**Q: How do you choose a symbol for a variable?**

**A:** You can choose any letter as a symbol for a variable. The variable is often the first letter of the word the variable represents. This makes the meaning of the symbol easy to remember. In the expression  $2(l + w)$ , for example,  $l$  stands for length and  $w$  stands for width. To avoid confusion with  $x$ , which is a symbol commonly used in algebra, the multiplication sign is sometimes not written in algebraic expressions describing a situation. So instead of writing  $3 \times n$ , we write  $3n$ .

**Q: How do you evaluate an algebraic expression?**

**A:** First you substitute a number for the variable. Then you use the order of operations to calculate the answer. For example, to evaluate the expression  $2n + 1$  when  $n = 4$ :

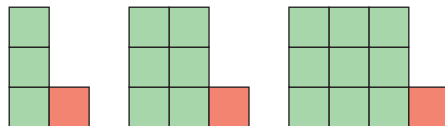
$$\begin{aligned} &2n + 1 \\ &= 2(4) + 1 \\ &= 8 + 1 \\ &= 9 \end{aligned}$$

To prevent copying and arithmetic errors, use brackets to show the substitution, and write each step below the step before it.

**Q: How can you represent a pattern rule given in words as an algebraic expression?**

**A:** You use one or more variables, and possibly numbers and operations signs. For example, the rule for this pattern can be described as “Start with one red square and one column of three green squares, and add another column of green squares each time.” An algebraic expression for this is  $3n + 1$ , where  $n$  represents the figure number.

You can check by substituting the figure number into the expression and calculating the total number of squares.



## Practice Questions

- (8.2) 1. a) Copy and complete the table of values for this pattern.

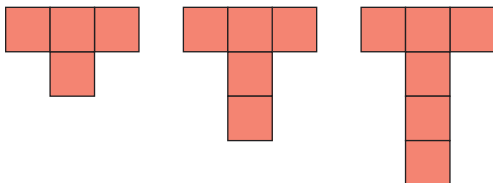
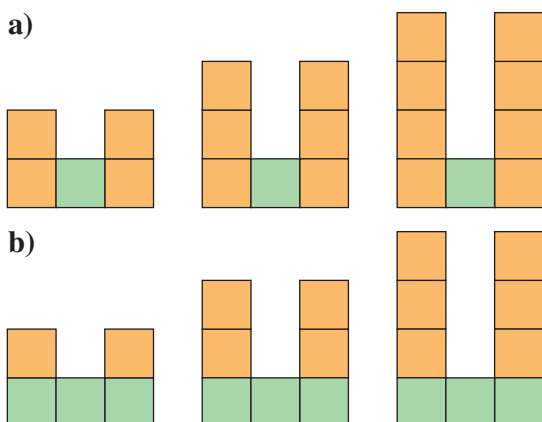


Figure number	Number of squares
1	4
2	5
3	
4	
5	

- b) Use words to describe the pattern rule for the relationship between the figure number and the number of squares.
- c) Write your pattern rule as an algebraic expression.
- d) What did you use as the variable in your algebraic expression?
- e) What does the variable represent?
- f) Which value in your algebraic expression does not change?
- (8.2) 2. The two sets of diagrams show two different ways of representing the same pattern rule. Write an algebraic expression that represents each set of diagrams.



3. How many toothpicks would you need to make the 10th figure in the following pattern? Show three different ways of solving this problem. (8.2)



Figure 1

Figure 2

Figure 3

4. Match each phrase with the correct algebraic expression. (8.3)
- |                                  |            |
|----------------------------------|------------|
| a) a number increased by seven   | A. $7n$    |
| b) a number decreased by seven   | B. $n + 5$ |
| c) a number multiplied by seven  | C. $n - 7$ |
| d) five subtracted from a number | D. $n + 7$ |
| e) the sum of five and a number  | E. $n - 5$ |
5. Use the algebraic expressions  $5n$  and  $n + 5$ . (8.3)
- a) Explain why these expressions represent different calculations.
- b) Suppose that you select a whole number and use it to evaluate each expression. Which expression is more likely to have a greater result? Why?
6. Write an algebraic expression for each. (8.3)
- Angela's age five years from now
  - Raji's height increased by eleven centimetres
  - four times the figure number
  - the number of books decreased by nine
7. Explain how to evaluate the expression  $4b + 3$  when  $b = 8$ . Show your work. (8.3)