Practise

For help with #4 and #5, refer to Example 1 on page 93.

4. Write each expression as a power, and evaluate.

a) 7×7

b) $3 \times 3 \times 3$

c) $8 \times 8 \times 8 \times 8 \times 8$

d) $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

5. Write each expression as a power. Identify the base and the exponent in each power. Then, evaluate.

a) $1 \times 1 \times 1 \times 1$

b) $2 \times 2 \times 2 \times 2 \times 2$

c) $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$

d) 13

For help with #6 to #9, refer to Example 2 on page 94.

6. Evaluate each power.

a) 5^2 **b)** 3^3 **c)** 4^5

7. What is the value of each power?

a) 8^3 **b)** 2^6 **c)** 1^9

8. Copy and complete the table.

	Repeated Multiplication	Exponential Form	Value
a)	$6 \times 6 \times 6$	6^3	■
b)	$3 \times 3 \times 3 \times 3$	■	■
c)	▬	■	49
d)	▬	11^2	■
e)	▬	■	125

9. Does $4^3 = 3^4$? Show how you know.

For help with #10 to #13, refer to Example 3 on page 95.

10. Evaluate each power.

a) $(-9)^2$ **b)** -5^3 **c)** $(-2)^7$

11. What is the value of each power?

a) -8^2 **b)** $(-1)^5$ **c)** $-(-3)^7$

12. Copy and complete the table.

|	Repeated Multiplication	Exponential Form	Value
a)	$(-3) \times (-3) \times (-3)$	$(-3)^3$	■
b)	$(-4) \times (-4)$	$(-4)^2$	■
c)	$(-1) \times (-1) \times (-1)$	■	■
d)	▬	$(-7)^2$	■
e)	▬	■	-1000

13. Does $(-6)^4 = -6^4$? Show how you know.

Apply

14. The volume of a cube with an edge length of 3 cm is 27 cm³. Write the volume in repeated multiplication form and exponential form.

3 cm
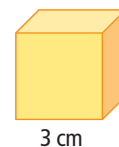
15. In a children's story, Double Dan the Dragonfly is growing fast. His body length is doubling every month. At the beginning of the story, his length is 1 cm.
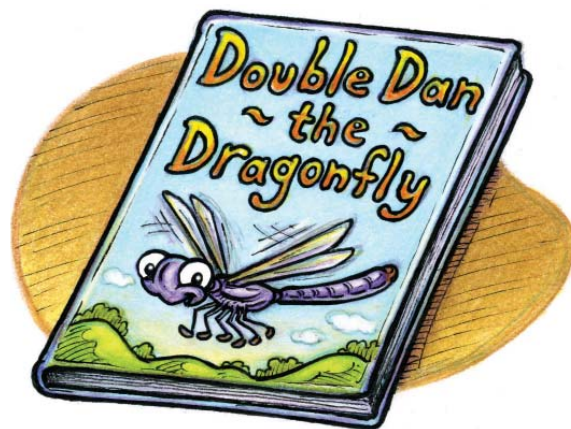
a) Create a table to show how Dan's body length increases every month for ten months.

b) What is his body length five months after the beginning of the story? Express your answer as a power. Then, evaluate.

c) After how many months is his body length more than 50 cm?

16. Arrange the following powers from least to greatest value: 1^{22}, 3^4, 4^3, 2^5, 7^2.

17. A single bacterium doubles in number every hour. How many bacteria are present after 15 h?
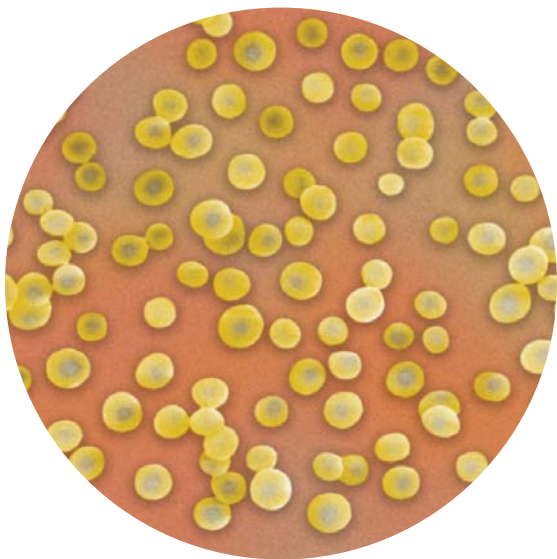
18. Express 9 as a power where the exponent is 2 and the base is
  a) positive
  b) negative

19. Explain what the following statement means using numerical examples:

Multiplication is a way to represent repeated addition, and powers are a way to represent repeated multiplication.

20. The power 7^3 can be read as "seven cubed." Draw a picture of a cube with a volume of 7^3 cubic units, or 343 cubic units. Label appropriate dimensions for the cube.

21. Represent 144 in three different ways using repeated multiplication.

Extend

22. Evaluate the powers of 5 from 5^3 to 5^{10}. Use only whole numbers as exponents.
  a) What do you notice about the last three digits of each value?
  b) Predict the last three digits if you evaluate 5^{46}.

23. Evaluate the powers of 3 from 3^1 to 3^{12}. Use only whole numbers as exponents.
  a) What do you notice about the units digit?
  b) Predict the units digit if you evaluate 3^{63}. Explain how you arrived at your answer.

Math Link

Some formulas use exponents. Two that you are familiar with are given below.
• $SA = 6s^2$
• $V = \pi r^2 h$

a) Rewrite each formula using repeated multiplication. Identify what the formula represents and how you would use it.

b) For the mobile you will build at the end of the chapter, you will need to use formulas. Identify two formulas that contain exponents, for the shapes shown. Write each formula using repeated multiplication.