4 PRACTICE AND APPLY

Assignment Guide

Answer Transparencies available for all exercises

Basic:
Day 1: SRH p. 923 Exs. 9–13
pp. 523–527
Exs. 1–21
Day 2: pp. 523–527
Exs. 22–27, 38–43, 52–61

Average:
Day 1: pp. 523–527
Exs. 1–8, 11–21, 35, 60, 61
Day 2: pp. 523–527
Exs. 22–34, 38–46, 52–58 even

Advanced:
Day 1: pp. 523–527
Exs. 1, 2, 4–8, 13–21, 35–37*, 60
Day 2: pp. 523–527
Exs. 26–34, 39–51*, 54, 58

Block:
pp. 523–527
Exs. 1–8, 11–35, 38–46,
52–58 even, 60, 61

Differentiated Instruction

See *Algebra 1 Best Practices Toolkit* for suggestions on addressing the needs of a diverse classroom.

Homework Check

For a quick check of student understanding of key concepts, go over the following exercises:

Basic: 4, 12, 24, 38, 39

Average: 5, 16, 28, 38, 40

Advanced: 6, 20, 32, 38, 41

Extra Practice

- Student Edition, p. 945
- Chapter 8 Resource Book: Practice levels A, B, C, pp. 51–56

Practice Worksheet

An easily-readable reduced practice page (with answers) for this lesson can be found on p. 486C.

EXAMPLE 1 on p. 520 for Exs. 4–8

4. $y = 4 \cdot 2^x$
5. $y = 125 \cdot 5^x$
6. $y = \frac{1}{2} \cdot 2^x$
7. $y = \frac{1}{9} \cdot 3^x$

WRITING FUNCTIONS Write a rule for the function.

4.

x	−2	−1	0	1	2
y	1	2	4	8	16

5.

x	−2	−1	0	1	2
y	5	25	125	625	3125

6.

x	−2	−1	0	1	2
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2

7.

x	−2	−1	0	1	2
y	$\frac{1}{81}$	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1

8. ★ **WRITING** Given a table of values, describe how can you tell if the table represents a linear function or an exponential function. See margin.

EXAMPLE 2 on p. 521 for Exs. 9–21

GRAPHING FUNCTIONS Graph the function and identify its domain and range. 9–20. See margin.

9. $y = 4^x$
10. $y = 7^x$
11. $y = 8^x$
12. $y = 9^x$
13. $y = (1.5)^x$
14. $y = (2.5)^x$
15. $y = (1.2)^x$
16. $y = (4.3)^x$
17. $y = \left(\frac{4}{3}\right)^x$
18. $y = \left(\frac{7}{2}\right)^x$
19. $y = \left(\frac{5}{3}\right)^x$
20. $y = \left(\frac{5}{4}\right)^x$

21. **ERROR ANALYSIS** The price P (in dollars) of a pound of flour was \$.27 in 1999. The price has increased by about 2% each year. Let t be the number of years since 1999. *Describe* and correct the error in finding the price of a pound of flour in 2002.

$P = a(1 + r)^t$

$= 0.27(1 + 2)^3 = 0.27(3)^3 = 7.29$

In 2002 the price of a pound of flour was \$7.29.

21. The percent increase was not written as a decimal; $0.27(1 + 0.02)^3 = 0.27(1.02)^3 = \$.29$.

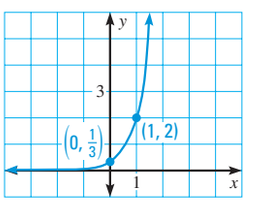
EXAMPLE 3 B on p. 521 for Exs. 22–34

COMPARING GRAPHS OF FUNCTIONS Graph the function. Compare the graph with the graph of $y = 3^x$. 22–33. See margin.

22. $y = 2 \cdot 3^x$
23. $y = 4 \cdot 3^x$
24. $y = \frac{1}{4} \cdot 3^x$
25. $y = \frac{2}{3} \cdot 3^x$
26. $y = 0.5 \cdot 3^x$
27. $y = 2.5 \cdot 3^x$
28. $y = -2 \cdot 3^x$
29. $y = -4 \cdot 3^x$
30. $y = -\frac{1}{4} \cdot 3^x$
31. $y = -\frac{2}{3} \cdot 3^x$
32. $y = -0.5 \cdot 3^x$
33. $y = -2.5 \cdot 3^x$

35. 200%. *Sample answer:* A growth rate of 200% would create a growth factor of $1 + 2 = 3$, which would represent the tripling of the population every year.

34. ★ **MULTIPLE CHOICE** The graph of which function is shown? C



Ⓐ $f(x) = 6^x$
Ⓑ $f(x) = \left(\frac{1}{3}\right)^x$
Ⓒ $f(x) = \frac{1}{3} \cdot 6^x$
Ⓓ $f(x) = 6 \cdot \left(\frac{1}{3}\right)^x$

C

35. ★ **WRITING** If a population triples each year, what is the population's growth rate (as a percent)? *Explain*.

36. **CHALLENGE** Write a linear function and an exponential function whose graphs pass through the points (0, 2) and (1, 6). *Sample answer:* $f(x) = 4x + 2$, $f(x) = 2 \cdot 3^x$

37. **CHALLENGE** Compare the graph of the function $f(x) = 2^{x+2}$ with the graph of the function $g(x) = 4 \cdot 2^x$. Use properties of exponents to explain your observations. *Sample answer:* The graphs are the same. Since by the product of a power property $2^{x+2} = 2^x \cdot 2^2$, and $2^x \cdot 2^2$ simplifies to $4 \cdot 2^x$, $2^{x+2} = 4 \cdot 2^x$.

○ = WORKED-OUT SOLUTIONS on p. WS1 ★ = STANDARDIZED TEST PRACTICE ◆ = MULTIPLE REPRESENTATIONS

8. *Sample answer:* If the difference between successive terms is constant, the function is linear and if the ratio of successive terms is constant, the function is exponential.

9–20, 22–33. See Additional Answers beginning on p. AA1.

PROBLEM SOLVING

GRAPHING CALCULATOR **You may wish to use a graphing calculator to complete the following Problem Solving exercises.**

EXAMPLES A 4 and 5 on pp. 522–523 for Exs. 38–41

38. INVESTMENTS You deposit $125 in a savings account that earns 5% annual interest compounded yearly. Find the balance in the account after the given amounts of time.

a. 1 year **$131.25** **b.** 2 years **$137.81** **c.** 5 years **$159.54** **d.** 20 years **$331.66**

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39a. Let x represent the number of years since 2001 and $f(x)$ represent the number of computers (in hundreds of millions); $f(x) = 6 \cdot (1.1)^x$.

39. MULTI-STEP PROBLEM One computer industry expert reported that there were about 600 million computers in use worldwide in 2001 and that the number was increasing at an annual rate of about 10%.

a. Write a function that models the number of computers in use over time.

b. Use the function to predict the number of computers that will be in use worldwide in 2009. **about 1,286,153,286 computers**

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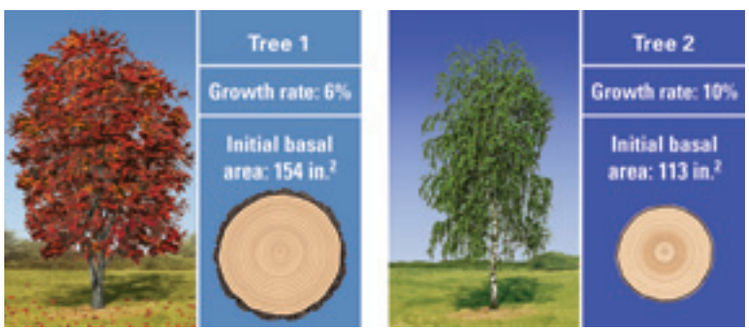
40a. Let x represent the number of years since 1985 and $f(x)$ represent the number of grills shipped; $f(x) = 3{,}173{,}000 \cdot (1.07)^x$.

40. MULTI-STEP PROBLEM A research association reported that 3,173,000 gas grills were shipped by various manufacturers in the U.S. in 1985. Shipments increased by about 7% per year from 1985 to 2002.

a. Write a function that models the number of gas grills shipped over time.

b. About how many gas grills were shipped in 2002? **about 10,022,921 gas grills**

41. **MULTIPLE REPRESENTATIONS** A tree's cross-sectional area taken at a height of 4.5 feet from the ground is called its basal area and is measured in square inches. Tree growth can be measured by the growth of the tree's basal area. The initial basal area and annual growth rate for two particular trees are shown.



a. Writing a Model Write a function that models the basal area A of each tree over time. **tree 1: $A = 154 \cdot (1.06)^t$, tree 2: $A = 113 \cdot (1.1)^t$**

b. Graphing a Function Use a graphing calculator to graph the functions from part (a) in the same coordinate plane. In about how many years will the trees be the same height? **See margin for art; about 8.4 yr.**

Avoiding Common Errors

Exercises 4–6 Some students may fail to find the value of a. Remind students that an exponential function is in the form of $y = ab^x$ and that they can find the value of a by finding the value of y when $x = 0$.

Exercises 38–41 Watch for students who do not write percents as decimals before applying the exponential growth model.

Graphing Calculator

Exercises 9–20, 22–34 Students may want to check their graphs on a graphing calculator. They can enter the function in the Y = menu and then press Graph. They can press Table to check values. They can scroll up or down to see more values.

Reading Strategy

Exercises 38–41 Draw students' attention to the graphing calculator logo at the top of page 525. Point out that the logo appears whenever a graphing calculator is suggested for the exercises.

41b.