Student Guide

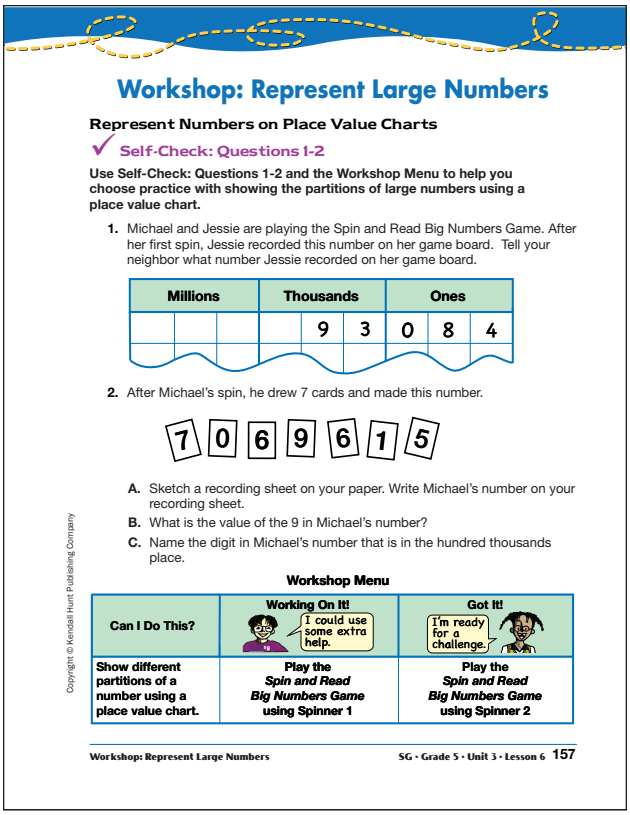
Workshop: Represent Large Numbers (SG p. 157) Questions 1–2

1. Ninety-three thousand eighty-four
2. A.

Millions			Thousands			Ones		
		7	0	6	9	6	1	5

B. 9 thousand

C. 0



Workshop: Represent Large Numbers

Represent Numbers on Place Value Charts

✓ Self-Check: Questions 1-2

Use Self-Check: Questions 1-2 and the Workshop Menu to help you choose practice with showing the partitions of large numbers using a place value chart.

1. Michael and Jessie are playing the Spin and Read Big Numbers Game. After her first spin, Jessie recorded this number on her game board. Tell your neighbor what number Jessie recorded on her game board.

Millions			Thousands			Ones		
				9	3	0	8	4

2. After Michael's spin, he drew 7 cards and made this number.

7 0 6 9 6 1 5

A. Sketch a recording sheet on your paper. Write Michael's number on your recording sheet.

B. What is the value of the 9 in Michael's number?

C. Name the digit in Michael's number that is in the hundred thousands place.

Workshop Menu

Can I Do This?	Working On It!	Got It!
	I could use some extra help.	I'm ready for a challenge.
Show different partitions of a number using a place value chart.	Play the *Spin and Read Big Numbers Game* using Spinner 1	Play the *Spin and Read Big Numbers Game* using Spinner 2

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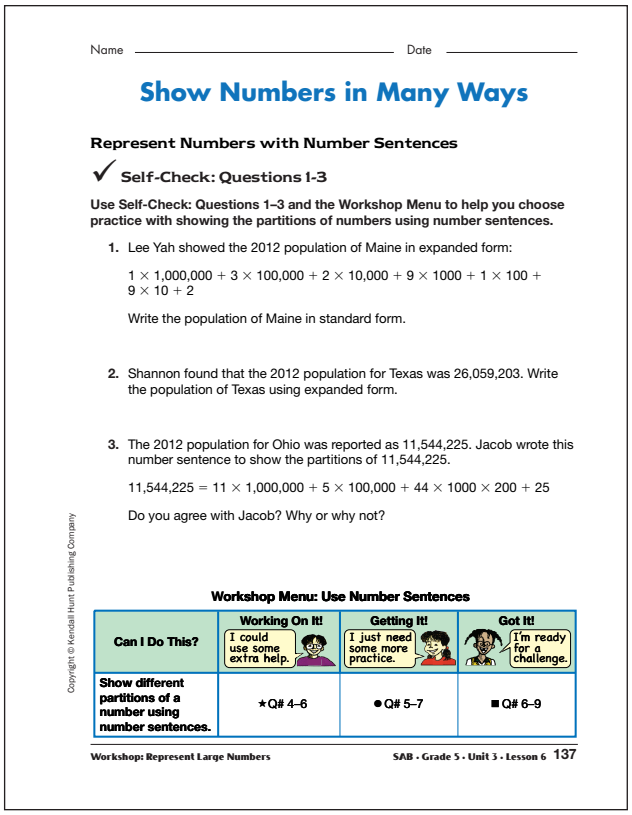

Name _____ Date _____

Show Numbers in Many Ways

Represent Numbers with Number Sentences

✓ Self-Check: Questions 1-3

Use Self-Check: Questions 1–3 and the Workshop Menu to help you choose practice with showing the partitions of numbers using number sentences.

1. Lee Yah showed the 2012 population of Maine in expanded form:

   $1 \times 1{,}000{,}000 + 3 \times 100{,}000 + 2 \times 10{,}000 + 9 \times 1000 + 1 \times 100 + 9 \times 10 + 2$

   Write the population of Maine in standard form.

2. Shannon found that the 2012 population for Texas was 26,059,203. Write the population of Texas using expanded form.

3. The 2012 population for Ohio was reported as 11,544,225. Jacob wrote this number sentence to show the partitions of 11,544,225.

   $11{,}544{,}225 = 11 \times 1{,}000{,}000 + 5 \times 100{,}000 + 44 \times 1000 \times 200 + 25$

   Do you agree with Jacob? Why or why not?

Workshop Menu: Use Number Sentences

Can I Do This?	Working On It!	Getting It!	Got It!
	I could use some extra help.	I just need some more practice.	I'm ready for a challenge.
Show different partitions of a number using number sentences.	★Q# 4–6	●Q# 5–7	■Q# 6–9

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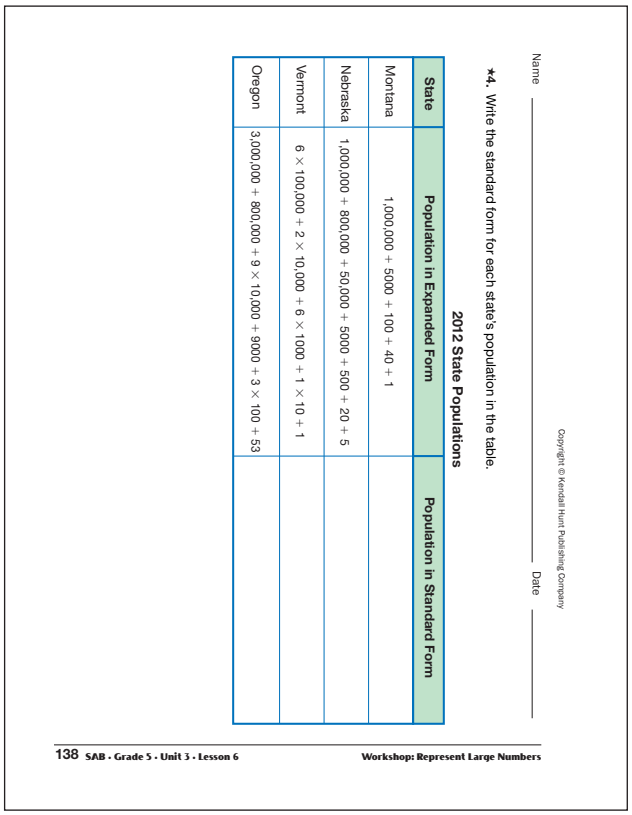

Name _____ Date _____

★4. Write the standard form for each state's population in the table.

2012 State Populations

State	Population in Expanded Form	Population in Standard Form
Montana	1,000,000 + 5000 + 100 + 40 + 1	
Nebraska	1,000,000 + 800,000 + 50,000 + 5000 + 500 + 20 + 5	
Vermont	6 × 100,000 + 2 × 10,000 + 6 × 1000 + 1 × 10 + 1	
Oregon	3,000,000 + 800,000 + 9 × 10,000 + 9000 + 3 × 100 + 53	

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Student Activity Book

Show Numbers in Many Ways (SAB pp. 137–147) Questions 1–18

1. 1,329,192
2. Two possible responses: 20,000,000 + 6,000,000 + 50,000 + 9000 + 200 + 3 or $2 \times 10{,}000{,}000 + 6 \times 1{,}000{,}000 + 5 \times 10{,}000 + 9 \times 1000 + 2 \times 100 + 3$
3. Possible response: Yes, I agree because $11 \times 1{,}000{,}000 = 11{,}000{,}000$; $5 \times 100{,}000 = 500{,}000$; $44 \times 1000 = 44{,}000$; $200 + 25 = 225$. If you add the numbers together $11{,}000{,}000 + 500{,}000 + 44{,}000 + 225 = 11{,}544{,}225$.
4.

State	Population in Expanded Form	Population in Standard Form
Montana	1,000,000 + 5000 + 100 + 40 + 1	1,005,141
Nebraska	1,000,000 + 800,000 + 50,000 + 5000 + 500 + 20 + 5	1,855,525
Vermont	6 × 100,000 + 2 × 10,000 + 6 × 1000 + 1 × 10 + 1	626,011
Oregon	3,000,000 + 800,000 + 9 × 10,000 + 9000 + 3 × 100 + 53	3,899,353

5. **A.** $1 \times 10{,}000 + 5 \times 1000 + 2 \times 100 + 9 \times 10 + 2$ → 1,050,292

B. $6 \times 1{,}000{,}000 + 800{,}000 + 9 \times 1000 + 7 \times 100 + 1 \times 10 + 2$ → 689,712

C. $1 \times 1{,}000{,}000 + 5 \times 10{,}000 + 2 \times 100 + 9 \times 10 + 2$ → 6,809,712

D. $6 \times 1{,}000{,}000 + 8 \times 100{,}000 + 9 \times 10{,}000 + 7 \times 1000 + 1 \times 100 + 2 \times 10$ → 6,897,012

E. $6 \times 1{,}000{,}000 + 8 \times 100{,}000 + 9 \times 10{,}000, + 7000 + 12$ → 15,292

F. $1 \times 1{,}000{,}000 + 5 \times 100{,}000 + 20{,}000 + 9 \times 10 + 2$ → 6,897,120

G. $600{,}000 + 8 \times 10{,}000 + 9 \times 1{,}000 + 7 \times 100 + 1 \times 10 + 2$ → 1,520,092

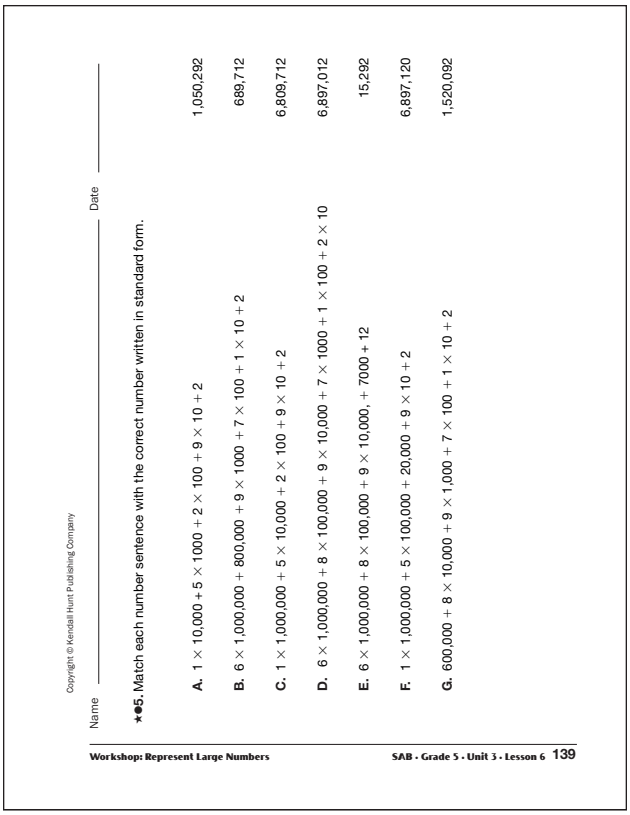
6. 5,884,563 =
5 × 1,000,000 + 8 × **100,000** + 8 × 10,000 + 4 × **1000** + 5 × 100 + **6** × 10 + **3**

7. **A.** Yes, Possible response: Grace's solution 9,000,000 + 750,000 + 2000 + 70 + 3 = 9,752,073 and Ming's solution 9,000,000 + 700,000 + 50,000 + 2000 + 73 = 7,752,073. Since both solutions are equal both number sentences are true.

B. Possible response:
$9 \times 1{,}000{,}000 + 7 \times 100{,}000 + 5 \times 10{,}000 + 2 \times 1000 + 0 \times 100 + 7 \times 10 + 3$

8. Two possible responses:
$6 \times 1{,}000{,}000 + 2 \times 10{,}000 + 1 \times 1000 + 9 \times 100 + 8 \times 10 + 8$

$6{,}000{,}000 + 20{,}000 + 1000 + 900 + 80 + 8$



Name _____ Date _____

★●5. Match each number sentence with the correct number written in standard form.

A. $1 \times 10{,}000 + 5 \times 1000 + 2 \times 100 + 9 \times 10 + 2$ — 1,050,292

B. $6 \times 1{,}000{,}000 + 800{,}000 + 9 \times 1000 + 7 \times 100 + 1 \times 10 + 2$ — 689,712

C. $1 \times 1{,}000{,}000 + 5 \times 10{,}000 + 2 \times 100 + 9 \times 10 + 2$ — 6,809,712

D. $6 \times 1{,}000{,}000 + 8 \times 100{,}000 + 9 \times 10{,}000 + 7 \times 1000 + 1 \times 100 + 2 \times 10$ — 6,897,012

E. $6 \times 1{,}000{,}000 + 8 \times 100{,}000 + 9 \times 10{,}000, + 7000 + 12$ — 15,292

F. $1 \times 1{,}000{,}000 + 5 \times 100{,}000 + 20{,}000 + 9 \times 10 + 2$ — 6,897,120

G. $600{,}000 + 8 \times 10{,}000 + 9 \times 1{,}000 + 7 \times 100 + 1 \times 10 + 2$ — 1,520,092

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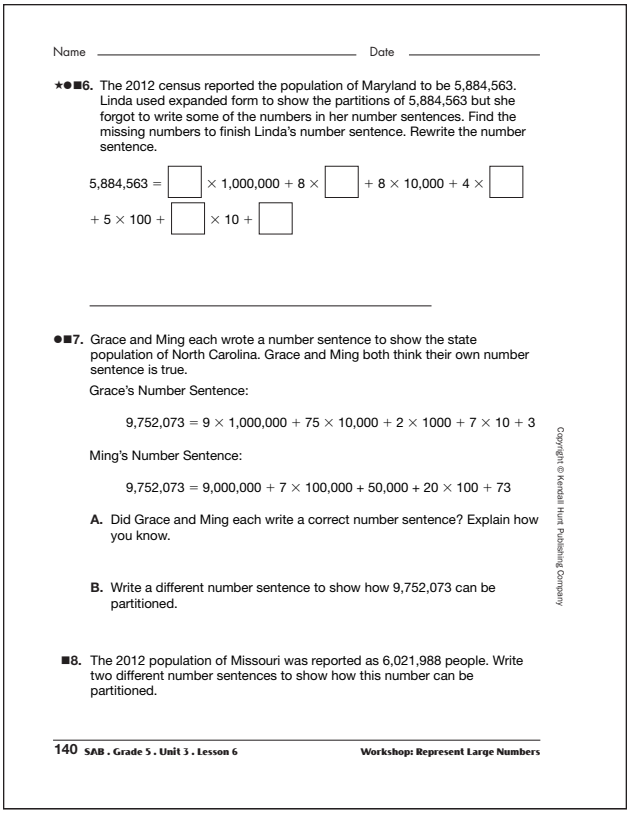

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★●■6. The 2012 census reported the population of Maryland to be 5,884,563. Linda used expanded form to show the partitions of 5,884,563 but she forgot to write some of the numbers in her number sentences. Find the missing numbers to finish Linda's number sentence. Rewrite the number sentence.

5,884,563 = ☐ × 1,000,000 + 8 × ☐ + 8 × 10,000 + 4 × ☐ + 5 × 100 + ☐ × 10 + ☐

●■7. Grace and Ming each wrote a number sentence to show the state population of North Carolina. Grace and Ming both think their own number sentence is true.

Grace's Number Sentence:

$9{,}752{,}073 = 9 \times 1{,}000{,}000 + 75 \times 10{,}000 + 2 \times 1000 + 7 \times 10 + 3$

Ming's Number Sentence:

$9{,}752{,}073 = 9{,}000{,}000 + 7 \times 100{,}000 + 50{,}000 + 20 \times 100 + 73$

A. Did Grace and Ming each write a correct number sentence? Explain how you know.

B. Write a different number sentence to show how 9,752,073 can be partitioned.

■8. The 2012 population of Missouri was reported as 6,021,988 people. Write two different number sentences to show how this number can be partitioned.

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■**9.** Solve each riddle to find the 2012 population of each state.

A. To find the population of Virginia, start with the population of Washington:

$6 \times 1{,}000{,}000 + 8 \times 100{,}000 + 9 \times 90{,}000 + 7000 + 1 \times 10 + 2$

Add: $1 \times 1{,}000{,}000 + 200{,}000 + 8 \times 10{,}000 + 8000 + 8 \times 100 + 5$

B. To find the 2012 population of Oklahoma, start with the population of South Carolina:

$4{,}000{,}000 + 72 \times 10{,}000 + 3 \times 1000 + 7 \times 100 + 2 \times 10 + 3$

Subtract: $9 \times 100{,}000 + 8000 + 9 \times 100 + 3$

C. To find the 2012 population of New York, start with the population of New Jersey:

$8 \times 1{,}000{,}000 + 800{,}000 + 6 \times 10{,}000 + 4 \times 1000 + 500 + 9 \times 10$

Add the population of North Carolina:

$9{,}000{,}000 + 700{,}000 + 5 \times 10{,}000 + 2000 + 7 \times 10 + 3$

Add the population of North Dakota:

$600{,}000 + 90{,}000 + 9000 + 600 + 20 + 8$

Add: $1 \times 100{,}000 + 2 \times 10{,}000 + 2 \times 100 + 4 \times 10 + 4$

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Represent Numbers with Exponents

✓ **Self-Check: Questions 10-12**

Use Self-Check: Questions 10–12 and the Workshop Menu to review your progress with exponents.

10. Complete the missing information in the table.

Number Sentence	Number with Exponent	Product
$2 \times 2 \times 2 \times 2$	2^4	16
	3^3	
5×5		25
$4 \times 4 \times 4 \times 4 \times 4$		
	10^5	100,000

11. A. What is the base and the exponent in 5^4?

B. What is the base and the power in 7^3?

C. Solve $6^5 = n$. Explain how the exponent helps you solve this problem.

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9. A. $6{,}897{,}012 + 1{,}288{,}805 = 8{,}185{,}817$

B. $4{,}723{,}723 - 908{,}903 = 3{,}814{,}820$

C. $8{,}864{,}590 + 9{,}752{,}073 + 699{,}628 = 19{,}436{,}535$

10.

Number Sentence	Number with Exponent	Product
$2 \times 2 \times 2 \times 2$	2^4	16
$3 \times 3 \times 3$	3^3	**27**
5×5	**5^2**	25
$4 \times 4 \times 4 \times 4 \times 4$	**4^5**	**1024**
$10 \times 10 \times 10 \times 10 \times 10$	10^5	100,000

11. A. The base is 5 and the exponent is 4.

B. The base is 7 and the power is 3.

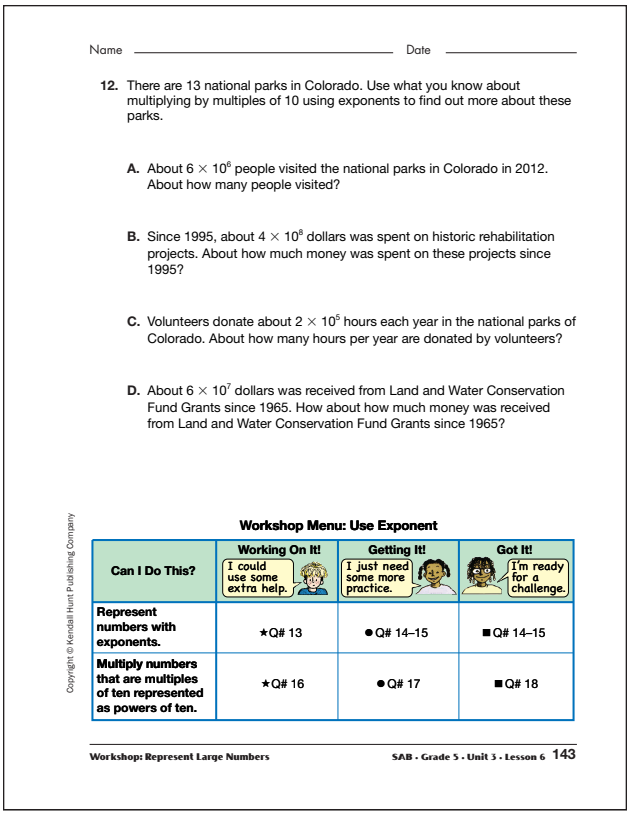
C. 7776; The exponent tells me how many times I have to multiply 6 by itself.

12. A. 6,000,000 people
B. $400,000,000
C. 200,000 hours
D. $60,000,000

13. A. $5^4 = 625$
B. $2^5 = 32$
C. $3^3 = 27$

14. A. 64 years old
B. 243 pages
C. 144 rocks

15. A. 725
B. 204
C. 1817
D. Possible response for B: $7^2 + 2^6 + 10^1 + 3^4 = 49 + 64 + 10 + 81 = 204$



Name _____ Date _____

12. There are 13 national parks in Colorado. Use what you know about multiplying by multiples of 10 using exponents to find out more about these parks.

A. About 6×10^6 people visited the national parks in Colorado in 2012. About how many people visited?

B. Since 1995, about 4×10^8 dollars was spent on historic rehabilitation projects. About how much money was spent on these projects since 1995?

C. Volunteers donate about 2×10^5 hours each year in the national parks of Colorado. About how many hours per year are donated by volunteers?

D. About 6×10^7 dollars was received from Land and Water Conservation Fund Grants since 1965. How about how much money was received from Land and Water Conservation Fund Grants since 1965?

Workshop Menu: Use Exponent

Can I Do This?	Working On It! I could use some extra help.	Getting It! I just need some more practice.	Got It! I'm ready for a challenge.
Represent numbers with exponents.	★Q# 13	●Q# 14–15	■Q# 14–15
Multiply numbers that are multiples of ten represented as powers of ten.	★Q# 16	●Q# 17	■Q# 18

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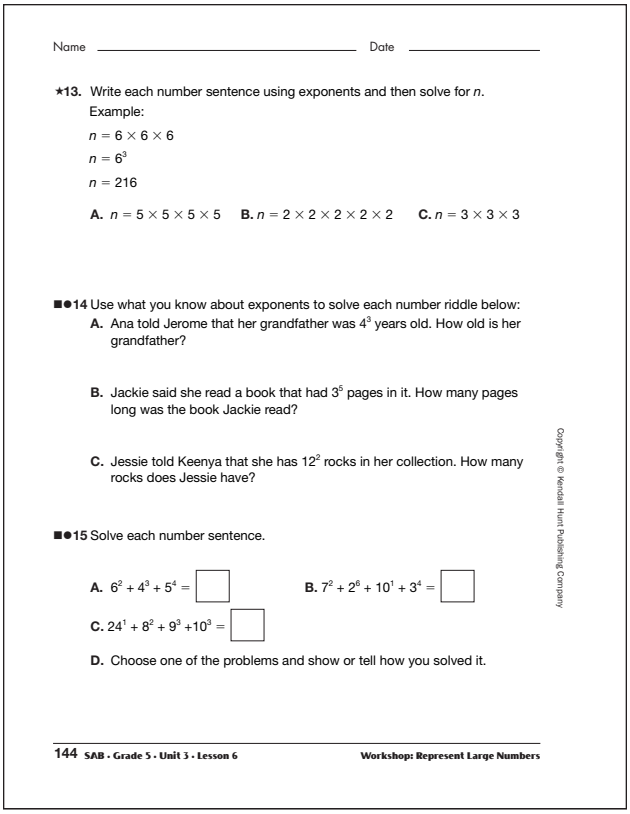

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★13. Write each number sentence using exponents and then solve for *n*.
Example:
$n = 6 \times 6 \times 6$
$n = 6^3$
$n = 216$

A. $n = 5 \times 5 \times 5 \times 5 \times 5$ **B.** $n = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ **C.** $n = 3 \times 3 \times 3$

■●14 Use what you know about exponents to solve each number riddle below:

A. Ana told Jerome that her grandfather was 4^3 years old. How old is her grandfather?

B. Jackie said she read a book that had 3^5 pages in it. How many pages long was the book Jackie read?

C. Jessie told Keenya that she has 12^2 rocks in her collection. How many rocks does Jessie have?

■●15 Solve each number sentence.

A. $6^2 + 4^3 + 5^4 =$ ☐ **B.** $7^2 + 2^6 + 10^1 + 3^4 =$ ☐

C. $24^1 + 8^2 + 9^3 + 10^3 =$ ☐

D. Choose one of the problems and show or tell how you solved it.

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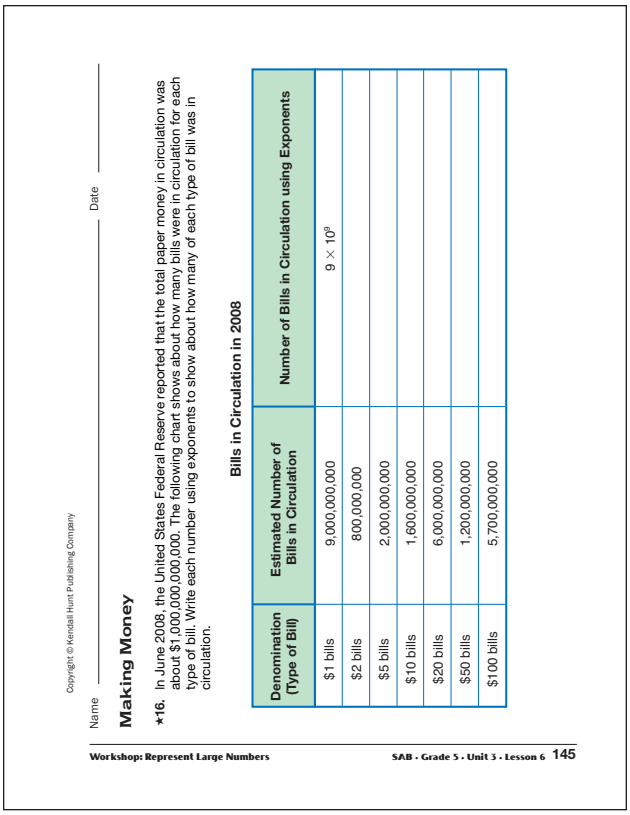

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Making Money

★16. In June 2008, the United States Federal Reserve reported that the total paper money in circulation was about $1,000,000,000,000. The following chart shows about how many bills were in circulation for each type of bill. Write each number using exponents to show about how many of each type of bill was in circulation.

Bills in Circulation in 2008

Denomination (Type of Bill)	Estimated Number of Bills in Circulation	Number of Bills in Circulation using Exponents
$1 bills	9,000,000,000	6×10^9
$2 bills	800,000,000	
$5 bills	2,000,000,000	
$10 bills	1,600,000,000	
$20 bills	6,000,000,000	
$50 bills	1,200,000,000	
$100 bills	5,700,000,000	

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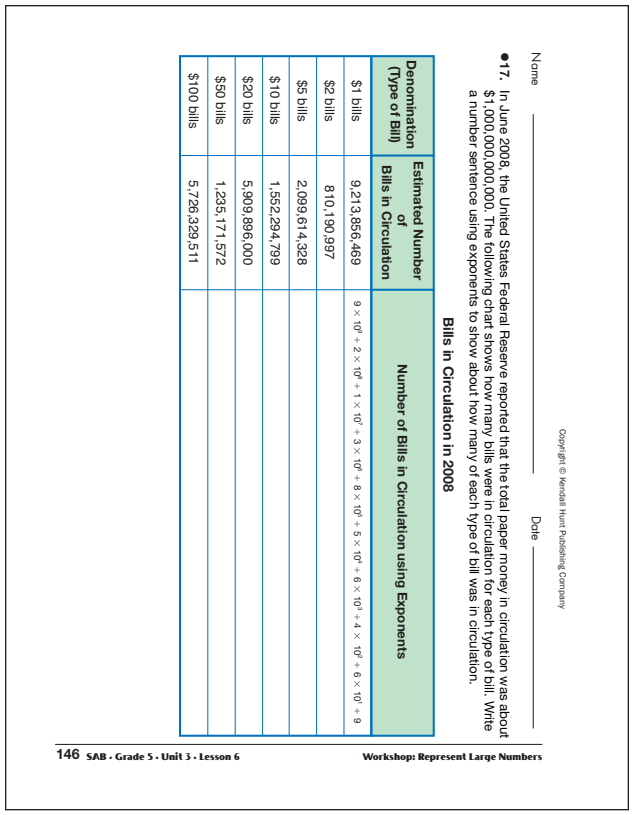

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●17. In June 2008, the United States Federal Reserve reported that the total paper money in circulation was about $1,000,000,000,000. The following chart shows how many bills were in circulation for each type of bill. Write a number sentence using exponents to show about how many of each type of bill was in circulation.

Bills in Circulation in 2008

Denomination (Type of Bill)	Estimated Number of Bills in Circulation	Number of Bills in Circulation using Exponents
$1 bills	9,213,856,469	$9 \times 10^9 + 2 \times 10^8 + 1 \times 10^7 + 3 \times 10^6 + 8 \times 10^5 + 5 \times 10^4 + 6 \times 10^3 + 4 \times 10^2 + 6 \times 10^1 + 9$
$2 bills	810,190,997	
$5 bills	2,099,614,328	
$10 bills	1,552,294,799	
$20 bills	5,909,896,000	
$50 bills	1,235,171,572	
$100 bills	5,726,329,511	

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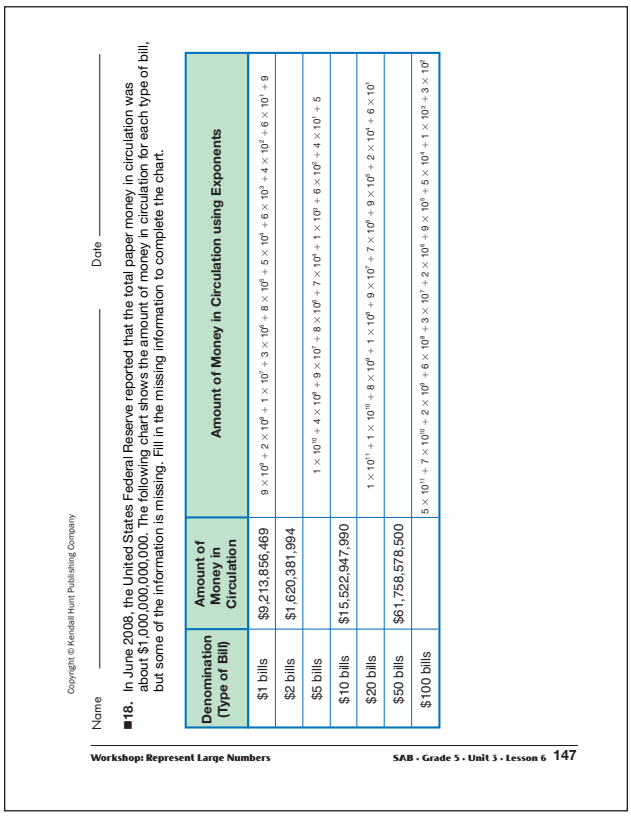
16.

Number Sentence	Number with Exponent	Product
$2 \times 2 \times 2 \times 2$	2^4	16
$3 \times 3 \times 3$	3^3	27
5×5	5^2	25
$4 \times 4 \times 4 \times 4 \times 4$	4^5	1024
$10 \times 10 \times 10 \times 10 \times 10$	10^5	100,000

17.

Denomination (Type of Bill)	Estimated Number of Bills in Circulation	Number of Bills in Circulation using Exponents
$1 bills	9,213,856,469	$9 \times 10^9 + 2 \times 10^8 + 1 \times 10^7 + 3 \times 10^6 + 8 \times 10^5 + 5 \times 10^4 + 6 \times 10^3 + 4 \times 10^2 + 6 \times 10^1 + 9$
$2 bills	810,190,997	$8 \times 10^8 \times 1 \times 10^7 + 1 \times 10^5 + 9 \times 10^4 + 9 \times 10^2 + 9 \times 10 + 7$
$5 bills	2,099,614,328	$1 \times 10^9 + 9 \times 10^7 + 9 \times 10^6 + 6 \times 10^5 + 1 \times 10^4 + 4 \times 10^3 + 3 \times 10^2 + 2 \times 10 + 8$
$10 bills	1,552,294,799	$2 \times 10^9 + 5 \times 10^8 + 5 \times 10^7 + 2 \times 10^6 + 2 \times 10^5 + 9 \times 10^4 + 4 \times 10^3 + 7 \times 10^2 + 9 \times 10 + 9$
$20 bills	5,909,896,000	$5 \times 10^9 + 9 \times 10^8 + 9 \times 10^6 + 8 \times 10^5 + 9 \times 10^4 + 6 \times 10^3$
$50 bills	1,235,171,572	$1 \times 10^9 + 2 \times 10^8 + 3 \times 10^7 + 5 \times 10^6 + 1 \times 10^5 + 7 \times 10^4 + 1 \times 10^3 + 5 \times 10^2 + 7 \times 10 + 2$
$100 bills	5,726,329,511	$5 \times 10^9 + 7 \times 10^8 + 2 \times 10^7 + 6 \times 10^6 + 3 \times 10^5 + 2 \times 10^4 + 9 \times 10^3 + 5 \times 10^2 + 1 \times 10 + 1$



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■18. In June 2008, the United States Federal Reserve reported that the total paper money in circulation was about $1,000,000,000,000. The following chart shows the amount of money in circulation for each type of bill, but some of the information is missing. Fill in the missing information to complete the chart.

Denomination (Type of Bill)	Amount of Money in Circulation	Amount of Money in Circulation using Exponents
$1 bills	$9,213,856,469	$9 \times 10^9 + 2 \times 10^8 + 1 \times 10^7 + 3 \times 10^6 + 8 \times 10^5 + 5 \times 10^4 + 6 \times 10^3 + 4 \times 10^2 + 6 \times 10^1 + 9$
$2 bills	$1,620,381,994	
$5 bills		$1 \times 10^{10} + 4 \times 10^8 + 9 \times 10^7 + 8 \times 10^6 + 7 \times 10^4 + 1 \times 10^3 + 6 \times 10^2 + 4 \times 10^1 + 5$
$10 bills	$15,522,947,990	
$20 bills		$1 \times 10^{11} + 1 \times 10^{10} + 8 \times 10^9 + 1 \times 10^8 + 9 \times 10^7 + 7 \times 10^6 + 9 \times 10^5 + 2 \times 10^4 + 6 \times 10^1$
$50 bills	$61,758,578,500	
$100 bills		$5 \times 10^{11} + 7 \times 10^{10} + 2 \times 10^9 + 6 \times 10^8 + 3 \times 10^7 + 2 \times 10^6 + 9 \times 10^5 + 5 \times 10^4 + 1 \times 10^3 + 3 \times 10^2$

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18.

Denomination (Type of Bill)	Amount of Money in Circulation	Amount of Money in Circulation using Exponents
$1 bills	$9,213,856,469	$9 \times 10^9 + 2 \times 10^8 + 1 \times 10^7 + 3 \times 10^6 + 8 \times 10^5 + 5 \times 10^4 + 6 \times 10^3 + 4 \times 10^2 + 6 \times 10^1 + 9$
$2 bills	$1,620,381,994	**$1 \times 10^9 \times 6 \times 10^8 + 2 \times 10^7 + 3 \times 10^5 + 8 \times 10^4 + 1 \times 10^3 + 9 \times 10^2 + 9 \times 10 + 4$**
$5 bills	**$10,498,071,645**	$1 \times 10^{10} + 4 \times 10^8 + 9 \times 10^7 + 8 \times 10^6 + 7 \times 10^4 + 1 \times 10^3 + 6 \times 10^2 + 4 \times 10^1 + 5$
$10 bills	$15,522,947,990	**$1 \times 10^{10} + 5 \times 10^9 + 5 \times 10^8 + 2 \times 10^7 + 2 \times 10^6 + 9 \times 10^5 + 4 \times 10^4 + 7 \times 10^3 + 9 \times 10^2 + 9 \times 10$**
$20 bills	**$118,197,920,060**	$1 \times 10^{11} + 1 \times 10^{10} + 8 \times 10^9 + 1 \times 10^8 + 9 \times 10^7 + 7 \times 10^6 + 9 \times 10^5 + 2 \times 10^4 + 6 \times 10^1$
$50 bills	$61,758,578,500	**$6 \times 10^{10} + 1 \times 10^9 + 7 \times 10^8 + 5 \times 10^7 + 8 \times 10^6 + 5 \times 10^5 + 7 \times 10^4 + 8 \times 10^3 + 5 \times 10^2$**
$100 bills	**$572,632,951,100**	$5 \times 10^{11} + 7 \times 10^{10} + 2 \times 10^9 + 6 \times 10^8 + 3 \times 10^7 + 2 \times 10^6 + 9 \times 10^5 + 5 \times 10^4 + 1 \times 10^3 + 3 \times 10^2$