

Discuss

- On a copy of the 100 Chart in your Student Activity Book, use a blue crayon or pencil to circle all the multiples of 2. Then, describe any patterns you see. Save your copy of the 100 Chart to use later in the lesson.
- Shannon's book is 318 pages long. In which column would 318 be if the 100 Chart kept going beyond 100?
- A. Which of the following numbers are divisible by 2? Why do you think so? Check your predictions using a calculator.

109	213	216	275	784
1000	1358	2462	6767	8091
- B. Write a multiplication sentence and a division sentence for each number that is divisible by 2. For example, $216 \div 2 = 108$ and $108 \times 2 = 216$. Use a calculator to help you.
- How can you tell if a number is divisible by 2?

Is It Divisible by 3?

- 12 is divisible by 3. 21 is divisible by 3. 30 is divisible by 3.
 $4 \times 3 = 12$ $7 \times 3 = 21$ $10 \times 3 = 30$
 $12 \div 3 = 4$ $21 \div 3 = 7$ $30 \div 3 = 10$

3 is a factor of 12, 21, and 30. A factor of a number can be divided **evenly** or **exactly** into the number. That is, when you divide a whole number by one of its factors, the answer (or quotient) is a whole number. Since 12, 21, and 30 can be divided by 3 evenly, we say that 12, 21, and 30 are divisible by 3.

- Use your copy of the 100 Chart that you used earlier. The multiples of 2 should be circled in blue. Using a red crayon or pencil, mark all the multiples of 3 with an "X." Your 100 Chart should look like the one below.

1	2	X	4	5	X	7	8	X	10
11	X	13	14	X	16	17	X	19	20
X	22	23	X	25	26	X	28	29	X

- Describe any patterns you see.

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Discuss

- Use your copy of the 100 Chart and your calculator to help you answer the following questions:
 - Is 27 a multiple of 3? Write a multiplication sentence.
 - Is 27 divisible by 3? Write a division sentence.
 - Is 51 a multiple of 3? Write a multiplication sentence.
 - Is 51 divisible by 3? Write a division sentence.
- A. Is 14 a multiple of 3? How do you know?
 B. If 14 is divided by 3, what is the remainder? Write a multiplication or division sentence. Remember to include the remainder.
- C. Use your calculator. Press: $14 \div 3 =$
 How does your calculator show whether 14 is divisible by 3? Is the answer a whole number?
- Is 74, 75, or 76 divisible by 3? Use your copy of the 100 Chart or a calculator to decide. Write a division sentence showing which number is divisible by 3.
- Look carefully at your 100 Chart. Write in more numbers below it if you need to.
 - Predict: Is 101 divisible by 3? Check your prediction with a calculator.
 - Predict: Is 102 divisible by 3? Check your prediction with a calculator.
 - Predict: Which of the following is divisible by 3? 116, 117, or 118? Why do you think so? Check your prediction with a calculator.

11. Mrs. Dewey started listing numbers from the 100 Chart that were divisible by 3. Then she made the table on the right. Roberto saw a pattern. Do you? Explain.

Number	Sum of Digits
18	$1 + 8 = 9$
42	$4 + 2 = 6$
51	$5 + 1 = 6$
84	$8 + 4 = 12$
99	$9 + 9 = 18$

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*Answers and/or discussion are included in the lesson.

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Questions 1–24 (SG pp. 258–262)


- * See Figure 1 in Lesson 2.
- * In the column with the 8.
- A. 216, 784, 1000, 1358, 2462; These numbers are even. The ones digit is 0, 2, 4, 6, or 8.
 B. $108 \times 2 = 216$; $216 \div 2 = 108$; $392 \times 2 = 784$; $784 \div 2 = 392$; $500 \times 2 = 1000$; $1000 \div 2 = 500$; $679 \times 2 = 1358$; $1358 \div 2 = 679$; $1231 \times 2 = 2462$; $2462 \div 2 = 1231$
- A number is divisible by 2 if it is a multiple of 2. Multiples of 2 are even. The ones digit is 0, 2, 4, 6, or 8.
- * See Figure 2 in Lesson 2.
- * See lesson.
- A. Yes; $9 \times 3 = 27$
 B. Yes; $27 \div 3 = 9$
 C. Yes; $17 \times 3 = 51$
 D. Yes; $51 \div 3 = 17$
- A. No; Explanations will vary. 3 and no other whole number will multiply to make 14; 14 is not reached when you skip count by 3s; if you divide 14 by 3, you do not get a whole number answer.
 B. R2; $4 \times 3 + 2 = 14$ or $14 \div 3 = 4$ R2
 C. The calculator does not show a whole number so 14 is not divisible by 3. It shows 4.6666667.
- 75; $75 \div 3 = 25$
- A. Predictions will vary. No, 101 does not fall on the diagonals made on the 100 Chart. On the calculator, $101 \div 3$ does not give a whole number; therefore, 101 is not divisible by 3.
 B. Predictions will vary. Yes, 102 falls on the same diagonal as 84 and 93. On the calculator $102 \div 3 = 34$, a whole number. 102 is divisible by 3.
 C. Explanations will vary. If you extend the 100 Chart, you can see that 117 falls on the diagonal with 90 and 99. On the calculator, $117 \div 3 = 39$, a whole number. 117 is divisible by 3. 116 and 118 are not divisible by 3.

11.* Answers will vary. See lesson.

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12. Answers will vary. A few examples are: 126, 138, 159, 171
13. Answers will vary. A few examples are: 255, 378, 501
14. **A.** 126, 342, 177, 1002, 297, 8775
B. 126, 342, 1664, 1002, 8770
C. 126, 342, 1002
15. Yes; Yes
16. **A.** 126, 342, 1002
B.* Answers will vary. If the number is divisible by both 2 and 3, it is divisible by 6. If the number is even and the sum of its digits is a multiple of 3, it is divisible by 6.
C. Yes; 12,345,678 is even, and the sum of its digits is a multiple of 3.
17. **A.** Answers will vary. A few examples are: 174, 186, 204
B. Answers will vary. A few examples are: 264, 270, 348
18. 9
 18
 27
 36
 45
 54
 63
 72
 81
 90
- 19.* See lesson. The tens digits count up by ones. The ones digits count down by ones. The sum of the 2 digits of the product is 9.
20. **A.** 5706 **B.** 207
C. 333 **D.** 657
E. 1287 **F.** 3996
G. 6786 **H.** 39,789
- 21.* See lesson. The process of adding digits can be repeated until 9 itself results.
22. **A.** 144; 747; 2556; 8721; 12,987; The sums of the digits of these numbers are all multiples of 9. Repeatedly adding the digits results in 9.

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12. Name a number greater than 125 that is divisible by 3. Check your prediction.

13. Name a number greater than 200 that is divisible by 3. Check your prediction.

14. Use the numbers below to make predictions for Questions 14A–14C. Then check your predictions with a calculator.

126	209	342	177	1664
1002	991	297	8770	8775

A. Which of the numbers are divisible by 3?
B. Which are divisible by 2?
C. Which are divisible by 2 and 3?

15. Is 12,345,678 divisible by 2? Divisible by 3? Check using your calculator.

Is It Divisible by 6?

16. **A.** Find out which numbers in Question 14 are divisible by 6. Use a calculator.
B. How can you determine if a number is divisible by 6? Find the multiples of 6 by skip counting by 6s on your 100 Chart. What do you notice?
C. Based on the patterns you see, predict whether 12,345,678 (from Question 15) is divisible by 6. Check your prediction.

17. **A.** Give a number greater than 150 that is divisible by 6.
B. Give a number greater than 225 that is divisible by 6. Explain how you found your number.

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Is It Divisible by 9?

18. Copy and complete the list of facts for 9. Then write the products in a column, one on each line.

1 × 9 =
2 × 9 =
3 × 9 =
4 × 9 =
5 × 9 =
6 × 9 =
7 × 9 =
8 × 9 =
9 × 9 =
9 × 10 =

19. What patterns do you see? What can you say about the sum of the digits of the products?

20. Use your calculator to find more multiples of 9. Find the products below.

A. 9 × 634 =	B. 9 × 23 =
C. 9 × 37 =	D. 9 × 73 =
E. 9 × 143 =	F. 9 × 444 =
G. 9 × 754 =	H. 9 × 4421 =

21. Go back and add the digits of each product in Question 20. For example: 9 × 634 = 5706
 Add the digits in 5706: 5 + 7 + 0 + 6 = 18
 Now, add the digits in 18: 1 + 8 = 9
 Describe what happens when you add the digits of a multiple of 9.

22. **A.** Predict which numbers below are divisible by 9. Show how you decided.
B. Then check using a calculator.
C. Finally, write a multiplication and division sentence for each multiple of 9 you identify.

172	144	743	747	1007
2556	4906	8721	9908	12,987

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*Answers and/or discussion are included in the lesson.

23. Use a clean 100 Chart from the Student Activity Book to explore the following.
- A. Skip count by 5s on the 100 Chart. Mark each multiple of 5 with a circle. Then, skip count by 10s and mark the multiples of 10 with an X.
 - B. Describe how you know a number is divisible by 5. In your description, include:
 - Examples of numbers that are divisible by 5.
 - Multiplication sentences and division sentences for those numbers.
 - Descriptions of patterns you see on the 100 Chart.
 - C. Describe how you know a number is divisible by 10. In your description, include:
 - Examples of numbers that are divisible by 10.
 - Multiplication sentences and division sentences for those numbers.
 - Descriptions of patterns you see on the 100 Chart.

✓ **Check-In: Question 24**

24. Answer Questions A–F about the following numbers:
- | | | | |
|------|------|------|------|
| 345 | 980 | 1369 | 1197 |
| 9036 | 2273 | 1035 | 8665 |
| | | | 3288 |
| | | | 2073 |
- A. Which numbers are divisible by 2? Tell how you decided.
 - B. Which numbers are divisible by 3? Tell how you decided.
 - C. Which numbers are divisible by 6? Tell how you decided.
 - D. Which numbers are divisible by 9? Tell how you decided.
 - E. Which numbers are divisible by 5? Tell how you decided.
 - F. Which numbers are divisible by 10? Tell how you decided.

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Homework

Divisibility Rules

1. Use the divisibility rules to predict answers to the following questions. Then use a calculator to check to see if your predictions are correct.
- | | | | | | |
|-----|-----|-----|-----|-----|-----|
| 414 | 930 | 515 | 648 | 819 | 745 |
|-----|-----|-----|-----|-----|-----|
- A. Which numbers are divisible by 2?
 - B. Which numbers are a multiple of 3?
 - C. Which numbers are divisible by 5?
 - D. Which numbers are a multiple of 6?
 - E. Which numbers are divisible by 10?

Order of Operations Review

2. Solve these problems using the order of operations.
- | | |
|--------------------------------|----------------------------------|
| A. $6 \times 7 - 4 \times 8 =$ | B. $1 + 48 \div 8 =$ |
| C. $4 + 7 \times 8 =$ | D. $4 \times 7 - 24 \div 6 =$ |
| E. $(4 + 7) \times 8 =$ | F. $4 \times (7 - 4) \times 2 =$ |

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*Answers and/or discussion are included in the lesson.

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- B. Using a calculator results in whole numbers for the following: $144 \div 9$, $747 \div 9$, $2556 \div 9$, $8721 \div 9$, $12,987 \div 9$.
- C. $144 \div 9 = 16$; $16 \times 9 = 144$;
 $747 \div 9 = 83$; $83 \times 9 = 747$;
 $2556 \div 9 = 284$; $284 \times 9 = 2556$;
 $8721 \div 9 = 969$; $969 \times 9 = 8721$;
 $12,987 \div 9 = 1443$; $1443 \times 9 = 12,987$
- 23.*A. See Figure 5 in lesson 2.
- B. Multiples of 5 end in 0 and 5. The ones digit is 0 or 5. Examples are 10 and 55.
 $5 \times 2 = 10$ and $10 \div 5 = 2$; $5 \times 11 = 55$ and $55 \div 5 = 11$.
- C. Multiples of 10 end in 0. The ones digit is 0. If a number is a multiple of 10, it is also a multiple of 5. Examples are 20 and 100. $10 \times 2 = 20$ and $20 \div 2 = 10$;
 $10 \times 10 = 100$ and $100 \div 10 = 10$.
- 24. A. 980; 3288; 9036; They are even numbers. The ones digit is 0, 2, 4, 6, or 8.
- B. 345; 1197; 3288; 9036; 1035; 2073; The sum of the digits in each number is a multiple of 3. Some students might use a calculator. Divide each number by 3 on the calculator. If the answer is a whole number, it is divisible by 3.
- C. 3288; 9036; These numbers are divisible by 2 and 3 so they are divisible by 6.
- D. 1197; 9036; 1035; The sums of the digits are multiples of 9. If you repeatedly add the digits, you get 9. (For example, $1 + 1 + 9 + 7 = 18$; $1 + 8 = 9$)
- E. 345, 980, 1035, 8665; Numbers that end in 5 or 0 are divisible by 5.
- F. 980; Numbers that end in 0 are divisible by 10.

Homework (SG p. 263)

Questions 1–2

- | | |
|---------------------|-----------------------|
| 1. A. 414, 930, 648 | B. 414, 930, 648, 819 |
| C. 930, 515, 745 | D. 414, 930, 648 |
| E. 930 | |
| 2. A. 10 | B. 7 |
| C. 60 | D. 24 |
| E. 88 | F. 24 |

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