Name _____ Class _____ Date _____

Use after Section 9.5

Extra Practice

Problems and Applications

1 Identify the property illustrated.

a $2(x-1)=0$, so $x-1=0$

b $6(x-2)=6x-12$

c $(5\cdot 8)\cdot 9=5\cdot(8\cdot 9)$

d $(4\cdot 5)\cdot(x+1)=(x+1)\cdot(4\cdot 5)$

e $(13+17)+5=(17+13)+5$

f $(7+1)+6=7+(1+6)$

2 Solve each equation for x.

a $(x)(13)=0$

b $(x-7)(13)=0$

c $(x-6)(3x)=0$

d $(x-9)(x+1)=0$

3 Without using a calculator, indicate whether <, >, or = goes in the blank.

a $(106+97)+113$ _____ $106+(97+113)$

b $(86-44)-32$ _____ $86-(44-32)$

c $(67+92)-52$ _____ $67+(92-52)$

d $43-(19+21)$ _____ $(43-19)+21$

4 The product of four consecutive positive integers is 0. What are the possible values of these four positive integers?

5 For a $595 mountain bike, Better-Buy Biker offers a 10% clearance discount followed by 20% holiday discount. On the same item, Best-Buy Biker offers a 20% sale discount followed by a 10% overstocked discount. A third store, Go-For-Broke, sells the same item at a one time 28% discount. How do the mountain bike prices of the three stores compare?

6 Suppose $A=\begin{bmatrix}0 & 5\\ 9 & -3\end{bmatrix}$ and $B=\begin{bmatrix}2 & -1\\ 3 & 5\end{bmatrix}$.

a Find A + B and B + A. Is A + B = B + A?

b Find AB and BA. Is AB = BA?

7 Use the number properties to evaluate each expression. Do not use a calculator.

a $1000(9\cdot 0.15)$

b $9.005+(13.2+0.995)$

c $(981+360)+19$

d $(49\cdot 2)\frac{5}{7}$

8 A "combination" is determined by multiplying all of the numbers in a row or column. Without multiplying, determine which row or column will have the greatest combination.

	1	2	3	4
A	0	1	18	5
B	10	0	6	13
C	13	4	2	0
D	3	1	1	21

1a _____

b _____

c _____

d _____

e _____

f _____

2a _____

b _____

c _____

d _____

3a _____

b _____

c _____

d _____

4 _____

5 _____

6a _____

b _____

7a _____

b _____

c _____

d _____

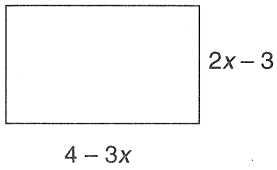
8 _____

Name _____ Class _____ Date _____

9 If $a \# b = a + b$, is the operation symbolized by # commutative? 9 _____

10 Solve each equation for x.
- a $5x(10x - 15) = 0$ 10a _____
- b $(4x - 5)(7x - 21) = 0$ b _____
- c $7x(x - 3)(x + 5) = 0$ c _____
- d $4(3x - 2) + 0 = 16$ d _____

11 a Write a function $A(x)$ for the area of the figure. 11a _____



- b What values of x give an area of zero? b _____
- c What is the set of possible values of x? c _____

12 The digits of a three-digit number are all different. The product of the digits is 0 and the sum is 14. If the number is divided by 5, the result is a prime number. What might the three-digit number be? 12 _____

◀ Spiral Learning ▶

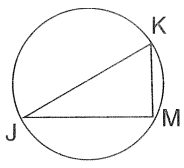
13 For the points (–5, 2) and (3, –2), 13a _____
- a Find the mean of the x-coordinates and the mean of the y-coordinates.
- b Graph the two given points and the point found in part a.

c _____

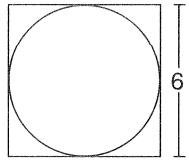
- c Explain the relationship among these three points.

14 The measures of the angles of a triangle are in the ratio 2:9:7. Find the measures of the angles. 14 _____

15 $\overline{JK}$ is a diameter and JM = 8 centimeters. The area of the triangle is 24 square centimeters. Find 15a _____
- a KM b _____
- b JK
- c The circumference of the circle. c _____



16 The square has side 6. A dart lands somewhere inside the square. 16a _____
- a What is the probability the dart has landed inside the circle?
- b Suppose the side of the square is 3, not 6. What is the probability the dart has landed inside the circle? b _____



17 The Custom Van comes in 5 different colors, with 4 different interior designs, and with 2 different engines. How many versions of the Custom Van are possible? 17 _____

Name _____ Class _____ Date _____

Use with Section 9.5

Cooperative Learning Activities

Activity 1

For this activity, the operation $\square$ is defined as follows:

$$a \square b = a^2 + b^2$$

1 Evaluate each expression.

a $2 \square 3$

b $3 \square 2$

c $-5 \square 4$

d $4 \square -5$

2 Is the operation $\square$ a commutative operation? Explain your answer.

3 Evaluate each expression.

a $-4 \square (3 \square 6)$

b $(-4 \square 3) \square 6$

c $6 \square (-2 \square -3)$

d $(6 \square -2) \square -3$

4 Is the operation $\square$ an associative operation? Explain your answer.

5 Make up your own operation. Show whether the operation is commutative and whether it is associative.

Activity 2

Use the following table and find the row or column with the greatest product. Share how you solved the problem with the rest of the class.

	A	B	C	D	E
1	6	1	8	0	5
2	9	6	7	7	0
3	0	5	2	3	6
4	8	7	4	0	1
5	4	0	3	2	3

Use with Section 9.5

Facilitating the Activities

Activity 1

Students may not readily accept $\square$ as an operator or an operation. You may have to work through an example or two to get them used to it. Problem 5 really gets at whether students understand the concepts. Encourage students to come up with examples to illustrate why the properties either work or do not work for their operation and to give brief written or oral explanations.

Activity 2

This is a quick activity to help students discover the Zero Product Property. If your students have a hard time using this property, activities like this should help.

Name _____ Class _____ Date _____

Use with Section 9.5

Enrichment

Multiplication in Modular Arithmetic

In modular arithmetic, the modulus can be any counting number. For modulus 12, there are 12 numbers, 0 through 11.

Multiplication in modular arithmetic starts the same way as regular multiplication. Then there is an extra step to represent the "product" using only the allowed numbers.

Example Find $3 \times 7 \pmod{12}$.

Solution First step: $3 \times 7 = 7 + 7 + 7 = 21$.
Second step: The modulus is 12, so subtract 12 from 21: $21 - 12 = 9$.
So: $3 \times 7 \pmod{12} \equiv 9 \pmod{12}$.

Use a clock face to help find these products in mod 12. Remember to substitute 0 for 12.

1 2×11 _____ (mod 12)

2 4×5 _____ (mod 12)

3 7×6 _____ (mod 12)

4 1×5 _____ (mod 12)

5 3×5 _____ (mod 12)

6 6×8 _____ (mod 12)

7 2×4 _____ (mod 12)

8 5×7 _____ (mod 12)

For large numbers, you can use division to help solve problems in modular arithmetic. For example, what is 125 (mod 12)? If you used a clock, the hands would go around 10 full circles to get to the number 120, so 125 (mod 12) = 5. Dividing 125 by 12, the quotient is 10 and the remainder is 5. So the remainder gives you the answer.

Find these products.

9 6×3 _____ (mod 12)

10 5×9 _____ (mod 12)

11 0×5 _____ (mod 12)

12 3×4 _____ (mod 12)

13 2×3 _____ (mod 12)

14 7×8 _____ (mod 12)

15 3×4 _____ (mod 5)

16 2×3 _____ (mod 5)

17 3×3 _____ (mod 5)

18 11×3 _____ (mod 14)

19 7×4 _____ (mod 14)

20 4×5 _____ (mod 6)

21 3×6 _____ (mod 9)

22 12×13 _____ (mod 15)

23 5×2 _____ (mod 7)

24 3×3 _____ (mod 4)

25 4×2 _____ (mod 10)

26 4×5 _____ (mod 20)

27 The Zero Product Property in this section of the textbook states:

If $ab = 0$, then either $a = 0$ or $b = 0$.

Look at the problems on this worksheet where the product is zero. Does the Zero Product Property hold in modular arithmetic?

_____

Use with Section 9.5

Name _____ Class _____ Date _____

Learning Log

1 Write two problems that illustrate each property presented in this lesson. Give the answers.

2 A friend asks you, "I am always confusing the commutative properties and the associative properties. How can I learn to keep them straight?" How would you help your friend?