Chapter 3 lesson review

First lesson - divisibility rules - you have an 8 page book of these rules

A number is *divisible* by a second number if the second number divides into the first with no remainder. Here are some rules.

Last Digit of a Number	The Number Is Divisible by	Examples
any	1	any number
0, 2, 4, 6, 8	2	10; 24; 32; 54; 106; 138
0, 5	5	10; 25; 70; 915; 1,250
0	10	10; 20; 90; 500; 4,300

The Sum of the Digits	The Number Is Divisible by	Examples		
is divisible by 3	3	843 →	$8 + 4 + 3 = 15$ and $15 \div 3 = 5$	$3\overline{)843}$ = 281 R0
is divisible by 9	9	2,898 →	$2 + 8 + 9 + 8 = 27$ and $27 \div 9 = 3$	$9\overline{)2,898}$ = 322 R0

Use mental math to determine if the first number is divisible by the second.

6. 185; 5 ____________

7. 76,870; 10 ____________

8. 456; 3 ____________

9. 35,994; 2 ____________

10. 12,866; 9 ____________

11. 151,002; 9 ____________

12. 6,888; 2 ____________

13. 31,067; 5 ____________

14. 901,204; 3 ____________

15. 2,232; 3 ____________

16. 45,812; 9 ____________

17. 3,090; 10 ____________

18. 312; 9 ____________

19. 1,933; 3 ____________

20. 28,889; 2 ____________

An *exponent* tells how many times a number is used as a factor.

$3 \times 3 \times 3 \times 3$ shows the number 3 is used as a factor 4 times.

$3 \times 3 \times 3 \times 3$ can be written 3^4.

In 3^4, 3 is the *base* and 4 is the exponent.

Read 3^4 as "three to the fourth power."

- To *simplify* a power, first write it as a product.

  $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

- When you simplify expressions with exponents, do all operations inside parentheses first. Then simplify the powers.

  Example: $30 - (2 + 3)^2 = 30 - 5^2$
  $= 30 - 25$
  $= 5$

Simplify each expression.

7. 6^2 ____________

8. 3^5 ____________

9. 10^4 ____________

10. $4^2 + 5^2$ ____________

11. $2 \times 6 - 2^3$ ____________

12. $6^2 + 4^2$ ____________

13. $5 + 5^2 - 2$ ____________

14. $24 \div 4 + 2^4$ ____________

15. $9 + (40 \div 2^3)$ ____________

16. $(4^2 + 4) \div 5$ ____________

17. $10 \times (30 - 5^2)$ ____________

18. $12 + 18 \div 3^2$ ____________

A *prime number* has exactly two factors, the number itself and 1.

$5 \times 1 = 5$
5 is a prime number.

A *composite number* has more than two factors.

$1 \times 6 = 6$
$2 \times 3 = 6$

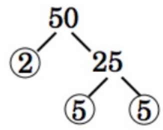
1, 2, 3, and 6 are factors of 6.
6 is a composite number.

The number 1 is neither prime nor composite.

Every composite number can be written as a product of prime numbers.

$6 = 2 \times 3$
$8 = 2 \times 2 \times 2$
$12 = 2 \times 2 \times 3$

Factors that are prime numbers are called *prime factors.* You can use a *factor tree* to find prime factors. This one shows the prime factors of 50.



$50 = 2 \times 5 \times 5$ is the *prime factorization* of 50.

Find the prime factorization of each number.

16. 21

17. 48

18. 81

19. 63

20. 100

21. 103

You can find the *greatest common factor (GCF)* of 12 and 18 using a division ladder, factor trees, or by listing the factors. Two of these methods are shown.

① List the factors of 12 and 18.

12: 1, 2, 3, 4, 6, 12
18: 1, 2, 3, 6, 9, 18

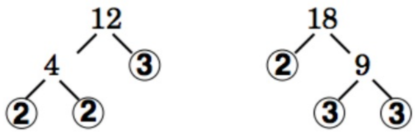
② Find the common factors.

12: ①,②,③, 4,⑥, 12
18: ①,②,③,⑥, 9, 18

The common factors are 1, 2, 3, and 6.

③ Name the greatest common factor: 6.

① Draw factor trees.



② Write each prime factorization. Identify common factors.

12: ②× 2 ×③
18: ②×③× 3

③ Multiply the common factors. $2 \times 3 = 6$.
The GCF of 12 and 18 is 6.

Find the GCF of each set of numbers.

9. 21, 60 ____________________

10. 15, 45 ____________________

11. 54, 60 ____________________

12. 20, 50 ____________________

13. 36, 40 ____________________

14. 48, 72 ____________________

Find the *least common multiple (LCM)* of 8 and 12.

① Begin listing multiples of each number.

8: 8, 16, 24, 32, 40

12: 12, 24

② Continue the lists until you find the first multiple that is common to both lists. That is the LCM.

The least common multiple of 8 and 12 is 24.

List multiples to find the LCM of each pair of numbers.

1. 4: ______________________

5: ______________________

LCM: ______________________

2. 6: ______________________

7: ______________________

LCM: ______________________

3. 9: ______________________

15: ______________________

LCM: ______________________

4. 10: ______________________

25: ______________________

LCM: ______________________

Use prime factorization to find the LCM of each set of numbers.

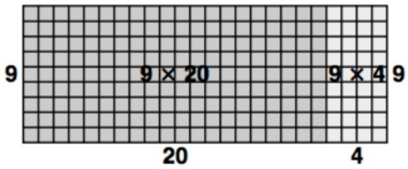
9. 9, 21 ______________________________

10. 6, 8 ______________________________

11. 18, 24 ______________________________

12. 40, 50 ______________________________

The *Distributive Property* allows you to break numbers apart to make mental math easier.



Multiply 9 × 24 mentally.

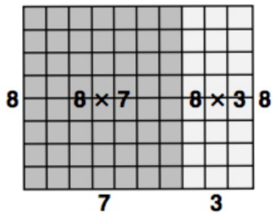
Think: $9 \times 24 = 9 \times (20 + 4)$

$= (9 \times 20) + (9 \times 4)$

$= 180 + 36$

$= 216$

The Distributive Property may also help you to simplify an expression.



$(8 \times 7) + (8 \times 3) = 8 \times (7 + 3)$

$= 8 \times 10$

$= 80$

EXAMPLE Using the Distributive Property with Algebraic Expressions

1 Write an equivalent expression for $2(6x - 3y + 7)$.

$$2(6x - 3y + 7) = 2 \cdot 6x - 2 \cdot 3y + 2 \cdot 7 \quad \leftarrow \text{Use the Distributive Property.}$$
$$= 12x - 6y + 14 \quad \leftarrow \text{Multiply.}$$

1. Simplify each expression.

a. $4(3n + 6)$ **b.** $8(7 - 3m + 4p)$ **c.** $12(2a + 3b - 5)$

EXAMPLE Factoring Numeric Expressions

2 Factor 20 + 8.

$20 = 5 \times 2 \times 2$
$8 = 2 \times 2 \times 2$ ← **Find the GCF of 20 and 8. The GCF is 2 × 2 = 4.**

$20 + 8 = 4(5) + 4(2)$ ← **Write each term as a product of the GCF and its remaining factors.**

$= 4(5 + 2)$ ← **Use the Distributive Property.**

Quick Check

2. Factor each expression.

a. $18 + 24$ **b.** $56 + 49$ **c.** $84 + 60$