Reteaching 4-1 Divisibility and Factors

Find all the factors of 30.

Start with 1 and 30.
Is 30 divisible by 2? Yes, it ends in 0.
List 2 and 15.

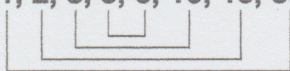Is 30 divisible by 3? Yes, the sum of the digits, 3, is divisible by 3.
List 3 and 10.

Is 30 divisible by 4? No, $4 \cdot 7 = 28$ and $4 \cdot 8 = 32$.

Is 30 divisible by 5? Yes, it ends in 0.
List 5 and 6.

When you list all the factors in order, the pairs with products of 30 form a symmetric pattern.

1, 2, 3, 5, 6, 10, 15, 30

Fill in the boxes to find all the factors for each number.

1. 34
1, 2, ☐, 34

2. 50
1, 2, 5, ☐, ☐, 50

3. 52
1, ☐, ☐, 13, 26, 52

4. 36
1, ☐, 3, ☐, 6, 9, ☐, 18, 36

Find all the factors of each number.

5. 55 _____

6. 40 _____

7. 42 _____

8. 48 _____

Practice 4-1 Divisibility and Factors

List all the factors of each number.

1. 12 _____

2. 45 _____

3. 41 _____

4. 54 _____

5. 48 _____

6. 100 _____

7. 117 _____

Test whether each number is divisible by 2, 3, 5, 9, and 10.

8. 215 _____   **9.** 432 _____

10. 770 _____   **11.** 1,011 _____

12 975 _____   **13.** 2,070 _____

14. 3,707 _____   **15.** 5,715 _____

Write the missing digit to make each number divisible by 9.

16. 7☐1   **17.** 2,2☐2   **18.** 88,☐12

19. There are four different digits which, when inserted in the blank space in the number 4☐5, make the number divisible by 3. Write them.

_____

20. There are two different digits which, when inserted in the blank space in the number 7,16☐, make the number divisible by 5. Write them.

_____

21. There are five different digits which, when inserted in the blank space in the number 99,99☐, make the number divisible by 2. Write them.

_____

Reteaching 4-2 Exponents

Evaluate $(-x)^2$, $-x^2$, and $2(x - 4)^2 + 1$ when $x = 9$.

Substitute 9 for x in $(-x)^2$.
$(-9)^2 = (-9)(-9) = 81$

Substitute 9 for x in $-x^2$.
$-9^2 = -(9 \cdot 9) = -81$

Substitute 9 for x in $2(x - 4)^2 + 1$.

$$
\begin{aligned}
2(x - 4)^2 + 1 &= 2(9 - 4)^2 + 1 && \text{Substitute 9 for } x. \\
&= 2(5)^2 + 1 && \text{Work within parentheses first.} \\
&= 2(25) + 1 && \text{Simplify } (5)^2. \\
&= 50 + 1 && \text{Multiply.} \\
&= 51 && \text{Add.}
\end{aligned}
$$

Evaluate each expression.

1. $(-a)^2$, for $a = 10$ $(-$ _____ $)^2 =$ _____

2. $-a^2$, for $a = 10$ $-$ _____ $^2 =$ _____

3. a^2, for $a = -10$ $($ _____ $)^2 =$ _____

4. $-a^2$, for $a = -10$ $-($ _____ $)^2 =$ _____

5. $-3m^2$, for $m = 5$ $-3($ _____ $)^2 = -3($ _____ $) =$ _____

6. $2n^2 - 4$, for $n = 3$ $2($ _____ $)^2 - 4 = 2($ _____ $) - 4$

$= ($ _____ $) - 4 =$ _____

7. $5(2h - 4)^2$, for $h = 4$ $5(2 \cdot$ _____ $- 4)^2 = 5($ _____ $- 4)^2$

$= 5($ _____ $)^2 = 5($ _____ $) =$ _____

8. xy^2, for $x = 7$, $y = 2$ $($ _____ $)($ _____ $)^2 = ($ _____ $)($ _____ $)$

$=$ _____

Practice 4-2 Exponents

Evaluate each expression.

1. m^4, for $m = 5$ _____

2. $(5a)^3$, for $a = -1$ _____

3. $-(2p)^2$, for $p = 7$ _____

4. $-n^6$, for $n = 2$ _____

5. b^6, for $b = -1$ _____

6. $(e - 2)^3$, for $e = 11$ _____

7. $(6 + h^2)^2$, for $h = 3$ _____

8. $x^2 + 3x - 7$, for $x = -4$ _____

9. $y^3 - 2y^2 + 3y - 4$, for $y = 5$ _____

Write using exponents.

10. $3 \cdot 3 \cdot 3 \cdot 3$ _____

11. $k \cdot k \cdot k \cdot k \cdot k$ _____

12. $(-9)(-9)(-9)m \cdot m \cdot m$ _____

13. $g \cdot g \cdot g \cdot g \cdot h$ _____

14. $7 \cdot a \cdot a \cdot b \cdot b \cdot b$ _____

15. $-8 \cdot m \cdot n \cdot n \cdot 2 \cdot m \cdot m$ _____

16. $d \cdot (-3) \cdot e \cdot e \cdot d \cdot (-3) \cdot e$ _____

Simplify each expression.

17. $(-2)^3$ and -2^3 _____

18. 0^{12} _____

19. 2^8 and 4^4 _____

20. $-5^2 + 4 \cdot 2^3$ _____

21. $3(8 - 6)^2$ _____

22. $-6^2 + 2 \cdot 3^2$ _____

23. $(-2)(-5)^2(3)$ _____

24. $24 + (11 - 3)^2 \div 4$ _____

25. $(17 - 3)^2 \div (4^2 - 3^2)$ _____

26. $(5 + 10)^2 \div 5^2$ _____

27. $4^3 \div (2^5 - 4^2)$ _____

28. $(-1)^5 \cdot (2^4 - 13)^2$ _____

Reteaching 4-3 Prime Factorization and Greatest Common Factor

Find the GCF of 36 and 54.

$36 = 2^2 \cdot 3^2 = \boxed{2} \cdot 2 \cdot \boxed{3 \cdot 3}$ **write the prime**
$54 = 2 \cdot 3^3 = \boxed{2} \cdot 3 \cdot \boxed{3 \cdot 3}$ **factorization**

find the common factors

$GCF = 2 \cdot 3 \cdot 3 = 2 \cdot 3^2 = 18$

Notice 2 is the lesser power of 2^2 and 2, and 3^2 is the lesser power of 3^2 and 3^3.

Find the GCF.

1. 50 = _____

35 = _____

GCF = _____

2. 75 = _____

30 = _____

GCF = _____

3. 48 = _____

60 = _____

GCF = _____

4. 45 = _____

72 = _____

GCF = _____

5. 98 = _____

42 = _____

GCF = _____

6. 24 = _____

80 = _____

GCF = _____

7. 315 = _____

360 = _____

GCF = _____

8. 156 = _____

208 = _____

GCF = _____

Practice 4-3 Prime Factorization and Greatest Common Factor

Find each GCF.

1. 8, 12 _____

2. 36, 54 _____

3. 63, 81 _____

4. 69, 92 _____

5. 15, 28 _____

6. 21, 35 _____

7. $30m, 36n$ _____

8. $75x^3y^2, 100xy$ _____

9. 15, 24, 30 _____

10. 48, 80, 128 _____

11. $36hk^3, 60k^2m, 84k^4n$ _____

12. $2mn, 4m^2n^2$ _____

Is each number prime, composite, or neither? For each composite, write the prime factorization.

13. 75 _____

14. 152 _____

15. 432 _____

16. 588 _____

17. 160 _____

18. 108 _____

19. 19 _____

20. 143 _____

21. 531 _____

22. 369 _____

23. 83 _____

24. 137 _____

25. The numbers 3, 5, and 7 are factors of n. Find four other factors of n besides 1.

_____

26. For which expressions is the GCF $8x$?

   A. $2xy$ and $4x^2$ **B.** $16x^2$ and $24xy$ **C.** $8x^3$ and $4x$ **D.** $24x^2$ and $48x^3$

Reteaching 4-4 Simplifying Fractions

Write $\frac{8ab^2}{12a^2b}$ in simplest form.

$\frac{8ab^2}{12a^2b} = \frac{2 \cdot 2 \cdot 2 \cdot a \cdot b \cdot b}{2 \cdot 2 \cdot 3 \cdot a \cdot a \cdot b}$ Write as a product of prime factors.

$= \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot 2 \cdot \overset{1}{\cancel{a}} \cdot b \cdot \overset{1}{\cancel{b}}}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot 3 \cdot \underset{1}{\cancel{a}} \cdot a \cdot \underset{1}{\cancel{b}}}$ Divide the numerator and denominator by the common factors.

$= \frac{2b}{3a}$ Remove the common factors.

Write in simplest form.

1. $\frac{8}{22}$ _____

2. $\frac{16}{24}$ _____

3. $\frac{9}{21}$ _____

4. $\frac{20h}{24h}$ _____

5. $\frac{30a^2}{36ab} =$ _____ = _____

6. $\frac{4x^2y}{14xy^2} =$ _____ = _____

7. $\frac{18s^3t^2}{8st^2} =$ _____ = _____

8. $\frac{10pqr}{5p^2q} =$ _____ = _____

9. $\frac{11gh^3}{gh} =$ _____ = _____

10. $\frac{2m^2n}{16m^3n^2} =$ _____ = _____

Practice 4-4 Simplifying Fractions

Write in simplest form.

1. $\frac{10}{15}$ _____

2. $\frac{18}{36}$ _____

3. $\frac{27}{36}$ _____

4. $\frac{12}{15}$ _____

5. $\frac{26}{39}$ _____

6. $\frac{7b}{9b}$ _____

7. $\frac{16y^3}{20y^4}$ _____

8. $\frac{8x}{10y}$ _____

9. $\frac{6xy}{16y}$ _____

10. $\frac{24n^2}{28n}$ _____

11. $\frac{abc}{10abc}$ _____

12. $\frac{30hxy}{54kxy}$ _____

13. $\frac{mn^2}{pm^5n}$ _____

14. $\frac{5jh}{15jh^3}$ _____

15. $\frac{12h^3k}{16h^2k^2}$ _____

16. $\frac{20s^2t^3}{16st^5}$ _____

Find two fractions equivalent to each fraction.

17. $\frac{1}{4}$ _____

18. $\frac{2}{3}$ _____

19. $\frac{3}{5}$ _____

20. $\frac{3}{18}$ _____

21. $\frac{8k}{16k}$ _____

22. $\frac{3m}{8n}$ _____

23. $\frac{5pq}{10p^2q^3}$ _____

24. $\frac{3s^2t^2}{7r}$ _____

25. Monty completed 18 passes in 30 attempts. What fraction of his passes did Monty complete? Write in simplest form.

_____

26. Five new state quarters will be issued by the United States mint this year. What fraction of the states will have quarters issued this year?

_____

Reteaching 4-6 Rational Numbers

Evaluate $\frac{a + 7}{b}$, for $a = 9$ and $b = -2$. Write in simplest form.

$\frac{a + 7}{b} = \frac{9 + 7}{-2}$ Substitute.

$\qquad = \frac{16}{-2}$ Add.

$\qquad = -8$ Write in simplest form.

Evaluate. Write in simplest form.

1. $\frac{a}{b}$, for $a = -12$ and $b = 6$ _____

2. $\frac{m - n}{-4}$, for $m = -5$ and $n = 3$ _____

3. $\frac{2x - 5}{y}$, for $x = 6$ and $y = 21$ _____

4. $\frac{h}{h^2 - 2}$, for $h = 4$ _____

5. $\frac{n}{2m - 8}$, for $m = 2$ and $n = 10$ _____

6. $\frac{x}{3y + 4}$, for $x = 4$ and $y = 6$ _____

7. $\frac{-r - s}{s + 2}$, for $r = -4$ and $s = 2$ _____

8. $\frac{j^2 - k}{k}$, for $j = 4$ and $k = -12$ _____

9. $\frac{10 + f^2}{3f}$, for $f = 6$ _____

10. $\frac{z + 2}{z^2 - 4}$, for $z = 6$ _____

11. $\frac{a^2 + b^2}{2a + b}$, for $a = 4$ and $b = -3$ _____

12. $\frac{e}{f^2 - 2f + 1}$, for $e = -6$ and $f = 5$ _____

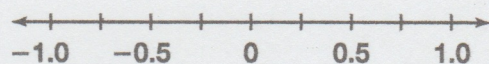13. $\frac{17 - u^2}{v^2 - 4v}$, for $u = -3$ and $v = 2$ _____

14. $\frac{-50}{2x^2 - 3x + 5}$, for $x = -1$ _____

15. $\frac{y^3 - 4y + 6}{y^3}$, for $y = -2$ _____

Practice 4-6 Rational Numbers

Graph the rational numbers below on the same number line.

1. $\frac{3}{4}$ 2. $-\frac{1}{4}$ 3. -0.5 4. 0.3

Evaluate. Write in simplest form.

5. $\frac{x}{y}$, for $x = 12, y = 21$ _____

6. $\frac{n}{n + p}$, for $n = 9, p = 6$ _____

7. $\frac{k}{k^2 + 4}$, for $k = 6$ _____

8. $\frac{x - y}{-21}$, for $x = -2, y = 5$ _____

9. $\frac{m}{-n}$, for $m = 6, n = 7$ _____

10. $\frac{x(xy - 8)}{60}$, for $x = 3, y = 9$ _____

Write three fractions equivalent to each fraction.

11. $\frac{5}{7}$ _____

12. $\frac{22}{33}$ _____

13. $\frac{24}{30}$ _____

14. $\frac{6}{16}$ _____

15. Which of the following rational numbers are equal to $-\frac{17}{10}$?

   $-17, -1.7, -\frac{34}{20}, 0.17$ _____

16. Which of the following rational numbers are equal to $\frac{3}{5}$?

   $\frac{12}{20}, \frac{-3}{-5}, 0.3, \frac{6}{10}$ _____

17. Which of the following rational numbers are equal to $\frac{12}{15}$?

   $\frac{4}{5}, \frac{40}{50}, -\frac{8}{10}, \frac{8}{10}$ _____

18. The weight w of an object in pounds is related to its distance d from the center of Earth by the equation $w = \frac{320}{d^2}$, where d is in thousands of miles. How much does the object weigh at sea level which is about 4,000 miles from the center of Earth?

   _____

Reteaching 4-8 Exponents and Division

Simplify $\frac{a^3}{a^3}$ and $\frac{m^2}{m^6}$.

To divide variables with the same non-zero base, you subtract the exponents.

$\frac{a^3}{a^3} = a^{3-3}$ Subtract the exponents.

$= a^0$ Simplify the exponent.

However, $\frac{a^3}{a^3} = 1$ as long as a is not zero, just like $\frac{2}{2} = 1, \frac{9}{9} = 1$, and so on.

So $\frac{a^3}{a^3} = 1$ and $a^0 = 1$.

$\frac{m^2}{m^6} = m^{2-6}$ Subtract the exponents.

$= m^{-4}$ Simplify the exponent.

However, $\frac{m^2}{m^6} = \frac{\overset{1}{m} \cdot \overset{1}{m}}{\underset{1}{m} \cdot \underset{1}{m} \cdot m \cdot m \cdot m \cdot m} = \frac{1}{m^4}$

So, $\frac{m^2}{m^6} = \frac{1}{m^4}$ and $m^{-4} = \frac{1}{m^4}$.

The *simplified* form of $\frac{a^3}{a^3}$ is 1, and the *simplified* form of $\frac{m^2}{m^6}$ is $\frac{1}{m^4}$.

Simplify each expression.

1. $\frac{7^8}{7^2}$ _____   2. $\frac{x^5}{x}$ _____

3. 5^0 _____   4. n^{-3} _____

5. $x^{-2}y^4$ _____   6. $6a^{-3}$ _____

7. $(-4)^0$ _____   8. $\frac{b^3}{b^8}$ _____

9. $\frac{y^2}{y^9}$ _____   10. $7s^{-5}t^{-3}$ _____

11. $\frac{3^{18}}{3^3}$ _____   12. $(-729)^0$ _____

13. $\frac{z^7}{z^{34}}$ _____   14. $4e^3f^{-2}$ _____

Practice 4-8 *Exponents and Division*

Complete each equation.

1. $\frac{8^n}{8^7} = 8^2$, $n =$ _____

2. $\frac{12x^5}{4x} = 3x^n$, $n =$ _____

3. $\frac{1}{h^5} = h^n$, $n =$ _____

4. $\frac{p^n}{p^8} = p^{-6}$, $n =$ _____

5. $\frac{1}{81} = 3^n$, $n =$ _____

6. $\frac{12^4}{12^n} = 1$, $n =$ _____ .

Simplify each expression.

7. $\frac{a^3}{a^7}$ _____

8. $\frac{j^5}{j^6}$ _____

9. $\frac{x^7}{x^7}$ _____

10. $\frac{k^5}{k^9}$ _____

11. $\frac{9x^8}{12x^5}$ _____

12. $\frac{2f^{10}}{f^5}$ _____

13. $\frac{3y^4}{6y^{-4}}$ _____

14. n^{-5} _____

15. $\frac{3xy^4}{9xy}$ _____

16. $(-15)^0$ _____

17. $\frac{15h^6k^3}{5hk^2}$ _____

18. $4b^{-6}$ _____

Write each expression without a fraction bar.

19. $\frac{a^7}{a^{10}}$ _____

20. $\frac{4x^2y}{2x^3}$ _____

21. $\frac{x^3y^4}{x^9y^2}$ _____

22. $\frac{12mn}{12m^3n^5}$ _____

23. $\frac{16s^2t^4}{8s^5t^3}$ _____

24. $\frac{21e^4f^2}{7e^2}$ _____

25. Write three different quotients that equal 4^{-5}.

_____

Name_____

Exponents and Multiplication

Date_____ Period____

Simplify. Your answer should contain only positive exponents.

1) $4^2 \cdot 4^2$

2) $4 \cdot 4^2$

3) $3^2 \cdot 3^2$

4) $2 \cdot 2^2 \cdot 2^2$

5) $2n^4 \cdot 5n^4$

6) $6r \cdot 5r^2$

7) $2n^4 \cdot 6n^4$

8) $6k^2 \cdot k$

9) $5b^2 \cdot 8b$

10) $4x^2 \cdot 3x$

11) $6x \cdot 2x^2$

12) $6x \cdot 6x^3$

13) $7v^3 \cdot 10u^3v^5 \cdot 8uv^3$

14) $9xy^2 \cdot 9x^5y^2$

15) $6m^3n^3 \cdot 8m^2n^3$

16) $6x^2 \cdot 6x^3y^4$

17) $7u^2v^5 \cdot 9uv^3$

18) $uv \cdot 4uv^5$

19) $10xy^3 \cdot 8x^5y^3$

20) $3u^4v^5 \cdot 7u^2v^3$

21) $\left(2x^2\right)^2$

22) $\left(p^4\right)^4$

23) $\left(k^3\right)^4$

24) $\left(7k\right)^2$

25) $\left(x^2\right)^3$

26) $\left(2b^2\right)^4$

Name _____ Class _____ Date _____

Reteaching 4-9 *Scientific Notation*

Write each number in scientific notation, then multiply: $(8,600,000)(0.0042)$.

8.6 is between 1 and 10

$$8,600,000. = 8.6 \times 10^6$$

6 places to the left

4.2 is between 1 and 10

$$0.0042 = 4.2 \times 10^{-3}$$

3 places to the right

$(8.6 \times 10^6)(4.2 \times 10^{-3}) = 8.6 \times 4.2 \times 10^6 \times 10^{-3}$ Use the commutative property of multiplication.

$= 36.12 \times 10^6 \times 10^{-3}$ Multiply 8.6 and 4.2.

$= 36.12 \times 10^3$ Add the exponents.

$= 3.612 \times 10^1 \times 10^3$ Write 36.12 as 3.612×10^1.

$= 3.612 \times 10^4$ Add the exponents.

Write each number in scientific notation.

1. 745 million _____

2. 0.00034 _____

3. 888,200,000 _____

4. 5,700 _____

Multiply. Write your result using scientific notation.

5. $(1.6 \times 10^6)(3.7 \times 10^4)$ _____

6. $(3 \times 10^{-4})(2 \times 10^{-5})$ _____

7. $72,000 \times 143,000$ _____

8. $(2.3 \times 10^{-2})(1.5 \times 10^4)$ _____

Practice 4-9 Scientific Notation

Write each number in standard notation.

1. 3.77×10^4 _____

2. 8.5×10^3 _____

3. 9.002×10^{-5} _____

4. 1.91×10^{-3} _____

Write each number in scientific notation.

5. Pluto is about 3,653,000,000 mi from the sun. _____

6. There are 63,360 in. in a mile. _____

7. At its closest, Mercury is about 46,000,000 km from the sun. _____

8. 77,250,000 _____

9. 526,000 _____

10. 8 billion _____

11. 8,100,000 _____

12. 0.00000073 _____

13. 0.000903 _____

Multiply. Express each result in scientific notation.

14. $(2 \times 10^5)(3 \times 10^2)$

_____

15. $(1.5 \times 10^5)(4 \times 10^9)$

_____

16. $(6 \times 10^{-4})(1.2 \times 10^{-3})$

_____

17. $(5 \times 10^3)(1.7 \times 10^{-5})$

_____

Order from least to greatest.

18. $72 \times 10^5, 6.9 \times 10^6, 23 \times 10^5$

_____

19. $19 \times 10^{-3}, 2.5 \times 10^{-4}, 1.89 \times 10^{-4}$

_____

20. An ounce is 0.00003125 tons. Write this number in scientific notation.

_____

21. A century is 3,153,600,000 seconds. Write this number in scientific notation.

_____