

• **Greatest Common Factor (GCF)**

Power Up

facts

Power Up H

mental math

In the expression $3(40 + 6)$, the sum of 40 and 6 is multiplied by 3. By using the *Distributive Property*, we can first multiply each addend and then add the partial products.

$$\begin{array}{c}
 \begin{array}{c} \curvearrowright \\ \curvearrowleft \end{array} \\
 3(40 + 6) \\
 120 + 18 = 138
 \end{array}$$

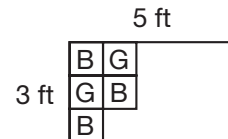
Use the Distributive Property to solve problems **a** and **b**.

- a. **Number Sense:** $3(20 + 7)$
- b. **Number Sense:** $4(30 + 6)$
- c. **Powers/Roots:** 6^2
- d. **Time:** What time is 30 minutes before 11:18 a.m.?
- e. **Number Sense:** Reduce the fractions $\frac{2}{4}$, $\frac{2}{6}$, $\frac{2}{8}$, and $\frac{2}{10}$.
- f. **Number Sense:** $\frac{1}{3}$ of 100
- g. **Measurement:** The classroom is 8 yards wide. How many feet is that?
- h. **Calculation:** $\sqrt{81}$, $+ 1$, $\times 5$, $- 2$, $\div 4$

problem solving

Choose an appropriate problem-solving strategy to solve this problem.

Marissa is covering a 5-by-3-foot bulletin board with blue and gold construction paper squares to make a checkerboard pattern. Each square is 1 foot by 1 foot. Copy this diagram on your paper, and complete the checkerboard pattern. What is the total area of the bulletin board? How many squares of each color does Marissa need?



New Concept

We have practiced finding the factors of whole numbers. In this lesson we will practice finding the **greatest common factor** of two numbers. The greatest common factor of two numbers is the largest whole number that is a factor of both numbers. The letters **GCF** are sometimes used to stand for the term *greatest common factor*.

To find the greatest common factor of 12 and 18, we first list the factors of each. We have circled the common factors; that is, the numbers that are factors of both 12 and 18.

Factors of 12: ①, ②, ③, 4, ⑥, 12

Factors of 18: ①, ②, ③, ⑥, 9, 18

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

The greatest of these common factors is 6.

Example 1

Find the greatest common factor (GCF) of 8 and 20.

We will first find the factors and identify the common factors. The factors of 8 and 20 are listed below with the common factors circled.

Factors of 8: ①, ②, ④, 8

Factors of 20: ①, ②, ④, 5, 10, 20

We see that there are three common factors. The greatest of the three common factors is **4**.

We may use greatest common factors to help us reduce fractions.

Example 2

Use the GCF of 8 and 20 to reduce $\frac{8}{20}$.

In Example 1, we found that the GCF of 8 and 20 is 4. This means we can reduce $\frac{8}{20}$ by dividing both 8 and 20 by 4.

$$\frac{8 \div 4}{20 \div 4} = \frac{2}{5}$$

Lesson Practice

Find the greatest common factor (GCF) of each pair of numbers:

a. 6 and 9

b. 6 and 12

c. 15 and 100

d. 6 and 10

e. 12 and 15

f. 7 and 10

Reduce each fraction by dividing the terms of the fraction by their GCF:


g. $\frac{6}{9}$

h. $\frac{6}{12}$

i. $\frac{15}{100}$

Written Practice

Distributed and Integrated

1.  **Justify** ⁽⁴⁹⁾ Javier was paid \$34.50 for working on Saturday. He worked from 8 a.m. to 2 p.m. How much money did he earn per hour? Explain why your answer is reasonable.

2. ⁽⁶²⁾ Estimate the product of 396 and 507 by rounding to the nearest hundred before multiplying.

3. **Conclude** ⁽¹⁾ What is the next number in this counting sequence?

..., 3452, 3552, 3652, _____, ...

4. **Multiple Choice** ⁽⁷⁴⁾ Most adults are between 5 and 6 feet tall. The height of most cars is about

A 4 to 5 feet **B** 8 to 10 feet **C** 40 to 50 feet **D** 20 to 25 feet

5. ^(68, 73) When sixty-five and fourteen hundredths is subtracted from eighty and forty-eight hundredths, what is the difference?

6. ^(32, 53) If one side of a regular octagon is 12 inches long, then what is the perimeter of the octagon?

*7. **Multiple Choice** ⁽⁸⁰⁾ Which of these numbers is *not* a prime number?

A 11 **B** 21 **C** 31 **D** 41

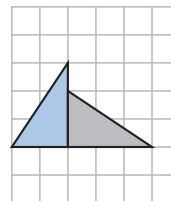
*8. ⁽⁸²⁾ a. Find the greatest common factor (GCF) of 20 and 30.

b. Use the GCF of 20 and 30 to reduce $\frac{20}{30}$.

9. ^(46, 74) How many inches is $\frac{3}{4}$ of a foot?

- *10. Multiple Choice** Which transformation moves the blue triangle to the position of the gray triangle?
(Inv. 8)

- A translation
B rotation
C reflection
D flip



- 11. a.** What number is $\frac{1}{3}$ of 12?
(Inv. 3)
b. What number is $\frac{2}{3}$ of 12?

***12.** Reduce: $\frac{6}{12}$
(81)

***13.** Compare: 2^3 ○ 3^2
(78)

14. $\frac{5}{7} + \frac{3}{7}$
(75)

15. $\frac{4}{4} - \frac{2}{2}$
(59)

***16.** $\frac{2}{3} \times \square = \frac{6}{9}$
(79)

17. $\begin{array}{r} 976.5 \\ 470.4 \\ 436.7 \\ + 98.6 \\ \hline \end{array}$
(73)

18. $\begin{array}{r} \$40.00 \\ - \$32.85 \\ \hline \end{array}$
(13)

19. $\begin{array}{r} \$8.47 \\ \times 70 \\ \hline \end{array}$
(29)

20. $6 \overline{)43,715}$
(26)

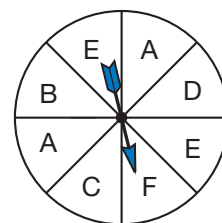
21. $\frac{2640}{30}$
(54)

22. $\begin{array}{r} 367 \\ \times 418 \\ \hline \end{array}$
(55)

***23.** $3\frac{1}{4} + 3\frac{1}{4}$
(81)

24. $\$18.64 \div 4$
(26)

- *25. Analyze** Find the probability that with one spin, the spinner will *not* stop on A. Write the answer as a reduced fraction.
(57, 81)

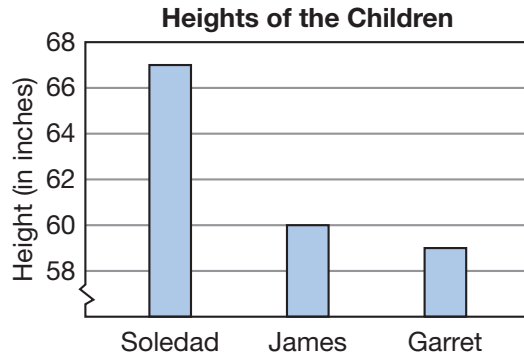


- *26. Multiple Choice** Which of these Venn diagrams illustrates the relationship between rectangles (R) and parallelograms (P)?
(45, Inv. 8)



- *27.** Write 22% as a fraction. Then reduce the fraction by dividing both terms by 2.
(71, 81)

- *28.** **Interpret** Use the graph below to answer problems **a–e**.
(50, Inv. 9)



- a. How many inches must Garret grow to be as tall as Soledad?
 - b. Which child is exactly 5 feet tall?
 - c. What is the average height of the three children?
 - d. What is the range of the heights?
 - e. What is the median height?
- 29.** In Alaska, Mt. McKinley is 890 meters taller than Mt. Foraker and 1198 meters taller than Mt. Blackburn. The height of Mt. Blackburn is 4996 meters. What is the height of Mt. Foraker?
(49)

- 30.** **Justify** In 1957, *Sputnik* was the first satellite launched into space. In 1976, a spacecraft named *Viking I* was the first spacecraft to land on the planet Mars. About how many years after the launch of *Sputnik* did *Viking I* land on Mars? Explain how you made your estimate.
(62)

Early Finishers
Real-World Connection

Noni surveyed 36 students in the library to find out whether they would rather learn more about the oceans or about space. Of the students surveyed, 24 students wanted to learn more about the oceans.

- a. Write a fraction to represent the number of students who wanted to learn more about the oceans.
- b. Find the greatest common factor of the numerator and denominator.
- c. Use the GCF to reduce the fraction.