

• Listing the Factors of Whole Numbers

Power Up

facts

Power Up D or E

count aloud

Count up by 5s from 3 to 53 (3, 8, 13, 18, ...). Count by 7s from 0 to 77. (A calendar can help you start.)

mental math

- Measurement:** 10×10 cm
- Measurement:** 10×100 cm
- Number Sense:** 6×24
- Fractional Parts:** $\frac{1}{2}$ of 12 inches
- Fractional Parts:** $\frac{1}{4}$ of 12 inches
- Fractional Parts:** $\frac{1}{10}$ of 60 minutes
- Time:** What day of the week is 8 days after Sunday?
- Number Sense:** $6 \times 2, -2, \times 2, + 1, \div 3$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Hamdi was thinking of a two-digit even number. Hamdi hinted that you say the number when counting by 3s and when counting by 7s, but not when counting by 4s. Of what number was Hamdi thinking?

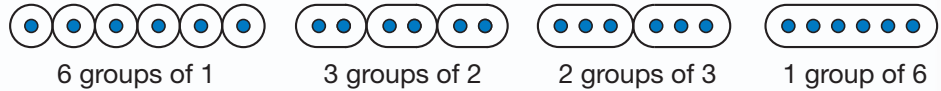
New Concept

The **factors** of a number are all the whole numbers that can divide it without leaving a remainder. For example, the factors of 6 are 1, 2, 3, and 6 because each of these numbers divides 6 without leaving a remainder.

Activity

Grouping by Factors

The factors of 6 are 1, 2, 3, and 6. This means we can separate 6 items into equal groups of 1, 2, 3, or 6.



We cannot separate 6 items into equal groups of 4 or 5, so 4 and 5 are not factors of 6.



Draw sets of 12 dots. Illustrate the factors of 12 by making equal groups and labeling each group as shown in the examples above.

Example 1

Math Language

When a number is **divisible** by 2, it has 2 as a factor.

List the factors of 20.

We look for all the whole numbers that divide 20 without leaving a remainder.

$$\boxed{?} \overline{)20}$$

Which numbers can be put into this box to give us an answer without a remainder?

One way to find out is to start with 1 and to try each whole number up to 20. If we do this, we find that the numbers that divide 20 evenly are **1, 2, 4, 5, 10,** and **20**. These are the factors of 20. All other whole numbers leave a remainder.

We can cut our search for factors in half if we record the quotient when we find a factor.

$$\begin{array}{r} 20 \\ 1 \overline{)20} \end{array} \quad \text{Both } \mathbf{1} \text{ and } \mathbf{20} \text{ are factors.}$$

$$\begin{array}{r} 10 \\ 2 \overline{)20} \end{array} \quad \text{Both } \mathbf{2} \text{ and } \mathbf{10} \text{ are factors.}$$

$$\begin{array}{r} 5 \\ 4 \overline{)20} \end{array} \quad \text{Both } \mathbf{4} \text{ and } \mathbf{5} \text{ are factors.}$$

Example 2

List the factors of 23.

The only factors of 23 are **1** and **23**. Every number greater than 1 has at least two factors: the number 1 and itself.

Math Language

A counting number that has exactly two factors—1 and itself—is called a **prime number**.

Sometimes we can discover some factors of a number just by looking at one or two of its digits. For example, a factor of every even number is 2, and any whole number ending in 0 or 5 has 5 as a factor. Since 20 is even and ends in zero, we know that both 2 and 5 are factors of 20.

Example 3

Which of these numbers is *not* a factor of 30?

- A** 2 **B** 3 **C** 4 **D** 5

We see that 30 is an even number ending in zero, so 2 and 5 are factors. We also quickly see that 30 can be divided by 3 without a remainder. The only choice that is not a factor of 30 is **C**.

Discuss How could we use divisibility rules to help us answer the question?

Example 4

Which factors of 9 are also factors of 18?

The factors of 9 are 1, 3, and 9. The factors of 18 include all these numbers and also 2, 6, and 18. We say that 1, 3, and 9 are the common factors of 9 and 18 because they are factors of both 9 and 18.

Analyze What is the greatest common factor of 9 and 18?

Lesson Practice

List Write the factors of each of these numbers:

- a.** 4 **b.** 3 **c.** 6 **d.** 5
e. 8 **f.** 11 **g.** 9 **h.** 12
i. 1 **j.** 14 **k.** 2 **l.** 15

m. Multiple Choice Two is *not* a factor of which of these numbers?

- A** 236 **B** 632 **C** 362 **D** 263

n. Multiple Choice Five is *not* a factor of which of these numbers?

- A** 105 **B** 150 **C** 510 **D** 501

- o. Multiple Choice** Which of these numbers is *not* a factor of 40?

A 2

B 5

C 6


D 10

Written Practice

Distributed and Integrated

Formulate For problems 1–3, write an equation and find the answer.

- *1. At the tree farm, 9 rows of trees with 24 trees in each row were planted.
(21) How many trees were planted?

- *2.  **Explain** The haircut cost \$6.75. Mila paid for it with a \$10 bill.
(16) How much money should she get back? Explain why your answer is reasonable.

- *3. Dannell bought four cartons of milk for \$1.12 each. Altogether, how
(17) much did Dannell spend?

- *4. **List** Write the factors of 13.
(25)

5. Which factors of 10 are also factors of 30?
(25)

6. Compare: $4 \times (6 \times 10)$ \bigcirc $(4 \times 6) \times 10$
(24)

7. **Verify** Which property of multiplication is illustrated in problem 6?
(24)

8. $6 \times (7 + 8)$
(24)

9. $(6 \times 7) + 8$
(24)

10. **Connect** Write two multiplication facts and two division facts for the
(19) fact family 10, 12, and 120.

*11. $9n = 54$
(18)

12. $55 \div 8$
(22)

13.
$$\begin{array}{r} 1234 \\ \times \quad 5 \\ \hline \end{array}$$

(17)

14.
$$\begin{array}{r} \$5.67 \\ \times \quad 8 \\ \hline \end{array}$$

(17)

15.
$$\begin{array}{r} 987 \\ \times \quad 6 \\ \hline \end{array}$$

(17)

*16. $w - \$13.55 = \5
(13, 14)

*17. $2001 - r = 1002$
(14)

*18. $4387 + 124 + 96$
(6)

*19. $3715 + 987 + 850$
(6)

*20. $\$6.75 + \$8 + \$1.36 + p = \20
(10, 13)

*21. **Analyze** How much money is $\frac{1}{2}$ of a dollar plus $\frac{1}{4}$ of a dollar plus $\frac{1}{10}$ of a dollar?
(Inv. 2)

22. **Represent** Use words to name the number 894,201.
(7)

23. Which number is the divisor in this equation? $6 \overline{)42}$
(20)

24. **Predict** What is the tenth term in this counting sequence?
(1)

5, 10, 15, 20, ...

25. **Verify** Think of a whole number. Multiply it by 2. Is the answer odd or even?
(2, 15)

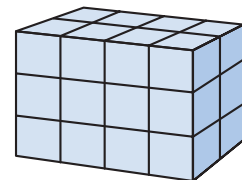
26. **Multiple Choice** Two is *not* a factor of which of these numbers?
(25)

- A 456 B 465 C 654 D 564

27. **Verify** Which property of addition is illustrated by this equation?
(24)

$$(6 + 7) + 8 = 6 + (7 + 8)$$

28. Write a multiplication equation that shows the number of blocks used to build this figure.
(18)



*29. The fraction $\frac{1}{10}$ is equivalent to what decimal?
(Inv. 2)

30. The relationship between yards and feet is shown in the table.
(1)

Number of Yards	1	2	3	4
Number of Feet	3	6	9	12

- a. **Generalize** Write a rule that describes how to find the number of feet for any number of yards.
- b. **Predict** How many feet are equal to twenty yards?