

### • Word Problems about Equal Groups

- Word problems about equal groups use a multiplication formula.
- A complete equal-groups problem has three parts: the number of groups, the number of items in each group, and the total number in all the groups. A formula describes how these parts are related by multiplication.

$$\text{number of groups} \times \text{number in each group} = \text{total}$$

$$\begin{array}{r} \text{number in each groups} \\ \times \text{number of groups} \\ \hline \text{total} \end{array}$$

- In equal-groups problems, one of the numbers is missing. If the total is missing, we multiply. If either of the other numbers is missing, we divide.

**Example:** Jamie has 8 bottles of water. There are 16 ounces of water in each bottle. How many total ounces of water does Jamie have?

**Solution:**

$$\begin{array}{r} 16 \text{ ounces in each bottle} \\ \times 8 \text{ bottles of water} \\ \hline 128 \text{ ounces of water} \end{array}$$

number in each group  
number of groups  
total

### **Practice:**

1. Each bookshelf had 12 books on it. There were 6 shelves. How many books were on all the shelves?

$$\begin{array}{r} \text{books on each shelf} \\ \times \text{shelves} \\ \hline \end{array}$$

\_\_\_\_\_ books on all the shelves

2. Each pack of juice has 6 cans. Jill needs 48 cans of juice. How many packs should she buy?

\_\_\_\_\_ packs of juice

3. Thom jogs the same distance every day. In a week Thom jogged 21 miles. How many miles did he jog each day?

\_\_\_\_\_ miles a day

### • Division with and without Remainders

- Division and multiplication are **inverse operations**.
- Use division to find a missing factor in multiplication problems.  
Subtract using mental math.

**Example:**  $8 \overline{)50}$

Think:  $6 \times 8 = 48$        $6 \text{ R}2$

$50 - 48 = 2$        $8 \overline{)50}$

The remainder is 2.

- Multiply to check division.
- Divisibility tests tell if division answers have remainders.

#### Tests for Divisibility

A number is divisible by ...	
2	if the last digit is even.
5	if the last digit is 0 or 5.
10	if the last digit is 0.

### **Practice:**

Divide. Write each answer with a remainder.

1.  $4 \overline{)23}$  R

2.  $5 \overline{)34}$  R

3.  $2 \overline{)17}$  R

4.  $36 \div 6$  )

5.  $7 \overline{)52}$  R

6.  $49 \div 8$  ) R

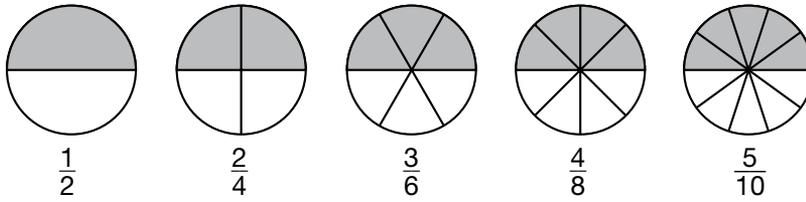
7.  $9 \overline{)60}$  R

8.  $6 \overline{)43}$  R

9.  $28 \div 4$  )

### • Recognizing Halves

- Many fractions equal one half.



- The numerator of each fraction is half the denominator.

$\frac{2}{4}$  Two is half of four.       $\frac{4}{8}$  Four is half of eight.

$\frac{3}{6}$  Three is half of six.       $\frac{5}{10}$  Five is half of ten.

- If the numerator is greater than half the denominator, the fraction is greater than  $\frac{1}{2}$ .
- If the numerator is less than half the denominator, the fraction is less than  $\frac{1}{2}$ .

### **Practice:**

1. Think of a counting number. Double it. Then write a fraction equal to  $\frac{1}{2}$  using your number and its double.

counting number \_\_\_\_\_

doubled \_\_\_\_\_

fraction \_\_\_\_\_

2. Which of these fractions does not equal  $\frac{1}{2}$ ? \_\_\_\_\_

**A**  $\frac{6}{12}$

**B**  $\frac{5}{10}$

**C**  $\frac{8}{18}$

**D**  $\frac{12}{24}$

3. Compare.

$\frac{3}{5} \bigcirc \frac{6}{12}$

4. Compare.

$\frac{3}{7} \bigcirc \frac{3}{6}$

## • Parentheses and the Associative Property

- Parentheses separate a problem into parts.

• Work the part inside the parentheses first:  $2 \times (3 + 4) \bigcirc (2 \times 3) + 4$

$$\begin{array}{ccccccc} 2 \times & 7 & & 6 & + & 4 & \\ & 14 & \bigcirc & 10 & & & \end{array}$$

- **Associative Property of Addition:** No matter how we group the addends, the answer is the same.

$$(4 + 5) + 6 = 4 + (5 + 6) \quad (a + b) + c = a + (b + c)$$

- **Associative Property of Multiplication:** No matter how we group the factors, the answer is the same.

$$(2 \times 3) \times 4 = 2 \times (3 \times 4) \quad (ab)c = a(bc)$$

- The associative property does not work for subtraction or division.

### **Practice:**

1.  $5 - (3 - 2) =$  \_\_\_\_\_

2.  $6 + (2 + 4) =$  \_\_\_\_\_

3.  $(9 \div 3) - 2 =$  \_\_\_\_\_

4.  $(7 + 3) \times 2 =$  \_\_\_\_\_

5.  $6 \div (4 - 1) =$  \_\_\_\_\_

6.  $9 \times (3 + 1) =$  \_\_\_\_\_

7. Name the four operations of arithmetic:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### • Listing the Factors of Whole Numbers

- To list the factors of a whole number we find all of the whole numbers that divide evenly into the number.
  1. On separate paper, start by writing the number 1.
  2. Write the whole number given on the next line, under 1.
  3. Then find all of the other whole numbers that divide evenly into the given number. Ask, "Will 2 divide evenly? How many times? Will 3 divide evenly? How many times?", and so on.
  4. For each number, write the number you're trying on the first line. Then write the number of times it divides into the given number on the second line.  
(*Hint: Either cross-out or don't write numbers that don't divide evenly.*)
  5. Stop when the factors repeat.
  6. Rewrite the numbers in order, on one line.

**Example:** List the factors of 30.

1	2	3	<del>4</del>	5	<del>6</del>	We don't need to write 6, because it repeats. Stop.
30	15	10		6		Write the factors in order: 1, 2, 3, 5, 6, 10, 15, 30

### **Practice:**

List the factors of each number:

1. 3 \_\_\_\_\_, \_\_\_\_\_
2. 6 \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
3. 8 \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
4. 12 \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
5. 4 \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
6. 20 \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
7. Three is not a factor of which of these numbers? \_\_\_\_\_  

A 27	B 60	C 75	D 101
------	------	------	-------
8. Ten is not a factor of which of these numbers? \_\_\_\_\_  

A 20	B 110	C 35	D 60
------	-------	------	------

## • Division Algorithm

- We can use a **division algorithm** to break larger division problems into a series of smaller division problems that are easier to do.

- Use the division chart to remember the steps.

Step 1: **Divide** and write a number.

Step 2: **Multiply** and write a number.

Step 3: **Subtract** and write a number.

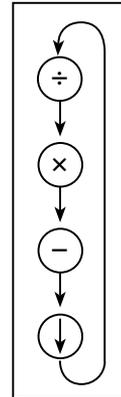
Step 4: **Bring down** the next digit.

- Continue to divide until there are no digits left to bring down.
- The remainder must be less than the divisor.
- When the dividend is a decimal number, place the decimal point in the quotient directly above the decimal point in the dividend.
- Checking division takes two steps.

Step 1: Multiply the quotient by the divisor.

Step 2: Then add the remainder to the product.

Division Chart




---

### **Practice:**

Use the division algorithm to solve.

1.  $5 \overline{)405}$

2.  $7 \overline{)462} \begin{matrix} 0 \\ R \end{matrix}$

3.  $3 \overline{)396}$

4.  $5 \overline{)465}$

5.  $6 \overline{)270}$

6.  $4 \overline{)311} \begin{matrix} 0 \\ R \end{matrix}$

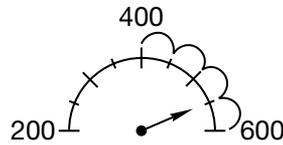
7. Show how to check this division answer in the space below.

$7 \overline{)85} \begin{matrix} 12 \\ R1 \end{matrix}$

**• Reading Scales**

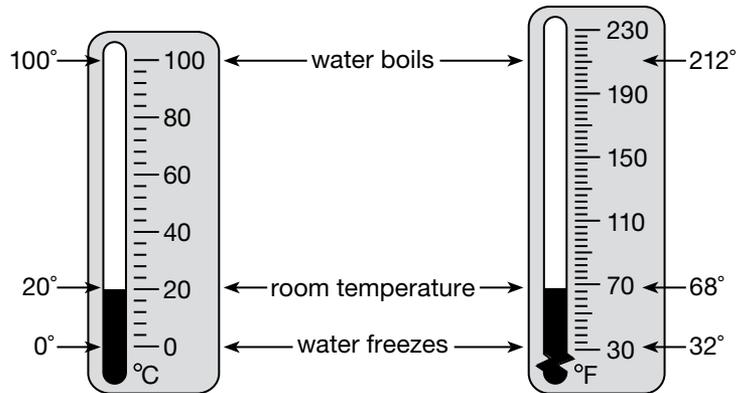
- Scales can be horizontal, vertical, or curved.
- Scales can be marked to count by any number (interval). Most scales count by 1s, 2s, 5s, or 10s.
- To find points on scales, we “split the difference.”
  1. Subtract the two numbers on both sides of the point to find the difference.
  2. Count the parts between the numbers.
  3. Divide the difference by the number of parts.
  4. Now count by that number.

**Example:**



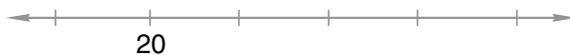
1. Subtract the two nearest numbers:
 
$$\begin{array}{r} 600 \\ - 400 \\ \hline 200 \end{array}$$
2. Count the parts between the numbers: 4
3. Divide 200 by 4: 
$$\begin{array}{r} 50 \\ 4 \overline{)200} \end{array}$$
4. Now count by 50s until you reach the marked point: 400, 450, 500, 550

- A thermometer is a scale for measuring temperature.
- Two common temperature scales:
  - Celsius scale (centigrade)
  - Fahrenheit scale



**Practice:**

1. Finish labeling this number line from 0 to 100 counting by 20s.



2. On the Celsius scale, what temperature is five degrees less than the boiling point of water? Remember to write the degree symbol.

\_\_\_\_\_

3. On the Fahrenheit scale, what temperature is three degrees more than the freezing point of water?

\_\_\_\_\_

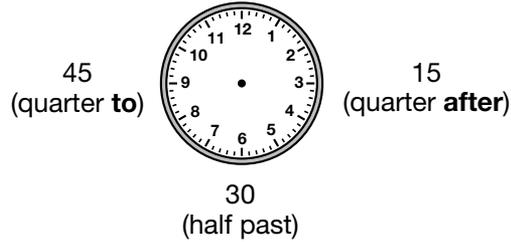
**• Measuring Time and Elapsed Time**

- A **leap year** comes every 4 years.

It has one more day than a common year.  
The extra day comes in February.

- Analog clocks tell time using two “hands”.

The short hand shows **hours**.  
The long hand shows **minutes**.



- **a.m.** indicates the 12 hours before noon.
- **p.m.** indicates the 12 hours after noon.
- 12:00 a.m. is **midnight**.
- 12:00 p.m. is **noon**.
- Twelve hours later or earlier is the same hour, only the a.m. or p.m. changes.
- Twenty-four hours later or earlier is the same hour, only the day after or before.

**Practice:**

1. Six centuries is how many years? \_\_\_\_\_
2. According to the calendar, what is the date of the second Wednesday in June 2014?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
Month                  Day                  Year

JUNE 2014						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

3. How many more days does a leap year have than a common year?

\_\_\_\_\_

4. How many minutes is a half hour? \_\_\_\_\_
5. How many hours will it be from now until this time tomorrow? \_\_\_\_\_
6. Write the time that is 18 minutes after 4 in the afternoon. \_\_\_\_\_

### • Multiplying by Multiples of 10 and 100

- When multiplying by multiples of 10, use “offset multiplication.”

1. Write the multiple of 10 as the bottom number.
2. Let the zero “hang out” (offset to the right).
3. Copy the zero into the answer.
4. Multiply.

$$\begin{array}{r} 35 \\ \times 40 \\ \hline \end{array} \quad \text{zero “hangs out to the right”} \quad \begin{array}{r} 35 \\ \times 40 \\ \hline 0 \end{array} \quad \text{Copy the zero.} \quad \begin{array}{r} 35 \\ \times 40 \\ \hline 1400 \end{array}$$

**Shortcuts:** To multiply a whole number by 10, just attach a zero.

$$35 \times 10 = 350 \quad 37 \times 10 = 370$$

To multiply a whole number by 100, attach two zeros.

$$35 \times 100 = 3500$$

- When multiplying a money amount by a multiple of 10, put two decimal places in the answer.

$$\begin{array}{r} \$4.25 \\ \times 10 \\ \hline \$42.50 \end{array} \quad \begin{array}{r} \$1.80 \\ \times 200 \\ \hline \$360.00 \end{array}$$

### **Practice:**

Use offset multiplication. Remember to write the dollar sign in money problems.

1.  $15 \times 10$

$$\begin{array}{r} 15 \\ \times 10 \\ \hline \end{array}$$

2.  $40 \times 38$

$$\begin{array}{r} \times \\ \hline \end{array}$$

3.  $31 \times 30$

$$\begin{array}{r} \times \\ \hline \end{array}$$

4.  $200 \times 47$

$$\begin{array}{r} \times \\ \hline \end{array}$$

5.  $75 \times 300$

$$\begin{array}{r} \times \\ \hline \end{array}$$

6.  $\$1.83 \times 20$

$$\begin{array}{r} \times \\ \hline \end{array}$$

7.  $\$4.19 \times 50$

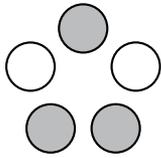
$$\begin{array}{r} \times \\ \hline \end{array}$$

8.  $82 \times 400$

$$\begin{array}{r} \times \\ \hline \end{array}$$

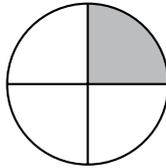
**• Interpreting Pictures of Fractions, Decimals and Percents**

- Name how many parts are shaded out of a total number of parts.



$\frac{3}{5}$  is shaded.

$\frac{2}{5}$  is **not** shaded.



$\frac{1}{4}$  is shaded.

$\frac{3}{4}$  is **not** shaded.

- Just as one cent is one hundredth of a whole dollar, one percent is one hundredth of a whole number.

$\frac{1}{2}$  of a dollar is 50¢.       $\frac{1}{4}$  of a dollar is 25¢.       $\frac{1}{10}$  of a dollar is 10¢.

$\frac{1}{2}$  of a whole is 50%.       $\frac{1}{4}$  of a whole is 25%.       $\frac{1}{10}$  of a whole is 10%.

**Practice:**

Remember to write the percent symbol in percent problems.

1. What fraction of the rectangle is shaded? \_\_\_\_\_

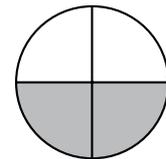


2. What percent of the rectangle is shaded? \_\_\_\_\_

3. What fraction of the rectangle is not shaded? \_\_\_\_\_

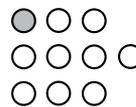
4. What percent of the rectangle is not shaded? \_\_\_\_\_

5. What two fractions name the shaded part of the circle? \_\_\_\_\_



6. What percent of the circle is shaded? \_\_\_\_\_

7. What fraction of the group is shaded? \_\_\_\_\_



8. What percent of the group is shaded? \_\_\_\_\_

9. What fraction of the group is not shaded? \_\_\_\_\_

10. One tenth is 10%. What percent is equal to  $\frac{3}{10}$ ? \_\_\_\_\_