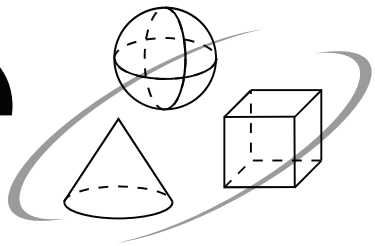
Simple Solutions.



Minutes a Day—Mastery for a Lifetime!

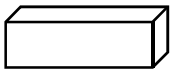
Standards-Based Mathematics 3

Help Pages

Help Pages

Vocabulary	
Area	the amount of space within a polygon; area is always measured in square units (e.g. cm^2, $in.^2$, m^2)
Denominator	the bottom number of a fraction. **Example**: $\frac{1}{4}$ ➔ denominator is 4
Difference	the result or answer to a subtraction problem. **Example**: The difference of 5 and 1 is 4.
Fraction	a part of a whole. **Example**:  This box has 4 parts. 1 part is shaded. In a fraction this is written $\frac{1}{4}$.
Numerator	the top number of a fraction. **Example**: $\frac{1}{4}$ ➔ numerator is 1
Perimeter	the distance around the outside of a polygon.
Product	the result or answer to a multiplication problem. **Example**: The product of 5 and 3 is 15.
Quotient	the result or answer to a division problem. **Example**: The quotient of 8 and 2 is 4.
Sum	the result or answer to an addition problem. **Example**: The sum of 5 and 2 is 7.

Geometry — Polygons (Two-dimensional)			
Number of Sides and Angles	**Name**	**Number of Sides and Angles**	**Name**
3 	Triangle	5 	Pentagon
4 	Quadrilateral	6 	Hexagon

Geometry — Solids (Three-dimensional)	
Cone — 	Rectangular Prism — 
Cube — 	Sphere — 
Cylinder — 	

Place Value

1,	4	0	5
Thousands	Hundreds	Tens	Ones

The number above is read: one thousand, four hundred five

Base-Ten Numbers

Base-ten numbers can be named in many ways. These expanded forms all name **234**.

two hundred thirty-four
2 hundreds, 3 tens, 4 ones
3 tens, 4 ones, 2 hundreds
234 ones
2 hundreds, 34 ones
23 tens, 4 ones
200 + 30 + 4

Properties of Multiplication

The factors in multiplication can be placed in any order. The answer will be the same either way. This is called the **commutative property**.

Example: 3 × 9 = 9 × 3 Both are equal to 27.

You can solve 3 × 5 × 2 two ways. This is called the **associative property**.

Example:

- $(3 \times 5) \times 2 = 30 \qquad \boxed{15} \times 2 = 30$
- $3 \times (5 \times 2) = 30 \qquad 3 \times \boxed{10} = 30$

The **distributive property** can help you solve multiplication problems easily, especially if one of the numbers is large. 4 × 23 is not a fact most people have memorized. Knowing that 23 = 20 + 3 can help you solve this problem. 4 × 23 is the same as 4 × (20 + 3).

Example: $4 \times 23 = ?$

$4 \times (20 + 3) = ?$

$(4 \times 20) + (4 \times 3) = ?$

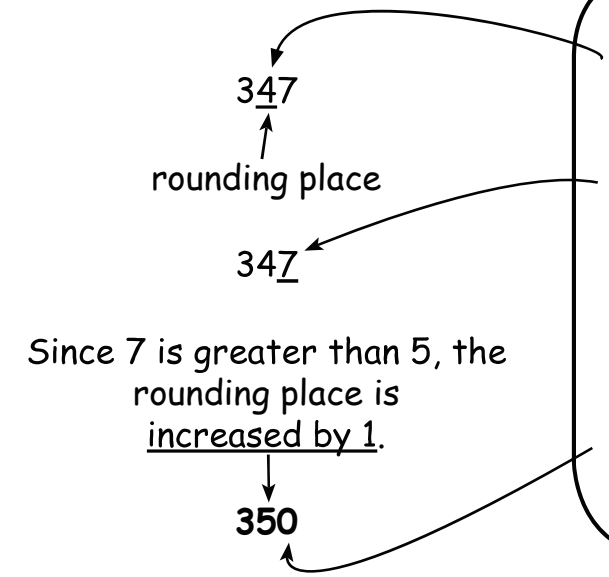
$80 + 12 = \square$

Help Pages

Whole Numbers - Rounding to Tens and Hundreds

When we **round numbers**, we are estimating them. This means we focus on a particular place value, and decide if that digit is closer to the next highest number (round up) or to the next lower number (keep the same). It might be helpful to look at the place-value chart on the previous page.

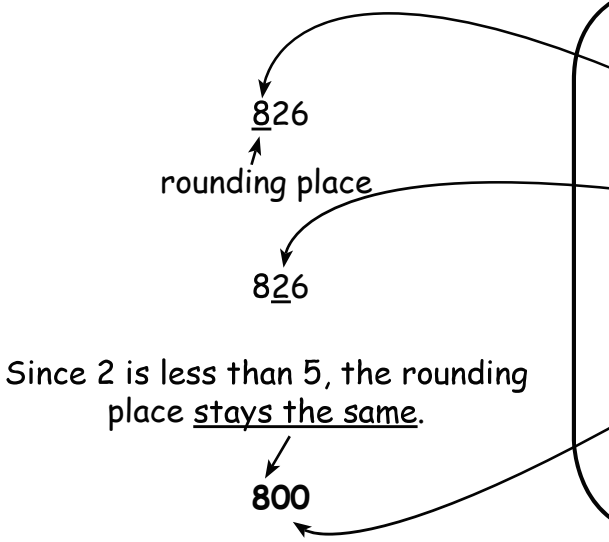
Example: Round 347 to the tens place.



1. Identify the place that you want to round to. What number is in that place? (4)
2. Look at the digit to its right. (7)
3. If this digit is 5 or greater, increase the number in the rounding place by 1. (round up) If the digit is less than 5, keep the number in the rounding place the same.
4. Replace all digits to the right of the rounding place with zeroes.

Here is another example of rounding whole numbers.

Example: Round 826 to the hundreds place.



1. Identify the place that you want to round to. What number is in that place? (8)
2. Look at the digit to its right.
3. If this digit is 5 or greater, increase the number in the rounding place by 1. (round up) If the digit is less than 5, keep the number in the rounding place the same.
4. Replace all digits to the right of the rounding place with zeroes.

Help Pages

Whole Numbers - Addition Table of Basic Facts

It is very important that you learn your **addition facts**. This table will help you.

Choose a number in the top gray box and add it to a number in the left gray box. Follow both with your fingers (one down and one across) until they meet. The number in that box is the sum.

An example is shown for you:

3 + 4 = 7

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Help Pages

Whole Numbers - Addition and Subtraction

When adding or subtracting whole numbers, the numbers must first be lined-up on the right. Starting with the ones place, add (or subtract) the numbers; when adding, if the answer has 2 digits, write the ones digit and regroup the tens digit (for subtraction, it may also be necessary to regroup first). Then, add (or subtract) the numbers in the tens place. Continue with the hundreds, etc.

Look at these examples of **addition**.

Examples: Find the sum of 314 and 12.

$$\begin{array}{r} 314 \\ +\ 12 \\ \hline 326 \end{array}$$

1. Line up the numbers on the right.
2. Beginning with the ones place, add. Regroup if necessary.
3. Repeat with the tens place.
4. Continue this process with the hundreds place, etc.

Add 6,478 and 1,843.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ 1} \\ 6{,}478 \\ +1{,}843 \\ \hline 8{,}321 \end{array}$$

Use the following examples of **subtraction** to help you.

Examples: Subtract 37 from 93.

$$\begin{array}{r} {\scriptstyle 8\ \ 13} \\ \cancel{9}\ \cancel{3} \\ -\ 3\ 7 \\ \hline 5\ 6 \end{array}$$

1. Begin with the ones place. Check to see if you need to regroup. Since 7 is larger than 3, you must regroup to 8 tens and 13 ones.
2. Now look at the tens place. Since 3 is less than 8, you do not need to regroup.
3. Subtract each place value beginning with the ones.

Find the difference of 425 and 233.

$$\begin{array}{r} {\scriptstyle 3\ \ 12} \\ \cancel{4}\ \cancel{2}\ 5 \\ -\ 2\ 3\ 3 \\ \hline 1\ 9\ 2 \end{array}$$

1. Begin with the ones place. Check to see if you need to regroup. Since 3 is less than 5, you do not need to regroup.
2. Now look at the tens place. Check to see if you need to regroup. Since 3 is larger than 2, you must regroup to 3 hundreds and 12 tens.
3. Now look at the hundreds place. Since 2 is less than 3, you are ready to subtract.
4. Subtract each place value beginning with the ones.

Help Pages

Whole Numbers - Addition and Subtraction (continued)

Sometimes when doing subtraction, you must **subtract from zero**. This always requires regrouping. Use the examples below to help you.

Examples: Subtract 261 from 500.

$$\begin{array}{r} {}^{4}\cancel{5}\,{}^{9}\cancel{0}\,{}^{10}\cancel{0} \\ -\ 2\ 6\ 1 \\ \hline 2\ 3\ 9 \end{array}$$

1. Begin with the ones place. Since 1 is less than 0, you must regroup. You must continue to the hundreds place, and then begin regrouping.
2. Regroup the hundreds place to 4 hundreds and 10 tens.
3. Then, regroup the tens place to 9 tens and 10 ones.
4. Finally, subtract each place value beginning with the ones.

Find the difference between 600 and 238.

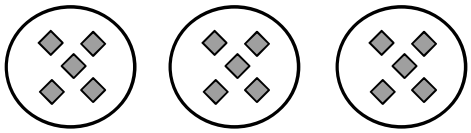
$$\begin{array}{r} {}^{5}\cancel{6}\,{}^{9}\cancel{0}\,{}^{10}\cancel{0} \\ -\ 2\ 3\ 8 \\ \hline 3\ 6\ 2 \end{array}$$

Whole Numbers - Multiplication

Multiplication is a quicker way to add groups of numbers. The sign (×) for multiplication is read "times." The answer to a multiplication problem is called the product. Use the examples below to help you understand multiplication.

Examples: 3 × 5 is read "three times five."

It means 3 groups of 5 or 5 + 5 + 5.

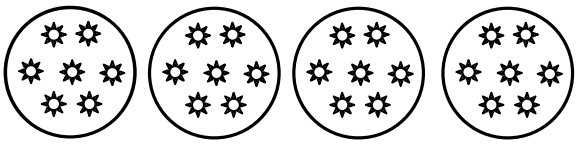


3 × 5 = 5 + 5 + 5 = 15

The product of 3 × 5 is 15.

4 × 7 is read "four times seven."

It means 4 groups of 7 or 7 + 7 + 7 + 7.



4 × 7 = 7 + 7 + 7 + 7 = 28

The product of 4 × 7 is 28.

Help Pages

Whole Numbers - Multiplication Table of Basic Facts

It is very important that you memorize your **multiplication facts**. This table will help you as you memorize them!

To use this table, choose a number in the top gray box and multiply it by a number in the left gray box. Follow both with your fingers (one down and one across) until they meet. The number in that box is the product.

An example is shown for you: 2 × 3 = 6

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Help Pages

Whole Numbers - Multiplying One-Digit Whole Numbers by Multiples of 10

The **multiples** of 10 are 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, etc. These multiples are the product of a given number and 10.

$5 \times 20 = \_\_\_\_$

Use place value to multiply 5 X 20. Think of the problem as 5 X 2 tens. The product is 10 tens; 10 tens are the same as 100.

You can also use the basic fact (5 X 2) and patterns of zero to mentally compute multiples of 10. If 5 X 2 = 10, then 5 X 2<u>0</u> = 10<u>0</u>

You can change the way in which the numbers are grouped. The product stays the same.

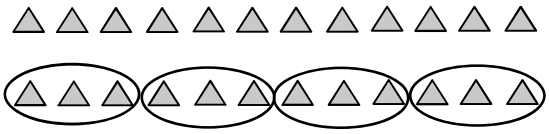
$$\begin{aligned} 5 \times 20 &= 5 \times (2 \times 10) \\ &= (5 \times 2) \times 10 \\ &= 10 \times 10 \\ &= 100 \end{aligned}$$

Whole Numbers - Division

Division is the opposite of multiplication. The symbols for division are ÷ and $\overline{)}$ and are read "divided by." The answer to a division problem is called the quotient. Remember that multiplication is a way of adding groups to get their total. Think of division as the reverse of this. In a division problem you already know the total and the number in each group. You want to know how many groups there are. Follow the examples below.

Examples: Find the quotient of 12 ÷ 3. (12 items divided into groups of 3)

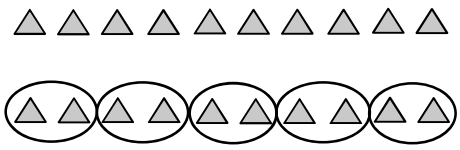
The total number is 12.
Each group contains 3.
How many groups are there?
There are 4 groups.



$12 \div 3 = 4$

Divide 10 by 2. (10 items divided into groups of 2)

The total number is 10.
Each group contains 2.
How many groups are there?
There are 5 groups.

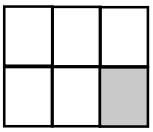


$10 \div 2 = 5$

Help Pages

Fractions

A **fraction** is used to represent part of a whole. The top number in a fraction is called the **numerator** and represents the part. The bottom number in a fraction is called the **denominator** and represents the whole.



The whole rectangle has 6 sections.

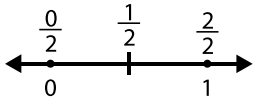
Only 1 section is shaded.

This can be shown as the fraction $\frac{1}{6}$.

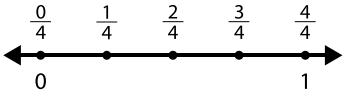
$\frac{1}{6}$ shaded part = numerator / total parts = denominator

Fractions on a Number Line

This number line is divided into 2 equal parts.

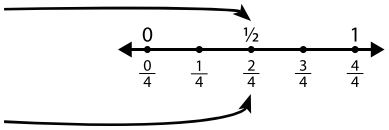


This number line is divided into 4 equal parts.

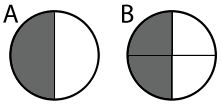


Fractions - Equivalent Fractions

The point halfway between 0 and 1 is called $\frac{1}{2}$ or $\frac{2}{4}$.



Circle A is divided into 2 equal parts.
Circle B is divided into 4 equal parts.
In both circles, the same amount is shaded.

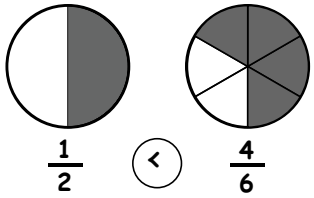


Example: $\frac{1}{2} = \frac{2}{4}$

Whole numbers can be written as fractions: **Example**: $4 = \frac{4}{1}$ and $\frac{6}{1} = 6$

Fractions that show one in the denominator are always equal to the numerator. **Example**: $\frac{8}{1} = 8$

You can compare the shaded parts of two circles,
In this case, $\frac{1}{2}$ is less than $\frac{4}{6}$.



Help Pages

Interpreting Data - Bar Graphs

A bar graph is another way to show and compare data.

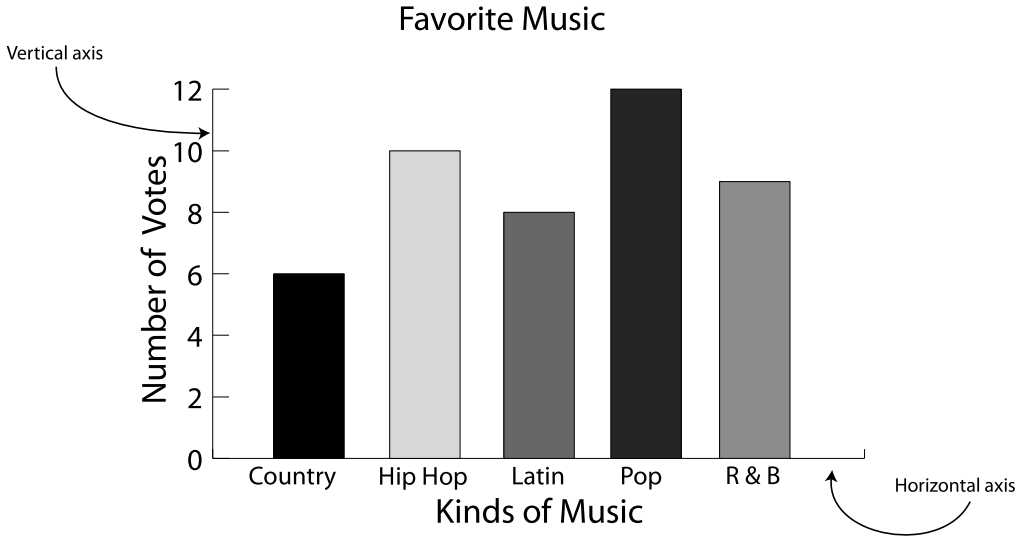
Terri asked 45 people to vote for a favorite kind of music. First, she made a survey chart to show how people voted.

Survey Chart

Favorite Music	
Kind of Music	Number of Votes
Country	6
Hip Hop	10
Latin	8
Pop	12
R & B	9

Terri can show her data on a bar graph. Here is how to make one:

- Give labels to the two sides of the graph (called a horizontal axis and a vertical axis).
- Choose a simple scale for the vertical axis. Start at 0 and go up by 1 or another easy number. This graph goes up by 2.
- Write the kinds of music on the horizontal axis.
- Draw and color in each bar to a height on the graph that matches the number in the survey chart.



Help Pages

Interpreting Data - Line Plots

On a **line plot** you can quickly see data. It may be spread out or close together.

To make a line plot,

- Give the line plot a title.
- Find the greatest value and the lowest value in the set of data.
- Draw a number line on the grid paper near the bottom. The number line should begin with the lowest value you found.
- The length of your line should include space to mark from your lowest to your greater value.
- For each piece of data, draw an "x" above the matching value. An "x" on the line plot will take the place of each number from the data chart. No student names are needed.

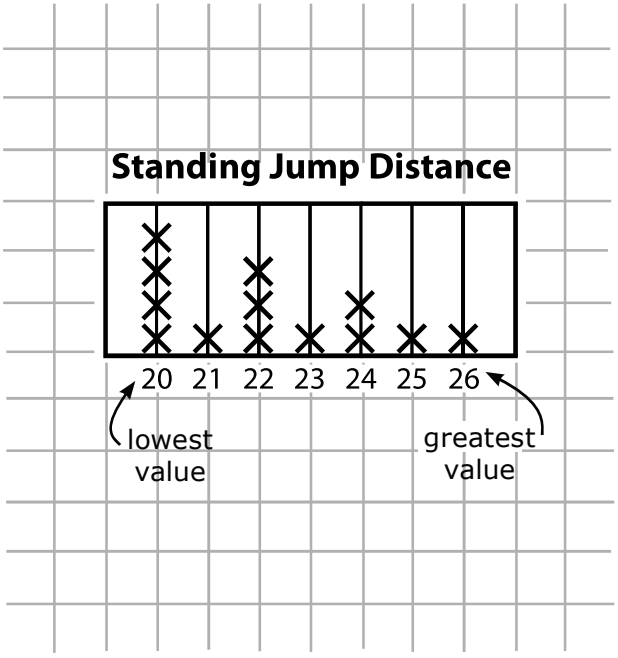
Data Table

Standing Jump Distance	
Students	Inches
Ana	24
Ben	22
Cassie	20
Dora	21
Ellen	20
Fred	23
Gary	22
Hannah	20
Jake	22
Kia	20
Lee	24
Miki	25
Noah	26

lowest number

greatest number

Line Plot

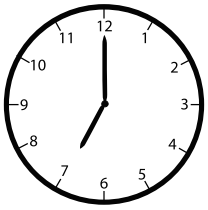
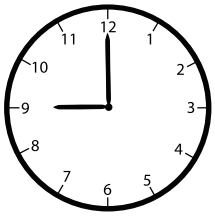


Help Pages

Elapsed Time

The measure of how long something takes to happen is called **elapsed time**.

Example:

The movie began at 7:00  and ended at 9:00. 

How long did the movie last? (How much time elapsed, or passed, between 7:00 and 9:00?) There are **2 hours** between 7:00 and 9:00.

Example: How many hours pass from the beginning of Spelling class until the end of Math class?

Spelling starts at 8:30. Math ends at 11:30. (How much time passes between 8:30 and 11:30?)

Class Schedule

8:30 – 9:00	Spelling
9:00 – 10:00	Reading
10:00 – 11:30	Math
11:30 – 12:00	English

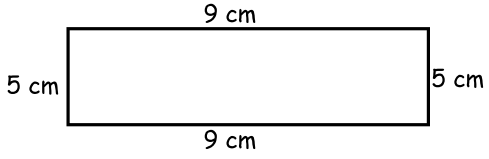
There are **3 hours** between 8:30 and 11:30.

Geometric Measurement - Perimeter

The **perimeter** of a polygon is the distance around the outside of the figure. To find the perimeter, add the lengths of the sides of the figure. Be sure to label your answer.

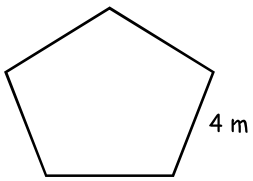
Perimeter = sum of the sides

Example: Find the perimeter of the rectangle below.



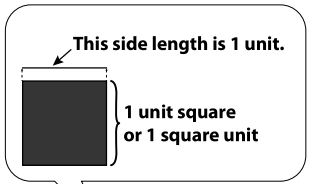
Perimeter = 5 cm + 9 cm + 5 cm + 9 cm
Perimeter = 28 cm

Example: Find the perimeter of the regular pentagon below.



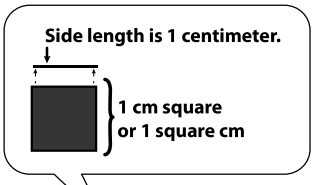
A pentagon has 5 sides. Each of the sides is 4 m long.
P = 4 m + 4 m + 4 m + 4 m + 4 m
P = 5 × 4 m
P = 20 m

Geometric Measurement - Area



The area of the rectangle is 6 square units.

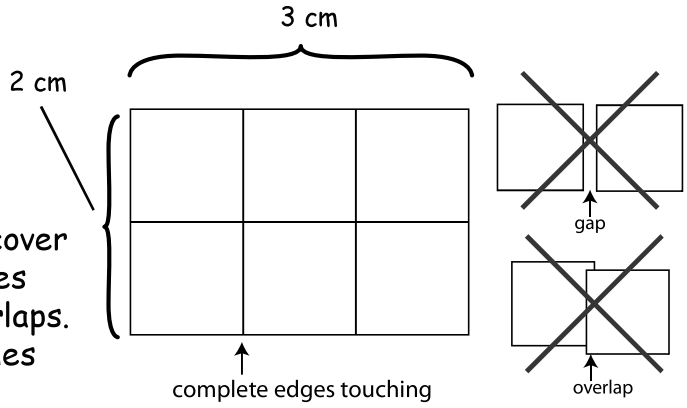
A square with a side length of 1 unit, called "a unit square," is also known as "one square unit" of **area**. It is used to measure the area inside a shape.



The area of this rectangle is 4 sq. cm.

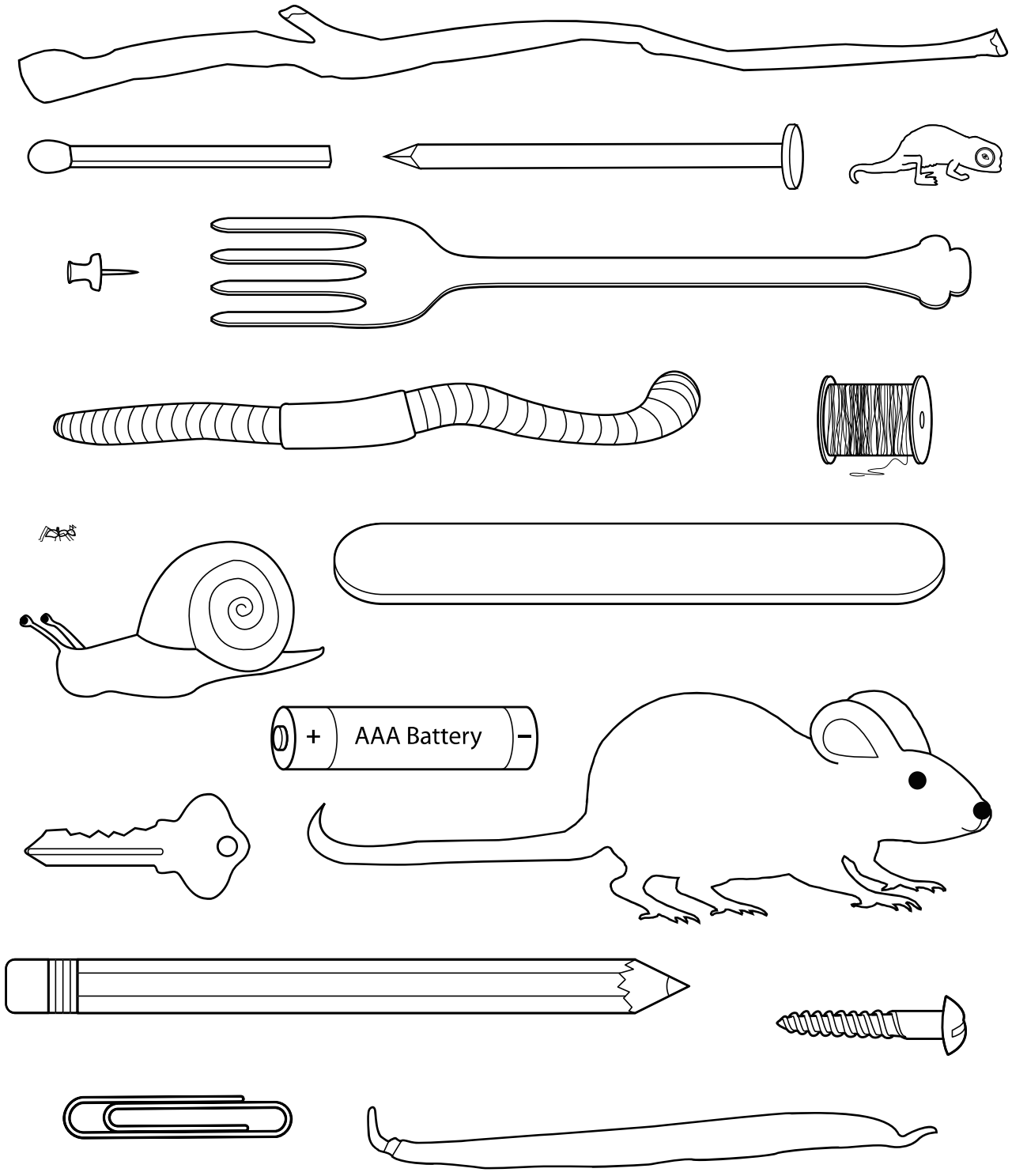
The units used to measure area can be square centimeters (sq. cm), square inches (sq. in.) or other standard units.

This rectangle has an area of 6 square centimeters. The square centimeters cover the inside of the rectangle. The squares have no gaps between them and no overlaps. The complete edge of one square touches the complete edge of another.

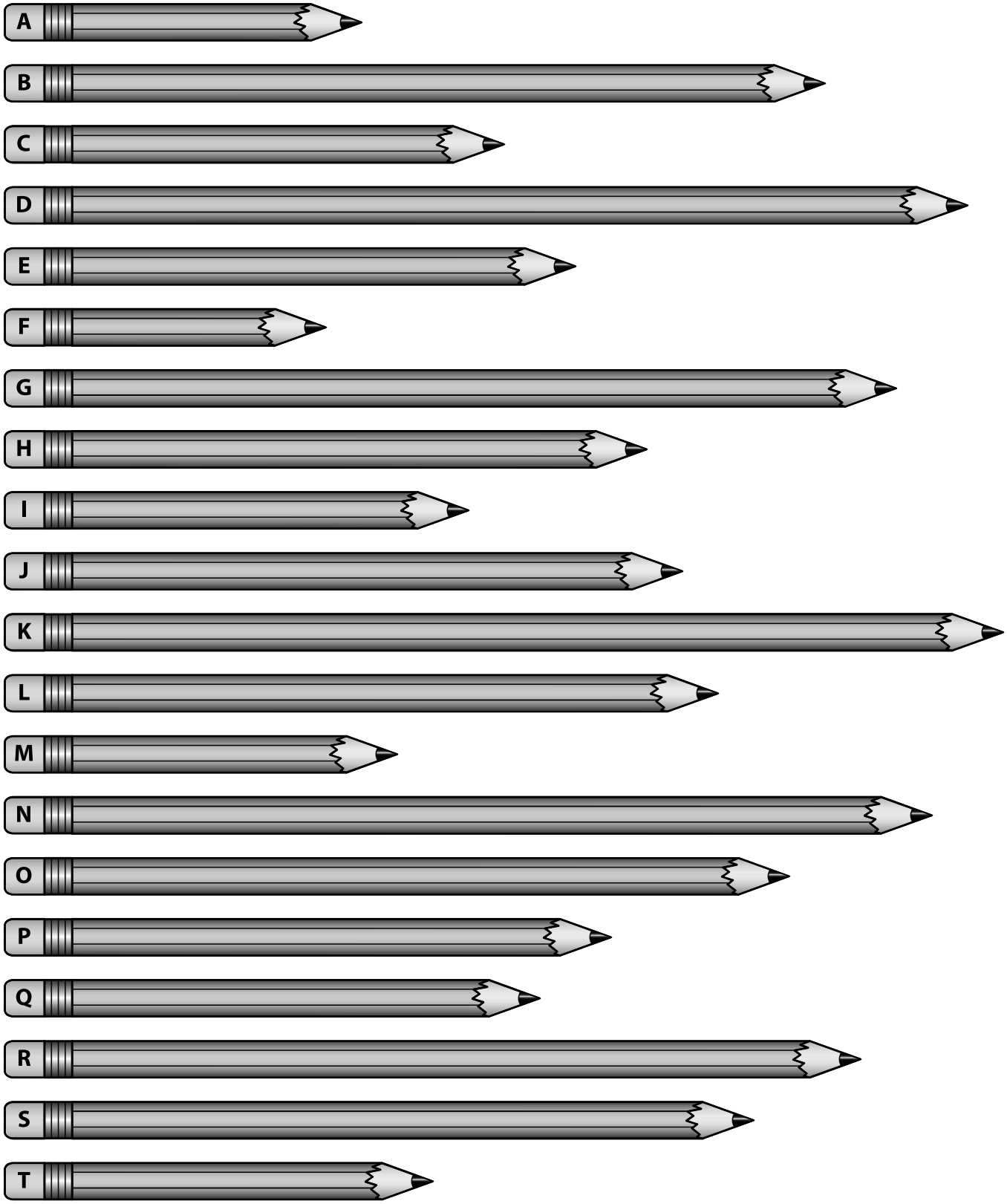


Another way to find the area of a rectangle is to multiply the side lengths. In the example above one side is 2 cm long and the other side is 3 cm long. 2 x 3 = 6 square centimeters.

Hands-On Pages



Hands-On Pages

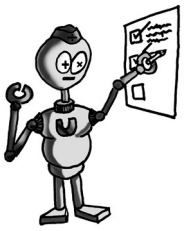


Problem Solving Strategies

Make an Organized List

An **organized list** of possible answers for a problem uses an order that makes sense to you so that you do not miss any ideas or write the same answer more than once.

Guess and Check

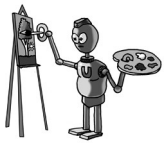


For the **guess and check** strategy, take a guess and see if it fits all the clues by checking each one. If it does, you have solved the problem. If it doesn't, keep trying until it works out. One way to know you have the best answer is when your answer fits <u>every</u> clue.

Look for a Pattern

Sometimes math problems ask us to *continue a pattern by writing what comes next*. A **pattern** is an idea that repeats. In order to write what comes next in the pattern, you will first need to study the given information. As you study it, see if there is an idea that repeats.

Draw a Picture

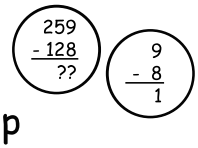


When you **draw a picture** it helps you see the ideas you are trying to understand. The picture makes it easier to understand the words.

Work Backward

Using this strategy comes in handy when you know the end of a problem and the steps along the way, but you don't know how the problem began. If you start at the end and do the steps in reverse order you will end up at the beginning.

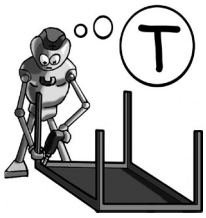
Solve a Simpler Problem



When you read a math problem with ideas that seem too big to understand, try to **solve a simpler problem**. Instead of giving up or skipping that problem, replace the harder numbers with easier ones.

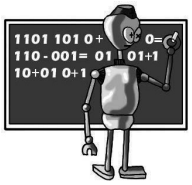
Problem Solving Strategies (continued)

Make a Table



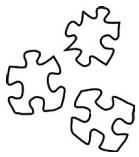
Tables have columns and rows. Labels are helpful too. Writing your ideas in this type of table (or chart) can help you organize the information in a problem so you can find an answer more easily. Sometimes it will make a pattern show up that you did not see before.

Write a Number Sentence



A **number sentence** is made up of numbers and math symbols (+ − × ÷ > < =). To use this strategy you will turn the words of a problem into numbers and symbols.

Use Logical Reasoning



Logical reasoning is basically common sense. **Logical** means "sensible." **Reasoning** is "a way of thinking." **Logical reasoning** is done one step at a time until you see the whole answer.

Make a Model

A **model** can be a picture you draw, or an object you make or find to **help you understand the words** of a problem. These objects can be coins, paper clips, paper for folding, or cubes.