
# Level 3

## Help Pages &
## "Who Knows" Drill

# Help Pages

## Vocabulary

| **Arithmetic Operations** |
|---|
| **Difference** — the result or answer to a subtraction problem. Example: The difference of 5 and 1 is 4. |
| **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** |
| **Acute Angle** — an angle measuring less than 90°. |
| **Area** — the size of a surface. Area is always given in square units (feet$^2$, meters$^2$,…). |
| **Congruent** — figures with the same shape and the same size. |
| **Denominator** — the bottom number of a fraction. Example: $\frac{1}{4}$ ➡ denominator is 4 |
| **Diameter** — the widest distance across a circle. The diameter always passes through the center. |
| **Fraction** — a part of a whole. Example:  This box has 4 parts. 1 part is shaded. $\frac{1}{4}$ |
| **Line of Symmetry** — a line along which a figure can be folded so that the two halves match exactly. |
| **Numerator** — the top number of a fraction. Example: $\frac{1}{4}$ ➡ numerator is 1 |
| **Obtuse Angle** — an angle measuring more than 90°. |
| **Perimeter** — the distance around the outside of a polygon. |
| **Radius** — the distance from any point on the circle to the center. The radius is half of the diameter. |
| **Remainder** — the part left over when one number can't be divided exactly by another. |
| **Right Angle** — an angle measuring exactly 90°. |
| **Similar** — figures having the same shape, but different sizes. |

**Geometry — Polygons**

| Number of Sides | | Name | Number of Sides | | Name |
|---|---|---|---|---|---|
| 3 |  | Triangle | 6 |  | Hexagon |
| 4 |  | Quadrilateral | 8 |  | Octagon |
| 5 |  | Pentagon | | | |

# Help Pages

## Vocabulary

| Measurement — Relationships | |
|---|---|
| **Volume** | **Distance** |
| 3 teaspoons in a tablespoon | 36 inches in a yard |
| 2 cups in a pint | 1760 yards in a mile |
| 2 pints in a quart | 5280 feet in a mile |
| 4 quarts in a gallon | 100 centimeters in a meter |
| **Weight** | 1000 millimeters in a meter |
| 16 ounces in a pound | **Temperature** |
| 2000 pounds in a ton | 0° Celsius – Freezing Point |
| **Time** | 100° Celsius – Boiling Point |
| 10 years in a decade | 32° Fahrenheit – Freezing Point |
| 100 years in a century | 212° Fahrenheit – Boiling Point |

**Statistics**

**Mode** — the number that occurs most often in a group of numbers. The mode is found by counting how many times each number occurs in the list. The number that occurs more than any other is the mode. Some groups of numbers have more than one mode.

Example: The mode of 77, (93), 85, (93), 77, 81, (93), and 71 is **93**.
(93 is the mode because it occurs more than the others.)

## Place Value

**Whole Numbers**

| 2 | 7 | 1 , | 4 | 0 | 5 |
|---|---|---|---|---|---|
| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |

The number above is read: two hundred seventy-one thousand, four hundred five.

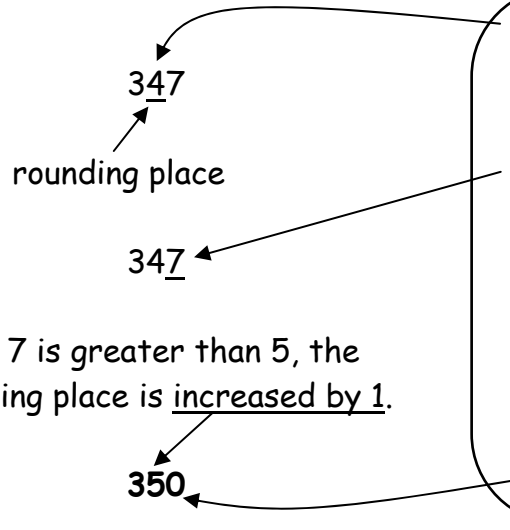
# Help Pages

## Solved Examples

### Whole Numbers (continued)

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 page 285.

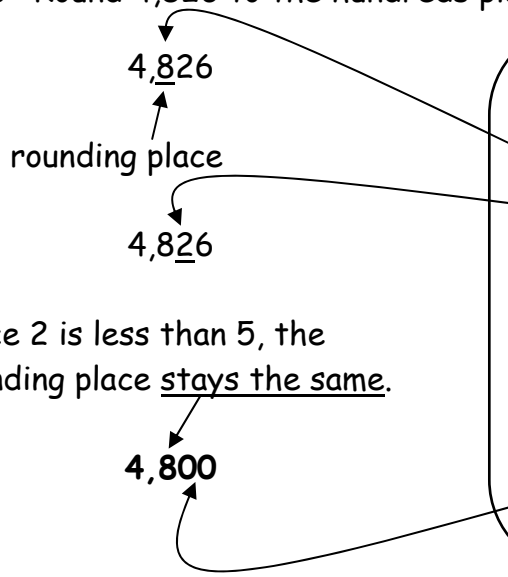
Example: Round 347 to the tens place.




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.

Examples: Round 4,826 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

## Solved Examples

### Whole Numbers (continued)

**When adding or subtracting whole numbers,** first the numbers must 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. Check to see if you need to regroup. 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. Check to see if you need to regroup. Since 2 is less than 3, you are ready to subtract.
4. Subtract each place value beginning with the ones.

# Help Pages

## Solved Examples

### Whole Numbers (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.

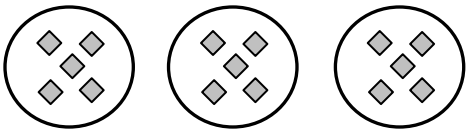
Find the difference between 600 and 238.

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

**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.

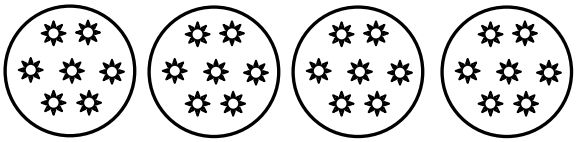


3 × 5 = 5 + 5 + 5 = 15

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**.

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## Solved Examples

### Whole Numbers (continued)

It is very important that you memorize your **multiplication facts**. This table will help you, but only until 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 finger (down and across) until they meet. The number in that box is the product.

An example is shown for you: $2 \times 3 = 6$

| × | 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

## Solved Examples

### Whole Numbers (continued)

When **multiplying multi-digit whole numbers**, it is important to know your multiplication facts. Follow the steps and the examples below.

Examples: Multiply 23 by 5.

$$\begin{array}{r} {}^{1}2\,3 \\ \times\ 5 \\ \hline 115 \end{array}$$

$3 \times 5 = 15$ ones or 1 ten and 5 ones

$2 \times 5 = 10$ tens + 1 ten (regrouped) or 11 tens.

1. Line up the numbers on the right.
2. Multiply the digits in the ones place. Regroup if necessary.
3. Multiply the digits in the tens place. Add any regrouped tens.
4. Repeat step 3 for the hundreds place, etc.

Find the product of 314 and 3.

$$\begin{array}{r} {}^{1}3\,{}^{1}1\,4 \\ \times\ \ 3 \\ \hline 942 \end{array}$$

$4 \times 3 = 12$ ones or 1 ten and 2 ones.

$1 \times 3 = 3$ tens + 1 ten (regrouped) or 4 tens.

$3 \times 3 = 9$ hundreds.

**Division** is the opposite of multiplication. The symbols for division are $\div$ 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.

Example: Find the quotient of $12 \div 3$. (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

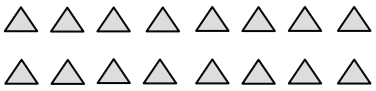
## Solved Examples

### Whole Numbers (continued)

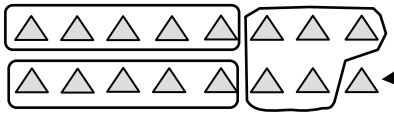
Sometimes when you are dividing, there are items left over that do not make a whole group. These left-over items are called the **remainder**. When this happens, we say that "the whole cannot be divided evenly by that number."

Example: What is 16 divided by 5? (16 items divided into groups of 5)

The total number is 16.



Each group contains 5.



How many groups are there? There are 3 groups, but there is 1 left over.
The remainder is 1.

16 ÷ 5 = **3 R1** (This is read "3 remainder 1.")

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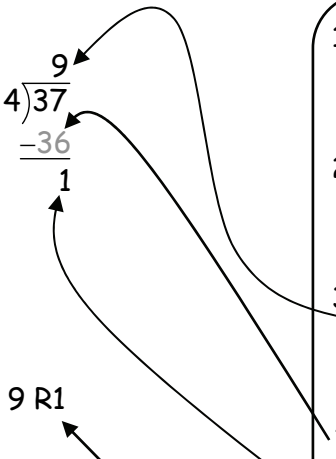
The next group of examples involves **long division using one-digit divisors with remainders**. You already know how to divide single-digit numbers. This process helps you to be able to divide numbers with multiple digits.

Example: Divide 37 by 4.




1. In this problem, 37 is the dividend and 4 is the divisor. You're going to look at each digit in the dividend, starting on the left.
2. Ask yourself if the divisor (4) goes into the left-most digit in the dividend (3). It doesn't, so keep going to the right.
3. Does the divisor (4) go into the two left-most digits (37)? It does. How many times does 4 go into 37? (9 times)
4. Multiply 4 × 9 (product = 36).
5. Subtract 36 from 37 (difference = 1). There's nothing left to bring down from above. Once this number is smaller than the divisor, it is called the remainder and the problem is finished. The remainder is 1.
6. Write the answer (above the top line) with the remainder. (9 R1)

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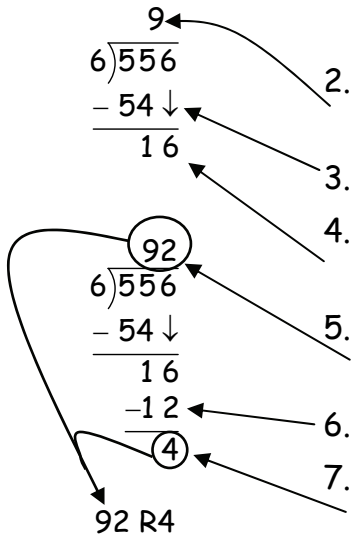
## Solved Examples

### Whole Numbers (continued)

Example: What is 556 divided by 6?

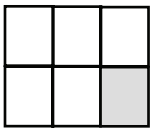



1. Ask yourself if the divisor (6) goes into the left-most digit in the dividend (5). It doesn't, so keep going to the right.
2. Does the divisor (6) go into the two left-most digits (55)? It does. How many times does 6 go into 55? (9 times)
3. Multiply $6 \times 9$ (product is 54).
4. Subtract 54 from 55. (1) Bring down the 6 ones from the first line. This leaves 16 left from the original 556.
5. Ask yourself if the divisor (6) goes into 16. It does. How many times does 6 go into 16? (2)
6. Multiply $6 \times 2$ (product is 12).
7. Subtract 12 from 16 (result is 4). There's nothing left to bring down from above. Once this number is smaller than the divisor, it is called the remainder and the problem is finished. The remainder is 4.
8. Write the answer with the remainder. (92 R 4)

Remember: The remainder can NEVER be larger than the divisor!

### 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)

To **add (or subtract) fractions with the same denominator**, simply add (or subtract) the numerators, keeping the same denominator.

Examples: $\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$ $\frac{8}{9} - \frac{1}{9} = \frac{7}{9}$

# Help Pages

## Solved Examples

### Decimals

**Adding and subtracting decimals** is very similar to adding or subtracting whole numbers. The main difference is that you have to line-up the decimal points in the numbers before you begin. Add zeros if necessary, so that all of the numbers have the same number of digits after the decimal point. Before you subtract, remember to check to see if you must regroup. When you're finished adding (or subtracting), bring the decimal straight down into your answer.

Examples: Find the sum of 4.25 and 2.31.

$$\begin{array}{r} 4.25 \\ +\ 2.31 \\ \hline 6.56 \end{array}$$

1. Line up the decimal points. Add zeroes as needed.
2. Add (or subtract) the decimals.
3. Add (or subtract) the whole numbers.
4. Bring the decimal point straight down.

Examples: Subtract 4.8 from 7.4.

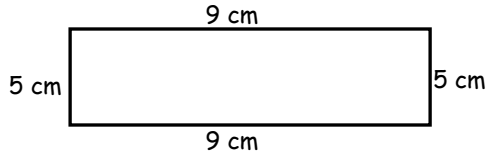
$$\begin{array}{r} {}^{6}\cancel{7}.{}^{14}\cancel{4} \\ -\ 4.8 \\ \hline 2.6 \end{array}$$

### Geometry

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

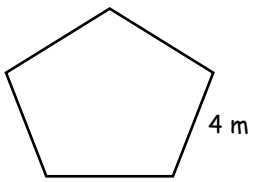
Example: Find the perimeter of the rectangle below.




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

# Help Pages

## Who Knows???

Sides in a Quadrilateral? ..... (4)

Sides in a Pentagon? ..... (5)

Sides in a Hexagon? ..... (6)

Sides in an Octagon? ..... (8)

Inches in a foot? ..... (12)

Feet in a yard? ..... (3)

Inches in a yard? .....(36)

Ounces in a pound? ..... (16)

Pounds in a ton? .....(2000)

Cups in a pint? ..... (2)

Pints in a quart? ..... (2)

Quarts in a gallon? ..... (4)

Years in a decade? ..... (10)

Figures with the same size and shape? .....
.....(congruent)

Figures with same shape, but different size? .....
..... (similar)

Answer to an addition problem? .....(sum)

Answer to a subtraction problem?.... (difference)

Answer to a multiplication problem? ..... (product)

Answer to a division problem? ..... (quotient)