

New
PIONEERS
GRADED
MATHS

Book 5



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Place Value Through Hundred Thousands

You Can Write Numbers In Different Ways.

417,805 can be written in:

Standard Form	Use digits-417,805
Word Form	Use words - four hundred seventeen thousand, eight hundred and five
Short word form	Use digits and words 417 thousand, 805
Expanded form	Use digits to show the value of each place

$$400,000 + 10,000 + 7,000 + 800 + 5 = (4 \times 100,000) + (1 \times 10,000) + (7 \times 1,000) + (8 \times 100) + (5 \times 1)$$

Write each number in standard form.

415 thousand, 25

800,000 + 4,000 + 60 + 2

100,000 + 900 + 20 + 3

Three hundred forty-seven thousand, one hundred and five

Write the value of the coloured digit in word form.

137,294

563,089

426,718

Write the number in word form, short word form, and in expanded form.

702,946

What is an exponent?

An exponents is simply shorthand for multiplying that number of identical factors.

4^3 Is the same as $(4) \times (4) \times (4)$ -three identical factors of 4 (3 is the exponents indicating the number of identical factors.

If we have a number of identical factors we can rewrite it using exponents.

Example 1: $125 = 5 \times 5 \times 5$
 $125 = 5^3$

Example 2: $100 = 10 \times 10 = 10^2$
 $1000 = 10 \times 10 \times 10 = 10^3$
 $10000 = 10 \times 10 \times 10 \times 10 = 10^4$
 and so on.

Example 3: To write the number 32528 using exponents.

1. We decompose the number (we write it in expanded form)

$$\begin{aligned} 32,528 &= (2 \times 10000) + (2 \times 1000) + (5 \times 100) + (2 \times 10) + 8 \\ &= 3 \times (10 \times 10 \times 10 \times 10) + 2 \times (10 \times 10 \times 10) + 5 \times (10 \times 10) + 2 \times 10 + 8 \\ &= 3 \times 10^4 + 2 \times 10^3 + 5 \times 10^2 + 2 \times 10^1 + 8 \times 10^0 \end{aligned}$$

Example 4: Write 653,496 in Expanded Form using expand

$$653,496 = (6 \times 10^5) + (5 \times 10^4) + (3 \times 10^3) + (4 \times 10^2) + (9 \times 10^1) + (6 \times 10^0).$$

Estimate Sums and Differences

(1)

Ways to Estimate a Sum or Difference

Round to the greatest place.	Round to the a lesser place.	Use front-end estimation.
$\begin{array}{r} 4,268 \\ + 1,625 \\ \hline \end{array}$ round to $\begin{array}{r} 4,000 \\ + 2,000 \\ \hline 6,000 \end{array}$	$\begin{array}{r} 3,278 \\ + 1,634 \\ \hline \end{array}$ round to $\begin{array}{r} 3,300 \\ + 1,600 \\ \hline 4,900 \end{array}$	$\begin{array}{r} 3,278 \\ + 1,634 \\ \hline \end{array}$ round to $\begin{array}{r} 3,200 \\ + 1,600 \\ \hline 4,800 \end{array}$

Estimate. Tell which method you used.

$$\begin{array}{r} 957 \\ - 512 \\ \hline \end{array}$$

$$\begin{array}{r} 6,114 \\ - 2,352 \\ \hline \end{array}$$

$$\begin{array}{r} 7,020 \\ - 1,986 \\ \hline \end{array}$$

$$57,308 - 29,554 =$$

Estimate. Decide whether the sum is closer to 50 or 100.

$$33 + 24 =$$

$$54 + 46 =$$

$$67 + 27 =$$

$$41 + 13 =$$

- (1) In Front End estimation, we add or subtract the digits of the two highest place values (the front end digits-the two digits on the left), then insert zeros for the other place values.

Add and Subtract Whole Numbers

When Adding or Subtracting Whole Numbers, Regroup when Necessary.

$$\begin{array}{r} \overset{1}{6} \overset{1}{6}, \overset{1}{8} 3 4 \\ + 23,166 \\ \hline 90,000 \end{array}$$

$$\begin{array}{r} \overset{7}{1} \overset{9}{8}, \overset{9}{0} \overset{10}{0} \overset{0}{0} \\ - 12,843 \\ \hline 05,157 \end{array}$$

Add or subtract. Check that your answer is reasonable.

$$\begin{array}{r} 8,914 \\ + 6,382 \\ \hline \end{array}$$

$$\begin{array}{r} 41,948 \\ + 8,655 \\ \hline \end{array}$$

$$\begin{array}{r} 4,000 \\ - 2,731 \\ \hline \end{array}$$

$$\begin{array}{r} 10,000 \\ - 3,629 \\ \hline \end{array}$$

Find each sum or difference when $n = 2,000,000$ and $s = 350$

$$n + 7$$

$$n + 7,000$$

$$n + 7,000,000$$

$$1,000 - s$$

$$10,000 - s$$

Add and Subtract Greater Numbers

When adding or subtracting greater numbers, choose either mental math, paper and pencil, estimation, a calculator, or a computer to solve the problem.

Estimate Before you Add or Subtract. Round to the Greatest Place

$$\begin{array}{r} 4,871,506 \\ + 1,349,005 \\ \hline \end{array} \quad \begin{array}{c} \xrightarrow{\text{round to}} \\ \xrightarrow{\text{round to}} \end{array} \quad \begin{array}{r} 5,000,000 \\ + 1,000,000 \\ \hline 6,000,000 \end{array}$$

Estimate

$$\begin{array}{r} 200,000 \\ - 65,815 \\ \hline \end{array} \quad \begin{array}{c} \xrightarrow{\text{round to}} \\ \xrightarrow{\text{round to}} \end{array} \quad \begin{array}{r} 200,000 \\ - 70,000 \\ \hline 130,000 \end{array}$$

Estimate

Complete the Addition and Subtraction. Make Sure to Line Up the Ones Digits.

$$4,871,506 + 1,349,005$$

$$\begin{array}{r} \overset{1}{4}, \overset{1}{8} \overset{1}{7} 1, \overset{1}{5} 0 6 \\ + 1, 3 4 9, 0 0 5 \\ \hline 6, 2 2 0, 5 1 1 \end{array}$$

$$200,000 - 65,815$$

$$\begin{array}{r} \overset{1}{2} \overset{9}{0} \overset{9}{0}, \overset{9}{0} \overset{9}{0} \overset{10}{0} \\ - 65,815 \\ \hline 134,185 \end{array}$$

Add or subtract. Tell which method you used.

$$\begin{array}{r} 708,214 \\ + 290,528 \\ \hline \end{array}$$

$$\begin{array}{r} 6,927,000 \\ - 2,000,000 \\ \hline \end{array}$$

$$\begin{array}{r} 346,572 \\ + 628,719 \\ \hline \end{array}$$

$$5,700,000 - 65,500$$

$$360,000 + 640,000$$

Multiply by One-Digit Numbers

$$\begin{array}{r} 32 \\ 475 \\ \times 4 \\ \hline 1,900 \end{array}$$

Partial product

$$\begin{aligned} 4 \times 475 &= 4 \times (400 + 70 + 5) \\ &= (4 \times 400) + (4 \times 70) + (4 \times 5) \\ &= 1,600 + 280 + 20 \\ &= 1,900 \end{aligned}$$

Find the product.

$$\begin{array}{r} 58 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 561 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7,462 \\ \times 8 \\ \hline \end{array}$$

$$285,115 \times 3$$

$$2 \times 474,691$$

Complete the function table.

Rule: $y = 3x$

X	215	784	3746	7135	12,516
Y	245				

Use the distributive property to rewrite each expression. Then solve.

Remember: the distribution property lets you multiply a sum by multiplying each addend separately, and then add the products. For example:

$$4 \times 2345 = (4 \times 2000) + (4 \times 300) + (4 \times 40) + (4 \times 5).$$

$$7 \times 2,393$$

$$52,816 \times 4$$



Patterns In Multiples of 10

Multiply.
 $6 \times 4,000 = n$

Different Ways to Multiply Multiples by 10

Use a pattern.

$$\begin{aligned} 6 \times 4 &= 24 \\ 6 \times 40 &= 240 \\ 6 \times 400 &= 2,400 \\ 6 \times 4,000 &= 24,000 \end{aligned}$$

Use mental math.

$$\begin{aligned} 6 \times 4,000 &= 6 \times 4 \times 1,000 \\ &= 24 \times 1,000 \\ &= 24,000 \end{aligned}$$

Use a pattern or mental math to find each product.

$$\begin{array}{r} 70 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 600 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 9,000 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 500 \\ \times 70 \\ \hline \end{array}$$

$$\begin{array}{r} 900 \\ \times 90 \\ \hline \end{array}$$

$$\begin{array}{r} 6,000 \\ \times 80 \\ \hline \end{array}$$

Multiply.

$$37 \times 60$$

$$728 \times 30$$

$$641 \times 70$$

$$398 \times 20$$

$$566 \times 50$$

$$435 \times 60$$

Estimate Products

Different Ways to Estimate Products

Front-end Estimation

$$\begin{array}{r} 84 \\ \times 37 \\ \hline \end{array} \quad \begin{array}{r} 80 \\ \times 30 \\ \hline 2,400 \end{array}$$

Rounding

$$\begin{array}{r} 84 \\ \times 37 \\ \hline \end{array} \quad \begin{array}{r} 80 \\ \times 40 \\ \hline 3,200 \end{array}$$

Find a Range

$$\begin{array}{r} 84 \\ \times 37 \\ \hline \end{array} \quad \begin{array}{r} 80 \\ \times 30 \\ \hline 2,400 \end{array} \quad \begin{array}{r} 90 \\ \times 40 \\ \hline 3,600 \end{array}$$

Estimate by using front-end estimation. Then estimate by rounding.

$$26 \times 49$$

$$18 \times 79$$

$$32 \times 21$$

$$85 \times 442$$

Estimate. Give a range which includes the actual product. Then find the actual product.

$$23 \times 79$$

$$71 \times 19$$

Multiply by Two-Digit Numbers

Different Ways to Multiply by Two-Digit Numbers

$$\begin{array}{r} \overset{1}{\cancel{2}} \\ 147 \\ \times 24 \\ \hline 588 \\ + 2940 \\ \hline 3,528 \end{array}$$

$$\begin{aligned} 147 \times 24 &= 147 \times (20 + 4) \\ &= (147 \times 20) + (147 \times 4) \\ &= 2,940 + 588 \\ &= 3,528 \end{aligned}$$

Find each product. Estimate or use a calculator to check.

$$\begin{array}{r} 65 \\ \times 29 \\ \hline \end{array}$$

$$\begin{array}{r} 591 \\ \times 54 \\ \hline \end{array}$$

$$\begin{array}{r} 198 \\ \times 22 \\ \hline \end{array}$$

$$\begin{array}{r} 86 \\ \times 51 \\ \hline \end{array}$$

$$\begin{array}{r} 94 \\ \times 17 \\ \hline \end{array}$$

Use the distributive property to rewrite each expression. Then solve.

Notice that the product can be written as. The sum of or difference between two products. For example: $16 \times 49 = 16 \times (50 - 1) = 800 - 16 = 784$

$$61 \times 19$$

$$725 \times 48$$

Estimate Quotients

Estimate.

$$1,759 \div 6 = n$$

Estimate With Compatible Numbers

Note: when the dividend can be easily divided by the divisor, the dividend and the divisor are compatible. For example, 18 and 6 are compatible.

Round the dividend to a multiple of 10 that can be divided easily by 6.

$$1,800 \div 6 = n$$

$$\begin{array}{r} 300 \\ 6 \overline{) 1,800} \end{array}$$

The estimated quotient is 300.

Estimate the quotient.

$$649 \div 8$$

$$2,479 \div 5$$

$$43,054 \div 6$$

$$5 \overline{) 408}$$

$$3 \overline{) 11,955}$$

$$6 \overline{) 2,371}$$

$$8 \overline{) 3,297}$$

One-Digit Divisors

Quotients With Remainders

If the dividend and divisor are not compatible numbers, then the quotient will include a **remainder**.

Divide $315 \div 6 = n$

$$\begin{array}{r} 52 \text{ R}3 \\ 6 \overline{) 315} \\ \underline{- 30} \\ 15 \\ \underline{- 12} \\ 3 \end{array}$$

Check:

$$\begin{array}{r} (52 \times 6) + 3 \\ 312 + 3 \\ = 315 \end{array}$$

Divide and check.

$$4 \overline{) 138}$$

$$3,191 \div 6$$

$$9 \overline{) 71,824}$$

$$3 \overline{) 12,662}$$

$$2 \overline{) 9,257}$$

Equations

The division statement $17 \div 4 \rightarrow 4 \text{ R}1$ can be rewritten as $(4 \times 4) + 1 = 17$. Write and solve a division statement for each equation.

$$4a + r = 27$$

$$2b + r = 21$$

Divisibility

Divisibility Rules

A number is **divisible** by another number when the quotient is a whole number and there is no remainder. Any **factor** of a given number divides into that number with no remainder.

Tell if each number is divisible by 2, 3, 4, 5, 6, 9, or 10.

712

810

388

621

524

460

1,912

5,700

3,126

1,890

Use the table for problems 1-2.

1. Majed and other members of his class gathered a total number of cans that is divisible by 4. What grade is Majed in?



2. The cans from each grade are packed individually in boxes of 9. Which two grades' cans will have boxes that are partially full?

Canned Food Drive Totals

Grade	Cans Collected
3	668
4	670
5	702
6	585

Zeros In the Quotient

Quotients With Zeros

Sometimes you cannot divide after bringing down a digit from the dividend. You must put a zero in the quotient before bringing down the next digit.

Divide $1,421 \div 7 = n$

$$\begin{array}{r} 203 \\ 7 \overline{) 1,421} \\ \underline{- 14} \\ 021 \\ \underline{- 21} \\ 0 \end{array}$$

Multiply. 3×7

Subtract $21 - 21$

There is no remainder.

Check:

$$\begin{array}{r} 203 \\ \times 7 \\ \hline 1,421 \end{array}$$

Divide.

$$8 \overline{) 816}$$

$$5 \overline{) 547}$$

$$2 \overline{) 6,016}$$

$$7 \overline{) 56,765}$$

$$6 \overline{) 24,425}$$

$$4,555 \div 9$$

Solve Equations

Solving Equations

Solve $5n = 40$

Think: What number times 5 equals 40?

$$5 \times 8 = 40$$
$$n = 8$$

Solve $54 \div n = 9$

Think: 54 divided by what number equals 9?

$$54 \div 6 = 9$$
$$n = 6$$

Solve $n \div 8 = 6$

Think: What number divided by 8 equals 6?

$$48 \div 8 = 6$$
$$n = 48$$

Solve each problem.

1. Islam worked for 6 hours. She earned £42. How much does Islam earn per hour?
 $6n = 42$

2. Isra'a will be able to give each of her seven friends four fruit snacks. How many fruit snacks does she have?
 $n \div 7 = 4$

Use mental math to solve the equations.

$32 \div r = 4$

$N \div 7 = 3$

$9b = 63$

$S \div 6 = 6$

$24 \div m = 3$

$6t = 18$

$5c = 35$

Replace n with 8. Is the equation true? Write yes or no.

$45 \div n = 5$

$7n = 56$

$N \div 1 = n$