

Grade 6 · Multi-Digit Division · Lesson

Common Core 6.NS.B.2 · mathovore.fr

Long division is the standard algorithm for dividing a multi-digit whole number by a divisor of one or more digits. You divide, multiply, subtract, and bring down the next digit, working left to right until no digits remain. Any number left over is the remainder, and you can check the answer with multiplication.

Grade 6 Common Core: 6.NS.B.2

Key facts:

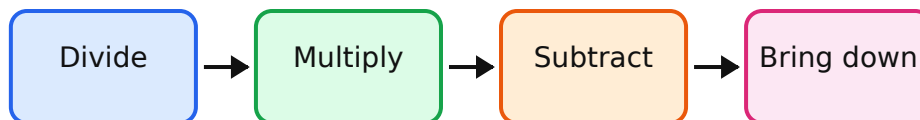
- Each round of long division repeats four steps: divide, multiply, subtract, bring down.
- A remainder is always smaller than the divisor.
- Estimate with compatible numbers, such as $8,000 \div 40$, to catch a misplaced digit.
- Check by computing $\text{quotient} \times \text{divisor} + \text{remainder}$ to get the dividend.
- In word problems, decide whether to round up, drop, or report the remainder.

What is long division?

Long division splits a large dividend into equal groups, one place value at a time. Each round repeats the same four moves: divide, multiply, subtract, bring down. The method works the same whether the divisor has one digit, two digits, or more.

Vocabulary

Dividend: the number being divided. **Divisor:** the number you divide by. **Quotient:** the answer. **Remainder:** the amount left over, always smaller than the divisor.



The four steps repeat for every digit of the dividend.

How do you divide by a two-digit number?

Here is the standard algorithm for $5,625 \div 25$.

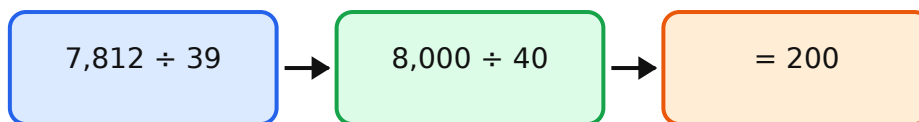
1. Look at the first digits of the dividend until the number is at least as big as the divisor.
Since 5 is less than 25, use 56. Estimate: 25 goes into 56 two times, so write 2 above the 6.
2. Multiply: $2 \times 25 = 50$. Subtract: $56 - 50 = 6$.
3. Bring down the next digit, 2, to make 62. Now 25 goes into 62 two times, so write 2.
Multiply $2 \times 25 = 50$ and subtract: $62 - 50 = 12$.
4. Bring down the last digit, 5, to make 125. Since $5 \times 25 = 125$, write 5 and subtract:
 $125 - 125 = 0$.
5. The quotient is 225 with no remainder.

$$\begin{array}{r}
 \textcolor{green}{225} \\
 25 \overline{) 5625} \\
 \underline{50} \\
 62 \\
 \underline{50} \\
 125 \\
 \underline{125} \\
 0
 \end{array}$$

Worked example: $5,625 \div 25 = 225$.

How do you estimate a quotient first?

Replace both numbers with nearby compatible numbers that divide easily. For $7,812 \div 39$, use $8,000 \div 40 = 200$. The exact answer should be close to 200, so a result like 20 or 2,000 signals a misplaced digit.

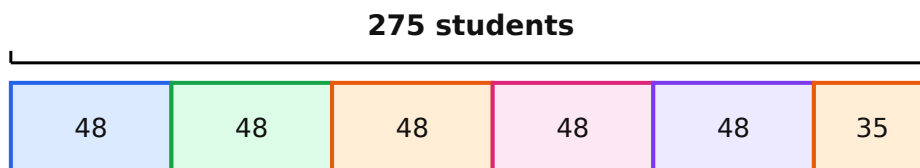


Round to compatible numbers to estimate the quotient.

What should you do with a remainder?

The meaning of the remainder depends on the question being asked.

Situation	What to do	Example: $275 \div 48 = 5 \text{ R } 35$
Everyone must be carried or covered	Round the quotient up	6 buses are needed
Only full groups count	Drop the remainder	5 buses are completely full
The leftover itself is asked	Report the remainder	35 students ride in the last bus



Remainder in context: 5 full buses plus 35 students means 6 buses are needed.

How do you check a long division answer?

Multiply the quotient by the divisor, then add the remainder. The result must equal the dividend. For $7,359 \div 45 = 163 \text{ R } 24$, check $45 \times 163 + 24 = 7,335 + 24 = 7,359$.

Multi-Digit Division: frequently asked questions

What are the four steps of long division?

Divide, multiply, subtract, and bring down. Repeat them for each digit of the dividend until no digits are left. The last subtraction gives the remainder.

How do you know where to write the first digit of the quotient?

Find the first group of digits in the dividend that is at least as large as the divisor. Write the first quotient digit above the last digit of that group.

Can a remainder be bigger than the divisor?

No. If the remainder is as large as the divisor, the quotient digit was too small. Increase that digit by 1 and subtract again.

What if the divisor does not go into a number at all?

Write 0 in the quotient for that place, then bring down the next digit. For example, in $3,150 \div 15$ the last step is $0 \div 15$, so the quotient is 210, not 21.

How do you check a division problem with a remainder?

Multiply the quotient by the divisor and add the remainder. If the sum equals the dividend, the division is correct.