

STUDY GUIDE – Multiplication & Division

Section 1 - Multiplication

Let's begin with multiplication. When multiplying, we are working with what is known as "the standard algorithm." The idea is that, from the right to the left and starting with the bottom number, all digits of the bottom number must multiply with all digits of the top number. When setting up one of these problems, place the number with the fewer digits on the bottom, and more digits on top. This makes the process slightly easier and faster.

EXAMPLE: multiply 125 times 21.

$$\begin{array}{r} 123 \\ \times 21 \\ \hline 3 \end{array} \rightarrow \begin{array}{r} 123 \\ \times 21 \\ \hline 23 \end{array} \rightarrow \begin{array}{r} 123 \\ \times 21 \\ \hline 123 \end{array} \rightarrow \begin{array}{r} 123 \\ \times 21 \\ \hline 123 \\ 2460 \end{array} \rightarrow \begin{array}{r} 123 \\ \times 21 \\ \hline 123 \\ +2460 \\ \hline 2583 \end{array}$$

As you can see here, with start with the one on the bottom, then multiply each digit of the top number with it, right to left. Then we do the same with the two. **DON'T FORGET TO PLACE YOUR "BONUS" PLACEHOLDER ZERO – THE TWO IS REALLY A TWENTY!** After doing this process, we sum the resulting numbers ("partial products") to get our final answer.

Using this, answer questions 1 – 5.

Section 2 – Division.

Before beginning, recall the names of parts of a division problem. For example, in $36 \div 5$.

$$\begin{array}{r}
 \text{Quotient} \\
 7 \text{ R}1 \\
 \hline
 \text{Divisor } 5 \overline{)36} \text{ Dividend} \\
 - 35 \\
 \hline
 1 \text{ Remainder}
 \end{array}$$

Now, let's go over the steps. Remember that, adding digit-by-digit, we ask ourselves "how many times can I fit the divisor into this digit?" If we cannot, we add a digit, and try the new number. We then find the multiple that gets us close to, but not over, that number, and place the partial quotient down and bring down the next digit. We continue from there by repeating the process with our. Importantly: we must leave our remainder as a **fraction**. This is simple: we put our **remainder over the divisor**.

Example: A school has to place 267 students into 25 homerooms. If each homeroom can fit 25 students, how many total homerooms do they need? First, divide $267 \div 25$.

$$\begin{array}{r}
 1 \\
 25 \overline{)267} \\
 - 25 \\
 \hline
 1
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 10 \\
 25 \overline{)267} \\
 - 25 \\
 \hline
 17 \\
 - 0 \\
 \hline
 17
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 10 \frac{17}{25} \\
 25 \overline{)267} \\
 - 25 \\
 \hline
 17 \\
 - 0 \\
 \hline
 17
 \end{array}$$

As you can see here, after dividing, we are left with an answer of $10 \frac{17}{25}$ rooms if we leave our remainder as a fraction. If we were only dividing, this answer would be acceptable. **However, you cannot have a "piece" of a room.** Therefore, we may need to sometimes round our quotient up to get a final answer. In this case, the *final* final answer would be 11 homerooms.

Using the knowledge from above, answer questions 6 – 12.

1. Multiply 268 by 22.
2. Multiply 1634 by 76.
3. Complete the operation: 534×812 .
4. Roderigo is saving up to buy himself a brand new scooter that costs \$212 after taxes. He earns \$15 per week from his allowance. He estimates that it will take him 14 weeks to save up to buy his scooter. Is he correct or incorrect?

9. **Set up** and complete the operation: $10,396 \div 72$. Leave your remainder as a fraction if necessary.
10. **At a fundraiser**, Simone receives \$15 in pledges (donations) for every mile she bikes. She only receives a donation for every **complete** mile that she bikes. How many miles must she bike to earn \$515 in pledges?
11. **Luna** is making beaded necklaces to sell at the local fair. If she uses 36 beads per necklace, how many necklaces can she make with 14,203 beads?

12. Johann and Lora are collecting fair prize tickets. Lora had a much better ticket strategy and collected 16 times more tickets than Johann. Together, they have 221 tickets. How many tickets do they have **individually**?