



2-Digit by 2-Digit Using Partial Products and Standard Algorithm

Purpose In 4.M.4 Ramp Up, students estimate and solve simple 2-digit by 2-digit multiplication problems using two methods: partial products and algorithms. Next, students test their problem solving skills as they analyze solutions to problems solved INCORRECTLY! Students must find the mistake that led to each wrong solution, explain it, and correct it.

About the Problems: Problem #2 requires students to know that there are 14 days in 2 weeks.

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> One-step problems | <input type="checkbox"/> Concrete Models | <input type="checkbox"/> Teacher-facilitated |
| <input type="checkbox"/> Two-step problems | <input type="checkbox"/> Array/Area Models | <input checked="" type="checkbox"/> Small group |
| <input type="checkbox"/> Multi-step problems | <input checked="" type="checkbox"/> Partial Products/Quotients | <input checked="" type="checkbox"/> Tutoring/Intervention |
| <input type="checkbox"/> Estimation | <input checked="" type="checkbox"/> Standard Algorithm | <input type="checkbox"/> Centers |
| | | <input checked="" type="checkbox"/> Challenge! |

Setting Up For Instruction

- Make 1 copy of **4.M.4 Ramp Up** for each student.

Thought Extenders

- What is the number written in expanded form?
- How can you make a rectangle that has the same dimensions as the factors in the problem?
- How is this model different from those in the previous lesson's problems?
- Check your arithmetic.
- What are the partial products?
- What is the sum of the partial products?
- Is the solution close to your estimate?
- In your explanation, did you use academic vocabulary? Can you use words from the Word Wall to help you explain?

How-To Guide

1. Put students in groups of 3–4. Hand out materials.
2. Have students work in groups to estimate and solve the problems and correct the problems that are incorrect.

Helping Students Write Better Explanations—A Couple of Ideas (4.1G)

#1

“Math speak” can be confusing for students. Even competent students sometimes have difficulty expressing their ideas. Build a *Word Wall* with your students in order to help them understand and use the terminology precisely and appropriately. For multiplication, use words like: place value, partial products, factors, dimensions, area, product, tens, ones, multiply, and add. Encourage your students to use several of the words from the wall in their explanations of the mistakes.

#2

ELAR TEKS 4.19 Writing/Persuasive Texts has a great cross-application in math. Have your students write precise explanations of why the wrong solutions are wrong. After that, collect them all and choose a few decent (but not super amazing) examples, preferably ones that focus on different aspects of the problem. Help your students merge these 3 different explanations into 1 GREAT explanation.



4.M.4 RAMP UP ANSWER KEY (PG. 1 of 2)

Directions: For Problems #1–#3, solve each problem using partial products and the standard algorithm.

| | Partial Products | Algorithm |
|--|---|---|
| <p>1 Groucho has 35 boxes. Each box has 16 hats in it. How many hats does Groucho have in his boxes?</p> | $ \begin{array}{r} 35 = 30 + 5 \\ \times 16 = 10 + 6 \\ \hline 30 \\ 180 \\ 50 \\ + 300 \\ \hline 560 \end{array} $ | $ \begin{array}{r} 35 \\ \times 16 \\ \hline 210 \\ + 350 \\ \hline 560 \end{array} $ <p>Solution: <u>560 hats</u></p> |
| <p>2 Saul loves spicy peanuts! Each day he spends \$28 to buy them. How much does he spend on spicy peanuts in 2 weeks?</p> | $ \begin{array}{r} 28 = 20 + 8 \\ \times 14 = 10 + 4 \\ \hline 32 \\ 80 \\ 80 \\ + 200 \\ \hline 392 \end{array} $ | $ \begin{array}{r} 28 \\ \times 14 \\ \hline 112 \\ + 280 \\ \hline 392 \end{array} $ <p>Correction: <u>\$392</u></p> |
| <p>3 Detective Elephant solves 26 cases each week. How many cases will she solve in 15 weeks?</p> | $ \begin{array}{r} 26 = 20 + 6 \\ \times 15 = 10 + 5 \\ \hline 30 \\ 100 \\ 60 \\ + 200 \\ \hline 390 \end{array} $ | $ \begin{array}{r} 26 \\ \times 15 \\ \hline 130 \\ + 260 \\ \hline 390 \end{array} $ <p>Solution: <u>390 cases</u></p> |





4.M.4 RAMP UP ANSWER KEY (PG. 2 of 2)

Directions: Problems #4–#6 have mistakes! Your job is to find the mistake, tell what the mistake is, and correct it.

| | Find the Mistake! | Correction |
|---|--|--|
| <p>4 The richest man in town has 21 dinner guests over for 12 desserts. That is 12 desserts for each person! How many desserts will be served altogether?</p> | $ \begin{array}{r} 21 = 20 + 1 \\ \times 12 = 10 + 2 \\ \hline 2 \\ 40 \\ 10 \\ + 20 \\ \hline 72 \end{array} $ | <p>What is the mistake? $20 \times 10 = 200$, not 20</p> <p>Correction:</p> <p>Solution: <u>252 desserts</u></p> |
| <p>5 Josephine, the proud kitty, has 18 kittens in her life. Each of Josephine's 18 kittens has 10 kittens of their own. How many kittens does Josephine's kitten have altogether?</p> | $ \begin{array}{r} 10 \qquad 8 \\ \boxed{\begin{array}{ c c } \hline 100 & 8 \\ \hline \end{array}} \\ 100 \\ + 8 \\ \hline 108 \end{array} $ | <p>What is the mistake? <i>Did not multiply 10×8</i></p> <p>Correction:</p> <p>Solution: <u>180 kittens</u></p> |
| <p>6 A metal factory can make 28 iron dumpsters every day. How many dumpsters can they make in 11 days?</p> | $ \begin{array}{r} 28 \\ \times 11 \\ \hline 8 \\ 20 \\ 8 \\ + 20 \\ \hline 56 \end{array} $ | <p>What is the mistake? <i>Multiplied 1×28 twice instead of multiplying 1×28 and 10×28</i></p> <p>Correction:</p> <p>Solution: <u>308 dumpsters</u></p> |



4.M.4 RAMP UP (PG. 1 of 2)

Name: _____

Directions: For Problems #1–#3, solve each problem using partial products and the standard algorithm.

| | Partial Products | Algorithm |
|--|------------------|------------------------|
| <p>1 Groucho has 35 boxes. Each box has 16 hats in it. How many hats does Groucho have in his boxes?</p> | | <p>Solution: _____</p> |
| <p>2 Saul loves spicy peanuts! Each day he spends \$28 to buy them. How much does he spend on spicy peanuts in 2 weeks?</p> | | <p>Solution: _____</p> |
| <p>3 Detective Elephant solves 26 cases each week. How many cases will she solve in 15 weeks?</p> | | <p>Solution: _____</p> |





4.M.4 RAMP UP (PG. 2 of 2)

Name: _____

Directions: Problems #4–#6 have mistakes! Your job is to find the mistake, tell what the mistake is, and correct it.

| | Find the Mistake! | Algorithm |
|---|---|---|
| <p>4 The richest man in town has 21 dinner guests over for 12 desserts. That is 12 desserts for each person! How many desserts will be served altogether?</p> | $\begin{array}{r} 21 = 20 + 1 \\ \times 12 = 10 + 2 \\ \hline 2 \\ 40 \\ 10 \\ + 20 \\ \hline 72 \end{array}$ | <p>What is the mistake?</p> <p>Correction:</p> <p>Solution: _____</p> |
| <p>5 Josephine, the proud kitty, has 18 kittens in her life. Each of Josephine's 18 kittens has 10 kittens of their own. How many kittens does Josephine's kitten have altogether?</p> | $\begin{array}{r} 10 \qquad 8 \\ \boxed{100 \quad 8} \\ + 8 \\ \hline 108 \end{array}$ | <p>What is the mistake?</p> <p>Correction:</p> <p>Solution: _____</p> |
| <p>6 A metal factory can make 28 iron dumpsters every day. How many dumpsters can they make in 11 days?</p> | $\begin{array}{r} 28 \\ \times 11 \\ \hline 8 \\ 20 \\ 8 \\ + 20 \\ \hline 56 \end{array}$ | <p>What is the mistake?</p> <p>Correction:</p> <p>Solution: _____</p> |

