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Lesson 1 MULTIPLY 3-DIGIT NUMBERS

PART ONE: Learn about multiplying by 1-digit factors



How can you multiply 3-digit numbers by 1-digit numbers?

Explore

You can use place value to multiply **2-digit numbers**.

Multiply the ones. Multiply the tens.
The **product** is 420.

How can you multiply **3-digit numbers**?

$$4 \times 132$$

$$\begin{array}{r} 84 \\ \times 5 \\ \hline 420 \end{array}$$

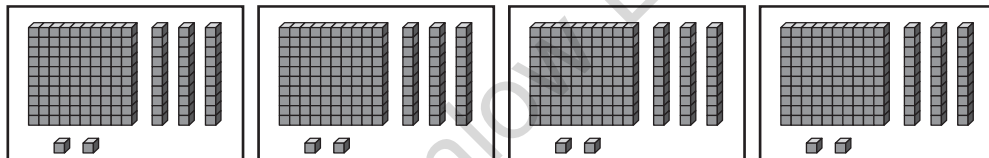
20 ones regrouped as 2 tens

Think

4×132 is the same as 4 groups of 132.

$132 =$ 1 hundred, 3 tens and 2 ones.

4 groups of 132



Connect

Set up the problem vertically. Follow the steps to multiply.

Step 1. Multiply the ones.

$$\begin{array}{r} 132 \\ \times 4 \\ \hline 8 \end{array}$$

Multiply 2 ones by 4 to get 8 ones.

Step 2. Multiply the tens.

$$\begin{array}{r} 132 \\ \times 4 \\ \hline 28 \end{array}$$

Multiply 3 tens by 4 to get 12 tens. Regroup 10 tens as 1 hundred.

Step 3. Multiply the hundreds.

$$\begin{array}{r} 132 \\ \times 4 \\ \hline 528 \end{array}$$

Multiply 1 hundred by 4 to get 4 hundreds. Add the regrouped hundred.

The product of $4 \times 132 = 528$.

Let's Talk

If there are only 4 hundreds blocks in the model, why does the product have 5 hundreds?



Think It Through

Fill in the blanks. Solve the problem.

Members of the year five class are giving 3 performances of their spring concert. The school theatre has 248 seats. They sold all the tickets available for each show.

How many tickets did they sell in all?

- 3×248 is the same as ____ groups of ____.
- $248 =$ ____ hundreds, ____ tens and ____ ones.

- Follow the steps to multiply 3×248 .

1. Multiply the ones.

Multiply 8 ones by 3 to get ____ ones.

Regroup 20 ones as ____ tens.

2. Multiply the tens.

Multiply 4 tens by 3 to get ____ tens.

Add the regrouped ones to get ____ tens.

Regroup 10 tens as ____ hundred.

3. Multiply the hundreds.

Multiply 2 hundreds by 3 to get ____ hundreds.

Add the regrouped hundred to get ____ hundreds.

$$\begin{array}{r} \square \square \\ 248 \\ \times 3 \\ \hline \square \square \square \end{array}$$

You can draw models of base-ten blocks to help check your multiplication. Remember to regroup blocks when there are 10 or more than 10 of them.



Solution: The year five class sold ____ tickets.

Your Turn

Now, use what you know to solve this problem.

1. A shop ordered 5 boxes of rulers. There are 125 rulers in each box. What is the total number of rulers the shop ordered?
 - (A) 505
 - (B) 580
 - (C) 625
 - (D) 705

PART TWO: Learn about multiplying by 2-digit factors



How can you multiply 3-digit numbers by 2-digit numbers?

Explore

To multiply a 3-digit number by a 1-digit number, use place value to multiply each digit in the 3-digit number by the 1-digit number. Regroup as needed.

$$\begin{array}{r} 11 \\ 236 \\ \times 3 \\ \hline 708 \end{array}$$

How can you multiply 3-digit numbers by 2-digit numbers? 23×381

Think

Estimate the product. Round **factors** to numbers that are easy to multiply.

Round 23 to 20. Round 381 to 400.

The estimated product is $\underline{20} \times \underline{400} = \underline{8000}$.

The actual product should be close to 8000.

Connect

Find the actual product. Set up the problem vertically. Follow the steps.

Step 1. Multiply the ones, tens and hundreds by the ones.

Step 2. Multiply the ones, tens and hundreds by the tens. Write 0 in the ones place because the tens are being multiplied.

Step 3. Add the **partial products** to find the product.

$$\begin{array}{r} 2 \\ 381 \\ \times 23 \\ \hline 1143 \end{array}$$

$$\begin{array}{r} 1 \\ 381 \\ \times 23 \\ \hline 1143 \\ 7620 \end{array}$$

$$\begin{array}{r} 381 \\ \times 23 \\ \hline 1143 \\ + 7620 \\ \hline 8763 \end{array}$$

Multiply 381 by 3 ones. Multiply 381 by 2 tens. Add 1143 and 7620.

The actual product of $23 \times 381 = 8763$. This is close to the estimate 8000.

Let's Talk

Why was it necessary to write a zero in the second partial product?



Fill in the blanks. Solve the problem.

Martin put \$186 into his bank account each month for 18 months.
How much money did Martin save?

■ Estimate the product.

Round 18 to _____. Round 186 to _____.

The estimated product is _____ \times _____ = _____.

The actual product should be close to _____.

■ Follow the steps to multiply 18×186 .

1. Multiply the ones, tens and hundreds by the ones. So, multiply _____ by _____ ones. Regroup as needed. Write the partial product.

2. Multiply the ones, tens and hundreds by the tens. So, multiply 186 by _____ ten. Write _____ in the ones place because the tens are being multiplied. Write the partial product.

3. Add the partial products to find the product.

■ The actual product, _____, is close to the estimate of _____. The answer is reasonable.

Solution: Martin saved \$_____ in all.

For this product, you need to regroup when multiplying the ones in the 2-digit number, but not the tens. Be sure to **not** add the regrouped numbers again when you find the second partial product.



	1		8		6
			\times		18
+					

Your Turn

Now, use what you know to solve this problem.

2. There are 365 days in 1 year.
How many days are there in 21 years?
Show your work.

$21 \times 365 = \underline{\hspace{2cm}}$ days

PART THREE: Choose the right answer

Solve the problem. Then read why each answer choice is correct or not correct.

Solve

Mr Wilson drives 143 kilometres to and from work each day.
What is the total number of kilometres he drives in 9 days?

- (A) 967
- (B) 1142
- (C) 1287
- (D) 1627

Check

Check to see if you chose the correct answer.

Find the product of 9×143 . Set up the problem vertically.

Multiply the ones: $9 \times 3 = 27$. Regroup 20 ones as 2 tens.

Multiply the tens: $9 \times 4 = 36$. Add the regrouped tens and regroup 30 tens as 3 hundreds.

Multiply the hundreds: $9 \times 1 = 9$. Add the regrouped hundreds.

The product is 1287.

So, the correct answer is (C).

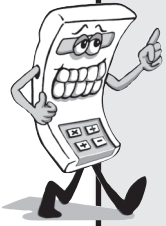
Why are the other answer choices not correct?

(A) 967	The regrouped amounts are <i>not</i> included in this answer.
(B) 1142	Each digit in 143 was <i>added</i> to 9 instead of multiplied by 9.
(D) 1627	The 2 regrouped tens were <i>multiplied</i> instead of added.

$$\begin{array}{r} 32 \\ 143 \\ \times 9 \\ \hline 1287 \end{array}$$


Your Turn

Solve each problem. Use the hints to avoid mistakes.



- Identify the numbers being multiplied. Write the multiplication vertically with the number with fewer digits on the bottom.
- Regroup amounts as needed. Remember to add (not multiply) the regrouped amounts.
- When multiplying a 3-digit number by the tens place of a 2-digit number, write a zero in the ones place to be sure the partial product has the correct place value.

3. What are the partial products when multiplying 492×13 ?
- (A) 1476 and 4920
 (B) 14760 and 492
 (C) 2476 and 492
 (D) 1276 and 4920
4. There are 124 seats on a small aeroplane. An airline owns 35 of these aeroplanes. How many seats are there in all the aeroplanes?
- (A) 992
 (B) 1590
 (C) 3724
 (D) 4340
5. An animal shelter can hold 268 dogs. Each dog needs 2 bowls: one for its food and one for its water. What is the total number of bowls the animal shelter needs?
- (A) 426
 (B) 490
 (C) 536
 (D) 686
6. A book company is inviting 8 students from each school to submit an essay for a contest. There are 231 schools. What is the total number of students who may submit essays to the contest?
- (A) 2318
 (B) 1848
 (C) 1648
 (D) 1119

PART FOUR: Write the best answer

Study the model. It is a good example of a written answer.

Student model

Each shelf in the public library can hold 267 books. There are 36 shelves in the fiction section. How many fiction books can this section of the library hold?

Use pictures, words or numbers to show your work.

Estimate. $40 \times 250 = 10\,000$

Find 36×267 .

1. Multiply 267 by 6 ones.
2. Multiply 267 by 3 tens.
3. Add the partial products.

$$\begin{array}{r} 22 \\ 44 \\ 267 \\ \times 36 \\ \hline 1602 \\ + 8010 \\ \hline 9612 \end{array}$$

Solution: The library can place 9612 books in the fiction section.

Explain how you got your answer.

I needed to find the product of a 3-digit number and a

2-digit number, so I first estimated: $40 \times 250 = 10\,000$.

Then, I multiplied the ones, tens and hundreds in 267 by

the 6 ones in 36 and wrote the partial product. Next,

I multiplied the ones, tens and hundreds in 267 by the

3 tens in 36. Because I was multiplying by tens, I wrote

a zero in the ones place of the partial product. Finally,

I added the partial products, 1602 and 8010, to find

the product, 9612.

The student shows each step.

The student correctly answers the question asked.

The student gives important details about how to find the product.

The student uses the maths words *product*, *3-digit number*, *2-digit number*, *estimate* and *partial products*.

Show

Explain


Your Turn

Solve the problem. Use what you learned from the model.

7. A battery can power a radio for 201 hours. For how many hours can a 24-pack of batteries power the radio?

Use pictures, words or numbers to show your work.


CHECKLIST

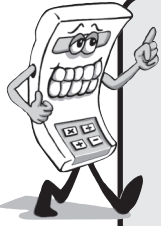
Did you . . .

- show each step?
- answer the question asked?
- give important details?
- use maths words?

Solution: A 24-pack of batteries can power the radio for _____ hours.

Explain how you got your answer.

PART FIVE: Prepare for a test



As you solve multiplication problems, remember to:

- write the steps to multiply 3-digit numbers by 1- or 2-digits.
- add the regrouped amounts.
- add the partial products together to find the product.
- estimate to check if your answer is reasonable.

Solve each problem.

8. A skateboard company produces 258 skateboards each week. Every skateboard has 4 wheels. How many wheels does the company use each week to produce the skateboards?
- (A) 802
(B) 1032
(C) 2584
(D) 4258
9. Brooke is using a hose to fill a swimming pool. The hose adds 826 litres of water to the pool each hour. How many litres of water can Brooke add to the swimming pool in 5 hours?
- (A) 4130 litres
(B) 4100 litres
(C) 4000 litres
(D) 911 litres
10. A movie complex has 12 theatres. Each theatre has 328 seats. What is the total number of seats in the movie complex?
- (A) 984
(B) 1646
(C) 3400
(D) 3936
11. A spider has 8 legs. Which is the most reasonable estimate for the total number of legs 532 spiders have?
- (A) 580
(B) 3600
(C) 4000
(D) 5800
12. One truck carries 682 oranges. How many oranges do 12 trucks carry?
- (A) 12 682
(B) 8184
(C) 6700
(D) 2046

13. A farmer bought 362 packages of seeds. Each package contains 24 seeds. How many seeds did the farmer buy in all?

- Ⓐ 2172
- Ⓑ 2534
- Ⓒ 3860
- Ⓓ 8688

14. One chocolate-chip biscuit has 358 kilojoules. Write an equation that shows the total number of kilojoules in 9 chocolate-chip biscuits.

15. A zookeeper feeds the giraffes 382 kilograms of food each week. How much food does the zookeeper need to feed the giraffes for one year? (Hint: There are about 52 weeks in one year.)

Use pictures, words or numbers to show your work.

Solution: The zookeeper needs _____ kilograms of food.

Explain how you found your answer.
