

Important Concepts . . .

Preview Review



Mathematics Grade 4 *TEACHER KEY*

W2 - Lesson 2: Multiplication 2

Important Concepts of Grade 4 Mathematics

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Materials Required

Mathematics Grade 4

Version 5

Preview/Review W2 - Lesson 2 TEACHER KEY

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Preview/Review Concepts for Grade Four Mathematics

TEACHER KEY



*W2 - Lesson 2:
Multiplication 2*

OBJECTIVES

By the end of the lesson, you should

- use mental math strategies to multiply by 10 and 100
- use estimation strategies (rounding) and mental math to solve problems
- use estimation to verify solutions to multiplication problems or to find approximate answers
- multiply 2-digit numbers by 1-digit numbers
 - long form (expansion)
 - short form
- multiply 3-digit numbers by 1-digit numbers
 - long form (expansion)
 - short form
- choose the correct operations for addition, subtraction, and multiplication story problems

GLOSSARY

estimate - to make a careful guess that is close to the actual value without calculating it exactly

expanded form - a way of writing a number so the place value of each digit is shown; for example, $834 = 800 + 30 + 4$

HTO chart - a place value chart with three columns: hundreds, tens, and ones

regrouping - to move a number from one place value column and add it to another; also known as *carrying* or *borrowing*

rounded number - a number that is approximately equal to a given number; for example, 2 775 rounded to the nearest hundred is 2 800

W2 - Lesson 2: Multiplication 2

A. Introduction

This lesson deals once again with multiplication and builds on what was learned in W2 - Lesson 1. In this lesson, you will use larger numbers in your computations. First, you will look at a mental math strategy to use when you are multiplying by 10 or 100. Then, you will learn how to use estimation and rounding to help you multiply larger numbers.

B. Tacking on Zeros

First, let's review the basic multiplication facts for 10. Fill in these blanks.

$$1 \times 10 = \underline{10}$$

$$6 \times 10 = \underline{60}$$

$$2 \times 10 = \underline{20}$$

$$7 \times 10 = \underline{70}$$

$$3 \times 10 = \underline{30}$$

$$8 \times 10 = \underline{80}$$

$$4 \times 10 = \underline{40}$$

$$9 \times 10 = \underline{90}$$

$$5 \times 10 = \underline{50}$$

$$10 \times 10 = \underline{100}$$

Can you see a pattern?

When you multiply a number by ten, you simply **tack on a zero** to the number being multiplied.

A similar pattern occurs when you multiply by 100.

$$5 \times 100 = \underline{500}$$

$$9 \times 100 = \underline{900}$$

When you multiply a number by one hundred, you **tack on two zeros** to the number being multiplied.

These two mental math strategies work for larger numbers as well.

$$19 \times 10 = \underline{190}$$

$$54 \times 10 = \underline{540}$$

$$19 \times 100 = \underline{1\,900}$$

$$54 \times 100 = \underline{5\,400}$$

Your Turn!

1. Complete each of the following. Use the “tacking on zeros” strategy.

a. $20 \times 10 = \underline{200}$

b. $5 \times 100 = \underline{500}$

c. $78 \times 10 = \underline{780}$

d. $176 \times 10 = \underline{1\,760}$

e. $477 \times 10 = \underline{4\,770}$

f. $80 \times 100 = \underline{8\,000}$

g. $18 \times 100 = \underline{1\,800}$

h. $100 \times 10 = \underline{1\,000}$

i. $101 \times 10 = \underline{1\,010}$

j. $68 \times 10 = \underline{680}$

C. Estimating and Rounding Numbers

An **estimate** is an approximate guess. You can use estimation to solve a problem if you **do not** need to know the exact answer. Estimates are usually made in your head using mental math.

When estimating, you often have to multiply in your head numbers that have been rounded to the nearest 10 or 100.



1. Round the following numbers to the nearest 10.

Remember: Numbers are rounded down if the digit in the **ones** place is **less than 5**.

$$74 \xrightarrow{\text{rounds to}} 70$$

Numbers are rounded up if the digit in the **ones** place is **5 or greater**.

$$25 \xrightarrow{\text{rounds to}} 30$$

a. $47 \underline{\quad 50 \quad}$

b. $63 \underline{\quad 60 \quad}$

c. $55 \underline{\quad 60 \quad}$

d. $82 \underline{\quad 80 \quad}$

e. $94 \underline{\quad 90 \quad}$

f. $19 \underline{\quad 20 \quad}$

2. Estimate the answer for each question below. First, round the larger number to the nearest ten. Then, multiply to find the estimated answer. Use the **tacking on zeros** strategy.

Example: $7 \times 39 = \underline{7} \times \underline{40} = \underline{280}$

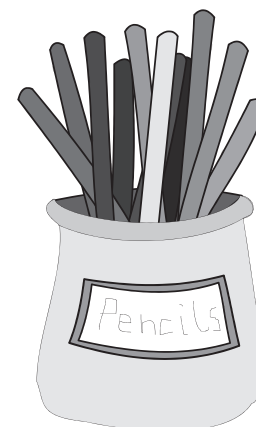
a. $6 \times 54 = \underline{6} \times \underline{50} = \underline{300}$

b. $4 \times 78 = \underline{4} \times \underline{80} = \underline{320}$

c. $26 \times 9 = \underline{30} \times \underline{9} = \underline{270}$

d. $95 \times 3 = \underline{100} \times \underline{3} = \underline{300}$

e. $6 \times 67 = \underline{6} \times \underline{70} = \underline{420}$



Using Rounded Numbers to Solve Problems

You can use rounded numbers to solve multiplication problems if you do not need the exact answer.

Example:

67 students are planning a school field trip. They want to visit a museum. Each ticket costs \$8. Estimate **about** how much money they need to go to the museum?

To find the approximate answer, first round 67 to 70.

Then multiply $70 \times \$8 = \560

Answer: They need about \$560 to go to the museum.

3. Use estimation to find the approximate answers to each of the following story problems. (Show which numbers you multiplied in your head.) Then write a sentence answer for each.

- a. Harry bought 4 DVDs for presents. Each DVD cost \$18. About how much did he spend?

$$18 \rightarrow 20$$

$$4 \times 20 = 80$$

Harry spent about \$80 for the DVDs.

- b. A group of Scouts went for a long bike trip. They were able to cycle about 23 kilometres per hour. The whole trip took them 7 hours. About how many kilometres was their entire trip?

$$23 \rightarrow 20$$

$$7 \times 20 = 140$$

Their trip was 140 km long.

- c. Would 9×87 be less or more than one thousand? Use only estimation to find your answer. Show how you calculated your estimate in your head.

$$87 \rightarrow 90$$

$$9 \times 90 = 810$$

9×90 would be less than one thousand.

Checking To See if Your Answer is Reasonable

Estimation is also useful for checking to see if an answer you calculated is

- likely correct (reasonable)
- likely too large
- likely too small



4. In each question below, an answer has already been calculated. Your task is to do the estimation on the right. Use your estimate to help you decide if the calculated answer is

- likely correct (reasonable)
- likely too large
- likely too small

Example:

Calculated answer

$$91 \times 7 = \underline{797}$$

797 is likely too large.

Estimation

$$\text{Round } 91 \longrightarrow 90, \text{ then } 90 \times 7 = \underline{630}$$

a. **Calculated answer****Estimation**

$$4 \times 65 = \underline{340}$$

$$4 \times 70 = \underline{280}$$



340 is likely too large.

b. **Calculated answer****Estimation**

$$78 \times 6 = \underline{368}$$

$$80 \times 6 = \underline{480}$$



368 is likely too small.

c. **Calculated answer****Estimation**

$$5 \times 82 = \underline{410}$$

$$5 \times 80 = \underline{400}$$



410 is likely correct.

d. **Calculated answer****Estimation**

$$5 \times 77 = \underline{585}$$

$$5 \times 80 = \underline{400}$$



585 is likely too large.

Remember:

You can use estimation and rounding to

- *find approximate products*
- *check to see if answers are reasonable*
- *calculate products mentally*

D. Multiplying 2-Digit Numbers by 1-Digit Numbers

Sometimes it is easier to multiply two numbers together if the larger number is expanded. When we expand a number, we look at the place value of each digit.

Example:

42 is made up of 4 tens and 2 ones or $40 + 2$.

You can find the product of 42×3 by multiplying both 40 and 2 by 3.

$$\begin{aligned}
 42 \times 3 &= (40 + 2) \times 3 \\
 &= (40 \times 3) + (2 \times 3) \\
 &= 120 + 6 \\
 &= 126
 \end{aligned}$$

Here is the same calculation arranged vertically.

$$\begin{array}{r}
 = 42 \times 3 \rightarrow 42 \rightarrow 40 + 2 \\
 \quad \quad \quad \times 3 \\
 \hline
 \end{array}
 \qquad
 \begin{array}{r}
 42 \\
 \times 3 \\
 \hline
 6 \quad (3 \times 2) \\
 + 120 \quad (3 \times 40) \\
 \hline
 126
 \end{array}$$

Your Turn!

1. Expand the following numbers. The first one has been done for you.

Example: $24 = 20 + 4$

a. $36 = \underline{30 + 6}$

b. $91 = \underline{90 + 1}$

c. $48 = \underline{40 + 8}$

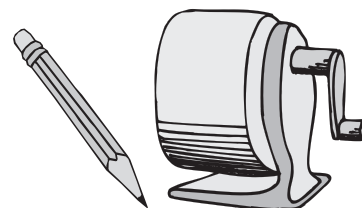
d. $55 = \underline{50 + 5}$

2. Find the product of 48 and 7. Expand the 48 first.

$$\begin{aligned} 48 \times 7 &= (\underline{40} + \underline{8}) \times \underline{7} \\ &= (\underline{40 \times 7}) + (\underline{8 \times 7}) \\ &= \underline{280} + \underline{56} \\ &= \underline{336} \end{aligned}$$

OR

$$\begin{array}{r} 48 \times 7 \rightarrow 48 \rightarrow \\ \quad \times 7 \\ \hline \end{array} \quad \begin{array}{r} \boxed{40} + \boxed{8} \\ \times \quad 7 \\ \hline \boxed{56} \\ + \quad \boxed{280} \\ \hline \boxed{336} \end{array}$$



3. Now find the products for each of the following numbers. Expand the larger number first. Use either method as shown in Question 2.

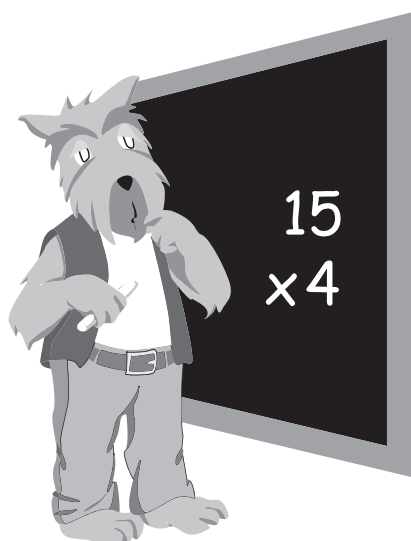
a. $57 \times 4 = \underline{228}$

b. $39 \times 6 = \underline{234}$

c. $81 \times 9 = \underline{729}$

d. $73 \times 5 = \underline{365}$

Note: Students must use either the expanded method or the short method for each question.



Using the Short Form of Multiplication

The most common method of multiplying is called the **short form method** of multiplication. To use the short form method, you must use **regrouping**. You have already learned how to regroup numbers when you add and subtract.

Look at the example below that uses an HTO chart to multiply the factors.

Multiply 56×7 .

H	T	O
	4	
	5	6
		$\times 7$
		2

Step 1: Multiply the ones ($7 \times 6 = 42$).
(Remember 42 is $40 + 2$ or 4 tens and 2 ones)

Step 2: Write the 2 ones below the line in the Ones column.
Regroup the 4 tens to the Tens column.
Write a small 4 above the five in the Tens column.

H	T	O
	4	
	5	6
		$\times 7$
3	9	2

Step 3: Multiply the tens ($7 \times 5 = 35$ tens).
Add the regrouped 4 tens ($35 + 4 = 39$ tens).

Step 4: Write the 9 below the line in the Tens column.
Write the 3 (30 tens) below the line in the hundreds column.

The answer is 392.

4. Multiply using the short form method.

a.

H	T	O
	5	2
		$\times 4$
2	0	8

b.

H	T	O
	3	8
		$\times 7$
2	6	6

c.

H	T	O
	9	6
		$\times 5$
4	8	0

5. Use the short form method to find the product of the following factors. Then, use estimation to see if each answer is reasonable. An example is done for you.

Example:

$$\begin{array}{r} 43 \\ \times 8 \\ \hline 344 \end{array}$$

Estimate: Round 43 \longrightarrow 40
 Multiply \longrightarrow $\begin{array}{r} 40 \\ \times 8 \\ \hline 320 \end{array}$

Because the calculated answer (344) is close to the estimate (320), we can say 344 is a reasonable answer.

	Estimate		Estimate
a. $\begin{array}{r} 32 \\ \times 4 \\ \hline 128 \end{array}$	$\begin{array}{r} 30 \\ \times 4 \\ \hline 120 \end{array}$	b. $\begin{array}{r} 74 \\ \times 7 \\ \hline 518 \end{array}$	$\begin{array}{r} 70 \\ \times 7 \\ \hline 490 \end{array}$

	Estimate		Estimate
c. $\begin{array}{r} 58 \\ \times 6 \\ \hline 348 \end{array}$	$\begin{array}{r} 60 \\ \times 6 \\ \hline 360 \end{array}$	d. $\begin{array}{r} 84 \\ \times 2 \\ \hline 168 \end{array}$	$\begin{array}{r} 80 \\ \times 2 \\ \hline 160 \end{array}$

	Estimate		Estimate
e. $\begin{array}{r} 29 \\ \times 3 \\ \hline 87 \end{array}$	$\begin{array}{r} 30 \\ \times 3 \\ \hline 90 \end{array}$	f. $\begin{array}{r} 99 \\ \times 9 \\ \hline 891 \end{array}$	$\begin{array}{r} 100 \\ \times 9 \\ \hline 900 \end{array}$

E. Multiplying 3-Digit Numbers by 1-Digit Numbers

Multiplying a three-digit number by a one-digit number is very similar to what you have already done. You must use regrouping to find your answer. Usually you will need to regroup two times. First, you will regroup the ones. Then, you will regroup the tens.

Let's review rounding numbers to the **nearest hundred**.

Remember:

*Numbers are rounded down if the digit in the **tens** place is **less than 5**.*

$$242 \longrightarrow 200$$

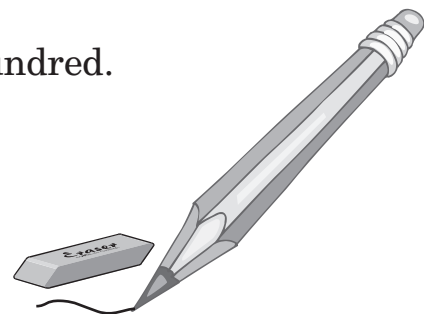
*Numbers are rounded up if the digit in the **tens** place is **5 or greater**.*

$$183 \longrightarrow 200$$

Your Turn!

1. Round the following numbers to the nearest hundred.
An example is done for you.

Example: 561 is rounded to 600



- a. 129 is rounded to 100 b. 548 is rounded to 500
c. 459 is rounded to 500 e. 768 is rounded to 800
e. 98 is rounded to 100 f. 999 is rounded to 1 000

2. Estimate the answer for each question below. First, round the larger number to the nearest hundred. Then, multiply to find the estimate. Use the **Tacking on Zeros** strategy.

Example: $762 \times 4 = \underline{800 \times 4 = 3\,200}$

- a. $632 \times 3 = \underline{600 \times 3 = 1\,800}$ b. $299 \times 6 = \underline{300 \times 6 = 1\,800}$
 c. $561 \times 8 = \underline{600 \times 8 = 4\,800}$ d. $968 \times 9 = \underline{1000 \times 9 = 9\,000}$
 e. $187 \times 3 = \underline{200 \times 3 = 600}$ f. $450 \times 5 = \underline{500 \times 5 = 2\,500}$

Earlier in this lesson you learned to use the expanded number method and the short form method to multiply numbers. You can use both of these methods to find the products when you multiply three-digit numbers.

3. Find the following products. First, find the product using the **expanded number method**. Then, check your answer by finding the product again using the **short form method**. Your answer should be the same with both methods.

Example:

Expanded Number Method

$$\begin{array}{r}
 225 \\
 \times 5 \\
 \hline
 25 \\
 + 100 \\
 + 1\,000 \\
 \hline
 1\,125
 \end{array}$$

Short Form Method

$$\begin{array}{r}
 \overset{1}{2} 25 \\
 \times 5 \\
 \hline
 1\,125
 \end{array}$$

Expanded Number Method

a.
$$\begin{array}{r} 312 \\ \times 7 \\ \hline 2100 \\ 70 \\ \hline 2184 \end{array}$$

Short Form Method

b.
$$\begin{array}{r} 312 \\ \times 7 \\ \hline 2184 \end{array}$$

Expanded Number Method

c.
$$\begin{array}{r} 843 \\ \times 2 \\ \hline 1600 \\ 80 \\ \hline 1686 \end{array}$$

Short Form Method

d.
$$\begin{array}{r} 843 \\ \times 2 \\ \hline 1686 \end{array}$$

Expanded Number Method

e.
$$\begin{array}{r} 684 \\ \times 8 \\ \hline 4800 \\ 640 \\ \hline 5472 \end{array}$$

Short Form Method

f.
$$\begin{array}{r} 684 \\ \times 8 \\ \hline 5472 \end{array}$$

F. Problem Solving

Choosing the Correct Operation

In the Four-Step Problem-Solving Process, you are asked to make a plan or choose a strategy at Step 2. Sometimes, a special strategy such as the *Make-A-List* strategy is needed. For other problems, all you need to do is choose the correct operation to solve the problem.

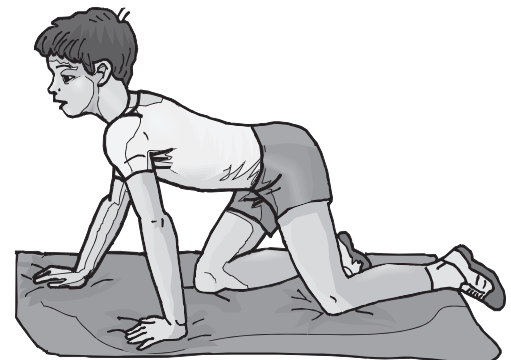
Four-Step Process for Problem Solving	
Step 1	Understand the problem
Step 2	Make a plan
Step 3	Try the plan
Step 4	Look back

For each of the following problems, choose the correct operation, and then solve the problem.

1. Les does 18 minutes of exercise each morning. How many minutes does he spend exercising in 7 days?

$$\begin{array}{r} 18 \\ \times 7 \\ \hline 126 \end{array}$$

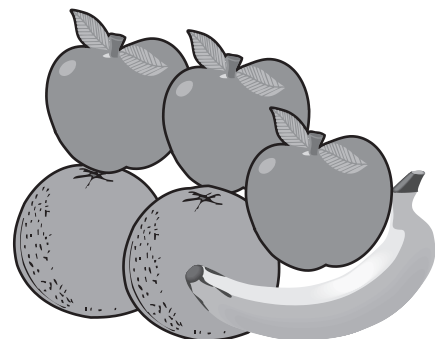
7 × 18 = 126
Les spends 126 minutes exercising in 7 days.



2. Mary bought some fruit for supper. She bought a banana for 49 cents, 2 oranges for 35 cents each, and 3 apples for 55 cents each. How much did she spend?

Banana 1 × 49 = \$0.49
Oranges 2 × 35 = \$0.70
Apples 3 × 55 = \$1.65
\$2.84

Mary spent \$2.84.



3. John walks 2 kilometres each morning and then 2 more kilometres each afternoon. How many kilometres does he walk in 1 week?

$$(2 + 2) \times 7 = ?$$

$$4 \times 7 = \underline{28}$$

John will walk 28 km in one week.



4. A teacher wanted to buy 6 stickers for each of the 30 students in her class. The sheets of stickers that she bought had 7 rows of 5 stickers each. She bought 5 sheets. Did she buy enough stickers? Show your calculation.

1 sheet of stickers

5 sheets of stickers

$$7 \times 5 = 35 \text{ stickers}$$

$$35$$

$$\times 5$$

175 stickers



Teacher needs $6 \times 30 = 180$ stickers

Therefore, the teacher did not buy enough stickers.

5. There are 28 children and 1 teacher in the library. Each child takes out 4 books. How many books did the children take out?

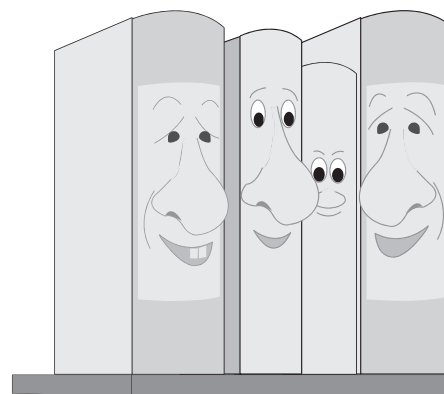
$$28$$

$$\times 4$$

$$\underline{112}$$

The children took out

112 books.



Homework

1. Use the **Tacking on Zeros** Strategy to answer the following questions.

a. $32 \times 100 = \underline{3\ 200}$

b. $76 \times 100 = \underline{7\ 600}$

c. $10 \times 111 = \underline{1\ 110}$

d. $100 \times 12 = \underline{1\ 200}$

e. $40 \times 100 = \underline{4\ 000}$

f. $10 \times 100 = \underline{1\ 000}$

2. Estimate the answer for each question below.

Example: $49 \times 3 = \underline{50 \times 3 = 150}$

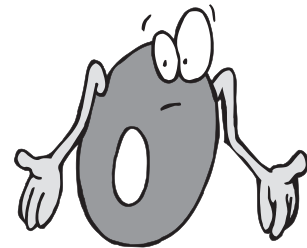
a. $3 \times 27 = \underline{3 \times 30 = 90}$

b. $69 \times 4 = \underline{70 \times 4 = 280}$

c. $18 \times 8 = \underline{20 \times 8 = 160}$

d. $22 \times 7 = \underline{20 \times 7 = 140}$

e. $39 \times 9 = \underline{40 \times 9 = 360}$



3. Find the product. Use the short method.

$$\begin{array}{r} \text{a.} \quad 74 \\ \times 6 \\ \hline 444 \end{array}$$

$$\begin{array}{r} \text{b.} \quad 85 \\ \times 4 \\ \hline 340 \end{array}$$

$$\begin{array}{r} \text{c.} \quad 39 \\ \times 7 \\ \hline 273 \end{array}$$

$$\begin{array}{r} \text{d.} \quad 52 \\ \times 8 \\ \hline 416 \end{array}$$

4. Find the product. Use the short method.

$$\begin{array}{r} \text{a.} \quad 165 \\ \times 3 \\ \hline 495 \end{array}$$

$$\begin{array}{r} \text{b.} \quad 590 \\ \times 5 \\ \hline 2\ 950 \end{array}$$

$$\begin{array}{r} \text{c.} \quad 184 \\ \times 9 \\ \hline 1\ 656 \end{array}$$

$$\begin{array}{r} \text{d.} \quad 264 \\ \times 7 \\ \hline 1\ 848 \end{array}$$

