Lesson 7

DIVIDE WHOLE NUMBERS NY-6.NS.2

INTRODUCTION

Real-World Connection

On a cross-country road trip one summer, Casey's family drove 7,205 miles. If they drove an average speed of 55 miles per hour, how many hours did they drive? Let's practice the skills in the **Guided Instruction** and **Independent Practice** and, at the end of the lesson, see how long the trip was!

What I Am Going to Learn

- How to divide multi-digit numbers using the division algorithm

What I May Already Know

- I know how to multiply multi-digit numbers.

- I know how to divide numbers up to four digits by one- and two-digit numbers.

Vocabulary in Action

A shorter method of division to divide large numbers is called the division **algorithm**.

- An algorithm is a step-by-step method.

- Look at the **dividend,** which is the number you are dividing and is inside the division bracket. Find how many groups of the **divisor** there are for each place value part of the dividend. The divisor is the number you are dividing by and is placed on the left outside the division bracket.

- The **quotient** is the answer, and it will be found by adding these groups together.

EXAMPLE

Divide: 6,136 ÷ 26

$$26\overline{)6136}$$

How many groups of 26 are in 6,136?

Step One Start with the greatest place value.

Would there be 1,000 groups of 26 in 6,136? No: $26 \times 1,000 = 26,000$.

Would there be at least 100 groups of 26 in 6,136?

Yes: $26 \times 100 = 2,600$, $26 \times 200 = 5,200$, $26 \times 300 = 7,800$.

So, start with 200 groups of 26.

Write 2 in the hundreds place and subtract 5,200 from 6,136 to see what is left to divide.

$$\begin{array}{r} 2 \\ 26\overline{)6136} \\ -5200 \\ \hline 936 \end{array}$$

Step Two Determine how many groups of 26 are left.

Would there be at least 20 groups of 26 in 936? Yes: $26 \times 20 = 520$, $26 \times 30 = 780$, $26 \times 40 > 1,000$, since 25×40 is 1,000.

So, there are 30 groups of 26.

Write 3 in the tens place and subtract 780 from 936 to see what is left to divide.

There are 156 left.

$$\begin{array}{r} 23 \\ 26\overline{)6136} \\ -5200 \\ \hline 936 \\ -780 \\ \hline 156 \end{array}$$

◀ **TIPS AND HINTS**

Check that the quotient is correct by multiplying it by the divisor to see if it equals the dividend.

Step Three You know that 4 groups of 26 equals about 100.

Would 5 groups of 26 work? Yes: $26 \times 5 = 130$.

$26 \times 6 = 156$

So, 6 groups of 26 will finish the problem.

Write 6 in the ones place and subtract 156 from 156.

So, $6,136 \div 26 = 236$

$$\begin{array}{r} 236 \\ 26\overline{)6136} \\ -5200 \\ \hline 936 \\ -780 \\ \hline 156 \\ -156 \\ \hline 0 \end{array}$$

GUIDED INSTRUCTION

A farmer plants 5,637 corn plants in 215 rows in a field. How many corn plants are in each row?

1. $5,637 \div 215 = ?$

Step One Start with the greatest place value and work down.

Are there 1,000 groups of 215? No, $215 \times 1,000 = 215,000$.

Are there 100 groups of 215? No, $215 \times 100 \div 21,500$.

Are there 10 groups of 215? Yes, $215 \times 10 = 2,150$.

How about 20 groups of 215? Yes, $215 \times 20 = 4,300$.

Will 30 groups of 215 work? No, $215 \times 30 = 6,450$.

Write 2 in the tens place and subtract 4,300 from 5,637 to see how many are left.

$$
\begin{array}{r}
2 \\
215\overline{)5637} \\
-4300 \\
\hline
1337
\end{array}
$$

Step Two Determine how many groups of 215 are left.

$215 \times 5 \approx 200 \times 5$, about 1,000.

Will 6 groups work? Yes, $215 \times 6 = 1,290$.

Will 7 groups work? No, $200 \times 7 = 1,400$.

Write 6 in the ones place and subtract 1,290 from 1,337 to see how many are left.

$$
\begin{array}{r}
26 \\
215\overline{)5637} \\
-4300 \\
\hline
1337 \\
-1290 \\
\hline
47
\end{array}
$$

There are 47 left, which is less than 215, so no more groups can be taken.

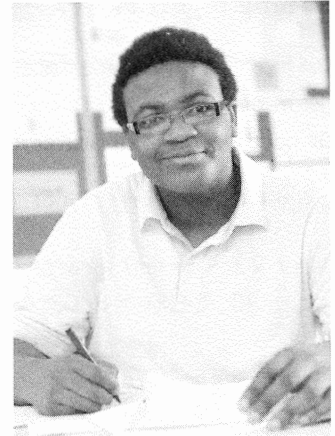$5,637 \div 215 =$ [_____] with [_____] left over.

TIPS AND HINTS

Estimation and rounding are useful when deciding how many groups you can take.

Step Three Check that the quotient is correct.

$215 \times 20 = 4,300$

$215 \times 6 = 1,290$

$+ \ 47$

2. You can also divide by looking at part of the dividend at a time and bringing down the next part of the dividend when ready. Fill in the missing numbers.

Step One Divide.

$41\overline{)4\quad9\quad2}$

TURN AND TALK

Discuss the point of the arrow in the problem.

Step Two Check your answer.

$\times$

$4 \quad 9 \quad 2$

3. Charisse earned $4,368 last year working as a babysitter and dog walker. How much did she earn per week? (There are 52 weeks in a year.)

Ⓐ $8

Ⓑ $84

Ⓒ $364

Ⓓ $840

TIPS AND HINTS

How many digits will the quotient be? Round 52 to 50 and $4,368 to $4,000 to see.

Learning Together

With a partner, practice determining the first answer number in a division problem. Take turns writing division problems with two or three digits in the divisor and three or four digits in the dividend. When your partner writes a problem, you call out the first number in the answer and explain why.

Example: Partner #1: $431\overline{)7482}$

Partner #2: The first answer number would be 1 because $2 \times 400 = 800$, which is greater than 748 or because $20 \times 400 = 8000$, which is greater than 7482.
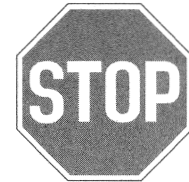
How Am I Doing?

What questions do you have?

_____

_____

_____

_____

How do you divide using the division algorithm?

_____

_____

_____

_____

_____

What is one example in which long division would be used in everyday life?

_____

_____

_____

_____

_____

_____

_____

Circle the sign that shows how you are doing with the skill.

STOP

I am stuck.

YIELD

I almost have it.

I understand the skill.

INDEPENDENT PRACTICE 1

1 What is the quotient of 308 ÷ 14?

A   4,312

B   322

C   284

D   22

2 During one day, 336 people rode a roller coaster. If 24 people can ride each trip, what is the fewest number of trips the coaster traveled that day?

A   14

B   21

C   360

D   8,064

3 There are 435 students in the sixth grade. Each student will receive an equal number of candy bars to sell. There are a total of 10,875 candy bars. How many candy bars will each student get to sell?

A   25

B   125

C   250

D   4,730,625

4 The manager of Music Palace is giving away 255 music downloads at its grand opening event.

- An equal number of the music downloads will be given to the first 75 customers who come through the door.

- If any music downloads are left over, 1 will be given to each of the next customers until they are all given away.

How many music downloads will each of the first 75 customers get?

Show your work.

◀ THINK ABOUT IT

Should the first answer number go in the ones place, the tens place, or the hundreds place?

Answer _____ music downloads

How many customers will receive 1 music download each?

Answer _____ customers

INDEPENDENT PRACTICE 2

1   Look at the division problem below.

   $2,367 \div 13 = $ _____

What is the answer to the problem?

A   180

B   182 R1

C   183

D   1,800 R3

2   A concert hall has 12,768 seats divided into 57 rows, each with the same number of seats. How many seats are in each row?

A   128

B   224

C   226

D   232

3   Which division sentence is **not** true?

A $3,060 \div 45 = 68$

B $1,606 \div 22 = 73$

C $1,288 \div 56 = 28$

D $5,740 \div 70 = 82$

4 Riya burns 159 calories per hour walking. How many hours will it take her to burn 10,335 calories?

A   55 hours

B   65 hours

C   75 hours

D   100 hours

5 A movie grossed $192,525 in ticket sales. Each movie ticket cost $18. About how many tickets were sold?

A   2,000

B   10,000

C   100,000

D   200,000

6 Which situation would show that a division problem is incorrect?

A   The divisor is smaller than the dividend.

B   The remainder is greater than the divisor.

C   The answer has only one digit.

D   The dividend has more digits than the answer.

7 The distance from Rochester, New York to Dallas, Texas, is 1,435 miles. Keep in mind that, when it is 10:00 in Dallas, it is 11:00 in Rochester. A plane has the flight details shown below.

FLIGHT 721	
Departing Rochester	8:15 p.m.
Arriving in Dallas	10:00 p.m.

To the nearest mile per hour, what is the average speed for this flight?

A 174

B 262

C 522

D 717.5

8 Jacob worked the problem below.

$$\begin{array}{r} 24 \\ 23\overline{)4692} \\ -4600 \\ \hline 92 \\ -92 \\ \hline 0 \end{array}$$

What mistake did Jacob make?

Explain your answer.

_____

_____

_____

_____

_____

_____

9   A museum had 11,496 visitors last year. How many visitors did the museum average per month?

Show your work.

Answer _____ visitors per month

If the museum is closed for holidays 9 days during the year, what is the average number of visitors per day it receives on the days it is open?

Show your work.

Answer _____ visitors per day

EXIT TICKET

Now that you have mastered the division algorithm, let's solve the problem in the **Real-World Connection**.

On a cross-country trip one summer, Casey's family drove 7,205 miles. If they drove an average speed of 55 miles per hour, how many hours did they drive?