Lesson 8

Objective: Extend the use of place value disks to represent three- and four-digit by one-digit multiplication.

Fluency Practice

Expanded Form

200 + 30 + 4 Say the addition sentence with the answer in standard form. = 234

3,000 + 500 + 60 + 8 and 400 + 7 + 90 = _____

3,568 497

572 Say the number.

Write **572** in expanded form. 500 + 70 + 2

Write **8,463** in expanded form. 8,000 + 400 + 60 + 3

Write **9,075** in expanded form. 9,000 + 70 + 5

Multiply Mentally

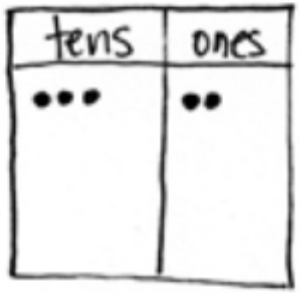
30 x 2 = 60	30 x 3 = 90	20 x 4 = 80	20 x 3 = 60
4 x 2 = 8	1 x 3 = 3	2 x 4 = 8	4 x 3 = 12
34 × 2 = 68	31 x 3 = 93	22 × 4 = 88	24 × 3 = 72

Multiply Using Disks

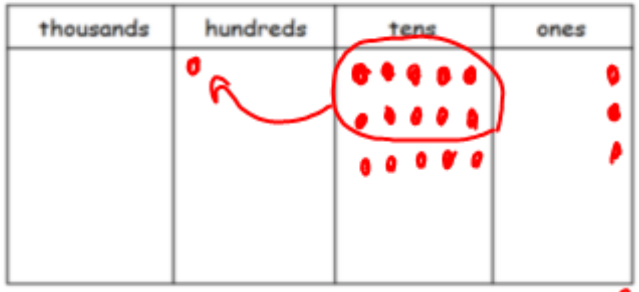
1 × 32 On your personal white boards, draw place value disks to show this multiplication sentence.

1 × 3 tens + 1 × 2 ones Fill in the blanks and write the problem vertically.

Let's try ... **2 × 32** **3 × 32** **4 × 32** **2 × 28** **3 × 51**



32
x 1
2
+30
32

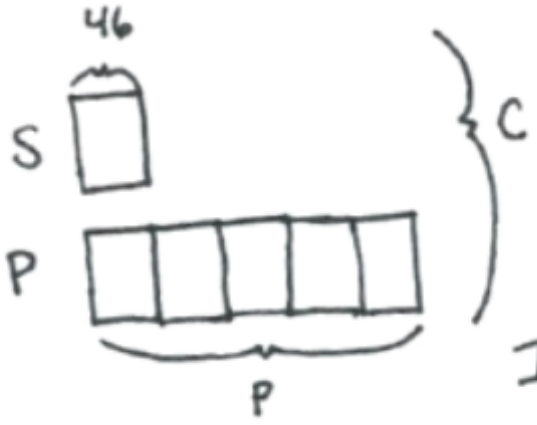


51
x 3
(1x3) 3
(50x3) 150
153

1 5 3

Application Problem

Andre bought a stamp to mail a letter. The stamp costs 46 cents. Andre also mailed a package. The postage to mail the package costs 5 times as much as the cost of the stamp. How much did it cost to mail the package and letter?



46 × 5 = 30, 30 + 200 = 230

230 + 46 = 276

C = 276

1 unit = 46

6 units = 276

46 × 6 = 36, 36 + 240 = 276

It costs 276 cents to mail the letter and package.

$2.76

276

200 76

$2

Concept Development

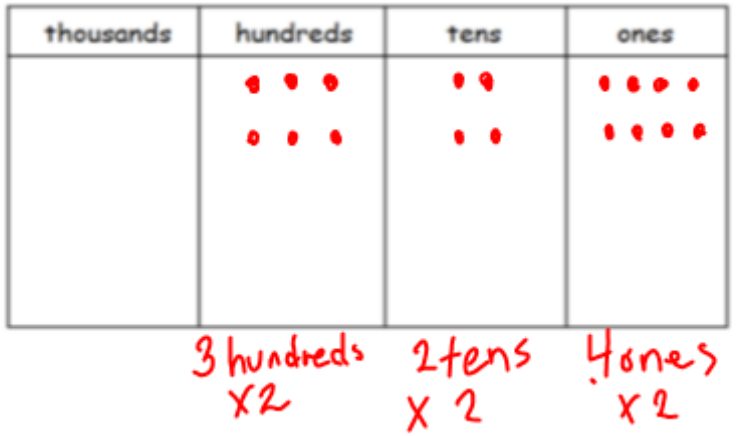
Problem 1: Represent 2 × 324 with disks. Write a matching equation, and record the partial products vertically.

Use your place value chart to represent **2 times 324**.

What is the value in the **ones**? 8

The **tens**? 40

The **hundreds**? 600



Beneath your place value chart, as we did in yesterday's lesson, **write an expression** that shows the total value expressed in the chart.

Write **2 times 324 vertically** on your personal white boards. Record the partial products for the ones, tens, and hundreds.

What is the value of the **disks** represented on the chart?

Add the values that you wrote in the problem. What is their sum?

Work with a partner to solve **3 × 231**.

$$\begin{array}{r} 324 \\ \times \quad 2 \\ \hline \end{array}$$

(4 x 2) 8

(20 x 2) 40

(300 x 2) + 600

648

3 x 231

thousands	hundreds	tens	ones
	●● ●● ●●	●●● ●●● ●●●	● ● ●

6 9 . 3

231
× 3
(1 x 3) 3
(30 x 3) 90
(200 x 3) + 600
693

Problem 2: Model and solve 4 × 605 on the place value chart.

Draw disks to represent **4 times 605** on your place value chart.
Write **4 × 605 vertically** on your board.

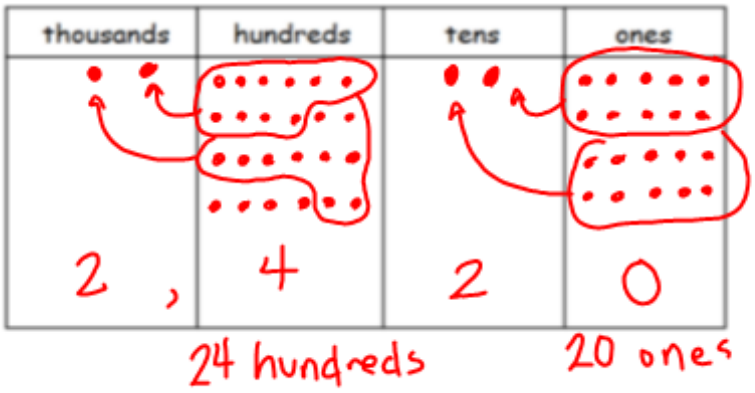
Tell your partner the value of the digit in each place.

Do we need to **regroup**?

Show me.

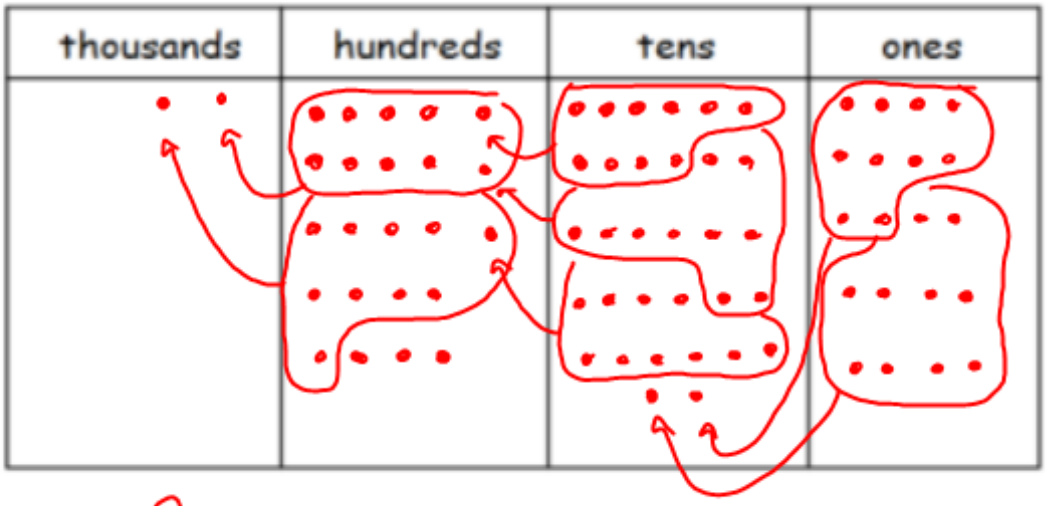
What value is represented on the place value chart?

Add the numbers that we wrote in the problem. What is the sum?



$$\begin{array}{r} 605 \\ \times \quad 4 \\ \hline (5\times4)\quad 20 \\ (600\times4)\ 2400 \\ \hline 2420 \end{array}$$

5 × 464



2 , 3 2 0

464

× 5

(4 x 5) 20

(60 x 5) 300

(400 x 5) + 2,000

2,320

Problem 3: Solve 3 × 851 using a partial products drawing on the place value chart.

Write the problem 3 × 851 vertically. This time, rather than recording 3 groups of 851 to begin, let's record the partial products as we multiply each unit.

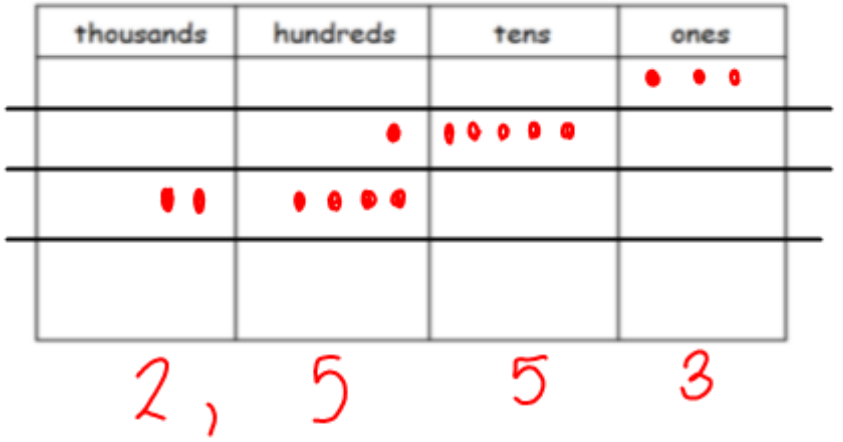
3 times 1 one is?

Record that in your place value chart at the top of the ones place.

3 times 5 tens?

3 times 8 hundreds?

Record that in your place value chart as?



Just as we record the partial products numerically, we draw them. This does not show the connection to addition well, but it does show the partial products well. Can you see the three partial products?

Just looking at the place value chart for now, what are the products from smallest to greatest in unit form?

What is the total product recorded both in your vertical problem and in your place value chart?

851
× 3
(1 × 3) 3
(50 × 3) 150
+ (800 × 3) 2400
2,553

3×763

thousands	hundreds	tens	ones
			••• ••• •• •••
	•	••••••••	
••	•		

2, 2 8 9

763

× 3

9 (3 x 3)

180 (60 x 3)

2,100 (700 x 3)

2,289

Problem 4: Solve 4 × 6,379 using a partial products drawing on the place value chart.

Write the equation 4 × 6,379. Let's record the partial products as we multiply each unit.

4 times 9 ones is?

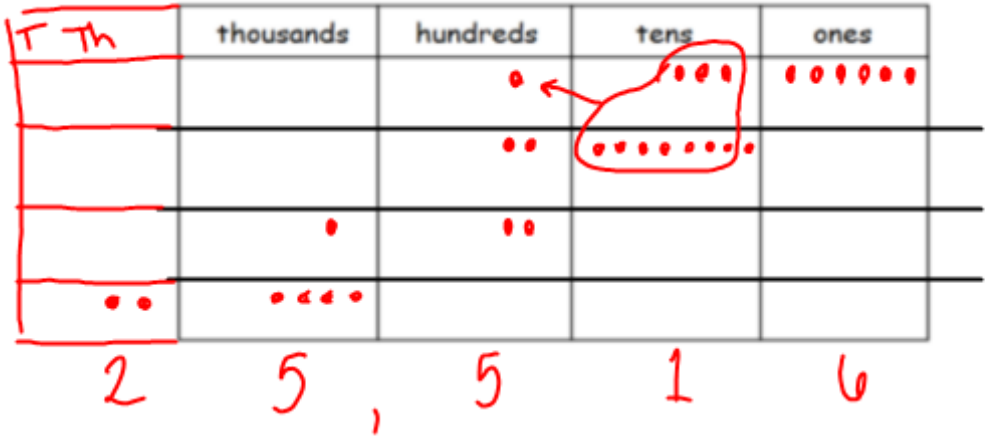
Record that in your place value chart at the top.

4 times 7 tens?

Record that in your place value chart as 2 hundreds 8 tens a bit lower than the 3 tens 6 ones so you can see the separate partial product.

4 times 3 hundreds?

Record that in your place value chart as?



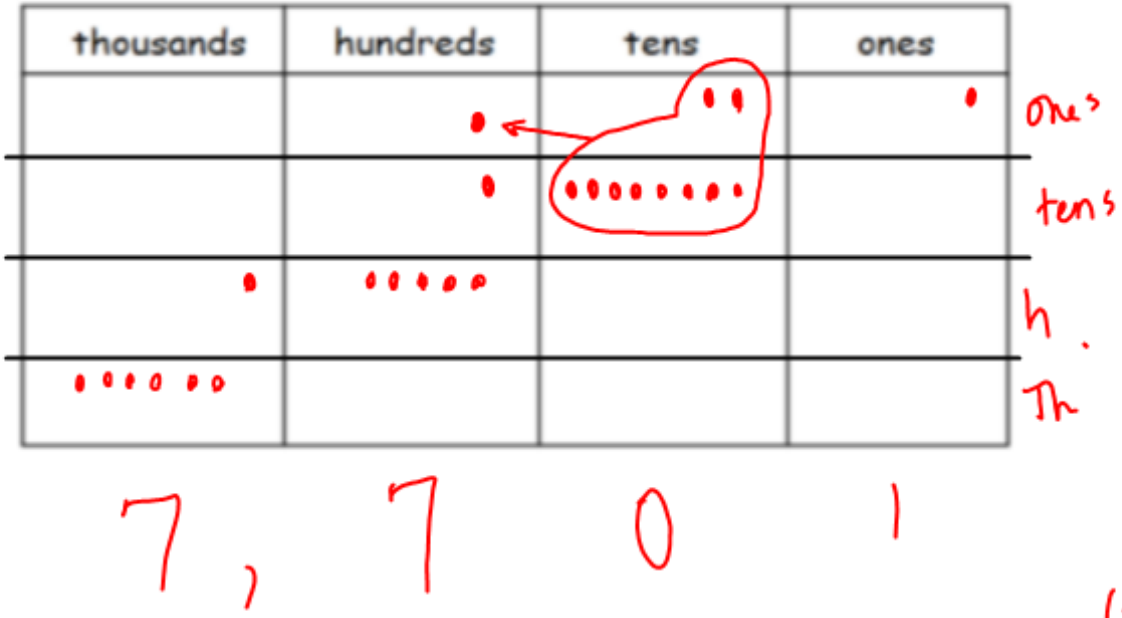
4 times 6 thousands?

Can you see the four partial products?

Find the total of the partial products both in your problem and in your place value chart.
Notice that you will need to regroup when you find the total of the partial products.
What is the total?

6,379
× 4
(9×4) 36
(70×4) 280
(300×4) 1200
(6,000×4) + 24000
25,516

Work with a partner to solve 3 × 2,567



2,567

× 3

(7 × 3) 21

(60 × 3) 180

(500 × 3) 1500

(2,000 × 3) + 6000

7,701

Name _____ Date _____

1. Represent the following expressions with disks, regrouping as necessary, writing a matching expression, and recording the partial products vertically as shown below.

   a. 1 × 213

hundreds	tens	ones

1 × ___ hundreds + 1 × ___ ten + 1 × ___ ones

```
    2   1   3
×           1
-------------
                → 1 × 3 ones
                → 1 × 1 ten
                → 1 × 2 hundreds
+
-------------
```

b. 2×213

hundreds	tens	ones

c. 3×214

hundreds	tens	ones

d. $3 \times 1{,}254$

thousands	hundreds	tens	ones

2. Represent the following expressions with disks, using either method shown during class, regrouping as necessary. To the right, record the partial products vertically.

   a. 3×212

   b. $2 \times 4{,}036$

   c. $3 \times 2{,}546$

   d. $3 \times 1{,}407$

3. Every day at the bagel factory, Cyndi makes 5 different kinds of bagels. If she makes 144 of each kind, what is the total number of bagels that she makes?

Name _____ Date _____

1. Represent the following expressions with disks, regrouping as necessary, writing a matching expression, and recording the partial products vertically as shown below.

   a. 2 × 424

hundreds	tens	ones
● ● ● ●	● ●	● ● ● ●

4 2 4

× 2

_____

→ 2 × ___ ones

→ 2 × ___ _____

+ _____

→ ___ × ___ _____

2 × ___ _____ + 2 × ___ _____ + 2 × ___ ones

b. 3×424

hundreds	tens	ones

c. $4 \times 1{,}424$

2. Represent the following expressions with disks, using either method shown in class, regrouping as necessary. To the right, record the partial products vertically.

   a. 2×617

   b. 5×642

   c. $3 \times 3{,}034$