9.2 Multiplying 10s and 100s  Page 1

GOAL
Use patterns to multiply 10s and 100s.

Problem
Diane is making safety pin necklaces.
She uses 100 beads and 10 safety pins to make each necklace.

How many does she need to make 5 necklaces?

Step 1: Use base ten blocks to model the number of beads in each necklace.
There are 100 beads in each necklace.
Use 5 hundreds blocks to show the beads.

These blocks show 5 \times 100.

Count by 100s to find out how many beads are needed for the 5 necklaces.
100, 200, ______, ______, ______
Diane needs ______ beads.

Step 2: Use base ten blocks to model the number of pins in each necklace.
There are 10 pins in each necklace.
Use 5 tens blocks to show the pins.

These blocks show 5 \times 10.

Count by 10s to find out how many pins are needed for the 5 necklaces.
10, 20, ______, ______, ______
Diane needs ______ pins.
9.2 Multiplying 10s and 100s Page 2

Step 3: You can use tables to organize your information and look for patterns. Complete the tables below for up to 5 necklaces.

<table>
<thead>
<tr>
<th>Number of necklaces</th>
<th>Number of beads</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1 \times 1$ hundred = 1 hundred</td>
</tr>
<tr>
<td>2</td>
<td>$2 \times 1$ hundred = 2 hundreds</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of necklaces</th>
<th>Number of pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1 \times 1$ ten = 1 ten</td>
</tr>
<tr>
<td>2</td>
<td>$2 \times 1$ ten = 2 tens</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Reflecting

What patterns do you see in your tables?
9.1 Exploring Multiplication

Student Book page 310

GOAL

Use your own strategies to solve everyday math problems.

Your class is having a pizza party.
Each pizza has 8 slices.
Each pizza costs $10.

How much will the pizzas cost for your class party?

How many students are in your class? ________

How can you find out how many slices your class needs?

__________________________________________

__________________________________________

How many slices does 1 pizza have? ________

How can you find out how many pizzas your class needs?

__________________________________________

__________________________________________

__________________________________________

How much would all the pizza your class needs cost? Show you work below.

__________________________________________

__________________________________________

__________________________________________
9.1 Exploring Multiplication

GOAL
Use your own strategies to solve everyday math problems.

Problem
Annie is having some friends over for pizza.
There will be 6 people.
Each person wants to have 2 slices of pizza.
Each pizza has 8 slices.
Each pizza costs $9.

Problem
How much will the pizzas cost?

Step 1: How many slices of pizza will Annie need altogether?
There are 6 people.
They want 2 slices of pizza each.

$6 \times 2 = \underline{\hspace{2cm}}$

Step 2: How many slices are in 1 pizza? \underline{\hspace{2cm}}
How many slices are in 2 pizzas? \underline{\hspace{2cm}} \times 2 = \underline{\hspace{2cm}}
Are 2 pizzas enough?
Circle one: yes \hspace{1cm} no

Step 3: How much does 1 pizza cost? $\underline{\hspace{2cm}}$
How much do 2 pizzas cost? \underline{\hspace{2cm}} \times 2 = $\underline{\hspace{2cm}}$

How much will the pizza cost for all 6 people? $\underline{\hspace{2cm}}$
9.2 Multiplying 10s and 100s Page 1
Student Book pages 312-313

GOAL
Use patterns to multiply 10s and 100s.

Checking

1. How many beads and pins does Diane need for 7 bracelets?

Step 1: Each bracelet needs 100 beads.
Use base ten blocks to help fill in the chart below.

<table>
<thead>
<tr>
<th>Number of bracelets</th>
<th>Number of beads</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1 \times 1$ hundred = _______</td>
</tr>
<tr>
<td>2</td>
<td>$2 \times 1$ hundred = _______</td>
</tr>
<tr>
<td>3</td>
<td>$3 \times 1$ hundred = _______</td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Step 2: Each bracelet needs 50 pins.
Use base ten blocks to help fill in the chart below.

<table>
<thead>
<tr>
<th>Number of bracelets</th>
<th>Number of pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1 \times 5$ tens = _______ tens</td>
</tr>
<tr>
<td>2</td>
<td>$2 \times 5$ tens = _______ tens</td>
</tr>
<tr>
<td>3</td>
<td>$3 \times 5$ tens = _______ tens</td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Diane needs _______ beads and _______ pins to make 7 bracelets.
9.2 Multiplying 10s and 100s Page 2

Practising

2. Multiply.

a) $7 \times 10 = \underline{\hspace{2cm}} \times 1 \text{ ten}$
   $= \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}}$

b) $3 \times 40 = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}}$

c) $50 \times 4 = \underline{\hspace{2cm}} \text{ tens} \times \underline{\hspace{2cm}}$
   $= \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}}$

d) $9 \times 200 = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}} \text{ tens}$
   $= \underline{\hspace{2cm}}$

4. Find the missing number.

a) $400 = \underline{\hspace{2cm}} \times 100$

b) $60 = \underline{\hspace{2cm}} \times 10$

c) $80 = \underline{\hspace{2cm}} \times 10$

d) $700 = 7 \times \underline{\hspace{2cm}}$

Hint: Think of equal groups of tens and hundreds.
Multiplying 10s and 100s

GOAL
Use patterns to multiply 10s and 100s.

1. Multiply.
   a) $4 \times 1 = \underline{\quad}$    b) $4 \times 2 = \underline{\quad}$    c) $4 \times 5 = \underline{\quad}$
   $4 \times 10 = \underline{\quad}$    $4 \times 20 = \underline{\quad}$    $4 \times 50 = \underline{\quad}$
   $4 \times 100 = \underline{\quad}$    $4 \times 200 = \underline{\quad}$    $4 \times 500 = \underline{\quad}$

2. Multiply.
   a) $5 \times 10 = \underline{\quad}$    e) $2 \times 200 = \underline{\quad}$    i) $7 \times 300 = \underline{\quad}$  
   b) $60 \times 3 = \underline{\quad}$    f) $9 \times 30 = \underline{\quad}$    j) $90 \times 4 = \underline{\quad}$
   c) $8 \times 100 = \underline{\quad}$    g) $500 \times 5 = \underline{\quad}$    k) $10 \times 6 = \underline{\quad}$
   d) $70 \times 4 = \underline{\quad}$    h) $40 \times 6 = \underline{\quad}$    l) $4 \times 800 = \underline{\quad}$

3. Kate found four $100 bills.
   How much money did she find?

4. Lang is building a model of the school using blocks.
   He bought 8 sets of 30 blocks.
   How many blocks does he have in total?
Multiplying by 10

Multiply $10 \times 16$.
Think: $1 \times 16 = 16$, so
$10 \times 16 = 160$

When you multiply by 10, think of multiplying by 1. Then write a 0.

Complete each sentence.

1. Since I know $23 \times 1 = 23$, I also know $23 \times 10 = 230$.

2. Since I know $45 \times 1 = \underline{45}$, I also know $45 \times 10 = \underline{450}$.

3. Since I know $98 \times 1 = \underline{98}$, I also know $98 \times 10 = \underline{980}$.

4. Since I know $1 \times 36 = \underline{36}$, I also know $10 \times 36 = \underline{360}$.

5. Since I know $60 \times 1 = \underline{60}$, I also know $60 \times 10 = \underline{600}$.

6. Since I know $1 \times 72 = \underline{72}$, I also know $10 \times 72 = \underline{720}$.

Multiply these pairs of factors.

7. $85 \times 1 = \underline{85}$
   $85 \times 10 = \underline{850}$

8. $38 \times 1 = \underline{38}$
   $38 \times 10 = \underline{380}$

9. $572 \times 1 = \underline{572}$
   $572 \times 10 = \underline{5720}$

10. $1 \times 443 = \underline{443}$
    $10 \times 443 = \underline{4430}$

11. $20 \times 1 = \underline{20}$
    $20 \times 10 = \underline{200}$

12. $1 \times 76 = \underline{76}$
    $10 \times 76 = \underline{760}$

13. $10 \times 35 = \underline{350}$

14. $69 \times 10 = \underline{690}$

15. $546 \times 10 = \underline{5460}$

16. $41 \times 10 = \underline{410}$

17. $10 \times 768 = \underline{7680}$

18. $10 \times 80 = \underline{800}$
GOAL
Use arrays to visualize easier ways to multiply.

Checking

1. a) Complete the number sentence to show how the 5-by-14 array is shaded.

Look at the light grey part of the array.
How many rows are there in all? ________
How many light grey squares are in each row? ________
There are $5 \times ________$ squares in the light grey part of the array.

Look at the dark grey part of the array.
How many rows are there in all? ________
How many dark grey squares are in each row? ________
There are $5 \times ________$ squares in the dark grey part of the array.

The 5-by-14 array combines the 2 smaller arrays.
Complete the number sentence below.
$5 \times 14 = 5 \times ________ + 5 \times ________$

b) Complete the number sentences to calculate $5 \times 14$.

$5 \times 14 = 5 \times ________ + 5 \times ________$
$5 \times 14 = ________ + ________
$5 \times 14 = ________$
9.3 Multiplying Using Arrays Page 2

Practising

3. Look at the different shades in the arrays below.
   Complete the number sentences.

a)

\[6 \times 12 = 6 \times 10 + 6 \times \underline{_______}\]
\[6 \times 12 = \underline{_______} + \underline{_______}\]
\[6 \times 12 = \underline{_______}\]

b)

\[7 \times 11 = \underline{_______} \times \underline{_______} + \underline{_______} \times \underline{_______}\]
\[7 \times 11 = \underline{_______} + \underline{_______}\]
\[7 \times 11 = \underline{_______}\]

9. Sketch arrays on grid paper to show that each statement is true.

a) \[5 \times 23 = 5 \times 20 + 5 \times 3\]

b) \[5 \times 23 = 5 \times 10 + 5 \times 10 + 5 \times 3\]

c) \[5 \times 23 = 5 \times 7 + 5 \times 7 + 5 \times 7 + 5 \times 2\]
### 9.3 Multiplying Using Arrays Page 1

#### Goal
Use arrays to visualize easier ways to multiply.

#### Problem
Alec has a game board that has 4 rows of 12 spaces.

How can you calculate the number of spaces on Alec's 4-by-12 game board?

#### Step 1:
The game board has 4 rows of 12 spaces.
Sketch it on grid paper.

![Grid Paper Sketch](image)

#### Step 2:
$4 \times 12$ tells the number of spaces.
You already know $4 \times 10 =$ ________.
You also know that $4 \times 2 =$ ________.
Split the 4-by-12 array into a 4-by-10 array and a 4-by-2 array.
Colour and label both arrays as shown below.

![Array Split](image)
9.3 Multiplying Using Arrays Page 2

**Step 3:** 4 rows of 10 = $4 \times 10$
4 rows of 2 = $4 \times 2$
Use $4 \times 10 + 4 \times 2$ to calculate $4 \times 12$.
$4 \times 12 = 4 \times 10 + 4 \times 2$
$4 \times 12 = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
$4 \times 12 = \underline{\hspace{2cm}}$
So, there are \underline{\hspace{2cm}} spaces on Alec's game board.

**Reflecting**

How does splitting an array into smaller arrays help you to multiply?

________________________________________________________________________________________

________________________________________________________________________________________

What other ways can you split the 4-by-12 array to calculate $4 \times 12$?

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________
4. Jiri planted 7 rows of 18 trees. How many trees did he plant?
   There are _____ rows with _____ trees in each.
   So, there are _____ × _____ trees in all.
   I can model this problem with an array that has _____ rows and _____ columns.
   Draw the array on this grid.

   [Grid with 7 rows and 18 columns]

   Find and colour 2 smaller arrays inside the array.
   Find the products of the 2 smaller arrays and add them together.

   \[ 7 \times 18 = 7 \times _____ + 7 \times _____ \]
   \[ 7 \times 18 = _____ + _____ \]
   \[ 7 \times 18 = _____ \]
   Jiri planted _____ trees.

5. Complete.
   a) \[ 6 \times 21 = 6 \times 20 + 6 \times 1 \]
      \[ 6 \times 21 = _____ + _____ \]
      \[ 6 \times 21 = _____ \]
   b) \[ 4 \times 16 = 4 \times 8 + 4 \times 8 \]
      \[ 4 \times 16 = _____ + _____ \]
      \[ 4 \times 16 = _____ \]
   c) \[ 5 \times 32 = 5 \times 30 + 5 \times _____ \]
      \[ 5 \times 32 = _____ + _____ \]
      \[ 5 \times 32 = _____ \]
   d) \[ 5 \times 28 = 5 \times _____ + 5 \times _____ \]
      \[ 5 \times 28 = _____ + _____ \]
      \[ 5 \times 28 = _____ \]
1. Fill in the blanks.

   a) 
   
   \[
   3 \times 14 = 3 \times 10 + 3 \times \_
   \]
   
   \[
   3 \times 14 = \_
   \]
   
   \[
   3 \times 14 = \_
   \]

   b) 
   
   \[
   6 \times 17 = 6 \times 10 + 6 \times \_
   \]
   
   \[
   6 \times 17 = \_
   \]
   
   \[
   6 \times 17 = \_
   \]

2. Sketch arrays to help you multiply.

   a) \(5 \times 13 = \)  

   b) \(7 \times 15 = \)  

   c) \(2 \times 17 = \)  

   

3. Sketch an array to show that this statement is true.

   \(4 \times 26 = 4 \times 20 + 4 \times 6\)
Problem
Annie is making 54 leather bags.
She sews 3 designs on each bag.

How many designs will Annie sew?

Use expanded form to calculate.
5 tens + 4 ones

\[
\underbrace{\text{5 tens}} \times 3
\]

Step 1: 5 tens \times 3 =

Step 2: 4 ones \times 3 =

Step 3: 15 tens =

Step 4: 12 ones =

Step 5:
\[
15 \text{ tens} + 12 \text{ ones} = \underbrace{\text{(see Step 3)}} \text{ (see Step 4)}
\]

Total =

Annie sewed ________ designs.
9.4 Modelling Multiplication Page 2

Reflecting

How does grouping tens and ones help you with multiplication?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Scaffolding for Lesson 4, Questions 4 & 5

4. A box holds 5 pencils. How many pencils are in 85 boxes?

\[
\begin{align*}
8 \text{ tens} + 5 \text{ ones} \\
\times 5 \\
\hline
\text{ _____ tens} \\
\text{ _____ ones}
\end{align*}
\]

\[5 \times 8 = \underline{40}\]

There are \underline{400} pencils in 85 boxes.

5. Alasie made a bracelet with 6 rows of 64 beads.

a) How do you think Alasie knew she would need more than 350 beads?

Alasie can think of a number close to 64 that's easy to calculate with, like \underline{60}.

Since \[6 \times \underline{60} = \underline{360}\], she knows she needs more than 350 beads.

b) How many beads did she use altogether?

\[
\begin{align*}
6 \text{ tens} + 4 \text{ ones} \\
\underline{\times 6} \\
\text{ _____ tens} \\
\text{ + _____ ones}
\end{align*}
\]

\[6 \times 4 = \underline{24}\]

Alasie used \underline{384} beads altogether.
Chapter 9
Lesson 4

Multiplying Using Expanded Form

GOAL

Multiply 2-digit numbers by 1-digit numbers using expanded form.

1. Multiply.
   a) $5 \times 22 = \underline{110}$
   \[20 + 2 \quad \times 5\]
   b) $3 \times 64 = \underline{192}$
   \[60 + 4 \quad \times 3\]

2. Multiply using expanded form.
   a) $2 \times 19$  
   c) $5 \times 33$  
   e) $4 \times 26$
   b) $3 \times 51$  
   d) $6 \times 82$  
   f) $2 \times 48$

At-Home Help

You can use expanded form to multiply 2-digit numbers by 1-digit numbers. For example:
I want to know $4 \times 36$.
36 is the same as $30 + 6$, or 3 tens + 6 ones.
I will multiply each part separately by 4.
$30 + 6$
$\times 4$
$120$
$+ 24$
$144$
$4 \times 36 = 144$

3. Michael's school has 7 classrooms. There are 23 students in each class. How many students are at the school?