Chapter 6: Multiplication

1. Calculate each product.
   a) \(6 \times 2 = \) _____
   b) \(5 \times 5 = \) _____
   c) \(3 \times 6 = \) _____
   d) \(4 \times 4 = \) _____
   e) \(3 \times 7 = \) _____
   f) \(4 \times 7 = \) _____
   g) \(5 \times 7 = \) _____
   h) \(6 \times 6 = \) _____
   i) \(6 \times 4 = \) _____
   j) \(6 \times 8 = \) _____
   k) \(7 \times 9 = \) _____
   l) \(9 \times 8 = \) _____

2. Calculate.
   a) \(7 \times 10 = \) _____
   b) \(7 \times 60 = \) _____
   c) \(4 \times 90 = \) _____
   d) \(50 \times 8 = \) _____
   e) \(30 \times 9 = \) _____
   f) \(20 \times 8 = \) _____
   g) \(3 \times 100 = \) _____
   h) \(7 \times 100 = \) _____
   i) \(9 \times 500 = \) _____
   j) \(700 \times 7 = \) _____
   k) \(300 \times 8 = \) _____
   l) \(600 \times 2 = \) _____
Multiplication of greater numbers
You can multiply using arrays.

\[ 6 \times 12 = 6 \times 10 + 6 \times 2 \]
\[ = 60 + 12 \]
\[ = 72 \]

You can multiply using expanded form.

\[ 27 \times 4 \]
\[ 20 + 7 \times 4 \]
\[ + 28 \]
\[ = 108 \]

3. Estimate each product.
   a) \[ 6 \times 29 \] is about \[ \_\_\_\_\_\_\_ \].
   b) \[ 9 \times 15 \] is about \[ \_\_\_\_\_\_\_ \].
   c) \[ 8 \times 21 \] is about \[ \_\_\_\_\_\_\_ \].
   d) \[ 5 \times 49 \] is about \[ \_\_\_\_\_\_\_ \].
   e) \[ 8 \times 32 \] is about \[ \_\_\_\_\_\_\_ \].
   f) \[ 6 \times 17 \] is about \[ \_\_\_\_\_\_\_ \].

4. Calculate.
   a) \[ 8 \times 32 \]
   b) \[ 4 \times 71 \]
   c) \[ 6 \times 17 \]
   d) \[ 5 \times 48 \]
   e) \[ 5 \times 120 \]
   f) \[ 3 \times 251 \]
6.1 Multiplication Strategies Page 1

Student Book pages 176–179

**GOAL**

Multiply one-digit numbers using mental math strategies.

Owen swims 6 days a week.

**How many days does Owen swim in February?**

February has 4 weeks.

Owen swims _______ times a week.

The total number of days is $4 \times _______$. There are different ways to solve this problem.

**First way:** Skip counting

Start with $2 \times 6 = 12$.

Skip count by 6 two times to get to $4 \times 6$.

\[ 12 \rightarrow +6 \rightarrow +6 \rightarrow \]

Owen swam _______ days in February.

**Second way:** Doubling

Start with $2 \times 6$.

Then double the groups.

\[ 2 \times 6 \rightarrow 2 \times 12 \]

1 group of 6 is $1 \times 6 = _______$. 

2 groups of 6 is $2 \times _______ = _______$. 

4 groups of 6 is _______ $\times _______ = _______$. 

Owen swam _______ days in February.

[176] Learning BLM 6.1: Multiplication Strategies
Third way: Using known multiplication facts

Suppose that February had 5 weeks.
You know that \(5 \times 6 = 30\).
However, February has 4 weeks.
4 is ______ less than 5, so there are ______ \(\times 6 = \___\) fewer swim days.
\(4 \times 6 = 30 - \___\)
\(4 \times 6 = \___\)
Owen swam ______ days in February.

Reflecting

Owen related \(4 \times 6\) to \(2 \times 6\).
How can you relate \(4 \times 6\) to \(3 \times 6\) instead?

Hint: \(3 \times 6 = 18\).

Ami doubled \(2 \times 6\) to get \(4 \times 6\). What other multiplication facts can you calculate by doubling?
6.1 Multiplication Strategies  Page 1
Student Book pages 176–179

Checking

1. a) Calculate $7 \times 3$ in 2 ways.

First way:
Use $1 \times 3 = \underline{\phantom{0000}}$.
Skip count by 3s.
$3, 6, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}$
$7 \times 3 = \underline{\phantom{0000}}$

Second way:
Use $3 \times 3 = \underline{\phantom{0000}}$.
Skip count by 3s.
$9, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}, \underline{\phantom{0000}}$
$7 \times 3 = \underline{\phantom{0000}}$

b) Calculate $6 \times 6$ using $3 \times 6$.
$3 \times 6 = \underline{\phantom{0000}}$
Double your answer.
$2 \times \underline{\phantom{0000}} = \underline{\phantom{0000}}$
$6 \times 6$ is the same as the double of $3 \times 6$.
$6 \times 6 = \underline{\phantom{0000}}$

2. Aaron practises piano 5 times a week.
   How many times did he practise in February?
   February has 4 weeks.
The number of times he practised is $4 \times \underline{\phantom{0000}}$.
I know $2 \times 5 = \underline{\phantom{0000}}$, so I can double $\underline{\phantom{0000}}$ to calculate $4 \times 5$.
$4 \times 5 = \underline{\phantom{0000}}$
6.1 Multiplication Strategies  Page 2

Practising

3. Describe a strategy for calculating each product.
   Then write the product.

a) $7 \times 6$
   I know $5 \times 6 = \underline{\phantom{000}},$ so I can skip count by 6s from $\underline{\phantom{000}}$.
   $\underline{\phantom{000}}, \underline{\phantom{000}}, \underline{\phantom{000}}, \underline{\phantom{000}}, \underline{\phantom{000}}, \underline{\phantom{000}}$
   $7 \times 6 = \underline{\phantom{000}}$
   Another strategy I can use is ____________________________

b) $6 \times 5$
   I know $3 \times 5 = \underline{\phantom{000}},$ so I can double $\underline{\phantom{000}}$ to calculate $6 \times 5$.
   $6 \times 5 = \underline{\phantom{000}}$
   Another strategy I can use is ____________________________

8. There are 7 days in a week.
   How many days are in 8 weeks?

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<td>Walk the dog</td>
<td>Do math homework</td>
<td>Play soccer</td>
<td>Help with supper</td>
<td>Have piano lesson</td>
<td>Go to BBQ in park</td>
<td>Swim in pool</td>
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I need to calculate $\underline{\phantom{000}} \times \underline{\phantom{000}}$.
I know $\underline{\phantom{000}},$ so I can ____________________________.
6.2 Special Products  Page 1

Student Book pages 180–182

GOAL

Use special strategies to multiply by 8 and 9.

Marko’s mother embroidered 8 flowers to make this pillowcase. She made 6 pillowcases as gifts for her family.

How many flowers did Marko’s mother embroider?

How many flowers are on 1 pillowcase? _______
How many pillowcases did she make? _______
The total number of flowers is _______ × _______.

How can you double 6 × 2 to get 6 × 8?
The double of 2 is _______.
The double of 4 is _______.
The double of 6 × 2 is 6 × _______.
The double of 6 × _______ is 6 × 8.

6 × 2 = _______
6 × _______ = _______
6 × 8 = _______

Marko’s mother embroidered _______ flowers.
6.2 Special Products

Look at the diagram shown to the right.

How many groups of 10 are in the diagram? _______ groups of 10
Write the multiplication sentence for the diagram.

_______ × _______ = _______

Count how many squares are covered in each group of 10. _______
Write the multiplication sentence for the squares that are not covered.

_______ × _______ = _______

How does the diagram show that $6 \times 9 = 60 - 6$?

Use $6 \times 9 = 54$ to calculate $6 \times 8$.

$6 \times 9$ is 6 groups of _______.

$6 \times 8$ is 6 groups of _______.

$6 \times 8$ has _______ less group of _______ than $6 \times 9$.

$6 \times 8 = 54 - _______ = _______

Marko’s mother embroidered _______ flowers.

Reflecting

How can you calculate $8 \times 8$ by doubling?

Hint: Start with $2 \times 8$.

You learned $6 \times 9 = 60 - 6$. Use this strategy to multiply other 1-digit numbers by 9.

Hint: Use this strategy with $5 \times 9$ if you cannot think of a 1-digit number.
6.2 Special Products  Page 1
Student Book pages 180–182

Checking

1. a) Calculate $8 \times 7$ by doubling.
   $8 \times 7$ is double $4 \times 7$.
   $4 \times 7$ is double $2 \times 7$.
   
   $2 \times 7 = \underline{14}$
   $4 \times 7 = \underline{28}$ because $14 + 14 = 28$.
   $8 \times 7 = \underline{56}$ because $28 + 28 = 56$.

   b) Calculate $8 \times 9$ using 2 different strategies.

   **First way:** Doubling
   
   $2 \times 9 = \underline{18}$
   $4 \times 9 = \underline{36}$ because $18 + 18 = 36$.
   $8 \times 9 = \underline{72}$ because $36 + 36 = 72$.

   **Second way:** Subtracting groups
   
   $8 \times 10 = \underline{80}$
   $8 \times 1 = \underline{8}$
   
   $8 \times 9$ is the same as $8 \times 10$ minus $8 \times 1$.
   $8 \times 9 = \underline{72} - \underline{8} = \underline{64}$

2. The pillowcase design has 4 leaves.
   How many leaves will be on 9 pillowcases?
   I need to calculate $4 \times \underline{9}$.
   I know $4 \times \underline{9} = \underline{36}$, so I can double $\underline{36}$ to calculate $8 \times 9$. 
Practising

4. Spiders have 8 legs.
   Ants have 6 legs.

   a) How many more legs do
       8 spiders have than 8 ants?
       8 spiders have $8 \times 8$ legs.
       I know $\underline{\hspace{2cm}}$, so I can $\underline{\hspace{3cm}}$.


       $8 \times 8 = \underline{\hspace{2cm}}$
       8 ants have $8 \times 6$ legs.
       I know $\underline{\hspace{2cm}}$, so I can $\underline{\hspace{3cm}}$.


       $8 \times 6 = \underline{\hspace{2cm}}$
       $\underline{\hspace{2cm}}$ legs on 8 spiders $- \underline{\hspace{2cm}}$ legs on 8 ants $= \underline{\hspace{2cm}}$.
       8 spiders have $\underline{\hspace{2cm}}$ more legs than 8 ants.

   b) How many more legs do 9 spiders have than 9 ants?
       9 spiders have $\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$ legs.
       I can calculate the total number of legs by $\underline{\hspace{3cm}}$.


       9 ants have $\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$ legs.
       I can calculate the total number of legs by $\underline{\hspace{3cm}}$.


       $\underline{\hspace{2cm}}$ legs on 9 spiders $- \underline{\hspace{2cm}}$ legs on 9 ants $= \underline{\hspace{2cm}}$.
       9 spiders have $\underline{\hspace{2cm}}$ more legs than 9 ants.
6.3 Relating Multiplication Facts

Student Book page 183

GOAL
Describe how multiplication facts are related.

How can you calculate the second multiplication fact you spin using the first fact you spin?

Step 1: Spin the spinner once. Write the number below.
5 × _______

Step 2: Spin the spinner again. Write the number below.
5 × _______

Step 3: Use your fact from Step 1 to calculate the fact in Step 2.
Explain your strategy below.

Hint: Use doubling or repeated addition.

Step 4: Play again.
Explain how you related the first fact to calculate the second fact.
5 × _______
5 × _______

What strategy are you most comfortable working with?

You will need
- a spinner with the numbers 0 to 9
- a paper clip

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Explore BLM-8 6.3: Relating Multiplication Facts | 185
6.3 Relating Multiplication Facts
Student Book page 183

Brandon and Jay are playing Fact Spin.

How can you calculate the second multiplication fact you spin using the first fact you spin?

Step 1: Spin the spinner twice. Write the 2 numbers below.

_______ × _______

Step 2: Spin the spinner twice again. Write the 2 numbers below.

_______ × _______

Step 3: Use your fact from Step 1 to calculate the fact in Step 2. Explain your strategy below.
Hint: Use 1 of these strategies: doubling, halving, adding groups, or subtracting groups.

Step 4: Play again.
What strategies are you most comfortable working with?
6.4 Multiplying by Tens, Hundreds, and Thousands

You will need
- base ten blocks

Ami is creating problems that can be solved using multiplication.

How many times does each insect beat its wings in 10 s?

A dragonfly beats its wings 30 times in 1 s.

10 s = 10 \times ______ beats

A. Why can you think of 10 \times 30 as 10 \times 3 tens?

Model 30 with base ten blocks.
Sketch the blocks in the space to the right.
How many groups of 10 are in your model? ______
30 = ______ tens

B. How many tens is 10 \times 3 tens?
Model 10 groups of 3 tens with base ten blocks.
Sketch the model below. The first one is done for you.

How many tens altogether? ______
10 \times 3 tens = ______ tens
_______ tens = ______

Hint: Count all the tens blocks by 10.
A dragonfly beats its wings ______ times in 10 s.
6.4 Multiplying by Tens, Hundreds, and Thousands  Page 2

C. A bee beats its wings 200 times in 1 s.
   \[ 10 \text{ s} = 10 \times _______ \text{ beats} \]
   Model 200 with base ten blocks.
   Sketch the blocks in the space to the right.
   How many groups of hundreds? _______
   \[ 200 = _______ \text{ hundreds} \]
   \[ 10 \times 200 = 10 \times _______ \text{ hundreds} \]

D. Model 10 groups of _______ hundreds with base ten blocks.
   Sketch the model below. The first one is done for you.

   \[ \begin{array}{ccc}
   & & \\
   \quad & & \\
   & & \end{array} \]

   How many hundreds altogether? _______
   \[ 10 \times _______ \text{ hundreds} = _______ \text{ hundreds} \]
   \[ \vdots \text{ hundreds} = \text{_______} \]
   A bee beats its wings _______ times in 10 s.

Reflecting

How are the following calculations involving tens, hundreds, and thousands related to \( 2 \times 3 \)?

\[ \begin{array}{cccc}
2 \times 30 & 2 \times 300 & 2 \times 3000 & 20 \times 30 \\
\end{array} \]
6.4 Multiplying by Tens, Hundreds, and Thousands  Page 1
Student Book pages 184–187

Checking

1. Some dragonflies beat their wings about 40 times in 1 s.  
   How many times does 1 dragonfly beat its wings in 20 s?  
   20 s is $20 \times 40$ beats.  
   $40 = \underline{\hspace{1cm}}$ tens  
   $20 \times \underline{\hspace{1cm}}$ tens $= \underline{\hspace{1cm}}$ tens  
   $20 \times 40 = \underline{\hspace{1cm}}$  
   A dragonfly beats its wings _______ times in 20 s.

2. Calculate.

   a) $20 \times 70$  
      $20 \times 70 = 20 \times \underline{\hspace{1cm}}$ tens  
      $20 \times 70 = \underline{\hspace{1cm}}$ tens  
      $20 \times 70 = \underline{\hspace{1cm}}$

   b) $7 \times 300$  
      $7 \times 300 = 7 \times \underline{\hspace{1cm}}$ hundreds  
      $7 \times 300 = \underline{\hspace{1cm}}$ hundreds  
      $7 \times 300 = \underline{\hspace{1cm}}$

   c) $6 \times 1000$  
      $6 \times 1000 = 6 \times \underline{\hspace{1cm}}$ thousands  
      $6 \times 1000 = \underline{\hspace{1cm}}$ thousands  
      $6 \times 1000 = \underline{\hspace{1cm}}$

   d) $2000 \times 4$  
      $2000 \times 4 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$  
      $2000 \times 4 = \underline{\hspace{1cm}}$  
      $2000 \times 4 = \underline{\hspace{1cm}}$
4. Sketch an array to show each calculation.

a) $2 \times 600$
   How many rows of hundreds? ________
   How many columns of hundreds? ________
   $2 \times 600 = ________$

b) $2 \times 6000$
   How many rows of thousands? ________
   How many columns of thousands? ________
   $2 \times 6000 = ________$

5. Multiply. Explain your strategy.

a) $40 \times 80$
   
   
   

b) $90 \times 90$
   
   
   

b) $6 \times 2000$
   
   
   

d) $5 \times 700$
   
   
   

[Page 2]
GOAL

Multiply by halving and doubling.

Justine is putting winter carnival photos on CDs. She bought 8 packs of CDs with 25 CDs in each pack.

How many CDs did Justine buy?

The total number of CDs is $8 \times \underline{}$.

Step 1: Figure out half of 8.
Count out 8 counters. Make 2 equal groups.
Draw the number of counters in each group.

Each group has ______ counters.
Half of 8 is ______.
$8 \div 2 = \underline{}$
6.5 Halving and Doubling to Multiply  Page 2

Step 2: Figure out the double of 25.
Hint: Count by tens to figure out 50 + 50.

\[ 25 + 25 = \underline{______} \quad 25 \times 2 = \underline{______} \]

Step 3: Multiply.
\[ 8 \times 25 = (8 \div 2) \times (25 \times 2) \]
\[ 8 \times 25 = \underline{______} \times \underline{______} \]
Hint: Look at your answers in Steps 1 and 2.
Skip count to figure out the answer.
50, 100, ________, ________
Justine bought ________ CDs.

Reflecting
Why was it helpful to use the half/double strategy?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

In what other multiplication situations would the half/double strategy be useful?
__________________________________________________________________________
__________________________________________________________________________

half/double strategy
To calculate a product, you can divide one number by 2 to get half and double the other number. Then you can multiply.
For example:
\[ 8 \times 5 = (8 \div 2) \times (5 \times 2) \]
\[ 8 \times 5 = 4 \times 10 \]
\[ 8 \times 5 = 40 \]
Checking

1. Use the half/double strategy to solve these problems.

   a) How many straws are in 14 boxes of 200 straws?

   **Step 1:** Figure out the half and double of the numbers.
   Half: \(14 \div 2 = \) 
   Double: \(200 \times 2 = \)

   **Step 2:** Multiply (use your answers from Step 1).
   \(14 \times 200 = (14 \div 2) \times (200 \times 2)\)
   \(14 \times 200 = \) \( \) \( \times \) 
   \(14 \times 200 = \) \( \) because \( \)

   There are \( \) straws in all the boxes.

   b) What is the value of 22 $5 bills?

   **Step 1:** Figure out the half and double of the numbers.
   Half: \(22 \div 2 = \) 
   Double: \( \) \( \times 2 = \)

   **Step 2:** Multiply (use your answers from Step 1).
   \(22 \times 5 = (22 \div 2) \times (\) \( \times 2)\)
   \(22 \times 5 = \) \( \) \( \times \) 
   \(22 \times 5 = \) \( \) because \( \)

   The value of all the $5 bills is $\( \)\( \).
6.5 Halving and Doubling to Multiply

Practising

6. Rewrite each equation by making one factor 10, 100, or 1000 and keep the product the same.

a) \(24 \times 5 = ?\)
   Half: \(24 \div 2 = \) 
   Double: \(5 \times 2 = \) (factor of 10)
   \(? = (24 \div 2) \times (5 \times 2)\)
   \(? = \) 

b) \(? = 50 \times 14\)
   Double: \(\) \(\times 2 = 100\)
   Half: \(\) \(\div 2 = \)
   \(? = (answer \ from \ doubling) \times (answer \ from \ halving)\)
   \(? = \) 

C) \(8 \times 500 = \) ?
   Double: \(\) \(\times 2 = 1000\)
   Half: \(\) \(\div 2 = \)
   \(? = (answer \ from \ doubling) \times (answer \ from \ halving)\)
   \(? = \) 

d) \(? = 500 \times 18\)
   Explain how you can rewrite the equation. Show all the steps.
   \(\) 
   \(\) 
   \(\) 
   Calculate the answer.
   \(\)
4. Calculate each product using the half/double strategy. Look for numbers that can be halved or doubled to make 10, 100, or 1000.

a) $5 \times 12$
   Which factor of $5 \times 12$ can be doubled to 10? _____
   Double the 5 and halve the 12: _____ $\times$ _____
   $5 \times 12 = _____$

b) $9 \times 200$
   Which factor of $9 \times 200$ can be halved to 100? _____
   Double the _____ and halve the _____: _____ $\times$ _____
   $9 \times 200 = _____$

c) $500 \times 14$
   Which factor of $500 \times 14$ can be doubled to 1000? _____
   Double the _____ and halve the _____: _____ $\times$ _____
   $500 \times 14 = _____$

d) $50 \times 24$
   Double the _____ and halve the _____: _____ $\times$ _____
   $50 \times 24 = _____$

e) $200 \times 18 = 100 \times _____$
   $200 \times 18 = _____$

f) $18 \times 500 = _____ \times _____$
   $18 \times 500 = _____$
Mid-Chapter Review—Frequently Asked Questions

STUDENT BOOK PAGE 192

Q: What strategies can you use to multiply one-digit numbers?
A: 

Q: How can you multiply by multiples of tens, hundreds, or thousands?
A: 

Q: How can you simplify a calculation using the half/double strategy?
A: 

6.6 Multiplying Numbers Close to Tens

Checking

1. a) A building with 4 floors has 99 windows on each floor.
   How does this model show that $4 \times 99$ is 4 less than 400?

   4 floors with 100 is $4 \times 100$.
   But each floor has 99 windows, so I need to subtract ______ from 100.
   Since there are 4 floors, I have to take away ______ altogether.

   b) How can you use your answer from part a) to calculate $4 \times 99$?
   $4 \times 100 = _______
   $4 \times 99 = (answer \ from \ 4 \times 100) - _______
   $4 \times 99 = _______

2. Which is greater: $9 \times 80$ or $9 \times 82$?

   $9 \times 80 = (10 \times 80) - 80$
   $= _______ - 80$
   $= _______ $

   $9 \times 82 = (10 \times 82) - 82$
   $= _______ - 82$
   $= _______ $

   _______ is greater than _______ because ____________________________

   How much greater? _______ - _______ = _______
6.6 Multiplying Numbers Close to Tens

**Practising**

3. a) $3 \times 29$ is 3 less than $3 \times 30$.

$3 \times 30$ has _______ groups of 30.

Sketch a picture in the space below to show how you know.

29 is _______ less than 30, so I have to subtract _______ from each group.

That's _______ less in total.

b) How can you use your answer from part a) to calculate $3 \times 29$?

$3 \times 30 = 3 \times _______$ tens

$3 \times 30 = _______$ tens

$3 \times 30 = _______$

$3 \times 29 = (answer \ from \ 3 \times 30) - _______$

$3 \times 29 = _______ - _______$

$3 \times 29 = _______

5. Grace walks 9 km a day.

a) There are 28 days in February. How many kilometres did she walk in February?

______________________________

______________________________

b) There are 31 days in March. How can you use your answer from part a) to calculate $9 \times 31$?

*Hint: March has 3 more days than February.*

______________________________

______________________________

______________________________

______________________________

______________________________
6.6 Multiplying Numbers Close to Tens  Page 1

Goal
Multiply using a simpler, related question.

A hotel has 7 floors. There are 19 windows on each floor.

How many windows does the hotel have in total?

The total number of windows is \( 7 \times \text{_____} \).

**Step 1:** Use \( 7 \times 20 = 140 \) to find the answer.
Model 7 groups of 20 using base ten blocks.
Sketch the model below. The first one is done for you.
6.6 Multiplying Numbers Close to Tens

**Step 2:** There are 19 windows, not 20.

Take _______ away from each group.

How many did you take away altogether? _______

$7 \times 20 = 140$

$7 \times 19 = 140 - _______

$7 \times 19 = _______

The hotel has _______ windows in total.

**Reflecting**

Why did you multiply $7 \times 20$?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Explain how you could use a similar strategy if there had been 18 windows on each floor.

**Hint:** Is 18 close to 10 or 20?

The total number of windows is $7 \times 18$. The closest tens fact you can use is $7 \times ______$.

This is what you can do:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What if there had been 21 windows on each floor?

**Hint:** What ten is 21 closest to?

You need to calculate _______ $\times$ _______.

The closest tens fact you can use is _______ $\times$ _______.

This is what you can do:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
6.7 Estimating Products  Page 1
Student Book pages 198–200

Checking

1. Suppose your class is going to play a version of the counting game with 19 sticks.

   a) Estimate the number of sticks your class will need.

      How many students are in your class? ______
      The number of sticks your class will need is ______ × 19.
      Place the number of students in your class on the number line below.

      | 0 | 10 | 20 | 30 |
      |---|---|---|---|

      Which group of ten is your number closest to? ______
      Place 19 on the number line.
      19 is closest to ______.
      The number of sticks is close to ______ × ______, which is ______.

   b) Calculate the number of boxes of 150 sticks that your class will need.

      Complete the chart below.

      | Number of boxes | Number of sticks |
      |-----------------|-----------------|
      | 1               | 150             |
      | 2               | 300             |
      | 3               |                 |
      | 4               |                 |

      How many boxes will your class need? Use your estimate from part a).
6.7 Estimating Products  Page 2

Practising

2. Estimate.

a) $42 \times 26$
   42 is between 40 and _______.
   26 is between 20 and _______.
   Multiply the lower estimates: $40 \times 20 = _______
   Multiply the higher estimates: _______ $\times$ _______ $= _______
   $42 \times 26$ is more than _______ and less than _______.

b) $31 \times 21$
   31 is between 30 and _______.
   21 is between 20 and _______.
   Multiply the lower estimates: $30 \times 20 = _______
   Multiply the higher estimates: _______ $\times$ _______ $= _______
   $31 \times 21$ is more than _______ and less than _______.

c) $38 \times 72$
   38 is between 30 and _______.
   72 is between _______ and _______.
   Multiply the lower estimates: $30 \times _______ = _______
   Multiply the higher estimates: _______ $\times$ _______ $= _______
   $38 \times 72$ is more than _______ and less than _______.

4. Cara’s mother is buying 4 blankets for $84 each.
   Why does she estimate high by multiplying $4 \times 90$?
   Hint: What would happen if she estimated low?

________________________________________________________________________________________

________________________________________________________________________________________
6.7 Estimating Products Page 1
Student Book pages 198–200

**GOAL**
Estimate to solve problems.

Ami's class of 24 students are playing a Cree game of counting sticks. One player in each pair divides 19 sticks into 2 bundles and holds 1 bundle in each hand. The other player guesses which hand holds an even number of sticks.

How many boxes of 150 sticks does the class need to play the game?

There are 12 pairs of students.
Each pair needs 19 sticks.
The number of boxes needed is _______ \times _______.

**Step 1:** Put 12 on the number line.

\[ 0 \quad \quad \quad 10 \quad \quad \quad 20 \]
12 is between _______ and _______.

**Step 2:** Put 19 on the number line.

\[ 0 \quad \quad \quad 10 \quad \quad \quad 20 \]
19 is between _______ and _______.

**Step 3:** Multiply the lower numbers: _______ \times _______

Multiply the higher numbers: _______ \times _______

12 \times 19 is between _______ \times _______ and _______ \times _______.

**Step 4:** (Circle) the correct answer.

Is 12 closer to 10 or 20? 10 20
Is 19 closer to 20 or 30? 20 30

Multiply the numbers you circled. _______ \times _______
6.7 Estimating Products  Page 2

Step 5: (Circle) the correct answer.

Is 24 students closer to 25 or 30?  25  30
Is 19 sticks closer to 20 or 30?  20  30

Multiply the numbers you circled. _______ × _______

It's half this number because ____________________________

Step 6: Determine the number of sticks the class needs.

I learned that the number of sticks is close to $10 \times 20$.

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

$10 \times 20 = \underline{\quad} + \underline{\quad}$

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

1 box has 150 sticks in them so I need _______ boxes because ____________________________

Reflecting

Think about the estimation strategies you just used. Which one would you use to estimate the number of sticks?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Why is it better to estimate high than to estimate low in this problem?

________________________________________________________________________

________________________________________________________________________
8. A class of 36 students is having a bridge-building contest. Each group of 4 students has 35 straws to make a bridge. The straws come in bags of 50. Calculate the number of bags needed for the class by following the steps below.

How many groups of 4 are in 36? 36 ÷ 4 = ____ groups

How many straws does each group have? ____ straws

How can you estimate the total number of straws needed for all groups? ____ × ____

How many bags of straws does the class need? Explain.
6.8 Multiplying Two-Digit Numbers

According to a book called *In The Next Three Seconds*, “Every 3 s, 95 airplanes will take off.”

How many airplanes will take off in 45 s, 75 s, and 99 s?

**Step 1:** Calculate how many airplanes will take off in 45 s.

\[ 3 \text{ s} = 95 \text{ airplanes} \]
\[ 3 \times 15 = 45 \text{ s} \]
\[ 45 \text{ s} = 15 \times 95 \text{ airplanes} = \underline{____} \text{ airplanes} \]

Explain your strategy for calculating how many airplanes will take off in 45 s.

**Step 2:** Calculate how many airplanes will take off in 75 s. Explain your strategy.

**Hint:** Use your answer from Step 1.

\[ 3 \times \underline{____} = 75 \text{ s} \]
\[ 75 \text{ s} = \underline{____} \times 95 \text{ airplanes} = \underline{____} \text{ airplanes} \]

**Step 3:** Calculate how many airplanes will take off in 99 s. Explain your strategy.

**Hint:** Use a strategy from previous lessons.

\[ 3 \times \underline{____} = 99 \text{ s} \]
\[ 99 \text{ s} = \underline{____} \times 95 \text{ airplanes} = \underline{____} \text{ airplanes} \]
6.8 Multiplying Two-Digit Numbers

According to some statistics, every 1 s, 30 airplanes will take off.

How many airplanes will take off in 10 s, 20 s, and 100 s?

Step 1: Calculate how many airplanes will take off in 10 s.
1 s = 30 airplanes
10 s = _______ × 30 airplanes = _______ airplanes

Step 2: Calculate how many airplanes will take off in 20 s. Explain your strategy.

Hint: Use your answer from Step 1.
1 s = 30 airplanes
20 s = _______ × 30 airplanes = _______ airplanes

Step 3: Calculate how many airplanes will take off in 100 s. Explain your strategy.

Hint: Use base ten blocks to model the groups.
1 s = 30 airplanes
100 s = _______ × 30 airplanes = _______ airplanes
6.9 Multiplying with Base Ten Blocks  Page 1
Student Book pages 202–205

**GOAL**
Represent the products of two-digit numbers.

Rebecca is making a chart to record information about 13 of her friends in her class. The chart has 13 rows of 11 cells.

<table>
<thead>
<tr>
<th>Given name</th>
<th>Family name</th>
<th>E-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandon</td>
<td>Hughes</td>
<td><a href="mailto:brandon@home.com">brandon@home.com</a></td>
</tr>
<tr>
<td>Jay</td>
<td>Lebeau</td>
<td><a href="mailto:jay@home.com">jay@home.com</a></td>
</tr>
<tr>
<td>Ani</td>
<td>Jin</td>
<td><a href="mailto:ami@home.com">ami@home.com</a></td>
</tr>
</tbody>
</table>

How many cells are in Rebecca's chart?

Rebecca needs to calculate $13 \times _____$.

**Step 1:** Think of 13 as $10 + _____$.
Think of 11 as $10 + _____$.
Complete this array of 13 rows of 11 squares.

---

Step 2: Write a multiplication sentence for the 4 smaller parts.
Top left: 10 groups of 10
$10 \times 10 = _____$
Bottom left: _____ groups of 10
_____ $\times 10 = _____$
Top right: _____ groups of 1
_____ $\times 1 = _____$
Bottom right: _____ groups of 1
_____ $\times 1 = _____$

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6.9 Multiplying with Base Ten Blocks  Page 2

Step 3: Add the 4 products together to find the total.

\[
\begin{array}{c}
11 \\
\times 13 \\
+ \\
\hline
\hline
\end{array}
\]

top left total

top right total

bottom left total

bottom right total

There are _______ cells in Rebecca’s chart.

Reflecting

Why might you record your work like this?

\[
\begin{array}{c}
11 \\
\times 13 \\
13 (13 \times 1) \\
+ 130 (13 \times 10) \\
\hline
143
\end{array}
\]

Hint: Think about mental math strategies you might know.

Why did it make sense for you to build an array using the 4 parts?

Hint: Think of how you feel about multiplying numbers ending with a 0.
### 6.9 Multiplying with Base Ten Blocks Page 1

**Student Book pages 202–205**

#### Checking

1. Calculate 15 \times 22 using base ten blocks.
   
   Think of 15 as 10 + 5 and 22 as 20 + 2.
   
   Model an array with 15 rows of 22 squares.
   
   Sketch the base ten blocks below.

<table>
<thead>
<tr>
<th></th>
<th>20</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 rows of 20</td>
<td>10 rows of 2</td>
</tr>
<tr>
<td>5</td>
<td>5 rows of 20</td>
<td>5 rows of 2</td>
</tr>
</tbody>
</table>

Calculate the 4 parts of the array.

10 \times 20 =

10 \times 2 =

5 \times 20 =

5 \times 2 =

Add the parts together.

\[
\boxed{\text{10 \times 20} + \boxed{\text{10 \times 2}} + \boxed{\text{5 \times 20}} + \boxed{\text{5 \times 2}}} = \boxed{15 \times 22} = \boxed{330}
\]
6.9 Multiplying with Base Ten Blocks  Page 2

Practising

3. Calculate the number of cells in each chart.

a) 16 rows of 12 cells
   16 is $10 + \underline{\hspace{2cm}}$. 12 is $10 + \underline{\hspace{2cm}}$.
   $16 \times 12$ is the same as $(10 + \underline{\hspace{2cm}}) \times (10 + \underline{\hspace{2cm}})$.
   Model an array with 16 rows of 12 squares with base ten blocks.
   Calculate the 4 parts of the array.
   $10 \times 10 = \underline{\hspace{2cm}}$
   $10 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
   $\underline{\hspace{2cm}} \times 10 = \underline{\hspace{2cm}}$
   $\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
   $16 \times 12$ is $\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$.

b) 18 rows of 22 cells
   18 is $10 + \underline{\hspace{2cm}}$. 22 is $\underline{\hspace{2cm}} + 2$.
   $18 \times 22$ is the same as $(10 + \underline{\hspace{2cm}}) \times (\underline{\hspace{2cm}} + 2)$.
   Model an array with 18 rows of 22 squares with base ten blocks.
   Calculate the 4 parts of the array.
   $10 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
   $10 \times 2 = \underline{\hspace{2cm}}$
   $\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
   $\underline{\hspace{2cm}} \times 2 = \underline{\hspace{2cm}}$
   $18 \times 22$ is $\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$.

8. The floor of a hall has 12 rows of 14 tiles.
   How many tiles cover the floor? Explain your thinking.
   **Hint:** Think of $12 \times 14$ as $(\underline{\hspace{2cm}} + \underline{\hspace{2cm}}) \times (\underline{\hspace{2cm}} + \underline{\hspace{2cm}})$.

   

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6.10 Multiplying with Arrays  Page 1

Student Book pages 206–207

**GOAL**

Multiply two-digit numbers using arrays.

You will need

* grid paper

A crossword puzzle has 15 rows and 15 columns.

**How many small squares are in the crossword puzzle?**

The total number of small squares is \[ \underline{\phantom{0}} \times \underline{\phantom{0}} \].

**Step 1:** Determine the number of rows and columns in each part of the puzzle.

**Part A (upper left):**

How many rows down? \[ \underline{\phantom{0}} \]

How many columns across? \[ \underline{\phantom{0}} \]

Part A = \[ \underline{\phantom{0}} \times \underline{\phantom{0}} \]

**Part B (upper right):**

How many rows down? \[ \underline{\phantom{0}} \]

How many columns across? \[ \underline{\phantom{0}} \]

Part B = \[ \underline{\phantom{0}} \times \underline{\phantom{0}} \]

**Part C (lower left):**

How many rows down? \[ \underline{\phantom{0}} \]

How many columns across? \[ \underline{\phantom{0}} \]

Part C = \[ \underline{\phantom{0}} \times \underline{\phantom{0}} \]

**Part D (lower right):**

How many rows down? \[ \underline{\phantom{0}} \]

How many columns across? \[ \underline{\phantom{0}} \]

Part D = \[ \underline{\phantom{0}} \times \underline{\phantom{0}} \]
Step 2: Determine the number of small squares in each part.

Part A (upper left) = _______ × _______ = _______ small squares
Part B (upper right) = _______ × _______ = _______ small squares
Part C (lower left) = _______ × _______ = _______ small squares
Part D (lower right) = _______ × _______ = _______ small squares

Step 3: Determine the number of squares in the whole puzzle.

Add the 4 totals together.

\[
\begin{array}{c}
15 \\
\times \hspace{1cm} 15 \\
\end{array}
\]

part A total
+ part B total
+ part C total
+ part D total

There are _______ small squares in the whole puzzle.

Reflecting

You can use the same strategy for a 25-by-25 puzzle. Why would you organize the puzzle like this to find the total number of small squares?

The 4 parts are:

\[
\begin{array}{c}
\hspace{1cm} \times \hspace{1cm} \hspace{1cm} \\
\hspace{1cm} \times \hspace{1cm} \\
\hspace{1cm} \times \hspace{1cm} \\
\hspace{1cm} \times \hspace{1cm} \\
\end{array}
\]

Hint: Look at the 4 parts and decide how you feel about using those numbers.
Checking

1. A puzzle has 36 rows of 36 squares.
   Divide the array into 4 parts.

   Top parts:
   30 rows of 30 columns
   30 rows of 6 columns

   Bottom parts:
   6 rows of 30 columns
   6 rows of 6 columns

   Calculate the partial products.

   **Top parts:** 30 × 30 = _______
   30 × 6  = _______

   **Bottom parts:** 6 × 30 = _______
   6 × 6  = _______

   Add the partial products together.
   ______ + ______ + ______ + ______ = _______

   There are _______ squares.
2. Mia used 18 spools of thread to finish a towel. Each spool held 25 m of thread. How much thread did she use? Divide the array into 4 parts. Write the partial products of each part.

**Top parts:** _______ × _______ = _______

_______ × _______ = _______

**Bottom parts:** _______ × _______ = _______

_______ × _______ = _______

Add the partial products together.

_______ + _______ + _______ + _______ = _______

Mia used _______ m of thread.

5. How does the model show that both of the following equations are true?

42 × 53 = (40 + 2) × (50 + 3)

42 × 53 = (40 × 50) + (40 × 3) + (2 × 50) + (2 × 3)

The array shows 42 as (_______ + _______) and 53 as (_______ + _______).

So 42 × 53 = (_______ + _______) × (_______ + _______).

The 4 sections of the rectangle show 4 small arrays. Write each of them, starting at the top.

_______ × _______, _______ × _______, _______ × _______, _______ × _______

Write them together.

42 × 53 = (_______) + (_______) + (_______) + (_______)
6.11 Communicating about Multiplication Methods Page 1

Student Book pages 208–209

GOAL

Explain your calculation method when solving a problem.

Jay read that a sprinkler sprays about 17 L of water in 1 minute.
His sprinkler was on for 22 minutes.

How much water did the sprinkler spray?

This is Jay's Solution.

<table>
<thead>
<tr>
<th>I think I should multiply 17 L by 22 min.</th>
<th>Why did you calculate instead of estimate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 x 22 = 200 + 140 + 20 + 14</td>
<td>Why did you multiply?</td>
</tr>
<tr>
<td>17 x 22 = 374</td>
<td>How did you get the four numbers you added?</td>
</tr>
</tbody>
</table>

Use Maya's questions and the Communication Checklist to improve Jay's solution.

Why didn't Jay estimate?

Why did Jay multiply?

Hint: Think of 1 minute as a group of 17.

Communication Checklist

✓ Did you explain your thinking?
✓ Did you show all the steps?
✓ Did you use math language?
How did Jay get the 4 numbers he added?

**Hint:** Calculate the 4 parts of the $17 \times 22$ array below.

Top left = _______ rows $\times$ _______ columns = _______ $\times$ _______ = 200
Top right = _______ rows $\times$ _______ columns = _______ $\times$ _______ = 140
Bottom left = _______ rows $\times$ _______ columns = _______ $\times$ _______ = 20
Bottom right = _______ rows $\times$ _______ columns = _______ $\times$ _______ = 14

Add the 4 totals together.

\[
\begin{array}{c}
17 \\
\times \\
22 \\
\hline
200 & top left total \\
+ & 140 & top right total \\
20 & bottom left total \\
14 & bottom right total \\
\end{array}
\]

The sprinkler sprayed _______ L of water.

**Reflecting**

Why is it important to communicate clearly when you solve a problem?

_______________________________

_______________________________
Checking

1. Using a diagram can help you communicate more clearly.
   How can you use a diagram to improve Jay's Solution?
   **Hint:** Explain how you can use arrays or base ten blocks to calculate $17 \times 22$.

Practising

2. How many months will you be on your 14th birthday?
   How many months are in a year? _______
   What can you multiply to solve the problem? _______ $\times$ _______
   Are you going to estimate or calculate the answer? ___________________
   Why?

Solve the problem using your own strategy.
3. A tour bus holds 48 passengers. There are 15 tour buses. Can these buses take 600 visitors?
What can you multiply to solve the problem? _______ × _______
Are you going to estimate or calculate the answer? ________________
Why?

Solve the problem using your own strategy.

4. Sebastian can walk 47 cm in 2 steps. How far can he walk in 50 steps?
What can you multiply to solve the problem? _______ × _______
Are you going to estimate or calculate the answer? ________________
Why?

Solve the problem using your own strategy.
Chapter 9: Multiplication and Division of Decimals

1. Estimate each product. Will your estimate be higher or lower than the actual answer? Explain.
   a) 24 × 7 is about _______________________
   b) 36 × 8 is about _______________________
   c) 5 × 18 is about _______________________
   d) 21 × 6 is about _______________________

2. Predict which products are between 200 and 300. How do you know?
   a) 5 × 37 _______________________
   b) 8 × 27 _______________________
   c) 6 × 35 _______________________
   d) 7 × 51 _______________________

3. Calculate each product.
   a) 39 × 7 = _______________  g) 29 × 17 = _______________
   b) 42 × 8 = _______________  h) 81 × 12 = _______________
   c) 15 × 4 = _______________  i) 21 × 22 = _______________
   d) 41 × 7 = _______________  j) 11 × 14 = _______________
   e) 25 × 9 = _______________  k) 27 × 41 = _______________
   f) 42 × 16 = _______________  l) 38 × 12 = _______________

4. Explain why 8 × 12 = 4 × 24 without actually calculating the product.

   ____________________________________
   ____________________________________
   ____________________________________
5. Estimate each quotient. Will your estimate be higher or lower than the actual answer? Explain.
   a) 29 ÷ 7 is about 
   b) 426 ÷ 7 is about 
   c) 115 ÷ 8 is about 
   d) 242 ÷ 6 is about 

6. Calculate each quotient.
   a) 161 ÷ 7 
   b) 176 ÷ 8 
   c) 204 ÷ 4 
   d) 112 ÷ 7 
   e) 315 ÷ 9 
   f) 360 ÷ 5 
   g) 203 ÷ 7 
   h) 243 ÷ 3 
   i) 168 ÷ 8 
   j) 44 ÷ 4 
   k) 162 ÷ 6 
   l) 342 ÷ 9 

7. The Grade 6 class picnic is going to cost about $330. Each Grade 6 student contributes $6. How many students are in the class? Explain your thinking.

   
   
   

8. A family of 4 has 362 cellphone minutes to share equally.
   
   a) How many minutes would each member get? Explain your thinking.

   
   
   

   b) Would there be any minutes left over? Explain your thinking.
Chapter 6
Lesson 1

Multiplication Strategies

GOAL
Multiply one-digit numbers using mental math strategies.

1. Calculate.
   a) $3 \times 5 = \underline{\hspace{2cm}}$
   b) $4 \times 7 = \underline{\hspace{2cm}}$
   c) $8 \times 2 = \underline{\hspace{2cm}}$
   d) $6 \times 5 = \underline{\hspace{2cm}}$

2. Use doubling to calculate.
   a) $2 \times 4 = \underline{\hspace{2cm}}$, so $4 \times 4 = \underline{\hspace{2cm}}$
   b) $3 \times 3 = \underline{\hspace{2cm}}$, so $3 \times 6 = \underline{\hspace{2cm}}$

3. Use each fact to calculate. The first one is partly done for you.
   a) $5 \times 5 = 25$, so $5 \times 6$ is the same as $25 + 5 = \underline{\hspace{2cm}}$
   b) $2 \times 7 = 14$, so $3 \times 7$ is the same as $14 + 7 = \underline{\hspace{2cm}}$
   c) $8 \times 4 = 32$, so $8 \times 3$ is the same as $32 - 5 = \underline{\hspace{2cm}}$

4. Calculate.
   a) $2 \times 9 = \underline{\hspace{2cm}}$
   b) $5 \times 7 = \underline{\hspace{2cm}}$
   c) $6 \times 4 = \underline{\hspace{2cm}}$

5. a) Four students are in Justine’s reading group. Each student has three books. How many books do they have in all?

   b) Describe how you calculated the answer.
Special Products

GOAL
Use special strategies to multiply by 8 and 9.

1. Calculate $8 \times 9$ using each strategy.
   a) doubling
   b) first multiplying by 10, and then subtracting

2. How could you calculate each product? Describe the strategy you would use. Then calculate.
   a) $9 \times 5$
   b) $5 \times 8$

3. Cars have four wheels and many trucks have six wheels.
   a) How many more wheels do eight trucks have than eight cars?
   b) How many more wheels do nine trucks have than nine cars?

At-Home Help
Here is another strategy to help you multiply.
To multiply by 8 or 9, first multiply by 10, and then subtract.
For example, to calculate $7 \times 9$, first calculate $7 \times 10 = 70$. Then subtract 7 to get $70 - 7 = 63$.
To calculate $7 \times 8$, first calculate $7 \times 10 = 70$. Then subtract two 7s to get $70 - 7 - 7 = 56$. 
Relating Multiplication Facts

GOAL
Describe how multiplication facts are related.

1. Describe how to use the first multiplication fact to calculate the second fact. The first one is partly done for you.

   a) I know \(2 \times 5 = 10\), and I want to know \(4 \times 5\).  
      I will ___ _____________.
      
   b) I know \(3 \times 5 = 15\), and I want to know \(6 \times 5\).  
      I will ___ _____________.
      
   c) I know \(10 \times 6 = 60\), and I want to know \(9 \times 6\).  
      I will ___ _____________.
      
   d) I know \(7 \times 4 = 28\), and I want to know \(7 \times 5\).  
      I will ___ _____________.

2. Use \(4 \times 8 = 32\) to calculate each multiplication fact. Show your work.

   a) \(5 \times 8\)  
   b) \(8 \times 8\)  
   c) \(3 \times 8\)

3. Jay knows that \(7 \times 7 = 49\).
   How can he use this fact to calculate \(7 \times 5\)?

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Multiply by Tens, Hundreds, and Thousands

**GOAL**

Calculate products with multiples of tens, hundreds, or thousands using mental math.

1. Use each fact to calculate.
   a) \(5 \times 5\) tens = 25 tens, so \(5 \times 50 = \\)
   b) \(7 \times 2\) hundreds = 14 hundreds, so \(7 \times 200 = \\)
   c) \(4 \times 8\) tens = 32 tens, so \(4 \times 80 = \\)
   d) \(7 \times 3\) thousands = 21 thousands, so \(7 \times 3000 = \\)

2. Calculate.
   a) \(80 \times 3\) tens = 240 tens, so \(80 \times 30 = \\)
   b) \(20 \times 9\) tens = 180 tens, so \(20 \times 90 = \\)
   c) \(10 \times 2\) hundreds = 20 hundreds, so \(10 \times 200 = \\)
   d) \(50 \times 3\) hundreds = 150 hundreds, so \(50 \times 300 = \\)

   a) \(4 \times 200 = \\)
   b) \(90 \times 30 = \\)
   c) \(6 \times 3000 = \\)

4. Calculate.
   a) \(20 \times 30 = \\)
   b) \(50 \times 60 = \\)
   c) \(40 \times 70 = \\)

5. Sydney can make 20 paper cranes in 1 day. How many paper cranes can she expect to make in 20 days?
Halving and Doubling to Multiply

GOAL

Multiply by halving and doubling.

1. Use the half/double strategy to calculate. The first one is done for you.
   a) $8 \times 3 = \underline{4 \times 6}$, so $8 \times 3 = \underline{24}$
   b) $20 \times 4 = \underline{\phantom{000}}$, so $20 \times 4 = \underline{\phantom{000}}$
   c) $6 \times 500 = \underline{\phantom{000}}$, so $6 \times 500 = \underline{\phantom{000}}$

2. Rewrite each equation by making one factor 10, 100, or 1000, and keeping the product the same. The first one is done for you.
   a) $5 \times 4$ is the same as $\underline{10 \times 2}$
   b) $8 \times 500$ is the same as $\underline{\phantom{000}}$
   c) $50 \times 14$ is the same as $\underline{\phantom{000}}$

3. Calculate.
   a) $50 \times 8$
   b) $500 \times 18$
   c) $20 \times 500$
   d) $12 \times 50$

4. What is the value of 500 toonies?

5. What is the value of 16 $50 bills?
Chapter 6
Lesson 6

Multiplying Numbers Close to Tens

GOAL
Multiply using a simpler, related question.

At-Home Help
Here is a strategy to help you multiply numbers that are close to tens.
Calculate the easier, related question first. Then add or subtract to answer the original question.
For example, calculate $29 \times 6$.
This question is close to $30 \times 6$. I will calculate this easier question first.
$30 \times 6 = 180$
I need to subtract one $6$ to answer the original question.
$180 - 6 = 174$, so $29 \times 6 = 174$

1. Calculate the first product. Use the answer to calculate the second product. The first one is partly done for you.
   a) $50 \times 3 = \underline{150}$, so $51 \times 3$ is the same as $\underline{150 + 3 = \underline{}}$
   b) $40 \times 6 = \underline{\underline{}}$, so $39 \times 6$ is the same as $\underline{\underline{}}$
   c) $80 \times 3 = \underline{\underline{}}$, so $82 \times 3$ is the same as $\underline{\underline{}}$

2. Calculate. Show what you did.
   a) $3 \times 31 \underline{\underline{}}$
   b) $89 \times 2 \underline{\underline{}}$
   c) $7 \times 19 \underline{\underline{}}$
   d) $8 \times 101 \underline{\underline{}}$

3. A building has 38 windows on each floor.
   a) How many windows are on 2 floors?

   b) How many windows are on 6 floors?

4. Rebecca earns $8 every Saturday morning. How much does Rebecca earn in 49 Saturdays?
Estimating Products

GOAL
Estimate to solve problems.

1. Estimate.
   a) $19 \times 5$ is about 
   b) $31 \times 2$ is about 
   c) $78 \times 3$ is about 

2. 76 students are going on a class trip. The teacher wants to know if 3 buses will be enough to take all the students. 23 students can go on each bus. Why do you think the teacher estimated high by multiplying $25 \times 3$?

   a) $21 \times 50$

   b) $89 \times 20$

   c) $62 \times 39$

4. Owen’s class is making kites. Each kite needs 35 m of string. There are 25 students in the class. About how much string does the class need?
Jolie and Desmond timed their blinks, breaths, and heartbeats for one minute. They recorded their results in a chart.

1. Use any strategy to calculate. Show your work.
   a) How many times would Jolie's heart beat in 30 min?
   b) How many times would Desmond breathe in 19 min?
   c) How many times would each person blink in 60 min?

2. Write and solve your own question about Jolie or Desmond.
Chapter 6: Multiplying with Base Ten Blocks

GOAL

Represent the products of two-digit numbers.

1. Complete the multiplication for the model.

```
  15
x 21
```

```
  200
+ 100
```

2. Calculate. Sketch a model to help you.

   a) 21
   x 21

   b) 17
   x 11

3. Grace has 14 sets of blocks.
   Each set has 12 blocks.
   How many blocks does she have in total?

At-Home Help

You can use base ten blocks to model $24 \times 13$.
Think of 24 as $20 + 4$, and 13 as $10 + 3$.

The size of each part of the array is the product of the number of rows and columns.
Add the four products to get the total product.

```
24
x 13
```

```
200 (20 \times 10)
60 (20 \times 3)
40 (10 \times 4)
+ 12 (4 \times 3)
```

= 312
Chapter 6
Lesson 10

Multiplying with Arrays

**GOAL**

Multiply two-digit numbers using arrays.

You will need grid paper.

1. **a)** Sketch an array that shows $15 \times 12$.

   ![Array Sketch]

   b) Divide your array into four parts that are easier to calculate.

   c) Calculate each product and add them to get the total product.

2. Calculate.

   a) $11 \times 19$

   b) $23 \times 29$

   c) $71 \times 42$

**At-Home Help**

Here is an example of using an array to multiply $18 \times 14$. This method is very similar to using base ten blocks.

- First, sketch an array of 18 by 14 squares on grid paper.
- Next, divide the array into four parts that are easier to calculate. For example, divide it into $10 \times 10$, $10 \times 8$, $4 \times 10$, and $4 \times 8$.

   ![Divided Array]

   - Add the four products to get the total product:
     $100 + 80 + 40 + 32 = 252$,
     so $18 \times 14 = 252$
1. Owen explained how he calculated $30 \times 81$.
   "81 is close to 80, so first I did $30 \times 80$. Then I added the leftover part to find the total. The answer is 2430."

Write a better explanation for $30 \times 81$.
Use the Communication Checklist.

2. Ami's house is 72 m away from the school. Over two weeks, Ami walked back and forth 19 times. How many metres did she walk? Show your thinking as completely as possible.

3. There are 30 cards in a set of baseball cards. Sydney has 48 sets of cards in her collection. How many baseball cards does she have?
Chapter 6

Test Yourself

Circle the correct answer.

1. How can you use $4 \times 3 = 12$ to help you calculate $8 \times 3$?
   A. multiply 3 by 10 and then subtract 4
   B. skip count from 4 three times
   C. halve the 4 and the 12
   D. double the 4 and the 12

2. Which multiplication fact is the most useful to help you multiply $9 \times 5$?
   A. $10 \times 5 = 50$
   B. $8 \times 8 = 64$
   C. $2 \times 3 = 6$
   D. $6 \times 6 = 36$

3. Calculate $30 \times 40$.
   A. 12
   B. 120
   C. 1200
   D. 12000

4. Calculate $8 \times 3000$.
   A. 24
   B. 240
   C. 2400
   D. 24000

5. Which multiplication fact is the same as $50 \times 14$?
   A. $51 \times 13 = 663$
   B. $100 \times 7 = 700$
   C. $25 \times 7 = 175$
   D. $100 \times 28 = 2800$

6. Calculate $40 \times 500$.
   A. 20000
   B. 40000
   C. 10000
   D. 2000

7. Calculate $4 \times 49$.
   A. 215
   B. 302
   C. 77
   D. 196

8. Estimate to decide which answer is reasonable for $81 \times 19$.
   A. 167
   B. 1539
   C. 2970
   D. 735

9. Calculate $33 \times 100$.
   A. 3300
   B. 330
   C. 33000
   D. 330000

    A. 389
    B. 358
    C. 377
    D. 319
1. List three multiplication facts that you can use to help you calculate $5 \times 8$. How can you use each fact?

2. Joe fills a box with six muffins.
   a) How many muffins does he need to fill eight boxes?

   b) How would the number change if he fills nine boxes?

3. How can you use base ten blocks to show that $30 \times 40 = 1200$? Sketch your model.

4. Use a sketch to show that $18 \times 50 = 9 \times 100$.

5. How much greater is $4 \times 96$ than $4 \times 90$? How do you know?
Chapter 6 Test  

6. One boat can hold 15 passengers to ferry them across a lake. About how many passengers can 21 boats hold? Describe your estimation strategy.

7. About 14 cars pass over a small bridge every 6 hours. About how many cars pass over the bridge in a week?

8. Calculate.
   a) $22 \times 17$

   b) $15 \times 15$

   a) How many times will her heart beat in 12 min?

   b) How many times will her heart beat in 35 min?

   c) How many times will her heart beat in 41 min?