UNIT 8

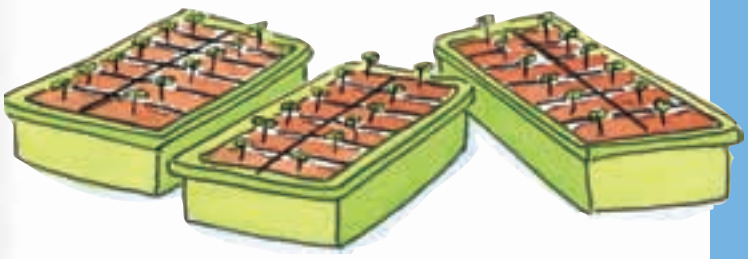
Multiplying and Numbers

Learning Goals

- use personal strategies to multiply
- estimate products
- use models and arrays to multiply and divide
- multiply a 2-digit and a 3-digit number by a 1-digit number
- estimate quotients
- divide a 2-digit number by a 1-digit number
- use personal strategies to divide
- relate multiplication and division
- identify patterns in multiplication and division

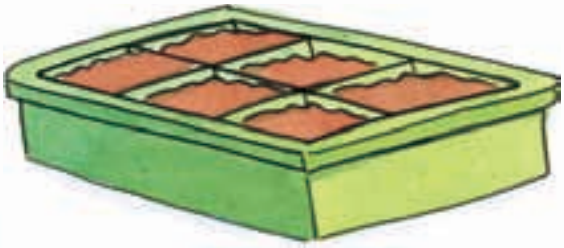
Dividing Larger

May-Lin works in a garden centre. She has planted seeds that grow into seedlings.



- How many seedlings are there?
- How did you find out?
- How many different ways can you find the answer?

May-Lin will replant the seedlings into other boxes like this:



- How many of these boxes does May-Lin need for all the seedlings?
- How do you know?

Key Words

multiplication sentence

quotient

remainder

division sentence

LESSON 1

Exploring Multiplication Patterns

Explore

You will need a calculator.

➤ Use a calculator to find each product.

4×1	9×1	5×5	2×3
4×10	9×10	5×50	2×30
4×100	9×100	5×500	2×300

What patterns do you see?

➤ Use patterns to find each product.
Check with a calculator.

7×1	8×1	4×2	2×9
7×10	8×10	4×20	2×90
7×100	8×100	4×200	2×900

Show *and* Share

Share the products and patterns you found with another pair of classmates.
How can you multiply by 10 and by 100 without using a calculator?
How can you multiply by multiples of 10 and of 100 without using a calculator?

Connect

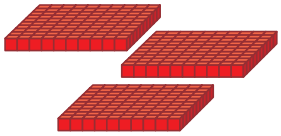
➤ You can use place value and patterns to multiply by 10 and by 100.

You know $3 \times 1 = 3$.

Use mental math to find 3×10 and 3×100.

3×1 ten $=$ 3 tens
$3 \times 10 = 30$

3×1 hundred $=$ 3 hundreds
$3 \times 100 = 300$



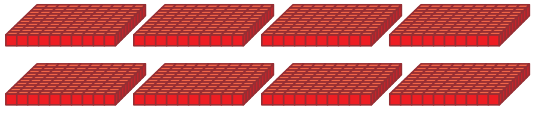
➤ You can use basic multiplication facts and place value to multiply by multiples of 10 and of 100.

You know 2×4 ones $=$ 8 ones
$2 \times 4 = 8$

Use mental math to find 2×40 and 2×400.

2×4 tens $=$ 8 tens
$2 \times 40 = 80$

2×4 hundreds $=$ 8 hundreds
$2 \times 400 = 800$



Practice

Use Base Ten Blocks when they help.

1. Use a basic fact and patterns to find each product.

a) $6 \times 1 = \square$
$6 \times 10 = \square$
$6 \times 100 = \square$

b) $7 \times 3 = \square$
$7 \times 30 = \square$
$7 \times 300 = \square$

c) $4 \times 6 = \square$
$4 \times 60 = \square$
$4 \times 600 = \square$

2. Multiply.

a) 3×10 **b)** 5×10 **c)** 7×10 **d)** 9×10
e) 10×4 **f)** 10×1 **g)** 10×8 **h)** 10×0

3. Find each product.

a) 4×100 **b)** 100×6 **c)** 9×100
d) 100×1 **e)** 7×100 **f)** 100×0

4. There are 60 cards in one box.
Caitlin bought 8 boxes.
How many cards did Caitlin buy?
How did you find out?

5. Multiply.

a) 3×50 **b)** 4×70 **c)** 9×30
d) 90×8 **e)** 20×6 **f)** 80×3

6. There are 200 cents in 1 toonie.
Clay has 6 toonies.
How many cents does Clay have?

7. Find each missing number.

a) $10 \times \square = 60$ **b)** $\square \times 100 = 800$ **c)** $2 \times \square = 80$
d) $4 \times \square = 200$ **e)** $20 \times \square = 180$ **f)** $\square \times 9 = 900$
g) $\square \times 3 = 90$ **h)** $60 \times \square = 240$ **i)** $\square \times 7 = 70$

8. **a)** How many balloons are in 6 packages?
b) How many candles are in 9 packages?
c) How many napkins are in 7 packages?
Show your work.

9. Make up some questions to show how you can multiply by:

a) multiples of 10

b) multiples of 100

Explain how your strategies work.

10. There are 50¢ in 1 roll of pennies. How many cents are in 9 rolls of pennies?

a) Write an equation you can solve to find out.

b) Solve the equation. Answer the question.

11. One tower is made with 100 red blocks, 200 yellow blocks, and 200 white blocks.

a) How many blocks of each colour would you need to make 4 towers?

b) How many blocks would you need altogether?

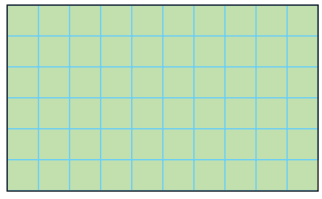
12. Choose a number.
Choose a multiple of 10 or 100.
Write an equation you can use to find the product of the number and the multiple.
Solve the equation.

Math Link

Measurement

To find the area of a rectangle, count the squares.
6 rows of 10 squares = 60 squares

To find the product of 6×10, use mental math.
$6 \times 10 = 60$



Reflect

Which patterns did you use when you multiplied by 10 and by 100?
Use words, pictures, or numbers to explain.

LESSON 2

Estimating Products

Sometimes you do not need to know the exact amount.
You only need to know *about* how many or how much.
An estimate is close to the exact amount.

Explore

A Bombardier Challenger airplane holds 22 passengers.
About how many passengers will 8 of these planes hold?
Estimate to solve this problem.
Record your answer.

Show *and* Share

Share your strategies for estimating the number of passengers with another pair of students.
Should your estimates be the same? Explain.

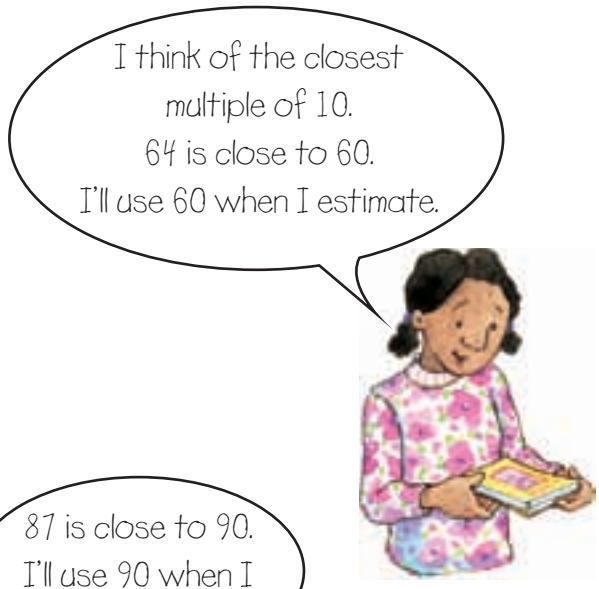
Connect

➤ A school bus holds 64 students.
About how many students can travel on 7 school buses?

To estimate 7×64

Think: $7 \times 60 = 420$

About 420 students can travel on 7 school buses.

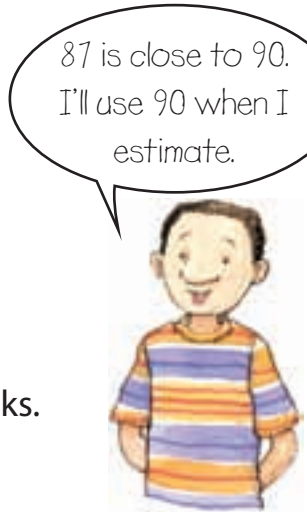


➤ There are 87 pages in a book.
About how many pages are there in 5 of these books?

To estimate 5×87

Think: $5 \times 90 = 450$

There are about 450 pages in 5 books.

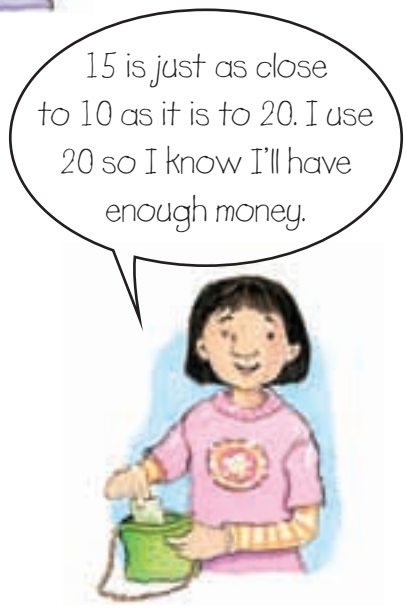


➤ A video costs $15.
About how much do 6 videos cost?

To estimate 6×15

Think: $6 \times 20 = 120$

It costs about $120 to buy 6 videos.



Practice

1. Estimate each product.

a) 3×21 **b)** 4×28 **c)** 5×35 **d)** 7×74

2. A can of soup costs 69¢.
About how much will 7 cans cost?

3. Estimate each product.
a) 62×4 **b)** 57×8 **c)** 28×2 **d)** 43×9

4. A belt is 77 cm long.
About how long are 5 of these belts?
How do you know?

5. Estimate to find out which product is greater:
6×72 or 7×66

6. Kyle's mother drives 47 km to work 5 days a week.
About how far does she drive in 2 weeks?
Show your work.

7. The estimated answer to a multiplication question is 360.
What might the question be?
How do you know?

8. There are 35 students in each group.
There are 8 groups.
Ali estimates that there are about 240 students in all.
Jenny estimates that there are about 320 students.
Explain why the estimates are different.

Reflect

How do you choose the multiple of 10 when you estimate?
Use words and numbers to explain.

LESSON 3

Using Models to Multiply

Explore

There are 24 eggs in a tray.
How many eggs are there in 6 trays?

Solve this problem.
Show your work.

Show *and* Share

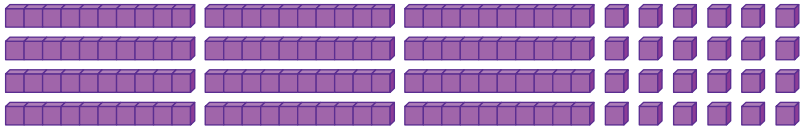
Share your strategy with another pair of students.
Did you get the same answer?
If not, how can you find out who is correct?

Connect

There are 36 trees in each row in the new park. There are 4 rows.
How many trees have been planted?

4 rows of 36 trees $= 4 \times 36$
You can use models to multiply.

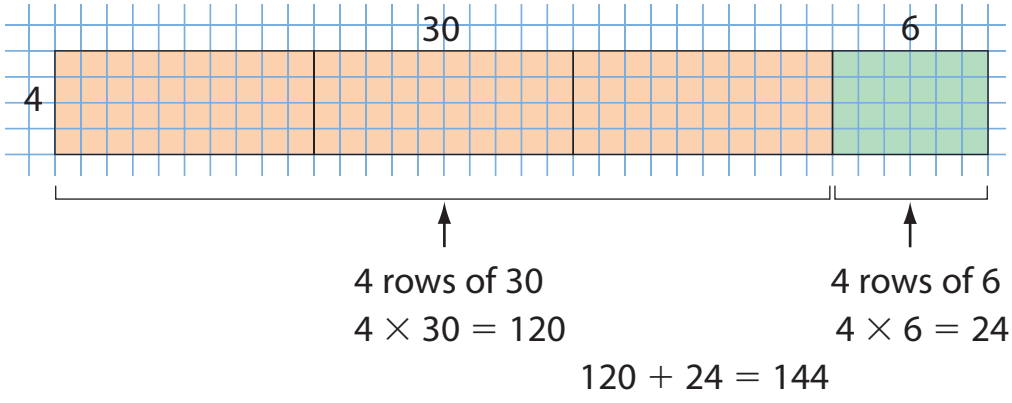
➤ Use Base Ten Blocks.
Arrange 4 rows of 3 tens and 6 ones.



Multiply the tens. ⟶ 4×30 4×6 ⟵ Multiply the ones.
Add. $120 + 24 = 144$

$4 \times 36 = 144$ ⟵ This **multiplication sentence** is an equation.

➤ Use grid paper to show an array for 4×36.

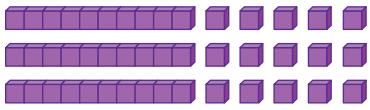


144 trees have been planted.

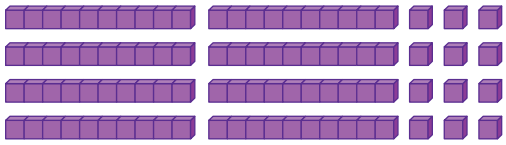
Practice

1. Write a multiplication sentence for each model.

a)



b)



2. On grid paper, draw an array to find each product.

a) 5×41 **b)** 35×4 **c)** 6×25 **d)** 18×6

Use Base Ten Blocks or grid paper when they help.

3. Multiply.

a) $\begin{array}{r} 23 \\ \times\ 3 \\ \hline \end{array}$ **b)** $\begin{array}{r} 36 \\ \times\ 2 \\ \hline \end{array}$ **c)** $\begin{array}{r} 62 \\ \times\ 4 \\ \hline \end{array}$ **d)** $\begin{array}{r} 72 \\ \times\ 6 \\ \hline \end{array}$ **e)** $\begin{array}{r} 47 \\ \times\ 3 \\ \hline \end{array}$

4. Find each product.

a) 5×61 **b)** 2×93 **c)** 45×4 **d)** 7×35 **e)** 19×5

5. Eva says to find 3×29, she would use mental math to find 3×30, then subtract 3.
Is Eva correct? Explain.

6. Gita works at a garden centre.
She plants 15 seedlings in each row.
Gita plants 7 rows.
How many seedlings does Gita plant?
a) Write an equation you can solve to find out.
b) Solve the equation. Answer the question.

7. How much greater is 7×23 than 6×23? Explain.

8. Tom is buying candles for his great grandmother's 90th birthday.
There are 24 candles in a box.
Tom buys 4 boxes of candles.
a) Will he have enough candles?
How do you know?
b) Will Tom have any candles left over?
How did you find out?
Show your work.

9. Write a story problem that can be solved by multiplying.
Solve your problem. Show your work.

10. Tara says that 4×36 is the same as 4×30 plus 4×6.
Do you agree? Explain your strategy.

11. A tray of petunias has 6 rows of 24 plants.
A tray of pansies has 8 rows of 16 plants.
Which tray has more plants?
Show your work.

Reflect

You have learned 2 models to multiply. Which do you prefer? Include an example of how you used the model.

At Home

Ask relatives and friends what strategies they use to multiply two numbers such as 74×5. Write about their strategies.

LESSON 4

Strategies Toolkit

Explore

Marcus makes a "penny triangle."
He puts 1 penny in the 1st row, 2 pennies in the 2nd row, 3 pennies in the 3rd row, and so on.
How many pennies does Marcus need to make a triangle with 8 rows?

Show *and* Share

Share your strategy with another pair of students.

Connect

There are 7 students in an inter-school math competition. When they meet, each student shakes hands with every other student.
How many handshakes will there be?

Strategies

- Make a table.
- Use a model.
- Draw a picture.
- Solve a simpler problem.
- Work backward.
- Guess and test.
- Make an organized list.
- Use a pattern.

What do you know?
- There are 7 students.
- When student A shakes hands with student B, that's *one* handshake.
- You have to find how many handshakes there will be in all.

Think of a strategy to help you solve the problem.
- You could **solve a simpler problem**.
- Count how many handshakes for 2 students, then for 3 students, and so on. Look for a pattern in the answers.

For 2 students, there is 1 handshake.
For 3 students, there are 3 handshakes.

Number of Students	2	3
Number of Handshakes	1	3

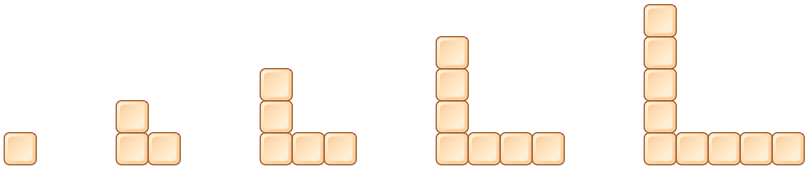
Copy and continue this table.
How many handshakes are there for 7 students?

How could you solve this problem another way?
Each student shakes hands with 6 other students.
Why is the total number of handshakes not 7×6?

Practice

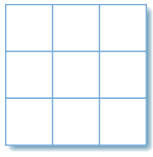
Choose one of the **Strategies**

1. Here is a pattern with Colour Tiles.
Suppose the pattern continues.



a) How many tiles would be in the 7th figure?
b) How many tiles are there in the first 7 figures?

2. How many squares can you see in this picture?
Remember to count big squares as well as small squares.



Reflect

Explain how you used the strategy of solve a simpler problem to solve one of the problems in this lesson.

LESSON 5

Other Strategies for Multiplication

Explore

There are 56 balloons in each package.
Kim bought 7 packages for his carnival game.
How many balloons has he bought?

Use any materials that help.
Show your work.

Show *and* Share

Share your strategy for multiplying with another pair of classmates.
How do you know you have the correct answer?

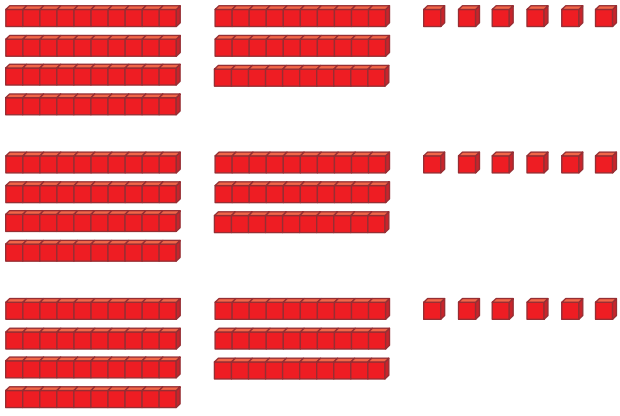
Connect

The prizes for the Fun Fair have arrived.
Each package has 76 prizes.
There are 3 packages.
How many prizes are there?

Here are three ways to find out.

The total number of prizes is 76×3.

➤ Use Base Ten Blocks to model the problem.



Multiply the tens.
3×70
210

Multiply the ones.
3×6
18

Add: $210 + 18 = 228$
So, $76 \times 3 = 228$

➤ Write the number in expanded form: $76 = 70 + 6$
Multiply the tens and multiply the ones.
Then add.

$3 \times 76 = (3 \times 70) + (3 \times 6)$

$210 + 18 = 228$

$76 \times 3 = 210 + 18 = 228$

I estimate to check my answer is reasonable. 76 is close to 80. I know $3 \times 80 = 240$. 240 is close to the answer, 228.

➤ Break the number apart.

$$\begin{array}{r} 76 \\ \times\ 3 \\ \hline 18 \\ +210 \\ \hline 228 \end{array}$$

Multiply the ones: 3×6 →
Multiply the tens: 3×70 →
Add.

So, $76 \times 3 = 228$

Practice

Use Base Ten Blocks when they help.

1. Find each missing number.

a) $31 \times 7 = (30 \times 7) + (\square \times 7)$ **b)** $45 \times 8 = (40 \times \square) + (5 \times 8)$

c) $66 \times 5 = (\square \times 5) + (6 \times 5)$ **d)** $86 \times 2 = (80 \times \square) + (6 \times \square)$

2. Find each product.

a) $\begin{array}{r} 29 \\ \times\ 5 \\ \hline \end{array}$ **b)** $\begin{array}{r} 82 \\ \times\ 6 \\ \hline \end{array}$ **c)** $\begin{array}{r} 66 \\ \times\ 3 \\ \hline \end{array}$ **d)** $\begin{array}{r} 36 \\ \times\ 2 \\ \hline \end{array}$ **e)** $\begin{array}{r} 41 \\ \times\ 8 \\ \hline \end{array}$

3. Multiply. Which strategies did you use?

a) 19×5 **b)** 39×4 **c)** 55×3 **d)** 23×9 **e)** 78×2

4. Each class is 45 minutes long.
The students have 3 classes after lunch.
How many minutes are students in class after lunch?

5. Write a story problem that can be solved by multiplying a 2-digit number by a 1-digit number.
Solve your problem.
Show your work.

6. Noah says that 34×8 is the same as $240 + 32$.
Do you agree?
Use words, pictures, or numbers to explain.

7. Chris wrote this product to find 62×6:
Explain each step of Chris' work.

$$\begin{array}{r} 62 \\ \times\ 6 \\ \hline 12 \\ +\ 360 \\ \hline 372 \end{array}$$

Reflect

Choose a *Practice* question. How can you check your answer by using a different strategy?

LESSON 6

Using Patterns to Multiply

Explore

You will need a copy of this multiplication chart.
Use patterns to complete the chart.

x	1	2	3	4	5	6	7	8	9
10	10	20	30	40	50	60	70	80	90
11	11	22	33	44	55				
12	12	24	36	48	60				
13	13	26	39	52	65				
14	14	28	42	56	70				
15	15	30	45	60	75				
16	16	32	48	64	80				
17	17	34	51	68	85				
18	18	36	54	72	90				
19	19	38	57	76	95				
20									

Show *and* Share

Show your completed chart to another pair of students.
Talk about the patterns you used, and the patterns in the chart.
Describe the pattern in the products that have 11 as a factor.

Connect

You can use patterns and mental math to multiply.

➤ Multiply: 6×79

Think:
79 is 1 less than 80.
So, 6×79 is
6 less than 6×80.
$6 \times 80 = 480$
Subtract 6.
$480 - 6 = 474$
So, $6 \times 79 = 474$

➤ Multiply: 8×42

Think:
42 is 2 more than 40.
So, 8×42 is
8×40 plus 8×2.
$8 \times 40 = 320$
Add 8×2, or 16.
$320 + 16 = 336$
So, $8 \times 42 = 336$

Practice

1. Multiply. What patterns do you see?

a) 2×99 **b)** 3×99 **c)** 4×99 **d)** 5×99 **e)** 6×99

2. Find each product.

a) 43×8 **b)** 9×37 **c)** 5×72 **d)** 36×6 **e)** 7×17

3. Stickers cost 68¢ a sheet.
How much money do you need for 6 sheets?

4. How can you tell what the ones digit of the product of 53×7 will be without solving the whole problem?

5. These numbers are from one row of a multiplication chart:

117	126	135	144	153	162

What number is being multiplied?
How do you know? Show your work.

6. Copy and complete this multiplication chart.
Use patterns to check.

×	60	61	62	63	64	65
2	120	122	124			
3		183	186	189		
4	240		248	252		
5	300		310	315		
6						
7						

Reflect

How can you use what you know about patterning to help you multiply?

LESSON 7

Multiplying a 3-Digit Number by a 1-Digit Number

Explore

Serena bought 2 packages of counters.
Each package contains 136 counters.
How many counters did Serena buy?

Use Base Ten Blocks to model the problem.
Write a multiplication fact for your model.
Record your work.
How can an estimate help you decide if your answer is reasonable?

Show *and* Share

Share your work with another pair of students.
How is multiplying a 3-digit number by a 1-digit number like multiplying a 2-digit number by a 1-digit number?
How is it different?
What strategy did you use to estimate?

LESSON FOCUS | Use Base Ten Blocks to multiply a 3-digit number by a 1-digit number.

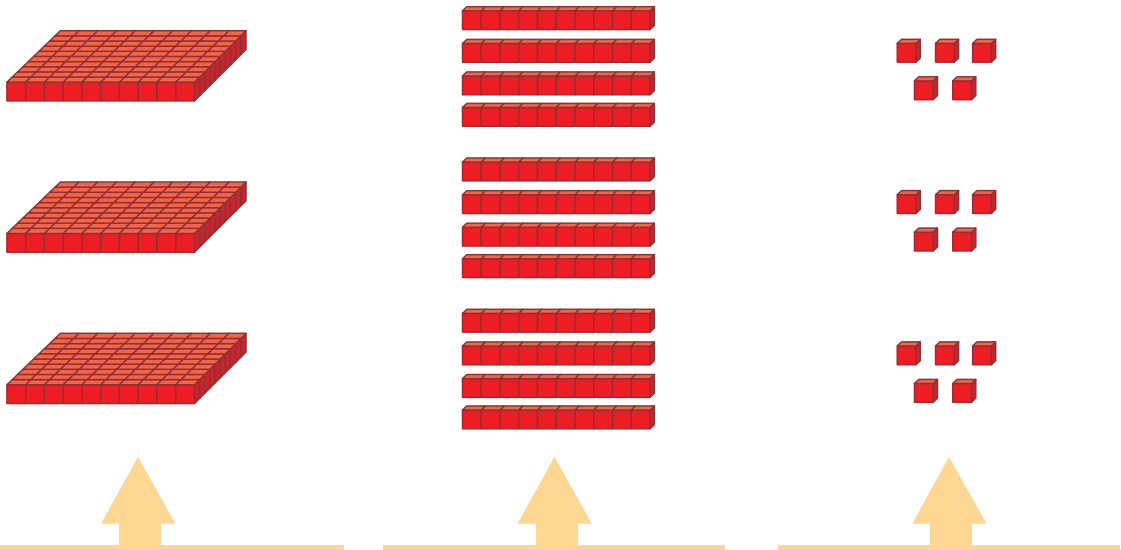
Connect

Mr. Martel arranged his class into 3 groups for an activity.
Each group needs a piece of string 145 cm long.
What length of string does Mr. Martel need?

The total length of string is 3×145 cm.

Here are three ways to multiply.

➤ Use Base Ten Blocks to model the problem.



Multiply the hundreds.
3×100
300

Multiply the tens.
3×40
120

Multiply the ones.
3×5
15

Add: $300 + 120 + 15 = 435$
So, $3 \times 145 = 435$

➤ Use expanded form.

145 is close to 150.
3×150 is 450. The answer, 435, is reasonable.

Write 145 as $100 + 40 + 5$.
Multiply, then add.

$$3 \times 145 = (3 \times 100) + (3 \times 40) + (3 \times 5)$$

$$3 \times 145 = 300 + 120 + 15 = 435$$

So, $3 \times 145 = 435$

➤ Break a number apart to multiply.

	145
	× 3
Multiply the ones: 3 × 5 →	15
Multiply the tens: 3 × 40 →	120
Multiply the hundreds: 3 × 100 →	+ 300
Add.	435

Mr. Martel needs 435 cm of string.

Practice

Use Base Ten Blocks when they help.

1. Find each missing number.

a) 178 × 5 = (100 × □) + (70 × 5) + (8 × □)

b) 523 × 4 = (500 × 4) + (20 × □) + (○ × 4)

c) 234 × 5 = (□ × 5) + (30 × 5) + (4 × ○)

d) 413 × 2 = (□ × 2) + (○ × 2) + (3 × 2)

2. Multiply. How do you know your answer is reasonable?

a) 121 × 3 **b)** 216 × 4 **c)** 171 × 5 **d)** 412 × 3 **e)** 210 × 6

3. Find each product.

a) 3 × 492 **b)** 152 × 7 **c)** 5 × 215 **d)** 124 × 6 **e)** 2 × 198

4. A large box of crayons holds 128 crayons.
How many crayons are in 4 large boxes?
Estimate to check if your answer is reasonable.

5. Solve each equation.

a) □ = 3 × 125 **b)** 256 × 4 = □ **c)** □ = 118 × 5

6. Write a story problem for each equation in question 5.

7. Write a story problem that can be solved by multiplying a 3-digit number by a 1-digit number.
Solve your problem.
Show your work.

8. Each seat on a roller coaster holds 3 people.
There are 42 seats.
The roller coaster completes 6 rides every hour.
Could 800 people ride the roller coaster in one hour? Explain.

9. Copy and complete each multiplication chart.
Explain your thinking.

a)

×	172	173	174	175
3	516		522	
4		692		700
5	860		870	
6		1038		1050

b)

×				
	600	603		
	800			812
			1010	1015
	1200		1212	1218

Reflect

How can you use what you know about multiplying a 2-digit number by a 1-digit number to multiply a 3-digit number by a 1-digit number?

LESSON 8

Estimating Quotients

In a division fact, the answer is the **quotient**.

$12 \div 3 = 4$

quotient

Explore

Students have collected 65 cans of food during a food drive.
They will pack the cans into boxes before they deliver them.
There are 9 boxes.
About how many cans will be in each box?
Record your answer.

Show *and* Share

Share your estimate with another pair of students.
Describe the strategies you used to estimate.

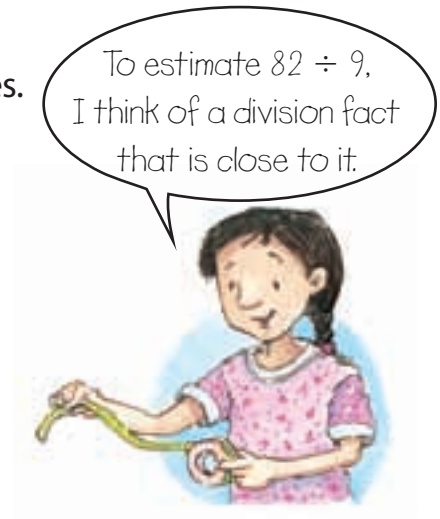
Connect

➤ A roll of ribbon is 82 m long.
Students plan to cut the ribbon into 9 equal pieces.
About how long will each piece be?

To estimate $82 \div 9$:

Think: 82 is close to 81.
81 is a multiple of 9.
$81 \div 9 = 9$

Each piece of ribbon will be about 9 m long.



➤ Nicole has $20.
She plans to buy small gifts for 7 friends.
About how much money will she spend on each gift?

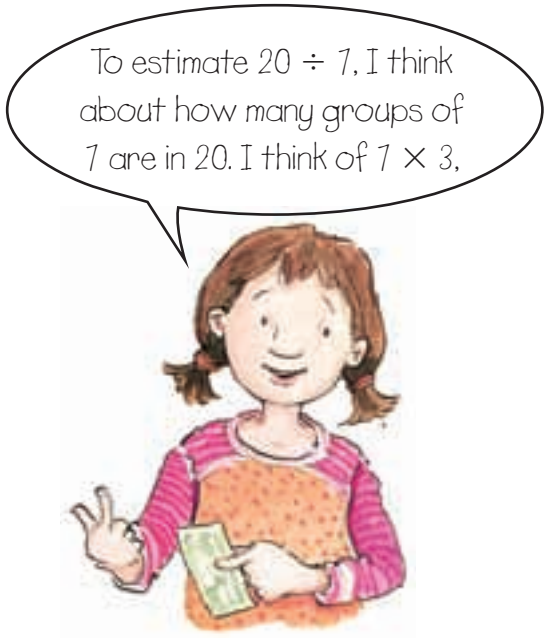
Here are two ways to estimate.

- To estimate 20 ÷ 7, use division.

Think: 20 is close to 21.
21 is a multiple of 7.
21 ÷ 7 = 3
Each gift will cost about $3.

- To estimate 20 ÷ 7, use multiplication.

Think: About how many groups of 7 are in 20?
7 × 3 is 21.
21 is close to 20.
21 ÷ 7 = 3
Each gift will cost about $3.



Practice

1. Write the division fact that helps you estimate each quotient.
a) 27 ÷ 4 **b)** 13 ÷ 2 **c)** 39 ÷ 5 **d)** 64 ÷ 7 **e)** 43 ÷ 6

2. Write the multiplication fact that helps you estimate each quotient.
a) 36 ÷ 5 **b)** 64 ÷ 9 **c)** 53 ÷ 6 **d)** 28 ÷ 9 **e)** 19 ÷ 2

3. Estimate each quotient.
a) 14 ÷ 3 **b)** 21 ÷ 4 **c)** 29 ÷ 9 **d)** 65 ÷ 8 **e)** 19 ÷ 6

4. Kada and her father travelled 65 km on a canoe trip.
The trip lasted 7 days.
Kada travelled about the same distance each day.
About how far did Kada travel each day?
How do you know?

5. Estimate to find which quotient is greater:
36 ÷ 7 or 50 ÷ 6

6. Forty-eight students go on a field trip.
They are divided into 7 groups.
About how many students are in each group?
How do you know?

7. Is the quotient of 53 ÷ 6 greater than or less than 9?
Explain your thinking.

8. Jilly has 65 stickers.
She plans to share them among 9 friends.
About how many will each friend get?
Show your work.

9. Write a story problem you can solve
by estimating the quotient.
Solve your problem.
Show your work.

10. Alona estimated 75 ÷ 9 as 8.
Chung estimated 75 ÷ 9 as 7.
Camille estimated 75 ÷ 9 as 9.
Which personal strategy do you think each student used?
Show your thinking.

Reflect

How does thinking of division and multiplication facts
help you to estimate?
Use words and numbers to explain.

LESSON 9

Division with Remainders

Explore

Monica works in a market.
She arranges fruit baskets.
Monica has 41 oranges.
She puts 6 oranges in each basket.
How many baskets can Monica make up?
How many oranges are left over?
Use any materials that help. Show your work.

Show *and* Share

Share your answer with another pair of students.
Talk about the strategies you used.
How are they the same? How are they different?

Connect

➤ Monica has 25 apples.
She puts the same number of apples in each of 4 baskets.
How many apples are there in each basket?

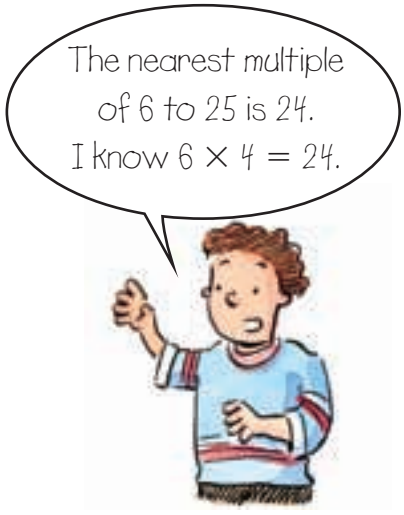
Share 25 apples equally among 4 baskets.
Divide: 25 ÷ 4
Make an array, with 4 in each row.
There are 6 rows, with 1 left over.

Monica puts 6 apples in each basket.
There is 1 apple left over.
This is called a **remainder**.

R stands for remainder.

You write: $25 \div 4 = 6$ R1 ← This is a **division sentence**.
You say: 25 divided by 4 is 6 remainder 1.

➤ Divide: $25 \div 6$
Think about the division fact that is closest to $25 \div 6$.
You know that $24 \div 6 = 4$.
So, $25 \div 6 = 4$ R1



Practice

Use arrays when they help.

1. Write a division sentence for each array.

a)

b)

c)

2. Divide. Draw an array to show how you got each answer.

a) $17 \div 2$ **b)** $28 \div 5$ **c)** $24 \div 3$ **d)** $20 \div 6$

3. Caleb is putting his markers into packages.
He has 43 markers.
Each package holds 8 markers.

a) How many packages will Caleb fill?

b) How many markers will he have left over?

4. Which division statements have an answer greater than 6?
How do you know?

a) 50 ÷ 8 **b)** 45 ÷ 7 **c)** 76 ÷ 9 **d)** 13 ÷ 2
e) 20 ÷ 4 **f)** 50 ÷ 6 **g)** 61 ÷ 8 **h)** 36 ÷ 5

5. Elizabeth takes 2 apples to school each day for her snack.
She has 15 apples.
How many days can Elizabeth take her snack to school?
Show your work.

6. Divide.

a) 14 ÷ 7 **b)** 15 ÷ 7 **c)** 16 ÷ 7 **d)** 17 ÷ 7
e) 18 ÷ 7 **f)** 19 ÷ 7 **g)** 20 ÷ 7 **h)** 21 ÷ 7

What is the greatest possible remainder when you divide by 7?
How do you know it is the greatest?

7. Write a story problem that has a remainder
when you divide to solve the problem.
Solve the problem.

8. Amina solves a division problem this way: 21 ÷ 4 = 5 R1
Tyler solves the problem this way: 21 ÷ 4 = 4 R5
Who is correct? How do you know?
Show your work.

9. Bottles are packaged 6 to a carton.
Every bottle must be in a carton.
There are 32 bottles to be packaged.

a) How many cartons are needed?
b) Does the number of cartons change if there are 35 bottles instead of 32? Explain.

Reflect

When you solve a division problem,
what strategies can you use?
Use examples to show your ideas.

LESSON 10

Using Base Ten Blocks to Divide

Explore

Felipe has 76 books.
He divides them equally among 4 boxes.
How many books are in each box?
Show your work.

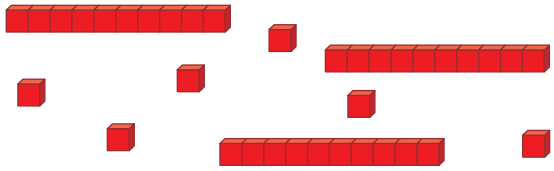
Suppose Felipe had 78 books.
Could he divide them equally among 4 boxes?
How do you know?

Show *and* Share

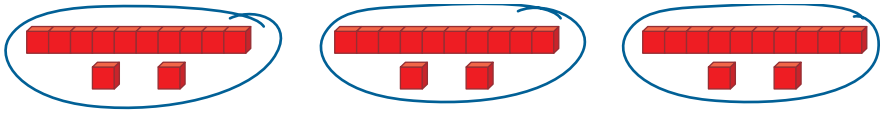
Share your answers with those of another pair of students.
What strategies did you use to solve the problem?

Connect

➤ Divide: 36 ÷ 3
Use Base Ten Blocks to show 36.



Divide the blocks into 3 equal groups.

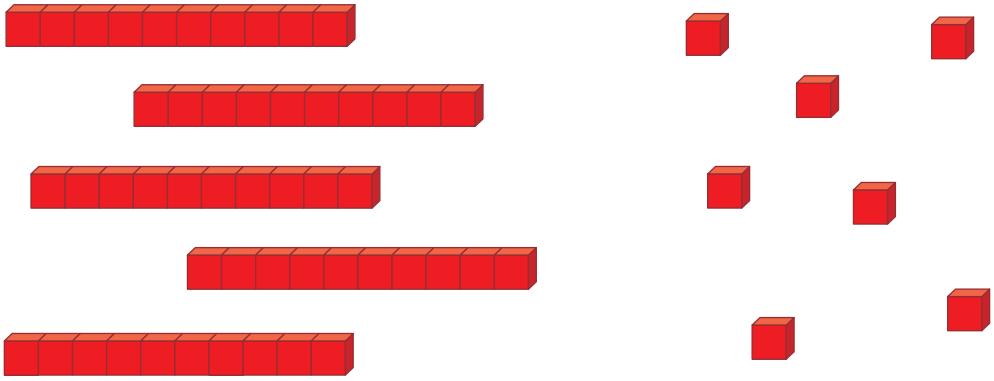


In each group, there is 1 ten rod and 2 unit cubes.
So, there are 12 in each group.

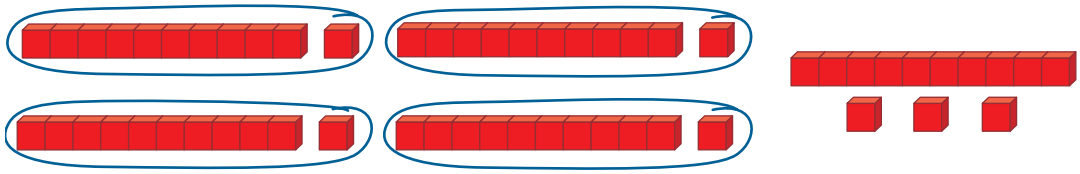
36 ÷ 3 = 12

➤ Divide: 57 ÷ 4

Use Base Ten Blocks to show 57.

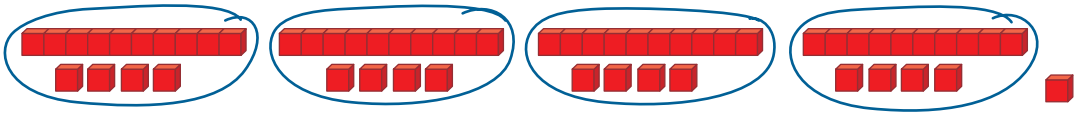


Divide the blocks into 4 equal groups.



There is 1 ten rod and 1 unit cube in each group.
There is 1 ten rod and 3 unit cubes left over.
Trade the ten rod for 10 unit cubes.

There are 13 unit cubes.
Divide these cubes among the 4 equal groups.



There is 1 ten rod and 4 unit cubes in each group.
There is 1 unit cube left over.

So, 57 ÷ 4 = 14 R1

Practice

Use Base Ten Blocks when they help.

1. Divide.

a) 69 ÷ 3 **b)** 68 ÷ 4 **c)** 87 ÷ 2 **d)** 64 ÷ 4 **e)** 75 ÷ 6

2. Aidan is collecting eggs at a farm. He puts the eggs in cartons. Each carton holds 6 eggs. Aidan collects 34 eggs. How many cartons does he need?

3. Divide. Draw a picture of the blocks you used to get one answer.

a) 93 ÷ 3 **b)** 49 ÷ 4 **c)** 96 ÷ 8 **d)** 56 ÷ 5 **e)** 91 ÷7

4. Write a story problem that can be solved using 78 ÷ 6.
Solve the problem.
Show your work.

5. Divide.

a) 40 ÷ 2 **b)** 41 ÷ 2 **c)** 42 ÷ 2 **d)** 43 ÷ 2
e) 44 ÷ 2 **f)** 45 ÷ 2 **g)** 46 ÷ 2 **h)** 47 ÷ 2

How can you tell *before* you divide by 2 if there will be a remainder?

6. Divide.

a) 40 ÷ 5 **b)** 42 ÷ 5 **c)** 45 ÷ 5 **d)** 46 ÷ 5
e) 50 ÷ 5 **f)** 54 ÷ 5 **g)** 55 ÷ 5 **h)** 57 ÷ 5

How can you tell *before* you divide by 5 if there will be a remainder?

7. Chin-Tan found 52 action figures for his yard sale. He wants to put them in more than 1 box, but fewer than 5 boxes. Each box will have the same number of figures.
How many boxes can Chin-Tan use? Explain.

Reflect

Use what you have learned about remainders.
Which numbers have no remainder when they are divided by 2? By 5? How do you know?

LESSON 11

Another Strategy for Division

Explore

There are 63 trees.
They are to be planted in 4 equal rows.
How many trees will there be in each row?
Do you think there will be any trees left over?
How do you know?

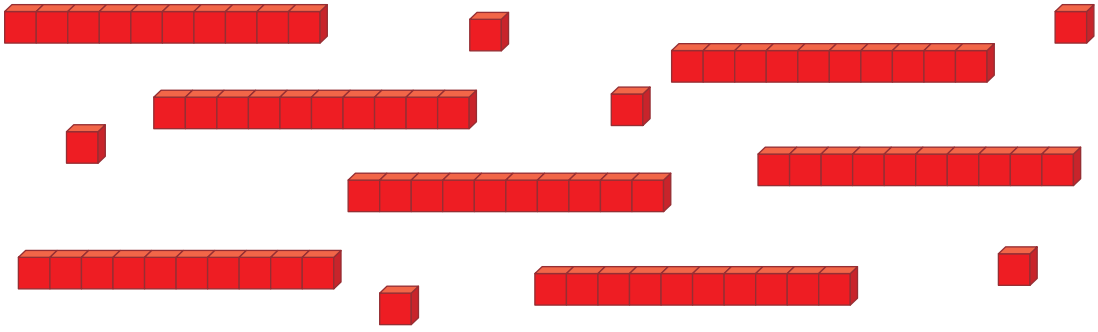
Show *and* Share

Talk with another pair of students about the strategy you used to solve this problem.

Connect

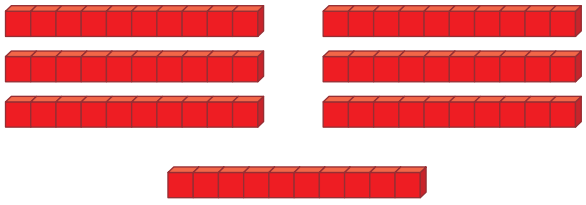
There are 76 plants.
They are to be planted in 3 gardens.
Each garden will have the same number of plants.
How many plants will there be in each garden?

Divide: 76 ÷ 3
Use Base Ten Blocks to show 76.



Arrange the 7 rods in 3 equal rows.

You see:



You think:

7 rods ÷ 3
is 2 rods each
with 1 rod left over.

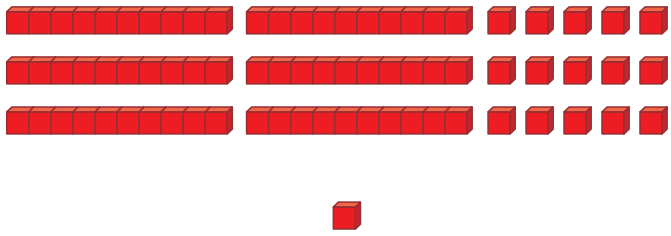
You write:

$$3\overline{)7^{1}6}\quad 2$$

Trade 1 ten rod for 10 ones.
You have 16 unit cubes.

Share these 16 cubes equally among the 3 rows.

You see:



You think:

16 cubes ÷ 3 is
5 cubes each
with 1 cube left over.

You write:

$$3\overline{)7^{1}6}\quad 25\ \text{R1}$$

So, 76 ÷ 3 = 25 R1
There will be 25 plants in each garden.
There will be 1 plant left over.

When you show division like this, it is called short division.

Practice

Use Base Ten Blocks when they help.

1. Find 3 division statements that have an answer greater than 11.

a) 27 ÷ 2 **b)** 47 ÷ 4 **c)** 61 ÷ 6 **d)** 84 ÷ 8
e) 52 ÷ 5 **f)** 46 ÷ 3 **g)** 99 ÷ 9 **h)** 73 ÷ 7

2. Victoria shares 49 crayons among 8 students.
How many crayons does each student get?

3. Divide.

a) 56 ÷ 6 **b)** 29 ÷ 9 **c)** 47 ÷ 7 **d)** 74 ÷ 4

e) 92 ÷ 2 **f)** 83 ÷ 3 **g)** 38 ÷ 8 **h)** 65 ÷ 5

4. Emma is collecting a series of books.
Each book costs $6.
How many books can Emma buy with $53?

5. Trenton has to feed 8 cats.
He has 45 large cans of cat food.
Each large can feeds 2 cats per day.
How many days of cat food does Trenton have?
Show your work.

6. Divide.

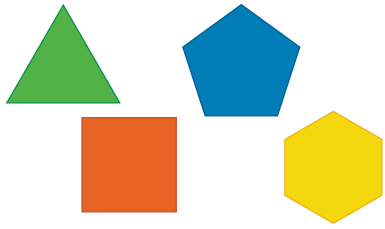
a) 36 ÷ 3 **b)** 38 ÷ 3 **c)** 39 ÷ 3 **d)** 40 ÷ 3

e) 42 ÷ 3 **f)** 43 ÷ 3 **g)** 45 ÷ 3 **h)** 46 ÷ 3

How can you tell *before* you divide by 3 if there will be a remainder?

7. Suppose you have 60 straws.
How many of each shape could you make?

a) triangles
b) squares
c) pentagons
d) hexagons



8. How many different 2-digit numbers can you find that have remainder 2 when each is divided by 6?
List the numbers.
What strategy did you use to find them?

Reflect

You have used different strategies to divide.
Which strategy do you prefer?
Use words, numbers, or pictures to explain.

Less Is More

You will need a decahedron numbered 0 to 9.
The object of the game is to make a division sentence with:

- the least quotient, *and*
- the least remainder

➤ Your teacher will give you copies of this division frame.
☐ ☐ ÷ ☐ = ____

A decahedron is an object with 10 congruent faces.

➤ Players take turns to roll the decahedron.
➤ On your turn, record the number that turns up in any square of the frame.
Once a number is written, you may not move it.
➤ Continue until each player has filled her or his frame.
➤ Each player finds the quotient for her or his frame.
Check each other's work.
Each player with a correct answer scores 1 point.
The player with the least remainder scores 1 point.
The player with the least quotient scores 1 point.
The first player to score 6 points wins.

Unit 8 Show What You Know

LESSON

1

1. Find each product.

a) 6×700 **b)** 900×8 **c)** 5×60 **d)** 80×4

e) 200×5 **f)** 3×70 **g)** 7×400 **h)** 90×2

2. Find each missing number.

a) $5 \times \square = 300$ **b)** $20 \times \square = 140$ **c)** $\square \times 6 = 600$

d) $\square \times 7 = 210$ **e)** $40 \times \square = 240$ **f)** $\square \times 9 = 90$

3. A radio station gives away a $300 prize every day for a week.
How much will the radio station have given away by the end of the week?
Show your work.

2

4. Estimate each product.

a) 5×31 **b)** 7×63 **c)** 8×56 **d)** 4×69

3 5

5. There are 6 rows of chairs set up for the concert.
In each row, there are 45 chairs.
How many chairs are there?
Show your work.

6. Multiply. What strategies did you use?

a) $\begin{array}{r} 29 \\ \times\ 2 \\ \hline \end{array}$ **b)** $\begin{array}{r} 73 \\ \times\ 3 \\ \hline \end{array}$ **c)** $\begin{array}{r} 34 \\ \times\ 6 \\ \hline \end{array}$ **d)** $\begin{array}{r} 95 \\ \times\ 4 \\ \hline \end{array}$

6

7. Copy and complete this multiplication chart.
Explain how you could use patterns to do this.

×	85	86	87	88	89
5	425	430	435		
6	510	516			
7	595				
8					
9					

LESSON

6 **8.** Identify the errors in this multiplication chart.
How did you identify each error?
Correct each error.

×	25	30	35	40	45
2	50	60	75	80	90
4	100	110	140	160	180
6	150	180	210	240	260
8	180	240	280	320	360

7 **9.** Multiply.

a) 178 × 6 **b)** 319 × 3 **c)** 164 × 2 **d)** 462 × 5

8 **10.** Estimate each quotient.
Which facts helped you estimate?

a) 32 ÷ 6 **b)** 65 ÷ 8
c) 26 ÷ 9 **d)** 43 ÷ 7

9 10 11 **11.** Divide. What strategies did you use?

a) 42 ÷ 3 **b)** 52 ÷ 4
c) 65 ÷ 5 **d)** 78 ÷ 6
e) 91 ÷ 7 **f)** 88 ÷ 8
g) 99 ÷ 9 **h)** 34 ÷ 2

12. A series on TV runs for 25 hours.
One videotape can record 4 hours.
Write a word problem using these data.
Solve the problem.
Show your work.

13. Divide.

a) 76 ÷ 5 **b)** 65 ÷ 3
c) 21 ÷ 2 **d)** 32 ÷ 6
e) 98 ÷ 7 **f)** 54 ÷ 8
g) 87 ÷ 9 **h)** 43 ÷ 4

14. Divide. What patterns do you see?

a) 99 ÷ 3 **b)** 98 ÷ 3
c) 97 ÷ 3 **d)** 96 ÷ 3
e) 95 ÷ 3 **f)** 94 ÷ 3

UNIT 8 **Learning Goals**

- ☑ use personal strategies to multiply
- ☑ estimate products
- ☑ use models and arrays to multiply and divide
- ☑ multiply a 2-digit and a 3-digit number by a 1-digit number
- ☑ estimate quotients
- ☑ divide a 2-digit number by a 1-digit number
- ☑ use personal strategies to divide
- ☑ relate multiplication and division
- ☑ identify patterns in multiplication and division

Unit Problem

At the Garden Centre

1. Jean works at a garden centre.
   He has an order for 72 petunias.
   The petunias are grown in boxes of 4 or 9.
   How many boxes of each size does Jean need?
   Can he deliver the order in more than one way?
   Explain.

2. The boxes of petunias fit on trays.
   One tray holds 6 boxes of 4 petunias or
   3 boxes of 9 petunias.
   How many trays are needed for an order of 75 petunias?

Check List

Your work should show

- ☑ the strategies you used to solve each problem
- ☑ a clear explanation of each answer
- ☑ how you multiplied and divided accurately

3. May-Lin is replanting trees.
She has 80 trees.
May-Lin will plant them in equal rows.
How many different ways can she do this?
Show each way as a multiplication fact, then a division fact.

4. The garden centre sells small plastic pots to grow seedlings.
The pots are sold in packages of 30 or 50.
One package of 30 pots costs $7.
One package of 50 pots costs $9.
A customer wants 180 pots.
What is the cheapest way she can buy the pots?

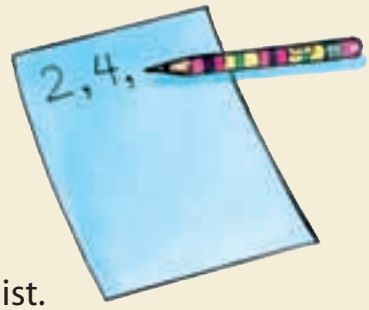
Reflect on Your Learning

Describe the strategies you use to multiply and divide.
Which strategies do you need to practise?
Give an example for each strategy.

Investigation

Circle Patterns

You will need a ruler and two copies of the sheet of circle diagrams below.



Part 1

- Write the first 12 multiples of 2.
- List the ones digit of each multiple.
  What do you notice?
- Use a circle diagram.
  On the circle, find the first number on your list.
  Draw a line from this number to the second number on the list,
  then from the second to the third, and so on.

Part 2

- Repeat *Part 1* for multiples of 8.
- What do you notice about your diagrams?
- Write about the diagrams.

Part 3

- Repeat *Parts 1* and *2* for multiples of 3 and multiples of 7.
- How are your diagrams similar to those for multiples of 2 and multiples of 8?
  How are they different?

Part 4

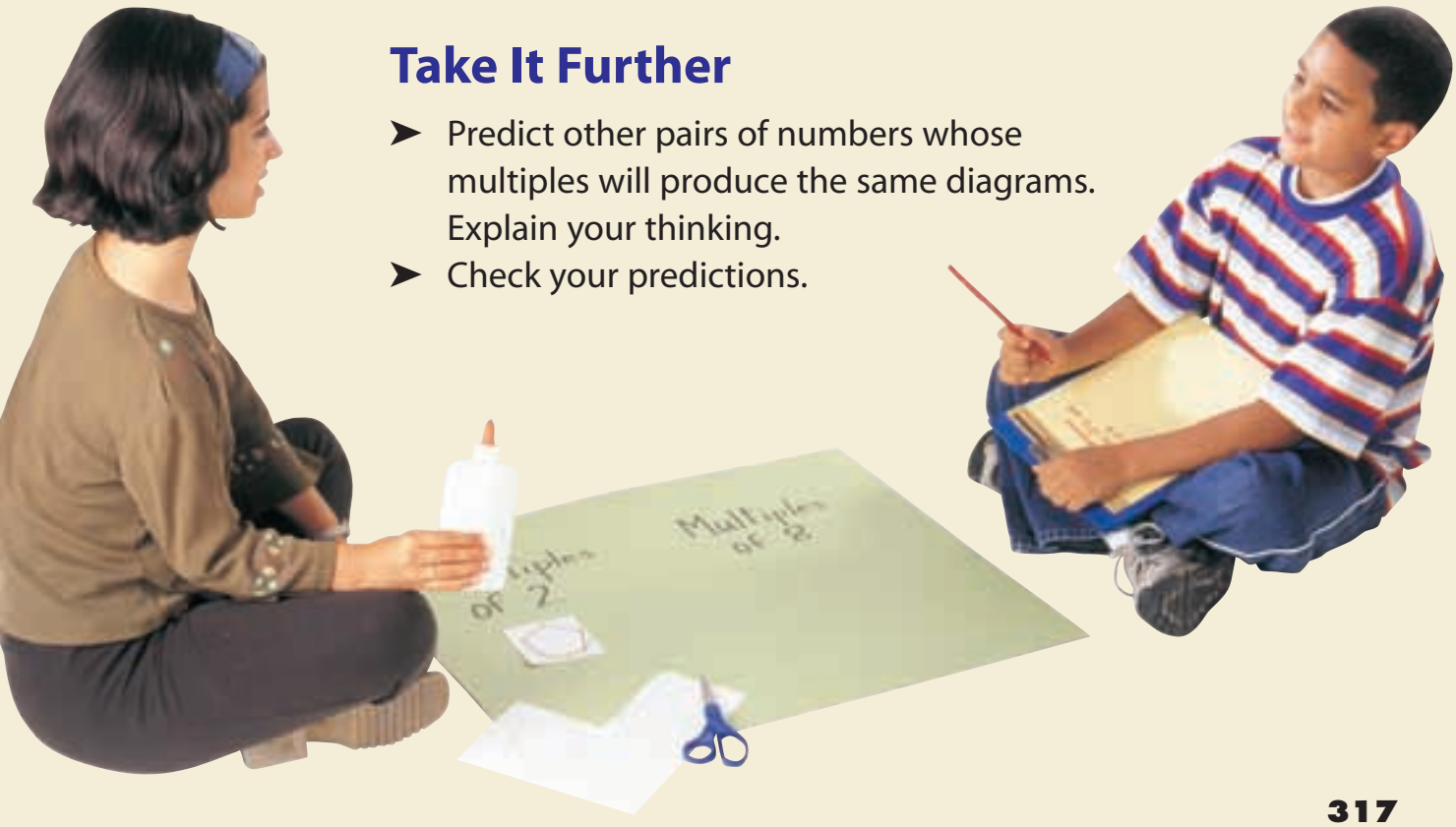
- Predict the patterns you will make for multiples of 4 and 6.
  Check your predictions.

Display Your Work

Make a poster display of your number patterns and circle diagrams.

Take It Further

- Predict other pairs of numbers whose multiples will produce the same diagrams. Explain your thinking.
- Check your predictions.



Units 1–8 Cumulative Review

UNIT 1

1. Here is a pattern made with Colour Tiles.
The side length of each square is 1 unit.

Figure 1 Figure 2 Figure 3

a) Draw the next 3 figures on grid paper.
b) Copy and complete this table for the first 6 figures.

Figure	Perimeter (units)
1	

c) Write a pattern rule for the perimeters.
d) Predict the perimeter of the 10th figure.
e) Will any figure have a perimeter of 50 units?
How did you find out?

2. Say what each equation means. Then solve each equation.
a) $\nabla + 6 = 15$ **b)** $56 = 7 \times \square$ **c)** $12 = \bigcirc - 20$ **d)** $\heartsuit \div 6 = 9$

3. Write a story problem that could be solved using each equation in question 2.

UNIT 2

4. A school concert had 3 performances.
This table shows how many people came each day.

Thursday	Friday	Saturday
1357	3408	2991

a) How many people went to the concert altogether?
b) How many more people went on Friday than on Thursday?
Than on Saturday?

5. **a)** Copy this Carroll diagram.
Sort these numbers
in the Carroll diagram:
12, 19, 24, 27, 28,
30, 37, 40, 52, 71

	Is divisible by 6	Is not divisible by 6
Is odd		
Is not odd		

b) Why is one box empty?
Write another number in each of the other 3 boxes.

c) Use the numbers from parts a and b.
Sort the numbers in a Venn diagram.
Use the attributes "Odd" and "Divisible by 6."

d) Do the Carroll diagram and Venn diagram
show the same information?
Explain how you know.

6. Explain the meaning of each digit in the number 8888.

7. Write each number in standard form.
a) 5000 + 300 + 20 + 1 **b)** 6000 + 50

3 **8.** Draw an array to illustrate your answer to each question below.
a) What is the quotient when you divide any number by 1?
b) What is the quotient when you divide any number by itself?

9. Suppose you know that $3 \times 4 = 12$.
What other multiplication facts can you find?
Explain how you found each fact.

4 **10.** Write each date in metric notation.
a) November 5th, 1999 **b)** July 7th, 2005 **c)** April 16th, 1950

11. Each date is written in metric notation.
Write each date using words and numbers.
a) 1998 03 14 **b)** 2007 10 10 **c)** 1997 06 03

12. a) Use a benchmark for 1 cm^2. Tell how you could estimate the area of the cover of your math book.

b) Use a benchmark for 1 m^2.
Tell how you could estimate the area of your classroom floor.

5

13. Draw a picture for each decimal. Write the decimal as a fraction.

a) 0.2 **b)** 0.02 **c)** 0.5 **d)** 0.05 **e)** 0.50

14. Draw a picture for each fraction. Write the fraction as a decimal.

a) $\frac{3}{10}$ **b)** $\frac{4}{100}$ **c)** $\frac{9}{10}$ **d)** $\frac{40}{100}$ **e)** $\frac{89}{100}$

15. When is $\frac{1}{2}$ of one set not equal to $\frac{1}{2}$ of another set?

16. Samya bought juice for $1.60 and fruit salad for $2.49.
How much change did she get from a $5 bill?

6

17. Find 4 triangular prisms in the classroom.
How are the prisms alike?

18. Use modelling clay.
Make a triangular prism and a rectangular prism.
How are the prisms alike? How are they different?

19. Use Pattern Blocks. Make a design that is symmetrical.
Copy the design on dot paper.
How do you know it is symmetrical?

7

20. The tally chart shows the favourite animals for students in Grades 4 and 5.

Favourite Animal	Number of Students
Bird	𝍸 |
Cat	𝍸 𝍸 𝍸 𝍸 𝍸 ||||
Hamster	𝍸 ||||
Horse	𝍸 𝍸 𝍸 𝍸 ||||
Rabbit	𝍸 𝍸 ||

a) Draw a bar graph to display these data.
What scale did you use? Explain your choice.
b) Draw a pictograph to display the data.
What key did you use? Explain your choice.
c) Which animal is twice as popular as the rabbit?
d) How many more students chose a cat than a hamster?
e) Write a question you can answer using the bar graph or pictograph. Answer your question.

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21. Find each product. What strategies did you use?

a) 6×7
6×70
6×700

b) 8×3
8×30
8×300

c) 5×9
5×90
5×900

d) 4×5
4×50
4×500

22. There are 8 nickels and 7 dimes in a change purse.
How many cents is that?

23. Estimate each quotient.
Which quotients are greater than 9?

a) $37 \div 3$ **b)** $46 \div 9$ **c)** $58 \div 5$ **d)** $63 \div 8$

24. Estimate each product.
Which strategy did you use each time?

a) 5×52 **b)** 68×6 **c)** 4×44 **d)** 9×32

25. Multiply.
How do you know your answer is reasonable?

a) 2×198 **b)** 4×136 **c)** 333×3 **d)** 164×5

26. There are 85 counters.
They are to be shared equally among 6 students.
Each student needs 14 counters.
Are there enough counters?
How do you know?