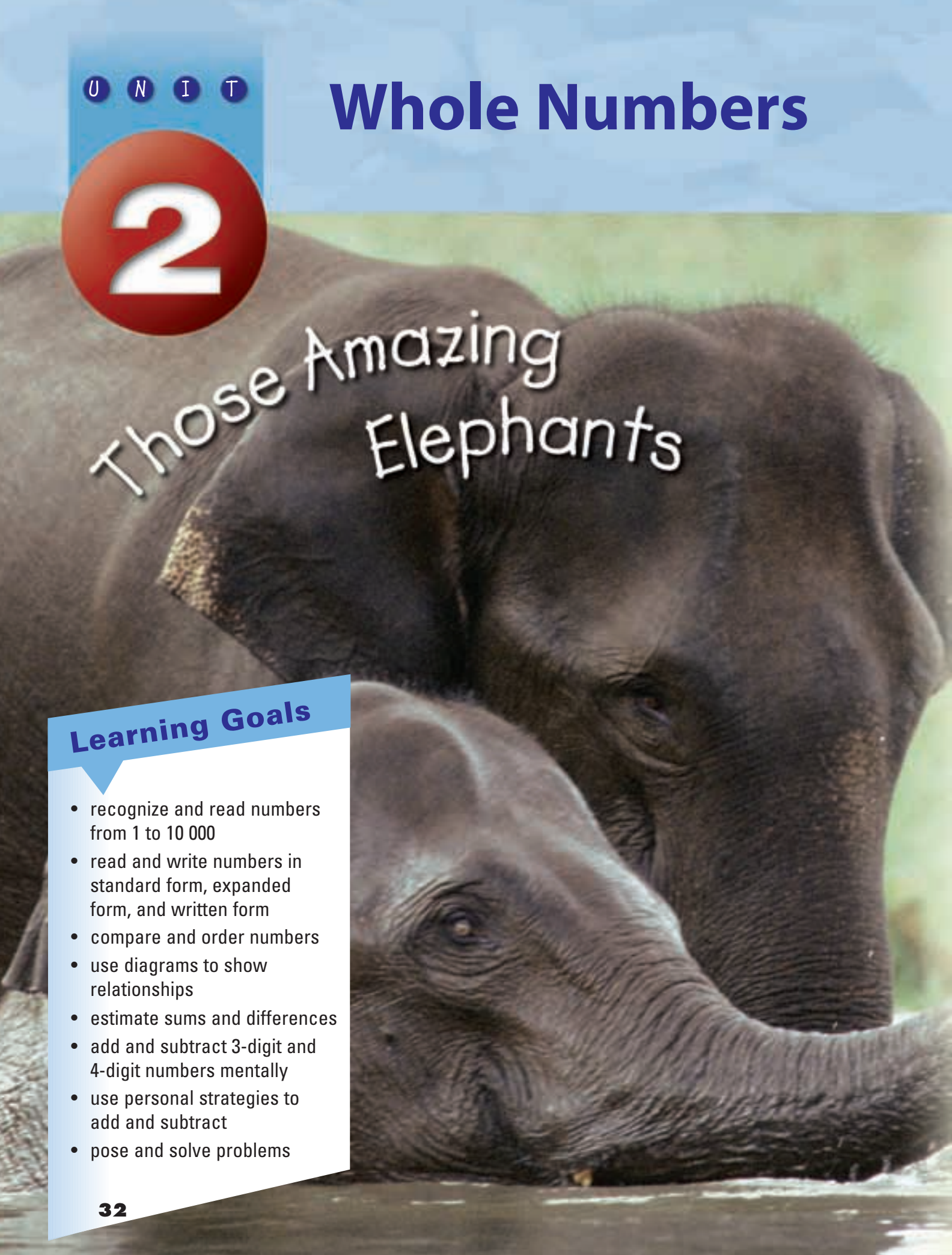
UNIT 2

Whole Numbers



Learning Goals

- recognize and read numbers from 1 to 10 000
- read and write numbers in standard form, expanded form, and written form
- compare and order numbers
- use diagrams to show relationships
- estimate sums and differences
- add and subtract 3-digit and 4-digit numbers mentally
- use personal strategies to add and subtract
- pose and solve problems

Key Words

- expanded form
- standard form
- Venn diagram
- Carroll diagram

The elephant is the world's largest animal.
There are two kinds of elephants.
The African elephant can be found in most parts of Africa.
The Asian elephant can be found in Southeast Asia.
African elephants are larger and heavier than their Asian cousins.
The mass of a typical adult African female elephant is about 3600 kg.
The mass of a typical male is about 5500 kg.
The mass of a typical adult Asian female elephant is about 2720 kg.
The mass of a typical male is about 4990 kg.

- How could you find how much greater the mass of the African female elephant is than the Asian female elephant?
- Kandula, a male Asian elephant, had a mass of about 145 kg at birth. Estimate how much mass he will gain from birth to adulthood.
- The largest elephant on record was an African male with an estimated mass of about 10 000 kg. About how much greater was the mass of this elephant than the typical African male elephant?

LESSON 1

Whole Numbers to 10 000

The largest marching band ever assembled had 4526 members.
There were students from 52 different school bands.

Explore

How many different ways can you show 4526?
Draw a picture to record each way you find.

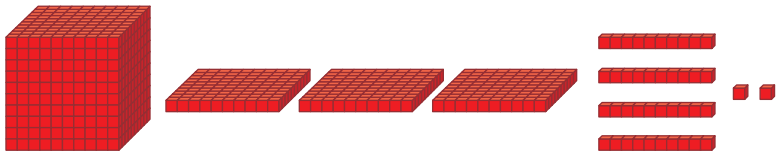
Show *and* Share

Share your pictures with another pair of students.
How do you know each picture shows 4526?

Connect

The largest marching band had 1342 majorettes, flag bearers, and drill team members.
The rest of the band were musicians.
You can represent the number 1342 in different ways.

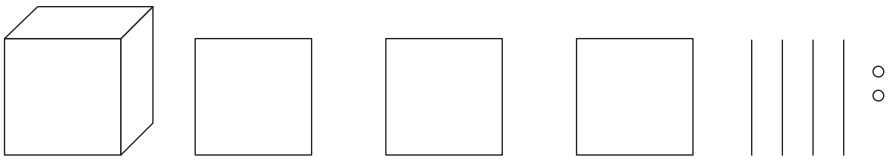
➤ Use Base Ten Blocks.
To show the number 1342:



1 thousand 3 hundreds 4 tens 2 ones

Lesson Focus | Read and write whole numbers in standard, expanded, and word forms.

➤ Draw a picture.
To show the number 1342:



➤ Use a place-value chart.
To show the number 1342:

Thousands	Hundreds	Tens	Ones
1	3	4	2
1000	300	40	2

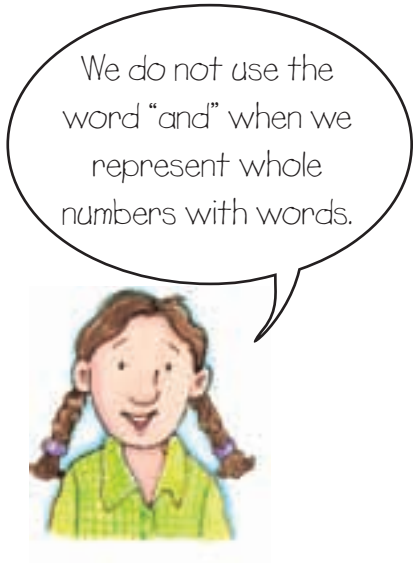
Every digit has a place value, depending on its position.

➤ Write the number 1342 as the sum of
the thousands, hundreds, tens, and ones.

$1342 = 1000 + 300 + 40 + 2$ ← This is **expanded form**.

➤ Use words.
1342 is one thousand three hundred forty-two.

➤ Use standard form.
The number 1342 is written in **standard form**.
It has no spaces between the digits.
The number 10 000 is also written in standard form.
↑
It has a space between the thousands digit and
the hundreds digit.



Practice

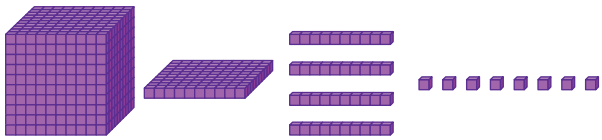
1. In 2001, the population of Iqaluit, Nunavut, was 5236.
Write this number in words.

2. Mount Everest is the world's highest mountain.
It is about 8850 m high.
Use Base Ten Blocks to show this number.
Draw pictures of the blocks.

3. Mount Logan, Yukon, is the highest mountain in Canada.
It is about 5959 m high.
Use expanded form to show this number.

4. Write the standard form of the number represented by each set of blocks.

a)



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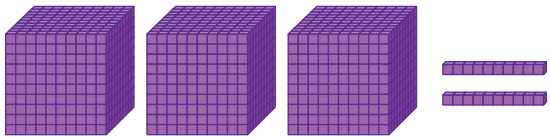


5. Write each number in question 4 in words.

6. Write each number in standard form.

a) 5000 + 600 + 40 + 3 **b)** 9000 + 700 + 80
c) 3000 + 200 + 9 **d)** 8000 + 20
e) 7000 + 5 **f)** 4000 + 70 + 3

7. Write each number in standard form, then in expanded form.

a) one thousand seven hundred fifty-four
b) nine thousand nine hundred ninety-nine
c) four thousand seventy
d) six thousand five hundred three
e) ten thousand

8. Write each number in expanded form.

a) 5352 **b)** 7056 **c)** 8104 **d)** 4370

9. Draw a picture to represent each number in question 8.

10. Write each number in question 8 in words.

11. **a)** Press: 578. Make the screen show 508.
How did you do it?

b) Explain how to get each target number from each start number.

Start	394	156	4689
Target	94	106	4009

c) Write your own start number and target number.
Explain how you reached your target.

12. Tyler wrote 2005 in words as "two hundred five."
Explain Tyler's mistake.
Show your work.

13. Use Base Ten Blocks.
Find as many ways as you can to show 2058.
Record your work in a place-value chart.

14. Use a place-value chart to show each number.
a) 7649 **b)** 908 **c)** 9441 **d)** 39

15. The value of the 4 in 2413 is 400.
Write the value of each underlined digit.
a) 7$\underline{8}$47 **b)** $\underline{9}$305 **c)** 68$\underline{4}$2 **d)** 9$\underline{9}$99

16. A student read 7647 as
"seven thousand six hundred and forty-seven."
Explain the student's mistake.

At Home

Look through newspapers and magazines.
Find example of large numbers.
Write each number.
In which form is it written?

Reflect

Use numbers, words, or pictures to explain the meaning of each digit in the number 7777.

LESSON 2

Comparing and Ordering Numbers

Explore

Use the digits 3, 5, 7, 8.
Write 3 different numbers using *all* these digits.
Order the numbers from greatest to least.
Show your work.

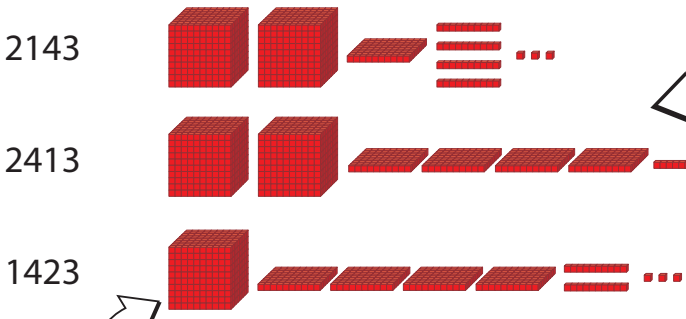
Show *and* Share

Share your numbers and ordering with another pair of students.
Take turns to tell about the strategy you used for ordering.
What other strategies could you use to order the numbers?

Connect

To order the numbers 2143, 2413, and 1423 from least to greatest:

➤ Represent each number with Base Ten Blocks.



Both 2143 and 2413 have 2 thousands.
Compare their hundred flats.
2143 has fewer.
So, 2143 is less than 2413.

Compare the thousand cubes.
1423 has the fewest.
So, 1423 is the least number.

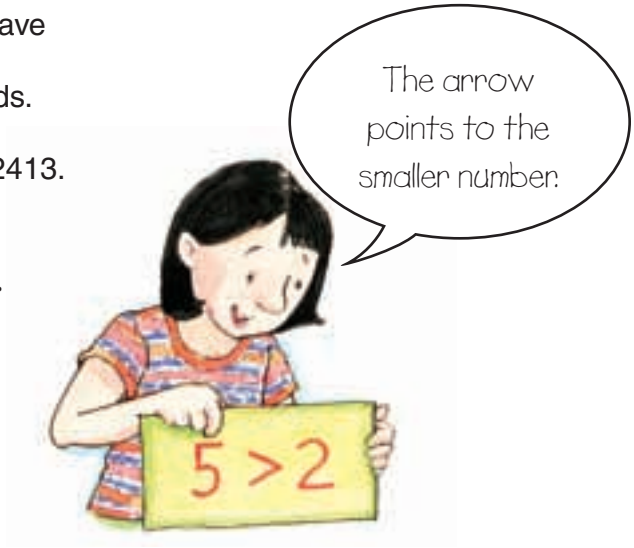
From least to greatest: 1423, 2143, 2413

➤ Write each number in a place-value chart.

Thousands	Hundreds	Tens	Ones
2	1	4	3
2	4	1	3
1	4	2	3

1423 has the fewest thousands, so it is the least number.

Both 2143 and 2413 have 2 thousands.
Compare their hundreds.
100 is less than 400.
So, 2143 is less than 2413.



You can use < and > to show order.
1423 < 2143 means
1423 is less than 2143.

2413 > 2143 means
2413 is greater than 2143.

➤ Use a number line.
Mark a dot for each number on a number line.

Read the numbers from left to right.
From least to greatest: 1423, 2143, 2413

Practice

1. The Canadian Armed Forces have 80 F-18 Hornets.
The US Navy has 200.
Which has more F-18s? How do you know?

2. Copy and complete. Write >, <, or =.

a) 582 ☐ 589 **b)** 3576 ☐ 3476 **c)** 5754 ☐ 5745

d) 792 ☐ 6082 **e)** 4110 ☐ 4101 **f)** 8192 ☐ 8291

How did you decide which symbol to use?

3. Write the numbers in order from least to greatest.

a) 862, 802, 869 **b)** 7656, 7665, 6756

4. Write the numbers in order from greatest to least.
Explain how you did it.

a) 9006, 9600, 9060 **b)** 5865, 895, 5685

5. Replace each ☐ with a digit so the statement is true.
Write the possible digits for each ☐.

a) 5762 < 5 ☐ 76 **b)** 7998 > ☐ 998 **c)** 6 ☐ 05 < 6604

6. Chantelle and Elena collect shells.
Chantelle has 4325 shells.
Elena has 4235.
Who has more shells?
How do you know?

7. Katie, Urvi, and Blake collect stamps.
Katie has 2340 stamps.
Urvi has 2304 stamps.
Blake has 2430 stamps.
Who has the most stamps? The fewest stamps?
How do you know?

8. Write three 4-digit numbers.
Order the numbers from greatest to least.

9. Use the digits 3, 7, 8, 9.
Write all the 4-digit numbers greater than 7000 and less than 8000.
Order the numbers from least to greatest.
Show your work.

10. Copy and fill in the blanks.

a) 8448, 8449, _____, _____, 8452, _____, _____

b) 5097, 5098, _____, _____, _____, 5102, _____

c) 4701, _____, _____, 4704, _____, _____, 4707

d) _____, 6320, _____, 6322, _____, _____, 6325

11. Rewrite the numbers in the correct order from least to greatest.

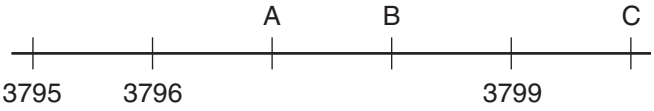
a) 5228, 5229, 5231, 5232, 5230, 5233

b) 1009, 1014, 1012, 1015, 1010, 1013, 1011

c) 4438, 4440, 4439, 4441, 4443, 4442, 4437

12. Write the number for each letter on the number lines.

a)



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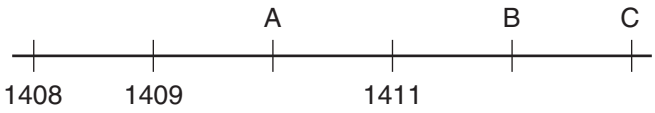

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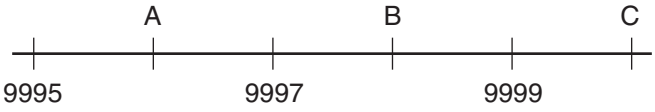


Reflect

Sue says that since 9 > 2, then 987 > 2134.
Is she correct?
Use words, pictures, or numbers to explain.

LESSON 3

Sorting Numbers

Explore

You will need loops of string and numeral cards like those below.

224	3689	2313	1722	467	94
371	176	2388	4585	690	2000

➤ Sort the numbers using two attributes. Record your sorting.

➤ Sort the numbers a different way. Record the sorting.

Show *and* Share

Show another pair of classmates one way you sorted. Ask them to tell the attributes you used. Have them name one more number for each of your groups.

Connect

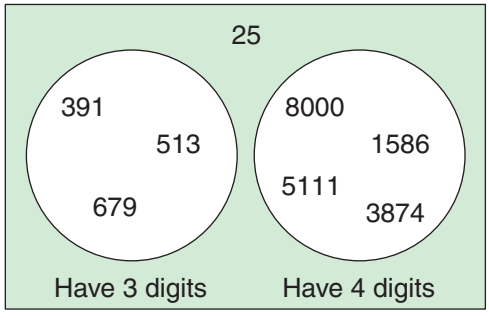
Here are four ways to sort these numbers.

8000 1586 391 5111 3874 513 679 25

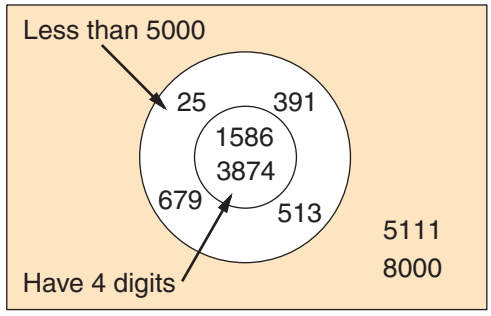
➤ Use a **Venn diagram** with separate circles.

A number cannot have 3 digits *and* 4 digits, so separate circles must be used.

Twenty-five has only 2 digits, so it is outside the circles.



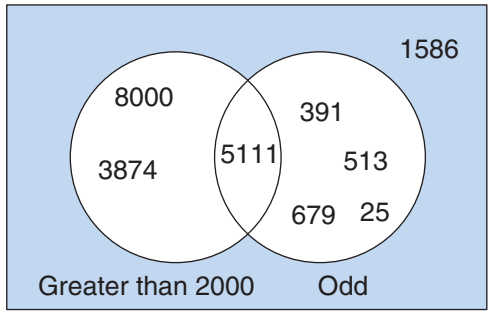
➤ Use a Venn diagram with one circle inside another circle.



All the numbers in the two circles are less than 5000.
The numbers in the inside circle also have 4 digits.

Both 8000 and 5111 are greater than 5000, so they are outside the circles.

➤ Use a Venn diagram with overlapping circles.



The numbers in the left circle are greater than 2000.
The numbers in the right circle are odd.
The number in the overlap is greater than 2000 and is also odd.
1586 is not greater than 2000 and it is not odd, so it is outside the circles.

➤ Use a **Carroll diagram**.

In the first row, all the numbers are odd.
In the second row, all the numbers are not odd.
Numbers whose digits add to less than 10 are in the first column.
Numbers whose digits add to 10 or more are in the second column.

	Digits add to less than 10	**Digits add to 10 or more**
Odd	5111 513 25	391 679
Not odd	8000	1586 3874

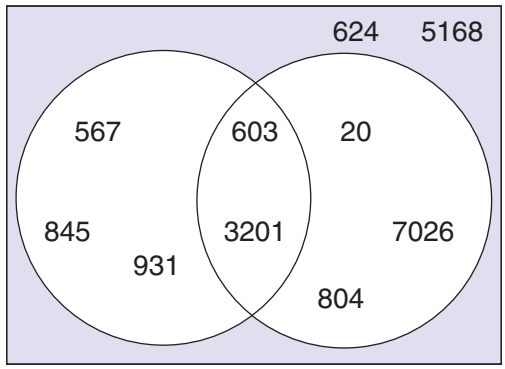
8000 is not odd and its digits add to less than 10.

Practice

1. **a)** Sort these numbers in a Venn diagram.
Use the attributes: "Even" and "Greater than 500."
494, 627, 806, 213, 529, 740, 89, 2017

b) Write one more number in each part of your Venn diagram.
Circle each number you write.

2. Copy the Venn diagram.



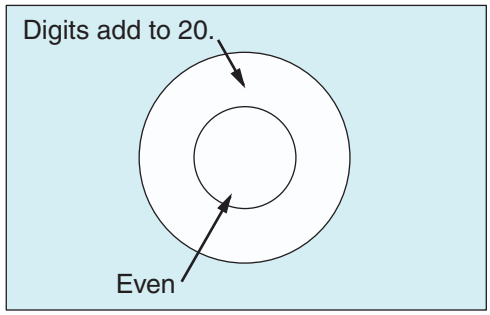
a) How have these numbers been sorted?
Label each circle.

b) Explain why each number in the Venn diagram belongs where it is placed.

c) Write these numbers in the Venn diagram: 920, 2563, 5808, 246

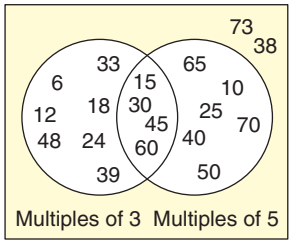
d) What other numbers could you write in each part of the Venn diagram?

3. Copy this Venn diagram.
Use the Venn diagram to sort these numbers.
4725, 9902, 2477, 385,
7265, 6608, 2945, 776



4. Describe what each Venn diagram shows.
How are the numbers related?
Explain the arrangement of the circles in each diagram.

a)



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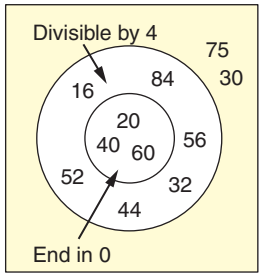
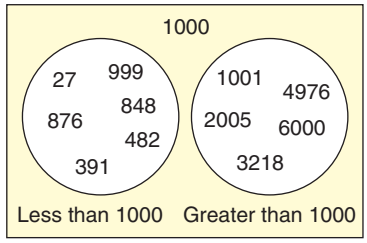


c)



5. Joe and Cher work at the dairy bar.
Joe worked on April 3rd
and every third day after that.
Cher worked on April 4th
and every fourth day after that.
Use a Venn diagram to find the dates in
April that Joe and Cher worked together.

6. Copy the Carroll diagram below.
Then sort these numbers in the diagram.
15, 50, 24, 30, 45, 19

	Even		Odd	
Multiples of 3	6 12	36 42	9 27	21 39
Not multiples of 3	8 44	16 74	35 67	53 17

7. **a)** Copy this Carroll diagram.
Sort these numbers in
the Carroll diagram:
15, 36, 60, 99, 83, 55, 74, 85, 17, 42

	Is divisible by 5	Is not divisible by 5
Is even		
Is not even		

b) Write another number in each
box in the Carroll diagram.

c) Use the numbers from
parts a and b.
Sort the numbers in a Venn diagram.
Use the attributes "Even" and "Divisible by 5."

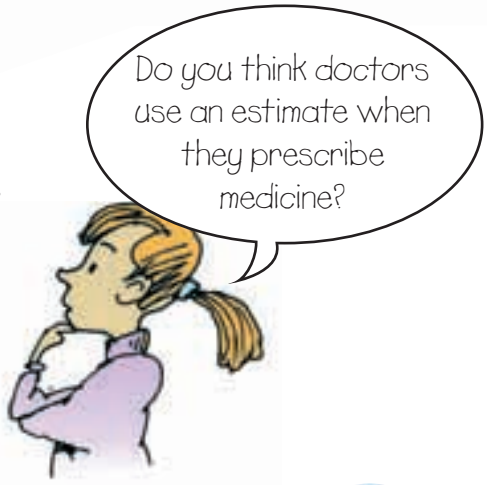
d) Do your Carroll diagram and your
Venn diagram show the same information?
Explain how you know.

Reflect

You have used Venn diagrams and Carroll diagrams.
How do you decide which diagram to use to sort a set of numbers?

LESSON 4

Estimating Sums



When you don't need an exact answer, you estimate.
When would you use an estimate?

When you estimate a sum, you find a number that is close to the sum.

Explore

- About how much will it cost to buy a TV set and a DVD player?
- What could you buy if you had $700 to spend?

Estimate to find out. Record your answers.

Show *and* Share

Compare your answers with those of another pair of students.
Are your estimates higher or lower? Explain.
What strategies did you use to estimate?

Connect

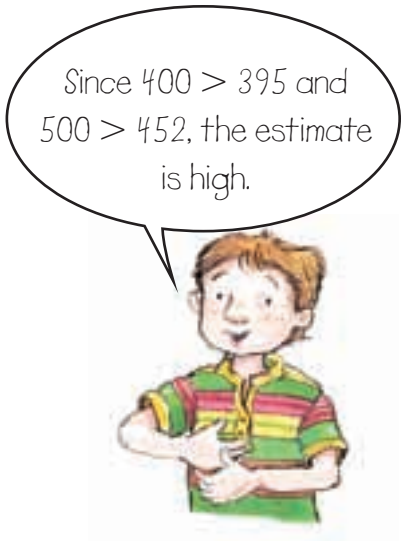
An electronics store had 395 customers on Friday and 452 customers on Saturday.
About how many customers did the store have for those 2 days?

When a question asks "about how many," you can estimate.

When you estimate, you use numbers that are close but easier to work with.

➤ Estimate: 395 + 452
You could write each number to the closest 100.
395 is closest to 400.
452 is closest to 500.

Add the numbers: 400 + 500 = 900
The store had about 900 customers for the 2 days.



➤ Estimate: 395 + 452
You could use front-end estimation.
Add the first digits of the numbers.
395 + **4**52 is about 300 + 400 = 700.

For a closer estimate of 395 + 452:
Think about 95 + 52.
This is about 100 + 50 = 150.
Add 150 to the front-end estimate.
So, 395 + 452 is about 700 + 150 = 850.
The store had about 850 customers for the 2 days.

Practice

1. How many digits do you think each answer will have?
Explain.
a) 714 + 621 **b)** 1375 + 2496 **c)** 265 + 661

2. Raji estimated each sum.
Is each estimate high or low?
How do you know?
a) 517 + 475 as 900 **b)** 4316 + 3442 as 7000
c) 5678 + 1785 as 8000 **d)** 4056 + 359 as 4300

3. Estimate each sum.
Explain your strategy.
a) 71 + 847 **b)** 165 + 72 **c)** 5192 + 2192
d) 189 + 2148 **e)** 982 + 828 **f)** 5307 + 88

4. Sam wants a lunch with less than 1000 Calories.
He has a hamburger with 445 Calories,
an apple pie with 405 Calories,
and ice cream with 270 Calories.

a) About how many Calories are in the lunch?

b) Did Sam make his goal? Explain.

5. Write a story problem where you would *not* use estimation to solve it.
Explain why you would not estimate.

6. Look at these two addition questions:

4491 + 4491 4517 + 4517

a) Estimate each sum by writing each number to the closest 1000.

b) Use a calculator.
Are the two sums as different as the estimates make them seem? Explain.

c) How might you get a better estimate for each sum?

7. When you estimate to add, how can you tell if the estimated sum is greater than or less than the exact sum?

8. The estimated sum of two numbers is 600.
What might the numbers be?
Show your work.

9. Look at the list of numbers: 538, 476, 852, 938, 725
Which 2 numbers will give the sum that is closest to each number below?
Show your work.

a) 1000 **b)** 1800

Reflect

Describe a situation in which you would estimate a sum rather than find the exact answer.

LESSON 5

Using Mental Math to Add

Explore

Students from two schools went on a field trip.
There were 227 students in one school,
and 134 students in the other school.
How many students went on the field trip?

Use mental math to find out.
Record your answer.

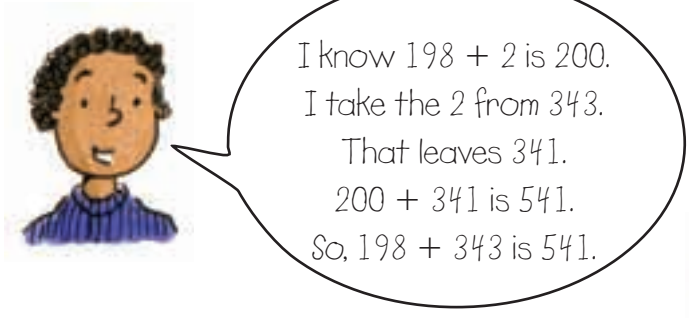
Show *and* Share

Share your strategies for adding with another pair of students.

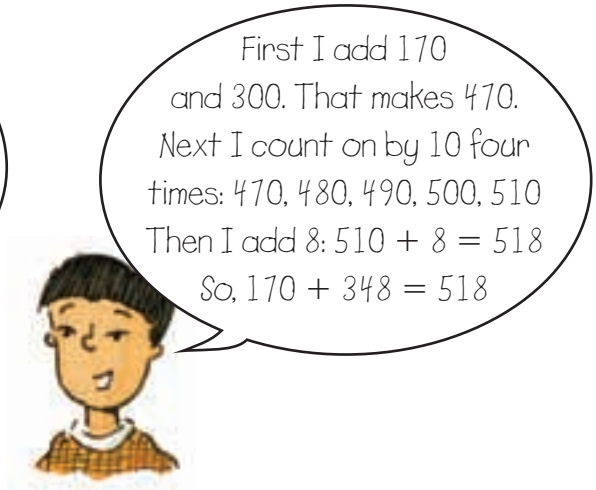
Connect

There are many ways to use mental math to add.

➤ Winston uses the strategy of make a "friendly" number to add 198 + 343.



➤ Trang uses the strategy of counting on to add 170 + 348.



➤ Alexia uses the strategy of adding on from left to right to add 353 + 260.

I'll start by
adding the hundreds –
3 hundred ... 5 hundred
Next I add the tens –
5 hundred fifty ...6 hundred ten
Then the ones –
6 hundred thirteen
So, 353 + 260 = 613

Practice

Use mental math.

1. Add. You choose the strategy.

a) 179 + 234	**b)** 4266 + 4313	**c)** 4002 + 5336	**d)** 723 + 856
e) 348 + 434	**f)** 536 + 299	**g)** 184 + 2301	**h)** 7620 + 95

2. Add.

a) 263 + 328	**b)** 1439 + 2544	**c)** 190 + 943	**d)** 3998 + 432
e) 691 + 180	**f)** 270 + 438	**g)** 3218 + 579	**h)** 2548 + 1573

3. There were 168 children in the park on Friday morning.
There were 273 different children in the park on Friday afternoon.
How many children were in the park on Friday?

4. Make up an addition problem you can solve using mental math.
Describe the strategy you used to solve the problem.

Reflect

You know several strategies to add mentally.
Which is your favourite strategy?
Can you always use it?
Use words and numbers to explain.

LESSON 6

Adding 3-Digit Numbers

Explore

Madhu uses the two sets of building blocks together.
How many pieces does she have?

Use any materials or strategies you like.
Use pictures, numbers, or words to show your work.

Show *and* Share

Share your results with another pair of students.
Did you use the same strategies? Explain.
What other strategy could you use to solve the problem?

Connect

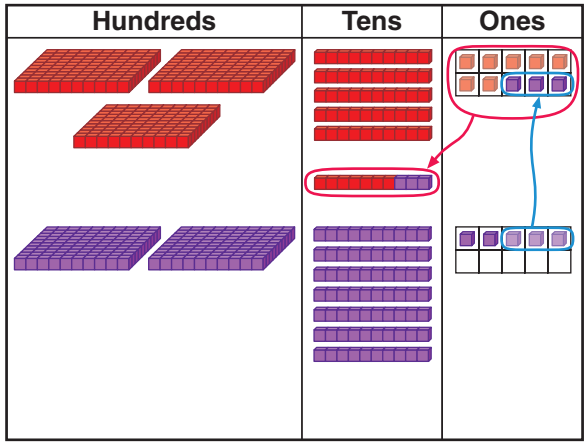
One jigsaw puzzle has 357 pieces.
Another puzzle has 275 pieces.
How many pieces are there altogether?

Add: 357 + 275
Here are different strategies students used.

➤ Abigail added from left to right.
Add the hundreds (300 + 200).
Add the tens (50 + 70).
Add the ones (7 + 5).
Add the sums.
357 + 275 = 632

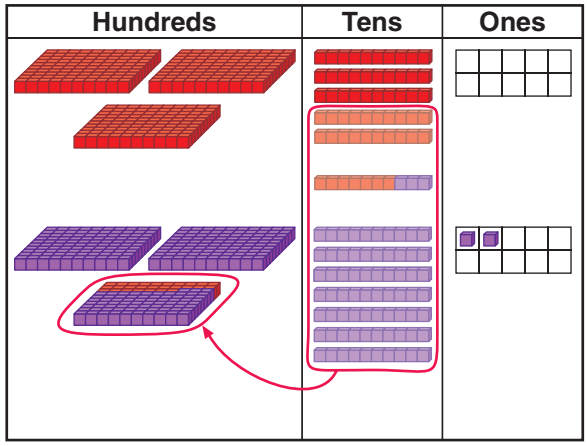
```
  357
+ 275
-----
  500
  120
   12
-----
  632
```

➤ Sayid used Base Ten Blocks on a place-value mat to add 357 + 275.



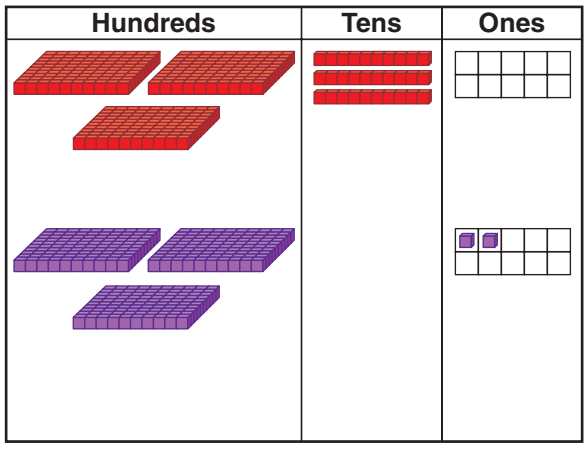
Sayid added the ones to get 12 ones.
He traded 10 ones for 1 ten.

$$\begin{array}{r} {\scriptstyle 1} \\ 357 \\ +\ 275 \\ \hline 2 \end{array}$$



That made 13 tens 2 ones
Sayid traded 10 tens for 1 hundred.

$$\begin{array}{r} {\scriptstyle 11} \\ 357 \\ +\ 275 \\ \hline 32 \end{array}$$



That made 6 hundreds 3 tens

$$\begin{array}{r} {\scriptstyle 11} \\ 357 \\ +\ 275 \\ \hline 632 \end{array}$$

357 + 275 = 632

There are 632 jigsaw puzzle pieces.

Practice

1. Estimate first.
Then add the numbers for which the sum will be greater than 600.

a) 503 + 365 **b)** 817 + 179
c) 199 + 52 **d)** 765 + 384

2. Estimate first.
Then use any strategy you wish to find each sum.

a) 384 + 765 **b)** 174 + 89
c) 305 + 168 **d)** 491 + 256

3. A video store rented 165 more DVDs than video games.
The store rented 258 video games.
How many DVDs did the store rent?

4. The sum of two numbers is 756.
What might the numbers be?
How do you know?
Can you find more than one pair of numbers?
Explain.

5. What is the greatest number you can add to 365 *without* having to regroup in any place?
Show your work.

6. Rahim visits golf courses to look for stray balls.
He collected 209 golf balls last month.
He collected 389 golf balls this week.
How many golf balls did Rahim collect in all?

7. Janny has two sticker books.
She has 488 stickers in one book and 374 stickers in the other book.
How many stickers does Janny have altogether?

8. Two hundred ninety-six students went skating on Monday.
Three hundred eight students went skating on Wednesday.
How many students went skating on the two days?

9. Carlotta delivered 427 flyers.
Chad delivered 583 flyers.
How many flyers did Carlotta and Chad deliver in all?

10. **a)** Write a story problem that can be solved by adding two 3-digit numbers.
b) Write an equation for your story problem.
Solve the equation.
Show your work.

11. Each letter in this sum represents a different digit.
What is the value of each letter?
How do you know?

$$\begin{array}{r} S\ E\ E \\ +\ Y\ O\ U \\ \hline S\ O\ O\ N \end{array}$$

Math Link

History

The abacus is used for counting.
You can add, subtract, multiply, and divide with it.
The abacus was invented in China over 800 years ago.
In North America, blind children are taught to use the abacus.

Reflect

Which strategy do you prefer to add two 3-digit numbers?
Use an example to explain.

LESSON 7

Adding 4-Digit Numbers

People set up dominoes in patterns.
So, when 1 domino topples, the rest topple.

Explore

There are 1275 dominoes in one set-up.
There are 2168 dominoes in another set-up.
How many dominoes are there altogether?

Use what you know about adding 3-digit numbers to solve this problem. Show your work.

Show *and* Share

Share your strategy with another pair of students.
How could you add without using Base Ten Blocks?

Connect

Scott Suko is a world famous "domino toppler."
On his Website, there are photos of his set-ups.
One of Scott's set-ups had 1976 dominoes.
Another set-up had 2868 dominoes.
How many dominoes were there altogether?

Add: 1976 + 2868

Here are different strategies students use to solve the problem.

➤ Joel adds from right to left.

```
  1
 1976
+2868
 ----
    4
```


```
 11
 1976
+2868
 ----
   44
```


```
 111
 1976
+2868
 ----
  844
```


```
 111
 1976
+2868
 ----
 4844
```

So, 1976 + 2868 = 4844

➤ Zena uses column addition.

Add each column.

1000s	100s	10s	1s
1 +2	9 8	7 6	6 8
3	17	13	14
4	7	13	14
4	8	3	14
4	8	4	4

17 hundreds is 1 thousand 7 hundred.
Adjust the 1000s and 100s.

13 tens is 1 hundred 3 tens.
Adjust the 100s and 10s.

14 ones is 1 ten 4 ones.
Adjust the 10s and 1s.

1976 + 2868 = 4844

There are 4844 dominoes altogether.

The students estimate to check that the sum is reasonable.
1976 is close to 2000.
2868 is close to 3000.

2000 + 3000 = 5000
Since 4844 is close to 5000, the sum is reasonable.

Practice

1. Find each sum. Estimate to check.
a) 4167 + 2534 **b)** 3974 + 4382 **c)** 5287 + 3756

2. Add. How do you know each sum is reasonable?

a)
$$\begin{array}{r} 7865 \\ +\ 1987 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 3198 \\ +\ 6751 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 9999 \\ +\ 324 \\ \hline \end{array}$$

3. **a)** Write a story problem that could be solved by adding:
4267 + 1398
b) Estimate the sum. How did you get your estimate?
c) Is your estimate high or low? How do you know?
d) Find the sum. What strategy did you use?
e) How do you know your answer is reasonable?
Show your work.

4. Three thousand six hundred forty-two people went to the Fall Fair on Friday.
Four thousand seven hundred ninety-five people went on Saturday.
How many people went to the Fall Fair on these 2 days?

5. The sum of two 4-digit numbers is 3456.
What might the two numbers be? Explain.

6. Jake guesses there are 2193 jellybeans in the jar.
Helena's guess is 1943 greater than Jake's guess.
What is Helena's guess?

7. Patsi's Girl Guide group collects pop can tabs.
The group collected 4594 tabs last year and 4406 tabs this year.
How many tabs did the group collect in the two years?

8. The Wong family grows apples and pears in its orchards.
This fall, the Wongs picked 3265 baskets of apples and 2144 baskets of pears.
How many baskets of fruit did the Wongs pick?

9. Babu has saved 2363 pennies.
Serena has saved 3048 pennies.
How many pennies did Babu and Serena save altogether?

Reflect

How do you keep track of digits with the same place value when you add? Use numbers and words to explain.

LESSON 8

Estimating Differences

Explore

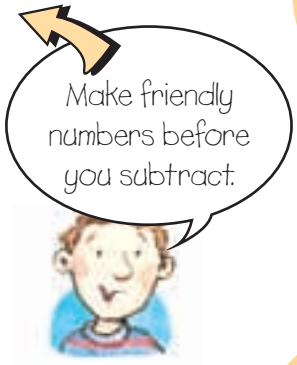
An arena has 594 seats.
Three hundred eight tickets have been sold for a concert.
About how many tickets are left?
Estimate to find out. Record your answer.

Show *and* Share

Compare your estimate with that of another pair of students.
Did the strategies you used affect your answers? Explain.

Connect

➤ Estimate: 612 − 387
Write each number to the closest 100.
612 is closer to 600 than 700.
387 is closer to 400 than 300.
Subtract:
600 − 400 = 200
So, 612 − 387
is about 200.

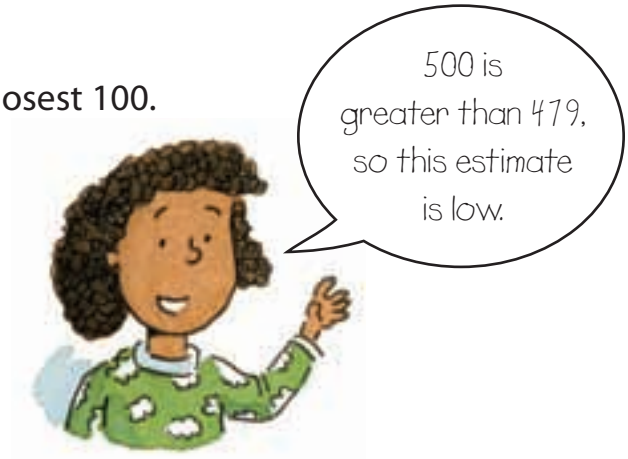


You get a closer estimate if you write only one number to the closest 100.
Write 387 as 400.
612 − 400 = 212
So, 612 − 387 is about 212.

➤ Estimate: 3274 − 1186
Use front-end estimation.
3274 → 3000
1186 → 1000
3000 − 1000 = 2000
So, 3274 − 1186 is about 2000.

Use the digits in the thousands place. Replace the other digits with zeros.

➤ Estimate: 824 − 479
Write the number you subtract to the closest 100.
824 − 500 = 324
So, 824 − 479 is about 324.



Practice

1. Use any strategy you wish to estimate each difference.

a) 871 − 263 **b)** 610 − 429

c) 734 − 591 **d)** 9907 − 6254

2. Kyle estimated each difference.
Is each estimate high or low?
How do you know?

a) 576 − 392 as 100 **b)** 911 − 188 as 800 **c)** 7361 − 1872 as 6000

3. Estimate each difference by writing each number to the closest 100.

a) 983 − 407 **b)** 7720 − 6953

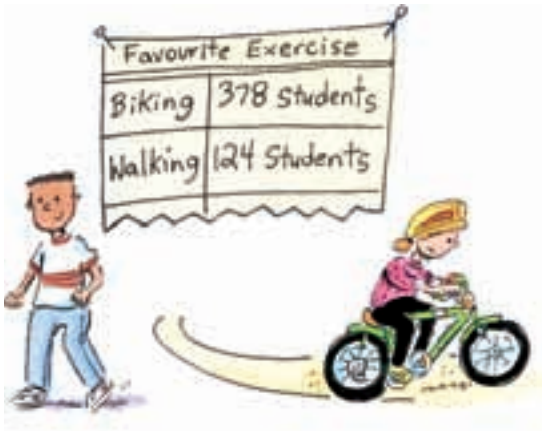
c) 918 − 75 **d)** 447 − 293

4. Charlotte looks at this survey.
She says, "About 300 more students chose biking over walking."

a) How might Charlotte have estimated? Explain.

b) Is the estimate high or low? Explain.

c) What might have been a better way to estimate?



5. Write a subtraction problem that can be solved by estimating.
Solve the problem.
Show your work.

6. The estimated difference of two numbers is 300.
What might the numbers be?
Explain how you found the numbers.

7. Describe a situation where you would estimate rather than find the exact answer to a subtraction problem.

8. Estimate each difference by using front-end estimation.

a) 763 − 419 **b)** 7647 − 2991

c) 988 − 462 **d)** 9411 − 6231

9. Hans had 528 paper clips.
He gave 257 of them to Gertie.
About how many paper clips does Hans have left?

10. Nikki's school has 491 students.
David's school has 703 students.
About how many more students does David's school have than Nikki's school?

11. The telephone was invented in 1876.
About how many years ago was that?

12. The CN Tower is 553 m tall.
The Empire State Building is 380 m tall.
About how much taller is the CN Tower than the Empire State Building?

Reflect

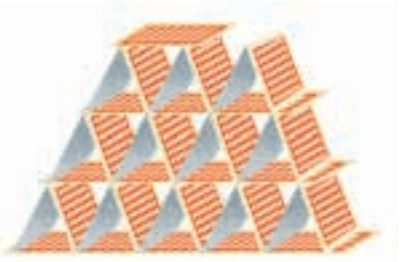
When does writing the numbers to the closest 100 not give a good estimate when you subtract?
Use words and numbers to explain.

LESSON 9

Using Mental Math to Subtract

Explore

Anita used 354 cards to make a house of cards.
Christopher used 198 to make his house.
How many more cards are in Anita's house than Christopher's?
Use mental math to find out. Record your answer.

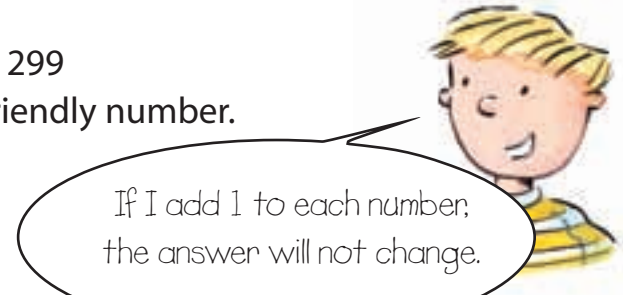


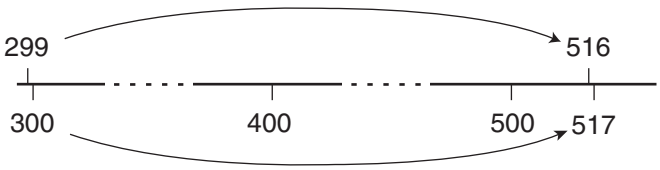
Show *and* Share

Share the strategy you used with another pair of students.

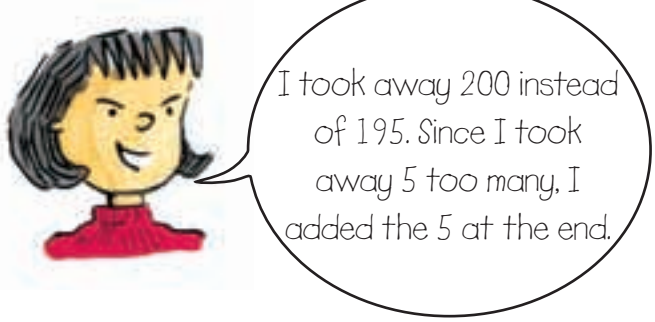
Connect

➤ Use mental math to subtract: 516 − 299
Bruce uses the strategy of make a friendly number.
He adds 1 to 299 to make 300.
He adds 1 to 516 to make 517.
He thinks: 517 − 300 = 217
So, 516 − 299 = 217





➤ Use mental math to subtract: 347 − 195
Marly uses a friendly number.
She subtracts 200 instead of 195.
She thinks: 347 − 200 = 147
Then she adds 5.
147 + 5 = 152
So, 347 − 195 = 152



➤ Use mental math to subtract: 432 − 220
Harry uses the strategy of "counting on."
He counts on from 220.

Count: 220, 320, 420, 430, 432

+ 100 + 100 + 10 + 2 = 212

So, 432 − 220 = 212

Practice

Use mental math.

1. Subtract. Which strategy did you use each time?
a) 536 − 399 **b)** 6352 − 1887 **c)** 822 − 216 **d)** 4231 − 2984

2. Subtract 715 − 197 mentally as many different ways as you can.
Which strategy was easiest? Explain.

3. How much change will you get from $1000 when you buy something that costs $680?
How do you know?

4. The answer to a subtraction problem is 127.
Use mental math to find what the problem might be.
Write as many different problems as you can.
Show your work.

5. Write a subtraction problem you can solve using mental math.
Solve the problem.

Reflect

Which mental math strategy is easiest for you?
Use words and numbers to explain.

LESSON 10

Subtracting 3-Digit Numbers

Explore

There are 430 students at Hirondelle School.
Two hundred sixty-five students are boys.
How many students are girls?

Use any materials or strategies you like.
Use pictures, numbers, or words to show your work.

Show *and* Share

Share your strategy with another pair of students.
What other strategy could you use to solve the problem?

Connect

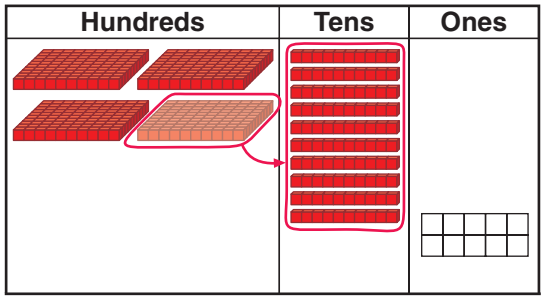
Here are different strategies students used to subtract.

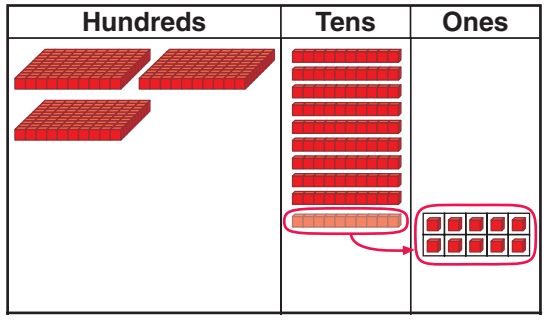
➤ Frankie makes a friendly number, to subtract: 565 − 317

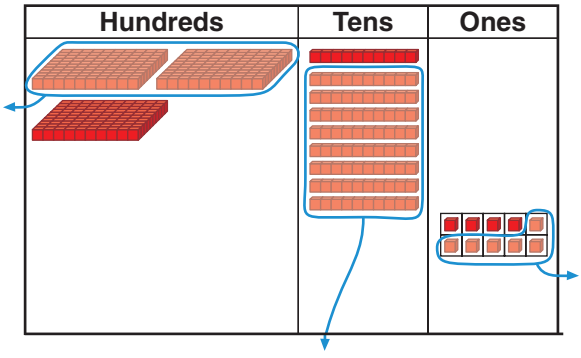
565	− 7	558	− 10	548
− 317	− 7	− 310	− 10	− 300
				248

So, 565 − 317 = 248

➤ Kada uses Base Ten Blocks on a place-value mat to subtract: 400 − 286



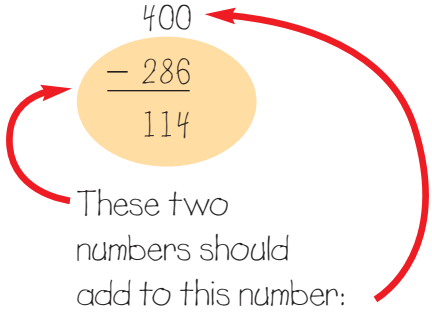




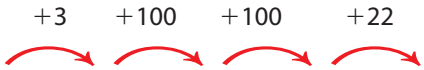
So, 400 − 286 = 114

Kada checks by adding.

Add: 286 + 114
The sum should be 400.
Since 286 + 114 is 400, the answer is correct.



➤ Jan uses counting on to subtract: 622 − 397
She counts on from 397 to 622.



Count: 397 400 500 600 622

Think: 3 … 103 … 203 … 225

So, 622 − 397 = 225

Practice

1. Subtract.
What patterns do you see in the questions and answers?

a) 857 − 100 **b)** 857 − 200 **c)** 857 − 300 **d)** 857 − 400

2. Estimate first. Then subtract the numbers for which the answer will be less than 200.

a) $\begin{array}{r} 255 \\ -\ 76 \\ \hline \end{array}$ **b)** $\begin{array}{r} 426 \\ -\ 158 \\ \hline \end{array}$ **c)** $\begin{array}{r} 678 \\ -\ 298 \\ \hline \end{array}$ **d)** $\begin{array}{r} 382 \\ -\ 192 \\ \hline \end{array}$

3. Subtract. How do you know each answer is reasonable?

a) 565 − 317 **b)** 700 − 189 **c)** 101 − 96 **d)** 861 − 178

4. Sadiq read 315 pages. Laura read 248 pages. How many more pages does Laura need to read to catch up with Sadiq?

5. The largest gorilla has a mass of about 275 kg. The largest orangutan has a mass of about 90 kg. What is the difference in their masses?

6. The world records for barrel jumps are held by Canadians.
The longest barrel jump by a woman is 670 cm.
The longest barrel jump by a man is 882 cm.
How much farther is the man's jump?
How do you know your answer is reasonable?
Show your work.

7. **a)** The answer to a subtraction problem is 375.
What might the problem be?
Write as many problems as you can.

b) The answer to an addition problem is 375.
What might the problem be?
Write as many problems as you can.

Reflect

Explain why you can check a subtraction problem by adding.

LESSON 11

Strategies Toolkit

Explore

Fiona is 5 cm taller than Zac.
Together their heights total 299 cm.
How tall is Fiona? How tall is Zac?

Work together to solve this problem.
Use any materials you think will help.

Show *and* Share

Describe the strategy you used to solve the problem.

Connect

Yael and Victor collect postcards.
Yael has 10 more postcards than Victor.
Together, they have 420 postcards.
How many postcards does each person have?

What do you know?

- There are 420 postcards in all.
- Yael has 10 more postcards than Victor.

Think of a strategy to help you solve the problem.

- You can **make an organized list**.
- Find two numbers that add to 420. One number must be 10 more than the other.

Strategies

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

Lesson Focus | Interpret a problem and select an appropriate strategy.

Make an organized list to show the numbers.
Choose a number for Yael's postcards; such as 220.
Subtract 220 from the total to find Victor's postcards:
420 − 220 is 200 postcards for Victor.
Subtract the numbers of postcards:
220 − 200 = 20 This is too high.

Try 1 less for Yael and 1 more for Victor.

Yael's postcards	Victor's postcards	Difference	
220	200	220 − 200 = 20	Too high
219	201	219 − 201 = 18	Too high

Continue this strategy until the difference is 10.

Could you have tried 2 less for Yael and 2 more for Victor instead? Explain.

Practice

Choose one of the **Strategies**

1. The Huda family picked 800 cucumbers in two days.
They picked 124 more cucumbers on the first day than on the second day.
How many cucumbers did the family pick each day?

2. Raphie has 90 cents in dimes and nickels.
She has the same number of each coin.
How many of each coin does Raphie have?

Reflect

What is the difference between "making a list" and "making an organized list"?
Which is the better strategy for solving problems? Explain.

LESSON 12

Subtracting 4-Digit Numbers

Explore

Matthew's school created a Website.
One day, the site had 1531 visitors. The next day it had 867 visitors.
How many more people visited the site the first day?

Use what you know about subtracting
3-digit numbers to solve this problem.

Show *and* Share

Share your solution with another pair of students.
How did you subtract without using Base Ten Blocks?

Connect

How many more people visited the Website
on Friday than on Saturday?

Subtract: 2031 − 856

Day	Visitors to Website
Friday	2031
Saturday	856

Here are the strategies some students used to solve the problem.

➤ Rod explains how he subtracts from right to left.

"You cannot take 6 ones from 1 one.
Regroup 1 ten as 10 ones.
Then, subtract the ones."

$$\begin{array}{r} {\scriptstyle 2\ 11} \\ 20\not{3}\not{1} \\ -\ 856 \\ \hline 5 \end{array}$$

"You cannot take 5 tens from 2 tens.
There are no hundreds to regroup.
So, regroup 1 thousand as 10 hundreds.
Then, regroup 1 hundred as 10 tens."

$$\begin{array}{r} {\scriptstyle 1\ \overset{9}{\not{1}}0\ \overset{12}{\not{2}}\ 11} \\ \not{2}\not{0}\not{3}\not{1} \\ -\ 856 \\ \hline 5 \end{array}$$

"Then, subtract the tens.
Subtract the hundreds.
Subtract the thousands."

$$\begin{array}{r} {\scriptstyle 1\ \overset{9}{\not{1}}0\ \overset{12}{\not{2}}\ 11} \\ \not{2}\not{0}\not{3}\not{1} \\ -\ 856 \\ \hline 1175 \end{array}$$

There were 1175 more visitors on Friday than on Saturday.

➤ Kate takes 31 away from each number then adds, to make friendly numbers.

$2031 - 856$

2031	−31	2000	+75	2075
− 856	−31	−825	+75	−900
				1175

I know that if I take 31 away from each number, it does not change the answer.

Kate checks her answer by estimating.
2031 is closest to 2000.
856 is closest to 900.
$2000 - 900 = 1100$

1100 is close to 1175; so, the answer is reasonable.

➤ Maksim uses the strategy of make a friendly number, then compensates.

$2031 - 856$

$2031 - 856 \rightarrow 2031 - 900 = 1131$
$900 - 856 = 44$
$1131 + 44 = 1175$
So, $2031 - 856 = 1175$

I subtracted 900 instead of 856. That's 44 too many. So I added 44 at the end.

Practice

1. Estimate, then subtract.
Is each answer reasonable? Explain.
a) $8274 - 3596$ **b)** $6328 - 937$ **c)** $4028 - 1639$

2. Subtract. Check your answer.

a)
$$\begin{array}{r} 3102 \\ -\ 1428 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 5287 \\ -\ 931 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 7000 \\ -\ 2476 \\ \hline \end{array}$$

3. Subtract.

a) 7130 − 2864 **b)** 9345 − 6898 **c)** 6005 − 4816

4. Subtract.

a) Seven thousand one minus three hundred fifty-six

b) Eight thousand twelve minus four thousand two hundred twenty-eight

5. Is it possible to subtract a 3-digit number from a 4-digit number and get a 4-digit number as the answer?
A 3-digit number as the answer?
A 2-digit number as the answer?
A 1-digit number as the answer?
Give an example for each possible answer.
Show your work.

6. In 1215, the Magna Carta was signed.
How many years ago was that?

7. Use eight different digits from 1 to 9.

$$\square\square\square\square - \square\square\square\square$$

a) What is the greatest difference you can make?

b) What is the least difference you can make?

c) How do you know the answer you found in part a is the greatest? In part b is the least?

8. Each letter in this problem represents a different digit from 0 to 9.
What is the value of each letter?
How do you know?

$$\begin{array}{r} S\ H\ H\ H \\ -\quad\quad S \\ \hline Z\ Z\ Z \end{array}$$

Reflect

How do you keep track of numbers with the same place value when you subtract? Use numbers and words to explain.

LESSON 13

Solving Addition and Subtraction Problems

Some athletes take part in stair-climbing races.
Some people climb the stairs to raise money for charity.

CN Tower
1776 Steps

Central Park Tower, Australia
1236 Steps

Menara Tower, Malaysia
2058 Steps

Explore

Mei participated in stair-climbing events at the Menara Tower, the Central Park Tower, and the CN Tower.

➤ How many steps did she climb altogether?

➤ Make up another problem, then solve it.

Show *and* Share

Trade problems with another pair of students. Solve their problem.
Compare your strategies for solving the problems.

Connect

Ahmal started a business selling computer parts.
He opened a bank account with $1776.
In his first two weeks he deposited $1236 and $2109 into the account.

➤ How much did he have in the account altogether?
Add: 1776 + 1236 + 2109

Add from left to right.

$$\begin{array}{r} 1776 \\ 1236 \\ +\ 2109 \\ \hline 4000 \\ 1000 \\ 100 \\ 21 \\ \hline 5121 \end{array}$$

Add the thousands (1000 + 1000 + 2000).
Add the hundreds (700 + 200 + 100).
Add the tens (70 + 30 + 0).
Add the ones (6 + 6 + 9).
Add the sums.

Ahmal had $5121 altogether in the account.

➤ In the third week, Ahmal had to pay 2 bills of $1041 and $650.
How much did Ahmal have in his account after paying the bills?

Ahmal started with $5121 in his account.

- Subtract: 5121 − 1041
  Subtract from right to left.

$$\begin{array}{r} {\scriptstyle 0\ 12} \\ 5\not{1}\not{2}1 \\ -\ 1041 \\ \hline 4080 \end{array}$$

- Then subtract 650 from the result.

$$\begin{array}{r} {\scriptstyle 3\ 10} \\ \not{4}\not{0}80 \\ -\ 650 \\ \hline 3430 \end{array}$$

Ahmal had $3430 in his account after paying his bills.

Practice

1. Find each sum.

a) 1175 + 3241 + 829
b) 2456 + 3727 + 1104
c) 4782 + 543 + 2368
d) 3040 + 4307 + 5198

2. Juan drives a truck. On Monday,
he left Prince George to drive 1639 km
to Whitehorse. On Wednesday,
he left to drive 1222 km to Inuvik.
On Saturday, he left to drive 3149 km to Yellowknife.
How far did Juan travel altogether?

3. The Lees drove 1431 km to their summer home.
On their return, they took the same route.
They drove 613 km the first day and 486 km on the second day.
How far would the Lees have to drive on the third day
to get home?

4. Kay spilled a drink on her homework.
Copy and complete the addition.
Find the digits that are covered.
Explain how you know.

$$\begin{array}{r} 3\ 6\ \square\ 5 \\ \triangle\ 9\ 7\ 4 \\ +\ 1\ 1\ 5\ \bigcirc \\ \hline 7\ *\ 1\ 5 \end{array}$$

5. The sum of 3 numbers is 8196.
One of the numbers is 988.
What might the other two numbers be?
How do you know?

6. At the beginning of the month,
Anne had $2340 in her bank account.
Anne deposited $936 one day and $94 another day.
Anne took out $790 the next week.
How much did Anne have in her account then?

7. Find a number you can add to 6274 so you have to
regroup ones, tens, and hundreds.
Can you find more than one number? Explain.

Reflect

When you add three numbers, does the order in which
you add the numbers matter?
Does the same rule apply to subtraction? Explain.

Unit 2 Show What You Know

LESSON

1

1. The highest score in a Scrabble game is 1049.
Write this number in words and in expanded form.

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

3. Write each number in standard form, then in a place-value chart.
a) eight thousand twenty-six **b)** 6000 + 800 + 7

4. Draw a picture to represent each number in question 3.

2

5. Write these numbers in order from least to greatest.
5242, 5232, 5223

3

6. Use a Venn diagram to sort these numbers:
3057, 555, 2454, 333, 636, 22, 4444
You choose the attributes.

4 8

7. Estimate each sum or difference.
a) 680 + 213 **b)** 2761 − 1780 **c)** 176 + 412
d) 597 − 237 **e)** 1276 + 2566 **f)** 911 − 499

5 9

8. Use mental math to add or subtract.
a) 2567 + 1724 **b)** 385 − 189 **c)** 247 + 338 **d)** 4210 − 2983

4 8

9. For a Read-A-Thon, Natalie read 786 pages.
Kevin read 815 pages. Mario read 623 pages.
Altogether, they read over 2000 pages.
a) Is 2000 exact or an estimate? How do you know?
b) About how many more pages did Kevin read than Mario?

6 7 10 12

10. Add or subtract. How do you know your answers are reasonable?

a) 2211 − 878	**b)** 452 + 348	**c)** 800 − 298	**d)** 4579 + 3975
e) 762 − 304	**f)** 737 + 843	**g)** 993 + 5002	**h)** 9843 − 4213

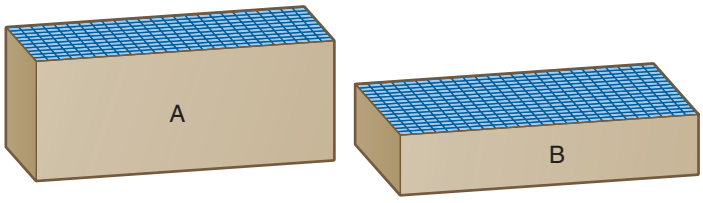
LESSON

13

11. The Musicians, a rock group, had 3 concerts last month. The first concert had an audience of 4356. The second concert had an audience of 3295. The third concert had an audience of 2964. How many people attended the concerts altogether?

12. Refer to question 11. The first Musicians concert was a promotion night.
Seven hundred forty-six tickets were given away through radio contests.
Three hundred twelve tickets were given away through Internet promotions.
The rest of the tickets were purchased by fans.
How many tickets were purchased for the first concert?

Use the following information to answer questions 13 to 15.
Container A holds 2500 unit cubes.
Container B holds 1875 unit cubes.
Both containers are full.



8

13. How many cubes do the two containers hold altogether?

13

14. Rhonda takes 725 cubes from container A. Then Marilyn takes 925 cubes, and Everett takes 375 cubes. How many cubes are left in container A?

15. Is there enough room now in container A to hold the cubes from container B? Explain.

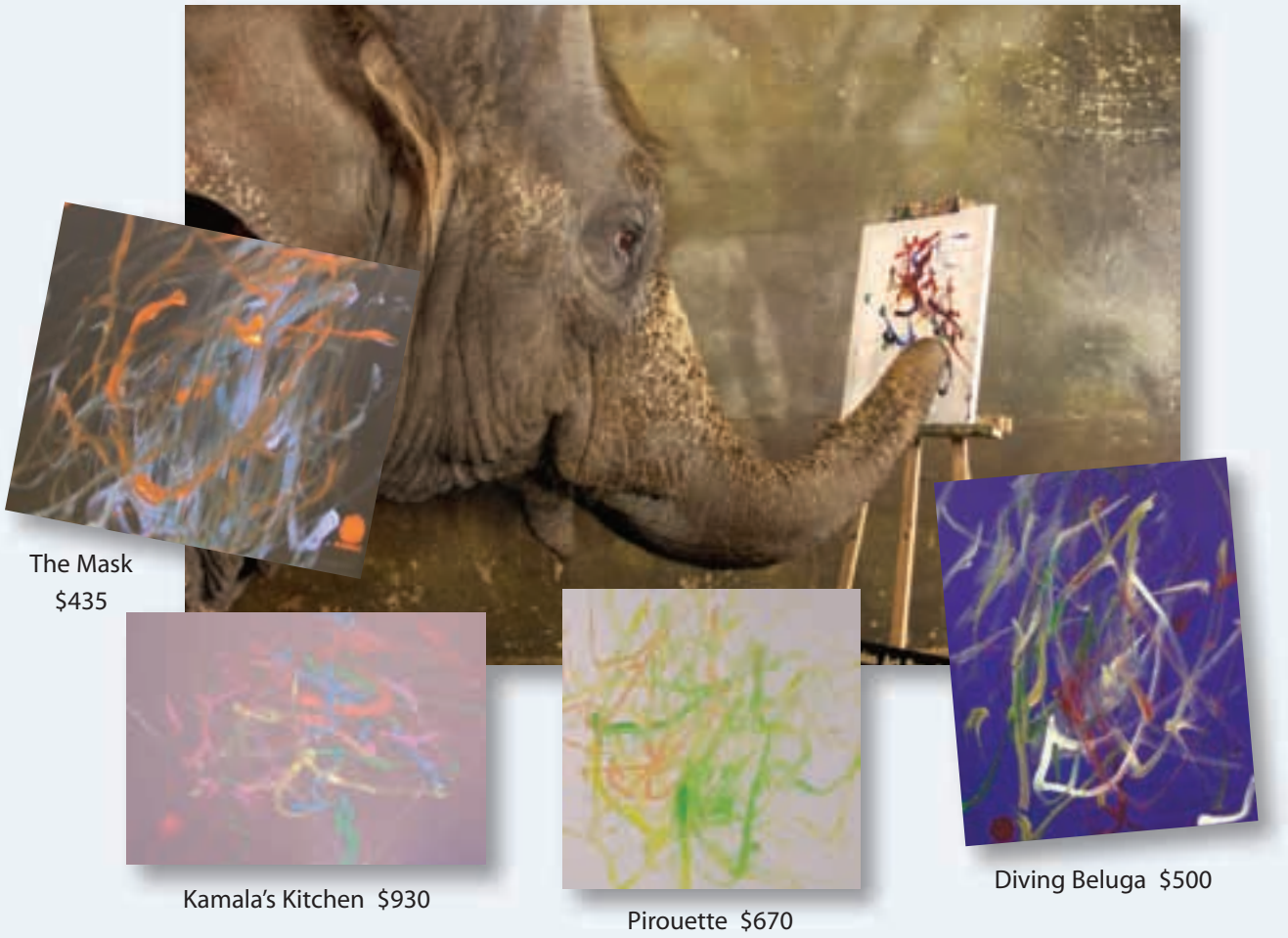
UNIT 2 Learning Goals

- ☑ recognize and read numbers from 1 to 10 000
- ☑ read and write numbers in standard form, expanded form, and written form
- ☑ compare and order numbers
- ☑ use diagrams to show relationships
- ☑ estimate sums and differences
- ☑ add and subtract 3-digit and 4-digit numbers mentally
- ☑ use personal strategies to add and subtract
- ☑ pose and solve problems

Unit Problem

Those Amazing Elephants

Kamala's Art



The Mask
$435

Kamala's Kitchen $930

Pirouette $670

Diving Beluga $500

1. The Calgary Zoo is home to 4 Asian elephants.
Use the data in the table.

a) Calculate the age of each elephant.

b) Order the elephants from youngest to oldest.

c) Kamala is Maharani's mother. How old was Kamala when Maharani was born?

d) In what year will Spike be 50 years old?

Elephants' Year of Birth	
Name	**Year**
Swarna	1975
Maharani	1990
Spike	1981
Kamala	1975

Check List

Your work should show

- ☑ that you can choose the correct operation
- ☑ your thinking in words, numbers, or pictures
- ☑ how you added and subtracted correctly
- ☑ a clear record of your answers

2. Kamala has been named Canada's most famous animal.
She paints pictures that are sold for hundreds of dollars. The money earned from the sales of the paintings will be used to build a new home for the elephants.
Use the pictures on page 78.

a) Order the paintings from least to most expensive.

b) Choose 3 of Kamala's paintings you would like to own.
How much would you pay for them?

c) Find the difference in cost of the most expensive and least expensive paintings.

3. Elephants can pick up and drag very heavy objects. Oscar, an adult Asian elephant, can lift a 435-kg log with his tusks. He can drag a load of 1500 kg.
How much more can Oscar drag than he can lift?

4. Write a story problem about elephants.
Solve the problem.
Show your work.

Reflect on Your Learning

Write about the different strategies you know for adding and subtracting.