Name _____

Mental Math: Adding

R 2-1

To add using mental math, you can break apart numbers or use compensation. The Commutative Property of Addition and the Associative Property of Addition explain why this works.

$13 + 6 = 6 + 13$	$(7 + 8) + 5 = 7 + (8 + 5)$
Commutative Property of Addition	Associative Property of Addition

With **breaking apart** you can add numbers in any order.

$235 + 158$	Break apart 158. $158 = 5 + 153$
$235 + 5 = 240$	Add one part to make a ten.
$240 + 153 = 393$	Add the other part.

With **compensation** you can add or subtract to make tens.

$235 + 158$	Add 2 to make a ten. $158 + 2 = 160$
$235 + 160 = 395$	
$395 - 2 = 393$	Subtract 2 from the answer because 2 was added earlier.

Add. Use mental math.

1. $67 + 31 =$ _____

2. $29 + 43 =$ _____

3. Reasoning How can you write $72 + (8 + 19)$ to make it easier to add? _____

	Marble Collection	
	red	425
	blue	375
	green	129
	yellow	99

Use mental math to find the number of

4. red and blue marbles. _____

5. red and green marbles. _____

Name _____

Mental Math: Subtracting

R 2-2

To subtract using mental math, you can break numbers apart, use compensation, or use counting on.

Using breaking apart

88 − 15	Break apart 15.
	10 + 5 = 15
88 − 5 = 83	Subtract one part.
83 − 10 = 73	Subtract the other part.

Using compensation

162 − 48	Add 2 to make 50.
162 − 50 = 112	2 + 48 = 50
112 + 2 = 114	Since you subtracted 2 too many, add 2 to the answer.

Using counting on

400 − 185	Add 5 to make 190.
	185 + 5 = 190
190 + 10 = 200	Make the next 100.
200 + 200 = 400	Add 200 to make 400.
5 + 10 + 200 = 215	Find the total of what you added.

Subtract. Use mental math.

1. 86 − 14 = _____

2. 66 − 58 = _____

3. 141 − 46 = _____

4. 206 − 78 = _____

5. Writing in Math Subtract 164 − 94, then describe the mental math method you used.

_____

_____

_____

_____

Name _____

Estimating Sums and Differences

R 2-3

Rounding and front-end estimation can be used to estimate sums and differences.

To estimate 1,436 + 422:

Rounding

1,436 rounds to 1,400
422 rounds to 400
1,400 + 400 = 1,800

Front-end estimation

1,400 becomes 1,000
422 becomes 400
1,000 + 400 = 1,400

To estimate 3,635 − 1,498:

Rounding

3,635 rounds to 3,600
1,498 rounds to 1,500
3,600 − 1,500 = 2,100

Front-end estimation

3,635 becomes 3,000
1,498 becomes 1,000
3,000 − 1,000 = 2,000

Estimate each sum or difference.

1. 265 + 426

2. 348 + 122

3. 562 − 223

4. 824 − 590

5. 2,189 + 388

6. 1,329 + 5,345

7. 877 − 475

8. 9,245 − 4,033

9. 788 + 212 = _____

10. 9,769 − 4,879 = _____

11. 65,328 − 14,231 = _____

12. 32,910 + 4,085 = _____

13. Number Sense Is 976 − 522 more or less than 400? Explain how you can tell without actually subtracting.

_____

Name _____

Overestimates and Underestimates

R 2-4

When you estimate, you come close to the exact answer. If your estimate is greater than the exact answer, it is called an overestimate. If your estimate is less than the exact answer, it is called an underestimate.

An Overestimate

3,770	rounds to	4,000
+ 5,829	rounds to	6,000
		10,000

Both numbers were rounded up, so 10,000 is an overestimate. The exact sum is less than 10,000.

An Underestimate

742	rounds to	700
+ 312	rounds to	300
		1,000

Both numbers were rounded down, so 1,000 is an underestimate. The exact sum is greater than 1,000.

Estimate each sum or difference. Then, if possible, tell whether your estimate is an overestimate or an underestimate.

1. 805 − 322 _____
2. 95 + 265 _____
3. 626 + 315 _____
4. 7,774 + 2,822 _____
5. 4,555 − 2,981 _____
6. 121 + 135 _____
7. 864 − 552 _____
8. 8,103 + 6,222 _____
9. **Number Sense** Melvin estimated 645 + 322 by adding 600 + 300. Is his estimated sum an overestimate or an underestimate? _____

Name _____

Adding Whole Numbers and Money

R 2-5

You can add numbers by adding the ones, then tens, then hundreds, and then thousands. For example:

Adding Larger Numbers

Add 53,482 + 38,811.

Estimate: 50,000 + 40,000 = 90,000

Add each place from right to left.

```
  11
  53,482
+ 38,811
  92,293
```

Regroup the hundreds into 1 thousand and 2 hundreds.

The sum 92,293 is reasonable because it is close to the estimate of 90,000.

Adding Money

Add $88.50 + $11.75.

Estimate: $90 + $10 = $100

Add each place from right to left.

```
   11
  $ 88.50
+   11.75
  $100.25
```

Regroup as necessary.

Place the dollar sign and decimal point into the answer.

The sum $100.25 is reasonable because it is close to the estimate of $100.

Add.

1. 668 + 343

2. $17.89 + 2.71

3. 14,587 + 5,532

4. 1,976 + 240

5. $36.36 + 24.84

6. 25,039 + 37,949

7. $86.50 + 5.65

8. 16,583 + 83,795

9. Estimation Zach adds 4,731 and 1,150. Should his sum be more or less than 6,000?

_____

Name _____

Column Addition

R 2-6

You can add more than two numbers when you line up the numbers by place value and add one place at a time.

Add 3,456 + 139 + 5,547.

Estimate: 3,000 + 100 + 6,000 = 9,100

Step 1

Line up numbers by place value.

Add the ones.

Regroup if needed.

```
   2
3,456
  139
+ 5,547
-------
      2
```

22 becomes 2 tens and 2 ones.

Step 2

Add the tens.

Regroup if needed.

```
  12
3,456
  139
+ 5,547
-------
     42
```

Keep digits in neat columns as you add.

Step 3

Add the hundreds, then the thousands.

Continue to regroup.

```
 1 12
3,456
  139
+ 5,547
-------
 9,142
```

9,142 is close to the estimate of 9,100.

Add.

1.
```
  945
  124
+ 343
-----
```

2.
```
 2,588
   373
+  866
------
```

3.
```
 12,566
  8,222
+ 5,532
-------
```

4.
```
 2,955
 9,017
+  248
------
```

5.
```
 $166.99
   33.11
+ 324.84
--------
```

6.
```
 $38.81
  17.35
+  3.64
-------
```

7. Number Sense Jill added 450 + 790 + 123 and got 1,163. Is this sum reasonable?

_____

_____

Name _____

Subtracting Whole Numbers and Money

R 2-7

Here is how to subtract across zeros.

Find 606 − 377.

Estimate: 600 − 400 = 200

Step 1

$$\begin{array}{r} 606 \\ -\ 377 \\ \hline \end{array}$$

You cannot subtract 7 ones from 6 ones, so you must regroup.

Step 2

$$\begin{array}{r} {\scriptstyle 5\ 10} \\ 6\cancel{0}6 \\ -\ 377 \\ \hline \end{array}$$

Since there is a zero in the tens place, you must regroup using the hundreds.

Regroup 6 hundreds as 5 hundreds and 10 tens.

Step 3

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 5}\,\cancel{1}\cancel{0}\,{\scriptstyle 16} \\ \cancel{6}\cancel{0}\cancel{6} \\ -\ 377 \\ \hline \end{array}$$

Regroup 10 tens and 6 ones as 9 tens and 16 ones.

Step 4

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 5}\,\cancel{1}\cancel{0}\,{\scriptstyle 16} \\ \cancel{6}\cancel{0}\cancel{6} \\ -\ 377 \\ \hline 229 \end{array}$$

Subtract.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 229 \\ +\ 377 \\ \hline 606 \end{array}$$

You can check your answer by using addition.

Subtract.

1. $\begin{array}{r} \$707 \\ -\ 58 \\ \hline \end{array}$

2. $\begin{array}{r} 950 \\ -\ 47 \\ \hline \end{array}$

3. $\begin{array}{r} 624 \\ -\ 379 \\ \hline \end{array}$

4. $\begin{array}{r} \$3{,}506 \\ -\ 866 \\ \hline \end{array}$

5. $\begin{array}{r} \$4{,}507 \\ -\ 3{,}569 \\ \hline \end{array}$

6. $\begin{array}{r} 3{,}076 \\ -\ 1{,}466 \\ \hline \end{array}$

7. $\begin{array}{r} \$81.06 \\ -\ 29.99 \\ \hline \end{array}$

8. $\begin{array}{r} 6{,}083 \\ -\ 1{,}492 \\ \hline \end{array}$

9. Reasonableness Lexi subtracts 938 from 1,405. Should her answer be greater than or less than 500? Explain.

_____

_____

Name _____

Choose a Computation Method

R 2-8

Use **mental math** when the problem is easy to do in your head.

Marlo needs to buy 10 bowls for the party. Each bowl costs $3. How much money will the 10 bowls cost?

$10 \times \$3 = \$30$
The total cost is $30.

Use **pencil and paper** when the problem does not have regroupings or is too difficult to solve mentally.

Mr. Davis has $45.55. He buys a baseball bat for $13.21. How much money does Mr. Davis have left?

$$\begin{array}{r} \$45.55 \\ -\ 13.21 \\ \hline \$32.34 \end{array}$$

Mr. Davis has $32.34 left.

Use a **calculator** for more complicated problems, like those that have a lot of regrouping. For example:

The Booster Club had a total of $1,080.50 in its account. Club members spent $179.05 on decorations for the school pep rally. How much money is left in the account?

Press:

1080.50 [−] **179.05**

[=]

Display: 901.45

There is $901.45 left in the account.

Add or subtract.

1. $\begin{array}{r} 660 \\ -\ 360 \\ \hline \end{array}$

2. $\begin{array}{r} 3{,}546 \\ +\ 554 \\ \hline \end{array}$

3. $\begin{array}{r} 13{,}507 \\ -\ 8{,}569 \\ \hline \end{array}$

4. $\begin{array}{r} 1{,}276 \\ +\ 1{,}004 \\ \hline \end{array}$

5. Number Sense Explain why you would not use mental math to find 1,256 − 879.

_____

Name _____

PROBLEM-SOLVING STRATEGY **R 2-9**

Look for a Pattern

What pattern do you see?

1 A 2 B 3 C 4 D 5 E 6 F

The numbers alternate with letters of the alphabet, in order.
The pattern would continue like this:

7 G 8 H 9 I

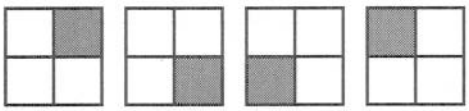
What pattern do you see?

A	B	C
1	1	1
2	2	4
3	3	9
4	4	16
5		25

The number in column A is multiplied by the number in column B.
Column C is the product.

The last number in column B would be 5.

Look for a pattern. Draw the next two shapes.

1. 

Look for a pattern. Write the three missing numbers.

2. 2, 4, 6, 8, _____ , _____ , _____

3. 2, 7, 12, 17, _____ , _____ , _____

4. 60, 52, 44, 36, _____ , _____ , _____

5. 88, 77, 66, 55, _____ , _____ , _____

Name _____

PROBLEM-SOLVING SKILL **R 2-10**

Translating Words to Expressions

A **number expression** contains numbers and at least one operation. Here are some examples:

67×3 $12 \div 4$ $67 + 89 + 13$ $177 - 54$

When you solve word problems, you use key words in the problem to make number expressions. For example:

Kelly has 2 pencils. Juan has 3 more pencils than Kelly. How many pencils does Juan have?

Word phrase: more than

More than refers to addition, so the number expression would be:

$2 + 3$.

Here are some other word phrases and the operations they refer to:

Word Phrase		Operation
more than total	plus combined with	addition
less than difference	fewer than minus	subtraction

Write a number expression for each phrase.

1. 37 marbles plus 52 marbles _____
2. 30 days less than 365 days _____
3. $45 increased by $67 _____
4. 25 tickets, with 18 tickets more _____
5. **Number Sense** Jerry sees 15 bikes in the bike rack. He knows there are 35 total spaces for bikes. What operation can he use to find out how many more bikes will fit in the bike rack?

_____

Name _____

Matching Words and Number Expressions

R 2-11

Number expressions that require more than one operation use parentheses to indicate which operation should be done first.

Lori had 40 baseball cards. She gave 7 to Theo and 3 to Linda. How many cards did Lori have left?

Step 1: Write a number expression.
$40 - (7 + 3)$

Step 2: Find the value of the expression. Because this number expression has parentheses around $7 + 3$, you would do this part first.

$40 - (7 + 3)$
$\Downarrow$
$40 - 10 = 30$
Lori has 30 cards left.

Choose the number expression that matches the words. Then find its value.

1. Mr. Roundtree had 20 tickets. He gave 10 to his family and 8 to his friends.

   $20 - (10 - 8)$ or $(20 - 10) - 8$ _____

2. Jane made 8 hamburgers. She sold 6, but then made 2 more.

   $(8 - 6) + 2$ or $8 - (6 + 2)$ _____

3. Lonzo had 24 CDs. He lost 3 and gave 5 to a friend. How many CDs does Lonzo have?

   $(24 - 3) - 5$ or $24 - (3 - 5)$ _____

4. **Number Sense** Do $18 - (10 + 3)$ and $(18 - 10) + 3$ have the same value? Explain.

   _____

Name _____

Evaluating Expressions

R 2-12

To evaluate an expression, replace the variable with a value and then compute. For example:

Suppose $t = 5$. To evaluate $t + 20$, substitute 5 for t. Then add.

$t + 20$
$\Downarrow$
$5 + 20 = 25$

How can you find the missing number in this table?

n	$n + 11$
5	16
8	19
10	21
12	

$5 + 11 = 16$

$8 + 11 = 19$

Substitute 12 for n in the expression $n + 11$.
$12 + 11 = 23$. The missing number is 23.

Evaluate each expression for $a = 7$.

1. $a + 22 =$ _____ **2.** $a - 6 =$ _____ **3.** $17 + a =$ _____

4. Number Sense Does the expression $f - 13$ have a greater value when $f = 23$ or when $f = 26$? _____

Evaluate each expression for $n = 9$.

5. $n \div 3 =$ _____ **6.** $n + 15 =$ _____ **7.** $n - 7 =$ _____

Find the missing numbers in each table.

8.

n	$n - 5$
20	15
31	
50	45
17	

9.

★	★ + 21
7	
9	30
30	51
40	

Name _____

Solving Addition and Subtraction Equations

R 2-13

An equation is a number sentence stating that two expressions are equal.

$$\underbrace{7 + 5}_{12} = 12$$
$$12 = 12$$

Some equations have variables, such as $n + 20 = 100$. To solve the equation, you must find the number the variable stands for. Solve $n + 20 = 100$.

Step 1	Step 2
Use mental math. What number plus 20 equals 100?	See if the number works. If it doesn't, try another number.
Try different numbers.	Does $70 + 20 = 100$?
Try $n = 70$.	No.
$70 + 20 = 90$	Try $n = 80$.
	$80 + 20 = 100$
	So, $n = 80$.

Solve each equation.

1. $a + 5 = 12$ _____

2. $n + 9 = 18$ _____

3. $e - 6 = 60$ _____

4. $j + 100 = 126$ _____

5. $w - 200 = 100$ _____

6. $88 + t = 100$ _____

7. Number Sense Is the solution of $100 - f = 60$ greater than or less than 60? Explain how you know.

_____

_____

8. Reasonableness Marty solved the equation $d + 71 = 87$ and got $d = 12$. Is this solution reasonable? Explain.

_____

Name _____

PROBLEM-SOLVING APPLICATIONS **R 2-14**

These Lakes Are Great!

Suppose that waves in a part of Lake Michigan caused the water temperature to change quickly from 72°F to 59°F.

How many degrees cooler did the water temperature become?

To find the difference, subtract.

$$\begin{array}{r} {}^{6}\not{7}\,{}^{12}\not{2} \\ -\ 5\,9 \\ \hline 1\,3 \end{array}$$

So, the water temperature is 13°F cooler.

In its deepest part, Lake Michigan is about 925 ft deep. The average depth of Lake Michigan is about 279 feet.

1. Find the difference between the depths.

_____

The shoreline of Lake Michigan is 1,638 miles. The shoreline of Lake Superior is 2,726 miles. The shoreline of Lake Erie is 871 miles.

2. How many miles of shoreline do the three lakes have combined?

_____

3. How many more miles of shoreline does Lake Michigan have than Lake Erie?

_____

4. **Writing in Math** Candice says that the shoreline of Lake Erie and Lake Michigan combined is greater than the shoreline of Lake Superior. Is she correct? Explain.

_____

_____