NCTM Annual 2019 San Diego, CA

# Games and Tasks that Promote Deep Connections and Deep Understanding Grades K-2

Jennifer Leimberer
jleimb1@uic.edu

Elizabeth Cape
ecape@uic.edu

mathtrailblazer@uic.edu

Teaching Integrated Math and Science Project
mathtrailblazers.uic.edu

Learning Sciences Research Institute
Metro Chicago Mathematics Initiative
http://mcmi.uic.edu/

University of Illinois at Chicago



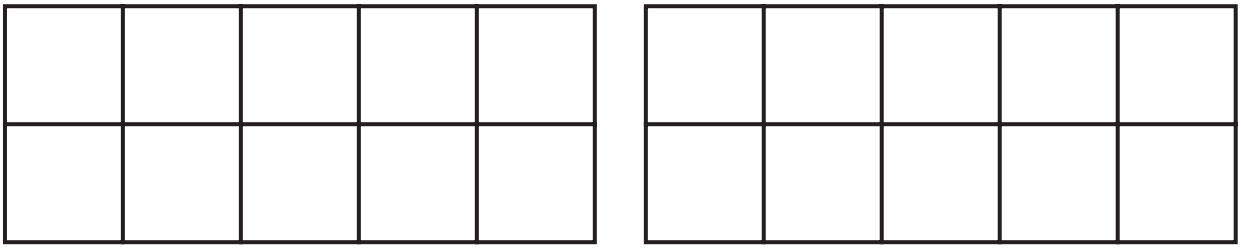

Name _____ Date _____

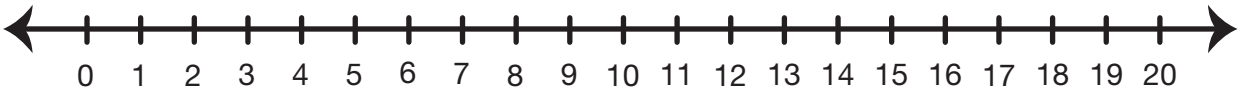
# Nan and Bert Problems

**Show or tell how to solve each problem. Write a number sentence. Use cubes, a number line, or ten frames. You may also draw a picture.**

**1.** Nan and Bert went on a picnic at the lake. Nan ate 9 grapes and Bert ate 5. How many did they eat altogether?

Number sentence _____

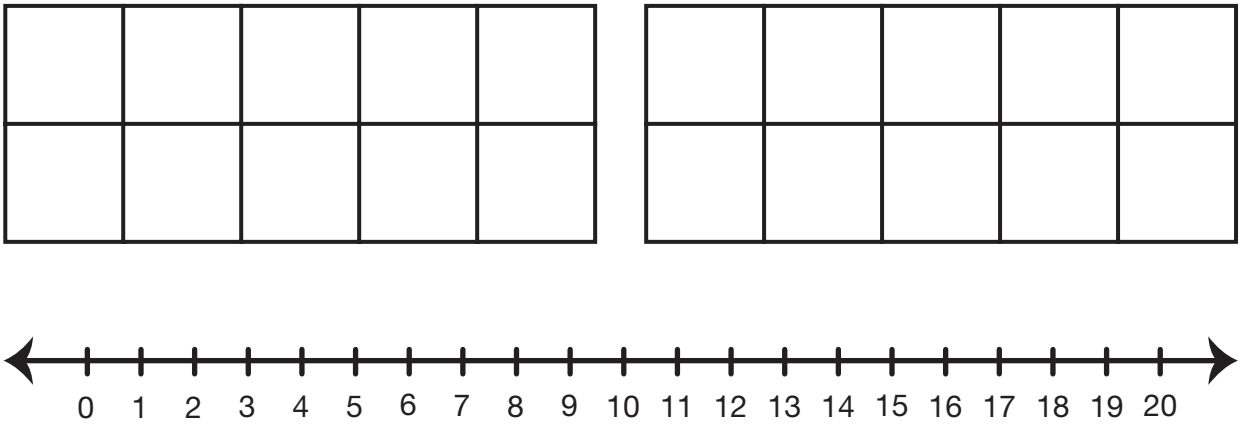





Name _____ Date _____

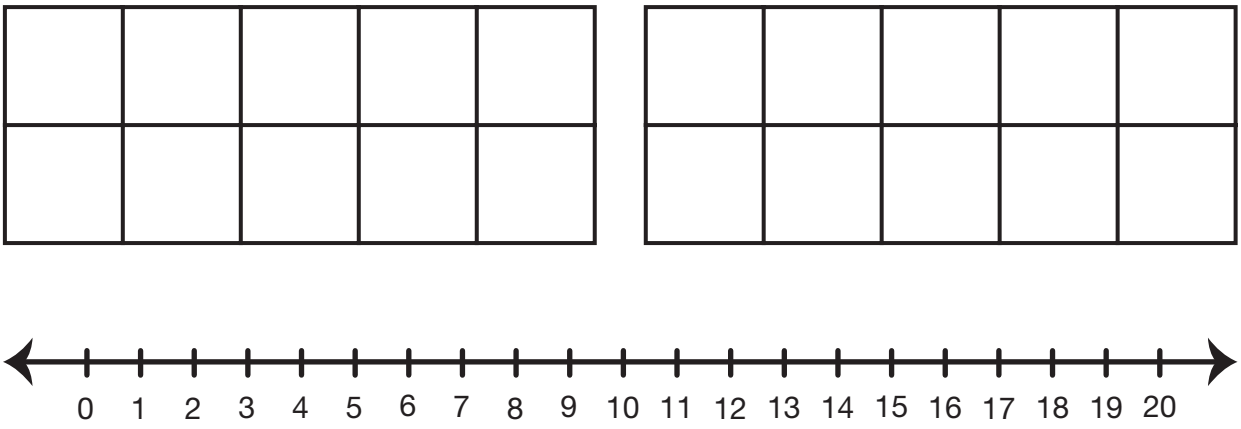
**2.** Grandma packed 15 baby carrots. Nan and Bert ate them all. If Nan ate 7, how many did Bert eat?

Number sentence _____




**3.** Grandma's ticket to the zoo cost $6. Nan and Bert's each cost $4. How much did all 3 tickets cost?

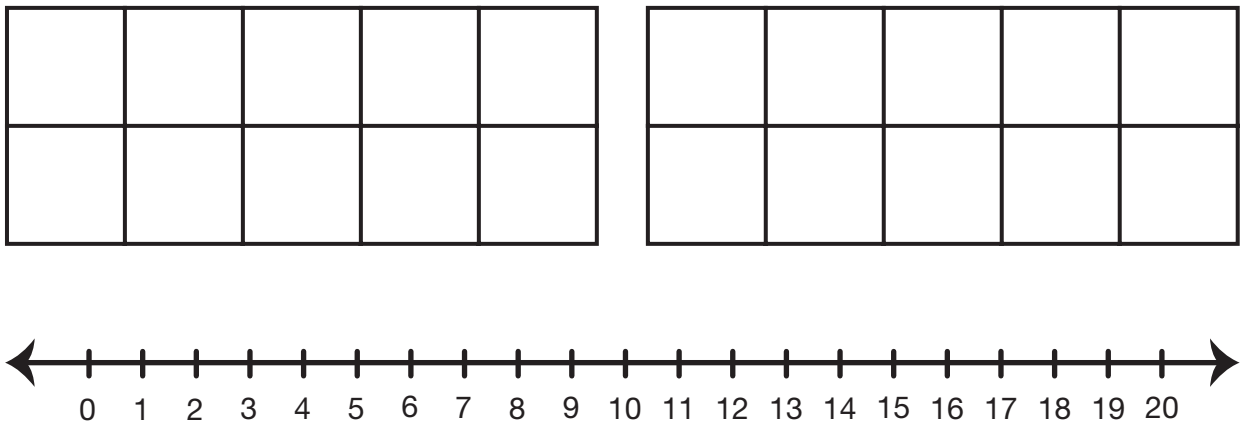
Number sentence _____



Name _____ Date _____

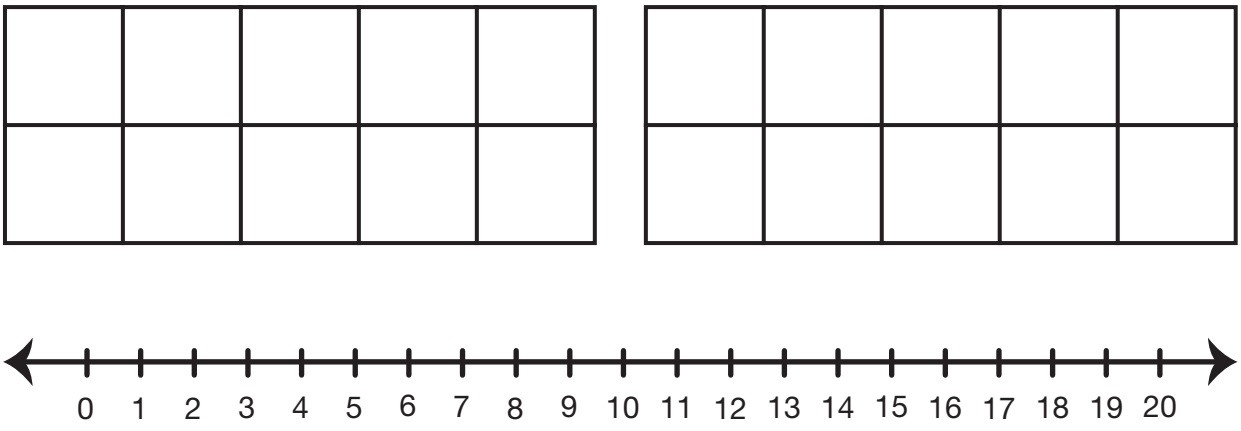
**4.** At the gift shop, Bert spent $16 and Nan spent half that much. How much did Nan spend?

Number sentence _____




**5.** Nan and Bert each brought a package of 8 crackers for a snack. How many crackers do they have altogether?

Number sentence _____



# Towers of Ten Game

**Materials:**

- **1 0-5 die**
- **10 unifix cubes in two colors, one tower per student**

**Students take turns rolling a die and building a tower with that quantity. The other student then adds blocks to the tower to make ten.**

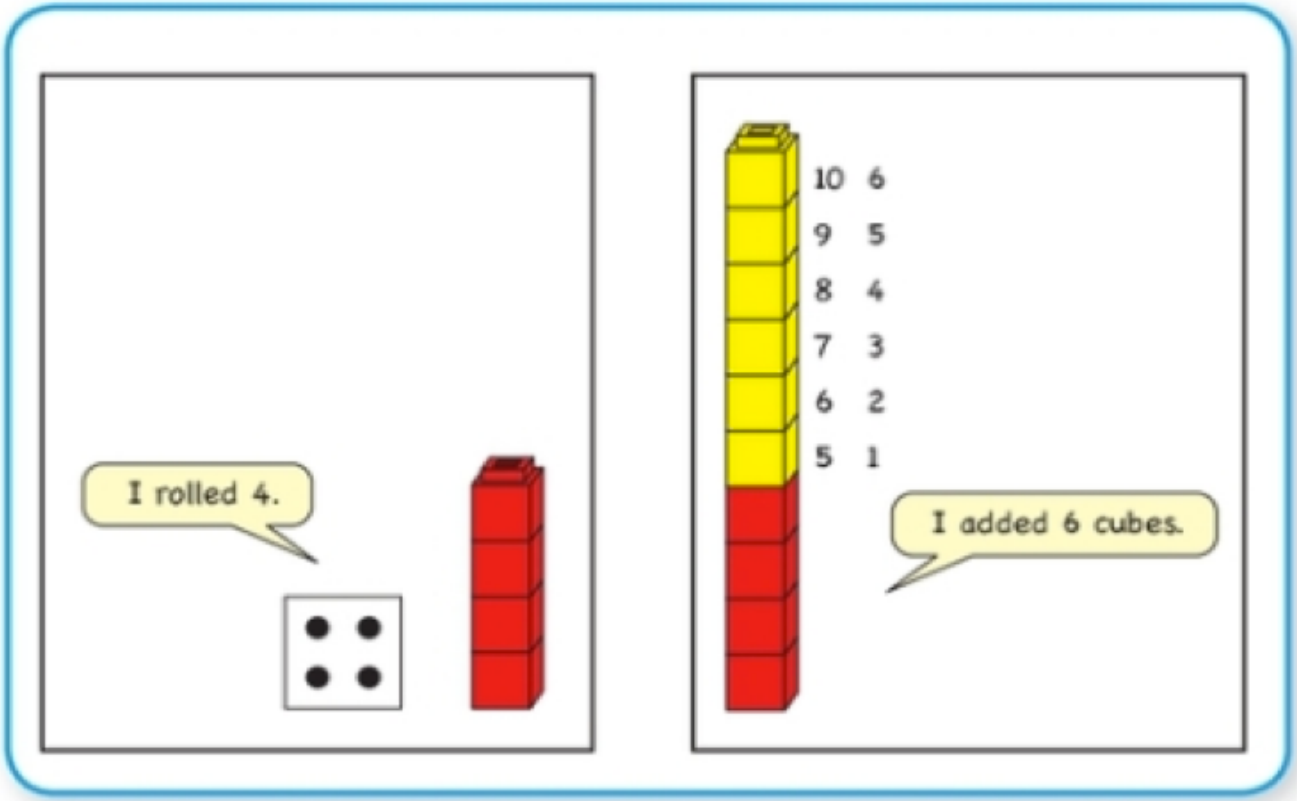



**Figure 1:** A sample round of Towers of Ten

Name _____ Date _____

# Doubles, Doubles +1, Doubles –1

**The object of this game is to write number sentences to show doubles, doubles +1, or doubles –1 and to predict whether the sum will be odd or even. This is a game for two players.**

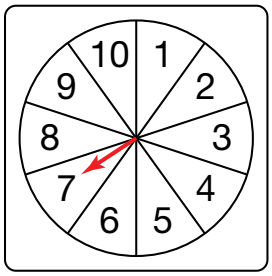
## Materials:

- Number Spinner (1–10) and Doubles Spinner
- Clear plastic spinner or a pencil and paper clip
- 25 connecting cubes
- Doubles, Doubles +1, Doubles –1 Recording Sheet

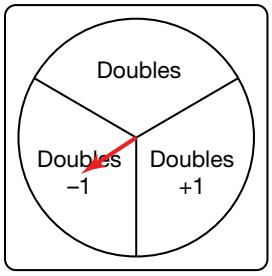
## Directions:

1. Player 1 spins the Number Spinner and the Doubles Spinner. For example, Player 1 spins a 7 and Doubles –1.
   - Use the spins to write a number sentence and predict whether the sum is odd or even. Find the sum and circle whether the sum is even or odd. Record your work on the recording sheet.

Number Spinner




Doubles Spinner



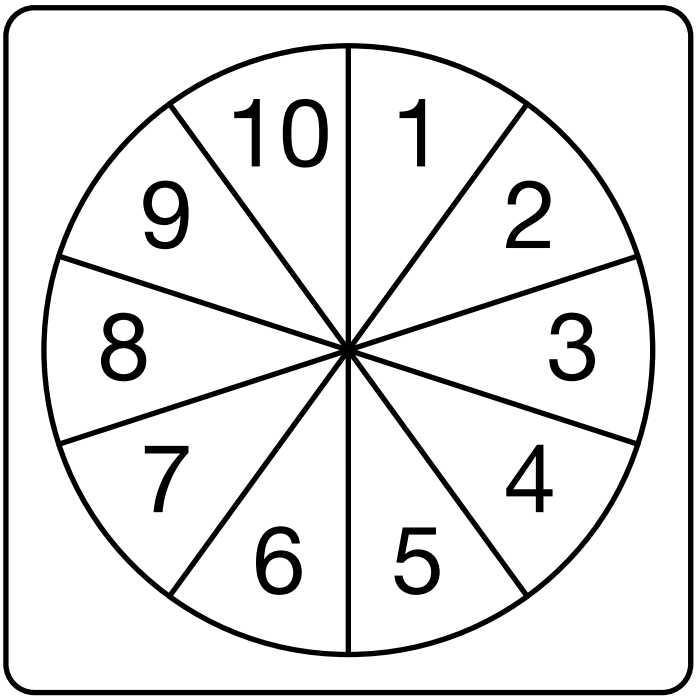

| Number Sentence | Sum | Even or Odd | Prediction Correct |
|---|---|---|---|
| 7 + 6 = | 13 | Even (Odd) | |
| | | | |
| | | | |

2. Player 2 checks Player 1's work and places a ✓ in Player 1's last column if the prediction is correct.
3. Player 2 now spins, makes a prediction, and completes the next row on the recording sheet.
4. Players continue to take turns for five rounds.
5. The player with most correct predictions wins.

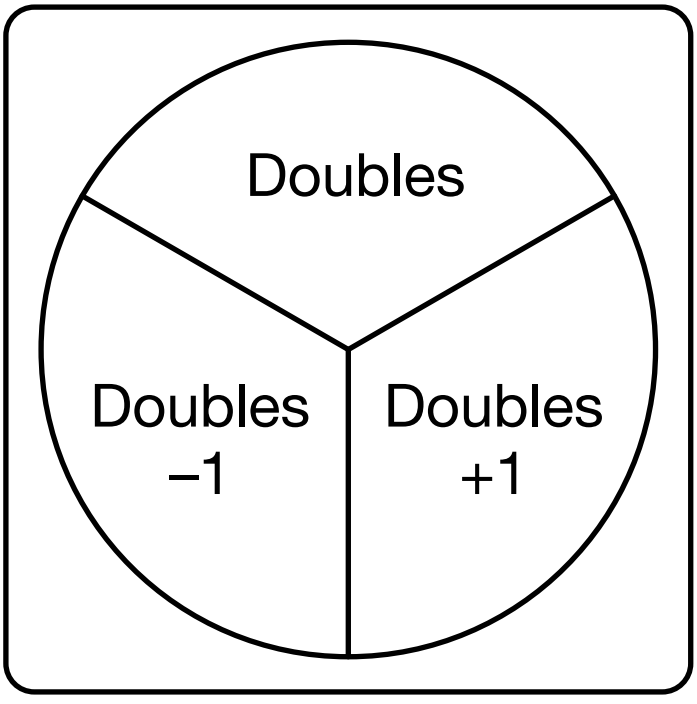
Name _____ Date _____

## Doubles, Doubles +1, Doubles −1, Spinners

Number Spinner




Doubles Spinner



Name _____ Date _____

## Doubles, Doubles +1, Doubles −1 Recording Sheet

| Number Sentence | Sum | Even or Odd | Prediction Correct |
|---|---|---|---|
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |
| | | Even Odd | |


**Use your table to answer these questions with your partner.**

1. What do you notice about the sums when both numbers are even?
2. What do you notice about the sums when both numbers are odd?
3. What do you notice about the sums when you add an even number and an odd number?

Name _____ Date _____

# Not More Than 100 Game

**This is a game for two or more players. The goal of this game is to get as close to 100 cubes as possible in exactly five spins without going over.**

## Materials

- Not More Than 100 Recording Sheets
- Not More Than 100 Spinner
- a clear plastic spinner or a pencil and paper clip
- 100 connecting cubes per player, grouped in ones and tens

## Directions

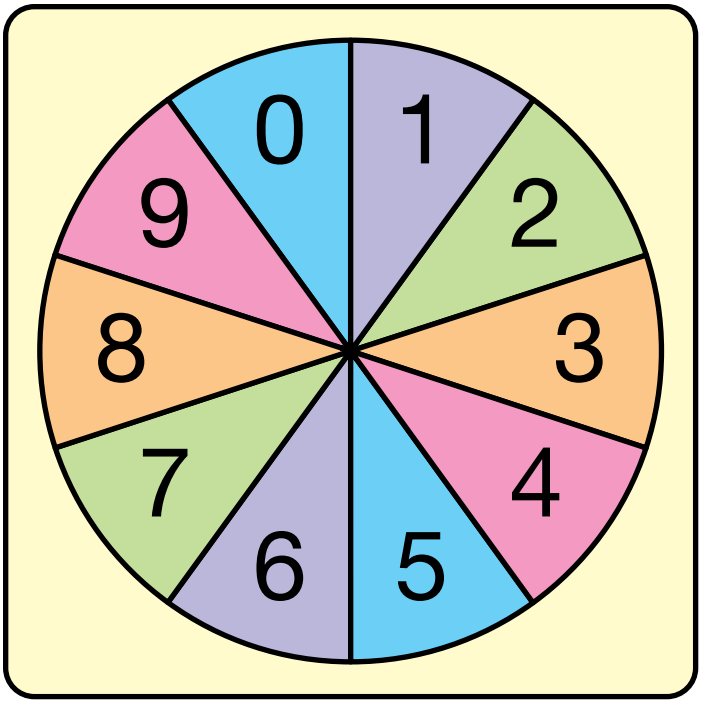
1. Players take turns spinning the spinner. They each get 5 turns.
2. With each spin, a player takes that number of ones **or** tens from the pile of cubes.
3. The player records the number taken on his or her recording sheet. Example: You spin a 5. You can take 5 ones and record 5 ones **or** you can take 5 tens and record 5 tens.
4. After five spins, the player who has the most connecting cubes, but not more than 100, wins.

Name _____ Date _____

## Sample Recording Sheet

| Spin | Tens | Ones | Number Sentence |
|---|---|---|---|
| 1 | 5 | 0 | 50 + 0 = 50 |
| 2 | | 6 | 50 + 6 = 56 |
| 3 | 2 | 0 | 56 + 20 = 76 |
| 4 | | 9 | 76 + 9 = 85 |
| 5 | 1 | 0 | 85 + 10 = 95 |

## Not More Than 100 Spinner



Name _____ Date _____

## Not More Than 100 Recording Sheets

| Spin | Tens | Ones | Number Sentence |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

| Spin | Tens | Ones | Number Sentence |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Name _____ Date _____

| Spin | Tens | Ones | Number Sentence |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

| Spin | Tens | Ones | Number Sentence |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

## Direct Modeling

Tell me a story for this problem. Ask connection questions: What does + mean in your story? What does the [3] mean?

Show your story [on a number line, with a picture, by acting it out, by acting it out with objects].

Provide the problem in a context.

## Counting Strategies

Show or tell me how you would solve the problem.

Try to solve it with [a number line, counters].

See how many different ways you can solve this problem.

Try to count a different way. counting up, counting back, counting on

I see you solved [4 + 3]. Find a way to solve [14 + 3].

## Reasoning from Known Facts

What friendly fact might help?

Try to solve it with a different friendly fact. How could [ten, a double] help?

Try to use [ten frames, a rekenrek].

I see you know [6 + 4]. How can that help you solve [8 + 4]?

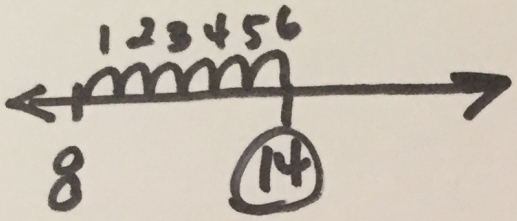
What addition fact might help with this subtraction problem?



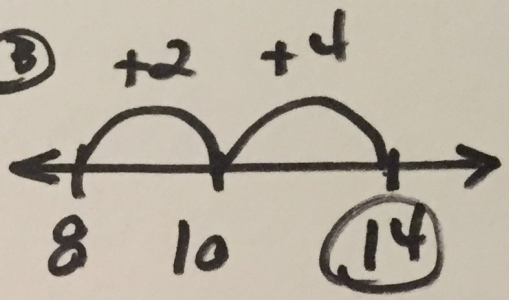
**Addition and Subtraction**

# 8 + 6

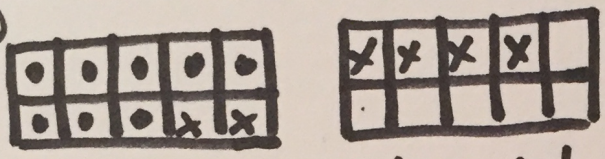
(A)




(B)




(C)

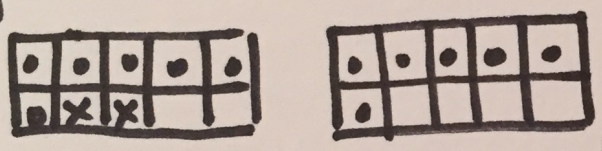


10 + 4 = 14

(D) (8+2) + 4

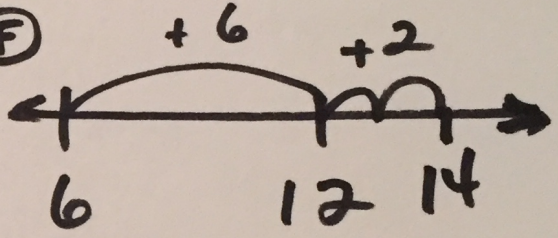
10 + 4 = 14

(E)

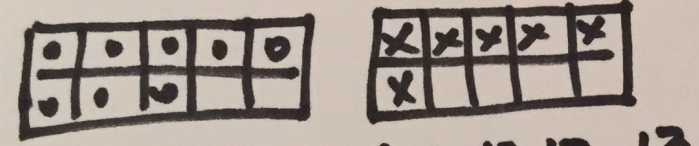


6 + 6 + 2 = 14

(F)



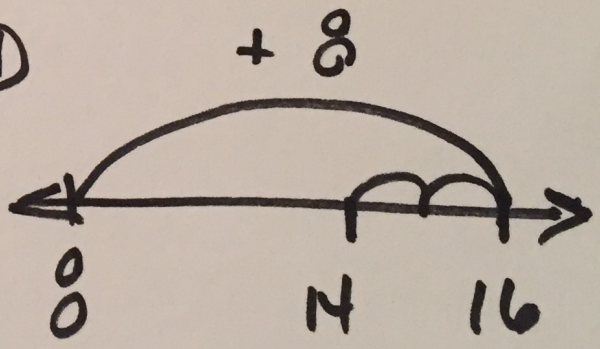

(G) 8 + 6 = 14



8

9, 10, 11, 12, 13

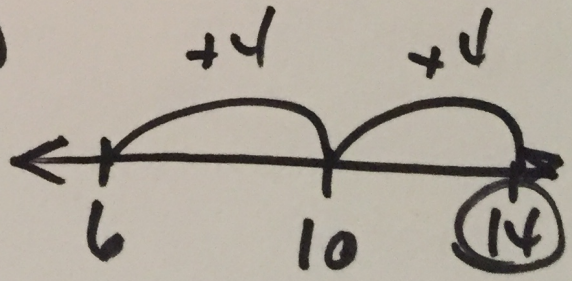
(H)




(I) 8 + 8 − 2

16 − 2 = 14

(J)



Name _____ Date _____

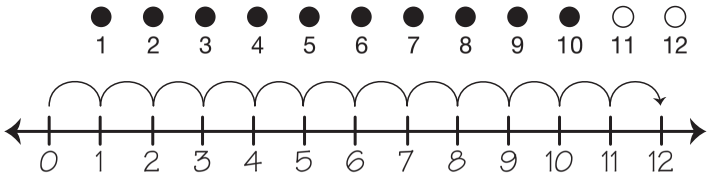
# My Addition Strategies Menu for Larger Numbers

| | |
|---|---|
| **Counting All** | **Making Ten** |
| **Counting On** | **Using Ten** |
| **Another Strategy** _____ | **Using Doubles** |

# Addition Strategies Menu for Larger Numbers

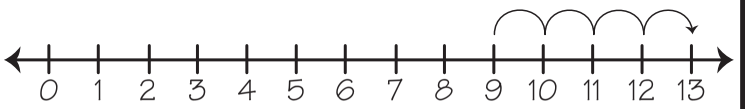
## Counting All

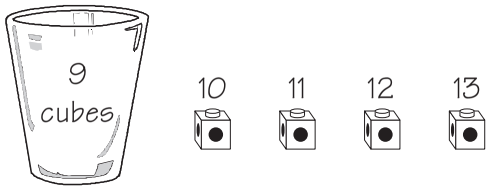
$10 + 2 = 12$




## Counting On

$9 + 4 = 13$

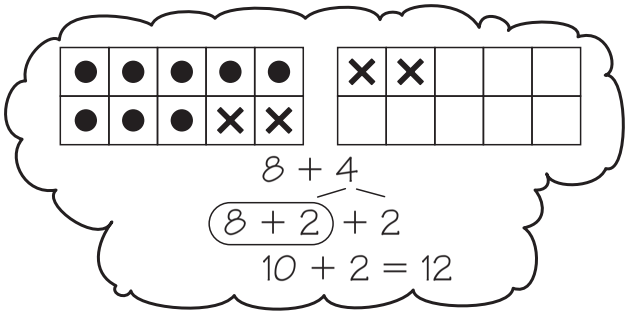



## Another Strategy _____

## Making Ten

$8 + 4 = 12$



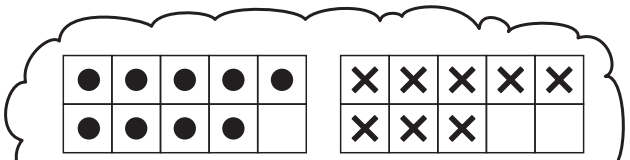
$8 + 4$

$(8 + 2) + 2$

$10 + 2 = 12$

## Using Ten

$9 + 8 = 17$



$10 + 8 = 18$

so

$9 + 8$ is one less or 17.

## Using Doubles

$6 + 7 = 13$

$6 + 6 = 12$

so

$6 + 7$ is one more or 13.

# Subtraction Strategies Menu

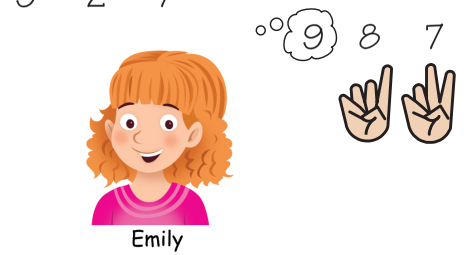
## Counting Strategies

### Counting Up

$8 - 5 = 3$


### Counting Back

$9 - 2 = 7$

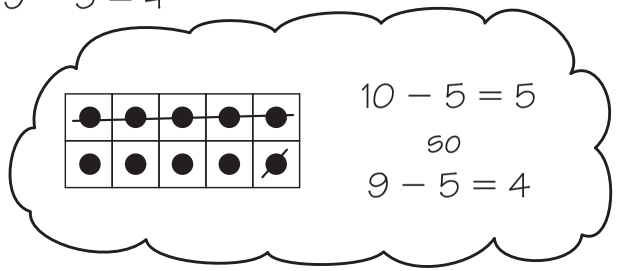



### Another Strategy _____

## Reasoning Strategies

### Using Ten

$9 - 5 = 4$



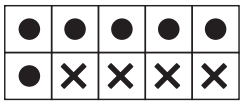

### Using Doubles

$8 - 3 = 5$

$4 + 4 = 8$ so $8 - 4 = 4$.
To solve $8 - 3$, I take off one less
so $8 - 3 = 5$.

### Making Ten

$10 - 6 = 4$

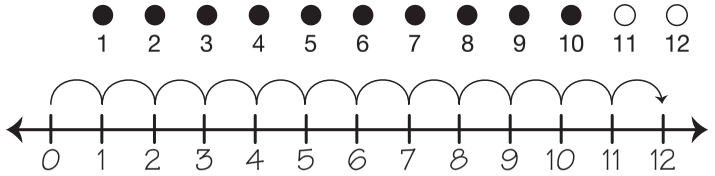


I know $6 + 4 = 10$
so
$10 - 6 = 4$.

# Addition Strategies Menu for the Facts

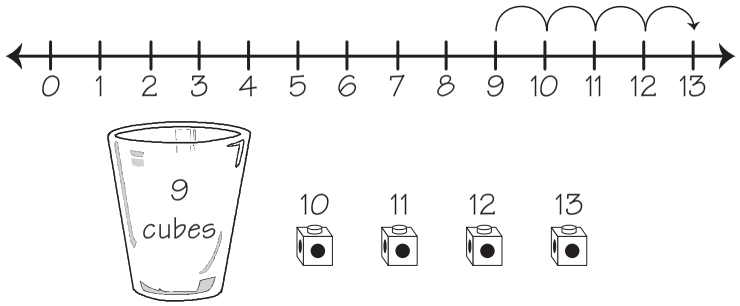
## Counting All

$10 + 2 = 12$




## Counting On

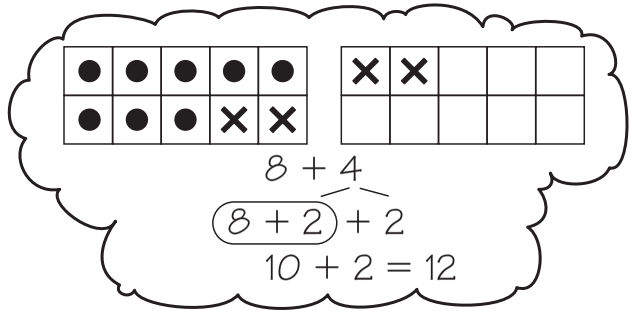
$9 + 4 = 13$




## Another Strategy _____

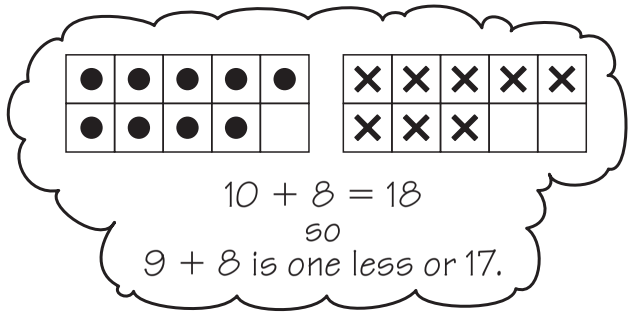
## Making Ten

$8 + 4 = 12$



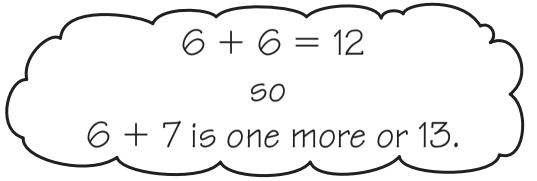

## Using Ten

$9 + 8 = 17$




## Using Doubles

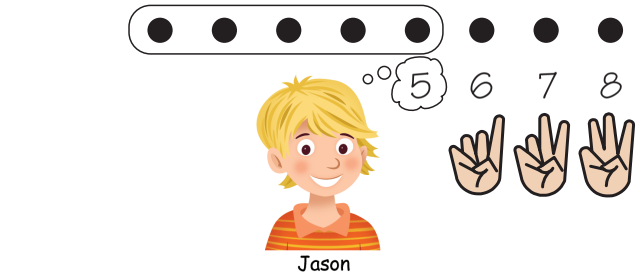
$6 + 7 = 13$



# Subtraction Strategies Menu for the Facts

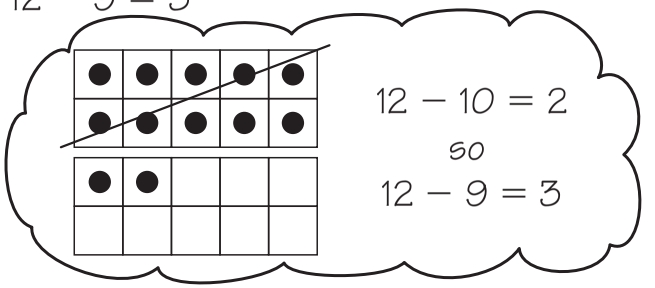
## Counting Up

$8 - 5 = 3$




## Using Ten

$12 - 9 = 3$



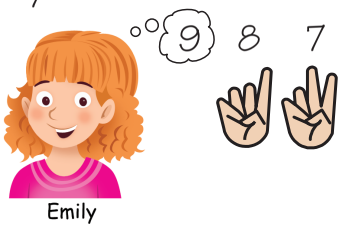
$12 - 10 = 2$

so

$12 - 9 = 3$

## Counting Back

$9 - 2 = 7$




## Using Doubles

$13 - 7 = 6$

$7 + 7 = 14$ so $14 - 7 = 7$.
To solve $13 - 7$, I start with one less so $13 - 7 = 6$.

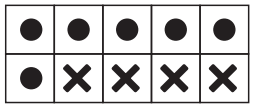
## Thinking Addition

$11 - 3 = 8$

I know $8 + 3 = 11$
so
$11 - 3 = 8$.

## Making Ten

$10 - 6 = 4$



I know $6 + 4 = 10$
so
$10 - 6 = 4$.

# Addition Strategies Menu

## Finding Friendly Numbers

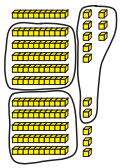
138 + 29

140 + 30 = 170
170 is a reasonable estimate.


Levi

## Using Base-Ten Pieces

68
+ 55
123



Trade 11 skinnies and 13 bits for
1 flat, 2 skinnies, and 3 bits

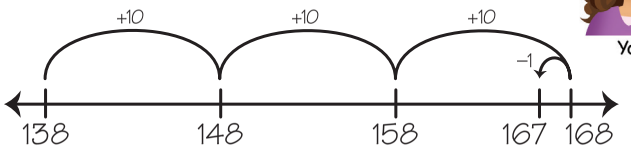

Peter

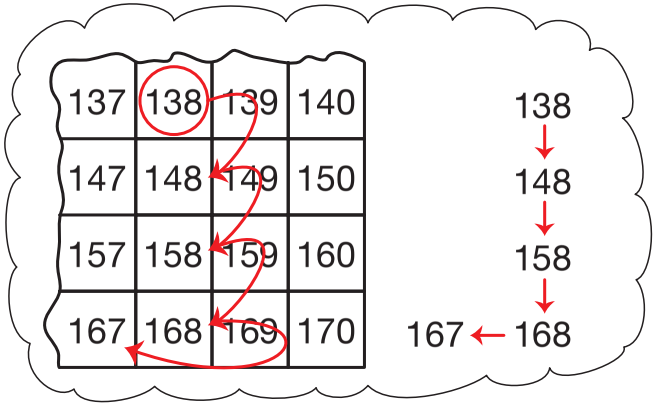
## Counting On

138 + 29

138 + 30 − 1 = 167


Yolanda




## Using Expanded Form

68 = 60 + 8
+ 55 = 50 + 5
110 + 13 = 123


Tara

## Using All-Partials

68
+ 55
110
13
123


Josh

## Using the Compact Method

1
68
+ 55
123


Julia