Major areas tested on 3rd grade MEAP (from the 2nd grade GLCEs)

1) place value to 1000 (blue)
2) add & subtract two digits without and with regrouping (green)
3) solve problems involving lengths (including finding perimeter) (yellow)
4) recognize, describe, classify 2-D shapes and 3-D objects (pink)

GLCEs in grey will not be tested on the MEAP because they moved to a higher grade in the Common Core.

GLCE	GLCE Gr.	Calc	GLCE Descriptor	Match to CCSS	
N.ME.02.01	2nd	N	Count to 1000 by 1s, 10s, and 100s starting from any #	2nd	core
N.ME.02.02	2nd	N	Read and write numbers to 1000	2nd	core
N.ME.02.03	2nd	N	Compare and order numbers to 1000; use <, >	2nd	core
N.FL.02.06	2nd	N	Decompose 100 into addition pairs, e.g., 99 + 1	2nd	core
N.MR.02.07	2nd	N	Find distance between numbers on a number line	2nd	core
N.MR.02.08	2nd	N	Solve problem such as 42 + __ = 57	2nd	core
N.MR.02.09	2nd	N	Solve story problems with objects, pictures, symbols	2nd	core
N.FL.02.10	2nd	N	Add and subtract fluently two numbers through 99	2nd	core
N.FL.02.11	2nd	N	Estimate sum of two numbers with three digits	2nd	core
N.MR.02.13	2nd	N	Recognize x as total number in a set of equal groups	3rd	
N.MR.02.14	2nd	N	Represent x using area and array models (not in CCSS)	2nd	
N.MR.02.15	2nd	N	Understand relationship of multiplication & division	3rd	
N.MR.02.16	2nd	N	Given situation with groups of equal size, represent	2nd	
N.ME.02.18	2nd	N	Use common unit fractions	2nd	
N.ME.02.19	2nd	N	Recognize, name and write halves, thirds and fourths	3rd	
N.ME.02.20	2nd	N	Place 0 and halves on number line; relate to a ruler	3rd	
N.ME.02.21	2nd	N	Knows denominator, fraction value relationship	3rd	
N.ME.02.22	2nd	N	Knows fraction equivalences of one	2nd	
M.UN.02.01	2nd	N	Measure lengths to nearest whole unit	2nd	
M.PS.02.02	2nd	N	Compare, add, subtract lengths (relate to N.MR.02.07)	2nd	core
M.TE.02.11	2nd	N	Determine perimeters of rectangles & triangles (not in CCSS)	2nd	core
M.UN.02.03	2nd	N	Measure area using non-standard units	2nd	
M.TE.02.04	2nd	N	Find the area of a rectangle using whole units	2nd	
M.UN.02.05	2nd	N	Tell time using A.M. and P.M.	2nd	
M.UN.02.06	2nd	N	Use the concept of duration of time	3rd	core
M.UN.02.07	2nd	N	Read & write money using decimal notations	3rd	core
M.PS.02.08	2nd	N	Add and subtract money in mixed units	4th	
M.UN.02.09	2nd	N	Read temperature in degrees Fahrenheit	N	
M.PS.02.10	2nd	N	Solve simple word problems involving length & money	2nd	core
G.GS.02.01	2nd	N	Identify, describe, compare 2-D & 3-D shapes	2nd	core
G.GS.02.02	2nd	N	Putting together, taking apart 2-D & 3-D shapes	K	core
G.SR.02.05	2nd	N	Classify familiar plane and solid objects	1st	core
G.GS.02.04	2nd	N	Know curved/straight lines, curved/flat surfaces	1st	
G.TR.02.06	2nd	N	Recognize transformed shapes	1st	
G.LO.02.07	2nd	N	Find, name points using simple coordinate systems	N	
D.RE.02.01	2nd	N	Make pictographs using a scale representation	2nd	
D.RE.02.02	2nd	N	Read, interpret pictographs with scales of 2 or 3	2nd	
D.RE.02.03	2nd	N	Solve problems using info in pictographs	2nd	

Instructions for Diagnostic Assessment on Core 2nd Grade GLCEs

Administer this assessment in the second half of 2nd grade or beginning of 3rd grade. Use the 1st Grade Diagnostic Assessment in the first half of 2nd grade for students who score below the cut-point on the screener.

Provide counters in case students want to use manipulatives.

You can read the test to students if you feel that's important.

On items 7-11, many students will use counting strategies rather than formal algorithms. This is acceptable in 2nd grade. In fact, successful use of counting strategies indicates that a student has command of number sense. You can judge their ability to use formal algorithms with the computations on the last page.

This is not a timed test, except for the last page. Administer the computations on the last page separately, after everyone has finished the first three pages. Allow 30 seconds for the 8 single-digit computations. Then let students work on the two-digit computations for no more than 1 minute.

Answer Key: (Students do not need to include the label for the answer to get full credit.)

1. 39 crayons. 24 + 15 = 39
2. 15 stickers. 42 – 27 = 15
3. 5 hundreds; 3 tens
4. 15
5. $2.35
6. 14
7. 15
8. 19 inches
9. 22 shells
10. 38
11. B
12. triangle
13. B
14. C

16	41	35	78	36	86	42
+7	+35	+25	+16	-12	-7	-27
23	76	60	94	24	79	15

In these computations, look for 1) whether the student knows "facts"; 2) if they know how to regroup when adding (problems 3 and 4); and 3) if they know how to regroup when subtracting (problems 6 &7).

To score this assessment, give one point for each correct answer. Problems 1, 2, 3, and 6 have two parts, so give two points total for these problems. There are a total of 36 points.

Concepts

Count orally by 3's and 4's starting with 0, and by 2's, 5's, and 10's starting from any whole number. N.ME.02.04 (This is foundational for multiplication.) – Item 4

Express numbers through 999 using place value. N.ME.02.05 – Item 3

Compare and order numbers through 999. N.ME.02.03 (core) – Item 11

Find the distance between numbers on the number line, e.g., how far is 79 from 26? N.MR.02.07 (core) – Item 7

Find missing values in open sentences, e.g., 42 + ? = 57; use relationship between addition and subtraction. N.MR.02.08 (core) – Items 6, 10

Identify, describe and compare familiar shapes. G.GS.02.01 (core) – Items 12-14

Computational Fluency

Add and subtract fluently with numbers up to 99, using strategies including formal algorithms. (core) N.FL.02.10 – computations on p. 4

Solve simple word problems involving length & money. (core) M.UN.02.10 – Item 5

Problem Solving

Given a contextual situation that involves addition and subtraction using numbers through 99: model using objects or pictures; explain in words; record using numbers and symbols; solve. (core) N.MR.02.9 – Items 1, 2, 8, 9

Compare lengths; add and subtract lengths (no conversion of units). M.PS.02.02 (core) – Item 8

Name _____

1. Amanda has 24 crayons. Her sister gives her 15 more crayons. How many crayons does Amanda have now?

   _____

   Write a number sentence to show this problem: _____

2. James has 42 stickers. He gives 27 stickers to Beth. How many stickers does James have left?

   _____

   Write a number sentence to show this problem: _____

3. Read the number 537. What number is in the hundreds place? _____

   What number is in the tens place? _____

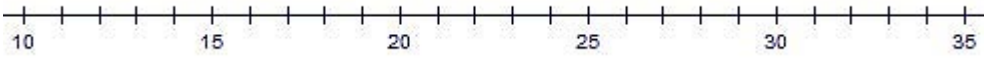
4. Write the missing number in the blank: 3, 6, 9, 12, _____, 18

5. You have $12 and spend $10 on a toy. How much money do you have left?

   _____

6. Find the missing number: 42 + ____ = 56

7. How far is 34 from 19 on this number line? _____



Which one of these shows this problem correctly? Circle one, then work it out.

34	34
+19	-19

8. A chain of beads is 35 inches long. You cut off 16 inches of the chain to give to your friend. How long is the chain that you have left?

_____

Draw a picture to show this:

9. Ted has 65 shells. Pam gives him some more shells. Now he has 87 shells. How many shells did Pam give him?

_____

Write a number sentence to show this problem: _____

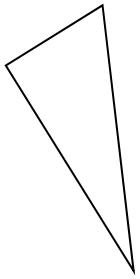
10. Find the missing number: ____ – 28 = 10

11. Which number can go in the blank so the numbers go from lowest to highest?

452 , _____ , 603

○ A 651
○ B 495
○ C 403

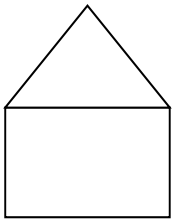
12. What is the name of this shape? _____



13. What shape is a basketball?

○ A triangle
○ B sphere
○ C cone

14. A simple house can be drawn like this:



What two shapes are put together to make this house?

○ A a triangle and a circle
○ B a triangle and a square
○ C a rectangle and a triangle

4 + 5 = ____

3 + 8 = ____

9 – 6 = ____

14 – 7 = ____

7 + 6 = _____

9 + 5 = _____

13 – 4 = ____

11 – 8 = ____

16	41	35	78
+7	+35	+25	+16

36	86	42
-12	-7	-27

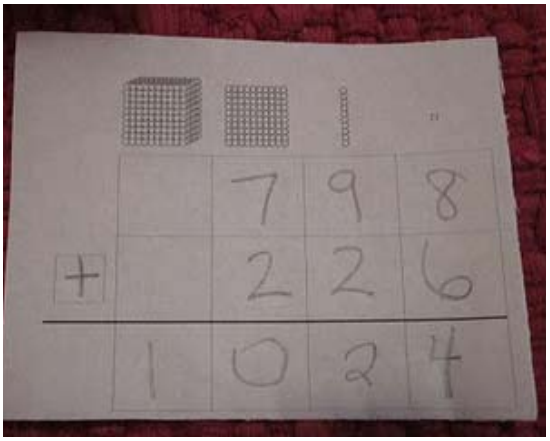
2nd Grade Critical Areas and Teaching Strategies

Read, write, compare and order numbers to 1000, based on place value

Simple CGI problems help students develop the notion of tens and ones: Erin puts flowers into bundles of ten. She has 3 bundles, and 5 single flowers. How many flowers does she have altogether? Or the hundreds version: Sweet & Yummy candy has 10 pieces in each bag. When they are made at the candy factory, 10 bags are placed in a carton for shipping, so there are 100 pieces of candy in each carton. Peter has 6 cartons of Sweet & Yummy candy for a school party, plus 3 more bags. How many pieces of candy is that?

Written numbers should always be used with word problems to show place value numeration: 35 represents the 3 bundles of ten and 5 singles. 630 represents six hundreds and 3 tens.

Models or manipulatives can be used to represent the base-ten system, including coffee stirrers bundled in 10s; unifix cubes snapped into a row of 10; and traditional base-ten blocks. Also, Montessori stacking place value cards and place value placemats are useful for visualizing and recording these concepts. (see photos below)



Add & subtract two-digit numbers

Students should be able to:

1) state all addition and subtraction facts quickly
2) solve the full range of CGI problem types for addition and subtraction, starting with problems that involve numbers within 20, moving to numbers within 100 (join, separate, compare, part-whole) – problem-solving includes using objects and pictures; developing strategies such as "tens and ones"; using formal algorithms eventually (C-R-A)
3) find distance between two numbers on a number line, as an extension of #2
4) decompose 100 into addition pairs, as another extension of #2
5) fluently add and subtract two-digit numbers, with and without regrouping
6) estimate the sum of two numbers with three digits

The simplest problem types (join, result unknown and separate, result unknown) are useful as tasks to begin the C-R-A approach. For example, *Jen has 26 pennies. Pete gives her 32 more pennies. How many pennies does Jen have now?* (Notice that the first problem is not one that requires regrouping.)

Step 1: Ask students to solve this problem any way they can, using mental math. Walk around the room while students are solving, noticing different solution approaches. Have several children show their solutions. Solutions will include modeling and counting with counters; counting up from 26 (or 32) using fingers or drawings; counting up by tens, then ones; adding tens separately from ones; etc.

Step 2: Record the problem using numbers and symbols, both horizontally and vertically. Talk about "lining up the tens and ones." Show how the solution of adding tens separately from ones translates into the formal algorithm.

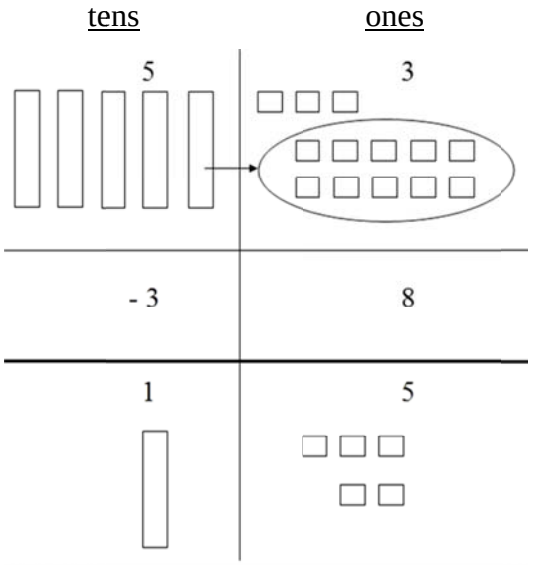
Step 3: Repeat with a problem that requires regrouping. Represent the problem using unifix cubes or bundles of 10 stirrers and single stirrers. Show the physical regrouping. Then translate what you did with objects into the formal algorithm.

Some students may benefit from writing "partial sums" rather than making the regrouping marks. And for some, it seems more natural to start at the left and move right (start with tens):

```
 26        348
+37       +172
 50        10
+13        110
 63        400
           520
```

Number line problems: Other problem types lend themselves to the learning targets about distance on the number line and decomposing 100. For example, *Zoe has 75 cents. She needs $1.00 to buy a book. How much more money does she need to have $1.00?* This is a "join, change unknown" problem, but it is typically solved by counting up from 75 to 100 – and using a number line makes this easy. Students are finding the distance between 75 and 100 when they do this. A similar problem uses a vertical number line to represent a thermometer: *Yesterday it was 82 degrees. Today it is 65 degrees. How much colder is it today than yesterday?* This is distance along the number line from 82 down to 65, a "comparison" problem. Students have developed many different strategies for solving this before they use a formal algorithm or a calculator. Allow students to share their strategies (and be amazed at how many there are!)

Subtraction with regrouping

Early strategies	Objects (Concrete manipulatives)	Pictures (Graphic representations)	Symbols (Abstract representations)
Start with a subtraction problem that does not involve regrouping. Allow the child to talk about it and try to solve it using any strategy. *There are 47 children on the playground. 24 go home. How many are left on the playground. Can you figure this out?* Children will use many different strategies to solve this. They may count down from 47, modeling the exact action in the problem. They may count back by tens (47… 37, 27) and then by ones (26, 25, 24, 23). Let them use counters to do this, or draw tick marks to keep track of their work, if they want. Ask them to record their work using numbers: 47 – 24 = 23.	If the child does not present a mental math solution, ask him or her to show the number of students who started on the playground (47) with unifix cubes in stacks of ten and ones on a base-ten placemat, then ask them to take away the number of students who went home (24). If they don't know how to do this, show them. Then try another and transfer the responsibility for doing it to them. Provide feedback as needed until the child can do this independently. Then pose a problem that requires regrouping, perhaps using the same context: *There are 53 children on the playground. 38 go home. How many are left on the playground. Can you figure this out?* As they try to use the same procedure, most will say "I can't take 8 away from 3." If needed, show them how to break apart a stack of 10 into 10 ones. Verbalize what you are doing: "How many are in this stack of ten?" (Ten.) Let's take apart the stack into 10 ones and place them in the ones column on the base ten placemat." As you regroup in this way, record the procedure symbolically. Then have the child take away 38 and count the answer. Have the child write the answer.	 Base-ten manipulatives for subtraction are available as a virtual manipulative at the National Library of Virtual Manipulatives, http://nlvm.usu.edu. Go to K-2, Number and Operation, then look for Base Blocks Subtraction. This is a good website for generating practice problems using these graphic representations.	Use symbols to record the moves that are made with objects/pictures, step by step: 4 13 ~~5~~3 -38 15 Then provide guided practice to students as they develop proficiency with this.

Problem set 1: Joining and separating, combinations up to 10+10

1-1 *6 birds were sitting in a tree. 4 more birds flew up to the tree. How many birds were there altogether in the tree?* Join, result unknown; direct modeling 6 + 4 = __

1-2 *6 birds were sitting in a tree. Some more fly up to the tree. Then there were 10 birds in the tree. How many more fly up to the tree?* Join, change unknown 6 + __ = 10

1-3 *Beth has 14 crayons. She gives 4 of them away to Jen. How many crayons does Beth have left?* Separate, result unknown 14 - 4 = __

1-4 Create your own: Separate, change unknown. 12 - __ = 7

Strategies children use to solve these problems start with **direct modeling** of the problem using counters. Then they move to **counting strategies** (counting on from the first number, counting on from the larger number, counting down, etc.). Then they use **derived facts** (e.g., to find 6 + 7, a child might say that 6 + 6 is 12, so one more is 13). Eventually they come to know the number combinations rapidly and accurately.

Problem set 2: Joining and separating, two-digit problems through 30

2-1 *Cindy's mom baked 15 cookies. Paul's dad baked 12 cookies. They both brought them to school for a party. How many cookies did they have altogether?*

2-2 *18 children were riding on the bus. At the bus stop, some more children got on the bus. Then there were 25 children altogether on the bus. How many children got on the bus at the bus stop?*

Problem set 3: "No action problems" – comparing, part-part-whole

3-1 *Maria has 15 baseball cards. Chuck has 9 baseball cards. How many more cards does Maria have?*

3-2 *Ten children were playing soccer. 6 were boys and the rest were girls. How many girls were playing soccer?*

Problem set 4: Building place value understanding

4-1 *Our class has 5 boxes of doughnuts. There are 10 doughnuts in each box. We also have 3 extra doughnuts. How many doughnuts do we have all together?*

4-2 *Jim picked 54 flowers. He put them into bunches with 10 flowers in each bunch. How many bunches of flowers did Jim make?*

4-3 *You have 2 boxes of crayons on your desk. Each box holds 10 crayons. You also have 4 more crayons. Your friend gives you 3 more boxes of crayons. How many crayons do you have altogether?* Join, result unknown. Strategy: counting by 10's.

Problem set 5: Multidigit addition and subtraction

Try these with manipulatives, experimenting with these strategies:

- Counting single units
- Direct modeling with tens (and hundreds)
- Invented algorithms – Incrementing strategy
- Invented algorithms – Combining tens and ones strategy
- Invented algorithms – Compensating strategies

5-1 *Misha has 34 dollars. How many dollars does she have to earn to have 47 dollars?*

5-2 *There were 28 girls and 35 boys on the playground at recess. How many children were there on the playground at recess?*

5-3 *There were 51 geese in the farmer's field. 28 of the geese flew away. How many geese were left in the field?*

5-4 *The elephant had 407 peanuts. She ate 129 of them. How many peanuts did the elephant have left?*

5-5 *There were 27 boys and 35 girls on the playground at recess. How many children were on the playground at recess?*

Todd: Let's see. 20 and 30, that's 50, and 7 more is 57. Then the 5. 57 and 3 is 60, and the 2 more from the 5 is 62. There were 62. (recall of number facts and derived facts)
Kisha: 20 [pause], 30, 40, 50 [pause], 57, 58, 59, 60, 61, 62. There were 62. (counting on)

5-6 *There were 58 geese and 37 ducks in the marsh. How many birds were in the marsh?*

Linda: 50 and 30, that's 80. Then 8 and 7, that's, ahh, 9, 10, 11, 12, 13, 14, 15. So it's 80 and 15 more. That's 90, 95. There were 95.
Juan: 5 and 3 is 8, that's 80. Then the 8 and the 7 ... um, 7 and 7 is 14, so 8 and 7 is 15. Okay, so now 15 and 80 is 95.

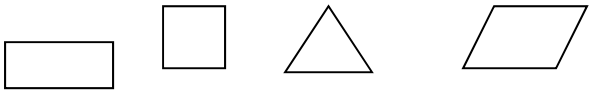
5-7 *Paul had 28 strawberries in his basket. He picked 35 more strawberries. How many strawberries did he have then?*

"30 and 35 would be 65. But it's 28, so it's 2 less. It's 63."

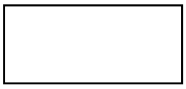
Identify, describe, compare 2-D & 3-D shapes based on sides, angles, faces; compose and decompose 2-D shapes

Example tasks:

Which of these are alike? Why?



Draw a square inside this rectangle.
What is the other shape that you formed?

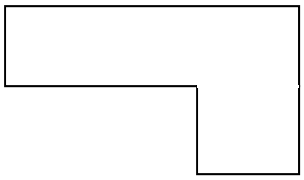


Draw a line in this rectangle from one corner to the opposite corner.
What shapes did you make?

What other shapes can you make by drawing one or two lines inside the rectangle?

Put these two triangles together to make a rectangle.

How many squares can you fit in this figure?



Measure, compare, add and subtract lengths; find perimeter of rectangles and triangles (not in CCSS)

Students should understand the idea behind measuring length, which is counting the number of units laid end-to-end that span the length. Units can be of different sizes, and at higher grades, fractions of units can be used. Typical units for measuring lengths in the classroom include inches, feet, yards and centimeters, meters. Non-standard units can also be used, such as the length of a pencil or paper clip, to develop the idea of laying the unit end-to-end to measure a length. Students should recognize that a ruler or meter stick is a convenient way to lay many units end-to-end at once and find a length without counting each unit (because the ruler or meter stick is marked to show how many units).

Adding, subtracting and comparing lengths is a useful set of activities for practicing addition and subtraction. Create some problems…

Fluency with Addition and Subtraction Facts – Teaching Strategy and Resources

1. **Assess what the student knows:** Find out which combinations the student knows already. Using the chart below, have each student fill in each combination, then cross off the ones he or she knowns. Focus on the unknown ones.

2. **Reinforce strategies they know:** Listen for any patterns or strategies they use as you quiz them on known combinations. Get them to verbalize any strategies they already use, such as doubles plus one or using combinations to ten as anchor numbers. Build on those strategies. Let

them know that it's good to use strategies, and that some students can use them as fast as if they had memorized the combination.

3. **Use well-structured problems to focus on concepts:** Provide lots of everyday problems, ones where the operation is obvious, that require the use of number combinations they don't know but that can build on ones they do know. This also ensures that they understand the concepts of addition and subtraction. Allow the use of drawings for figuring out these problems, but always have them write the number sentence to go with each one.

Examples:

1) Carey has 7 books. Her friends give her 4 more books for her birthday. Now how many books does Carey have?

2) 15 birds are sitting in a tree. 8 birds fly off. How many birds are left in the tree?

Create alternative versions of these problems that use the subtraction facts within the fact family as well as the addition fact. Ensure that students understand that addition combinations represent fact families that also include two related subtraction statements.

4. **Use representations** of addition and subtraction, such as ten frames and number lines. Sometimes new contexts or visual models trigger better memory storage.

5. **Introduce new strategies as needed**. It's better to have students show each other what strategies they use than for you to try to force students to use particular strategies. If you see a student using a strategy that you know others need to learn, have that student explain their thinking (always a good idea).

6. **Use fluency games and multiple real-world problems:** Have them play fluency games like the ones below. These provide practice in an agreeable way, and some encourage students to determine number combinations quickly (efficiently) because of the competition built into the game. Use many real-world problems to emphasize the relevance and need for being fluent.

Problem-solving Bingo, from *Zeroing in on Number and Operations*, Linda Dacey & Anne Collins

Teachers help students most by supporting a classroom atmosphere where their ideas and exchanges are respected and they have ample opportunities to develop their own solution strategies, which become more efficient over time. It is also important for students to solve lots of problems.

One teacher plays *Problem-Solving Bingo* about once a month. She identifies fifteen problems that represent a variety of addition and subtraction problem types and that have unique answers, and records one problem per file card. Then she distributes the recording sheet (see the *Problem-Solving Bingo* reproducible on page A18 of the appendix) and shows the students the fifteen answers. She directs the students to create their own bingo boards by randomly placing one answer in each empty cell and to write the word *free* in the remaining space. She shuffles the problem cards and reads one story at a time. Students place chips on answers as they solve the problems. The first student to get four in a row, column, or diagonal is the winner. As this usually occurs after less than half the problems have been read, they play again.

A possible set of story problems is provided in the *Problems for Bingo* reproducible page. Cut along the lines to use them for a bingo game. The answers are each of the numbers from one to fifteen.

Games for mastering addition and subtraction facts

- Calculator and Me: Addition - In pairs, students each draw a card from a deck of playing cards (1-10). One student uses a calculator and the other uses addition strategies to race and find the sum of the numbers on the cards.
- Subtraction Compare-It - Use the cards or dice to generate subtraction problems. The player with the largest difference wins the round.
- Placing Digits - Students use a deck of cards (0-9). Each player draws two cards and arranges them to make the largest possible number. The player with the largest number takes all four cards.
- Compare-It Dots - Use a set of double-nine dominoes. Place the dominoes face down on the playing surface. Each player turns over a domino and calls out the sum of the dots on the two halves. The winner of a round takes all the dominoes in play.
- Somewhere on the Number Line - Students try to guess the mystery number. Directions:
    1) One player chooses a number as the mystery number, for example 5, and says *I am thinking of a number between 1 and 9. What's my number?*
    2) The leader calls on someone to make a guess. For example: This player guesses 7. The leader says *No, my number is less than 7.* Then the leader moves the right penny to cover the 7.
    3) The leader calls on someone else to make a guess. For example: Someone guesses 4. *No, my number is larger than 4.* Then the left penny is moved to cover the four.
    4) Players continue to guess. Eventually, the mystery number will be "squeezed" between the two pennies. The player who guesses the mystery number becomes the next leader.
- Compare-It dice - Students use six sided dice to add the sums shown and take a counter if their sum is the greatest. Player with the most counters at the end of a given time period wins. Polyhedra dice can be used to add variety in the sums.

Fill out the addition chart below, then circle the number combinations that are hard for you to remember.

+	2	3	4	5	6	7	8	9	10
2	4								
3									
4									
5									
6									
7									
8									
9									
10									

Write a strategy or clue for remembering each combination that is hard for you.

Some strategies for adding

sums to 5	If you know the sums to 5, like 3+2, you can find other sums like 3+4, because 3+4 = 3+2 plus 2 more
sums to 10	If you know that 6+4 = 10, then you can figure out 6+5, because it's 1 more than 6+4
doubles plus one (or minus one)	6+7 = (6+6) + 1 more 6+7 = (7+7) – 1
doubles plus two (or minus two)	7+9 = (7+7) + 2 more 7+9 = (9+9) – 2
nines	Add ten then subtract 1