Supporting your child's math learning

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Tonight I will address

- How the teaching of math has and has not changed
- Things you can do to support your child's math learning
- There will certainly be time for questions throughout or at the end.

There are 5 strands

- Number
- Geometry
- Measurement
- Pattern and Algebra
- Data and Probability

Most of you…

- are most concerned about number, so I will start there.

Working with numbers

- The way we approach the learning of “facts” and the learning of procedures has changed in some ways, but not other ways.
- We will discuss both the how and the why.

Facts first

- Facts are things like 4 + 8 = 12 or 7 x 4 = 28 or

  12 – 3 = 9 or 40 ÷ 5 = 8.

- They involve small numbers.

- Facts remain important because they are fundamental both to estimation and any other calculations.

We used to believe…

- The best way to learn facts is to sit down and memorize them by saying them over and over.
- And that being super fast with them is really important.

Now we realize…

- That you are ahead of the game if you have tools to recall something you have memorized but may forget.
- We call these strategies.

An added benefit..

- The strategies we use to help kids recall facts also are useful in other computations.

There is now research that shows…

- That even though some kids memorize well..
- for kids who are anxious about math or get nervous having to be quick, old strategies doom them to failure.
- Brain research shows that when you are anxious, it is short term memory that is impacted and that is where facts are stored. (Sian Bellock)
- We need to approach fact learning in different ways for different kids.

So we teach principles and strategies

- For example, since 4 combined with 5 is the same as 5 combined with 4, we only have to learn half the addition facts.

So we teach principles and strategies

- For example, since 8 combined with 3 is the same 8 + 2 + 1, it's really 10 + 1

O	O	O	O	O
O	O	O	X	X

X				

So we teach principles and strategies

- For some reason, we learn doubles quickly, so kids can relate 3 + 4 to (3 + 3) + 1 or (4 + 4) – 1.

- Or 7 + 8 to (7 + 7) + 1 or (8 + 8) – 1.

So we teach principles and strategies

- For example, since 4 groups of 5 can be viewed as 5 groups of 4, we only need to memorize half the multiplication facts.

o o o o o

o o o o o

o o o o o

o o o o o

So we teach principles and strategies

- For example, since 4 groups of 7 can be viewed as 4 groups of 5 with 4 groups of 2, we know the 7 x table if we can learn the 5 x and 2 x tables.

o	o	o	o	o	x	x
o	o	o	o	o	x	x
o	o	o	o	o	x	x
o	o	o	o	o	x	x

Many of these principles can be..

- Seen on addition and multiplication tables
- visualized using manipulatives

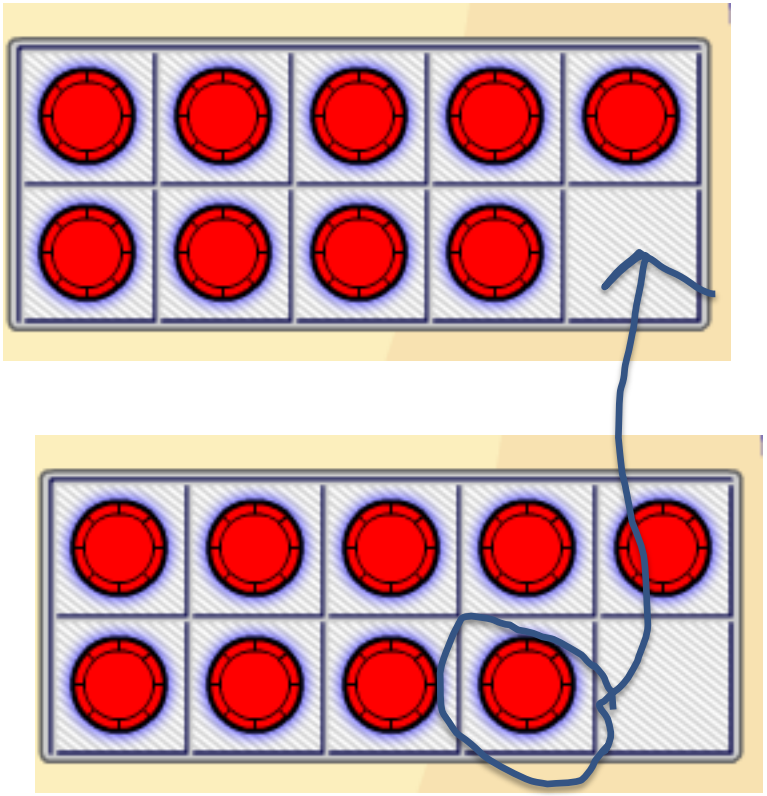
+	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Math tools

- 10-frames



It's easy to see why 9 + 9 = 10 + 8 (18).
Just move one counter up.

Accessing virtual manipulatives

- There are tools for materials your children use in class freely available on line.
- Many are also available as apps.

Pattern Blocks

- http://nlvm.usu.edu/en/nav/frames_asid_169_g_1_t_2.html?open=activities

Hundreds chart

- http://nlvm.usu.edu/en/nav/category_g_2_t_1.html

Base ten blocks

- http://nlvm.usu.edu/en/nav/category_g_2_t_1.html

Geometric shapes

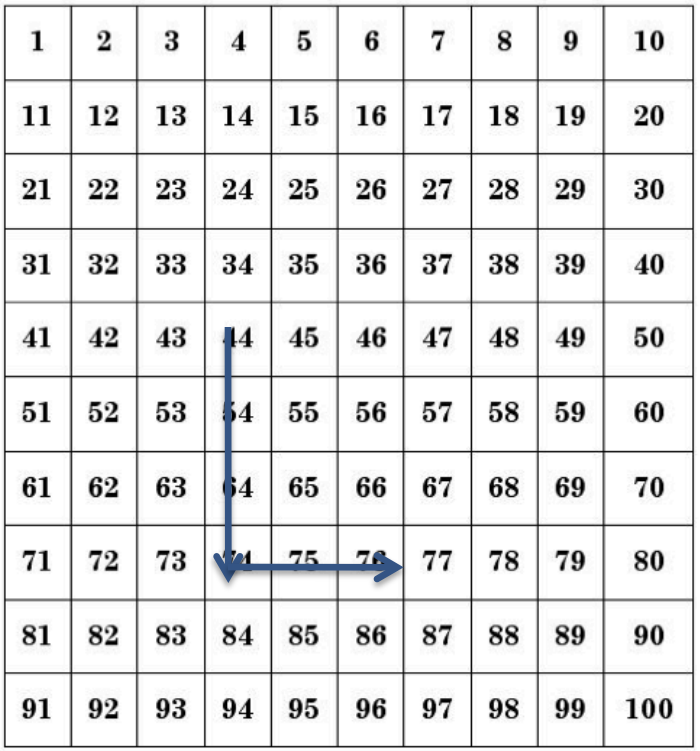
- http://illuminations.nctm.org/Activity.aspx?id=3521

What about computing with 2-digit or larger numbers

- There is increasingly more focus on estimation and more focus on calculation using strategies, often mentally

Adding on a 100 chart

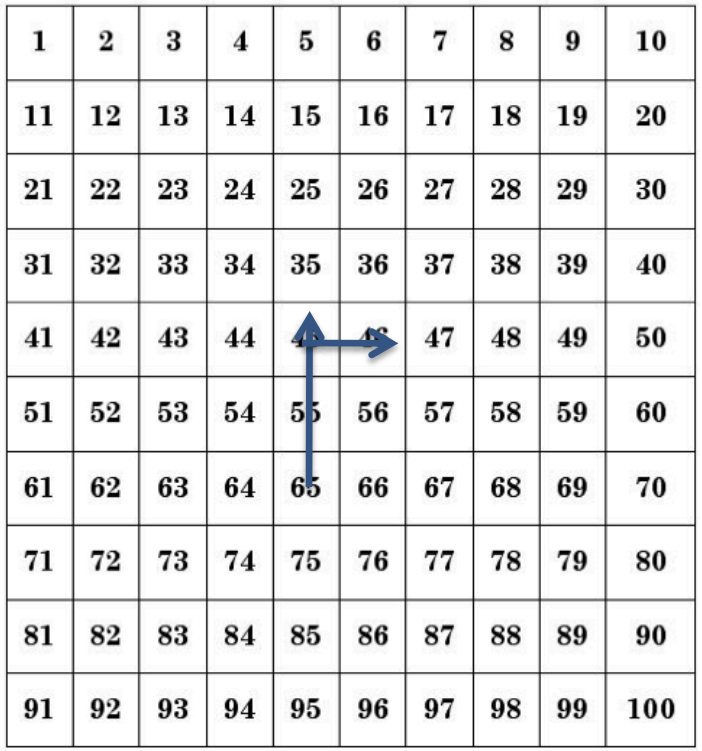
44 + 32



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Subtracting on a 100 chart

65 - 19



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Alternative strategies that might seem new

- How would you calculate 342 – 121?
- Would you do 200 – 2 the same way?

- Children are learning different strategies since different ones are more efficient or more meaningful in different situations AND
- Different ones make more sense to different kids.

For example

- It is reasonable and correct to add like this:

$$\begin{array}{r} 38 \\ +\ 47 \\ \hline 70 \\ +15 \\ \hline 85 \end{array}$$

For example

- It is reasonable and correct to add like this:

$$\begin{array}{r} 38 \\ +\ 47 \\ \hline \end{array}$$

$$= 38 + 50 - 3 = 88 - 3 = 85$$

Or subtract like this…

- 100 = 99 + 1

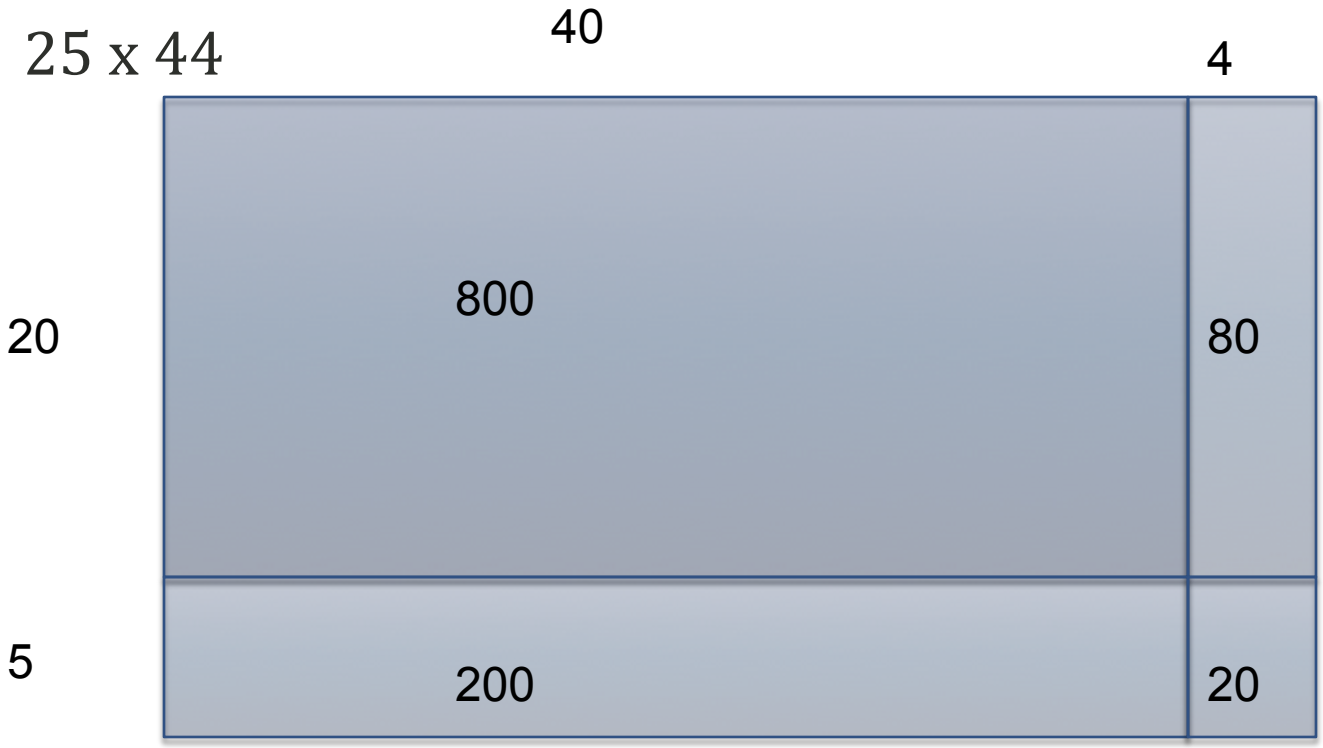
  - 79 - 79

  20 + 1 = 21

Strategies also are useful in multiplying

- For example:

- 25 x 44



Also division

- How many packages of 8 cookies if there are 348 cookies to package?

8	348	
	- 80	10
	268	
	-160	20
	108	
	- 80	10
	28	
	- 24	3
	4	43

Attention to estimation

- In the world toward which we are moving, technology will be regularly used to calculate, but we still need to estimate to see if those answers make sense.

Attention to estimation

- Is 42 + 58 + 91 closer to 100, 150 or 200? Why?
- About how much is 4213 – 3314?
- Why is 29 x 42 close to 1200?

Other strands

- Algebra work earlier, particularly things like:

  $4 + [] = 5 + 8$

Teaching through problem solving

- This is a better description of what we do than "discovery".
- It means that as we solve a problem, we clarify a lot of ideas.

I might ask…

- I bought something and gave the clerk $10.
- She gave me back one bill and 4 coins.
- How much might the item have cost?

Lots of thinking

- Realizing that the bill has to be $5.
- Realizing that the coins, these days, have to be nickels, dimes, quarters, loonies or toonies.
- Getting lots and lots of practice trying lots and lots of combinations.
- Realizing that the price + the change = $10

What can you do?

- Our big question as parents is what we can do to help our child.

Number Play

Lots of children respond well to “magic”.

For example:

- Choose a number.
- Double it.
- Add 4.
- Double that.
- Add 8.
- Divide by 4.

Tell me your answer and I will guess your number.

How did I make that up?

- Choose a number. 
- Double it. 
- Add 4.  + 4
- Double that.  + 8
- Add 8.  + 16
- Divide by 4.

 +4

How many….?

- Spoons in the drawer?
- Steps to get downstairs?
- Trees on the street?
- Sections in an orange?
- Windows in the house?

Interesting Questions

- Ask little questions in passing.
- e.g. The answer is 10. What is the question?

- If McDonalds's sells McNuggets in packs of 6, 9 and 20, can you buy exactly 25 McNuggets?

Support involves…

- Not showing, but probing.
- Asking why this or why that…
- Building connections

Games

- You could play games where you make up the rules or use existing games to practise skills.

Games to Play

- 2 players
- Each rolls two dice. The score is the sum.
- The first player to get to 100 wins.

Games to Play

- 2 players
- Each rolls two dice. The score is 2 x one value + the other.
- The first player to get to 100 wins.

Board games

- **24**

Box cars and one eyed jacks

- http://www.boxcarsandoneeyedjacks.com/

You could solve interesting problems

How much is your name worth?

A	B	C	D	E	F	G	H	I
1	2	3	4	5	6	7	8	9
J	K	L	M	N	O	P	Q	R
10	11	12	13	14	15	16	17	18
S	T	U	V	W	X	Y	Z	
19	20	21	22	23	24	25	26	

What words are worth 40 – 50?

A	B	C	D	E	F	G	H	I
1	2	3	4	5	6	7	8	9
J	K	L	M	N	O	P	Q	R
10	11	12	13	14	15	16	17	18
S	T	U	V	W	X	Y	Z	
19	20	21	22	23	24	25	26	

Figure this

- http://www.figurethis.org

What is success?

- Not just a mark
- Enjoying the math
- Making sense of the world using math
- Building connections

You need to…

- Encourage kids to "teach you" what they learned or explain their thinking to you.

You need to…

- Show that you enjoy math too.
- Show confidence- believe that they can if you give them the tim.
- Emphasize good thinking, not speed.
- Emphasize the good thinking, not the mistakes.

You might have questions

You can download at

- www.onetwoinfinity.ca
- Parents