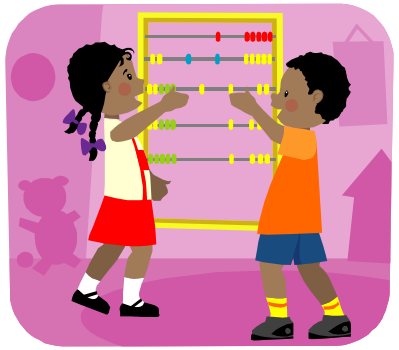
Awesome Addition and Strategic Subtraction!



Created by Jeannie DeBoice

based on John Van de Walle's book,
"Teaching Student-Centered Mathematics"

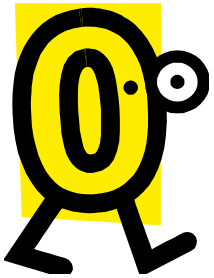
Before you begin to teach Basic Facts...

- It is critical that you always introduce a new concept (addition, subtractions) through a *real-life* problem.
- Work through several real-life problems involving the concept with as much real-life materials as you can.
- Then, to consolidate these concepts, begin to work with ten-frames (or other manips.)
- Finally, and most importantly, a child **must** stay at the concrete level until they show they are **ready** to move on to the cards with icons.

How will I know when they're ready???

What to look for/how to check...
(best done one-on-one)

- Child is using the counters, but is answering without moving them (i.e., build 8 & 5, but answers '13' without moving 2 counters over to the 8 to make a ten.)
- Try using the cards and see how she does. If she struggles at all, bring out the ten-frame saying, "Your brain just needs more time building it." (May use cards & real ten-frames together.)
- Have child close his eyes to visualize the ten-frame and 'move counters in his mind'.



Addition Strategies:
+0/0+

- Start with a **real-life problem:** “Mom gives you 5 cookies and then she gives you **no** more. How many do you have?” *(For some children, this is a hard concept!)*
- Build numbers 1 – 20 on a double ten-frame. Ask, “How much is ___ and 0?”
- Record 10+0 = 10 and 10 = 10 +0
- Write the equations

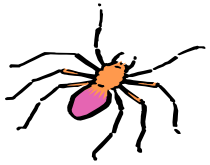
9 + 0 = ___ and

0 + 6 = ___ & have them solve it on the double ten-frame.

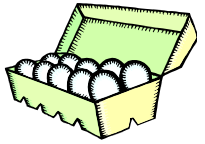
- *Help them come to the generalization that +0 doesn’t change the number.*

+1/+2

- Start with a **real-life** problem: “You have 5 cookies and Mom gives you 1 more. How many do you have?” **AND** “You have 1 cookie and Mom gives you 5 more.
- Build numbers 1 – 20 on a double ten-frame, say 8 in one colour, adding 1 in another colour.
- Ask: “How much is 8 and 1?” Write 8+1=9 and 9=8+1
- Remind them how this connects to ‘1 more than’
- *Move to icon cards when you see that they are beginning to answer before adding the counter in.*
- *When full mastery of +1/1+ is shown, start again with +2/2+*



Doubles



Use a G'Nizer:

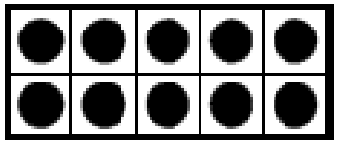
- Build 5 in each of the two small sections.
- Ask students to push both 5's up. "How much is there all together?"
- Ask: "How do you know without counting?"
- "What in our world is 5 & 5?" *(our fingers!)*
- Collect objects representing doubles and put them up on a bulletin board with the addition equations on strips beside each item.
- Connect the objects (e.g., egg carton, spider) to the icons on the cards and say:

"6+6 is the 'egg carton double' – how much is 6 + 6?"

*The idea is to get them to visualize or even go over to the real thing…**not** to count the eggs in the picture!*

Always relate back to the bulletin board of Doubles in your classroom.

+10/10+



- Use double ten-frames and 2-coloured counters.
- Have students build 10 on the top ten-frame in one colour and 5 on the bottom ten-frame in another colour.
- Record ’10 and 5 is __’
- Ask: “How many is 10 and 5?”
- Watch: some may just know, some may count **on** and some may count **all.**

Our aim is to help kids see the *pattern* - not count.

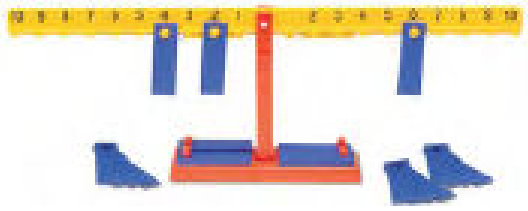
- Do this for about 5 equations, the stop and ask: ”Do you see a pattern?” Circle the ‘+5’ and the ‘5’ in 15.
- Repeat for 5 more equations, but this time put 10 on the bottom frame & write

  ‘8+10= __’
- Redo this lesson another day, doing all the equations **in order** from +1 to +9

+9/+8

Note: do +9 lesson first. Later do +8 lesson.

- Use a double ten-frame.
- Build 9 with one colour and 6 with another colour.
- Say: “6+9 isn’t very *friendly*. Which number is really close to 10? Can we make 9+6 more *friendly*? (**TIP: Have students put the rest of their counters *away* – otherwise, some may dip into the pot for a counter, making the 9 into a 10 but changing the value of the equation!)**
- Most will take one from the 6 to make the 9 into a 10.
- **Using 2 colours really shows how 9+6 = 10+5*
- *Record 9+6 = 10+5 on the board and ask: Is this true? Can we write this?*
- Show this equation on a ‘number scale’ to ‘prove’ the equality (also covering the algebra outcome!)



Doubles +1

+1

- Have students lay out 6 yellow counters while you do the same on the Overhead.
- Have them arrange them into 2 parts *symmetrically*
- Ask: ”How much? What double is this?”
- Turn off the overhead and add 1 red to one the groups of 3.
- Click the overhead on and say: “Can you still see the double? How can we figure out how much there is now **without counting?**”
- Have them show 3 + 4 in the same way, with 1 red counter added to the double 3.

3 + 3 = 6
So 3 + 4 = **7**

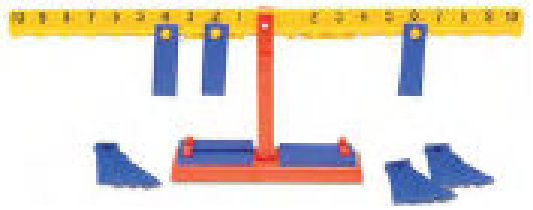
3+4

2-apart Doubles

- Have students lay out a group of 3 and a groups of 5 in the same colour side by side.
- Ask: “How far apart are these numbers?”
- *May help to look on a number line to see that they are **2 apart.***
- Say: “When we add 2-apart numbers, there is a double hiding *between* these 2 numbers.”

- Have children (and you model on overhead) move one from the larger set and give it to the smaller set.
- Ask: “What double is that?”
- Write 3 + 5 = 4 + 4

Showing it of the number scale can reinforce this idea:

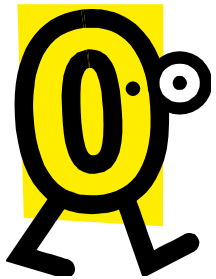


Strategy Selection Practice

- Once a child has shown mastery of these strategies, they need to practice *retrieving* them. Otherwise, they won't use them automatically.
- Children us the *Strategy Selection Boards* in pairs. They shuffle the 'test cards' and turn one over.
- First they tell which strategy they'd use to solve the addition, then they place the card in that solve and solve it.

Subtraction Strategies: -0/=0

- Start with a **real-life problem**: “You have 5 cookies and you give **zero** to your sister. Now how many do you have?” (For some children, this is a hard concept!)
- Build numbers 1-20 on a double ten-frame. Ask: “How much is ___take away 0?”
- Write 10-0 = 10 and 10= 10-0



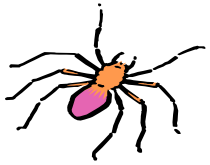
- *Help them come to the generalization that -0 doesn’t change the number.*
- For **=0**, start with 1-20 on the ten-frame, then create a story where all are subtracted. “How many have we got left?”
- Finally, write the equations 9-0=__ and
- 9-9=__ on the board. Students solve on the ten-frame.

 -1/-2 

- Start with a **real-life** problem: “You have 5 cookies and you give your sister 1. How many do you have now?”
- Build numbers 1-20 on a double ten-frame. Ask: “How much is __ take away 1?” Write 10-1=9
- Remind them how this connects to ‘1 less than’.

- *Move to icon cards when you see evidence that they are beginning to answer before moving the counter **away**.*
- When full mastery of -1 is shown using the symbol cards, start again with -2.

*Some children will do this easily, while others will need a longer time with manips – hence the need to **individualize.**

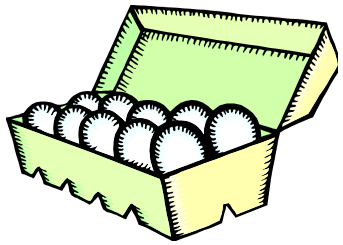


Subtraction Doubles

Use a G'Nizer:

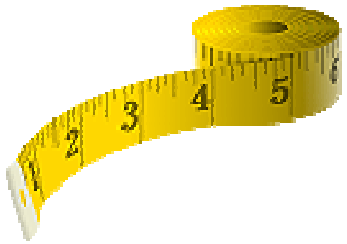
- Build 6 & 6 in 2 different colours on G'Nizer.
- Turn it so 12 (in the large section) is across the top.
- Have students show 12-6 by pulling 6 down into one section. Ask: "How much is left?" "How do you know that without counting?"

- Connect this to the Doubles icon of the egg carton and say: "An egg carton has 12 eggs. What if 6 were gone? How many are left? How do you know?"



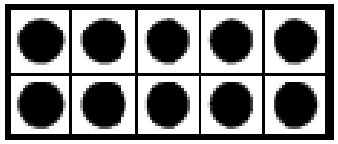
- Continue with other Doubles.

1 & 2 apart



- This is a great time to introduce the *other* concept of subtraction as *difference.*
- Have student build 10 on their ten-frame.
- Say: I had 10 cookies and gave my sister 9. How many are left? What's the *difference?*"
- Record "10-9" on the board. Have them solve on the ten-frame.
- Now say: I had 10 stuffies. My sister had 9. What's the difference between my number of stuffies and hers?"
- Ask: *"How far apart are 10 & 9?"*
- Make the connection between the ten-frame and the number line (ex. 10-9=1 and 10 & 9 are *one apart* one the number line.)
- In a later lesson, repeat for 2-apart.

Parts of 10
-10/=10



Parts of 10:

- You will have done ‘re-naming’ ten on the G’Nizer. Review this first with the students. (“Show me 10 is 1 & 9, 2 & 8…”)

TIP: *Set G’Nizer up with counters in 2 rows of 5 – like a ten-frame!*

- Relate these ideas to the ten-frame by building 10, then ask: “What is 10-4? What’s the other part of 10?”

-10/=10

- Have students build a teen number (14) on a double ten-frame.
- Record on the board.
- Now add “-10 = ___” and ask: “What’s the quickest, easiest way to take off 10?” *Most will wipe off the ten-frame.*
- Do all the teens minus 10.
- Now write ’14-4=__’ and ask: “What’s the quickest, easiest way to take off 4?”
- Do all the teens minus a single digit.

-9/-8

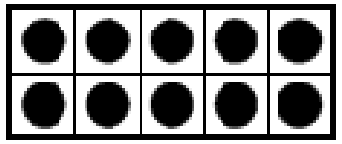
(**Note:** Do -9 lesson first. Do -8 in a later lesson.)

- Have students use a double ten-frame while you build on overhead.
- Have them build a teen number (14).
- Ask: “What’s the quickest, easiest way to take off 9?” (8?)
- Have students discuss their strategy with a partner. See if partner did it the same was they did.

Be prepared for at least 2 different ways:

- **Some** will take off 9 (8) right out of the full ten-frame.
- **Others** will clear off the smaller frame (4) then take the rest (5) from the full ten-frame.
- Scribe both ways on chart paper to keep for reference.

Back down thru 10



- Use a double ten-frame.
- Have students build a teen number between 11 and 16. (say 14)
- Ask: “What’s the quickest, easiest way to take off **5**?”
- Have students discuss with a partner to check who does it the same as they did.
- Do the others (*see underlined facts of the assessment sheet.)*

Be prepared for at least 2 different ways:

- Some will take off all of the lower frame (4) and one more from the 10.
- Others will take the 5 right out of the full ten-frame.

For the most part, the more straight forward way is the first one.

- Scribe both (all!) ways on a chart to keep for reference.

Strategy Selection Practice

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- Children us the *Strategy Selection Boards* in pairs. They shuffle the 'test cards' and turn one over.
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