

# Learning the Basic **Addition** and **Subtraction** Facts

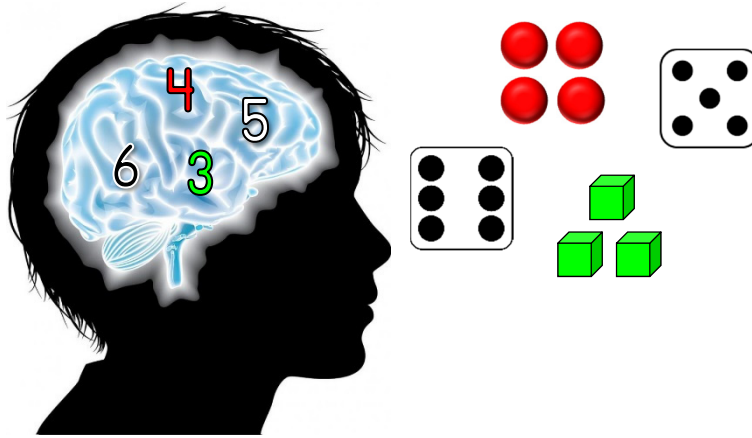
Personalization and Assessment Strategies for Teachers, Teaching Assistants and Parents

## A QUICK GUIDE

Students need to be able to count to ten if they are going to learn how to **add** and **subtract**. If a student is having trouble counting to ten, there are several diagnostic ideas that may help the teacher (parent or teaching assistant) guide the student. Please read *pages 7-10* of the *Planning to Learn the Basic Facts* chapter.



**Subitizing** (visually associating a specific set of objects with a specific number and numeral without counting) is possible because the **brain is designed to see patterns**.



When objects are arranged in a line or simply counted, it makes amounts over three more difficult to remember. Most of us can subitize three objects arranged in a triangle, four objects arranged in a square, five if the fifth object is inside the square (dice), six as two threes (dice). This is especially true if we have played games with dice or dominoes. **Numbers greater than six are more difficult** and this is one of the reasons that many authors advocate the use of ten-frames (Power of Ten™ cards).

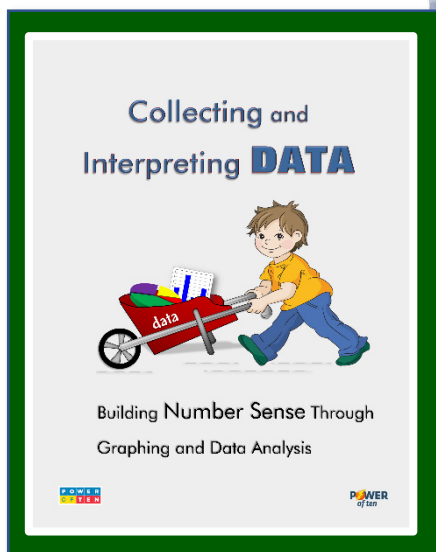
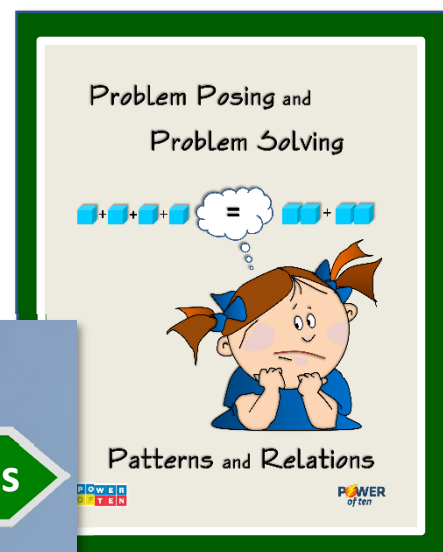
Once a student can subitize to ten, he/she is probably able to learn how to add, even if he/she cannot associate numerals with the correct number yet. (See pages 26-37)

**Patterning, problem-solving** and **meaning** are intricately related and the **key to learning the basic adding and subtracting facts**, first to ten (referred to in this manual as *Fact Families to 10 – page 26*) and then to eighteen.

**Good problem solvers** (pages 19-22) use ‘**Multiple Strategies**’ when they ‘**Get Stuck**’ because **strategies have hope**. When the addition and subtraction facts are learned using strategies, the strategies often transfer to learning multi-digit addition and subtraction and even to algebra (using strategies other than counting). **Beware of rulers; use them cautiously because they can foster a counting habit.**

# Teachers should foster a habit of putting numbers in a context of meaning.

**Story problems** are excellent for creating meaning, especially when students write the stories (see *Problem Solving and Problem Posing*).



Students who **collect data** and learn to organize the data into charts, tables and graphs learn early that **numbers are a powerful tool for understanding the world around us** (see *Collecting and Using Data* chapter).

**Games** are a powerful tool for learning how important numbers are in life. Students whose families play dice and card games for fun often find mathematics inherently meaningful (see *Games* chapter).

See the **free** download “A Quick Guide – Assessment Evaluation and Reporting Using the All the Facts/Fact Families Sheets” (pages 5, 6, 7).

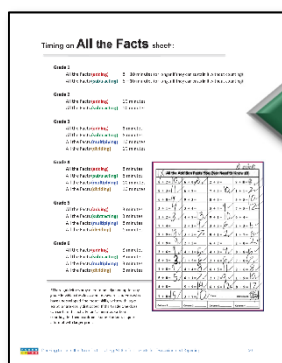


## Modelling is a very powerful tool.

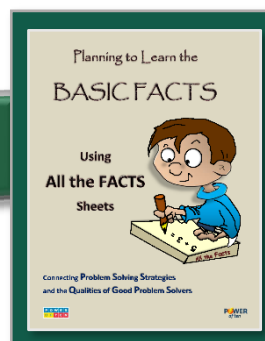
Teachers need to **create the conditions for the students to see patterns** that they **can connect to learning the facts** (e.g. adding 1, fact families, doubles, in  $9 + 6$  break it up so  $9 + 1 + 5$  makes it simpler). The patterns are then transferable to learning multi-digit operations and algebra. Teachers should try to model how to solve a problem rather than simply showing students how to do a math fact. Teachers rarely say, *“Let me show you how to read that!”* and they should avoid it in mathematics as well.



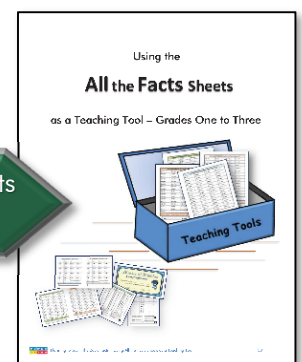
Teachers can model problem solving by doing an *All the Facts* sheet. Students should be given a limited time, about ten minutes to start (*see page 60 of the Planning to Learn the Basic Facts chapter*) depending on their writing speed. Students should not compete to see who can finish first; they should help each other reach the goal of learning all their facts. **Timed tests often create fear**; they are a major contributor to math anxiety in a significant percentage of the population. Students should **learn to scan** the sheet for questions they find easy and leave out difficult questions. They should **avoid counting strategies** and teachers should remove rulers and manipulatives from student desks. For a complete outline of how to introduce a *Fact Families* or *All the Facts* sheet, *see pages 39-68*.



Timing an All the Facts sheet (page 60)

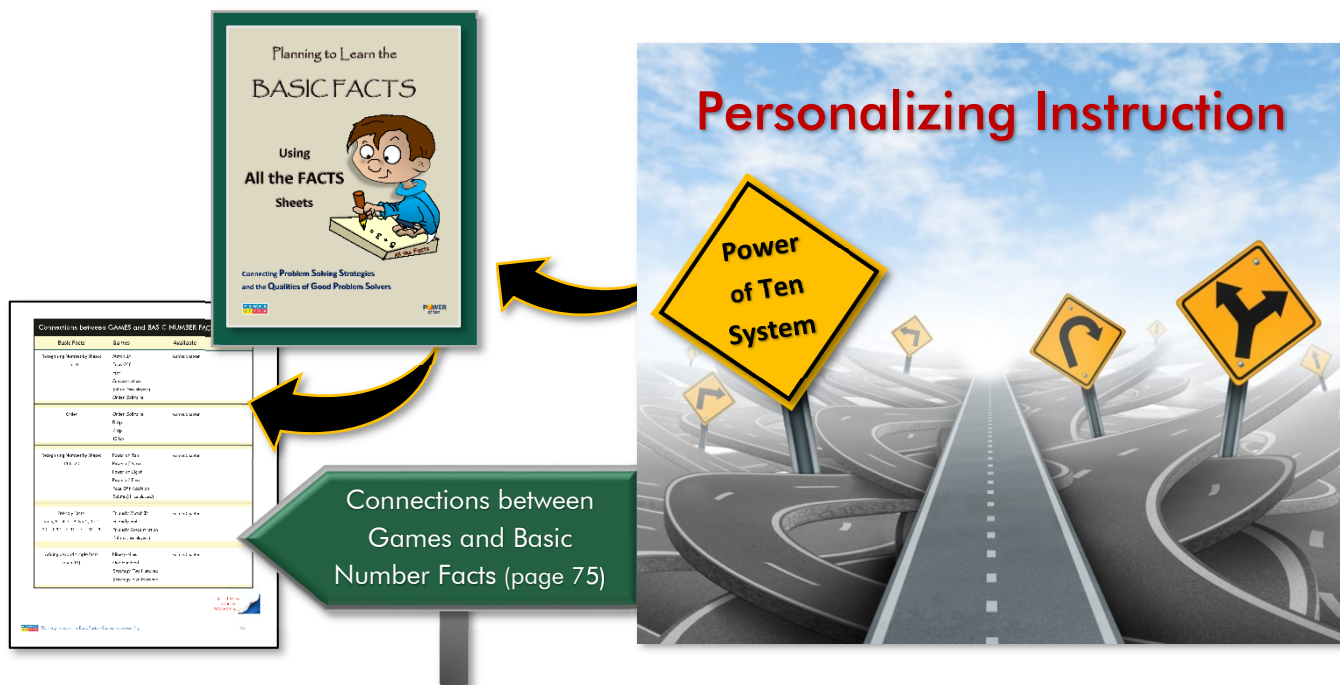


Using the All the Facts sheets (pages 39-68)





The **Power of Ten System** was created as a partial solution to the problem of **personalizing instruction**. Assigning different games to **GUIDED MATH GROUPS** (*page 75*) based on each student's progress on an *All the Facts sheet* is a good tool for diversifying instruction.



The circle illustrates how using the *All the Facts sheet* correctly covers the major philosophy of the **Power of Ten System** (**Meaning, Choice, Diversity, Trust, Learning Over Time**) and then connects to most of the curricular outcomes/expectations (**learning patterns, number sense, problem solving, data sense**). Imagine rotating either the inner ring or the outer ring and it is possible to see how everything is connected.

