

Complexity of numbers / efficiency of strategies

# Division: progression of strategies over time

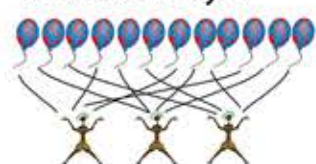
up to 100

up to 20

up to 10

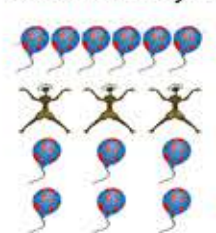
**Primitive strategies**  
Drawings replace direct modelling  
in order to solve problems.  
"Make a plan" drawings, not art class!

12 divided by 3

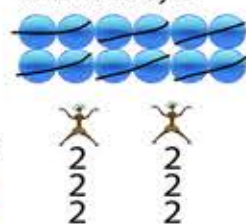


Drawings are initially elaborate and detailed  
(when working with small number ranges)

6 divided by 3



12 divided by 2



51 divided by 3

10	10	10	30
5	5	5	15
2	2	2	6
17 each			51

91 divided by 7

Repeated subtraction, for example  
 $91 - 7 \rightarrow 84 - 7 \rightarrow 77 - 7 \rightarrow 70$   
 $- 7 \rightarrow 63 - 7 \rightarrow 56 - 7 \rightarrow 49$  etc

91 divided by 7

Using doubling, for example  
 $7 + 7 = 14$   
 $14 + 14 = 28$   
 $28 + 28 = 56 + 14 \rightarrow 70 + 14 \rightarrow 84 + 7 \rightarrow 91$   
 $4 + 4 + 2 + 2 + 1 = 13$

Problems use bigger numbers to provoke (encourage)  
more efficient drawings and ways to solve the problem

The items being shared / grouped  
are no longer visible

**Increasingly efficient strategies**  
Numerical methods / strategies used  
to solve the problem but  
not the long division algorithm

108 divided by 9

Using inverse relationship of multiplication, for example  
 $10 \times 9 = 90$   
 $2 \times 9 = 18$   
 $90 + 18 = 108$   
 $10 + 2 = 12$

185 divided by 12

😊  
 $10 \times 12 = 120$   
 $5 \times 12 = 60$   
 $15 \times 12 = 180$   
 $185 - 180 = 5$   
 $180r5$

853 divided by 23

Prelude to long division, for example  
 $853$   
 $\begin{array}{r} 230 \text{ (10)} \\ 623 \\ \hline 460 \text{ (20)} \\ 163 \\ 115 \text{ (5)} \\ \hline 48 \\ 46 \text{ (2)} \\ \hline 12 \text{ (37)} \\ 37r12 \end{array}$

Increasing compression over time

533  
683  
7  
SA  
NUMERACY  
CHAIR  
PROJECT

Direct modelling with concrete items such as stones, counters etc.  
Often followed by drawing a record of how they did it  
(even before children know number names and symbols they can solve problems in this way)