Multiplication & Division Strategies

Flexibility of Multiplication Strategies

The following are called ‘Cluster Problems’ and they encourage students use facts that they know or can easily work out in order to find the answers to more difficult problems. Students are encouraged to initially solve the top problems and use some or all of these answers to solve the bold problem at the bottom. As always, make sure you discuss the strategies your child used.

10 x 18	400 x 9	2 x 72
5 x 18	500 x 9	10 x 72
50 x 18	90 x 9	5 x 72
2 x 18	8 x 9	20 x 72
20 x 18	2 x 9	200 x 72
40 x 18	**498 x 9**	210 x 72
45 x 18		**215 x 72**
47 x 18		

Division

Division can be easier than multiplication. Again, traditional algorithms used to solve division problems can be mysterious to children and be a source of errors for many.

There are two concepts for division:

1. *The fair-sharing or partitioning concept*

For example:

A bag has 783 jellybeans and Aidan and her four friends want to share them equally. How many jellybeans will Aidan and each of her friends get?

2. *The measurement or repeated subtraction concept.*

For example:

Jumbo the elephant’s trainer has 625 peanuts. If he gives Jumbo 20 peanuts each day, how many days will the peanuts last?

Strategies for Solving Division Problem

1. *143 jellybeans shared with 8 kids*

Try 14 x 8 = 112

“I know that there is more than 1 more group of 8 jellybeans left”

Try 16 x 8 = 128

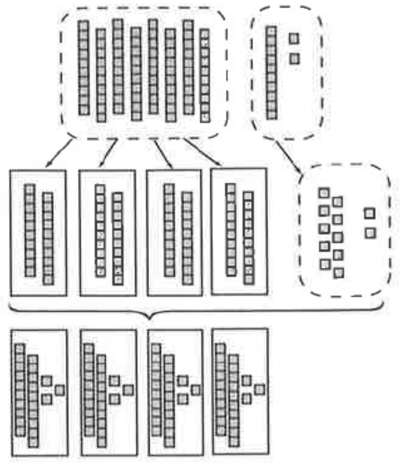
“I can see there is 15 jellybeans left over and I know that I can only take one group of 8 jellybeans from 15”

17 x 8 = 136; there’s 7 jellybeans left over.

“Each kid receives 17 jellybeans and there’ll be 7 left over”

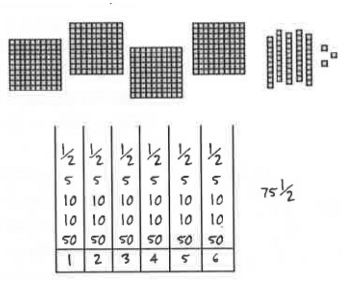
2. 92 ÷ 4

This is solved using MAB blocks. The tens are shared and there is one left over. This is added to the ones and they are then shared.



3. 453 ÷ 6 (share with 6 kids)

A similar approach. You share the hundreds, then the tends, then the ones. It is similar to a traditional division algorithm.



Flexibility of Division Strategies

As for multiplication, Cluster Problems . This is where children use facts they know to find the answer to more difficult questions.

For example, **82 ÷ 6**

Ask your child “What number x 6 is close to 82?”

10 x 6 = 60

12 x 6 = 72

82-72 = 10

Answer is 13 with 4 remaining

Millars Well PS

Multiplication and Division

Helping My Child At Home

Lee Pereira & Erin Smith, 2014

Why isn't my child stacking their multiplication sums?

With today's smart phones and other digital technologies, there is no longer a great need to solve large sums using traditional pen and paper methods. There are also many alternative strategies in which students can solve sums mentally without digital devices.

Usually, mental calculation strategies are easier, faster and can often be used without the need for working out.

Although traditional algorithms work, they can take time to solve and students often make errors as they do not have a deep understanding of the mathematics behind them.

Invented Strategies vs Traditional Algorithms

- Invented strategies are based on place value understandings rather than looking at digits in isolation. Looking at an entire number enables students to identify the easiest and most efficient strategy to use.

  For example, ***7 x 68***
  An efficient mental calculation might be:
  7 x 60 = 420;
  7 x 8 = 56;
  420 + 56 = 476.

  Traditional algorithms encourage students to multiply 7 x 6 rather than 7 x 60. This does not encourage children to develop a deep understanding of the math required to solve the problem.

- Invented strategies allow children to think flexibly about their mathematics. They can draw on a number of ways to solve a problem rather than traditional algorithms which can be quite rigid.

- Invented strategies are built on student understanding, rather than 'rules' or 'steps' to remember. Students can develop repeated errors with traditional methods if they forget the steps or misunderstand the 'rules'. Studies suggest students make fewer errors with invented strategies.

Multiplication & Division Strategies

PLEASE REMEMBER
Students should not be expected to calculate without written support when first learning to use mental strategies. Even when students have become efficient in using particular strategies, they may still require the use of partially written support structures to aid their memory.

Students should not use mental strategies without understanding the mathematics behind them.

Multiplication

Traditional strategies for solving multiplication problems are more complex than those used to solve addition and subtraction.

When students invent their own strategies for multiplication, they tend to think about numbers rather than digits. (As explained in the previous example: **7 x 60 rather than 7 x 6**)

In order to solve multiplication problems, it is vital that students can break up numbers in flexible ways.
For example, **43 x 5 = 40 x 5 + 3 x 5**

Try to provide your child with real-life multiplication problems. Encourage them to solve problems in ways that make sense to them.

Strategies for Multiplication

Complete Number Strategies

Initially, children may not be comfortable breaking numbers into parts and they may rely on repeated addition. This is ok.

For example, **63 x 5 = (63+63+63+63+63)**
An efficient method for calculating this may be to use addition strategies.

```
    63
+   63
   126
+   63
   189
+   63
   252
+   63
   315
```

```
63 → 126 → 315
63 ↗
63 → 126 → 189 ↑
63 ↗
63 ↗
```

Multiplication & Division Strategies

Partitioning Strategy

Students break numbers up in a variety of ways. With these types of strategies, they are reflecting their knowledge of base-ten concepts.

27 x 4
4 x 20 = 80
4 x 7 = 28
→ 108

268 x 7
7 x 200 = 1 400
7 x 60 = 420
7 x 8 = 56
→ 1 820 → 1 876

46 x 3
Double 46 = 92
92 + 46 = 138

27 x 4
10 x 4 = 40
10 x 4 = 40
7 x 4 = 28
→ 80 → 108

27 x 8
25 x 4 = 100
25 x 8 = 200
2 x 8 = 16
→ 216

Compensation Strategies

Students change the problem to one that is easier to solve, then make an adjustment (compensation). The use of these strategies are dependent on the numbers involved and they can't be used to solve all computations.

27 x 4
27 + 3 = 30
30 x 4 = 120
3 x 4 = 12
120 - 12 - 108

250 x 5
"I can split 250 in half and multiply by 10; this is the same as 250 x 5"
125 x 10 = 1250

17 x 70
20 x 70 = 1 400
3 x 70 = 210
1400 - 210 = 1190

Information taken from: "Van de Walle & Lovin, Student Centred Mathematics Years 5-8, 2006"