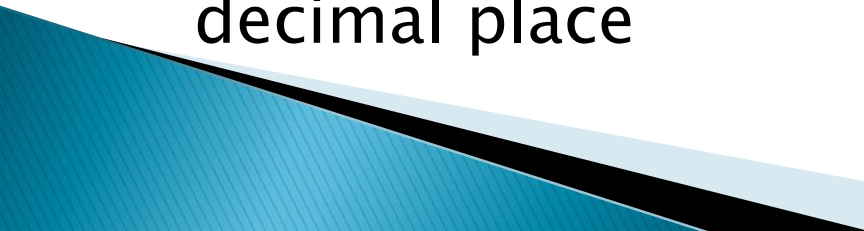


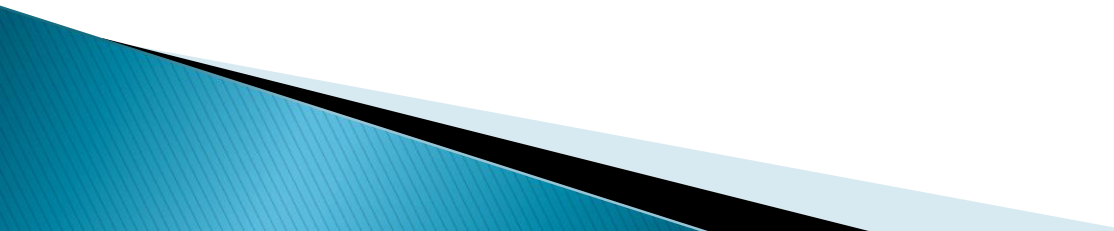
Mental Calculation Strategies in Upper Key Stage 2

Years 5 and 6

Addition and Subtraction Expectations

- ▶ Rapid recall and use of addition and subtraction facts for 1 and 10 (with decimal numbers to two decimal places)
 - ▶ Add and subtract two three-digit numbers where one or both are multiples of 10 or 100
 - ▶ Add and subtract two or three-digit numbers to and from a four digit number
 - ▶ Add and subtract two four-digit numbers (where there is no exchange or carrying involved)
 - ▶ Add and subtract pairs of decimals to one decimal place
- 

Mental Addition and Subtraction Strategies

1. Partition and combine multiples of thousands, hundreds, tens and ones
 2. Partition and combine multiples of ones and tenths
 3. Identify and use knowledge of number bonds within a calculation and identify related facts
 4. Find differences by counting up through the next multiple of 0.1, 1, 10, 100 or 1000
 5. Bridge through 10 when adding or subtracting a single digit number
 6. Add or subtract a whole number and adjust
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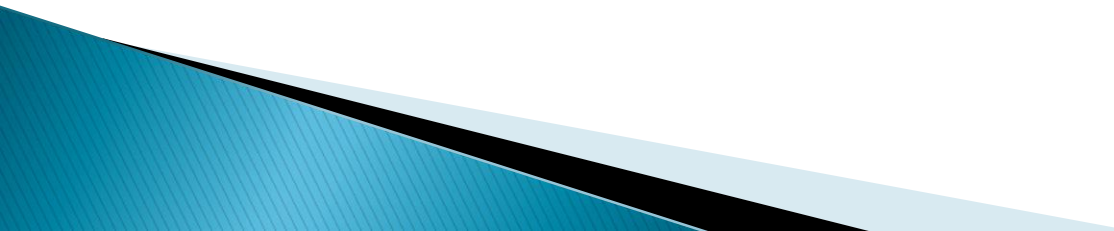
1. Partition and combine multiples of thousands, hundreds, tens and ones

$$6434 + 246 =$$

Partition the smaller number into 200, 40 and 6.

$$6434 + 6 = 6440$$

$$6440 + 40 = 6480$$

$$6480 + 200 = 6680$$


2. Partition and combine multiples of ones and tenths

$$3.4 + 6.2 =$$

Straightforward addition of ones and then the tenths.

$$3.4 + 6.2 = 9.6$$

$$5.6 + 4.5 =$$

Partition 4.5 into 4 ones and 5 tenths

$$5.6 + 0.5 = 6.1$$

$$6.1 + 4 = 10.1$$

3. Identify and use knowledge of number bonds within a calculation and identify related facts

$$1.5 + 2.7 =$$

This can be solved by using the related calculation...

$$15 + 27 = 42$$

therefore...

$$1.5 + 2.7 = 4.2$$

$$68 + 42 = 110$$

If children know this, they can also work out these...

$$680 + 420 = 1100$$

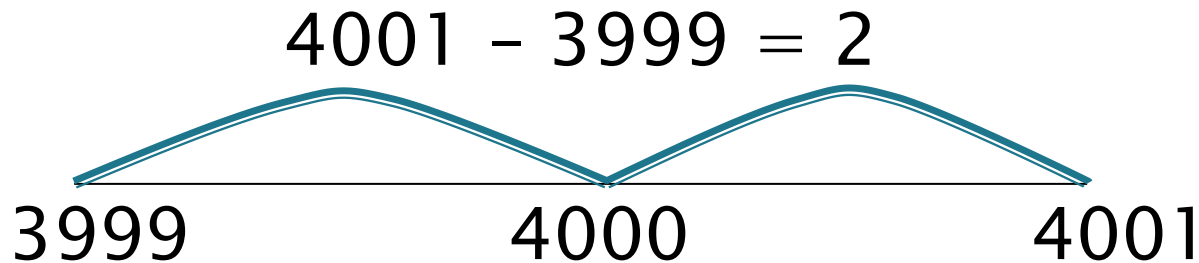
$$6.8 + 4.2 = 11$$

$$0.68 + 0.42 = 1.1$$

4. Find differences by counting up through the next multiple of 0.1, 1, 10, 100 or 1000

$$4001 - 3999 =$$

Many will see such big numbers and immediately turn to written column addition.



5. Bridge through 10 when adding or subtracting a single digit number

$$258 + 5 =$$

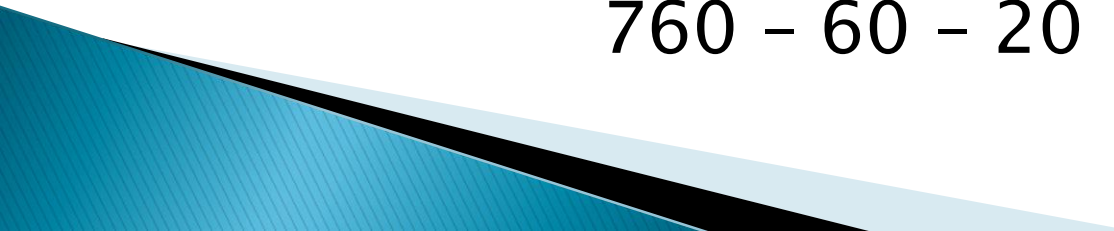
Partition the 5 into an appropriate number bond...

$$258 + 2 + 3 = 263$$

This strategy can also be used with larger numbers.

$$760 - 80 =$$

Partition the 80 into an appropriate number bond...

$$760 - 60 - 20 = 680$$


6. Add or subtract a whole number and adjust

$$5324 + 198 =$$

198 is only 2 away from 200...

$$5324 + 200 = 5524$$

Then adjust...

$$5524 - 2 = 5522$$

This strategy can also be used when adding/subtracting decimals.

$$4.3 - 2.9 =$$

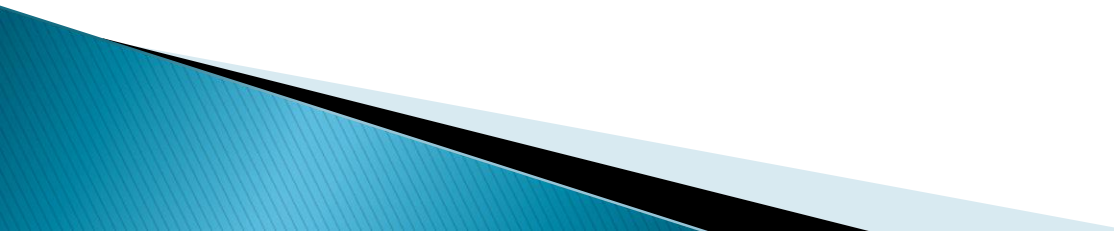
2.9 is only 0.1 away from 3...

$$4.3 - 3 = 1.3$$

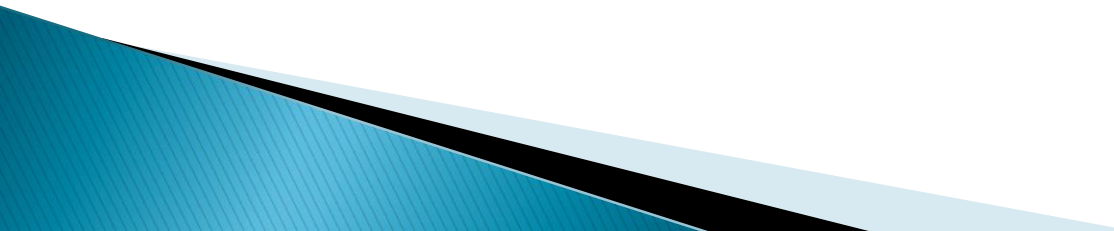
Then adjust...

$$1.3 + 0.1 = 1.4$$

Multiplication and Division Expectations

- ▶ Multiply and divide numbers mentally drawing upon known facts
 - ▶ Solve problems involving multiplication and division including using their knowledge of factors, multiples, squares and cubes
 - ▶ Perform mental calculations, including with mixed operations and large numbers
- 

Mental Multiplication and Division Strategies

1. Recall and derive related times tables for multiples of 10 and decimal numbers
 2. Using times tables, identify related unit fractions
 3. Use partitioning to double or halve any number, including decimals to two decimal places
 4. Recall square numbers of the corresponding multiples of 10
- 

1. Recall and derive related times tables for multiples of 10 and decimal numbers

► For multiples of 10:

$$70 \times 6 = 420$$

$$700 \times 6 = 4200$$

$$70 \times 60 = 4200$$

These can all be worked out by using the related fact...

$$7 \times 6 = 42$$

► For decimal numbers:

$$0.7 \times 6 = 4.2$$

$$7 \times 0.6 = 4.2$$

$$0.7 \times 0.6 = 0.42$$

Again, these can all be worked out using the related fact...

$$7 \times 6 = 42$$

2. Using times tables, identify related unit fractions

$$1/9 \text{ of } 63 = ?$$

$$1/7 \text{ of } 63 = ?$$

If children know $7 \times 9 = 63$, they should know the related division facts.

$$63 \div 9 = 7$$

$$63 \div 7 = 9$$

Therefore, if children understand fractions as division, they should know...

$$1/9 \text{ of } 63 = 7$$

$$1/7 \text{ of } 63 = 9$$

3. Use partitioning to double or halve any number, including decimals to two decimal places

14,632

Partition the number first.

- 14,000
- 600
- 30
- 2

Then half each number

- 14,000 = 7000
- 600 = 300
- 30 = 15
- 2 = 1

Then combine the numbers back together

- 7316

42.68

Partition the number first.

- 42
- 0.6
- 0.08

Then half each number

- 42 = 21
- 0.6 = 0.3
- 0.08 = 0.04

Then combine the numbers back together

- 21.34

4. Recall square numbers of the corresponding multiples of 10

$$40^2$$

is the same as...

$$40 \times 40 =$$

We know...

$$4 \times 4 = 16$$

Therefore...

$$40 \times 40 = 1600$$

What you can do at home?

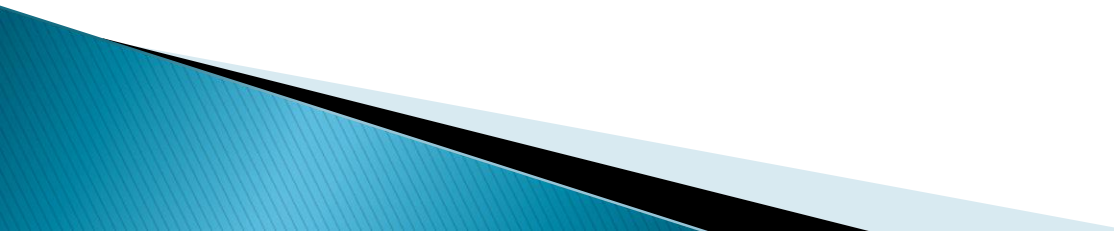
1. Make sure your child is secure with:

- ▶ Number bonds to 10 and 20 (including all the numbers in-between)
- ▶ Times tables (both multiplication and division facts)
- ▶ Partitioning numbers in different ways

2. Encourage children to handle money (this helps with understanding decimals)

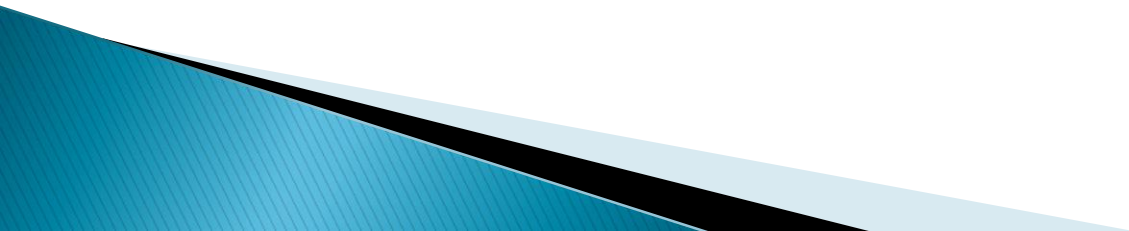
3. Encourage use of mental methods (don't just go straight to a written method)

Most importantly, encourage a love of maths!

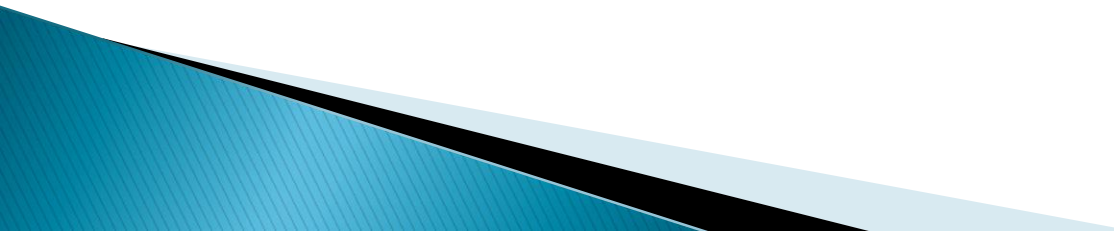


Thank you for listening 😊

Please feel free to ask any questions which you may have.



Example questions – + and –

- ▶ $7,624 - 913 - 87 =$
 - ▶ $1,932 - 851 =$
 - ▶ $854 + 543 - 198 =$
 - ▶ $56.38 + 24.5 =$
 - ▶ $2.7 + 3.014 =$
 - ▶ $37.7 + 87.2 =$
 - ▶ $1200 + 800 =$
 - ▶ $3.4 + 1.8 =$
 - ▶ $0.56 - 0.37 =$
- 

Example questions – x and ÷

- ▶ $0.3 \times 3 =$
 - ▶ $5.014 \times 10 =$
 - ▶ $3.9 \times 30 =$
 - ▶ $1.52 \times 6 =$
 - ▶ $0.9 \times 200 =$
 - ▶ $15\% \times 1,000 =$
 - ▶ $465 \times 52 =$
 - ▶ $98.4 \div 100 =$
 - ▶ $91.8 \div 3 =$
 - ▶ $645 \div 43 =$
 - ▶ $725 \div 29 =$
 - ▶ $3016 \div 13 =$
- 