Addition and Subtraction Key Stage 1 to Key Stage 2

<table>
<tr><td>KS1</td><td colspan="5">Pupils should practise addition to 20 and within to become increasingly fluent. They should use the facts they know to derive others, e.g using 7 + 3 = 10 to find 17 + 3= 20, 70 + 30 = 100
They should use concrete objects and practical apparatus, such as bead strings and number lines to explore additions including missing numbers.
Use pictorial representations such as bar models and whole part diagrams to show additive relationships.
100 squares could be used to explore patterns in calculations such as 74 +11, 77 + 9 encouraging children to think about ‘What do you notice?’ where partitioning or adjusting is used.

Pupils should learn to check their calculations, by using the inverse.
They should continue to see addition as both combining groups and counting on.
They should use Dienes to model partitioning into tens and ones* and learn to rearrange numbers in different ways e.g. 23 = 20 + 3 = 10 + 13.
Show understanding that adding zero leaves a number unchanged.</td></tr>
<tr><td>Year</td><td colspan="3">3 Addition</td><td colspan="2">4 Addition</td></tr>
<tr><td>Layers of vocabulary
 
Appendix 1a Beck’s Tiers of Vocabulary Appendix 1b: Vocabulary book</td><td colspan="3">Basic to subject specific (Beck’s Tiers):
+, add, addition, more, plus make, sum, total altogether score double, near double one more, two more... ten more... one hundred more how many more to make…? how many more is… than…? how much more is…?

Instructional vocabulary:
explain your method explain how you got your answer give an example of… show how you… show your working</td><td colspan="2">Basic to subject specific (Beck’s Tiers):
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…?

Instructional vocabulary:
calculate, work out, solve investigate, question answer check</td></tr>
<tr><td>NC 2014</td><td colspan="3">Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.</td><td colspan="2">Add and subtract numbers with up to 4 digits using the formal written method of columnar addition and subtraction where appropriate. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</td></tr>
<tr><td>Developing Conceptual/ Procedural Understanding</td><td>Near doubles
13+14 =
Double 13= 26
26+1 =27
or
Double 14 =28
28-1=27
Using known facts
40 + 80 = 120 using 4 + 8 = 12
So 400 + 800 = 1200</td><td>Start with least significant digit
67
+ 24
11 (7+4)
+ 80 (60+20)
91

“7 add 4 equals 11 and 60 add 20 equals 80. 1+ 0 = 1 and 1 ten + 8 tens = 9 tens”</td><td>Columnar addition
625
+ 48
673
1

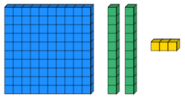
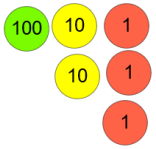
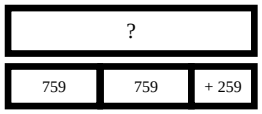
Teach the carried digit.</td><td>Using known facts
40 + 80 = 120 using 4 + 8 = 12
So 400 + 800 = 1200 and 4000+8000=12,000

Remodelling strategy
3548 + 1998
3546 + 2000 = 5546

Place value materials to</td><td>Columnar addition
587
+ 475
1062
1 1
“7 add 5 equals 12. That’s 2 ones and 1 ten to carry over. 8 add 7 equals 15 and the1 ten to carry makes 16. That’s 6 tens and 100 to carry over. 500 add 400 equals 900</td><td>Columnar addition (decimals) in contexts such as money and measurement
12.45
7.36
+ 24.50
44.31
1 1 1

Representing problems
There are 259 more boys than girls</td></tr>
</table>

Addition and Subtraction Key Stage 1 to Key Stage 2

	Remodelling strategy 243 + 198 241 + 200 = 441 **Place value materials to represent 3 digit numbers** Base 10 and then place value counters.  	**" 6 tens add 2 tens equals 8 tens"**  625 + 48 13 (5+8) 60 (20 + 40) +600 (600 + 0) 673 **All language in the context of the place value and added in columns, lining up the digits.** **Teaching point: no more than 9 in any given column following regrouping.**	**Representing problems** There are 334 children at Springfield School and 75 at Oak Nursery. How many children are there altogether?	**represent calculations**	**and the 1 hundred to carry makes 1000"** 7648 +1486 14 (8+6) 120 (40+80) 1000 (600+400) + 8000 (7000+1000) 9134 7648 + 1486 9134 111	**in Lucy's school. If there are 759 girls, how many pupils are there altogether?** 
Known facts	Derive and use addition and subtraction facts to 100, e.g. 33+ 67 =100.			Derive and use addition and subtraction facts (for multiples of 10) to 1000, e.g. 330+ 670=1000.		
Essential knowledge	Add single digit bridging through boundaries	Add multiples of 10,100		Fluency of 2 digit + 2 digit	Add multiples of 10, 100 and 1000	
	Partition second number to add	Pairs of 100 (complements of 100)		Partition second number to add	Decimal pairs of 10 and 1	
	Use near doubles to add	Add near multiples of 10 and 100 by rounding and adjusting		Use near doubles to add	Adjust both numbers before adding	
	Partition and recombine			Add near multiples	Partition and recombine	

Addition and Subtraction Key Stage 1 to Key Stage 2

<table>
<tr><th>Year</th><th colspan="2">5 Addition</th><th colspan="2">6 Addition</th></tr>
<tr><td>Layers of vocabulary
 
Appendix 1a Beck's Tiers of Vocabulary
Appendix 1b: Vocabulary book</td><td colspan="2">Basic to subject specific (Beck's Tiers):
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…?

Instructional vocabulary:
put, place arrange, rearrange change, change over split, separate</td><td colspan="2">Basic to subject specific (Beck's Tiers):
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…?

Instructional vocabulary:
put, place arrange, rearrange change, change over adjusting, adjust split, separate
carry on, continue, repeat what comes next? predict describe the pattern, describe the rule
find, find all, find different investigate</td></tr>
<tr><td>NC 2014</td><td colspan="2">Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</td><td colspan="2">Solve problems involving addition, subtraction, multiplication and division.</td></tr>
<tr><td>Developing Conceptual/ Procedural Understanding</td><td>Columnar addition
Include calculations involving more than 2 numbers and carrying figures >1.

25567
16397
+15984
57948
1 1 2 1
Include calculations with 'empty columns'.
124.9 + 7.25

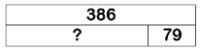
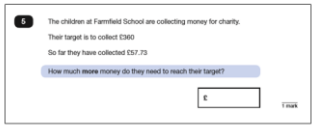
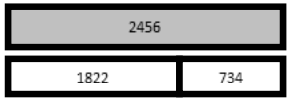
124.90
+ 7.25
132.25
1 1</td><td>Representing problems
If 2541 is the answer, what's the question? - Can you create three addition calculations? - Can you create three subtraction calculations? - Did you use a strategy?</td><td>Columnar addition
Include calculations with up to 3 'empty columns'.
128.7 + 3.014

128.700
+3.014
131.714
1</td><td>Representing problems
7208 females attended a concert as well as 8963 males. There were originally 20000 seats on sale. How many empty seats were there at the concert?</td></tr>
<tr><td>Known facts</td><td colspan="2">Derive and use addition and subtraction facts to 10 and 1, e.g. 3.3+ 6.7 =10 and so 0.33 + 0.67 = 1.</td><td colspan="2">All the KS2 required facts</td></tr>
<tr><td rowspan="2">Essential knowledge</td><td>Fluency of 2 digit + 2 digit including with decimals</td><td>Add multiples of 10, 100, 1000 and tenths</td><td>Fluency of 2 digit + 2 digit including with decimals</td><td>Add multiples of 10, 100, 1000, tenths and hundredths</td></tr>
<tr><td>Partition second number to add</td><td>Use number facts, bridging and place value</td><td>Partition second number to add</td><td>Use number facts, bridging and place value</td></tr>
</table>

Addition and Subtraction Key Stage 1 to Key Stage 2

	Adjust numbers to add	Partition and recombine	Adjust numbers to add	Partition and recombine
KS1	Pupils should practise subtraction to 20 and within to become increasingly fluent. They should use the facts they know to derive others, e.g using 10 - 7 = 3 and 7 = 10 - 3 to calculate 100 - 70 = 30 and 70 = 100 - 30. Know the effect of zero. As well as number lines, 100 squares could be used to model calculations such as 74 – 11, 77 – 9 or 36 – 14, where partitioning or adjusting are used. Pupils should learn to check their calculations, including by adding to check. They should continue to see subtraction as both take away and finding the difference and should find a small difference by counting up. They should use Dienes to model partitioning into tens and ones* and learn to partition numbers in different ways e.g. 23 = 20 + 3 = 10 + 13.			
Year	3 Subtraction		4 Subtraction	
Layers of vocabulary  **Appendix 1a** Beck's Tiers of Vocabulary **Appendix 1b:** Vocabulary book	**Basic to subject specific (Beck's Tiers):** subtract, subtraction, take (away), minus leave, how many are left/left over? one less, two less… ten less… one hundred less how many fewer is… than…? how much less is…? difference between half, halve = equals, sign, is the same as tens boundary, hundreds boundary exchange, carried digits **Instructional vocabulary:** explain your method explain how you got your answer give an example of… show how you… show your working		**Basic to subject specific (Beck's Tiers):** subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? difference between half, halve how many more/fewer is… than…? how much more/less is…? equals, sign, is the same as tens boundary, hundreds boundary, inverse exchange, carried digits **Instructional vocabulary:** calculate, work out, solve investigate, question answer check	
NC 2014	Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction. Least significant digit is always dealt with first to establish if the exchange is needed.		Add and subtract numbers with up to 4 digits using the formal written method of columnar addition and subtraction where appropriate. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	
Developing Conceptual/ Procedural Understanding	**Subtract mentally pairs of multiples of 100 using known facts** 600 – 200 = 400 because 6 – 2 = 4 **Remodelling strategy (keeping the difference the same)** 502 – 198 504 – 200 = 304 **Re-arranging** Use of apparatus to	**Start with least significant digit - decomposition** 81 = 80 1 - 57 50 7 81 = 70 11 - 57 50 7 24 20 4 "1 subtract 7 is tricky so I will rearrange 81 into 70 and 11. 11 subtract 7 equals 4 and 70 subtract	**Columnar subtraction** 6 14 1 ~~7~~ ~~5~~ 4 - 2 8 6 4 6 8 Emphasis on language of place value, i.e. 14 ones subtract 6 ones, 14 tens subtract 8 tens, and 6 hundreds subtract 2 hundreds.	**Subtract mentally pairs of multiples of 1000 using known facts** 6000 – 2000= 4000 because 6 – 2 = 4 **Remodelling strategy (keeping the difference the same)** 3548 - 1998 3550 – 2000 = 1550 **Find the difference strategy** 13 6 – 2 8 =	**Columnar subtraction** 2344 -187 2 1 3 1 ~~2~~ ~~3~~ ~~4~~ 4 -187 2157 6467 – 2684 5 13 1 ~~6~~ ~~4~~ ~~6~~ 7 - 2684 3783 **Columnar subtraction**	**Representing problems** Check the answer to the following calculations using the inverse. Show all your working.

Addition and Subtraction Key Stage 1 to Key Stage 2

	understand rearrangements, e.g. 55 as 40 and 15(not as part of calculations). **Place value materials to represent numbers in calculations**  	50 equals 20. 20 and 4 make 24." 754 700 50 4 - 86 80 6 754 600 140 14 - 86 80 6 668 600 60 8 "It's tricky to take 6 from 4 and 80 from 50. I need to rearrange the number. I will exchange one ten from 50 which leaves 40 and makes 14 in the units. 40 to subtract 80 is tricky. I will exchange one hundred from 700 and make 140. 14 subtract 6 equals 8. 140 subtract 80 equals 60 and 600 subtract 0 equals 600."	**Representing problems** There are 386 pupils at Oak Primary. If 79 pupils have sandwiches, how many have dinners?  	 13·6 – 2·8 = 10·8 **Place value materials to represent calculations** Appendix 1.	**(decimals) in contexts such as money and measurement** 32.34 – 14.18 2 1 2 1 32.34 -14.18 18.16	  2456- 734 = 1822 
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Essential knowledge	Subtract single digit bridging through boundaries	Subtract multiples of 10,100		Fluency of 2 digit - 2 digit	Subtract multiples of 10, 100 and 1000	
	Partition second number to subtract	Pairs of 100 (complements of 100)		Partition second number to subtract	Decimal subtraction from 10 or 1	
	Difference between	Subtract near multiples of 10 and 100 by rounding and adjusting		Difference between	Subtract near multiples by rounding and adjusting	
	Partition and recombine					

Year	5 Subtraction	6 Subtraction
Layers of vocabulary  **Appendix 2a** Beck's Tiers of	**Basic to subject specific (Beck's Tiers):** subtract, subtraction, take (away), minus, leave, how many are left/left over? ten less… one hundred less how many fewer is… than…? how much less is…? difference between half, halve = equals, sign, is the same as tens boundary, hundreds boundary, inverse, units boundary, tenths boundary	**Basic to subject specific (Beck's Tiers):** subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? difference between half, halve how many more/fewer is… than…? how much more/less is…? equals, sign, is the same as tens boundary, hundreds boundary, units boundary, tenths boundary, inverse

Addition and Subtraction Key Stage 1 to Key Stage 2

<table>
<tr><td>Vocabulary
Appendix 2b:
Vocabulary book</td><td colspan="2">exchange, carried digits

Instructional vocabulary:
put, place arrange, rearrange change, change over adjusting, adjust split, separate</td><td colspan="2">Instructional vocabulary:
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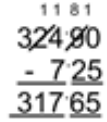
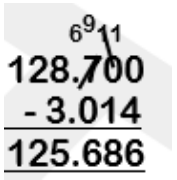
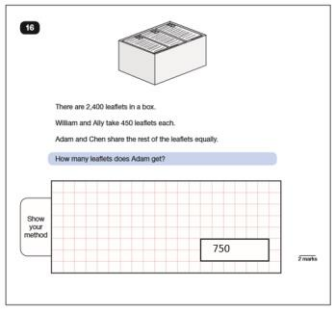
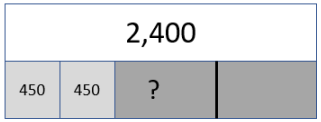
Include calculations with ‘empty columns’.
324.9 - 7.25
  </td><td>Representing problems
Kangchenjunga is the third highest mountain in the world at 28,169 feet above sea level. Lhotse is the fourth highest at 27,960 feet above sea level. Find the difference in heights mentally.

Keeping the difference, the same to make the numbers easier to calculate with.

122, 456 – 11,999

122, 457 – 12,000</td><td>Columnar subtraction
Include calculations with up to 3 ‘empty columns’.
128.7 - 3.014
  </td><td>Representing problems
Katie was given the calculation below 47326 – 1900 = She said “I will just take off 2000 then subtract another 100 so my answer is 45126.” Is she correct? Would you use her method? Explain your answer
 
  </td></tr>
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</table>

Appendix 1
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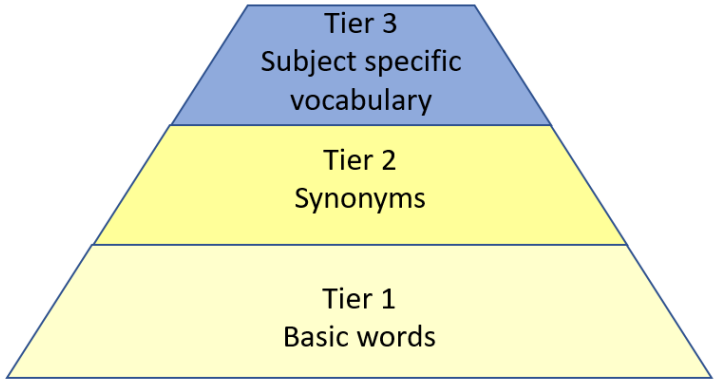
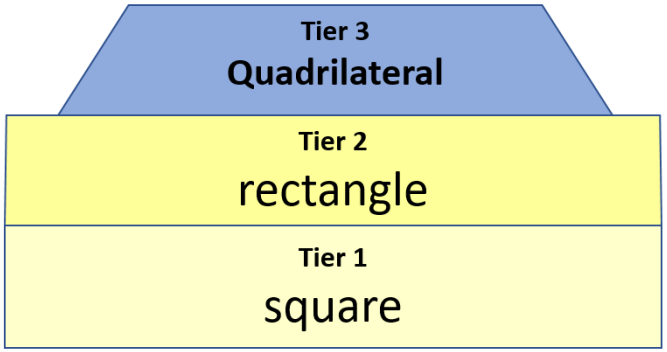
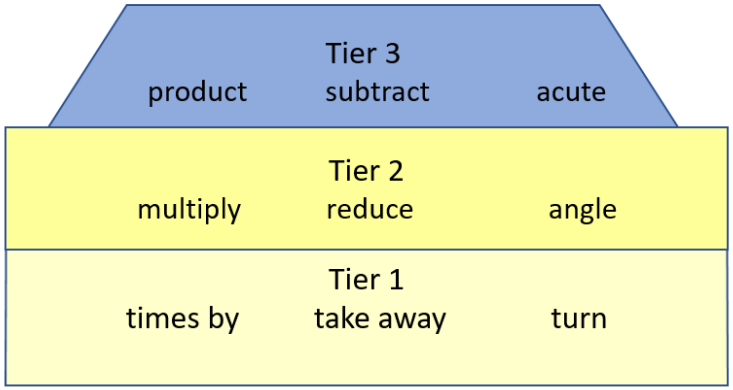
Beck's tiers of vocabulary



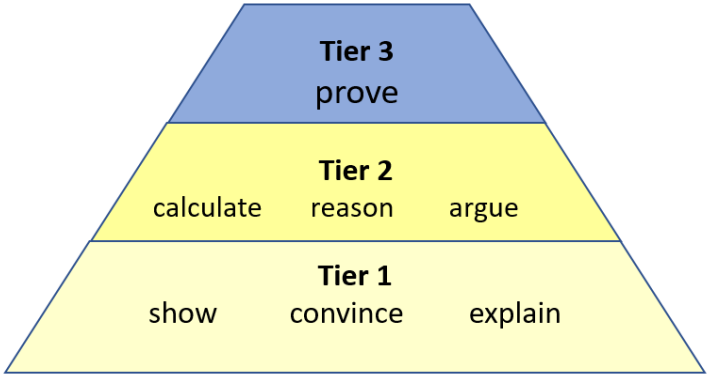
Beck's tiers of vocabulary: mathematics

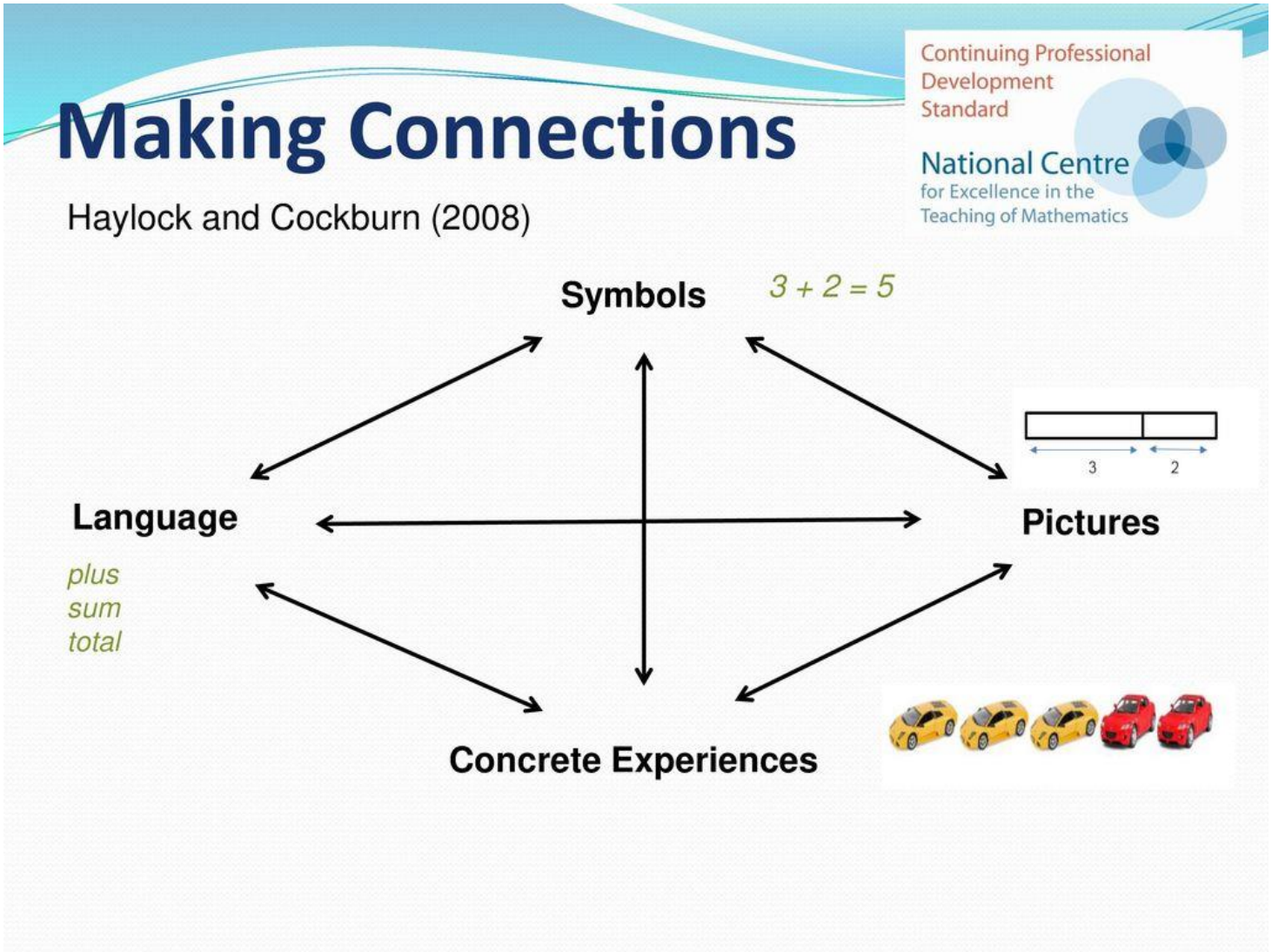


Beck's tiers of vocabulary: mathematics



Beck's tiers of *instructional* vocabulary





Haylock's connective model