Forwards add Backwards Assignment (Nrich Live Problem)

1. The number can be made by adding a -digit number with its reversal:

for example.

Can you find the other two ways of making a total of 747 in this way?

	Way 1	Way 2
	621	522
+	126	225
=	747	747

2. Can you find all the totals between 700 and 800 that can be made

from a number plus its reversal? (There are more than five…)

pair	No.
452+254	706
165+561	726
373+373	746
284+482	766
195+591	786
106+601	707
611+116	727
621+126	747
631+136	767
641+146	787

3. Can you explain how you know you have found all the possible totals?

To explain this, let's name the digits:

ABC+CBA= 700-800

I know all of them because I have first tried adding a carryover for the B position from 5 to 9, and to make sure the answer is between 700-800, I made sure A+C and C+A = 6.

Also, I tried A+C= 7 and B+B= 0,2,4,6,8.

4. How many totals between 300 and 400 can be made from a number plus

its reversal? And between 800 and 900…?

Pair	No.	Pair	No.
151+151	302	156+651	807
161+161	322	166+661	827
171+171	342	176+671	847
181+181	362	186+681	867
191+191	382	196+691	887
102+102	303	107+701	808
112+211	323	117+711	828
122+221	343	127+721	848
132+231	363	137+731	868
142+241	383	147+741	888

5. Can you work out how to make a total of 1251 by adding a 3-digit number

to its reversal?

Yes!

1. Find all the pairs that add up to 11 for ex. 8+3=11.

2. Find the same No.+ the same No.=14 for the tens; it will become 15 with the carry-over

From 11. 11.

3. here is our complete equation: 873+378=1,251.

6. Can you find all the totals between 1200 and 1300 that can be made

from a number plus its reversal? (There are more than five…)

Pair	No.
873+378	1251
556+655	1211
764+467	1231
982+289	1271
745+547	1292

7. And what about the totals between 1900 and 2000…?

pair	No.
989+989	1978
999+999	1998
979+979	1968
969+969	1958

8. Are there any numbers between 200 and 300 that can be made by subtracting a three-digit number from its reversal? (There are fewer than five…)

Pair	No.
502-205	297

9. Are there any numbers between 1200 and 1300 that can be made by subtracting a four-digit number from its reversal? (There are fewer than five, but more than one…)

Pair	No.
2521-1252	1269
8086-6808	1278
8196-6918	1268

10. Have you found all the possibilities? Can you explain how you know it?

Yes, there are only 3 possibilities!

My strategy is:

1.You label all 4 digits, and it can be shown like this:

A B C D

\- D C B A=

1200-1300

From this, you can make out that A > D and A–D=1 these are the options:

9-1
8-7
7-6
6-5
5-4
4-3
3-2
2-1
1-0

2. Next, you need to find out B and C. B > C as B will become one smaller and take a carryover and, B-C= 3, because then only the answer in the hundreds place will become 2. These are the options:

9-6
8-5
7-4
6-3
5-2
4-1
3-0

With these you can make a calculation....

Let's take A and D as 2 and 1, and B and C as 4 and 1:

2411 - 1142 = 1269

We know the ones place will always be 9 because D will always have a carryover and subtracting A will give it a 9, e.g.:

If A is 8, D is 7, then it would be 17-8 which is equal to 9.

The tens place will either be 4 or 6, because C will have minus 1 and then a carryover, like if C is 4 and D is 1.

4-1 = 3, with carryover 13. Now in the calculation it will become 13-4=9.

For the last two you focus on the hundreds place on how to get Two with the Top number – 1.