Some maths problems – Student work samples

Link to the assessment resource, *Some maths problems* (NM1333)

Order of strategies

1. Partitioning using rounding and compensation to jump through tidy numbers
2. Partitioning by rounding one number to a tidy number then compensation
3. Place value partitioning one number into *hundreds*, *tens* and *ones* then adding it on to the other
 in parts
4. Partitioning strategies (as above) without showing full working (uses some mental strategies)
5. Place value partitioning both numbers using *hundreds*, *tens* and *ones*
6. Place value partitioning expressing *tens* as *ones*
7. Horizontal diagram of place value partitioning or equivalent of vertical algorithm

These examples are generally listed from the most sophisticated to the least sophisticated. The mean ability of students using each strategy largely follows the stages of the number framework. Click on the link Analysis of student responses to NM1333 [pdf] for the breakdown of how many students answered using different strategies.

1. Partitioning using rounding and compensation to jump through tidy numbers
a) 154 + 38

I could round 154 up to 160 + 38 = 198 − 6 = 192

Answer: 192

d) 736 + 589

700 + 300 = 1000   1200 + 100 = 1300
1000 + 200 = 1200   1300 + 19 = 1319
80 + 20 = 100   1319 + 25 = 1344
10 + 9 = 19   So 736 + 589 = 1344
19 + 6 = 25

Answer: 1344

This student over-compensated by 19 but still showed understanding of crossing tens, hundred, and thousands boundaries.

2. Partitioning by rounding one number to a tidy number then compensation
a) 154 + 38

38 + 2 = 40
154 + 40 = 194
194 − 2 = 192

Answer: 192

d) 736 + 589

$$736 + 600 = 1336 - 11 = 1325$$

Answer: 1325

3. Place value partitioning one number into *hundreds*, *tens* and *ones* then adding it on to the other in parts

a) 154 + 38

$$154 + 8 = 162 + 30 = 192$$

Answer: 192

Skips in *ones*, *tens*, then *hundreds*
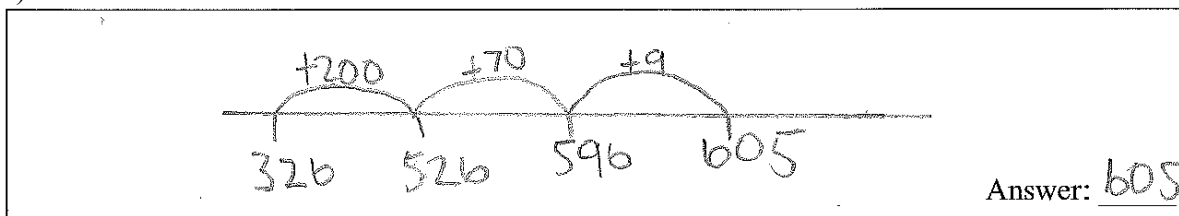
b) 357 + 162

$$357 + 162 \qquad 417 + 100 = 517$$

$$357 + 60 = 417 \qquad 517 + 2 = 519$$

Answer: 519

Skips in *tens*, *hundreds*, then *ones*

c) 326 + 279

Answer: 605

Uses a number line representation skipping in *hundreds*, *tens*, and *ones*.

4. Partitioning strategies (as above) without showing full working (uses some mental strategies)

b) 357 + 162

$$\cancel{357 + 43 = 400} \quad 162 - 43 = 119$$

$$357 + 43 = 400$$

$$400 + 119 = 519$$

Answer: 519

This student shows how to cross the *hundreds* boundary by adding on 43, but does not show how they subtracted 43 from 162

c) 326 + 279

$$326 + 300 = 626 - 21 = 625$$

Answer: 625

This student shows how to cross the *hundreds* boundary by adding on 21, but does not show how they compensated by subtracting 21 from 626, and makes an error in the subtraction.

d) 736 + 589

$$736 + 580 = 1310$$
$$6 + 9 = 15$$
$$1310 + 15 = 1325$$

Answer: 1325

This student does not show how they added 730 and 580

5. Place value partitioning both numbers using *hundreds*, *tens* and *ones*
a) 154 + 38

$$50 + 30 = 80 \quad 400 + 42 = 192$$
$$8 + 4 = 12$$
$$80 + 12 = 92$$

Answer: 192

b) 357 + 162

$$357 + 162$$
$$300 + 100 = 400 \quad 50 + 60 = 510 \quad 7 + 2 = 9$$

Answer: 519

This also demonstrates the student doing the equivalent of "carrying" in the *hundreds*.

b) 357 + 162

$$(300 + 100) + (50 + 60) + (7 + 2)$$
$$400 \qquad\qquad 110 \qquad\quad 9$$

$$\begin{array}{r} 400 \\ 110 \\ +\ 9 \\ \hline 519 \end{array}$$

Answer: 519

This shows the expanded form of the place value partitioning, and also expresses it as a vertical algorithm.

b) 357 + 162

357 + 162
400
110
300+100=400
50+60=110 and
2+7=9 so
all together   Answer: 560

This shows the expanded form of the PV partitioning, and also expresses it diagrammatically.

6. Place value partitioning expressing *tens* as *ones*
a) 154 + 38

4+8=12
5+3=8
1+0=1
= 192
Answer: 192

d) 736 + 589

7+5=12
3+8=11
6+9=15

1200+110=1310+15=1325
Answer: 1325

This also shows the relationship with *thousands*, *hundreds*, *tens*, and *ones*.

7. Horizontal diagram of place value partitioning or equivalent of vertical algorithm
a) 154 + 38

154 + 38
12

154
+ 38
192
Answer: 192

b) 357 + 162

357 + 162
4 1 9
Answer: 419