Reasoning and Problem Solving
Step 1: Numbers to Ten Million

National Curriculum Objectives:

Mathematics Year 6: (6N2) Read, write, order and compare numbers up to 10,000,000
Mathematics Year 6: (6N3) Determine the value of each digit in numbers up to 10,000,000

Differentiation:

Questions 1, 4 and 7 (Problem Solving)
Developing Match pairs of numbers to reach a number up to seven-digits. A selection of six numbers will be given. Includes multiples of 10, 100 and 1,000.
Expected Match pairs of numbers to reach a number up to seven-digits. More numbers to choose from.
Greater Depth Match pairs of numbers to reach a number up to seven-digits. More numbers to choose from. Includes unconventional partitioning.

Questions 2, 5 and 8 (Reasoning)
Developing Use understanding of place value and exchanging to prove whether a statement is true or false. Use of a seven-digit number. Includes multiples of 10, 100 and 1,000.
Expected Use understanding of place value and exchanging to prove whether a statement is true or false. Use of a seven-digit number.
Greater Depth Use understanding of place value and exchanging to prove whether a statement is true or false. Use of a seven-digit number. Includes unconventional partitioning.

Questions 3, 6 and 9 (Problem Solving)
Developing Create different pairs of numbers and calculate the difference between them. Use of seven-digit numbers. Includes multiples of 10, 100 and 1,000.
Expected Create different pairs of numbers and calculate the difference between them. Use of seven-digit numbers.
Greater Depth Create different pairs of numbers and calculate the difference between them. Use of seven-digit numbers and additional parameters. For example, numbers must be a multiple of a given number.

More Year 6 Place Value resources.

Did you like this resource? Don't forget to review it on our website.

1a. Match the pairs of numbers in the grid below to create the target number.

1,143,642

1,140,000	40,042	1,100,642
43,000	3,642	1,103,600

PS

1b. Match the pairs of numbers in the grid below to create the target number.

1,485,617

1,400,600	1,480,007	5,610
85,017	80,600	1,405,017

PS

2a. Zara says,

> If I add 4,000 to any six-digit number, it will only be the thousands column that I will need to change.

Is she correct?

Explain how you know, using examples to help you.

R

2b. Adam says,

> If I add 30 to any six-digit number, I will have to change the tens column and the hundreds column.

Is he correct?

Explain how you know, using examples to help you.

R

3a. Using the digit cards below, create three pairs of 7-digit numbers.

, 2 9 1 , 5   6

Your numbers must have a difference between one million and five million. Each digit card can only be used once per number.

| 0 | 3 | 4 | 7 | 8 |

PS

3b. Using the digit cards below, create three pairs of 7-digit numbers.

, 5 4 , 2 9 1

Your numbers must have a difference between one million and four million. Each digit card can only be used once per number.

| 4 | 3 | 6 | 7 | 8 |

PS

4a. Match the pairs of numbers in the grid below to create the target number.

3,465,326

200,320	1,405,326	3,005,306	3,265,006
460,020	3,460,026	2,060,000	5,300

PS

4b. Match the pairs of numbers in the grid below to create the target number.

7,424,645

7,024,605	110,040	6,400,605	1,024,040
7,314,605	6,304,640	400,040	1,120,005

PS

5a. Dennis says,

> If I add fifty thousand to any six-digit number, I will only need to change a maximum of three place value columns.

Is he correct?

Explain how you know, using examples to help you.

R

5b. Simon says,

> If I add ninety-six thousand and two to any six-digit number, I will have to change the thousands column and the ten-thousands column.

Is he correct?

Explain how you know, using examples to help you.

R

6a. Using the digit cards below, create three pairs of 7-digit numbers.

[ ] , [2] [0] [ ] , [5] [ ] [6]

Your numbers must have a difference between one million and three million. Each digit card can only be used once per number.

[1] [3] [4] [7] [8] [9]

PS

6b. Using the digit cards below, create three pairs of 7-digit numbers.

[ ] , [ ] [0] [4] , [1] [ ] [5]

Your numbers must have a difference between one million and two million. Each digit card can only be used once per number.

[2] [3] [6] [7] [8] [9]

PS

Reasoning and Problem Solving – Numbers to Ten Million – Year 6 Expected

Numbers to Ten Million

7a. Match the pairs of numbers in the grid below to create the target number.

> **Eight million, one hundred and eighty-seven thousand, seven hundred and eighty-one.**

5,076,721	5,005,720	5,133,310	3,054,471
5,116,281	3,071,500	3,111,060	3,182,061

PS

7b. Match the pairs of numbers in the grid below to create the target number.

> **Six million, eight hundred thousands, six hundreds, and seventy-eight ones.**

2,700,514	4,100,164	2,000,074	4,200,064
4,800,604	2,800,503	2,600,614	4,000,175

PS

8a. Bridget says,

> If I add forty-five thousand, six hundred and twenty-two to any six-digit number, I will always have to change digits in three place value columns.

Is she correct?

Explain how you know, using examples to help you.

R

8b. Mason says,

> If I add nine hundred and ninety hundreds and six to any six-digit number, I will have to change no more than four place value columns.

Is he correct?

Explain how you know, using examples to help you.

R

9a. Using the digit cards below, create three pairs of 7-digit numbers.

[ ] , [ ] [0] [1] [4] [ ] [ ]

Your numbers must have a difference between one million and two and half million. Each digit card can only be used once per number. The digit in the ones column must be a multiple of 3.

[2] [3] [5] [6] [7] [8] [9]

PS

9b. Using the digit cards below, create three pairs of 7-digit numbers.

[ ] , [ ] [5] , [0] [4] [ ]

Your numbers must have a difference between one and a half million and two and half million. Each digit card can only be used once per number. The digit in the ones column must be a multiple of 2.

[1] [3] [5] [6] [7] [8] [9]

PS

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Reasoning and Problem Solving – Numbers to Ten Million – Year 6 Greater Depth

Reasoning and Problem Solving
Numbers to Ten Million

Developing

1a. 1,140,000 + 3,642 = 1,143,642
40,042 + 1,103,600 = 1,143,642
1,100,642 + 43,000 = 1,143,642

2a. Zara is incorrect because if you cross the ten thousand boundary, the thousands, ten thousands and hundred thousands columns will need to change. For example, 199,999 + 4,000 = 203,999.

3a. Various answers, for example:
7,291,5<u>06</u> – <u>4</u>,291,5<u>06</u> = 3,000,000
7,291,5<u>06</u> – <u>3</u>,291,5<u>06</u> = 4,000,000
8,291,5<u>06</u> – <u>4</u>,291,5<u>06</u> = 4,000,000

Expected

4a. 200,320 + 3,265,006 = 3,465,326
1,405,326 + 2,060,000 = 3,465,326
3,005,306 + 460,020 = 3,465,326
3,460,026 + 5,300 = 3,465,326

5a. Dennis is correct because the only columns you would need to change are the ten thousands, hundred thousands and million columns. For example, 999,999 + 50,000 = 1,049,999.

6a. Various answers, for example:
4,<u>2</u>01,5<u>9</u>6 – 1,<u>2</u>0<u>9</u>,546 = 2,992,050
9,<u>2</u>08,5<u>3</u>6 – <u>7</u>,201,5<u>9</u>6 = 2,006,940
4,<u>2</u>09,5<u>7</u>6 – 3,<u>2</u>01,5<u>4</u>6 = 1,008,030

Greater Depth

7a. 5,076,721 + 3,111,060 = 8,187,781
5,005,720 + 3,182,061 = 8,187,781
5,133,310 + 3,054,471 = 8,187,781
5,116,281 + 3,071,500 = 8,187,781

8a. Bridget is incorrect because she could cross multiple place value boundaries depending on the number. For example, 45,622 + 987,654 = 1,033,276.

9a. Various answers, for example:
9,<u>8</u>01,4<u>36</u> – <u>8</u>,601,4<u>23</u> = 1,200,013
9,<u>2</u>01,4<u>63</u> – <u>7</u>,301,4<u>89</u> = 1,899,974
8,<u>7</u>01,4<u>56</u> – <u>7</u>,301,4<u>29</u> = 1,400,027

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duplicate
Developing

1b. 1,400,600 + 85,017 = 1,485,617
1,480,007 + 5,610 = 1,485,617
80,600 + 1,405,017 = 1,485,617

2b. Adam is incorrect because if the number does not pass the hundreds boundary, only the tens digit will need to change. For example, 199,900 + 30 = 199,930.

3b. Various answers, for example:
<u>6</u>,854,291 – <u>4</u>,<u>7</u>54,291 = 2,100,000
<u>4</u>,854,291 – <u>3</u>,<u>6</u>54,291 = 1,200,000
<u>6</u>,<u>7</u>54,291 – <u>3</u>,<u>6</u>54,291 = 3,100,000

Expected

4b. 7,024,605 + 400,040 = 7,424,645
110,040 + 7,314,605 = 7,424,645
6,400,605 + 1,024,040 = 7,424,645
6,304,640 + 1,120,005 = 7,424,645

5b. Simon is incorrect because as soon as you cross the ten boundary, multiple columns will need to change. For example, 999,999 + 96,002 = 1,096,001.

6b. Various answers, for example:
3,<u>9</u>04,1<u>8</u>5 – <u>2</u>,304,1<u>8</u>5 = 1,600,000
9,<u>6</u>04,1<u>3</u>5 – <u>8</u>,204,1<u>9</u>5 = 1,399,940
8,<u>3</u>04,1<u>9</u>5 – <u>7</u>,204,1<u>9</u>5 = 1,100,000

Greater Depth

7b. 2,700,514 + 4,100,164 = 6,800,678
2,000,074 + 4,800,604 = 6,800,678
4,200,064 + 2,600,614 = 6,800,678
2,800,503 + 4,000,175 = 6,800,678

8b. Mason is incorrect because he could cross multiple place value boundaries depending on the number. For example, 99,006 + 987,654 = 1,086,660.

9b. Various answers, for example:
9,<u>8</u>57,046 – <u>7</u>,651,048 = 2,205,998
8,<u>9</u>53,046 – <u>7</u>,158,046 = 1,795,000
5,<u>7</u>59,048 – <u>3</u>,651,048 = 2,108,000

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