

# Puzzle of the Week

## *Fill in the Blanks – 2*

Using the numbers from 1 to 5 at most once, this equation has three solutions.

$$\square - \square = \square - \square$$

1   2   3   4   5

The three solutions are:

$$\boxed{3} - \boxed{1} = \boxed{4} - \boxed{2}$$

$$\boxed{4} - \boxed{2} = \boxed{5} - \boxed{3}$$

$$\boxed{4} - \boxed{1} = \boxed{5} - \boxed{2}$$

**THE CHALLENGE:** Use the numbers from 1 to 8 at most once to fill in these blanks.

$$\square + \square = \square + \square = \square - \square$$

**1   2   3   4   5   6   7   8**

**EXPLORATION:** Explore other number ranges. What happens if you use 1 to 7, 1 to 9, or 1 to 10? How do things change if you use 0 to 7?

# Puzzle of the Week

## *Fill in the Blanks – 2 – Notes*

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**THE CHALLENGE:** As with the other Fill in the Blanks puzzles, a child can just play with this and eventually arrive at the answers. That exploration involves a lot of good experiences, and there is no reason to avoid it.

To be more systematic, the key observation is that the subtraction drives the solution.

For a difference of 5, the sums must be  $1 + 4$  and  $2 + 3$ , and that uses up all the numbers from 1 to 4.

For a difference of 6, if the subtraction is  $7 - 1$  or  $8 - 2$ , there aren't two ways of getting a sum of 6 without using a 1 (if it's  $7 - 1$ ) or a 2 (if it's  $8 - 2$ ).

So, the difference must be 7, and the last subtraction must be  $8 - 1$ . Without using a 1, the sum of 7 can be achieved as  $2 + 5$  or  $3 + 4$ , and that's our single solution.

**EXPLORATION:** We saw above that 1 to 7 cannot work.

Using the range 1 to 9 opens up more possibilities involving the 9.

- $9 - 1 = 8$  gives  $2 + 6 = 3 + 5 = 8$ .
- $9 - 2 = 7$  gives  $1 + 6 = 2 + 5 = 7$
- $9 - 3 = 6$  gives  $1 + 5 = 2 + 4 = 6$

Using the range 1 to 10 now allows us to use the 10.

- $10 - 1 = 9$  gives  $2 + 7 = 3 + 6 = 4 + 5 = 9$
- $10 - 2 = 8$  gives  $1 + 7 = 3 + 5 = 8$
- $10 - 3 = 7$  gives  $1 + 6 = 2 + 5 = 7$
- $10 - 4 = 6$  gives  $1 + 5 = 2 + 4 = 6$
- $10 - 5 = 5$  gives  $1 + 4 = 2 + 3 = 5$

Putting 0 in the range produces quite a few surprises. There are solutions for the ranges as small as 0 to 5!

- $1 + 4 = 2 + 3 = 5 - 0$
- $1 + 5 = 2 + 4 = 6 - 0$
- $0 + 5 = 2 + 3 = 6 - 1$
- $0 + 4 = 1 + 3 = 6 - 2$
- $1 + 6 = 2 + 5 = 3 + 4 = 7 - 0$
- $0 + 6 = 2 + 4 = 7 - 1$
- $0 + 5 = 1 + 4 = 7 - 2$
- $0 + 3 = 1 + 2 = 7 - 4$