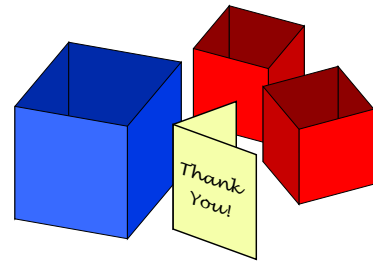## Problem

Jasmina has a mix of boxes, some red and some blue. She sorts 27 greeting cards into the boxes, putting exactly 3 cards into each red box, and 7 cards into each blue box. How many blue boxes does Jasmina have?

Hints

Hint 1 - Could Jasmina have 3 red boxes? Could she have 4 blue boxes?

Solution

Jasmina has some red and some blue boxes, and she puts exactly 3 cards into each red box, and exactly 7 cards into each blue box. Since there are 27 cards in total, it must be true that

$$3 \times (\text{Number of red boxes}) + 7 \times (\text{Number of blue boxes}) = 27$$

Let $R =$ the number of red boxes, and $B =$ the number of blue boxes, so the equation becomes

$$3R + 7B = 27$$

Since R and B must be positive whole numbers, we need a multiple of 3, plus a multiple of 7 which sum to 27.

        Multiples of 3:   3, 6, 9, 12, 15, 18, 21, 24, 27, ...
        Multiples of 7:   7, 14, 21, ...

Summing these in pairs reveals that the only possibility is $6 + 21 = 27$. thus Jasmina has 2 red boxes and 3 blue boxes, so $3 \times 2 + 7 \times 3 = 27$.