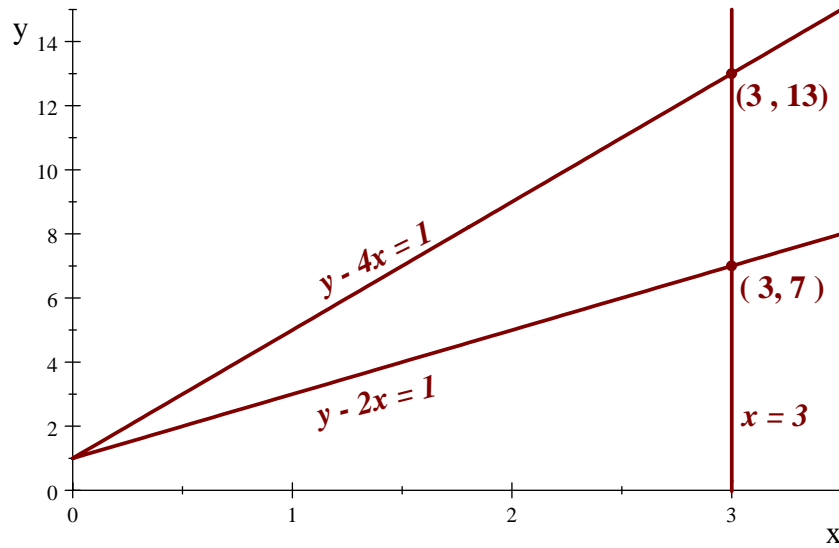


Student Math League
Solutions to Week of Oct. 1 Problems

1. Below is the graph of the figure



Thus the figure is a triangle with base 6 and height 3 so that the area is

$$\frac{1}{2}(6)(3) = 9$$

2. Let d = number of dimes, n = number of nickels, and q = number of quarters. Then the following equations must be true

$$d + n + q = 40$$

$$10d + 5n + 25q = 590$$

$$5d + 25n + 10q = 545$$

The solution to this system of linear equations is $d = 10$, $n = 13$, and $q = 17$. Thus, the number of nickels is 13.

3. Approach 1: There are two possible boy (B) / girl (G) arrangements that will work:

$$B \ G \ B \ G \ B \ G \ \text{OR} \ G \ B \ G \ B \ G \ B$$

There are ${}_3P_3 = 3!$ ways to place the three boys and ${}_3P_3 = 3!$ ways to place the three girls in either of these two arrangements. There are ${}_6P_6 = 6!$ ways to place the children in ANY arrangement. Thus the probability is

$$\frac{2 \cdot 3! \cdot 3!}{6!} = \frac{1}{10}$$

Approach 2: Choose any child for the first seat (prob = 1) (call the sex of this child A), next child must be sex B (prob = $\frac{3}{5}$), next child sex A (prob = $\frac{2}{4}$), next child sex B (prob = $\frac{2}{3}$), next child sex A (prob = $\frac{1}{2}$), last child sex B (prob = 1). Thus, using the multiplication rule, the probability is

$$1 \cdot \frac{3}{5} \cdot \frac{2}{4} \cdot \frac{2}{3} \cdot \frac{1}{2} \cdot 1 = \frac{1}{10}$$