

**Bergen County Math League
Calculators Permitted**



Contest #5

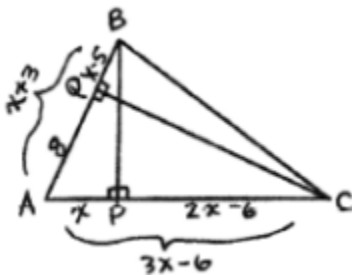
2025-2026

Answers/Solutions

5-1. **Answer:** $\frac{2}{3}$ or exact equivalent

Since she has at least one yellow ball, the possibilities for the two selections are $(Y, Y), (R, Y), (Y, R)$, each equally likely since the two bags had equal numbers of the two colors. In two of the three possibilities, a red ball is also present.

5-2. **Answer:** $\frac{2}{3}$



Using the diagram, $\cos A = \frac{x}{x+3} = \frac{8}{3x-6}$.

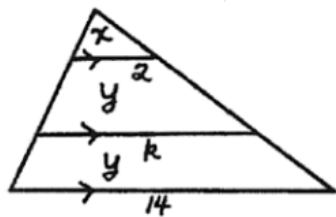
Thus, $8x + 24 = 3x^2 - 6x$ and

$$3x^2 - 14x - 24 = (3x + 4)(x - 6) = 0.$$

Since x is positive, $x = 6$ and $\cos A = \frac{2}{3}$.

5-3. **Answer:** 34
Since $9x + 2 = 4(2x + 9), x = 34$.

5-4. **Answer:** 10



In the diagram, k = the length sought, and x and y represent areas of the regions indicated. Notice that the sides of the trapezoid have been extended until they meet. Since all 3 triangles are similar,

$$\frac{x+2y}{x} = \frac{14^2}{2^2} = \frac{49}{1} \Rightarrow 1 + \frac{2y}{x} = \frac{49}{1}$$

$$\Rightarrow \frac{2y}{x} = \frac{48}{1} \Rightarrow \frac{y}{x} = \frac{24}{1} \Rightarrow 1 + \frac{y}{x} = \frac{x+y}{x} = \frac{25}{1} = \frac{5^2}{1^2} = \frac{k^2}{2^2} \Rightarrow k = 10.$$

5-5. **Answer:** $(6,6), \left(-\frac{6}{5}, \frac{6}{5}\right)$

The points are those which lie on the intersection of the given line and either of the lines whose equations are $y = x$ or $y = -x$. If $y = x$, then $2x - 3x + 6 = 0$. If $y = -x$, then $2x + 3x + 6 = 0$. The solutions are $(6,6), \left(-\frac{6}{5}, \frac{6}{5}\right)$.

5-6. **Answer:** 0

This is **NOT** the factorial function, since $f(0) = 0 \cdot f(-1) = 0$. Thus, $f(1) = 1 \cdot f(0) = 0$, and, in general, $f(x) = 0$ for all non-negative integral values of x . Thus, $f(5) = 0$.