

**MASSACHUSETTS MATHEMATICS LEAGUE**  
**CONTEST 6 - MARCH 2010**  
**ROUND 6 ALG 2: PROBABILITY AND THE BINOMIAL THEOREM**

**ANSWERS**

A) \_\_\_\_\_

B) \_\_\_\_\_

C) \_\_\_\_\_

<b>***** NO CALCULATORS IN THIS ROUND *****</b>
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A) One container has 5 blue chips and 4 red chips, while another container has 4 blue chips and 5 red chips. One chip is chosen at random from each container. What is the probability that one chip is red and the other is blue?

B) Three mathletes  $A$ ,  $B$  and  $C$  are simultaneously (but independently) trying to solve a difficult math problem. The probability of  $A$  correctly solving the problem is  $\frac{1}{5}$  and the probability of  $B$  correctly solving the same problem is  $\frac{1}{4}$ .

Let  $P$  denote the probability of the problem being solved by at least one of the mathletes.

Let  $Q$  denote the probability that the problem is solved by exactly one of the mathletes.

If  $P : Q = 8 : 5$ , compute the probability that  $C$  solves the problem correctly.

C) The 5<sup>th</sup> term in the expansion of  $\left(\frac{1}{2}x^2 + Ax^{-1}\right)^7$  is  $\frac{70}{81}x^T$ .

Compute all possible ordered pairs  $(A, T)$ .

Note: The 1<sup>st</sup> term in the expansion is  $\frac{x^{14}}{128}$ .