Two Practice Problems for Possibility & Probability
(11th Grade Online Workshop)

Problem #1 (from page xx in the *Teacher's Introduction*):

What is the probability of drawing three cards from a deck and getting all face cards?

Solution #1: The probability that the first card is a face card is $\frac{12}{52}$.

Once the first card has been chosen (and it was successfully a face card), the probability that the second card is a face card is $\frac{11}{51}$. Once the first two cards have been chosen (and both are face cards), the probability that the third card is a face card is $\frac{10}{50}$. Therefore, the probability that all three cards are face cards is $\frac{12}{52} \cdot \frac{11}{51} \cdot \frac{10}{50} \approx \underline{\textbf{1.00\%}}$.

Solution #2: The number of successful outcomes (number of ways to get three face cards) is $_{12}C_3 = 220$, and the total number of possible outcomes is $_{52}C_3 = 22{,}100$. Therefore, the probability of drawing three face cards is $220 \div 22{,}100 \approx \underline{\textbf{1.00\%}}$.

Note: For more problems involving decks of cards, see page xx in the *Teacher's Introduction* of our 11th/12th Grade Workbook, Teacher's Edition.

Problem #2 (from the *Challenge Problem Set* of the Possibility & Probability unit, problem #1a):

On a multiple choice test with 7 questions, each with four possible answers (ABCD), what is the probability of getting exactly 4 correct answers with random guessing?

Solution: First of all, we calculate the probability that the first four answers are all correct (which is $(\frac{1}{4})^4$) and the last three answers are all incorrect (which is $(\frac{3}{4})^3$). Therefore the probability that the first four answers are correct <u>and</u> the last three answers are incorrect is $(\frac{1}{4})^4 \cdot (\frac{3}{4})^3 \approx 0.0016479$. However, the problem stipulates that the four correct answers could be in any position. So we need to take the above answer and multiply it by the number of possible ways of rearranging the positions of the correct and incorrect answers. How many ways can we rearrange the positions of the correct and incorrect answers? Well, this is the same as the number of ways of rearranging the letters in the word AAAABBB, which is $\frac{7!}{4!\,3!}$ or $_7C_4$.

Therefore, the final answer to the originally stated problem is $_7C_4 \, (\frac{1}{4})^4 \, (\frac{3}{4})^3 \approx 5.77\%$.

Note: For other challenging problems with Possibility and Probability, see the *Challenge Problem Set* in our 11th/12th Grade Workbook.