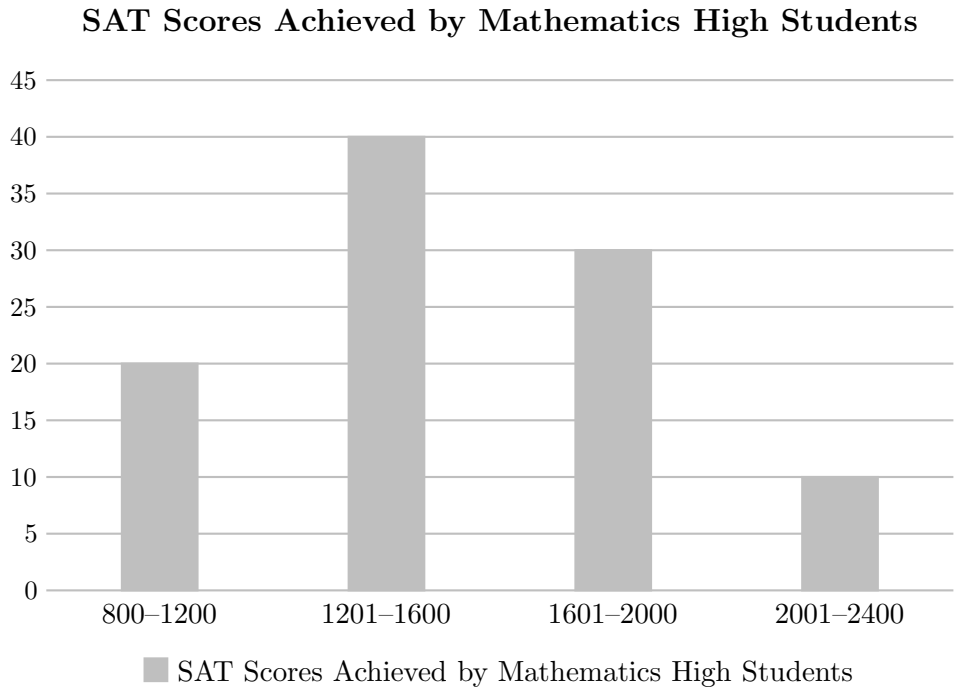
Probability and Statistics
8th Grade

1. **2 points:** The bar graph below shows the SAT scores that were achieved by a group of students from Mathematics High. Let A equal the average of the students' scores, let B equal the median score, and let C equal the mode of the scores. What is the greatest possible sum $A + B + C$?



2. **2 points:** Thirteen cards are stacked in increasing order: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K. If you were to choose a random card from the stack, then take that card and all cards above it and put them in the same order at the bottom of the stack, what is the probability that the top three cards in the new stack would still be in increasing order? For example, if you chose the 5, your new stack would be: 5, 6, 7, 8, 9, 10, J, Q, K, Ace, 2, 3, 4. **Express your answer as a reduced fraction.**

3. **2 points:** If the letters in the word "BINGO" are arranged at random, what is the probability that the two vowels will not be immediately next to each other in the resulting arrangement? **Express your answer as a reduced fraction.**

4. **3 points:** In a round-robin style mental math competition, each of ten contestants must match up against each of his/her opponents exactly three times. How many matches are played in all?

5. **3 points:** In a best-of-7 series of games between two players, a person is declared a winner once that person has won 4 games (no ties are allowed). In how many unique ways could the series play out?

6. **3 points:** The gelato shop "I Scream" offered up an irresistible "Random Bowl" promotion: out of 5 possible flavors, the employees would choose a random number of flavors and would then choose the flavors randomly. Given that there cannot be two scoops of the same flavor in a bowl, how many unique "Random Bowls" are possible?

7. **3 points:** Johnny paid \$1 to a gardening store owner for a small bag of apple tree seeds that cost \$0.59. In how many unique ways can the store owner give Johnny his change, using any number of quarters, dimes, nickels, and/or pennies?

8. **4 points:** Two black jars, each with a mix of tasty and gross cookies, sit on a countertop. Jar 1 has 2 chocolate chip cookies and 1 broccoli cookie. Jar 2 has 1 chocolate chip cookie and 2 broccoli cookies. One of the numbers between 1 and 3, inclusively, is randomly chosen. That number of randomly chosen cookies is transferred from Jar 1 to Jar 2. What is the probability then that a randomly chosen cookie from Jar 2 will be of the gross (broccoli) kind? **Express your answer as a reduced fraction.**

9. **4 points:** If two whole numbers between 1 and 100, inclusively, are multiplied together, what is the probability that their product will have a 6 as its ones digit? **Express your answer as a percent.**

10. **4 points:** Standing on the middle square of a 15-square-long game board, you roll a fair six-sided die three times. After the first roll, you move that many squares to the right. After the second roll, you move that many squares to the left. On the final roll, you again move that many squares to the right. What is the probability that you will step off the game board on the third roll? **Express your answer as a reduced fraction.**