



## Probability and Statistics 8<sup>th</sup> Grade

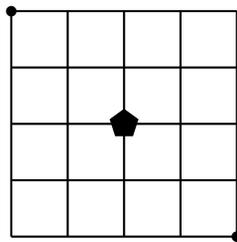
- 2 points:** If the seven digits 3, 2, 5, 2, 0, 1, and 7, are randomly arranged into a seven-digit number, what is the probability that it will be divisible by 4? **Express your answer as a reduced fraction.**
- 2 points:** Mr. Olsen is choosing an ultimate frisbee team of 5 players from a group of 7 players. Mr. Demos is choosing an opposing team of 5 players from a different group of 8 players. How many unique combined groups of 10 players out on the playing field are possible? Assume that all 5 players on a team have the same role.
- 2 points:** All bored by himself, Owen Lee rolls a standard, fair six-sided die three times. After the first roll, he moves right a number of steps equal to the number he rolled. After the second roll, he moves left a number of steps equal to the number he rolled the second time. Lastly, after the final roll, he moves right a number of steps equal to the number he rolled on his final roll. If all the steps he took were of the same size, what is the probability that he ends up in the same spot in which he began? **Express your answer as a reduced fraction.**
- 3 points:** After studying the interactions of her teachers and classmates, and whether when passing each other they would say “hello” to each other or not, Adele was able to collect several statistics. She found that:
  - 8% of the time, the student said hello and the teacher did not respond;
  - 24% of the time, the teacher said hello and the student did not respond;
  - 20% of the time, both said hello to each other;
  - 48% of the time, neither said hello to each other.Using the above data, given that a teacher says hello to a student, what is the probability that the student will **not** say hello? **Express your answer as a reduced fraction.**
- 3 points:** A rectangle is drawn with vertices at the points with coordinates (1, 1), (6, 1), (6, 9), and (1, 9). A point  $(x, y)$  is chosen randomly on or inside the rectangle. What is the probability that  $x < y$ ? **Express your answer as a reduced fraction.**

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6. **3 points:** Two friends are out at recess with their Pokemon cards. Pika has 8 common cards and 2 rare cards. Chu has 8 common cards and 1 rare card. If Pika closes her eyes and randomly chooses a card of hers to add to Chu's deck, and then Chu closes his eyes and randomly chooses a card of his to add to Pika's deck, what is the probability then that a randomly chosen card from Pika's deck will be a rare card? **Express your answer as a percent.**
7. **3 points:** A group of mathematicians was surveyed to find out what types of math they enjoyed working on during the course of their careers. It was found that:
- 63 enjoyed at least Algebra;
  - 34 enjoyed at least Geometry;
  - 52 enjoyed at least Probability/Statistics;
  - 15 enjoyed at least Algebra and Geometry;
  - 26 enjoyed at least Algebra and Probability/Statistics;
  - 18 enjoyed at least Geometry and Probability/Statistics;
  - 10 enjoyed all three types of math.

If each mathematician who was surveyed expressed enjoyment in at least one type of math, how many mathematicians were surveyed in all?

8. **4 points:** A list of seven positive integers has a mean of 5. Four of these seven numbers are 2, 3, 5, and 8. What is the minimum possible sum of the range and median of this list of numbers?
9. **4 points:** In the grid of streets below, a mailman is trying to determine a route from the top left part of the grid to the bottom right of the grid by walking along the streets and using the least possible distance. However, along the way, the mailman wants to stop at the local coffeeshop, Pentadollars, which is located in the center of the grid of streets. How many unique routes could he have taken that day?



10. **4 points:** Let  $A$  be the set of all one-digit positive integers. How many subsets of  $A$  contain at least one prime number?