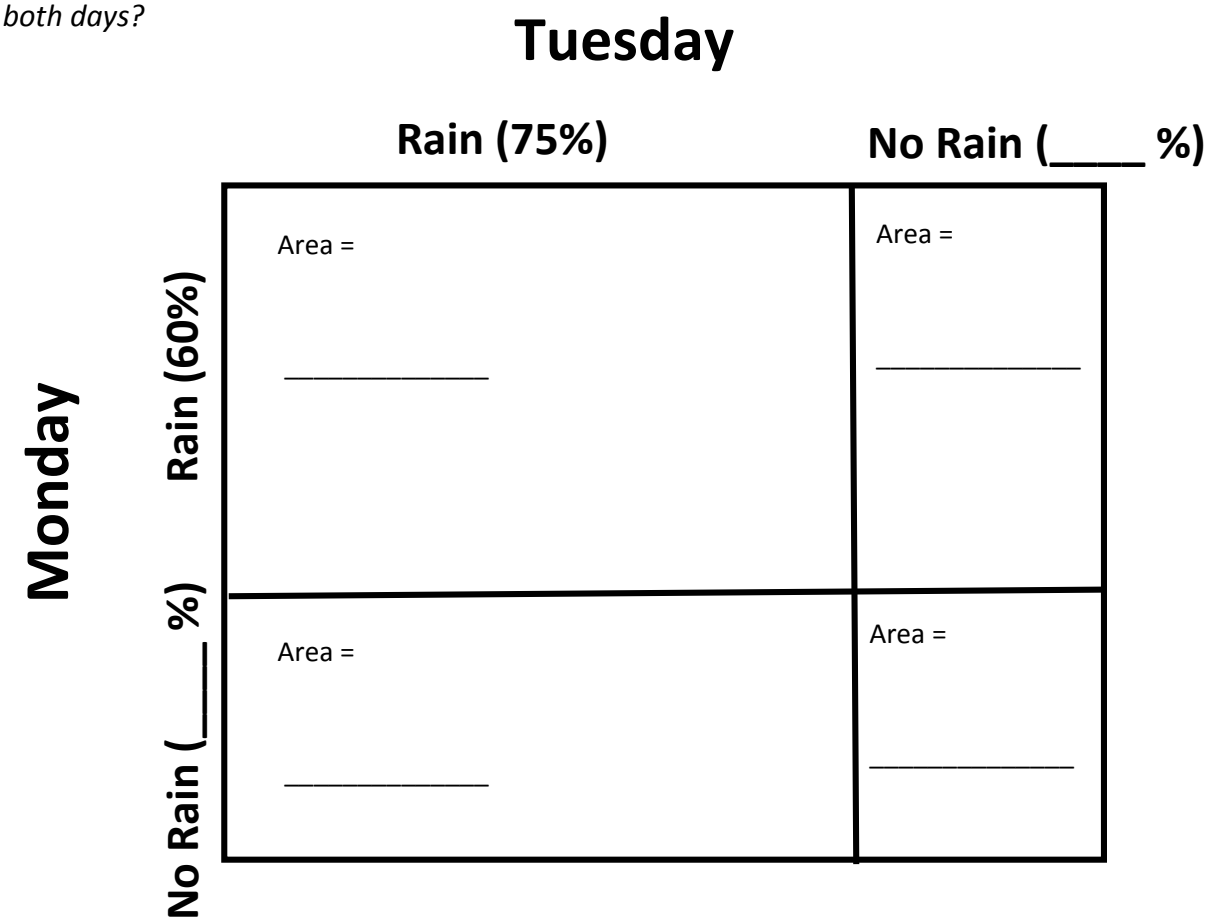
Geometry B Name _____

Understanding Probability

If there is a 60% chance of rain on Monday and a 75% chance of rain on Tuesday, what is the likelihood of rain on both days?



Each side represents the sample space of its event (rain/no rain Monday, rain/no rain Tuesday). The body of the rectangle represents the probability of the two intersecting events.

Use the length & width of the sides to calculate the area of the intersecting events.

Total Area = _____

Probability of rain on Monday & Tuesday = _____

Probability of rain on ONE day only = _____

Probability of NO rain at all = _____

The area model highlights two of the most important procedural questions in calculating probability:

1. When do you MULTIPLY probabilities?
2. When do you ADD probabilities?

Tree Diagrams

How many outcomes are possible from the following situations?

1. Flip a dime and then flip a quarter
2. A choice of chicken, fish or beef for the main dish and a choice of cake or pudding for dessert
3. A choice of either a green or blue shirt and a choice of blue, black or khaki pants
4. A choice of pizza or spaghetti; a choice of milk or juice to drink; a choice of pudding or an apple for dessert
5. Shirts come on three sizes: small, medium or large; shirts have buttons or snaps; colors are blue or beige
6. The choices for school mascot are lion, bear and porpoise; colors are red, blue and gold

As students present their work create a table like the one below:

Decisions per event	**Possible Outcomes**

Is there a relationship between the number of decisions to be made and the possible outcomes? *The possible outcomes is the product of the decisions – this is the* ***Fundamental Counting Principle***

The **Fundamental Counting Principle** tells us that if we have two decisions to make, and there are ***M*** ways to make the first decision, and ***N*** ways to make the second decision, the product of ***M*** and ***N*** tells us how many different outcomes there are for the overall decision process. In general, when a series of decision are to be made, the product of all the way to make the individual decisions determines the number of outcomes there are.

Travel Time

A travel agent plans trips for tourists from Chicago to Miami. He gives them three ways to get from town to town: airplane, bus, train. Once the tourists arrive, there are two ways to get to the hotel: hotel van or taxi. The cost of each type of transportation is given in the table below.

Transportation Type	Cost
Airplane	$350
Bus	$150
Train	$225
Hotel Van	$60
Taxi	$40

1. Draw a tree diagram to illustrate the possible choices for the tourists. Determine the cost for each outcome.

2. If these six outcomes are chosen equally by tourists, what is the probability that a randomly selected tourist travel in a bus?

3. What is the probability that a person's trip cost less than $300?

4. What is the probability that a person's trip costs more than $350?

5. If the tourists were flying to New York, the subway would be a third way to get to the hotel. How would this change the number of outcomes?

"Happy Birthday to You"

Andy has asked his boyfriend to make all the decisions for their date on his birthday. He will pick a restaurant and an activity for the date. Andy will choose a gift for him. The local restaurants include Mexican, Chinese, Seafood, and Italian. The activities he can choose from are Putt-Putt, bowling, and movies. Andy will buy him either candy or flowers.

1. How many outcomes are there for these three decisions? _____
2. Draw a tree diagram to illustrate the choices.

Dinner for Two	Activity Cost for Two	Gift Cost
Mexican - $20	Putt-Putt - $14	Flowers - $25
Chinese - $25	Bowling - $10	Candy - $7
Italian - $15	Movies - $20	

3. If all the possible outcomes are equally likely, what is the probability that the date will cost at least $50?

4. What is the maximum cost for the date?

5. What is the minimum cost for the date?

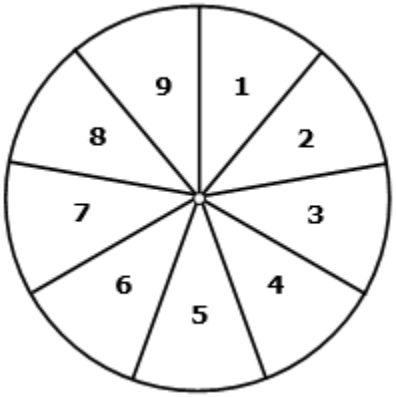
6. To the nearest dollar, what is the average cost for this date?

7. What is the probability that the date costs exactly $60?

8. What is the probability that the date costs under $40?

1. At a school carnival, the math club hosts a booth for games. One of the games uses the spinner to the right, where each numbered section is of the same size. A student who correctly guesses the sum of the numbers that result when the spinner is spun twice receives a prize.

   Which number should a student guess as the sum to have the *greatest* chance of winning a prize?

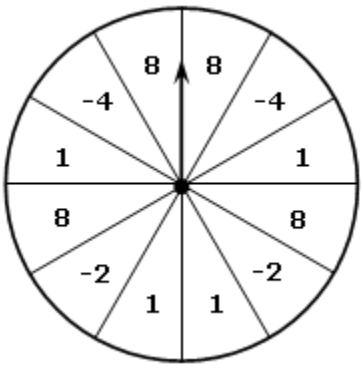


2. Two neighboring towns are looking at each of the houses in their towns to determine if they have certain features. Out of the 247 houses in Plainville, 67 of them have attached garages, 122 have non–attached garages, and 58 do not have a garage. Out of the 194 houses in Burbana, 56 of them have attached garages, 101 have non–attached garages, and 37 do not have a garage.

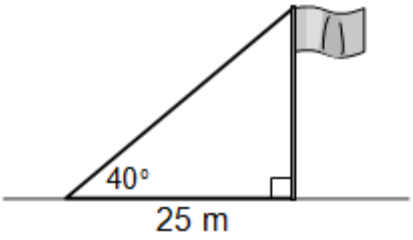
   Given a list of all of the houses, what is the probability of randomly selecting a house in each city that has an attached garage?

3. Andrea is playing a board game with her friends. When a player lands on the spinner space of the board game, the player spins the spinner shown to the right and receives the number of points indicated in the section where the arrow stops. A negative value means a loss of points.

   What is the expected payoff, in points, for landing on the spinner space of the board game?



4. A flagpole casts a shadow 25 meters long when the angle of elevation of the Sun is 40°. How tall is the flagpole to the nearest meter? Show all work.



5. Solve for x. Show all work.