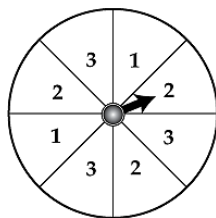


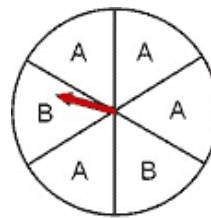


Target 8A: Use a sample space to describe events as subsets of that sample space and determine if two events are independent utilizing probability tests.

1. Given the spinners, identify the sample spaces. (1 point)

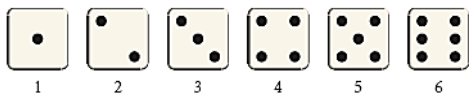


$$n = \{1, 2, 3\}$$



$$n = \{A, B\}$$

2. When rolling a 6-sided die, identify the sample space of rolling an odd number. (1 point)



$$n = \{1, 3, 5\}$$

3. Which of the following events would **NOT** represent independent probability? (1 point)

- A. Choosing a piece of candy from a jar and landing on tails after tossing a coin.
 - ☒ B. A marble is chosen from a jar, and without replacing it, a second marble is chosen.
 - C. Rolling a 2 on a single 6-sided die, and then rolling a 3 on a second roll of the die.
 - D. Choosing an 8 from a deck of cards, replacing it, and then choosing a King as the second card.
 - E. Landing on tails after tossing a coin and rolling a 1 on a single 6-sided die.
4. Today's forecast calls for a 22% chance of snow in Detroit and a 45% chance of snow in Elgin. The probability that it will rain in both cities is 9.9%. Are the events "It snows in Detroit" and "It snows in Elgin" dependent or independent? Justify your answer by demonstrating/explaining a probability test. (3 points)

Formula: $P(A \cap B) \stackrel{?}{=} P(A) \cdot P(B)$

$$0.099 \stackrel{?}{=} 0.22 \cdot 0.45$$

$$0.099 = 0.099 \text{ Yes, independent events.}$$

5. The probability of watching television is 0.73 and the probability of eating a snack is 0.34. If the probability of watching television and eating a snack is 29%, is watching television independent of eating snacks? Justify your answer by demonstrating/explaining a probability test. (3 points)

Formula: $P(A \cap B) \stackrel{?}{=} P(A) \cdot P(B)$

$$0.29 \stackrel{?}{=} 0.73 \cdot 0.34$$

$$0.29 \neq 0.2482 \text{ No, not independent events.}$$

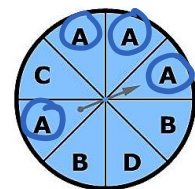
Target 8B: Use the rules of probability to compute probabilities of compound events in a uniform probability model.

6. Determine the probability of pulling a consonant tile *and* spinning a vowel. (1 point)

$$P(\text{consonant}) \cdot P(\text{vowel spin})$$

$$\frac{3}{6} \cdot \frac{4}{8} = \frac{12}{48} = \boxed{\frac{1}{4}}$$

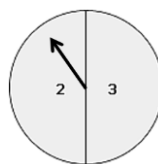
multiply!



7. Jim and Rose are playing a game where they spin a spinner coin three times and try to predict the outcomes. Using the sample space of possible outcomes listed below, what is $P(A \text{ and } B)$, the probability that the first spin is a 2 *and* the third spin is a 3? (1 point)

multiply!

$$\frac{4}{16} = \boxed{\frac{1}{4}}$$



2222	2223	3323	<u>2332</u>
3222	3333	3332	3322
2322	<u>2333</u>	<u>2233</u>	3232
<u>2232</u>	3233	2323	3223

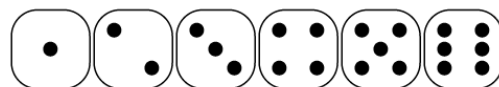
16 total outcomes

8. What is the probability of rolling a 6, *or* a number greater than 2 on a regular die? (1 point)

$$P(6) + P(3,4,5,6)$$

$$\frac{1}{6} + \frac{4}{6} = \boxed{\frac{5}{6}}$$

add!

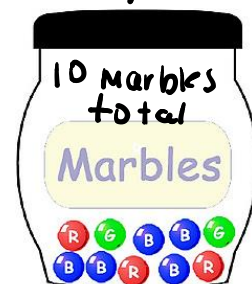


9. A jar contains 3 red marbles, 2 green marbles, and 5 blue marbles. If we choose a marble, then another marble without putting the first one back in the goblet, what is the probability that the first marble will be green *and* the second will be blue? (3 points)

$$P(\text{green}) \cdot P(\text{blue, no replacement})$$

$$\frac{2}{10} \cdot \frac{5}{9} = \frac{10}{90} \Rightarrow \boxed{\frac{1}{9}}$$

multiply!



10. On the weekends, you are happy to not wear the Morton uniform, and you wear as much color as possible. In your closet you have 4 shirts colored lime, pink, red, and yellow, and 3 pairs of pants colored black, green, and tan. What is the probability that you select either a pink or red shirt *and* green pants? (3 points)

$$P(\text{pink or red}) \cdot P(\text{green pants})$$

$$\frac{2}{4} \cdot \frac{1}{3} = \frac{2}{12} \Rightarrow \boxed{\frac{1}{6}}$$

multiply!



Target 8C: Construct and interpret a two-way frequency table.

11. If a person is chosen at random, what is the probability the person used Dropping Zone A and were Injured while parachute training? (1 point)

$$\frac{5}{55} = \boxed{\frac{1}{11}}$$

	Injured	Uninjured	Total
Dropping zone A	5	10	15
Dropping zone B	2	38	40
Total	7	48	55

↑
randomly chosen

12. If you choose a person from the survey at random, what is the probability the person will be a middle school student that does not play team sports? (1 point)

$$\frac{10}{20} = \boxed{\frac{1}{2}}$$

Middle School Music and Sports Survey			
	Plays Team Sport	Does Not Play Team Sport	Total
Plays Instrument	8	3	11
Does Not Play Instrument	2	7	9
Total	10	10	20

↑
randomly chosen

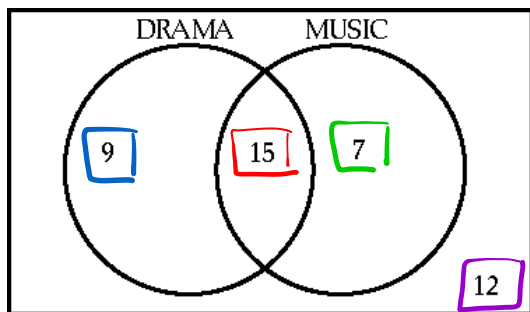
13. What is $P(\text{is a female} \mid \text{prefer Ritual B})$? (1 point) Formula: $P(A|B) = \frac{P(A \cap B)}{P(B)}$

$$= \frac{P(\text{female} \cap \text{Ritual B})}{P(\text{Ritual B})}$$

$$= \frac{\frac{4}{100}}{\frac{13}{100}} \Rightarrow \boxed{\frac{4}{13}}$$

	Ritual A	Ritual B	Totals
Male	43	9	52
Female	44	4	48
TOTALS	87	13	100

14. Theatre Club was asked to vote for the activity they preferred. Construct a two-way table for the information shown in the Venn diagram below. (3 points)



	Music YES	Music NO	TOTALS
Drama YES	15	9	24
Drama NO	7	12	19
TOTALS	22	21	43

15. Allison surveyed the teachers in her school and found that 45 males agree with the uniform policy while 15 do not. There were 81 females surveyed and 22 of them agree with the uniform policy. Construct a two-way table. (3 points)

	YES	NO	TOTALS
Male	45	15	60
Female	22	59 ⁽⁸¹⁻²²⁾	81
TOTALS	67	74	141

Target 8D: Demonstrate understanding by calculating conditional probability and independence using everyday examples of events based on the context of the problem.

16. The probability that Ella exercises is 0.58. The probability that she exercises and is overweight is 0.20. Find the probability that Ella is overweight, given that she exercises. (1 point)

Formula: $P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow \frac{0.20}{0.58} = \boxed{0.34}$

17. The probability that children eat chicken nuggets and drink apple juice is 0.72. The probability that children eat chicken nuggets is 0.57. Find the probability that children drink apple juice, given that they just ate chicken nuggets. (1 point)

Formula: $P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow \frac{0.72}{0.57} = \boxed{1.26}$

18. A school survey found that 4 out of 5 students brush their teeth every morning. If six students are chosen at random with replacement, what is the probability that all six students brush their teeth? (1 point)

$$\frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} = \left(\frac{4}{5}\right)^6 = \boxed{\frac{4096}{15,625}}$$

19. The probability of going to the zoo is 0.49 and the probability of going to the dolphin show is 0.23. If the probability of going to the dolphin show given that you went to the zoo is 0.38, is going to the zoo independent of going to the dolphin show? Show work to support your answer. (3 points)

Formula: $P(A|B) = \frac{P(A \cap B)}{P(B)}$

$$P(\text{dolphin} | \text{zoo}) = \frac{P(\text{dolphin}) \cdot P(\text{zoo})}{P(\text{zoo})} \Rightarrow 0.38 \stackrel{?}{=} \frac{0.23 \cdot 0.49}{0.49} \Rightarrow 0.38 \neq 0.23$$

Dependent Events

20. Given that Event A and B are independent: (3 points)

a) $P(A) = 0.8$ and $P(B) = 0.26$, then $P(A|B) = \frac{0.8 \cdot 0.26}{0.26} = \boxed{0.8}$

Formula: $P(A|B) = \frac{P(A \cap B)}{P(B)}$

b) $P(A) = 0.33$ and $P(B) = 0.52$, then $P(A \text{ and } B) = 0.33 \cdot 0.52 = \boxed{0.1716}$

Formula: $P(A \text{ and } B) = P(A) \cdot P(B)$

c) $P(A) = 0.86$ and $P(B) = 0.21$, then $P(B|A) = \frac{0.21 \cdot 0.86}{0.86} = \boxed{0.21}$

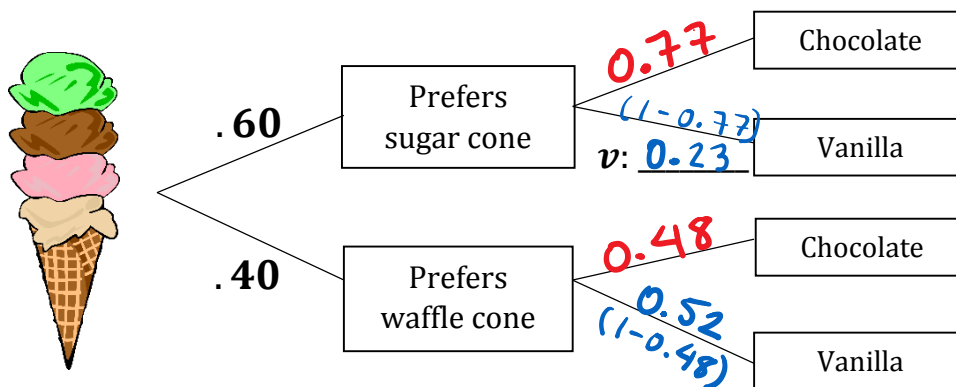
Formula: $P(B|A) = \frac{P(B \cap A)}{P(A)}$

Target 8E: Compute probabilities of independent, dependent and compound events and use these to interpret data.

Use the tree diagram and given information below to answer questions 21 – 24.

A survey reported the following data regarding ice cream consumption:

- Of the people who prefer sugar cones, 77% order chocolate ice cream
- Of the people who prefer waffle cones, 48% order chocolate ice cream



21. On the tree diagram, which decimal should be placed in the blank space labeled “v”? (1 point)

$$1 - 0.77 = \boxed{0.23}$$

22. Explain what the probability of v represents. (1 point)

The probability of ordering vanilla given you prefer sugar cones.

23. Find $P(\text{Prefers sugar cone AND orders vanilla})$. (1 point)

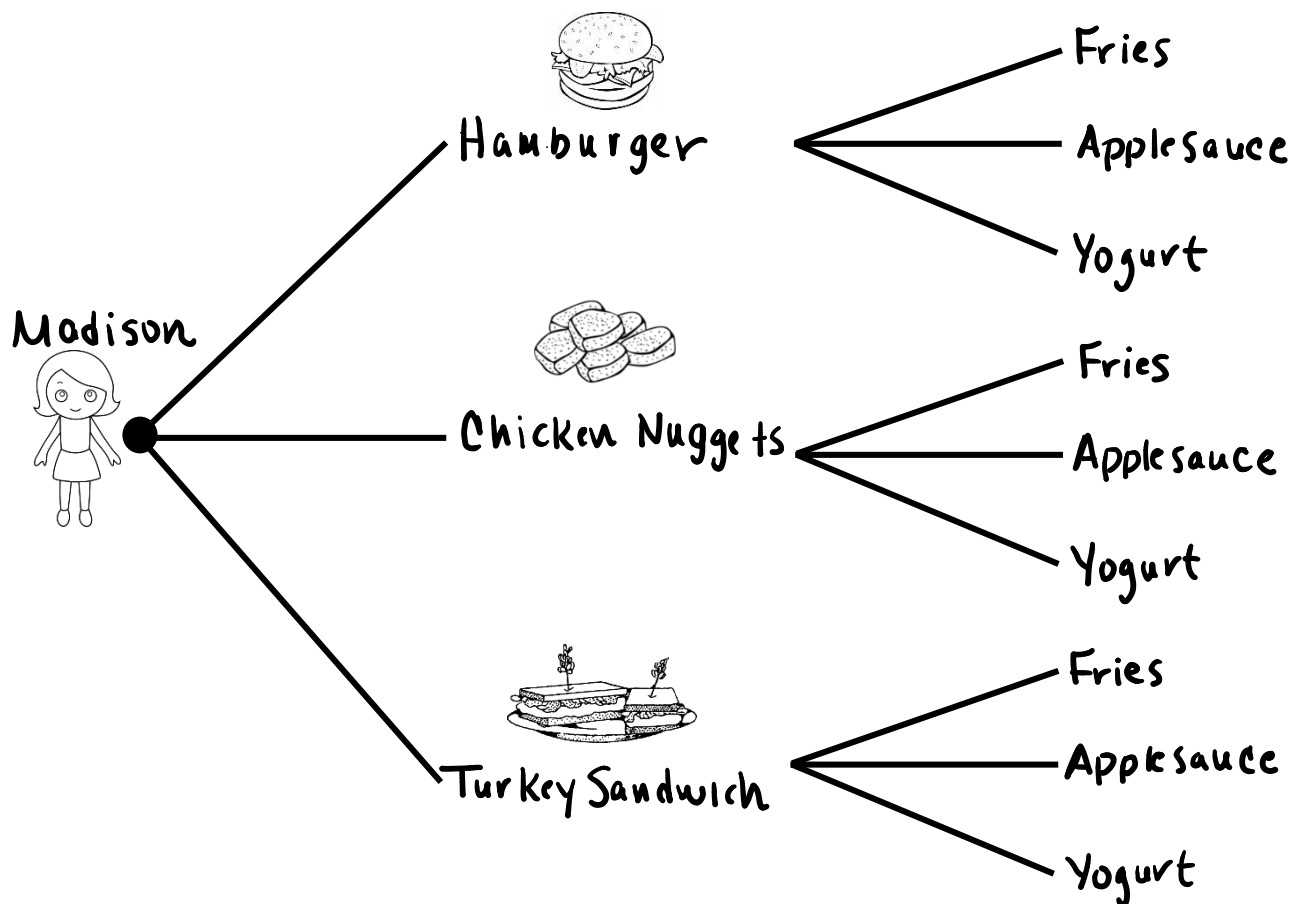
$$\begin{aligned} &= P(\text{sugar cone}) \cdot P(\text{vanilla}) \\ &= 0.60 \cdot 0.23 \Rightarrow \boxed{0.138} \end{aligned}$$

24. What is the overall percentage of people who order chocolate ice cream? (3 points)

$$\begin{aligned} &= P(\text{sugar cone \& chocolate}) + P(\text{waffle cone \& chocolate}) \\ &= (0.60 \cdot 0.77) + (0.40 \cdot 0.48) \\ &= 0.462 + 0.192 \\ &= 0.654 \Rightarrow \boxed{65\%} \end{aligned}$$

25. Madison needs to order her Happy Meal. She has three main choice options that include a hamburger, chicken nuggets, or a turkey sandwich. Madison also has three side dishes that include French fries, applesauce, or yogurt. Use the strategies below to determine the number of combinations that Madison could order. (3 points)

a) Draw a tree diagram that represents this situation:



b) How many combinations can Madison choose from?

9

- c) Calculate the probability of Madison choosing a turkey sandwich on Friday, *and* then choosing a hamburger on Saturday. On Saturday, turkey sandwiches are not available for purchase.

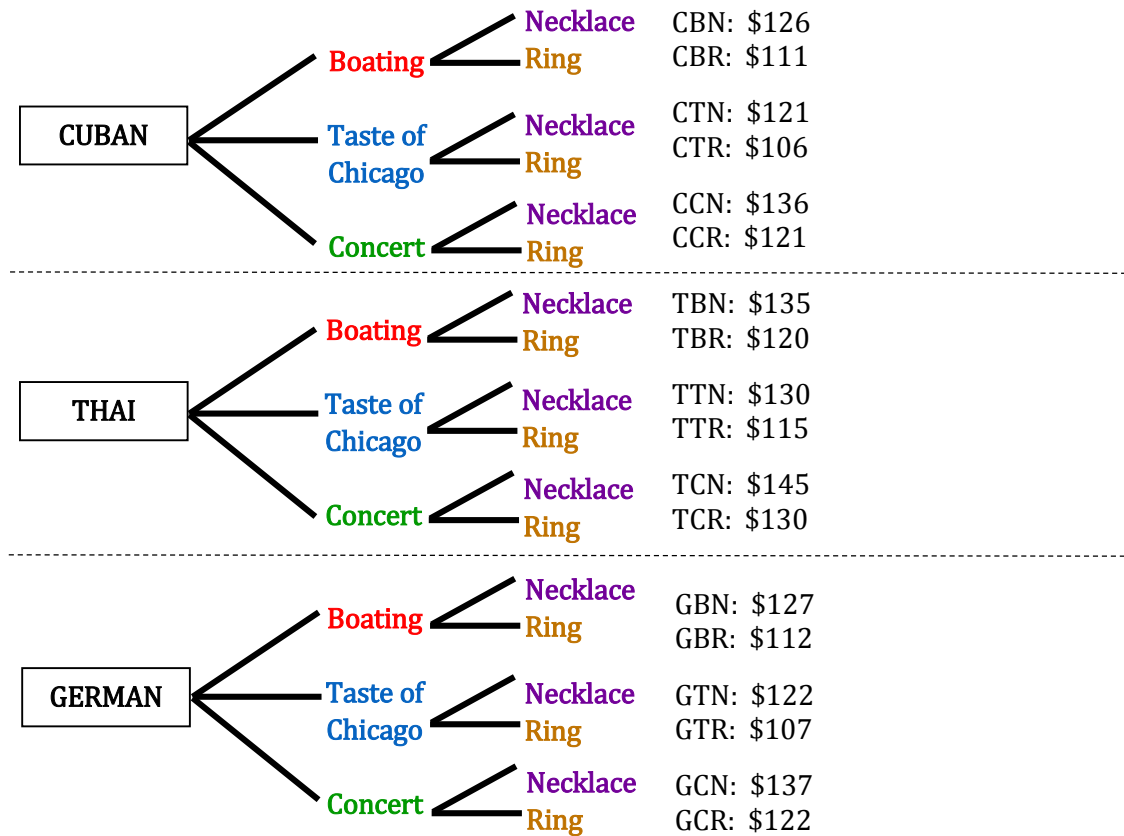
$$\frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$$

ADVANCED (10 possible points)

Theo has asked his girlfriend to make all the decisions for their anniversary. She will pick a restaurant and an activity for the date. Theo will choose a gift for her. The local restaurants include Cuban, Thai, and German. The activities she can choose from are boating on Lake Michigan, the Taste of Chicago, and a concert at Northerly Island. Theo will buy her either a necklace or a ring.

Dinner for Two	Activity Cost for Two	Gift Cost
Cuban - \$21	Boating on Lake Michigan - \$25	Necklace - \$80
Thai - \$30	Taste of Chicago - \$20	Ring - \$65
German - \$22	Northerly Island concert - \$35	

1. Draw a tree diagram to illustrate the choices, and calculate the total cost for each choice. (3 points)



2. How many outcomes are there for these three decisions? **18 outcomes**
3. If all of the possible outcomes are equally likely, what is the probability that the date will cost at least \$120?

$$\frac{13}{18}$$

4. What is the MAXIMUM cost for the date? **\$145**
5. What is the MINIMUM cost for the date? **\$106**
6. To the nearest dollar, what is the AVERAGE cost for this date?

$$\frac{\$2133}{18 \text{ total outcomes}} = \$118.50$$

7. What is the probability that the date costs exactly \$130? $\frac{2}{18} = \frac{1}{9}$

8. What is the probability that the date costs under \$125? $\frac{10}{18} = \frac{5}{9}$