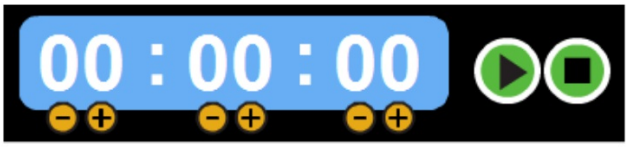
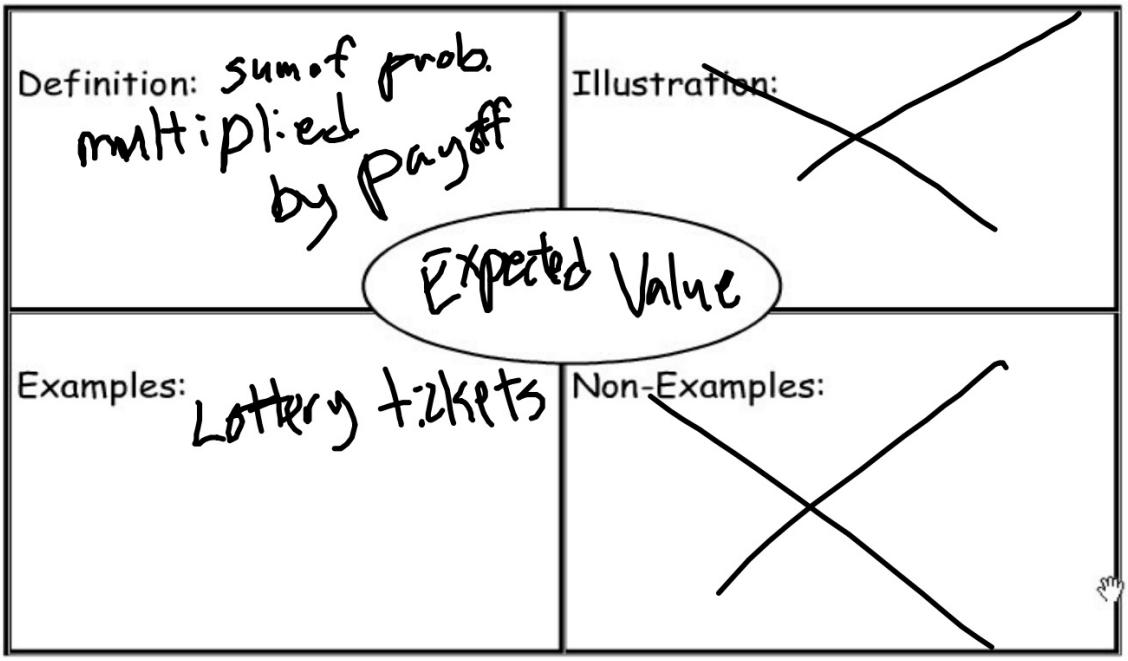
Timed Expectations



Create a frayer model for Expected Value



f the probabilities that Ger and Tabatha will be valedictorian of a high sch
s are 1/5 and 1/4 respectively, what is the probability that either Juan or
atha will be valedictorian?

card is drawn from a standard deck of 52 cards, not replaced, and a sec
d is drawn. What is the probability that both cards are nines?

quiz has 6 questions: 1 True-False question, 3 multiple choice questions
3 choices and 2 multiple choice questions with 4 choices. If a student ran
sses at each of the questions, what is the expected number of questions h
wer correctly?

NOTATION

$$P(A \text{ or } B) = P(A) \cup P(B) = P(A) + P(B)$$

Union

Mutually Exclusive

$$P(A \text{ and } B) = P(A) \cap P(B) = P(A) * P(B)$$

Independent
Dependent

$$P(B \text{ given } A) = P(B/A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{P(A) * P(B)}{P(A)}$$


Conditional
Probability

Conditional Probability

$$P(B \mid A) = \frac{P(B) \cdot P(A)}{P(A)}$$

- The probability that event, B, will occur given that another event, A, has already happened.
- Exists when two events **depend** on each other.

1. Re-write each conditional probability into words:

given

- **a.** *P(have short hair | the person is a boy)*

probability that person has short hair given the person is a boy

- **b.** *P(taking Spanish | senior)*

	Guitars	
	Acoustic	**Electric**
Tan	78	42
Black	34	56
Blue	12	16

1. $P(\text{black} \mid \text{acoustic})$

2. $P(\text{tan} \mid \text{electric})$

3. $P(\text{blue} \mid \text{electric})$

4. $P(\text{acoustic} \mid \text{tan})$

Students' Reading Preferences		
	Comic Books	Novels
Middle School	128	32
High School	86	98

160 > 34
184

214 130

344

5. What is the probability that a student prefers comic books, given that the student is in high school? 0.6

$P(B|A)$ $\frac{214}{344} \cdot \frac{184}{344} = \frac{214}{344} = \frac{107}{172}$

$\frac{184}{344}$

Education and Salary of Employees

	Under $20,000	$20,000 to $30,000	Over $30,000
Less than high school	69	36	2
High school	112	98	14
Some college	102	193	143
College degree	13	173	245

Use the table to calculate the following:

6. $P(\text{earns over \$30,000} \mid \text{only high school education})$

$P(\text{has high school education or less} \mid \text{earns over \$30,000})$

5.

- At Kennedy Middle School, the probability that a student takes Technology and Spanish is 0.087. The probability that a student takes Technology is 0.68. What is the probability that a student takes Spanish given that the student is taking Technology?

$$P(B/A) = \frac{(0.087)\cdot(0.68)}{0.68} = 0.087$$

6.

A jar contains black and white marbles. Two marbles are chosen without replacement. The probability of selecting a black marble and then a white marble is 0.34, and the probability of selecting a black marble on the first draw is 0.47. What is the probability of selecting a white marble on the second draw, given that the first marble drawn was black?

$$P(B/A) = \frac{(0.34)(0.47)}{0.47} = 0.$$

7.

- The probability that it is Friday and that a student is absent is 0.03. Since there are 5 school days in a week, the probability that it is Friday is 0.2. What is the probability that a student is absent given that today is Friday?

P(B/A)
Before A

$$\frac{0.03 \cdot 0.2}{0.2} = 0.03$$

8.

- If 39% of people in a community have a pet now and have had a pet in the past. 61% do not have a pet now. 86% have had a pet in the past and 14% do not have a pet now and have never had a pet in the past. What is the probability that a randomly selected person has a pet now, given that they have had a pet in the past?

9.

- In New York State, 48% of all teenagers own a skateboard and 39% of all teenagers own a skateboard and roller blades. What is the probability that a teenager owns roller blades given that the teenager owns a skateboard?

10.

- At a middle school, 18% of all students play football and basketball and 32% of all students play football. What is the probability that a student plays basketball given that the student plays football?

Assignment
Probability Assignment #7
(Handout)