

## Unit 4: Probability Models

### Learning Targets and Success Criteria:

1. I can determine if two events are disjoint (mutually exclusive).

I know I can because:

- I can decide if the two events can happen simultaneously.
- I can explain that the events are disjoint because  $P(A \cap B) \neq 0$ .

2. I can use the addition rule to calculate probabilities.

I know I can because:

- I can determine if I have an "OR" probability.
- I understand that  $\cup$  represents "OR" in math.
- I can use the formula:  $P(A \cup B) = P(A) + P(B)$  for events that are disjoint.
- I can use the formula:  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$  for non-disjoint events.

3. I can use the multiplication rule to calculate probabilities.

I know I can because:

- I can determine if I have an "AND" probability.
- I can understand that  $\cap$  represents "AND" in math.
- I can use the formula:  $P(A \cap B) = P(A) \cdot P(B)$  FOR INDEPENDENT EVENTS ONLY!!
- I can use the formula:  $P(A \cap B) = P(A) \cdot P(B|A)$  for dependent events.

4. I can calculate conditional probabilities.

I know I can because:

- I can understand that  $P(A|B)$  represents the probability of A "given" B has occurred.
- I can use the formula:  $P(A|B) =$

5. I can determine if two events are independent.

I know I can because:

- I can decide if one event will influence or change the probability of the other event.
- I can show evidence of independence by comparing  $P(A)$  to  $P(A|B)$ . If they are equal, then the two events are independent.

6. I can use diagrams to help calculate probabilities.

I know I can because:

- I can create a Venn Diagram to model probabilities of two events.
- I can create a Tree Diagram to model probabilities of conditional events.
- I can use the values from these diagrams to calculate specific probabilities.
- I can use a two-way (contingency table) to calculate probabilities.

7. I can calculate the expected value (mean) and standard deviation of a random variable.

I know I can because:

- I can define a random variable (X).
- I can create a probability model for all possible values (x) of the random variable (X).

- I can use the formula:  $E(X) = \mu = \sum x \cdot p(x)$  to calculate expected value.
- I can use the formula:  $SD(X) = \sigma =$  to calculate the standard deviation of a random variable.
- I can use the calculator to calculate both the expected value and st. dev. of a random variable. (values in L1, probabilities in L2) 1-var-stat L1, frequencies L2.

8. I can calculate expected values and standard deviations of random variables that have been shifted, scaled, combined, or subtracted.

I know I can because:

- I can understand the expected value (mean) gets the shift, but the standard deviation DOES NOT GET SHIFTED!!!
- I can understand that expected values and standard deviations both get the scale.
- I can understand that expected values can be added or subtracted.  $E(X+Y) = X + Y$  and  $E(X - Y) = X - Y$
- I can understand that standard deviations are ALWAYS squared, added, and square rooted no matter if you are finding the standard deviation for the sum or difference of two random variables!  $SD(X \pm Y) =$  where X and Y are the standard deviations for the random variables.
- I can use a normal model to find the probabilities of sums and differences of random variables.

9. I can calculate probabilities using Geometric and Binomial probability distributions.

I know I can because:

- I can determine if I am finding the probability of the 1<sup>st</sup> success (geometric) or the probability of a certain number of successes out of a certain number of trials (binomial).
- I can determine the values of p (probability of success) and q (probability of failure).
- I can determine n (number of trials...only in binomial situations)
- I can use the formula:  $P(X = x) = q^{x-1} \cdot p$  to calculate geometric probabilities where X = the first success.
- I can use the formula:  $P(X = x) = {}_n C_x \cdot p^x \cdot q^{n-x}$  to calculate binomial probabilities where X = total number of successes.
- I can calculate cumulative probabilities using the formulas for geometric and binomial probability.
- I can use a normal model to estimate cumulative binomial probabilities.

## **Day 1**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #1, 2, 3 (see above)

### **Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 14 Notes

Law of Averages discussion

### **Summarizers:**

Selected Problems from Handout

### **Homework:**

P. 338-339 #'s 1-17 odd

## **Day 2**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #1, 2, 3 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Thumbtack Task

Probability guided practice (cars)

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 338-339 #'s 18-25 all

**Day 2a**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #1, 2, 3 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Practice (History exam, M&Ms, & spinner)

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 338-339 #'s 27-43

**Day 3**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #1-6 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 15 Notes

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 361 #'s 1-19 odd

**Day 3b**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #1-6 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Guided Practice (Cards, Blue jeans, tree diagram)

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 361 #'s 2-18 even

**Day 4/5/5b**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 1-6 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 15 WS's (cars & CD players)

Probability WS's 1 & 2 (Quiz Practice)

**Summarizers:**

Selected Problems from Handout

**Homework:**

Study for CH. 14 & 15 Quiz

**Day 5c**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 1-6 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

CH. 14 & 15 Quiz

**Summarizers:**

Selected Problems from Handout

**Homework:**

none

**Day 6**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7,8 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Greedy Pig Game

Start Ch. 16 Notes

**Summarizers:**

Selected Problems from Handout

**Homework:**

none

## **Day 6b**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7,8 (see above)

### **Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Finish ch. 16 notes

### **Summarizers:**

Selected Problems from Handout

### **Homework:**

P. 383 #'s 1-15 odd

## **Day 7b**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7,8 (see above)

### **Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 16 practice WS's (I do fast food, they do rest)

### **Summarizers:**

Selected Problems from Handout

### **Homework:**

Finish packet for HW

## **Day 7**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7,8 (see above)

### **Activator**

AP Exam MC Practice Question

### **Direct Instruction, Guided Practice, Practice/Differentiation:**

Normal Model Examples Notes  
P. 384 #37 a-c IN CLASS GUIDED

### **Summarizers:**

Selected Problems from Handout

### **Homework:**

P. 384 #'s 39 & 41

## **Day 7c**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7,8 (see above)

### **Activator**

AP Exam MC Practice Question

### **Direct Instruction, Guided Practice, Practice/Differentiation:**

P. 384 #'s 2,8,10,30,38 (turn in)

### **Summarizers:**

Selected Problems from Handout

### **Homework:**

none

## **Day 9 (2 days)**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 9 (see above)

### **Activator**

AP Exam MC Practice Question

### **Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 17 Notes

Greater than or equal to example & p. 402 #'s 9, 17

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 401 #'s 10, 12, 16, 18

**Day 9a**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 9 (see above)

**Activator**

AP Exam MC Practice Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Finish Notes (Normal Model)

**Summarizers:**

Selected Problems from Handout

**Homework:**

P. 401 #'s 26, 30

**Day 10**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 9(see above)

**Activator**

Review Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Ch. 17 WS's ( I do 1st, they finish)

**Summarizers:**

Selected Problems from Handout



**Homework:**

Finish WS packet

**Day 10a**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7-9 (see above)

**Activator**

Review Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

2 Approaches WS  
Probability WS

**Summarizers:**

Selected Problems from Handout

**Homework:**

Finish WS

**Day 10b & 10c**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 7-9 (see above)

**Activator**

Review Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Quiz Practice: Unit 4 Review ch. 16 & 17

**Summarizers:**

Selected Problems from Handout

**Homework:**

STUDY FOR CH. 16 & 17 QUIZ

**Day 10d/11/12**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 1-9 (see above)

**Activator**

Review Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Quiz  
Unit 4 Probability Test Reviews

**Summarizers:**

Selected Problems from Handout

**Homework:**

COMPLETE REVIEWS AND STUDY FOR TEST!!!!

**Day 13 & 14**

**Standard:** Collecting Data (12% - 15% of AP Exam)

**Learning Target(s) & Success Criteria:** #'s 1-9 (see above)

**Activator**

Review Question

**Direct Instruction, Guided Practice, Practice/Differentiation:**

Test Day 1: 10MCQ & 2 FRQs  
Test Day 2: 3 FRQs

**Summarizers:**

Selected Problems from Handout

**Homework:**

None