

# High School Mathematics Transition Course

<b>Theme 6:</b> Probability <b>Context:</b> 23	<b>Number of Class Periods:</b> 2 (45 minutes)
<b>Lesson Title:</b> Blind Taste Test Challenge	
<b>Summary:</b> <ul style="list-style-type: none"><li>Students will design an experiment to taste test the difference between Coke and Pepsi (or some other equivalent comparison), as well as experience an introduction to binomial probabilities.</li></ul>	<b>Standards of Mathematical Practices:</b> <ul style="list-style-type: none"><li>MP.2</li><li>MP.3</li><li>MP.4</li></ul>
<b>Goals and Objectives:</b> <ul style="list-style-type: none"><li>Design and conduct a binomial probability experiment.</li><li>Find the binomial probability from data.</li></ul>	
<b>Concepts from Previous Mathematical Experiences to be Applied:</b> <ul style="list-style-type: none"><li>How to calculate simple probability.</li></ul>	
<b>Instructional Procedures:</b> <p><b>Day 1:</b></p> <ul style="list-style-type: none"><li>Pass out page 1 and 2 of the Cola Wars student handout pages.</li><li>Discuss the history of the Cola Wars and show a few commercials. Here is a suggested <a href="#">link</a> to celebrity commercials although you can find more on YouTube.</li><li>Next, read and emphasize the four bullet points of a binomial experiment.</li><li>Brainstorm a list of beverages as class that could be used to conduct a taste test if they don't like Coke or Pepsi. Some kids may not like pop. Some examples might be Dansani vs Aquafina, Bottled water vs Tap Water, Generic orange pop vs Fanta, or yellow Gatorade vs yellow Powerade.</li><li>Students form groups of three and choose a role:<ul style="list-style-type: none"><li>Blind Test Taster: Person who thinks they can tell the difference</li><li>Recorder: Person who will record the results and create a diagram (or answer key) of where each type of beverage was.</li><li>Pourer: Person who pours the drinks into the unmarked cups. The pourer and recorder will work together so they know which pop is which for each trial.</li></ul></li><li>Students should design their experiment. Instruct them to refer back to the list on the handout and think about every detail to make it binomial. Suggested questions for the teacher to ask:<ul style="list-style-type: none"><li>How many trials?</li><li>How to ensure two outcomes?</li><li>How are you going to make sure that the last drink didn't affect the next drink? Students may determine they need water in between trials or may even suggest something else such as pretzels or saltines. Teachers should not make suggestions about how to make the events independent but be prepared that they may ask for water or salty snacks.</li></ul></li><li>This planning should take about 20 minutes. Planning should be in individual groups and then each group will share out their plans for the experiment with the whole class. The whole class will critique each other's plans. For example, one group may want to do 15 trials and other groups might say that is too much sugar. Anything over 8 trials is too many.</li></ul> <p><b>Day Two:</b></p> <ul style="list-style-type: none"><li>Teachers should arrive with all taste testing materials for each group including mini bathroom cups, one can or bottle of each type of beverage, napkins, water, and/or salty snacks.</li></ul>	

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<ul style="list-style-type: none"> <li>• Taste testers must be unaware of the pourer setting up the experiments. Suggestions for this process include blind folding, sending them to one side of the room, move to an empty classroom, or move to the hall - just isolate the test tester from the experiment.</li> <li>• Once they've poured it and recorded the diagram, they can bring the taste tester over and run the test. The recorder should be very careful not to give away the answers and the pourer should help guide the tester through the process.</li> <li>• Now hand out Cola Wars Student Handout Page 3 so they can analyze their results.</li> <li>• Once each group has completed Cola Wars Page 3, then wrap up class with a whole class discussion. They should take this time to discuss the experiment, whether they would make any changes to their experiments, and if everyone understands the math behind questions 5, 6, and 7. For question 7 especially, ensure students use probability to explain their reasoning as to if the taste tester guessed.</li> <li>• Another idea to wrap up the lesson is to have students present their results to the class. They should be able to answer the question "Do you believe your results are strong enough to conclude that someone can tell the difference between the two beverages? Or was it a random guess?" Students can share how they chose their taste tester, what their results showed, and anything they found surprising in the experiment.</li> <li>• Clean Up</li> </ul>		
<b>General Notes</b> <ul style="list-style-type: none"> <li>• Individual cans and bottles are faster and easier to use than two-liter bottles.</li> <li>• Have lots of paper towels</li> </ul>		
<b>Differentiation Strategies:</b> <ul style="list-style-type: none"> <li>• Hand out a picture of pair of cups for each trial to record results.</li> </ul>		<b>Assessment:</b> <ul style="list-style-type: none"> <li>• Information assessment through questioning students while walking around</li> </ul>
<b>Extension Suggestions:</b> <ul style="list-style-type: none"> <li>• Develop the notation for solving a binomial probability.</li> <li>• Graph a binomial probability distribution.</li> <li>• Use this <a href="#">Slate.com Article</a> to discuss the marketing implications of the Cola Wars.</li> </ul>	<b>Materials and Resources:</b> <ul style="list-style-type: none"> <li>• Cola Wars Student Handout</li> <li>• bathroom cups</li> <li>• Water</li> <li>• Various brands of drinks</li> <li>• Saltines</li> <li>• Paper Towels or napkins</li> </ul>	<b>Supporting Documents:</b> <ul style="list-style-type: none"> <li>• Clayton Rainsberg's version of this activity.</li> </ul>
<b>Ohio Learning Standards:</b> <ul style="list-style-type: none"> <li>• S.IC.3</li> <li>• S.MD.7</li> </ul>	<b>Remediation-Free Standards:</b> <ul style="list-style-type: none"> <li>• PS.RUD.D</li> <li>• PS.PC.B</li> </ul>	<b>Notes:</b> <ul style="list-style-type: none"> <li>• Thank you to Clayton Rainsberg of New Albany-Plain Local Schools, Ohio</li> </ul>