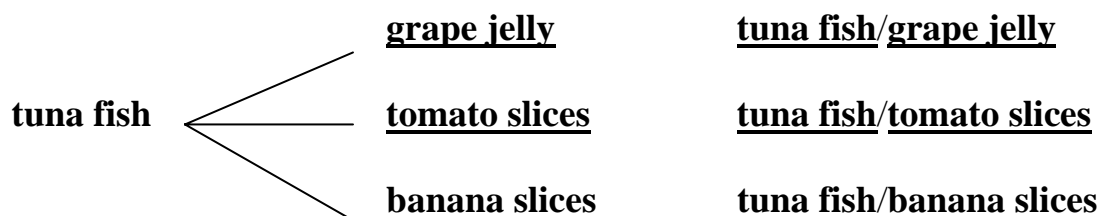
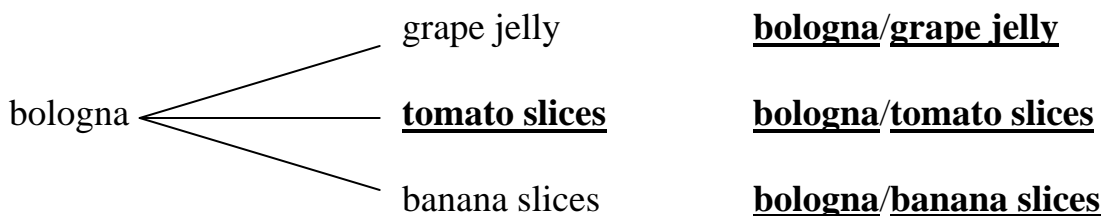
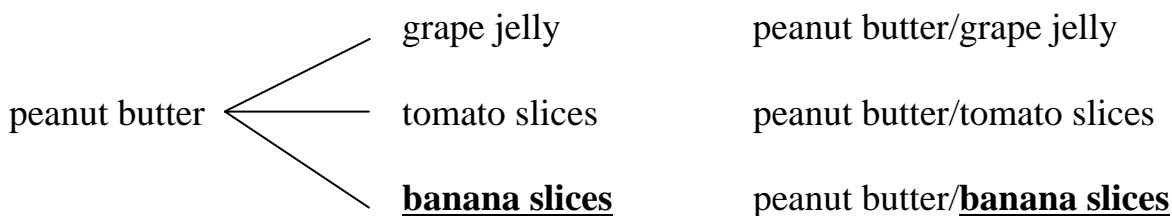


Makin' PB&Js

QUESTIONS FOR STUDENTS:

1. What do you think your graph will look like if you made 100 sandwiches? **The graph will start approaching 11.11%.**
200 sandwiches? 1000 sandwiches? **Each time the graph gets closer to 11.11%.**
2. If you have 3 ingredients and your friend has 3 ingredients, how many possible sandwiches can be made? **9**
3. List the possible sandwiches that can be made. **Peanut butter/jelly, peanut butter/banana, peanut butter/tomato, bologna/jelly, bologna/banana, bologna/tomato, tuna/jelly, tuna/banana, tuna/tomato**
4. Complete the tree diagram below:



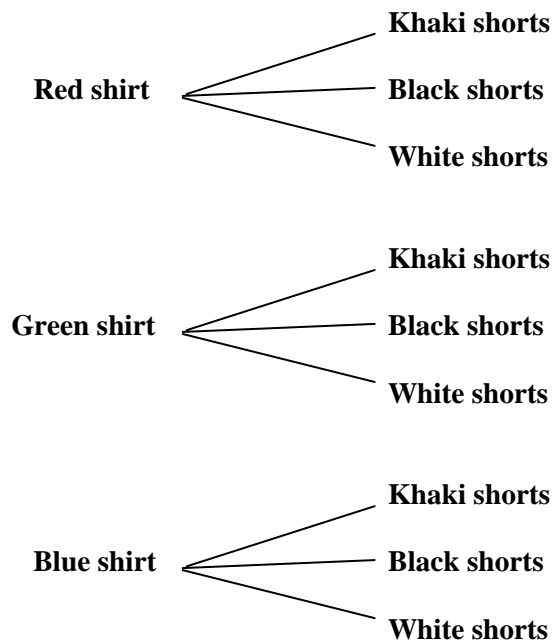
5. What is the theoretical probability that you will make a PB&J sandwich? **1/9**
6. What is the theoretical probability that you will make a peanut butter and banana sandwich? **1/9**
7. Are the outcomes equally likely? **Yes** Why or why not? **Each sandwich has a 1/9 chance of happening.**

8. How does the experimental probability compare with the theoretical probability? **The experimental probability gets closer to the theoretical probability as the number of sandwiches made increases.**
9. If you and your friend randomly picked an ingredient, what is the chance that you would make a PB&J sandwich? **1/9**
10. If you and your friend made 36 random sandwiches, how many of them would be PB&Js? **4**
11. If 100 sandwiches are made, what percent should be PB&J? **11.11%**
12. Suppose you just randomly made 3 PB&Js in a row. What is the probability that your next sandwich will again be a PB&J? **1/9**
13. PB&Js are in high demand at camp. How can you change the spinners to make more PB&Js while still making all of the other sandwiches? **Increase the size of the peanut butter sector on Spinner A and/or increase the size of the jelly sector on Spinner B.**
14. If we made 50 sandwiches using these new spinners, how would the graph compare to your original graph? **The line on the graph would be higher.**
15. The cafeteria just ran out of tuna! Now, what is the probability of making a PB&J? **1/6**
16. On the second day of camp, the cook brings out 2 types of bread, 3 ingredients for your workstation, and 4 ingredients for your friend's workstation. How many possible sandwiches can be made? **24**
Explain how you got your answer. **2 times 3 times 4 (2 x 3 x 4)**

ASSESSMENT OPTIONS: Your mom packed your suitcase for camp. In it she put 3 t-shirts (red, green, and blue) and 3 pairs of shorts (khaki, black, and white). How many possible outfits can be made? **9**

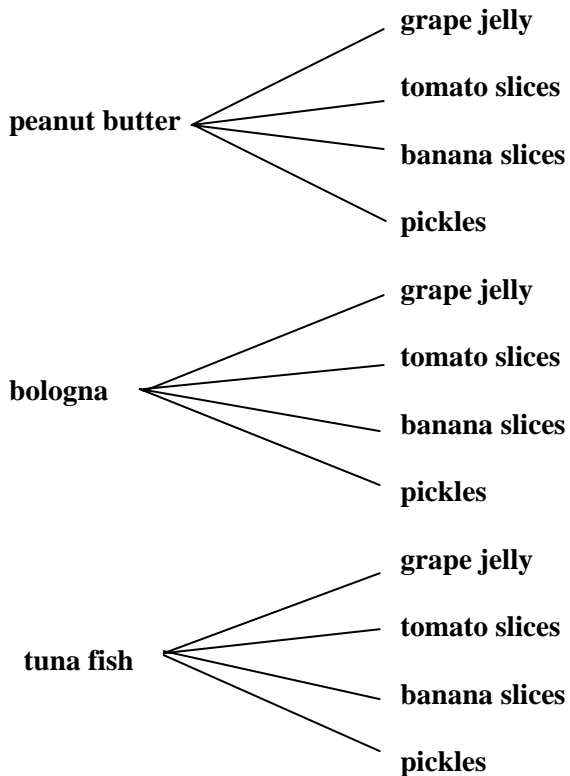
What are they? **Red shirt/khaki shorts, red shirt/black shorts, red shirt/white shorts, green shirt/khaki shorts, green shirt/black shorts, green shirt/white shorts, blue shirt/khaki shorts, blue shirt/black shorts, blue shirt/white shorts**

Draw the tree diagram showing this situation.



If you got dressed in the dark, what is the probability you will be wearing the green shirt and the black shorts? $\frac{1}{9}$

EXTENSIONS: The camp chef adds pickles to your best friend's workstation. Draw a new tree diagram showing your new sandwich options.



How will this change your graph? **The line on the graph will now start to approach $1/12$ or 8.3%.**

Is there any sandwich that is more likely to be made? **No, each sandwich has the same chance of being made.**

Is it as likely that you will make a PB&J as it was before? **No, there is less of a chance since there are more sandwich options.**

If you randomly made sandwiches for all 336 campers, how many of them would get a PB&J? **28**

Explain how you got your answer. **Multiply 336 by $1/12$.**