Probability tree problems worksheet

We need to understand independent and dependent events so that we can do the next sections. Two or more events are independent if one event does not affect the possibility of others happening. Two or more events are dependent if an event affects the likelihood that others will happen. Example: Grabbing heads both times on two coins are independent events. Picking a red marble randomly from a bag, then picking up a green marble without replacing the red marble are dependent on events. AND rule states: If two events, A and B are independent, then \text{P}(A\text{ and }B) = \text{P}(A) \times\text{P}(B) means that you have to multiply the probability of A and B occurring with the probability of occurrence of B. OR rule states that: For two events, A and B, then \text{P}(A\text{ or }B) = \text{P}(A) + \text{P}(B) - \text{P}(A\text{ and }B) if A and B cannot happen together, We say they are mutually unique, and then we have \text{P}(A\text{ and }B) = 0, so the OR rule converts to \text{P}(A\text{ or }B) = \text{P}(A) + \text{P}(B) probability trees Are similar to frequency trees, but we instead put possibilities on branches and events at the end of the branch. Example: A bag contains 4 red balls and 5 blue balls. Rahim selects 2 balls randomly. Calculate the probability that he chooses the same colored ball each time, given that he replaces it after each selection of a ball. Step 1: Build a likely tree showing two choices. We know there are a total of 9 balls in the bag so there is a chance {4}{9} the red ball picking up. Then as the red ball is replaced, there are still 4 red balls remaining from 9, so again there \dfrac{4}{9} chances of picking up a red ball at the second choice. go ahead and fill the others . Step 2: Use the AND rule of the tree chart we can see that there are two ways to do this, either blue and blue, or red and red we use and rule through tree chart, so \text{P(blue and blue)}=\dfrac{5}{9}\times\dfrac{5}{9}= \textcolor{blue}{\dfrac{25}{81}} \,\, and \,\, \text{P(red and red)}=\dfrac{4}{9}\times\dfrac{4}{9}= \textcolor{red}{\dfrac{16}{81}} 3 : Use the OR Rule final step and then this is to add possibilities together, given by or rule for unique mutual events, to receive, \text{P (same color)}= \dfrac{25}{81}+\dfrac{16}{81}=\dfrac{41}{81} conditional probability of B, the probability that event A happens according to that event B. You won't be told that this is a conditional probability question, but seeing words like 'no replacement' or 'given' will mean that it is one, or you may have to use your intuition. If two events, A and B, are independent, then \textcolor{black}{\text{P}(A\text{ given } B) = \text{P}(A)} \,\, and \,\, \textcolor{black}{\text{P}(B given } A) = \text{P}(B)} If two events, A and B are dependent, then \textcolor{black}{\text{P}(A \text{ and } B) = \text{P}(A) \times \text{P}(B \text{ given } A)} Example: Benjamin plays football for his local team. His chances of being in the starting line-up for his team this Sunday are 0.7. If he starts the game, his chances of scoring are 0.4. What are the chances that Benjamin will start the game but not score a goal? Step 1: We want to find \text{P(starts and doesn't score)} let's start event A and don't score event B Step 2: \text{P}(A) = 0.7 \text{P}(B\text{ given } A) = \text{P(does not score according to He starts)} = 1 - 0.4 = 0.6 Steps 3: Then, \text{P}(A\text{ and } B) = \text{P}(A) \times\text {P}(B\text{ given } A) = 0.7 \times 0.6 = 0.42 Conditional probability trees are similar to probability trees are similar to probability trees, but probabilities change depending on previous events. Example: A bag contains 4 red balls and 5 blue balls. Rahim selects 2 balls randomly. Calculate the probability that he chooses the same colored ball each time, given that he does not replace it every time a ball is selected. Step 1: Making the tree there is a possibility of showing two selections, 9 balls to start, reducing to 8 after the first choice, as shown below, is the chance to pick a red ball for the first choice \dfrac{4}{9}, then with a red ball removed, the second choice \dfrac{3}{8} and the like.... Step 2: Use the tree chart to determine the probability of selecting the same color twice. We see that there are two ways to do that, whether it's blue or blue, whether it's red or red. We use the AND rule through the probability tree, so \text{P(blue and blue)}=\dfrac{5}{9}\times\dfrac{4}{8}= \textcolor{blue}{\dfrac{20}{72}} \text { and } \text{P(red and red)}=\dfrac{4}{9}\times\dfrac{3}{8}= \textcolor{red}{\dfrac{12}{72}} Step 3: Add the probabilities together, By OR rule for reciprocal exclusivity, to get \text{P(same color)}= \dfrac{20}{72} +\dfrac{12}{72}=\dfrac{32}{72} (a) Let Anna pass Event be A_p and Rob passes the B_p. To work out the possibility of Rob passing, we can write the possibility of passing both as: P(A_p \text{ and } R_p) =0.35 Replacement in the probability of Anna passing her test, 0.7 \times P(R_p) =0.35 Rearranging the equation to make P(R_p) the subject: P(R_p) = 0.35 \div 0.7 = 0.5 (b) The prob of both Anna and Rob failure their driving test can be be found using a tree diagram as shown below: Therefore the probability of failure of both of them is \dfrac{3}{20} = 0.15. For this question when drawing tree charts we need to be careful as the likelihood of a change between the two events. This is the result of replacing the first counter so only leave 11 counters in the bag to choose from. Adding together the possibilities of being the result Then blue or green and then green: \dfrac{7}{22}+\dfrac{5}{33}=\dfrac{31}{66} to work out the possibility of the bus being late on both days we can use the tree chart where E represents the bus being on time or early and L represents the bus late. Going along the bottom line we find that the likelihood of being late from both days is: \dfrac{1}{16} Here we have to work out the possibility that the coach takes out two balls that have different colors. For conditional probability questions, when charting the tree, we need to be careful that the probability changes between the two events. This is the result of replacing the first ball so only leave 13 balls in the bag to pick out. Add together the probability of the result of two different colors: \dfrac{45}{182}+\dfrac{45}{182}=\dfrac{90}{182}=\dfrac{45}{91} as this is just under half more likely that the coach wants two balls that are of the same color. (a) The resulting tree chart should look something like: (b) to find out the possibility of him winning at least one game we can simplify adding 3 top branches of probabilities together or subtracting the probability of a low branch of 1: \dfrac{9}{25}+\dfrac{6}{25}+\dfrac{6}{25}=\dfrac{21}{25}, or, 1-\dfrac{4}{25}=\dfrac{21}{25} Try a revision card on this topic. This worksheet explains how to draw tree charts to show results based on the sport: a shopkeeper has bowls with 2 types of filters. Draw tree charts to show possible results. See how you go with this sport: In Dave's Garden I saw that there are 2 species available at 3 heights and 2 different quality levels. Draw tree charts to show possible results. You work on story-based problems like: The librarian told Dave that he could choose one of 2 different history books and 2 different geography books. Draw tree charts to show possible results. The concept of how to draw a tree chart is examined to represent a set of results. A sample problem is solved. You will fail six story practices based on words problems. Students will show their skills with the skills and concepts that we have explored here. You will ponder problems like this: 2 different cold drinks and one of 3 different ice creams. Draw tree charts to show possible results. We will spell out all the steps needed to solve this sport: a family has two children. How many results in the sample space are 2 generations? A sample problem is solved, and two training problems are provided. Students model predictable results from a situation using the techniques we discussed. Ten problems are provided. We solved exercises like: pick a table and pick a back desk seat from the carnival game. Behind them there are 2 tables and 2 chairs. How many choices are possible? Problems are provided. Deal with problems such as: the bag contains 3 reds and 5 white toys. pick two toys one after the other . Draw a tree chart that shows all possible combinations of toys that Rose can choose from? Students will show their ability with these types of problems. Ten problems are provided. This is a good way to introduce or examine the skills that we discover here. This worksheet explains how to model a scenario to show a set of results. A sample problem is solved, and two training problems are provided. You'll dissolve workouts like: a box contains green ball no. 1 to 4, purple ball no. 1 to 3, and red ball no. 1 to 2. Specify a method to show the total results for selecting two marbles. You have situations like: choose an outfit of red shirts, green jeans, blue model skirts? If the shoes come in your choice of 4 sizes and colors. This is a cool worksheet where you work on story problems like: 2 different roads from City A to City B and 3 different roads from City B to City C. Drawing tree charts representing the entire route from City A to City C through City B? Students demonstrate their ability to explore with all our concepts with this topic. Ten problems are provided. Students will use a well-known method to model possible outcomes. Three problems are provided, and space is included for students to copy the correct answer when given. You put these skills for you to determine the solution to problems like this: you roll out a 6-way death and draw a marble from a bag containing orange, red and a yellow marble. How many results are possible? You model data for situations like this: you choose a card and draw marble from a bag containing a red, yellow marble and a green colored marble. How many results are possible? This is a great visual series of problems for you to expand your skills with this series. We work with Perth's problems that add an extra level of difficulty to everything. Like: two cards are removed from one card pack, one after the other. We get a little more advanced by solving tasks like: baby has a bag of colored pastries consisting of 14 red pastries, 12 oranges and if the child eats 2 of the pastries one after the other. What are the chances of a sweet orange and red first? Check out the type of problems you can find here: remove two cards from a card pack that is not either ace or ace, one after the other. What's the possibility that no aces will be obtained? Obtained?