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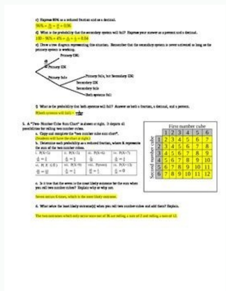
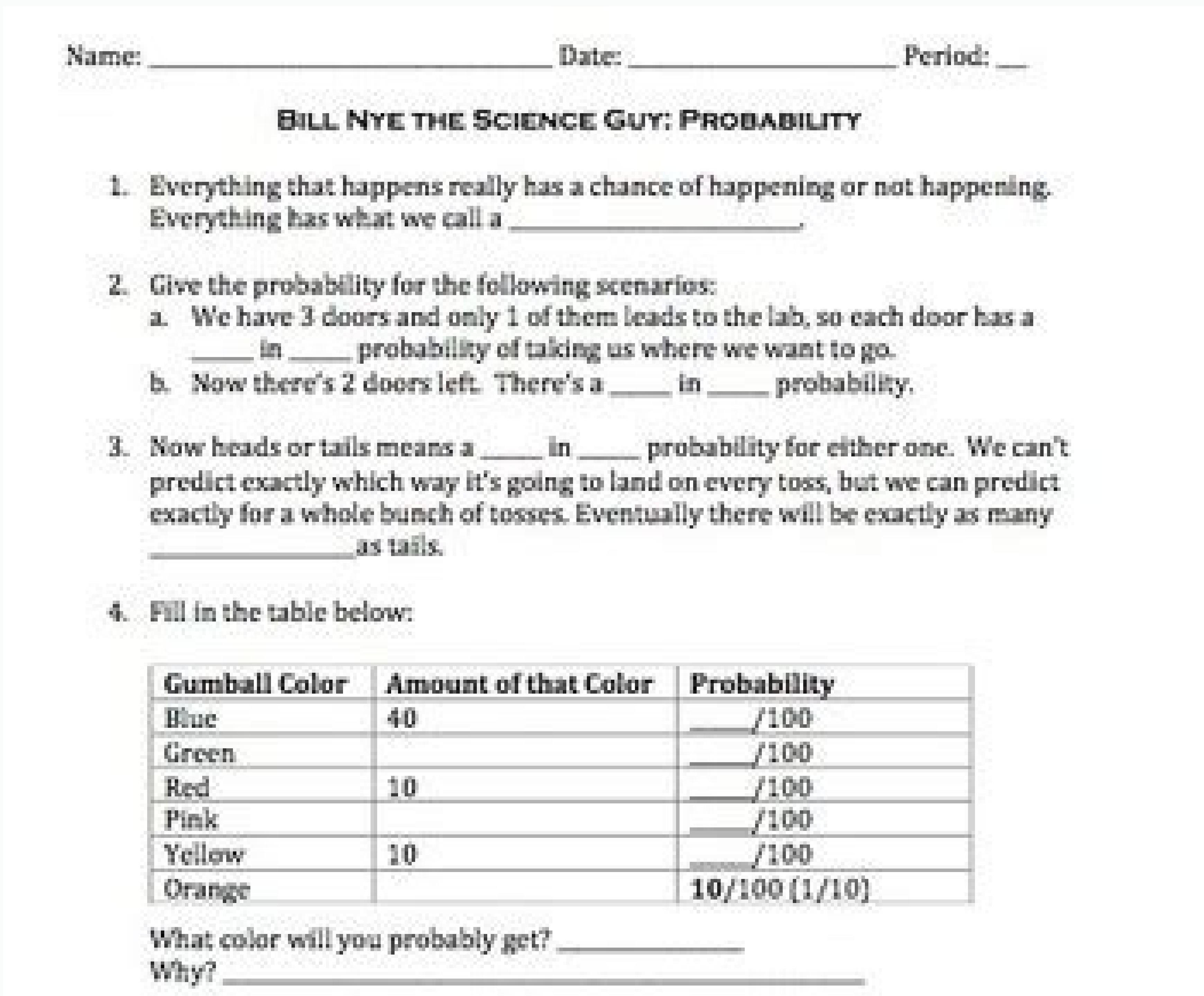
Conditional probability worksheet answer key grade 10 english language





Name: ______________________________ Date: ____________________ Period: ___

BILL NYE THE SCIENCE GUY: PROBABILITY

1. Everything that happens really has a chance of happening or not happening. Everything has what we call a ______________________.

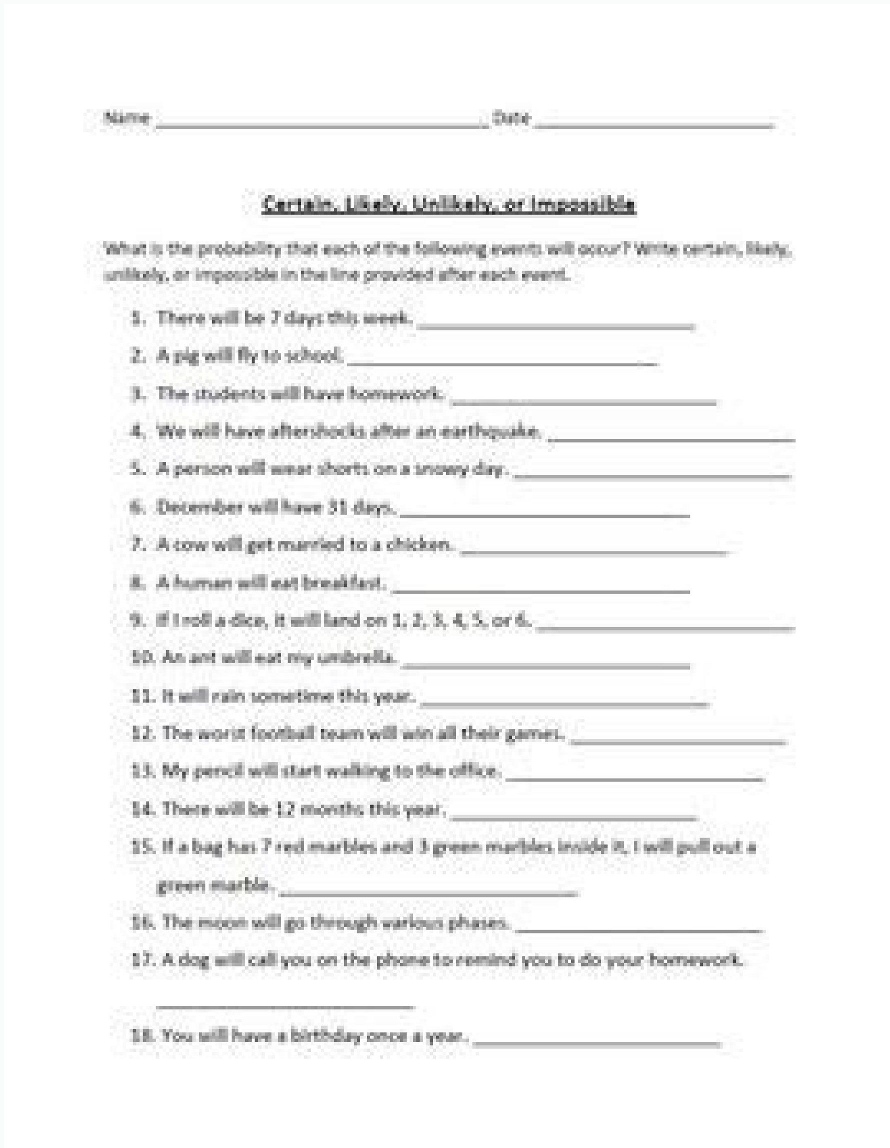
2. Give the probability for the following scenarios:
   a. We have 3 doors and only 1 of them leads to the lab, so each door has a _____ in _____ probability of taking us where we want to go.
   b. Now there's 2 doors left. There's a _____ in _____ probability.

3. Now heads or tails means a _____ in _____ probability for either one. We can't predict exactly which way it's going to land on every toss, but we can predict exactly for a whole bunch of tosses. Eventually there will be exactly as many ______________ as tails.

4. Fill in the table below:

Gumball Color	Amount of that Color	Probability
Blue	40	____/100
Green		____/100
Red	10	____/100
Pink		____/100
Yellow	10	____/100
Orange		10/100 (1/10)

What color will you probably get? ______________
Why? ____

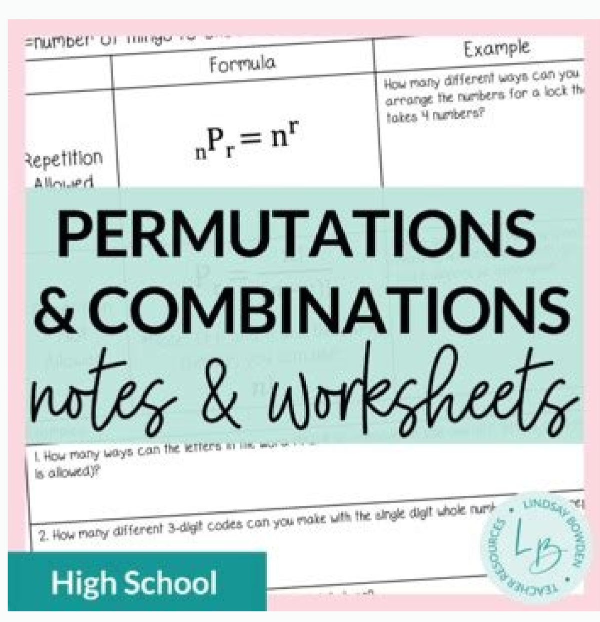


Name ______________________ Date ______________

Certain, Likely, Unlikely, or Impossible

What is the probability that each of the following events will occur? Write certain, likely, unlikely, or impossible in the line provided after each event.

1. There will be 7 days this week. ________________
2. A pig will fly to school. ________________
3. The students will have homework. ________________
4. We will have aftershocks after an earthquake. ________________
5. A person will wear shorts on a snowy day. ________________
6. December will have 31 days. ________________
7. A cow will get married to a chicken. ________________
8. A human will eat breakfast. ________________
9. If I roll a dice, it will land on 1, 2, 3, 4, 5, or 6. ________________
10. An ant will eat my umbrella. ________________
11. It will rain sometime this year. ________________
12. The worst football team will win all their games. ________________
13. My pencil will start walking to the office. ________________
14. There will be 12 months this year. ________________
15. If a bag has 7 red marbles and 3 green marbles inside it, I will pull out a green marble. ________________
16. The moon will go through various phases. ________________
17. A dog will call you on the phone to remind you to do your homework. ________________
18. You will have a birthday once a year. ________________



Although it is tedious to list them all, it is not difficult to count them. For A and B to have no outcomes in common means precisely that it is impossible for both A and B to occur on a single trial of the random experiment. It corresponds to combining descriptions of the two events using the word “and.” To say that the event $A\cap B$ occurred means that on a particular trial of the experiment both A and B occurred. The union corresponds to the shaded region. This probability can be computed in two ways. What is the percentage of students who need help in either mathematics or English? Find the probability that the number rolled is both even and greater than two. Example $\PageIndex{1}$ Two events connected with the experiment of rolling a single die are E: “the number rolled is even” and T: “the number rolled is greater than two.” Find the complement of each. Every outcome in the whole sample space S is in at least one or the other of the sets B and M, so $B\cup M=\{bb,bg,gb,gg\}=S$. Example $\PageIndex{4}$ A single die is rolled. This is the computation from part 1, of course. A visual representation of the union of events A and B in a sample space S is given in Figure $\PageIndex{2}$. Definition: Complement The complement of an event A in a sample space S, denoted A^c, is the collection of all outcomes in S that are not elements of the set A. Find the probabilities of the following events: both dice show a four at least one die shows a four Solution: As was the case with tossing two identical coins, actual experience dictates that for the sample space to have equally likely outcomes we should list outcomes as if we could distinguish the two dice. Each outcome in D is already in B, so the outcomes that are in at least one or the other of the sets B and D is just the set B itself: $B\cup D=\{bb,bg,gb\}=B$. Solution: A sample space for this experiment is $S=\{bb,bg,gb,gg\}$, where the first letter denotes the gender of the firstborn child and the second letter denotes the gender of the second child. The complements are $E^c=\{1,3,5\}$ and $T^c=\{1,2\}$. Thus using the result from part (1), $$P(M\cup T) = P(M) + P(T) - P(M\cap T) = 828 + 628 - 228 = 1228\approx 0.43$$ or about a 43% chance. Note that an outcome such as 4 that is in both sets is still listed only once (although strictly speaking it is not incorrect to list it twice). Among all the students seeking help from the service, 63% need help in mathematics, 34% need help in English, and 27% need help in both mathematics and English. Similarly, there are $8\times 2 = 16$ outcomes for four tosses and finally $16\times 2 = 32$ outcomes for five tosses. Now find the probability that the number rolled is both even and greater than two. In words the intersection is described by “the number rolled is even and is greater than two.” The only numbers between one and six that are both even and greater than two are four and six, corresponding to $E\cap T$ given above. It corresponds to combining descriptions of the two events using the word “or.” To say that the event $A\cup B$ occurred means that on a particular trial of the experiment either A or B occurred (or both did). Example $\PageIndex{5}$ In the experiment of rolling a single die, find three choices for an event A so that the events A and E: “the number rolled is even” are mutually exclusive. Since the die is fair, all outcomes are equally likely, so by counting we have $P(E\cap T)=\frac{2}{6}$. Solution: Since $E=\{2,4,6\}$ and we want A to have no elements in common with E, any event that does not contain any even number will do. Solution: When information is presented in a two-way classification table it is typically convenient to adjoin to the table the row and column totals, to produce a new table like this: Specialty Language Ability Total S T C 12 1 13 E 4 3 7 M 6 2 8 Total 22 6 28 The probability sought is $P(M\cap T)$. Definition: Union of Events The union of events A and $B,$ denoted $A\cup B$, is the collection of all outcomes that are elements of one or the other of the sets A and B, or of both of them. The table shows that there are 2 such people, out of 28 in all, hence $P(M\cap T) = 2/28 \approx 0.07$ or about a 7% chance. It corresponds to negating any description in words of the event A. Solution: Identify outcomes by lists of five hs and ts, such as $tthtt$ and $hhttt$. Find $B\cup D$ and $B\cup M$. For each of these four outcomes, there are two possibilities for the third toss, hence $4\times 2 = 8$ outcomes for three tosses. To see how the formula gives the same number, let A_G denote the event that the green die is a four and let A_R denote the event that the red die is a four. Solution: Imagine selecting a student at random, that is, in such a way that every student has the same chance of being selected. Example $\PageIndex{8}$ Two fair dice are thrown. A visual representation of the intersection of events A and B in a sample space S is given in Figure $\PageIndex{1}$. Example $\PageIndex{7}$ A two-child family is selected at random. Example $\PageIndex{2}$ Find the probability that at least one heads will appear in five tosses of a fair coin. In words the union is described by “the number rolled is even or is greater than two.” Every number between one and six except the number one is either even or is greater than two, corresponding to $E\cup T$ given above. Three choices are $\{1,3,5\}$ (the complement E^c, the odds), $\{1,3\}$, and $\{5\}$. Since $A_G\cap A_R = \{44\}$, $P(A_G\cap A_R) = 1/36$. Solution: In the sample space $S=\{1,2,3,4,5,6\}$ the corresponding sets of outcomes are $E=\{2,4,6\}$ and $T=\{3,4,5,6\}$. Then clearly by counting we get: $P(A_G) = 6/36$ and $P(A_R) = 6/36$. Figure $\PageIndex{2}$: The Union of Events A and B Example $\PageIndex{6}$ In the experiment of rolling a single die, find the union of the events E: “the number rolled is even” and T: “the number rolled is greater than two.” Solution: Since the outcomes that are in either $E=\{2,4,6\}$ or $T=\{3,4,5,6\}$ (or both) are $2, 3, 4, 5,$ and 6, that means $E\cup T=\{2,3,4,5,6\}$. Let O denote the event “at least one heads.” There are many ways to obtain at least one heads, but only one way to fail to do so: all tails. Definition: intersections The intersection of events A and B, denoted $A\cap B$, is the collection of all outcomes that are elements of both of the sets A and B. Since the event of interest can be viewed as the event $C\cup E$ and the events C and E are mutually exclusive, the answer is, using the first two row totals, $$P(C\cup E) = P(C) + P(E) - P(C\cap E) = 1328 + 728 - 028 = 2028\approx 0.71$$ On the other hand, the event of interest can be thought of as the complement M^c of M, hence using the value of $P(M)$ computed in part (2), $$P(M^c) = 1 - P(M) = 1 - 828 = 2028\approx 0.71$$ as before. This gives the following rule: Definition: Probability Rule for Mutually Exclusive Events Events A and B are mutually exclusive if and only if $$P(A ∩ B) = 0$$ Any event A and its complement A^c are mutually exclusive, but A and B can be mutually exclusive without being complements. Figure $\PageIndex{1}$: The Intersection of Events A and B Example $\PageIndex{3}$ In the experiment of rolling a single die, find the intersection $E\cap T$ of the events E: “the number rolled is even” and T: “the number rolled is greater than two.” Solution: The sample space is $S=\{1,2,3,4,5,6\}$. Thus by the Additive Rule of Probability we get: $$P(A_G\cap A_R) = P(A_G) + P(A_R) - P(A_G - A_R) = 6/36 + 6/36 - 1/36 = \frac{11}{36}$$ Example $\PageIndex{9}$ A tutoring service specializes in preparing adults for high school equivalence tests. There are two choices for the first toss. Solution: In both cases the sample space is $S=\{1,2,3,4,5,6\}$ and the event in question is the intersection $E\cap T=\{4,6\}$ of the previous example. Then any outcome can be labeled as a pair of numbers as in the following display, where the first number in the pair is the number of dots on the top face of the green die and the second number in the pair is the number of dots on the top face of the red die. In words the complements are described by “the number rolled is not even” and “the number rolled is not greater than two.” Of course easier descriptions would be “the number rolled is odd” and “the number rolled is less than three.” If there is a 60% chance of rain tomorrow, what is the probability of fair weather? Some events can be naturally expressed in terms of other, sometimes simpler, events. Similarly for the other two rows. The second column total and the grand total give $P(T) = 6/28$. Thus although it is difficult to list all the outcomes that form O, it is easy to write $O^c = \{ttttt\}$. Let B denote the event that at least one child is a boy, let D denote the event that the genders of the two children differ, and let M denote the event that the genders of the two children match. Suppose the die is fair. The results are shown in the following two-way classification table: Specialty Language Ability S T C 12 1 E 4 3 M 6 2 The first row of numbers means that 12 volunteers whose specialty is construction speak a single language fluently, and 1 volunteer whose specialty is construction speaks at least two languages fluently. From the table we can see that there are 11 pairs that correspond to the event in question: the six pairs in the fourth row (the green die shows a four) plus the additional five pairs other than the pair 44, already counted, in the fourth column (the red die is four), so the answer is $11/36$. Suppose the die has been “loaded” so that $P(1)=\frac{1}{12}$, $P(6)=\frac{3}{12}$, and the remaining four outcomes are equally likely with one another. Since the outcomes that are common to $E=\{2,4,6\}$ and $T=\{3,4,5,6\}$ are 4 and 6, $E\cap T=\{4,6\}$. The third row total and the grand total in the sample give $P(M) = 8/28$. The obvious answer, 40%, is an instance of the following general rule. Example $\PageIndex{10}$ Volunteers for a disaster relief effort were classified according to both specialty (C: construction, E: education, M: medicine) and language ability (S: speaks a single language fluently, T: speaks two or more languages fluently). The information on the probabilities of the six outcomes that we have so far is $$\begin{array}{l|cccc}Outcome & 1 & 2 & 3 & 4 & 5 & 6 \\ Probablity & \frac{1}{12} & p & p & p & p & \frac{3}{12}\end{array}$$ Since $P(1)+P(6)=\frac{4}{6}=\frac{1}{3}$ $$P(2) + P(3) + P(4) + P(5) = 1 - \frac{1}{3} = \frac{2}{3}$$ Thus $4p=\frac{2}{3}$, so $p=\frac{1}{6}$. The probability sought is $P(M\cup T)$. Since there are 32 equally likely outcomes, each has probability $\frac{1}{32}$, so $P(O^c)=1/32$, hence $P(O) = 1-\frac{1}{32}\approx 0.97$ or about a 97% chance. A volunteer is selected at random, meaning that each one has an equal chance of being chosen. The simple sum of the probabilities would work if the events in question were mutually exclusive, for then $P(A\cap B)$ is zero, and makes no difference. For each of these there are two choices for the second toss, hence $2\times 2 = 4$ outcomes for two tosses. Find the probability that: his specialty is medicine and he speaks two or more languages; either his specialty is medicine or he speaks two or more languages; his specialty is something other than medicine. Let M denote the event “the student needs help in mathematics” and let E denote the event “the student needs help in English.” The information given is that $P(M) = 0.63$, $P(E) = 0.34$ and $P(M\cap E) = 0.27$. Definition: Additive Rule of Probability A useful property to know is the Additive Rule of Probability, which is $$P(A\cup B) = P(A) + P(B) − P(A\cap B)$$ The next example, in which we compute the probability of a union both by counting and by using the formula, shows why the last term in the formula is needed. We could imagine that one of them is red and the other is green. The intersection corresponds to the shaded lens-shaped region that lies within both ovals. The events $B, D,$ and M are $B=\{bb,bg,gb\}$, $D=\{bg,gb\}$, $M=\{bb,gg\}$. $$\begin{array}11 & 12 & 13 & 14 & 15 & 16 \\ 21 & 22 & 23 & 24 & 25 & 26 \\ 31 & 32 & 33 & 34 & 35 & 36 \\ 41 & 42 & 43 & 44 & 45 & 46 \\ 51 & 52 & 53 & 54 & 55 & 56 \\ 61 & 62 & 63 & 64 & 65 & 66\end{array}$$ There are 36 equally likely outcomes, of which exactly one corresponds to two fours, so the probability of a pair of fours is $1/36$. In particular $P(4)=\frac{1}{6}$ therefore: $$P(E\cap T) = P(4) + P(6) = \frac{1}{6} + \frac{3}{12} = \frac{5}{12}$$ Definition: mutually exclusive Events A and B are mutually exclusive (cannot both occur at once) if they have no elements in common. Thus the Additive Rule of Probability gives: $$P(M\cup E) = P(M) + P(E) - P(M\cap E) = 0.63 + 0.34 - 0.27 = 0.70$$ Note how the naïve reasoning that if 63% need help in mathematics and 34% need help in English then 63 plus 34 or 97% need help in one or the other gives a number that is too large. Definition: Probability Rule for Complements The Probability Rule for Complements states that $$P(A^c) = 1 - P(A)$$ This formula is particularly useful when finding the probability of an event directly is difficult. Think of using a tree diagram to do so. The percentage that need help in both subjects must be subtracted off, else the people needing help in both are counted twice, once for needing help in mathematics and once again for needing help in English.

Guaranteed Apartment Approval is the name you can trust to secure credit approval, regardless of credit history, credit score, or past evictions. Sep 24, 2021 · Conditional expenses are defined in IRM 5. 10. 14. Abbreviated Language: Language used in the Specifications and otherApproval — No COVID-19 vaccines have been approved. For the binomial distribution, px(1 − p)n − x, represents the probability of any particular sequence with x successes and n − x failures. Use this formula to answer the following: In the Southern area of the United States, approximately 20% of adults have a college degree. We randomly ask four adults whether they have a college degree.

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