

SHARP

Worksheet 10: Probability

Grade 11 Mathematics

1. Give the definitions for the following and give an example of each: (R)
 - a) probability
 - b) mutually exclusive
 - c) dependent events
 - d) independent events

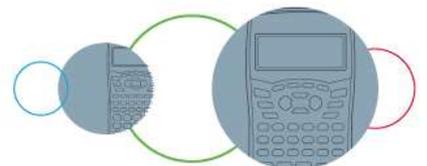
2. Given the probabilities below, say whether events X and Y are mutually exclusive, independent or neither mutually exclusive nor independent: (R)

a)	$P(X) = 0.4$	$P(Y) = 0.1$	$P(X \text{ or } Y) = 0.46$	$P(X \text{ and } Y) = 0.04$
b)	$P(X) = 0.2$	$P(Y) = 0.7$	$P(X \text{ and } Y) = 0.3$	$P(X \text{ or } Y) = 0.6$
c)	$P(X) = 0.6$	$P(Y) = 0.2$	$P(X \text{ or } Y) = 0.68$	$P(X \text{ and } Y) = 0.12$
d)	$P(X) = 0.3$	$P(Y) = 0.8$	$P(X \text{ and } Y) = 0.5$	$P(X \text{ or } Y) = 0.6$
e)	$P(X) = 0.5$	$P(Y) = 0.4$	$P(X \text{ or } Y) = 0.9$	$P(X \text{ and } Y) = 0$

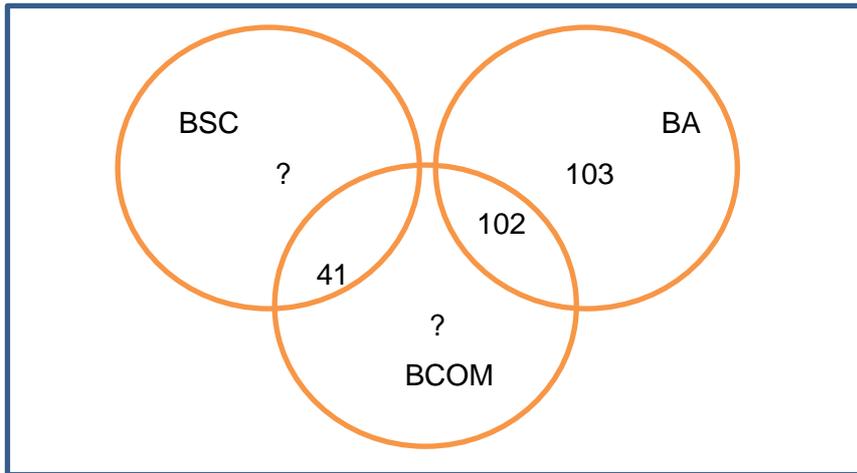
3. A survey was done where 150 students were asked to say whether they wanted chocolate muffins, raisin and bran muffins, or vanilla muffins in the canteen. Students were asked to say whether they would like all three, just two (which two flavours) or only one flavour. The following results were found:

15 students did not like any of the muffin flavours asked while 13 students wanted all three flavours. 19 students only wanted chocolate muffins and 18 students wanted only vanilla muffins. x students wanted vanilla and chocolate muffins, 5 students wanted bran and chocolate muffins and 8 students wanted vanilla and bran muffins. $2x$ students only wanted bran muffins.

 - a) Draw a Venn diagram representing the above information. (C)
 - b) Determine the value of x . (R)
 - c) What is the probability that a randomly selected student did not like at least one muffin flavour? (R)
 - d) What is the probability that a randomly selected student would like a chocolate muffin? (C)
 - e) How many students chose bran and vanilla muffins, but not chocolate muffins. (R)

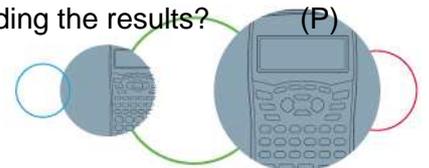


4. 500 grade 11 students were interviewed and asked what kind of degree they would like to study for in university. The results are summarized in the Venn diagram below:

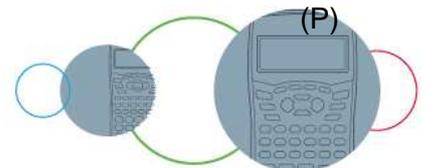


Given that a total of 155 people chose the option for BSC, determine:

- The number of grade 11 students who chose only a BSC degree. (R)
 - The number of grade 11 students who chose only a BCOM degree. (R)
 - The probability that a randomly selected grade 11 student would have chosen a BCOM degree. (C)
 - The probability that a randomly selected grade 11 student would have chosen a BSC and a BA degree? Hence what kind of events are BSC and BA? (C)
 - The probability that a randomly selected grade 11 student would have chosen either a BSC or a BA degree. (C)
 - The probability that a randomly selected grade 11 student would have chosen a BSC degree and a BCOM degree OR a BA degree and a BCOM degree. (C)
5. A car manufacturer is interested in determining what kinds of cars university students would want to buy while they are studying. They interview 680 university students and ask them whether they would prefer a hatchback car, a fuel efficient car or a fast car. The following are the results:
- 340 students wanted a hatchback car, 297 students wanted a fuel efficient car and 341 students wanted a fast car. 178 students wanted both a hatchback and a fast car, while 153 wanted a fuel efficient and fast car. 578 wanted at least one of the three characteristics, while 60 wanted all three characteristics for their car.
- Record this information in a Venn diagram. (C)
 - How many students did not want any of the characteristics offered by the car manufacturer? (K)
 - What is the probability of randomly selecting a student who wants a car with a hatchback and that is fuel efficient. (R)
 - What advice would you give to the car manufacturer regarding the results? (P)



6. An entrepreneur wants to know about the distribution cell-phone network users. He calls 300 people and asks them whether they use cell-phone network A, B or C. These are the results he gets:
- 180 report using cell-phone network A, while 120 report using network B and 80 report using network C. 44 report using both network A and B, while 36 report using both network A and C. 14 report using all three networks, while 287 report using at least one of the networks.
- Record this information in a Venn diagram. (C)
 - How many people do not use any of the networks mentioned? (R)
 - How many people use two or more networks? (C)
 - What is the probability that a randomly selected person will be using only one network? (C)
7. A certain bag contains 4 red marbles and 12 blue marbles.
- What is the probability of selecting a red marble from the bag, and what is the probability of selecting a blue marble out of the bag? (R)
 - If three marbles are taken out of the bag one at a time and not put back into the bag after the draw,
 - Draw a tree diagram to represent the above information. (C)
 - What is the probability of only choosing red marbles on all three draws? (C)
 - What is the probability of selecting one red marble and two blue marbles? (C)
 - What is the probability of selecting a green marble? (K)
 - If a marble is taken out of the bag, and then put back into the bag after each withdrawal three times,
 - Draw a tree diagram to represent the above information. (R)
 - What is the probability of only choosing three blue marbles in a row? (C)
 - What is the probability of choosing two red marbles and one blue marble in any order? (C)
 - What is the probability of choosing at most one red marble? (C)
8. A new driver works out the probability of a traffic light (robot) being red or green as he arrives at the light. The probability of the robot being red is 0.4 and the probability of the robot being green is 0.5. The events are independent events.
- Draw a tree diagram for the probability of four consecutive light changes. (C)
 - Determine the chance of getting 4 green lights in a row. (C)
 - What is the probability of getting two red lights and two green lights. (C)
 - What is the probability of getting no green robots? (C)
 - What is the probability of getting an orange light? (P)



9. Thabang is choosing what to wear – there is a 60% chance that she will choose high heels and a 40% chance that she will choose wedges. If she chooses high heels there is a 70% chance that she will wear a dress, but if she chooses wedges there is a 60% that she will wear a skirt.
- a) Draw a tree diagram and fill in all the missing probabilities. (C)
 - b) Determine the probability of Thabang choosing a high heels and a skirt. (R)
 - c) Determine the probability of Thabang choosing wedges and a skirt. (R)
 - d) Which outfit is Thabang most likely to wear? (P)
10. A certain game requires you to flip a coin and toss a die at the same time.
- a) Draw a tree diagram for the coin flip and die toss. (R)
 - b) If the game is won by either getting heads and a 6 or tails and a 1, determine the chance of winning the game. (C)
 - c) What is the chance of winning the game twice in a row? (C)
 - d) What is the chance of throwing an even number and a heads? (C)
 - e) What is the chance of throwing a multiple of three and tails? (C)
 - f) Another variation of the game is to choose a card from a 52 pack deck and throw a die at the same time. If the game is won by selecting an ace and throwing a 6, determine the chance of winning. (C)
 - g) Which game do you think you would play, and why do you say so? (P)

