

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Math 10 Honours section 7.3 Probability with Independent and Dependent Events**

1. Which of the following are independent or dependent events?
  - i) Being good in math and being tall
  - ii) Smoking and getting lung cancer
  - iii) Having a high IQ and being good in Math
  - iv) Flipping a coin, getting a heads first and then getting heads again
  - v) Flipping a coin 5 times and getting 5 heads in a row, then getting a head again on the next flip
  - vi) Rolling a dice twice, getting a 3 on the first roll and getting a sum of 8
  
2. A coin is tossed 3 times, event "A" is getting a heads on the first toss, event "B" is getting a heads on the second toss, and event "C" is getting two heads.
  - a. Are events "A" and "B" independent?
  
  - b. Are events "A" and "C" independent?
  
  - c. Are events "B" and "C" independent?
  
3. Classify the following events as being mutually exclusive, not mutually exclusive, independent or dependant.
  - a) Drawing a red card or a spade
  
  - b) Drawing two aces from a deck of cards without replacement.
  
  - c) Flipping a coin twice and getting heads both times.
  
  - d) Drawing a face card or a jack.


4. Indicate whether event "A" and "B" would be independent or dependent: If  $P(A) = 0.70$  ,  $P(B) = 0.8$  , and  $P(A \text{ and } B) = 0.56$
  
5. If the probability that event "A" occurs is 0.2, event "B" is 0.5, and the event of "A and B" is 0.3, then would events "A" and "B" be independent? Explain?
  
6. Tina and Brenda are two members of the Terry Fox Tennis team. Tina wins 70% of her matches and Brenda wins 55% of her matches. Assuming independence, determine the probability that Brenda wins her next match and Tina does not
  
7. The probability that you are late for your bus is  $7/11$ . The probability that the bus arrives on time is  $1/11$ . What is the probability that you are late and the bus is also late?
  
8. A biased coin with  $P(\text{heads})=0.6$  was tossed 4 times. The coin came up heads 3 times, 3 heads first then tails. What is the probability of this outcome?

9. In 6 tosses of a coin, the first two tosses resulted in 3 heads. What is the probability that the 6 tosses will produce 4 heads? (ans:3/8)
10. The probability that your car battery will last one year is 0.7 and that it will last two years is 0.2. At the end of the first year, what is the probability that the battery will last until the end of the second year?
11. There are 3 printers in a school and the probability that printer A is broken is  $\frac{1}{4}$ , printer B is broken is  $\frac{1}{2}$ , and printer C is broken is  $\frac{1}{7}$ . What is the probability of each event?
- i) All 3 machines are broken?                      ii) only two machines are broken?
12. Two hockey teams "A" and "B" have a shootout to see which team will win the gold medal. The teams take turns to attempt to score a goal. The first team to score a goal wins. The probability that team A will score a goal is 0.30. The probability that team B will score a goal is 0.2. What is the probability of each of the following events?
- a. Team "A" shoots first and then team "B" wins on the next shot
- b. Team "A" shoots first and then scores on its fifth shot
- c. Team "B" shoots first and team "A" scores on its 3<sup>rd</sup> shot
- d. Team "B" shoots first and team "A" wins

13. In bag A there are 2 red balls and 4 black balls. In bag B there are 4 red balls and 5 black balls. One ball is drawn from each bag. What is the probability of each event?
- Drawing two balls with different colours
  
  
  
  
  
  
  
  
  
  
  - Drawing two ball with the same colours
14. Juan rolls a fair regular octahedral die marked with numbers 1 through 8. Then Amos rolls a fair six sided die. What is the probability that the product of the two rolls is a multiple of 3? Amc 12 2002
15. An envelope contains eight bills: 2 ones, 2 fives, 2 tens, and 2 twenties. Two bills are drawn at random without replacement. What is the probability that their sum is \$20 or more? Amc 12 2005
16. On a standard die one of the dots is removed at random with each dot equally likely to be chosen. The die is then rolled. What is the probability that the top face has an odd number of dots? AMC 12 2005

17. Box 1 contains one gold marble and one black marble. Box 2 contains one gold marble and two black marbles. Box 3 contains one gold marble and three black marbles. Whenever a marble is chosen randomly from one of the boxes, each marble in that box is equally likely to be chosen. A marble is randomly chosen from Box 1 and placed in Box 2. Then a marble is randomly chosen from Box 2 and placed in Box 3. Finally a marble is chosen from Box 3. What is the probability that the marble chosen from Box 3 is gold?
18. Amy and Bill alternately toss a fair die with Amy going first. A neutral third party keeps a running tab of the combined sum of all their throws. Whoever reaches a combined sum divisible by 6 wins. What is the probability that Amy wins?
19. Each of the 2018 boxes in a line contains a single red marble, and for  $1 \leq k \leq 2018$ , the box in the  $k^{\text{th}}$  position contains " $k$ " white marbles. Isabella begins at the first box and successively draws a single marble at random from each box, in order. She stops when she first draws a red marble. Let  $P(n)$  be the probability that Isabella stops after drawing exactly " $n$ " marbles. What is the smallest value of " $n$ " for which
- $$P(n) < \frac{1}{2018}. \text{ AMC 10}$$

20. Jason has 3 green baskets, 3 red baskets, 3 blue baskets, and 3 yellow baskets. He randomly distributes 4 eggs among the green baskets, with each egg equally likely to be put in each basket. Similarly, he distributes 3 eggs among the red buckets, 2 eggs among the blue baskets, and 1 egg among the 3 yellow baskets. Once he is finished, what is the probability that a green basket contains more eggs than each of the other 11 baskets? Fermat 2018

9.  (a) The string  $AAABBBBAABB$  is a string of ten letters, each of which is  $A$  or  $B$ , that does not include the consecutive letters  $ABBA$ .  
The string  $AAABBAAABB$  is a string of ten letters, each of which is  $A$  or  $B$ , that does include the consecutive letters  $ABBA$ .  
Determine, with justification, the total number of strings of ten letters, each of which is  $A$  or  $B$ , that do not include the consecutive letters  $ABBA$ .