

## Resource for Day 6 – Probability and Counting Techniques

### Thursday 26 October

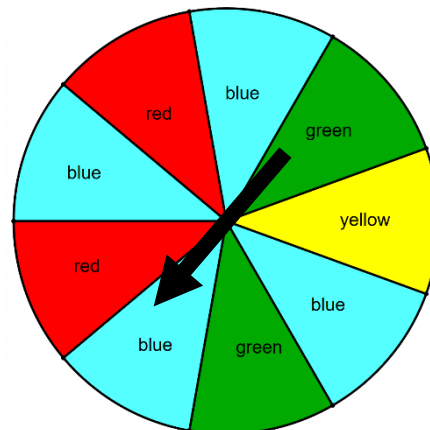
1. A die is thrown and a card is drawn from a pack. Determine the following probabilities:
  - a.  $P(3 \text{ on die} \cap \text{a red card})$  (2)
  - b.  $P(\text{prime on die} \cap \text{a heart})$  (2)
  - c.  $P(\text{factor of 9 on die} \cup \text{a black card})$  (3)
  - d.  $P(\text{even on die} \cup \text{a spade})$  (3)
  
2. Two friends are comparing their chances of getting a ticket to a certain concert. Suppose Thandi has a 40% chance, Bongi has a 16% chance and there is 6,4% chance that both get a ticket.
 

Are their chances of getting a ticket:

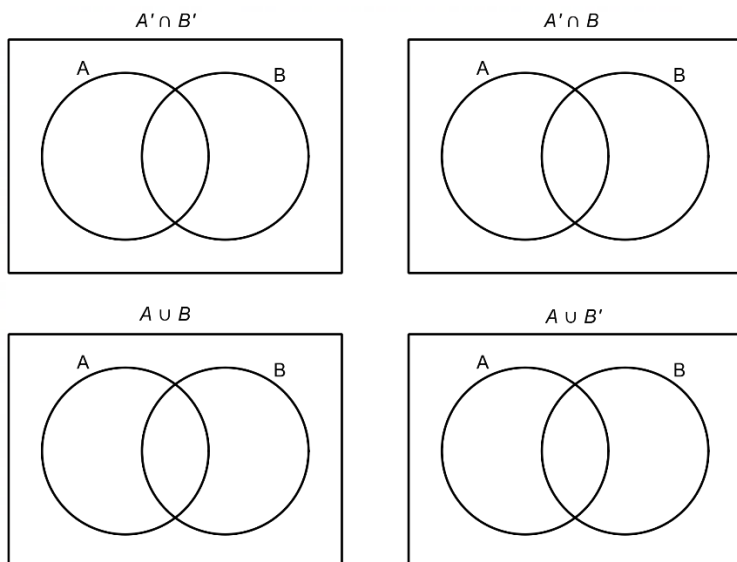
  - a. mutually exclusive? Justify. (2)
  - b. Independent? Justify. (2)
  
3. Suppose event A is six times more likely to happen than event B and that they are Mutually exclusive. If  $P(A \cup B) = 0,84$  then determine  $P(B)$  (4)
  
4. I spin the spinner below. It has nine equally-sized sectors.

Determine:

- a.  $P(\text{red})$
- b.  $P(\text{green} \cup \text{blue})$
- c.  $P(2 \text{ greens in 2 spins})$
- d.  $P(1 \text{ red in 2 spins})$
- e.  $P(\text{at least one blue in 5 spins})$
- f. The minimum number of times I must spin it to be at least 90% sure of getting at least one yellow.



5. Shade the requested areas on the venn diagrams below: (8)



6. The probability that Phumlani finishes the Comrades is 0,8 while the probability that Sanele finishes is 0,7. If the probability that either Phumlani or Sanele finishes is 94% then determine the probability that both finish and determine whether or not their chances of finishing are independent or not. (4)

7. Given:

$$P(A' \cap B) = 0,6$$

$$P(A \cap B) = 0,2$$

$$P(A) = 0,3$$

Draw a venn diagram. (3)

Now use it to determine:

- If A and B are mutually exclusive? Justify your answer. (1)
- If A and B are independent? Justify your answer. (2)
- $P(A' \cap B')$  (1)
- $P(A \cup B)$  (1)

8. A music play list on my phone has 9 songs. It plays them in random order and will not replay a song until all the songs have played. Four of the songs are by Taylor Swift.

Draw a tree diagram and use it to determine the probability that exactly 2 of the next three songs are by Taylor Swift. (5)

8. A bag contains 1 green bead and 3 red beads. John and Thandi take turns **removing** A bead from the bag with Thandi going first. The person who draws the green bead wins.

Determine the probability that Thandi wins.

Hint: use a tree diagram.

9. Repeat question 8 but this time with the bead being **replaced** after each turn. (6)

10. A computer code takes the form of 3 digits which may not be repeated followed by 2 letters which may be repeated.

An example of such a code is 015AA

- a. How many such codes are possible? (3)
- b. Suppose that twenty billion (20 000 000 000) unique codes are needed. It is decided to add extra letters. **Calculate** the **minimum** number of extra letters which will be needed. (5)

11. Adam is forming 5 digit numbers by choosing from the digits

2 ; 3 ; 4 ; 6 ; 7 ; 8 and 9

There is only one of each of the above digits.

- a. How many numbers can Adam form? (2)
- b. If one of the numbers formed by Adam is chosen at random what is the probability that it is even AND exceeds 70 000? (5)

12. Fundi arranges her eight books randomly on her shelf. What is the probability that her three Maths books are all next to one another? (3)

13. Consider the letters

M A T H E M A T I C A L

- a. How many different “words” can be formed using all the letters? (3)
- b. If such a word is chosen at random then what is the probability that it does NOT start and end with the same letter? (5)

14. Alexandra has cards with the following digits on:

6	2	4	1	8
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She has just one of each card and she is forming numbers using **some or all of** her cards.

For example:

2	1
---	---

 OR 

2	8	6
---	---	---

 OR 

1
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- a. How many different numbers can she form in this way? (4)
- b. What is the probability that the number she forms is bigger than 5000? (4)
15. A group of 6 friends goes to the movie. Johan hopes he won't be sitting next to Pieter as they have recently had a disagreement. What is the probability that they are NOT seated next to one another? (4)

16. Nonhlanhla is investigating whether people's hot drink preference is dependent of their left or right handedness. She collects the following data:

	Prefer tea	Prefer coffee	TOTAL
Left handed	19	76	
Right handed	213		1065
TOTAL		928	1160

- a. Complete the table
- b. Determine whether people's hot drink preference is dependent of their left or right handedness. Justify your answer with a calculation