

## Revision Sheet 7: Counting and Probability

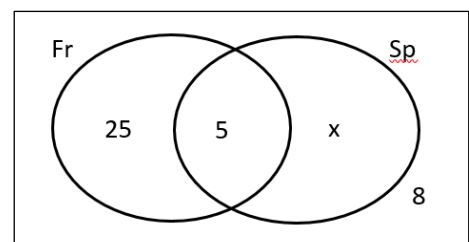
### Q1. Counting and Probability - The Basics (1<sup>st</sup> Year - Before Week 20)

- a) State the Fundamental Principle of Counting.
- b) An early bird menu consists of 3 starters and 5 main courses. How many different 2-course meals can you have?
- c) A code for a locker consists of one of the letters A, B, C or D followed by a digit from 1 to 9. How many different codes are possible?
- d) A pupil must choose one subject from block A, one subject from block B and one subject from block C for Leaving Cert. Group A has 4 modern languages, Group B has 3 Science subjects while Group C has 2 Business subjects. How many different subject selections are possible?
- e) A card is drawn at random from a deck of cards. Calculate the probability that the card is:
  - i) an Ace
  - ii) a Diamond
  - iii) a red picture card
  - iv) has a value bigger than 7 (ignoring picture cards)
- f) The letters of the word MATHEMATICS are printed on separate cards. If a card is chosen at random, what is the probability that the card is an M?
- g) In a pre-election poll of 400 people, 120 supported Fine Gael, 140 supported Fianna Fail and the rest were undecided. If a person is selected at random from this group what is the probability that they:
  - i) support Fine Gael?
  - ii) are undecided?
- h) A die is thrown and a coin is tossed.
  - i) Show all possible outcomes in a two-way table.
  - ii) What is the probability of getting a Head and an even number on the die?
- i) A fair die is thrown 60 times. How many times would you expect to get a 4?
- j) 50 cars pass through a junction in a few minutes. 15 of the cars are red.
  - i) Use these results to estimate the probability that the next car to pass the junction will be red.
  - ii) What do we call this estimate of the probability?

### Q2. Probability - 2<sup>nd</sup> Year Probability - Unit 5

- a) The given Venn Diagram shows the modern languages, if any, taken by a group of 50 students.

- i) Find the value of  $x$ .
- ii) If a student is selected at random, find the probability that the student takes at least one of these languages.



- b) In a class of 28 students, 25 were wearing blazers or ties or both. Seven wore blazers with no tie and eight wore blazers and ties.
- Show this information on a Venn Diagram.
  - Find the probability that a student selected at random was wearing a tie but not a blazer.
- c) 35 people coming back from America were asked if they had visited New York, Boston or San Francisco. The results were as follows: 20 had visited New York, 13 had visited Boston, 16 had visited San Francisco. 7 had been to all three cities. 3 had been to both New York and San Francisco, but not Boston. 1 had been to both New York and Boston, but not San Francisco. 8 had been to Boston and San Francisco.
- Display the information in a Venn Diagram.
  - If one person is chosen at random from the group, what is the probability that the person had not visited any of the three cities?
  - A person who visited New York is chosen at random. What is the probability that the person also visited Boston?
- d) Kaitlin has a 40% success rate from the free-throw line.
- Draw a Tree Diagram to show Kaitlin's possible success from three successive free throws.
  - Use your diagram to calculate the probability that she scores three free throws in a row.
  - What is the probability that she scores at least 2 of the free throws?
  - What is the probability that she scores exactly 1 of her 3 free throws?
- e) Olive throws a die three times in a row. Calculate the probability that she throws a four, three times in a row.
- f) There are 5 green beads and  $x$  golden beads in a bag. What is the value of  $x$  if the probability of drawing a golden bead is  $\frac{2}{3}$ ?
- g) A biased die is rolled. The table gives the probability that it will land on each of the numbers 1, 2, 4, 5 and 6.

	1	2	3	4	5	6
<i>Probability</i>	0.1	0.1		0.2	0.3	0.1

- Work out the probability that the die will land on a 3.
- Calculate the probability that the die will land on an even number.

### Q3. Extra Challenge and Problem Solving

- a) These are the results of an experiment to test a spinner:

	Result of Spins
Red	50
White	30
Blue	20
Total	100

- i) Explain what the spinner could look like.
- ii) Draw a possible sketch of the spinner.
- b) Paul is raising money for a charity in his school. He organises a fun day where one of the games is played using a spinner with five sectors numbered 1 to 6 and a second spinner with numbers 1 to 3. He charges €1 for each game, where both spinners must be spun. If a person gets the same number on both spinners they get their €1 back. If they get a sum of 8 on the two spinners, they get €5 back.
- i) Draw a two way table to show the sum of the numbers on the two spinners.
- ii) Find the probability of getting €5 back if you play the game once.
- iii) If every student in the 420 student school plays the game, find the number of students you would expect to get €1 back.
- iv) After 420 students have played the game, 80 students have got exactly €1 back and Paul has raised €120 for his charity. Find the number of students who got €5 back.
- v) Paul says that the probability of someone getting money back (€1 or €5) would decrease if he changed the spinner with 6 numbers to a spinner with 5 numbers instead, and kept the rules the same otherwise. Is Paul correct? Make out a two-way table using the changed Spinner, and use it to justify your answer fully.

Revision Sheet 7 Solutions:

Q1.

a) If there are  $m$  ways of doing one thing and  $n$  ways of doing another thing, then the total number of outcomes is given by  $m \times n$ .

b) 15      c) 36      d) 24 selections      e) i)  $\frac{1}{13}$     ii)  $\frac{1}{4}$     iii)  $\frac{3}{26}$     iv)  $\frac{3}{13}$

f)  $\frac{2}{11}$       g) i)  $\frac{3}{10}$     ii)  $\frac{7}{20}$       h) i) 

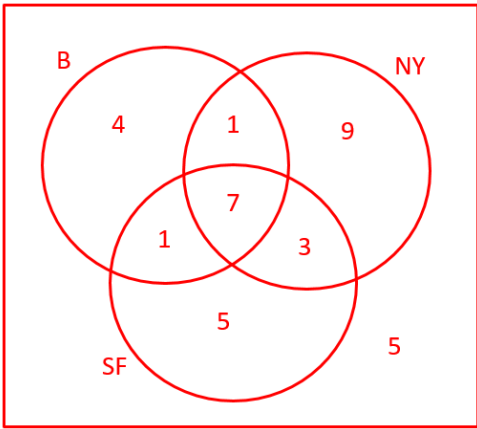
(H, 1)	(H, 2)	(H, 3)	(H, 4)	(H, 5)	(H, 6)
(T, 1)	(T, 2)	(T, 3)	(T, 4)	(T, 5)	(T, 6)

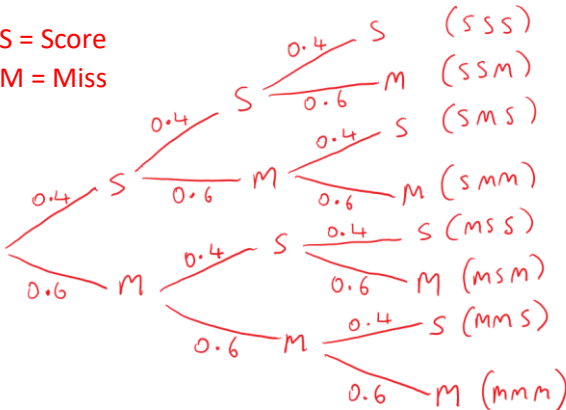
      ii)  $\frac{1}{4}$

i) 10 times    j) i)  $\frac{3}{10}$       ii) The relative frequency

Q2.

a) i)  $x = 12$     ii)  $\frac{21}{25}$       b) i)       ii)  $\frac{5}{14}$

c) i)       ii)  $\frac{1}{7}$       iii)  $\frac{2}{5}$

d) i)   
 S = Score  
 M = Miss  


ii) 0.064 or  $\frac{8}{125}$       iii) 0.352 or  $\frac{44}{125}$       iv) 0.432 or  $\frac{54}{125}$

e) i)  $\frac{1}{216}$

ii) 10 golden beads

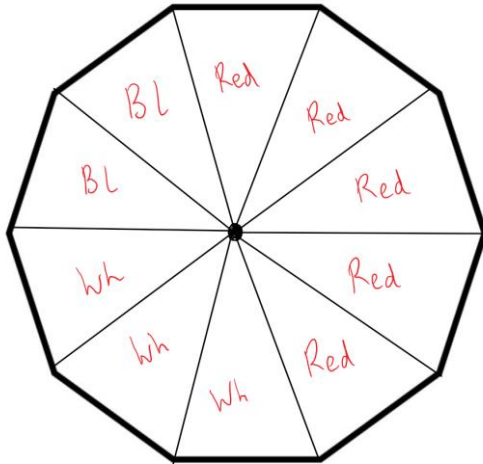
f) i) 0.2

ii) 0.4

Q3.

a) i) 50% of the spinner would be red, 30% would be white and 20% of it would be Blue

ii)



b) i)

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9

ii)  $\frac{1}{9}$

iii) 70 students

iv) 44 students

v)

	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8

⇒ Probability of someone getting money back was  $\frac{5}{18}$  with the 6 numbered spinner but now it's  $\frac{4}{18}$  so the probability has reduced, so Paul is correct.