A Guide to Probability

Teaching Approach

Probability allows you, as the teacher, to have some fun in class. CAPS calls for experiments with dice and cards and you should take full advantage of this. Organise some card games in the class and ask the learners to discuss the probability of winning. You do not need them to do calculations, just to use their instinct and own terminology to describe the games, their pitfalls and strategies to win.

Once your learners have gotten used to the idea of chance or luck, introduce the terminology needed for probability. Explain the difference between an outcome and an event, what likelihood means.

If your class struggles with converting fractions to percentages, you should revise this in the beginning stages. Then move on to the probability scale.

Once your learners have grasped the basics, you will move on to calculations in probability. Remember to stick closely to the types of problems discussed in CAPS. Rather do many examples of these problems than push your class to do more difficult questions than needed. Make sure that, by the end of the sections, they are able to do exam style questions with confidence.

These videos do not need to be watched in any particular order. They are given numbers for easy referencing but you are able to watch them in the order you choose without compromising the lessons.

Video Summaries

Some videos have a 'PAUSE' moment, at which point the teacher or learner can choose to pause the video and try to answer the question posed or calculate the answer to the problem under discussion. Once the video starts again, the answer to the question or the right answer to the calculation is given.

Mindset suggests a number of ways to use the video lessons. These include:

- Watch or show a lesson as an introduction to a lesson
- Watch of show a lesson after a lesson, as a summary or as a way of adding in some interesting real-life applications or practical aspects
- Design a worksheet or set of questions about one video lesson. Then ask learners to watch a video related to the lesson and to complete the worksheet or questions, either in groups or individually
- Worksheets and questions based on video lessons can be used as short assessments or exercises
- Ask learners to watch a particular video lesson for homework (in the school library or on the website, depending on how the material is available) as preparation for the next days lesson; if desired, learners can be given specific questions to answer in preparation for the next day's lesson

1. Playing Games of Chance

This video covers work from the sections 'Expressions of probability', 'Prediction', and 'Representations for determining possible outcomes'.

2. Weather and Probability Scale

This video covers work from the sections 'Expressions of probability', 'Prediction' and 'Representations for determining possible outcomes'. Probability in weather predictions is briefly explained before moving on to the probability scale.

3. What is Relative Frequency?

This video covers work from the sections 'Prediction' and 'Representations for determining possible outcomes'. This video clearly defines the difference between probability and relative frequency.

4. Doing Basic Probability Calculations

This video covers work from the sections 'Expressions of probability' and 'Representations for determining possible outcomes'. This video shows the learners how to do probability calculations.

5. Using Tree Diagrams and Two Way Tables

This lesson focuses on using tree diagrams and two way tables to make calculations in probability

Resource Material

1. **Playing Games of Chance**	http://www.free-training-tutorial.com/probability-games.html	A variety of online probability games that can be analysed.
	http://shazam.econ.ubc.ca/flip/index.html	Interactive coin tossing page.
2. **Weather and Probability Scale**	http://www.pearsonschool.com/live/images/custom/envisionmath_ca/games/pond.html	Probability Pond game which guides students through understanding probability.
	http://www.weathersa.co.za/web/	South African Weather Service
3. **What is Relative Frequency**	http://www.youtube.com/watch?v=vtaMipvrgIU	A YouTube clip on relative frequency involving a bag with 30 stones and pulling them out of the bag.
4. **Doing Basic Probability Calculations**	http://www.mathgoodies.com/lessons/vol6/intro_probability.html	A page on the definitions and basic calculations in probability. Good for self-study.
	http://www.youtube.com/watch?v=BAjOEsU_mpE	A YouTube clip on how to calculate the probability of simple events.
	http://www.wikihow.com/Calculate-Probability	Tips on how to calculate probability
	http://studyjams.scholastic.com/studyjams/jams/math/probability/probability-fraction.htm	An interactive card game that works with probability as fractions
	http://www.compasslearningodyssey.com/sample_act/34math_probably.html	Interactive lesson on probability

Task

As part of a school project, Sarah and George have been paired up by their teacher and need to find a way to raise money at the school carnival. George is keen to bake and sell cup cakes, but Sarah thinks they will make more money by playing games of chance.

Question 1

Before George commits to doing games of chance at the school carnival, he wants to confirm that Sarah's knowledge of probability is good. He gives her a set of statements and she must say whether they are true or false. Help her by saying if the statement is true or false. If it is false, correct the statement to make it true.

1.1 50% chance of winning is the same as 0,5 chance of winning.

1.2 If you have a ⅓ chance of pulling a blue marble out of a bag and a ¼ chance of pulling a red marble out of the same bag, you are more likely to pull a blue marble out.

1.3 If you have a 0,3 chance of losing, you have a 0,3 chance of winning.

1.4 If you have a 45% chance of winning, your opponent has a 55% chance of losing.

Question 2

Sarah thought George was being cheeky by making her take a test and as a result, set a test for George to see how his knowledge of probability is. She asked George to match an event with the probability of it occurring. Why don't you help him?

2.1	What is the probability of finding a flower in the desert?	A.	½
2.2	What is the probability of rolling a six on a normal dice?	B.	0,083
2.3	What is the probability of a pregnant woman giving birth to a boy	C.	Highly unlikely
2.4	What is the probability of Sarah's birthday being in this month?	D.	16,67%

Question 3

After talking about what games to play, George suggests a game that involves flipping a coin. The player will pay R1 to play. The object of the game is to toss a tail. If the player tosses a tail the player wins R2. If the player tosses a head George keeps the R1 entrance fee.

3.1 How many possible outcomes are there to this game?

3.2 What is the player's chance of winning? Give your answer as a percentage.

3.3 What are George's chances of keeping the R1?

Question 4

Sarah decides to make the coin game more difficult to win by saying that a play would have to toss the coin twice and get tails both times in order to win.

4.1 Why do you think Sarah has done this?

4.2 What is the player's chance of winning when these new rules are implemented?

4.3 What are Sarah's chances of winning?

Question 5

Sarah has decided she does not like the coin toss game and suggests a game where a player will draw a coloured marble from a bag. If the player draws a white marble, they will lose the R1 they use to play the game. If they draw a blue marble, they will double their money taking away R2. There will be 10 marbles in the bag. The marbles are replaced at the end of each draw.

5.1 What is the probability of a player winning if there are 5 blue and 5 white marbles?

5.2 How can Sarah change the game to increase her chances of keeping the R1 entrance fee? Explain your answer.

Task Answers

Question 1

1.1 True

1.2 False, you are more likely to pull a red marble out of the bag.

1.3 False. If you have a 0,3 chance of losing, you have a 0,7 chance of winning.

1.4 False. If you have a 45% change of winning, your opponent has a 45% chance of losing. Your chances of losing will be 55%, which is the same chance your opponent has of winning.
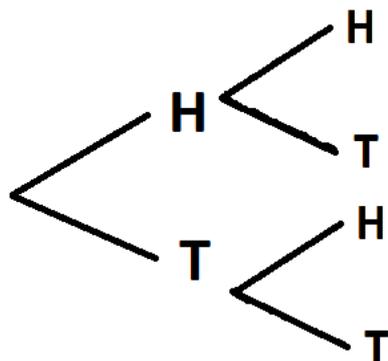
Question 2

2.1	What is the probability of finding a flower in the desert?	C	Highly unlikely
2.2	What is the probability of rolling a six on a normal dice?	D	16,67%
2.3	What is the probability of a pregnant woman giving birth to a boy	A	½
2.4	What is the probability of Sarah's birthday being in this month?	B	0,083

Question 3

There are two outcomes, heads or tails.

3.1 A player has a 50% or ½ or 0,5 chance of winning.

3.2 George has a 50% or ½ or 0,5 chance of keeping the R1.

Question 4

4.1 The new rules give Sarah a better chance of winning.

4.2 The tree diagram shows that a player only has one chance of winning out of four possible outcomes. This means their chance of winning is ¼ or 0,25 or 25%.

4.3 Sarah can win if the other three outcomes happen giving her a chance of ¾ or 0,75 or 75% of winning.

Question 5

5.1 A players chance of winning is $\frac{5}{10}$ which is 50% chance.

5.2 Sarah can put more white marbles in the bag than blue marbles. This means that the probability of choosing a white marble will be far greater.

Acknowledgements

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