PART V: Literature & Mathematics

AGE RANGE: 13-15

TOOL 54: PROBABILITY IN THE CURIOUS INCIDENT WITH THE

Sandgärdskolan

Educator's Guide

Title: Probability in The curious incident of the dog in the nigh-time

Age Range: 13-15 years old

Duration: 1 hour

Mathematical Concepts: Logic and probability

Artistic Concepts: Literary analysis

General Objectives: Understanding what it means to reason logically and what the difference is between logical and everyday reasoning. Another objective is to understand probability and the chance of something specific happening.

Instructions and Methodologies: The students are going to read excerpts and do exercises that are inspired by the content in them.

Resources: This tool provides pictures and excerpts. You only need pen and paper to solve the tasks.

Tips for the educator: Let the pupils read the excerpts. Make sure to discuss the diagnose "autism".

Desirable Outcomes and Competences: At the end of this tool, the student will be able to:
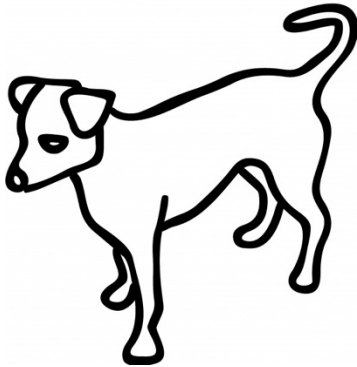
- o Understand the idea of deductive logic (but perhaps not the term as such)
- o Understand probability

Debriefing and Evaluation:

Write 3 aspects you liked about this activity:	1. 2. 3.
Write 2 aspects that you have learned	1. 2.
Write 1 aspect for improvement	1.

Introduction

The book "The Curious Incident of the Dog in the Night-time" is about 15-year-old Christopher. His main interests are logic and detective novels, especially the novels about Sherlock Holmes. One day he finds the neighbour's dog dead. It has been killed and Christopher decides to solve the crime, using Sherlock Holmes' way of deducing facts.

Picture 1: Dog https://www.publicdomainpictures.net/pictures/150000/nahled/outlined-dog-14528797030fP.jpg

Christopher is autistic, which means that he really needs to have things in order. On p.59f he lists other things that explains how his autism shows.

"These are some of my Behavioural Problems

A. Not talking to people for a long time.

B. Not eating or drinking anything for a long time.

C. Not liking being touched.

D. Screaming when I am angry or confused.

E. Not liking being in really small places with other people.

F. Smashing things when I'm angry or confused.

G. Groaning.

H. Not liking yellow things or brown things and refusing to touch yellow things or brown things.

I. Refusing to use my toothbrush if anyone else has touched it.

J. Not eating food if different sorts of food are touching each other.

K. Not noticing that people are angry with me.

L. Not smiling.

M. Saying things that other people think are rude.

N. Doing stupid things.

O. Hitting other people.

P. Hating France.

Q. Driving mother's car.

R. Getting cross when someone has moved the furniture."

(Haddon, M. (2012). "The Curious Incident of the Dog in the Nigh-time." David Fickling paperback edition. Oxford: David Fickling Books. p.59f)

One thing that Christopher likes though, is Maths. Probably because it appeals to his love for things being in order and being logic. In the book this is shown with his obsession for the colour of cars. He predicts the quality of the day (whether it is going to be a good day, a super good day or a black day) based on how many red cars in a row that he could spot and how many yellow cars he could spot.

The search for the killer of the dog leads Christopher to many strange situations where he really needs to challenge himself and also makes him realize things about his mother and father (that are divorced) that he did not know.

Excerpt

"In the bus on the way to school next morning we passed 4 red cars in a row which meant that it was a Good Day, so I decided not to be sad about Wellington.

Mr Jeavons, the psychologist at the school once asked me why 4 red cars in a row made it a Good Day, and 3 red cars in a row made it a Quite Good Day, and 5 red cars in a row made it's a Super Good Day, and why 4 yellow cars in a row made it a Black Day, which is a day when I don't speak to anyone and sit on my own reading books and don't eat my lunch and "Take No Risks". He said that I was clearly a very

logical person, so he was surprised that I should think like this because it wasn't very logical.

I said that I like things to be in a nice order and one way of things being in a nice order was to be logical. Especially if those things were numbers or an argument. But there were other ways of putting things in a nice order. And that was why I had Good Days and Black Days and I said that some people who work in an office came out of their house in the morning and saw that the sun was shining and it made them feel happy, or they saw that it was raining and it made them feel sad, but the only difference was the weather and if they worked in an office the weather didn't have anything to do with whether they had a good day or a bad day." (Haddon, M. (2012). "The Curious Incident of the Dog in the Nigh-time." David Fickling paperback edition. Oxford: David Fickling Books. p.31)

Glossary

Autism

A neuropsychiatric disability which affects both cognitive and emotional abilities. Typically (there are many expressions of it though) autism shows in limited abilities to communicate and also in repetitive behaviour. Autism among people are often divided in high functional and low functional syndromes.

Deducing

A way of proving that something is true. You start with two or more statements that you know are true and from them get the answer to the question you want to have answered. A classic example is the deduction that Socrates is mortal: All men are mortal. Socrates is a man. Therefore, Socrates is mortal.

Sherlock Holmes

A literary character created by sir Arthur Conan Doyle. He is a slightly eccentric private detective who solves crimes that nobody thought could be solved. He is often helped by his friend Dr Watson. Dr Watson is the narrator of the stories and more down to earth than Holmes. He often asks the detective the kinds of questions that the reader would ask. A returning theme in the books is a situation where Holmes explains a key part of the solution of a crime to the Doctor and it all becomes clear. Famous novels including Sherlock Holmes are The Hound of the Baskervilles and A Study in Scarlet. Many other stories have been published as parts of short story collections. Many of the stories have also been filmed.

The Math behind The curious incident with the dog in the night-time

Probability

The idea of probability is how likely it is that something happens from a certain start. Let's say that we flip a coin. Normally you would call the two sides of an American quarter dollar coin.

Picture 2: Heads or tails https://thesteppingstones.files.wordpress.com/2011/01/head-tails.jpg?w=1400

There are two possible outcomes from the start, so the probability for flipping heads is $\frac{1}{2}$. In the same way the probability for flipping tails is $\frac{1}{2}$.

Picture 3: Dice https://live.staticflickr.com/8384/8602592209_682a188ccf_b.jpg

If we use a normal dice with six faces, the probability for getting, say 1 would be $\frac{1}{6}$. The probability for getting 1 or 6 would then be $\frac{2}{6}$. What would be the probability for getting first 1 and in the next throw 6? Well, that would not be the same as 1 or 6. That would be $\frac{1}{6} x \frac{1}{6} = \frac{1}{36}$ since for every result of the first throw you would have the same probability for getting the desired result of the second throw.

Logic

Depending on your field of study, the idea of how to claim that something is true varies. Historians study real events that occurred. They interpret and argue about the truthfulness of various claims, for example that William the Conqueror invaded England in 1066. Physicists perform experiments to see if their hypotheses are correct, for example, they can test how fast the light goes in a vacuum. Mathematicians, on the other hand, have to stick to linguistic arguments. These arguments are based on logical reasoning. Logic in Mathematics is basically the study of what makes certain arguments valid or not. The idea is that if you have two arguments, often called definitions in Mathematics, you could state a thesis. Here is an example: if a is a rational number and b is a rational number, then the product of these numbers, $a \times b$, would be a rational number.

TASK

The goats and the car behind the door.

This is a classic problem of probability and logic and it is used in the book in a slightly modernized version.

"You are on a game show on television. On this game show the idea is to win a car as a prize. The game show host shows you three doors. He says that there is a car behind one of the doors and there are goats behind the other two doors. He asks you to pick a door. You pick a door but the door is not opened. Then the game show host opens one of the doors you didn't pick to show a goat (because he knows what is behind the doors). Then he says that you have one final chance to change your mind before the doors are opened and you get a car or a goat. So he asks you if you want to change your mind and pick the other unopened door instead. What should you do?" (Haddon, M. (2012). "The Curious Incident of the Dog in the Nigh-time." David Fickling paperback edition. Oxford: David Fickling Books. p.78f)

Explain how Christopher argues when he claims that you have a bigger chance of getting a car instead of a goat if you change your mind.

The colour of cars.

Christopher thinks that if he sees three cars in a row on his way to school it will become a Quite Good Day. Four red cars in a row would be a Good Day and five in a row would mean a Super Good Day. If we say that there are only black cars, silver-coloured cars, red cars and yellow cars and that there are equally many of each driving around in the streets; how big is the probability that Christopher at one specific occasion would have

a. a Quite Good Day (three red in a row)?

b. How big is the probability that he would have a Good Day (four in a row)?

c. How big is the probability that he would have a Super Good Day (five in a row)?

Christopher would probably get many chances to see cars of different colours, but in this case you should only calculate the probability for the coming three, four or five cars.

LEARN MORE…

Here is a webpage where you can learn more about probability and also see some films about it.

https://www.khanacademy.org/math/probability/probability-geometry/probability-basics/a/probability-the-basics

Here is a trailer for a stage production of the book

https://www.youtube.com/watch?v=MZ_P301wMDg