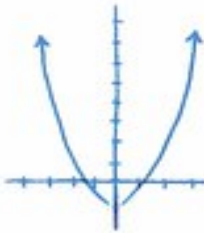


JOHN GREEN

PART V: Literature & Mathematics

AGE RANGE: 13-15

NEW YORK TIMES BESTSELLER
OUR STARS



TOOL 50: CHARTS IN AN ABUNDANCE OF KATHERINES

Sandgårdskolan



Co-funded by the
Erasmus+ Programme
of the European Union

Educator's Guide

Title: Charts and functions in An Abundance of Katherines

Age Range: 13-15 years old

Duration: 2 hours

Mathematical Concepts: Charts and functions.

Artistic Concepts: Literature analysis and to some extent history from World War 1.

General Objectives: This tool will give you a great opportunity to discover various forms of charts and functions. It also offers a not so well-known example of the work of a hugely popular author, namely John Green (The fault in our stars, Paper towns).

Instructions and methodologies: You read the excerpts from the book and then you do mathematical tasks that are similar to the ones described in the excerpts.

Resources: Hula hoops, bean bags and paper.

Learning Outcomes and Competences: At the end of this tool, the student will be able to:

- Understand parts and wholes
- Know the person behind Pythagoras' theorem

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 books “The Curious Incident of the Dog in the Night-time” by Mark Haddon (2003) and “An Abundance of Katherines” by John Green (2006) both have main characters that are autistic. They both try to deal with the complex world they are living in by organizing it mathematically.

After having read the excerpts offered students are going to meet the same mathematical problems that the main characters use. This task, however, deals with the mathematical content used in “Katherines”.

An Abundance of Katherines

The book takes place in the USA, where the protagonist Colin Singleton is out on a road trip with his friend Hassan searching for the grave of Franz Ferdinand, the killing of which led to the outbreak of World War 1. They end up in the fictional town Gutshot, Tennessee. It is described as being somewhere in between Nashville and Memphis.



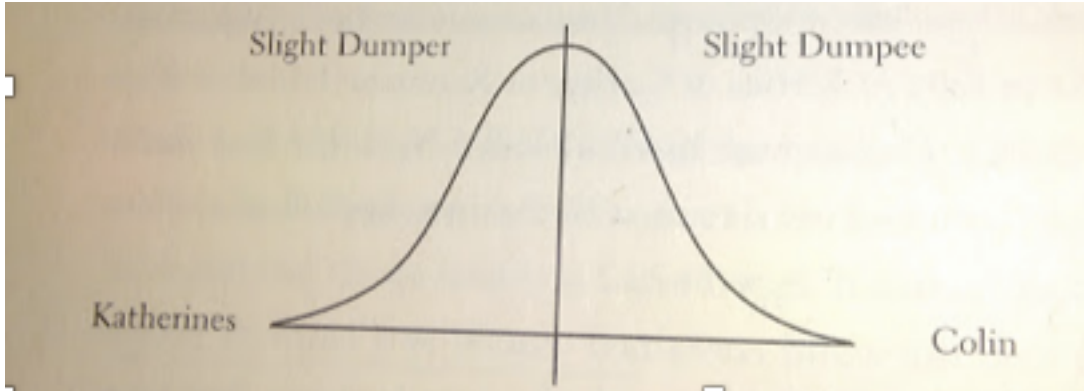
Picture 1: Map of Tennessee

Excerpts

“When it comes to girls (and in Colin's case, it so often did), everyone has a type. Colin Singleton's type was not physical but linguistic: he liked Katherines. And not Katies or Kats or Kitties or Cathys or Rynns or Trinas or Kays or Kates or, God forbid, Catherines. K-A-T-H-E-R-I-N-E. He had dated nineteen girls. All of them had been named Katherine. And all of them - every single solitary one - had dumped him.

Colin believed that the world contained exactly two kinds of people: Dumpers and Dumpees. A lot of people will claim to be both, but those people miss the point entirely: You are predisposed to either one fate or the other. Dumpers may not *always* be the heartbreakers, and the Dumpees may not *always* be the heartbroken. But

everyone has a tendency." (Green, J. "An Abundance of Katherines" London, UK: 2008. p.15f)



Picture 2: A Bell chart depicting the relation between dumpers and dumpees

"They walked through a screen door into the Gutshot General Store. From behind the counter, a girl with a long straight nose and brown eyes the size of some lesser planets looked up from an issue of "Celebrity Living" magazine and said, "How y'all doing?"

"We're okay. Yourself?" Hassan asked while Colin was trying to think whether a worthwhile soul in all of human history had ever read a single copy of "Celebrity Living." (p.30)



Picture 3: Venn Chart showing the integration of Interesting people and "Celebrity Living"-people

"Hassan sat down next to Colin and grabbed the notebook from him. He held it above his head to block the sun, which had darted out from behind a cloud to further bake the cracked orange dirt.

Hassan only glanced at the paper before saying, “You just got me all riled up and your big revelation is that you like getting dumped? Shit, Colin, I could have told you that. In fact, I have.”

“Love is graphable!” Colin said defensively.

“Wait.” Hassan looked down at the paper again, and then back to Colin.

“Universally? You’re claiming this will work for anyone?”

“Right. Because relationships are so predictable, right? Well, I’m finding a way to predict them. Take any two people, and even if they’ve never met each other, the formula will show who’s going to break up with whom if they ever date, and approximately how long the relationship will last.” (p.43)

Glossary

Franz Ferdinand: The Archduke Franz Ferdinand, whose grave Colin and his friend Hassan is looking for, is not at all buried in Tennessee. Not even in the USA as a matter of fact. You could perhaps think that he would be buried somewhere close to Sarajevo in Bosnia where he was shot, but he is actually buried in Austria. Since Ferdinand was an heir to the throne in the Austro-Hungarian empire his grave is now part of the museum at Artstetten castle in the Wachau valley in Lower Austria. The assassination of Franz Ferdinand led to the outbreak of World War I. This war eventually included many countries in Europe and the Middle East. The man who held the gun was called Gavrilo Princip.

The Math behind An Abundance of Kathrines

Bell curve chart: A bell curve chart, which Colin uses to illustrate the relation between the part of the population that are left when a relation ends and the part of the population that leave others (dumpers and dumpees, see picture 2), is a chart that shows normal distribution.

Function: A function in mathematics is a mathematical relation from a set of inputs x to a set of possible outputs y where each input is related to exactly one output. The graph of a function cannot cross itself or go alternately to the right and to the left. Examples of different functions are linear functions, quadratic functions and exponential functions.

The straight line equation: Let's start with an example. When one stays at a hotel for several nights a certain amount of money per night is spent, let's say €50. The cost for the entire hotel stay can then be calculated based on how much one night costs, and on how many nights you stay at the hotel. The relationship can be described like this:

Total cost = 50 euros · number of nights

If the number of nights is denoted with x and the total cost with y , this relation can be rewritten as

$$y = 50x$$

If, in addition to the cost of each night spent at the hotel, the hotel's spa department is also used once, an additional fee of 25 euros will be added. The relationship will be rewritten like this:

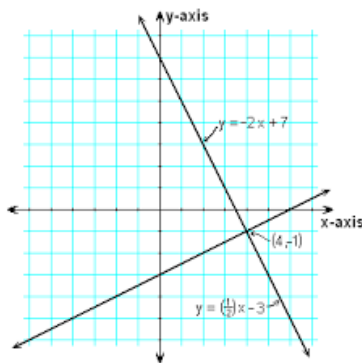
Total Cost = 50 euros · nights + 25 euros

$$y = 50x + 25$$

This equation follows a template called the straight line equation. It is a classical equation, describing the relationship between two variables; x and y . The equation is called the straight line equation, because if the corresponding function is typed ($y(x) = 50x + 25$ in our example) there is a straight line.

This will be shown in the task section by calculating the value of y based on a few different values of x . The points (x, y) that these pairs of values correspond to in a coordinate system will be inserted and the points connected.

Perpendicular lines: Two lines that intersect at a 90° angle.

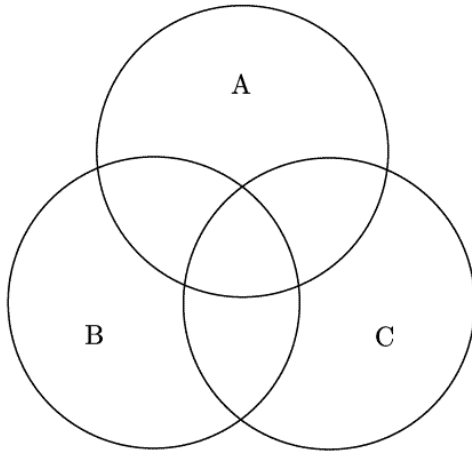


Picture 4: Perpendicular lines,

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Line chart: A drawing that uses lines to show how different pieces of information are related to each other.

Venn chart: A Venn chart is an illustration of the relationships among sets, groups of objects that share something in common. Usually, Venn charts are used to depict set intersections. This type of chart is used in scientific and engineering presentations, in theoretical mathematics, in computer applications, and in statistics.



Picture 5: Venn Chart

A Venn chart is a drawing which illustrates the relationship among three overlapping sets A, B, and C. An element is a member of the intersection of two sets if and only if that element is a member of both sets. Venn diagrams are generally drawn within a large rectangle that denotes the “universal”, the set of all elements under consideration. Colin uses Venn charts in the book (as can be seen in picture 3) to illustrate the (non-existing) relation between dumpers and dumpees.

TASKS

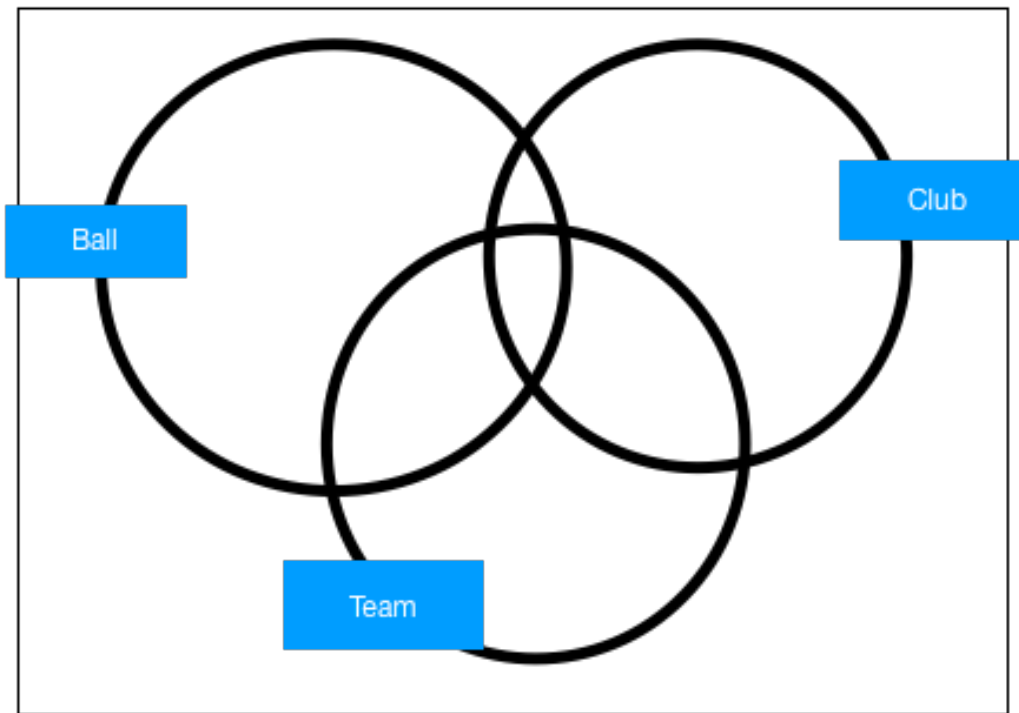
TASK 1

Set theory

You need three hula hoops marked: Ball, Club, Team. Then you need ten bean bags (or similar small bags or patches) used for bean bag tossing

The small bean bags or patches should be marked: riding, ice hockey, swimming, floorball, football, orienteering, badminton, basketball, diving, karate.

Place the hula hoops so they overlap each other.



Picture 6: Set theory task

Place the large hula hoops similar to the picture above.

Place the bean bags or patches in the field where they belong depending on whether they are team sports, played with a ball or with a club.

Do all pupils agree? Discuss whether the patches are in the correct field.

TASK 2

Linear functions

Determine the equation of a straight line which is perpendicular to the line:

- A. $y=2x+4$
- B. $y=4x+1$
- C. Write equations for another two straight lines which is perpendicular to each other.

Answers

- A) $y=-x/2+2$
- B) $y=-x/4+4$
- C) $y=3x+1$ and $y=-x/3+5$

LEARN MORE...

More facts about Franz Ferdinand, the killing of him and the outbreak of World War I

https://en.wikipedia.org/wiki/Archduke_Franz_Ferdinand_of_Austria