# SCIENCE SPAZA

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# COLOURFUL MATHS



**WHAT'S WRONG?**

**I'M STUCK. I HAVE TO WORK OUT A SCHEDULE FOR OUR SCHOOL SOCCER TOURNAMENT, AND ITS TOO COMPLICATED.**

**DID YOU KNOW THERE'S A SPECIAL KIND OF MATHS WHICH CAN HELP YOU SOLVE THIS PROBLEM? IT'S CALLED GRAPH THEORY. HERE, LET ME SHOW**

**WOW! I NEVER KNEW MATHS COULD HELP SOLVE A SPORTS PROBLEM.**

**AND IT CAN DO LOTS MORE THAN THAT!**

## MATHS IN SOCCER?!?

**HAVE YOU EVER WONDERED HOW ALL THE MATCHES ARE ARRANGED FOR SOCCER TOURNAMENTS? FOR EXAMPLE, THERE ARE 16 TEAMS IN THE PSL, AND NO MATCHES CLASH.**

**THERE IS A TYPE OF MATHS CALLED GRAPH THEORY WHERE THE COLOURING OF GRAPHS CAN BE USED TO WORK OUT SCHEDULES TO MAKE SURE THAT THERE IS NO CHANCE THAT ONE TEAM IS SCHEDULED TO PLAY IN MORE THAN ONE MATCH AT A TIME.**

Knowledge is Ncah!

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# TOURNAMENT ORGANISER!

IN THIS ACTIVITY YOU ARE GOING TO ORGANISE AND PLAY A COIN FLIPPING TOURNAMENT.
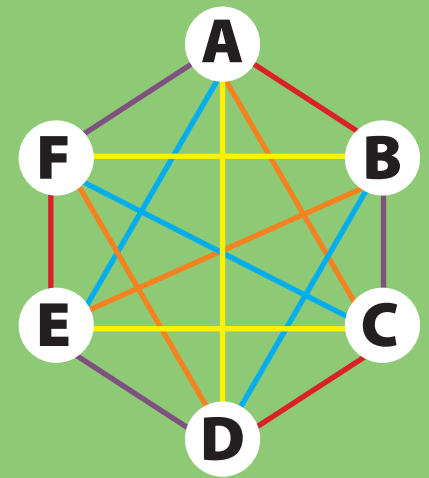
**1** FIND 5 FRIENDS TO PLAY THE TOURNAMENT WITH YOU. FILL IN THEIR NAMES ON THE "NAME" TABLE.

|   | Name |
|---|------|
| A |      |
| B |      |
| C |      |
| D |      |
| E |      |
| F |      |

**2** USE THE COLOUR GRAPH TO FILL IN THE "MATCHES" TABLE. EACH COLOUR ON THE GRAPH IS ONE ROUND. EACH LINE BETWEEN PLAYERS SHOWS WHO NEEDS TO PLAY EACH OTHER IN THAT ROUND.

| Matches | | | | |
|---------|---------|---------|---------|---------|
| **Round 1** | **Round 2** | **Round 3** | **Round 4** | **Round 5** |
| __ plays __ | __ plays __ | __ plays __ | __ plays __ | __ plays __ |
| __ plays __ | __ plays __ | __ plays __ | __ plays __ | __ plays __ |
| __ plays __ | __ plays __ | __ plays __ | __ plays __ | __ plays __ |

**3** PLAY THE MATCHES. EACH MATCH INVOLVES 2 PEOPLE. ONE PERSON FLIPS A COIN, AND THE OTHER SAYS "HEADS" OR "TAILS". IF THE CALLER GETS IT RIGHT, THEY WIN, IF THE CALLER GETS IT WRONG, THE OPPONENT WINS. EACH MATCH IS THE BEST OF 3 COIN FLIPS. THE WINNER GETS 1 POINT; THE LOSER GETS NO POINTS.

TAILS  HEADS

**4** COUNT UP YOUR POINTS TO SEE WHO THE OVERALL WINNER IS AT THE END OF ALL THE MATCHES. IF SOME PEOPLE HAVE THE SAME NUMBER OF POINTS, PLAY AN EXTRA KNOCKOUT ROUND – IF YOU LOSE YOU ARE OUT.
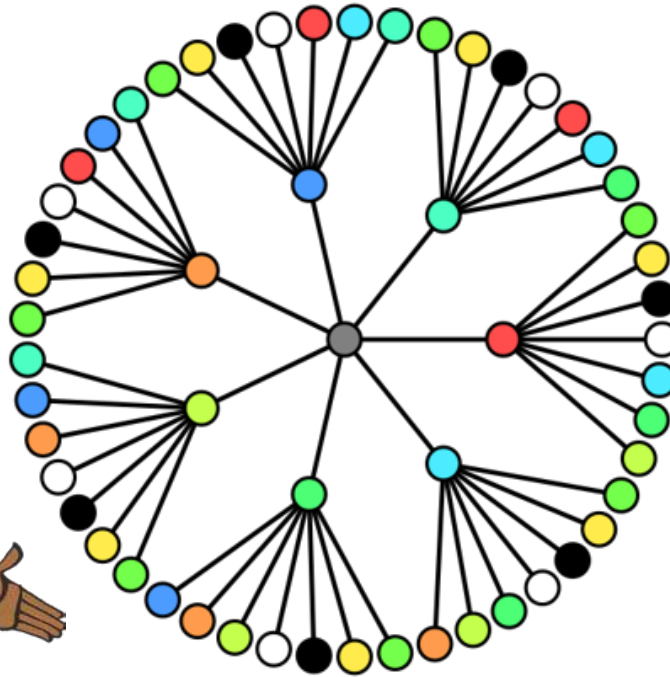
## MATHS - MAKING LIFE EASY!

GRAPH THEORY IS A KIND OF **MATHS** THAT HELPS SOLVE **COMPLEX PROBLEMS** SUCH AS FINDING SCHEDULES FOR SPORTS TOURNAMENTS. THIS TYPE OF MATHS CAN ALSO BE USED TO WORK OUT AN EXAM OR LESSON **TIMETABLE** ... OR EVEN THE BEST ROUTE FOR A TRAVELING SALESPERSON WHO MUST FIND THE **SHORTEST ROUTE**, WITHOUT VISITING THE SAME CUSTOMER TWICE.

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# SOUTH AFRICA'S AMAZING MATHS

MATHEMATICIANS AT THE **UNIVERSITY OF STELLENBOSCH**, RIGHT HERE IN SOUTH AFRICA, ARE RESEARCHING GRAPH THEORY. THEY ARE DISCOVERING SO MANY WAYS THAT IT CAN BE USED TO MAKE LIFE A WHOLE LOT SIMPLER, SUCH AS DEVELOPING MATHS THAT HELPS TO FIND THE BEST PLACES TO BUILD NEW WAREHOUSES OR CLINICS. THEY EVEN USE GRAPH THEORY TO KEEP COMMUNITIES SAFE BY FIGURING OUT HOW MANY FIRE TRUCKS SHOULD BE AT EACH FIRE STATION IN A CITY. **WHO SAID MATHS IS BORING?!**

## CAREERS:

**Data scientists** take data (information) that has been collected from observing something or from research - and make sense of it. The statistics from a soccer match will be analyzed by a data scientist.

**Operation Research Analysts** use their maths and reasoning skills to solve problems and provide solutions. They may use graph theory to improve a schedule or process. A business will hire them to improve their business practises.

Mathematicians can become **teachers** or **lecturers**. While teachers work in schools, lecturers work at tertiary education facilities, like a university. These are awesome careers as you get to pass on knowledge to the next generation!

**Klara Kleinhans** is an Honours student at Stellenbosch University. She has a degree in Mathematical Science and is using maths to figure out what the best option for setting up cell phone towers is. Amazing! Klara finds maths makes her curious, and she loves the challenge of using maths to solve real life problems. She says "maths does not discriminate, and anyone can learn".

## CURRICULUM LINKS

• Grade 7, 8 and 9: Mathematics - Numbers, Operations and Relationships: Numeric and Geometric Patterns - Investigate and extend patterns, input and output values.
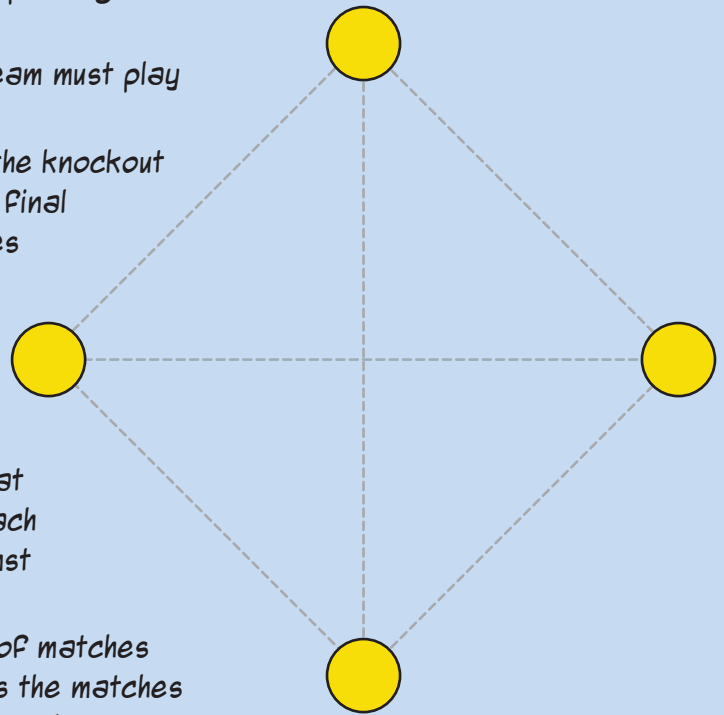
KNOWLEDGE IS Ncah!

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THE **CAF CHAMPIONS LEAGUE** HAPPENS EVERY YEAR. WORK OUT HOW MANY GAMES ARE PLAYED IN THE LEAGUE.

There are 16 teams split into 4 groups.

There are two stages — the groups stage and the knockout stage.

During the group stage, each team must play each other once.

The top 2 teams go through to the knockout stage which starts with quarter final matches, then semi-final matches and then the final match.

Colour the lines in the graph to work out how many matches are necessary for the group stages. Remember that each colour is one round and each line shows who should play against each other.

Then work out the total number of matches in the tournament, which includes the matches played in the group stage and knockout stage.

Answer: 6 matches per group = 24 matches; Quarter finals = 4 matches; Semi-finals = 2 matches; Finals = 1 match; TOTAL = 31 matches