SCISSORS, PAPER, ROCK

Game for 2 players

For scissors hold out 2 fingers like a pair of scissors.
For paper hold your hand out flat.
For rock clench your hand into a fist.

Count 3, 2, 1 and then both players, at the same time, make one of the signs: scissors, or paper or rock.

Scissors beats paper, paper beats rock and rock beats scissors.

It is a draw if both players make the same sign.

Play the game often and enjoy it.

SPR Wide-Splits - In China people play this game standing up facing their opponent. They start with their feet together and when they lose they step to one side so that their feet get further apart. After a while they are doing the splits. Play this game and see who can last longest before giving up or falling over.

SPR Forward-Splits – A game for two players who should be roughly the same height. Start the game toe to toe with the other foot toe to heel behind. Play one round of SPR. Whoever wins takes their front foot and puts it directly behind their back foot. Whoever loses that round must slide their front foot forward to meet toe to toe with their opponent again. Another round of SPR is played. Whoever wins takes their front foot and puts it directly behind their back foot. Whoever loses that round must slide their front foot forward to meet toe to toe with their opponent again. This continues until someone loses their balance and falls over or ends up in the splits!
Watch this video https://youtu.be/dN8xaC-g8Rk to see how the game is played.

LEARN THE MATHS

Play the game with a friend 10 times and keep a record of the results.

Player 1	Paper	Scissors	
Player 2	Rock	Rock	
Winner	Player 1	Player 2	

Is it a fair game? Did you both have the same chance of winning?

List all the different possible events that can happen each time you play this game. Did all these events happen in your 10 games?

What makes you decide which sign to make? Give your reasons.

Are you equally likely to make the scissors sign, the paper sign or the rock sign? Explain why.

HELP

This table is not for recording the results of the games you play. It gives **all the different results that could happen**. Fill in the other boxes. The table has been started for you.

PLAYER 1	SCISSORS	SCISSORS	SCISSORS						
PLAYER 2	SCISSORS	PAPER	ROCK						
WINNER	DRAW	1	2						

NEXT

Make up a similar game with 4 actions instead of 3. Play your game and record the results. Is your game a fair game?

NOTES FOR TEACHERS

SOLUTION

PLAYER 1	SCISSORS	SCISSORS	SCISSORS	PAPER	PAPER	PAPER	ROCK	ROCK	ROCK
PLAYER 2	SCISSORS	PAPER	ROCK	SCISSORS	PAPER	ROCK	SCISSORS	PAPER	ROCK
WINNER	DRAW	1	2	2	DRAW	1	1	2	DRAW

Table showing winners for all possible events.		PLAYER 1		
		SCISSORS	PAPER	ROCK
PLAYER 2	SCISSORS	Draw	2	1
	PAPER	1	Draw	2
	ROCK	2	1	Draw

To understand probability you must understand what events can happen. Mathematicians call this the *sample space*. Learners in primary school should have the experience of playing games, making lists of what can happen and counting the number of events that fit a particular description, for example 'Player 2 wins', but they don't need to learn the words sample space.

The nine different events in this sample space are listed in both tables in different ways.

The tables show that Player 1 has a 1 in 3 chance of winning, player 2 has a 1 in 3 chance of winning and there is a 1 in 3 chance of a draw. So it is a fair game.

Why do this activity?

Learners will enjoy playing this game and it will introduce them to some fundamental mathematical thinking about probability.

Learning objectives

In doing this activity students will have an opportunity to:

- experience involvement in a game that requires some mathematical thinking about probability;
- develop of mathematical thinking about the different possible events in a situation;
- meet the concept of a sample space (**without** technical language);
- explore the concept of equal chances and a fair game.

Generic competences

In doing this activity students will have an opportunity to:

- **think mathematically** and reason logically;
- **communicate** and exchange ideas with others about the rules of a game and the probability of winning;
- **develop life skills and consideration for others** in playing games.

Suggestions for teaching

This is a DO, TALK, RECORD lesson cycle that you might try to plan for most of your lessons.

Explain the game and get the class to play the game 10 times in pairs.

While they are playing write these questions on the board:

1. Is it a fair game? Do you both have the same chance of winning?
2. List all the different possible events that can happen each time you play this game.
3. Did all these events happen in your 10 games?

4. What makes you decide which sign to make? Give your reasons.
5. Are you equally likely to make the scissors sign, the paper sign or the rock sign? Explain why.

Then ask the learners to talk about the questions and to try to find answers. After about 5 minutes ask them to write down their answers in their notebooks.

Then have a plenary class discussion about the answers and list all the different possible events on the board. Ask "how can we record these possibilities clearly?" and introduce this table:

PLAYER 1	SCISSORS	SCISSORS	SCISSORS						
PLAYER 2	SCISSORS	PAPER	ROCK						
WINNER	DRAW	1	2						

Get the learners to tell you what to fill in the different cells. For older learners this is a good context in which to use a 2-way table.

When the learners understand that there are 9 events that can happen, ask the learners what chance Player 1 has of winning? Tell them that the word 'probability' means 'chance'. Ask them what is the probability of a draw.

The Diagnostic Quiz can be used at the end of the lesson to find out if the learners have understood the fundamental idea.

You can introduce the Chinese Splits version of the game at the end of the lesson or in another lesson.

Key questions

What are the different things that can happen when you play this game?
How many different events happen when you play this game?
Are you sure that you have made a list of all the possibilities? How do you know?
How many of those events end in a draw?
How many of those events end in you winning.
How many of those events end in your opponent winning?

Diagnostic Assessment This should take about 5–10 minutes.

1. Write the question on the board, say to the class:

There are 2 red and 5 blue counters in a container.

What is the probability of choosing a red counter from the container?

A $\frac{2}{5}$ B $\frac{5}{7}$ C $\frac{2}{7}$ D $\frac{5}{2}$

"Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D".

2. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.

3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.

4. **Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.** It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.

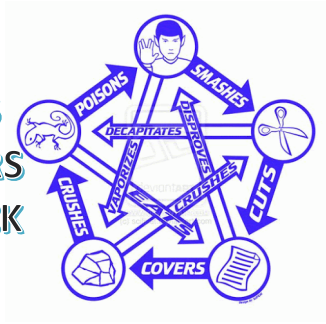
The correct answer is C. There are 7 events in the sample space. Choosing a red counter gives two of these events. https://diagnosticquestions.com

Follow up

In a Box https://aiminghigh.aimssec.ac.za/years-6-12-in-a-box/
Same Sweets https://aiminghigh.aimssec.ac.za/years-4-7-same-sweets/

PLAY SCISSORS PAPER ROCK LIZARD SPOCK - 5 ACTIONS IN PLACE OF 3

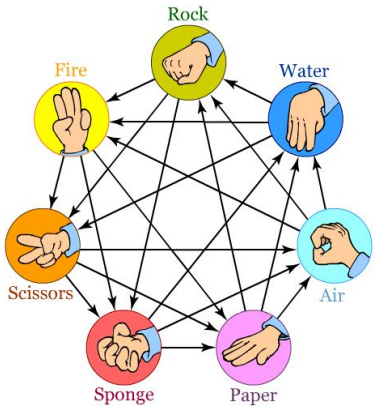
MORE VERSIONS OF SCISSORS PAPER ROCK GAME



5 ACTIONS SPR GAME	Scissors	Paper	Rock	Lizard	Spock
Scissors	D	Sc	R	Sc	S
Paper	Sc	D	P	L	P
Rock	R	P	D	R	S
Lizard	Sc	L	R	D	L
Spock	S	P	S	L	D

Paper covers Rock.
Rock crushes Lizard.
Lizard bites Spock.
Spock smashes Scissors.
Scissors decapitate Lizard.
Lizard eats Paper.
Paper criticises Spock.
Spock vaporizes Rock.
Rock crushes Scissors.
Scissors cut Paper.

7 ACTIONS SPR GAME	Rock	Water	Air	Paper	Sponge	Scissors	Fire
Rock	D	W	A	P	R	R	R
Water	W	D	A	P	S	W	W
Air	A	A	D	P	S	Sc	A
Paper	P	P	P	D	S	Sc	F
Sponge	R	S	S	S	D	Sc	F
Scissors	R	W	Sc	Sc	Sc	D	F
Fire	R	W	A	F	F	F	D



OR PLAY THE 7 ACTIONS GAME
The rules are in the contingency table.
But you need to make up your own 'stories'.

MATHS TOYS

Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum links: http://aiminghigh.aimssec.ac.za
Subscribe to the **MATHS TOYS YouTube Channel**
https://www.youtube.com/c/mathstoys
Download the whole AIMSSEC collection of resources to use offline with the **AIMSSEC App** see https://aimssec.app or find it on Google Play.

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and school years up to Secondary 5 in East Africa.
New material will be added for Secondary 6.
For resources for teaching A level mathematics (Years 12 and 13) see https://nrich.maths.org/12339
Mathematics taught in Year 13 (UK) & Secondary 6 (East Africa) is beyond the SA CAPS curriculum for Grade 12

	Lower Primary Approx. Age 5 to 8	Upper Primary Age 8 to 11	Lower Secondary Age 11 to 15	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13