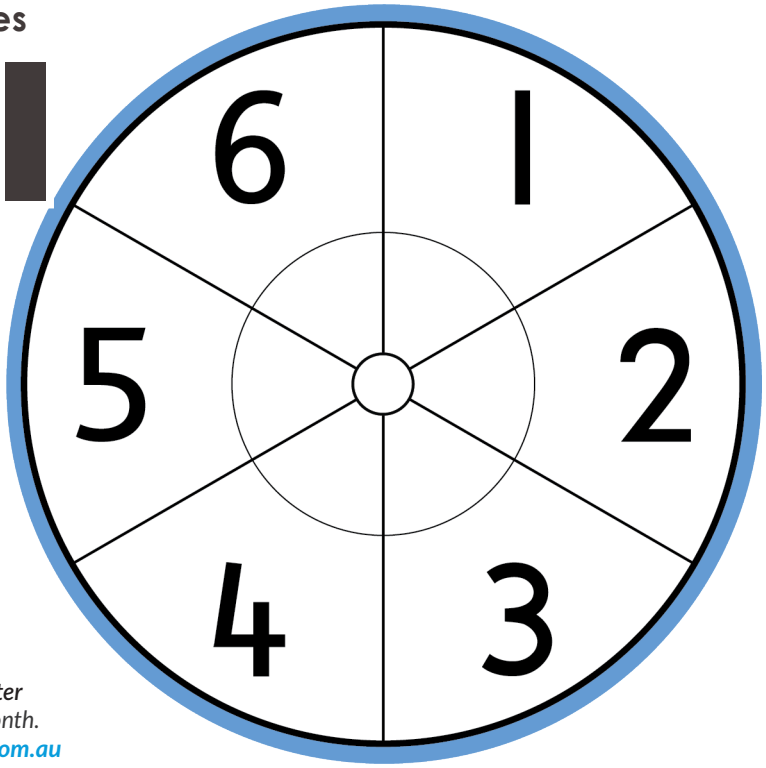
Purposeful Puzzles, Problems and Games

Dr Paul Swan



BOARD GAME PACK
YEARS 5+

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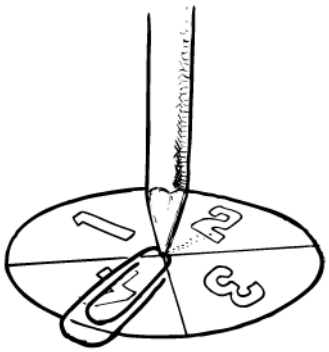
Game	Year Level & Topic	Content	AC Link(s)
Fraction Decimal Percentage Match	Years 5-6 | Comparing Fractions	Number, Fractions,	ACMNA102, ACMNA125
Equivalent Fraction Match 1 (Pictorial)	Years 5-6 | Matching Fractions	Number, Fractions,	ACMNA102, ACMNA125
Equivalent Fraction Match 2	Years 5-6| Matching Fractions	Number, Fractions,	ACMNA102, ACMNA125
Halving Games Set	Year 6 | Finding a fraction, decimal, precentage of a whole number	Number, Fractions,	ACMNA127
Quarter Games Set	Year 6 | Finding a fraction, decimal, precentage of a whole number	Number, Fractions,	ACMNA127
One Eighth Games Set	Year 6 | Finding a fraction, decimal, precentage of a whole number	Number, Fractions,	ACMNA127
One Tenth Games Set	Year 6 | Finding a fraction, decimal, precentage of a whole number	Number, Fractions,	ACMNA127

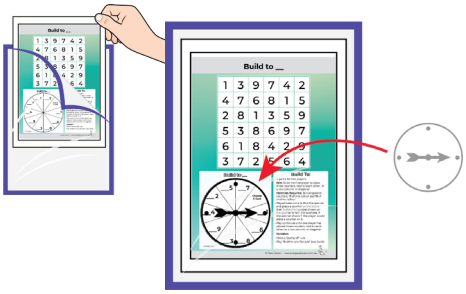
Spinners

Spinners are a fantastic resource for maths games, probability concepts and more. Spinners can come in a number of forms.

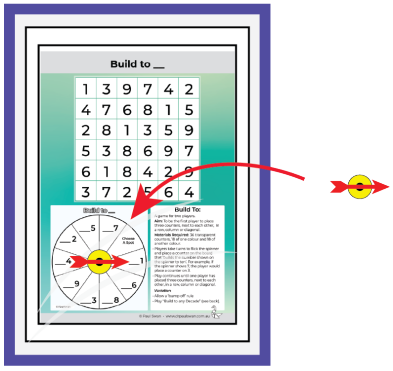
Temporary Spinners



1. Need a spinner in a pinch? Place **a paperclip** onto the spinner circle so that one end of the paperclip goes around the centre on the point of a pen. It should spin around the pen point and land on different outcomes.



2. A **Round Spinner** is a general purpose spinner that sits on top of paper, printed / laminated games or Write and Wipe Sleeves.

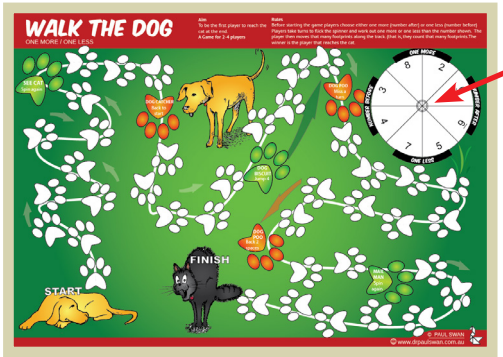


3. A **Suction Spinner** is another easy-to-use spinner that is particularly good together with whiteboards and write and wipe sleeves

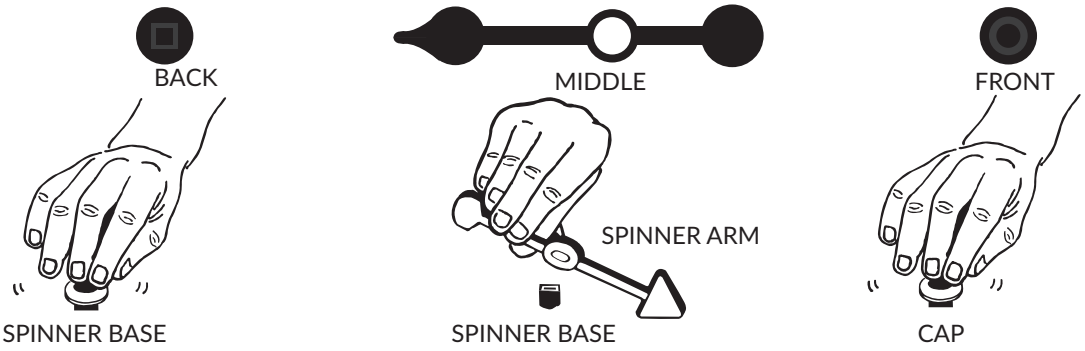
available from www.drpaulswan.com.au

Permanent Spinners

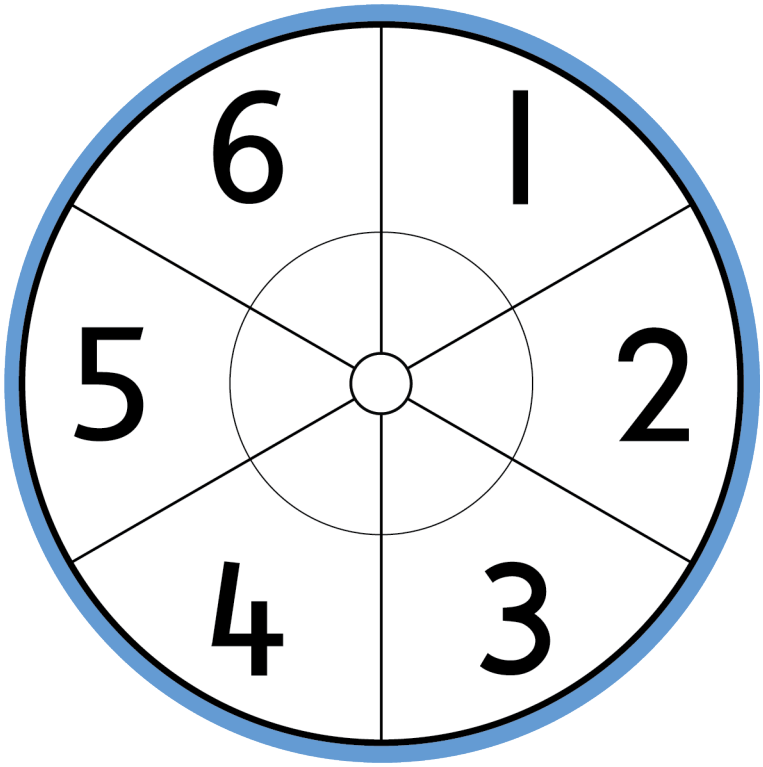
For a more permanent solution you can purchase **plastic spinner arrows** (available from www.drpaulswan.com.au) and use a nail to make a hole through a laminated spinner template or game board. Spinner arrows come in three parts – a base, and arrow and the cap.



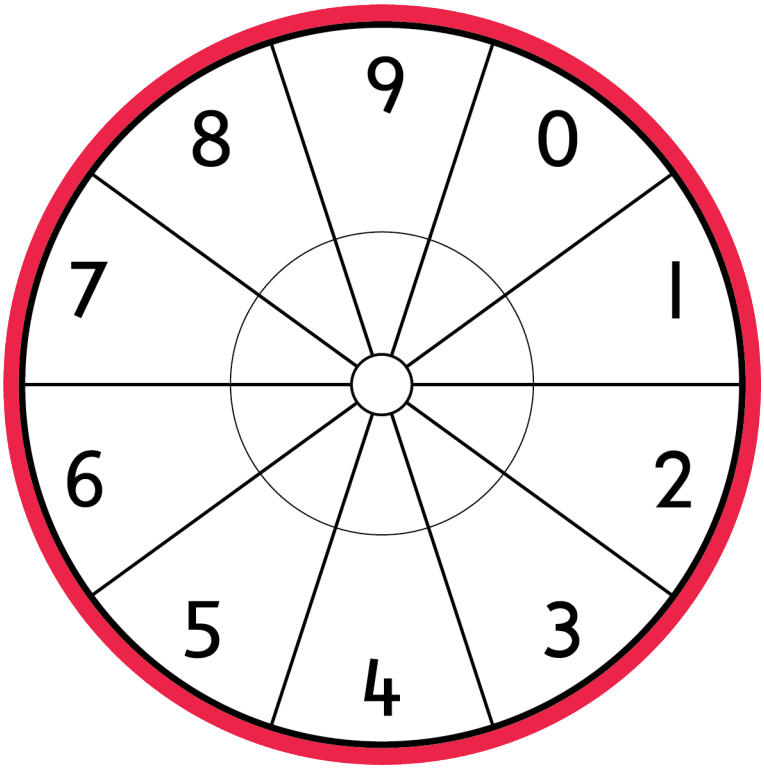
1. Use a nail to create a hole in a laminated spinner template or game board.
2. Insert the spinner base from the back of the laminated spinner through the nail hole.
3. Click the spinner together.



1-6 Spinner



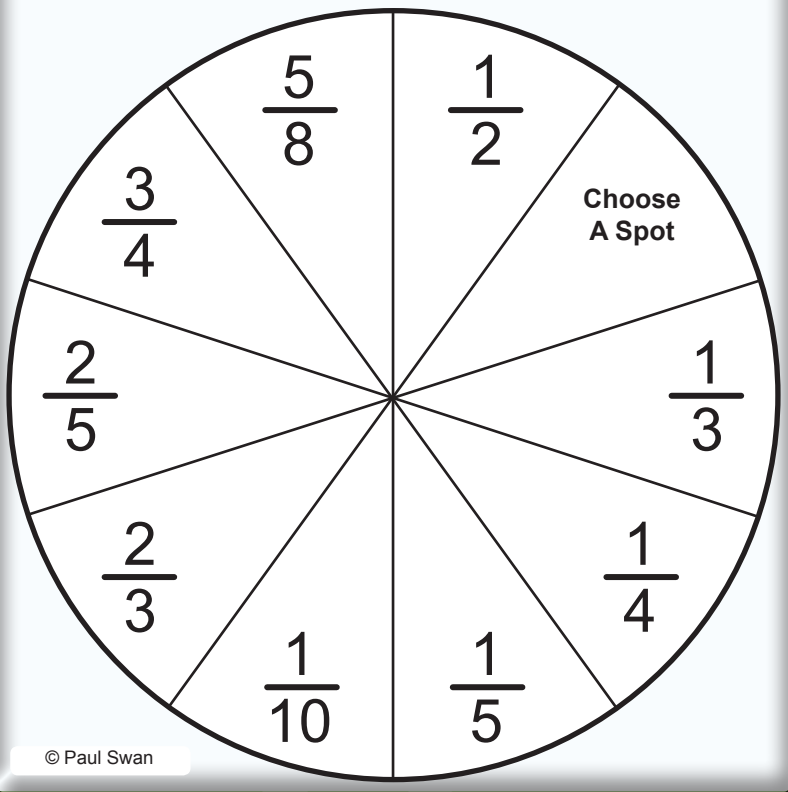
0-9 Spinner



Fraction Decimal Percentage Match

50%	0.25	62.5%	$\frac{40}{100}$	0.20	$33\frac{1}{3}\%$
20%	0.4	$66\frac{2}{3}\%$	0.75	0.5	$\frac{10}{100}$
$0.\overline{33}$	0.75	50%	0.25	0.10	0.625
0.1	25%	75%	$0.\overline{66}$	62.5%	40%
$66\frac{2}{3}\%$	$\frac{5}{50}$	$\frac{75}{100}$	0.2	$33\frac{1}{3}\%$	0.625
25%	$\frac{4}{10}$	$0.\overline{33}$	10%	$0.\overline{66}$	$\frac{20}{100}$

Fraction Decimal Percentage Match



Fraction Decimal Percentage Match

A game for two players.

Aim: To be the first player to place three counters next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that is equivalent to the fraction shown on the spinner.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Play 4 in a row, column or diagonal.
- Allow a 'bump off' rule.

Fraction Decimal Percentage Match

This fraction game is designed to help students link representations of fractions with the name of the fraction and the symbol representing the fraction. In this case fractions are linked to:

decimal fractions, that is, fractions where the denominator is 10, 100, 1000 (a power of 10), and

percentages, that is a fraction where the denominator is 100. The word percent, literally means out of every 100

Australian Curriculum Links

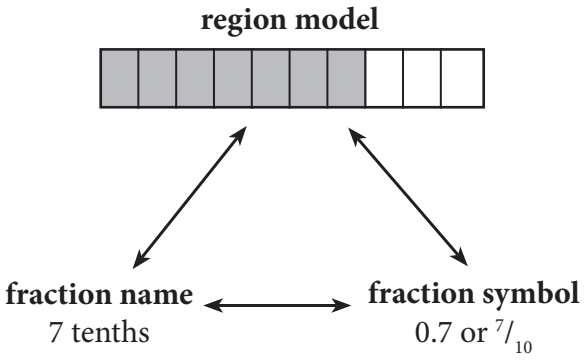
Yr 5 ACMNA102: Compare and order common unit fractions and locate and represent them on a number line.

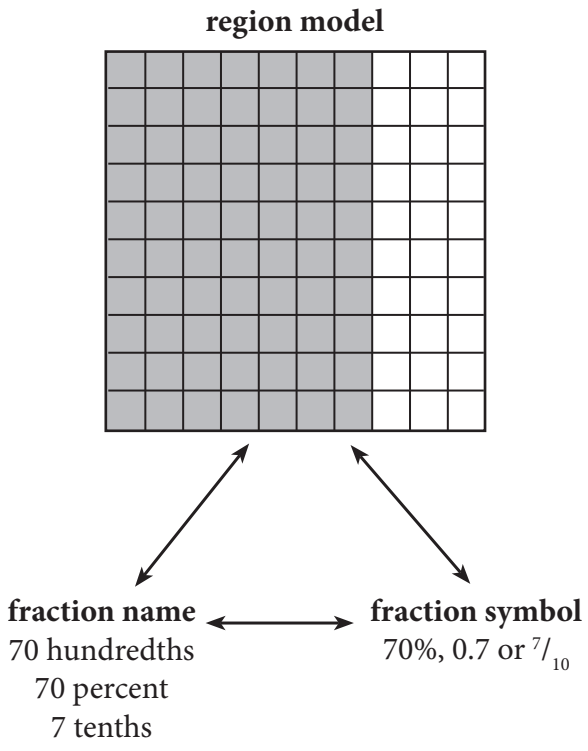
Yr 6 ACMNA125: Compare fractions with related denominators and locate and represent them on a number line.

Teacher notes

The region model referred to in the first game in this series – Equivalent Fraction Match 1 is extended in this game. The example on the left shows the links between the model, name and symbols. Note that 0.7 is 7 tenths.

A base ten (MAB) flat is an ideal model for showing hundredths.

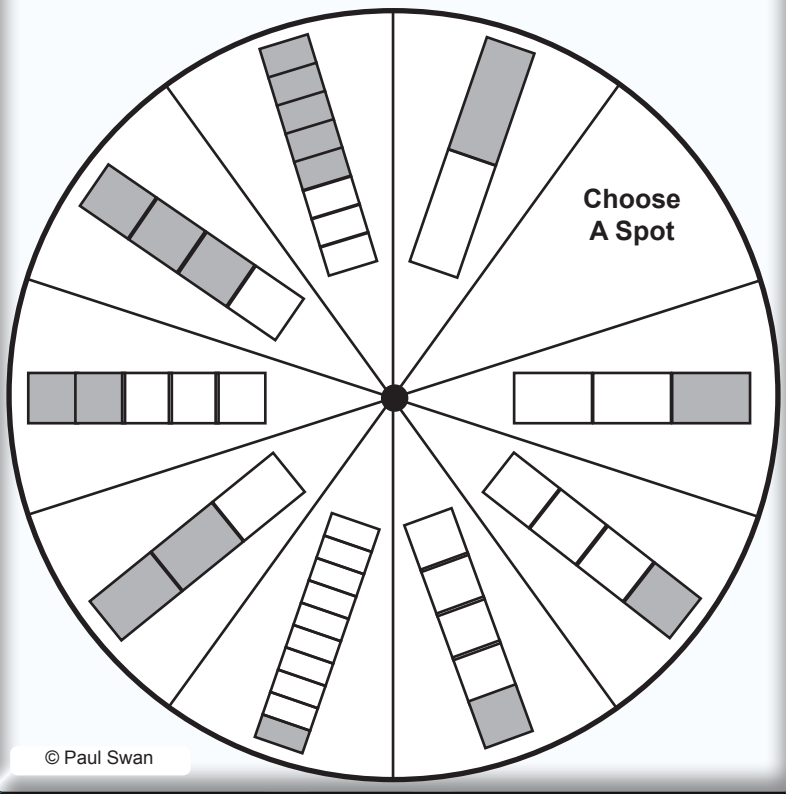




Equivalent Fraction Match 1

$\frac{1}{2}$	1 fourth	$\frac{5}{8}$	$\frac{2}{5}$	1 fifth	1 third
$\frac{2}{5}$	2 fifths	2 thirds	$\frac{3}{4}$	$\frac{1}{2}$	1 tenth
1 third	3 fourths	1 half	$\frac{1}{4}$	$\frac{1}{10}$	5 eighths
1 tenth	$\frac{1}{4}$	$\frac{3}{4}$	2 thirds	$\frac{5}{8}$	2 fifths
$\frac{2}{3}$	1 half	3 quarters	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{5}{8}$
1 quarter	$\frac{1}{5}$	$\frac{1}{3}$	1 tenth	$\frac{2}{3}$	1 fifth

Equivalent Fraction Match 1



Equivalent Fraction Match 1

A game for two players.

Aim: To be the first player to place three counters next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that is equivalent to the fraction shown on the spinner.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Play 4 in a row, column or diagonal.
- Allow a 'bump off' rule.

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Equivalent Fraction Match 1: Region Model

This fraction game is designed to help students link representations of fractions with the name of the fraction and the symbol representing the fraction.

Australian Curriculum Links

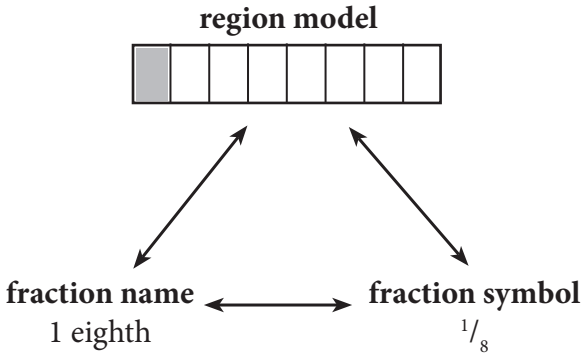
Yr 5 ACMNA102: Compare and order common unit fractions and locate and represent them on a number line.

Yr 6 ACMNA125: Compare fractions with related denominators and locate and represent them on a number line.

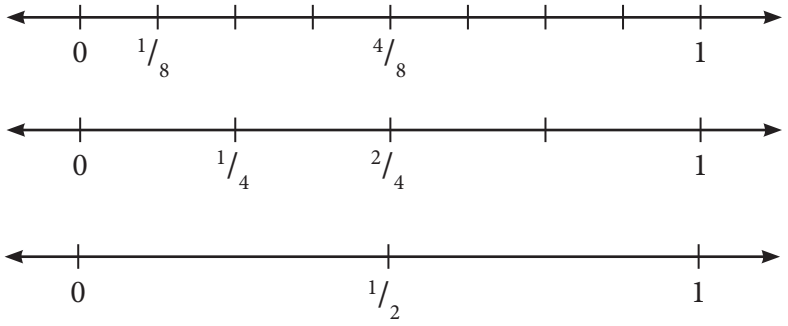
Teacher notes

A unit fraction is one where the numerator (top number) is one (1). A fraction is named by the number of equal parts. The word denominator is derived from the word to name.

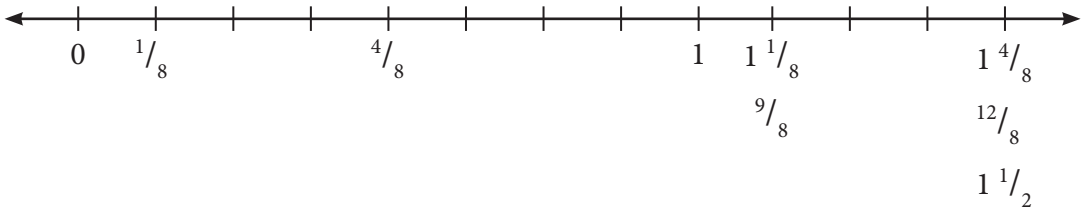
Prior to playing this game, students should be given opportunities to partition regions into equal sized parts. Links should be made to the naming of fractions and associated symbols. It is simpler for students to partition a rectangular region rather than a circular one so it is recommended that when students are first learning about fraction, circles be avoided.



The Australian Curriculum Mathematics makes specific mention of number lines. The number line is a different fraction model. A student may be given an empty number line and asked to divide it equally to represent fractions. For example a number line may be marked into 8 equal parts. Each division would represent 1 eighth of the distance between 0 and 1. If a second line was marked into 4 equal division over the same length then links between fractions may be made.



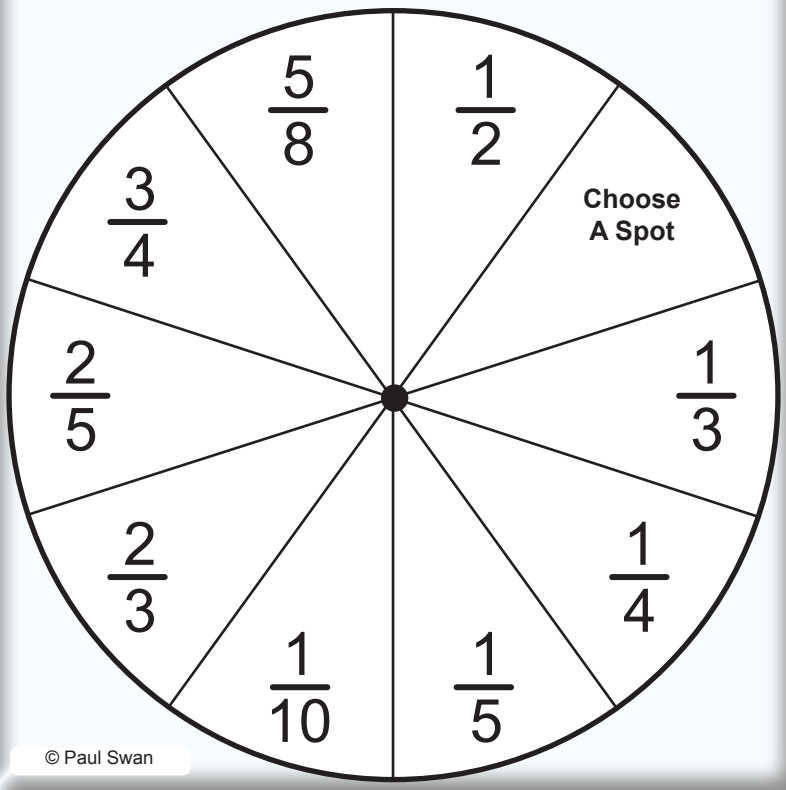
The number may be extended to show that fractions may be greater than one.



Equivalent Fraction Match (2)

$\frac{2}{4}$	$\frac{2}{8}$	$\frac{10}{16}$	$\frac{12}{30}$	$\frac{6}{30}$	$\frac{3}{9}$
$\frac{3}{5}$	$\frac{4}{10}$	$\frac{20}{30}$	$\frac{6}{8}$	$\frac{5}{10}$	$\frac{2}{20}$
$\frac{4}{12}$	$\frac{15}{20}$	$\frac{4}{8}$	$\frac{3}{12}$	$\frac{10}{100}$	$\frac{15}{24}$
$\frac{3}{30}$	$\frac{4}{16}$	$\frac{9}{12}$	$\frac{6}{9}$	$\frac{5}{8}$	$\frac{20}{50}$
$\frac{12}{18}$	$\frac{3}{6}$	$\frac{30}{40}$	$\frac{4}{20}$	$\frac{5}{15}$	$\frac{20}{32}$
$\frac{5}{20}$	$\frac{10}{25}$	$\frac{10}{30}$	$\frac{5}{50}$	$\frac{4}{6}$	$\frac{2}{10}$

Equivalent Fraction Match (2)



Equivalent Fraction Match (2)

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that is equivalent to the fraction shown on the spinner.
- Play continues until one player has placed three counters next to each other, in a row, column or diagonal.

Variation

- Play 4 in a row, column or diagonal.
- Allow a 'bump off' rule.

Equivalent Fraction Match 2

The series of Fraction Match games focus on:

- matching shaded regions with equivalent fractions (symbols) and words,
- matching equivalent fractions (this game) and
- matching fractions, decimal fractions and percentages.

Australian Curriculum Links

Yr 5 (ACMNA102): Compare and order common unit fractions and locate and represent them on a number line.

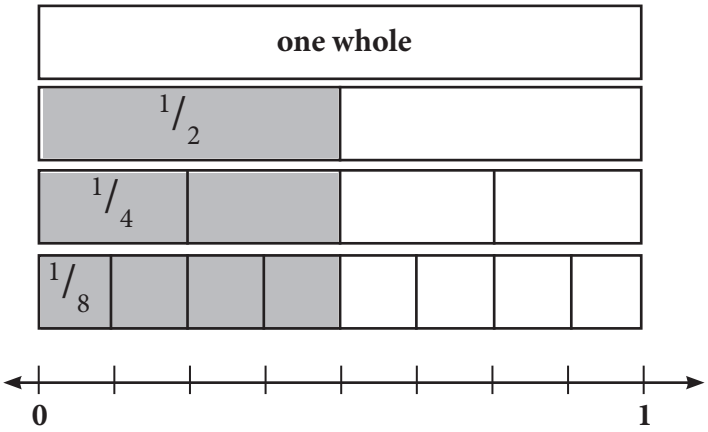
Yr 6 ACMNA125: Compare fractions with related denominators and locate and represent them on a number line.

Teacher notes

The language used to describe fractions can cause confusion. Consider that one-half may be thought of as $^1/_2$, $^2/_4$, $^3/_6$ as well as 0.5 (5 tenths) or 50%.

Prior to playing this game, which involves linking fraction names, students will need to be exposed to a variety of 'hands on' tasks. Here are just two examples.

Fraction ideas may be built from partitioning a region (one whole) into equal size parts. If the same size region is partitioned into different, but related, equal parts, the fractions can represent the same value. In the example below 1 half, 2 fourths and 4 eighths are the same length and represent the same fraction.



Eventually links may be made to number lines

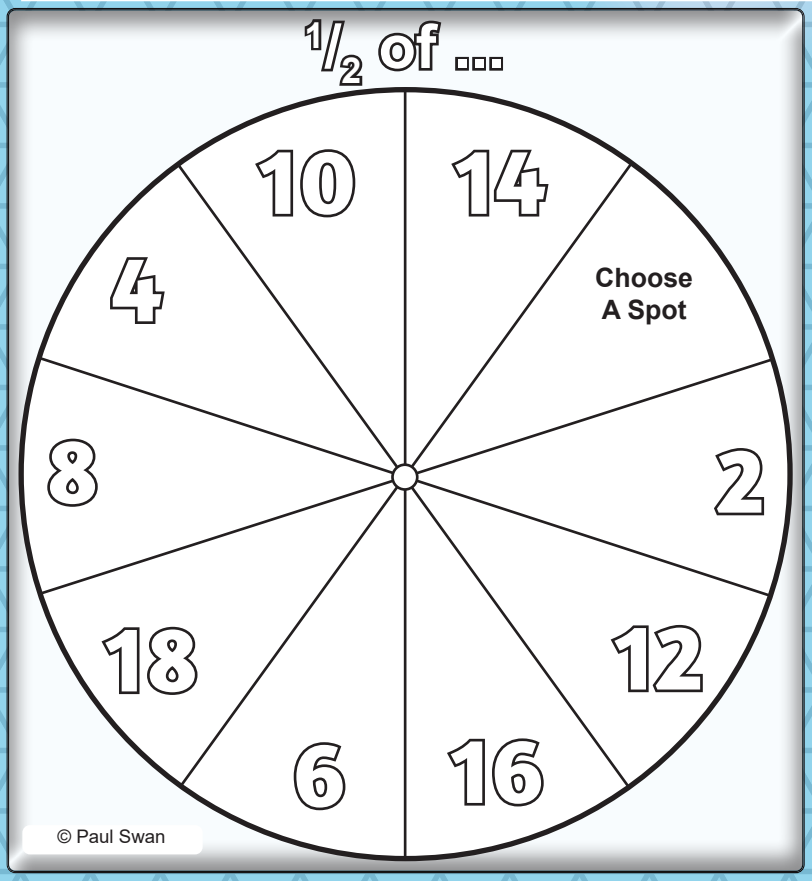
Paper folding also, may be used to illustrate that a shaded region may be represented by several fractions. For example, 3 fourths may be created by partitioning a region into four equal size pieces and shading four of them.

Folding the original piece, once, lengthwise, and then opening it will create 8 equal pieces, 6 of which are shaded, or 6 eighths.

If the original piece was folded in three, lengthwise, then unfolded, it would show 12 equal pieces, of which 9 were shaded, or 9 twelfths.

The Halving Game | ½ of ...

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4



The Halving Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **half** of the number shown on the spinner. For example, if the spinner shows 14, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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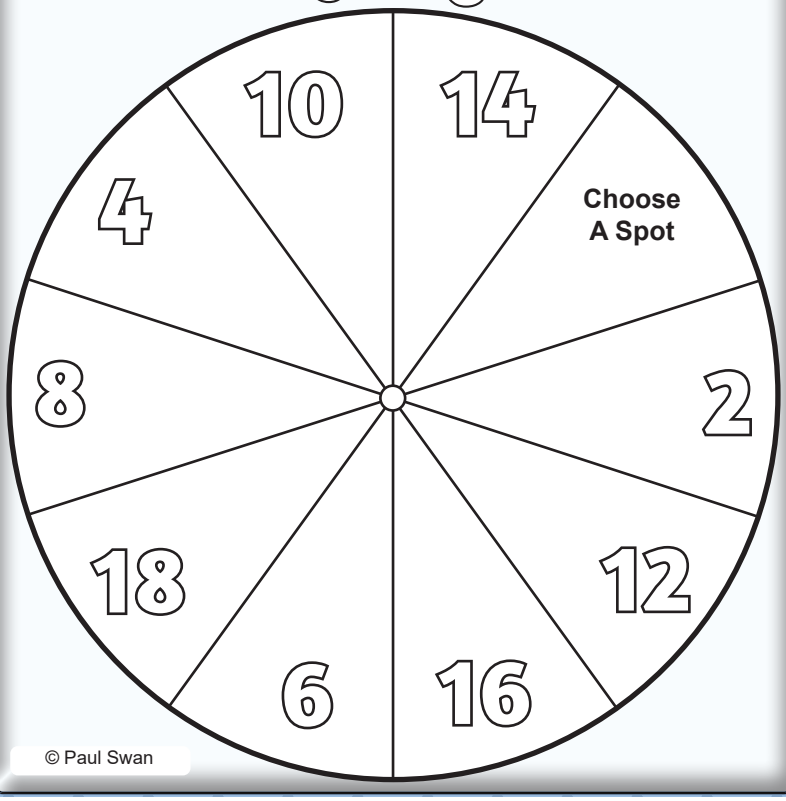
The 50% game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 50% game



The 50% Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **50%** of the number shown on the spinner. For example, if the spinner shows 14, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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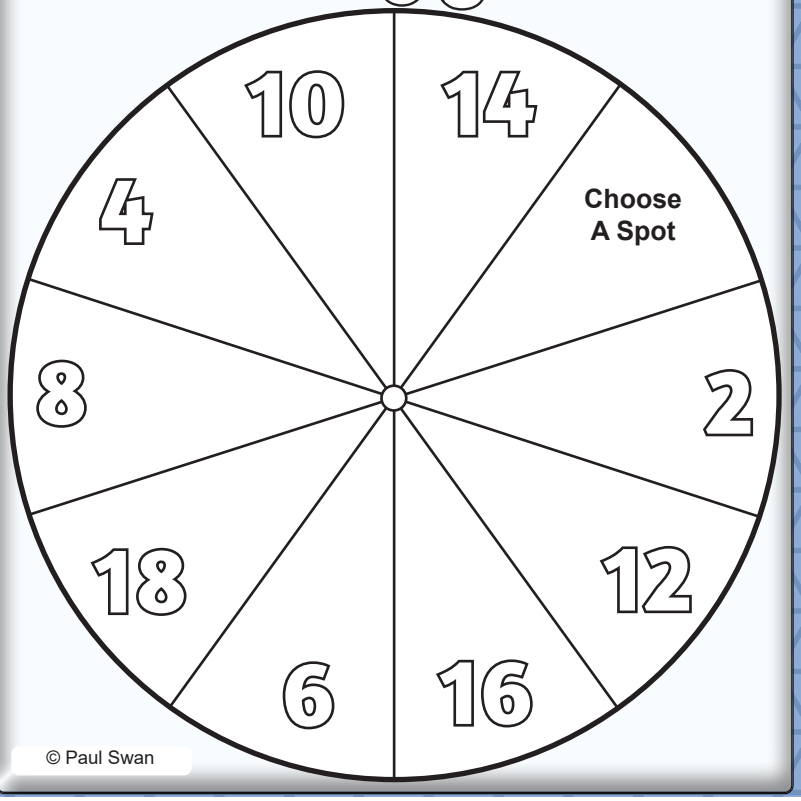
The 0.5 game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 0.5 game



The 0.5 Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **0.5x (of)** the number shown on the spinner. For example, if the spinner shows 14, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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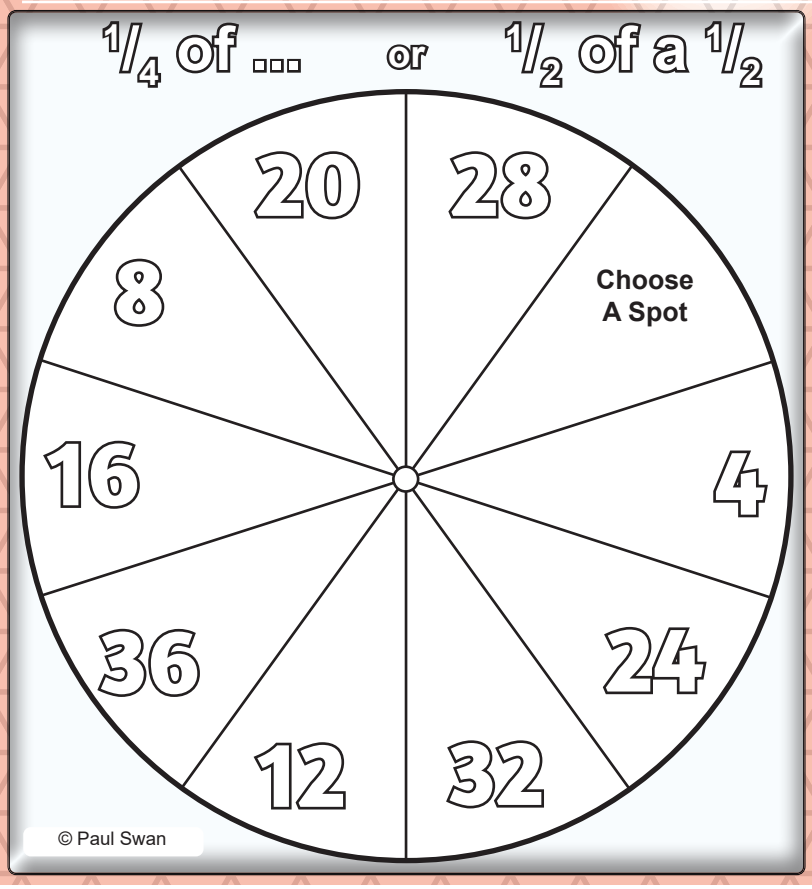
The Quarter Game ($\frac{1}{4}$)

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4



The Quarter Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **one quarter** of the number shown on the spinner. For example, if the spinner shows 28, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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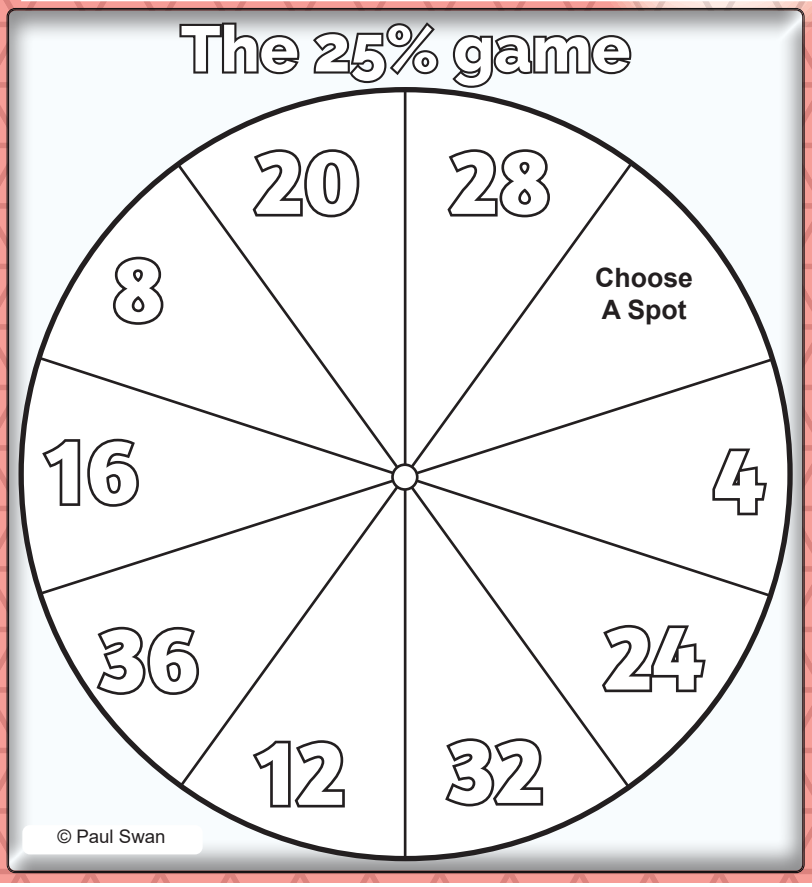
The 25% Game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4



The 25% Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **25%** of the number shown on the spinner. For example, if the spinner shows 28, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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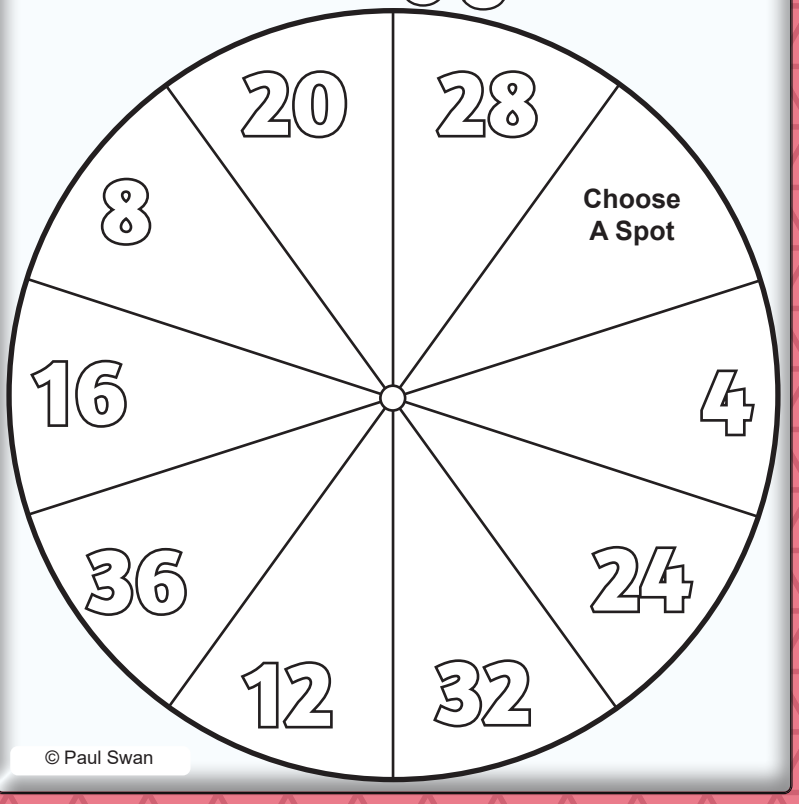
The 0.25 game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 0.25 game



The 0.25 Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **0.25x (of)** the number shown on the spinner. For example, if the spinner shows 28, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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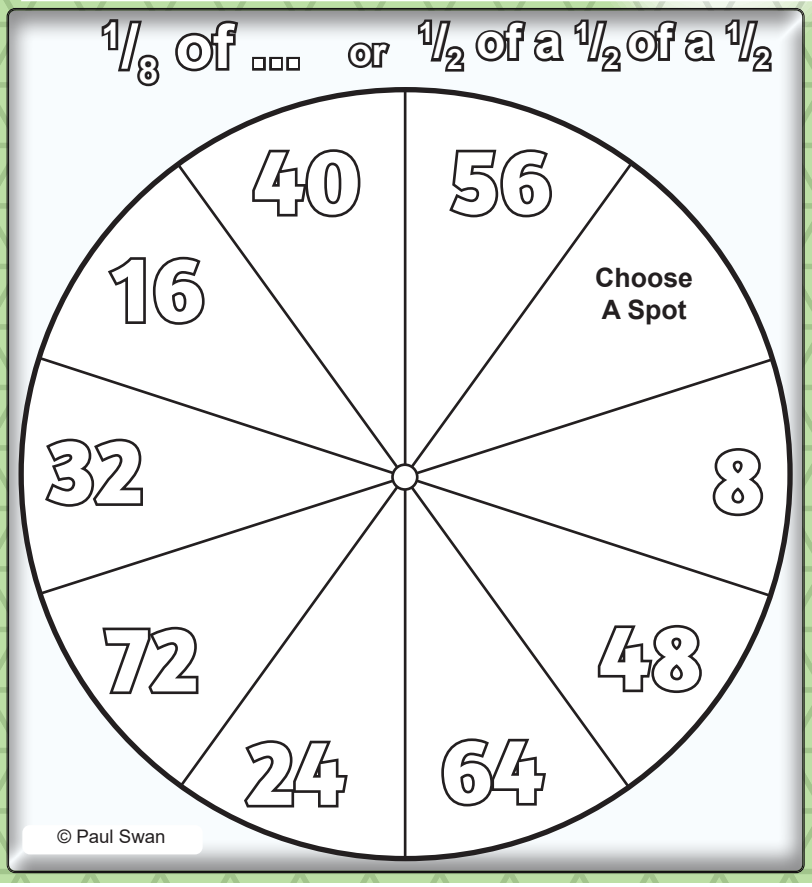
The Eighths Game (1/8) | 1/2 of a 1/2 of a 1/2

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4



The Eighths Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **one eighth** of the number shown on the spinner. For example, if the spinner shows 56, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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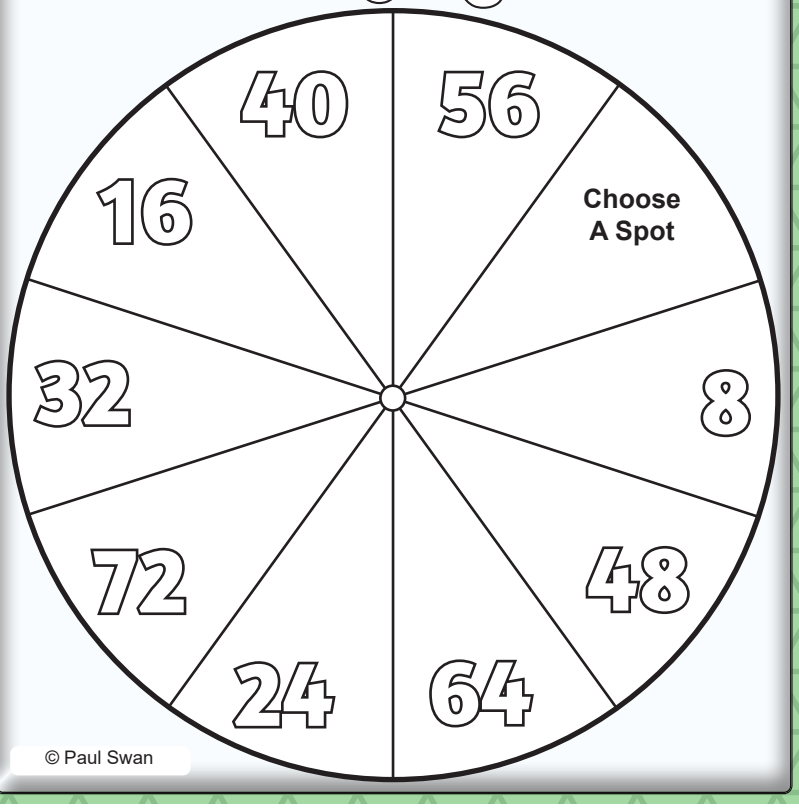
The 12.5% Game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 12.5% game



The 12.5% Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **12.5%** of the number shown on the spinner. For example, if the spinner shows 56, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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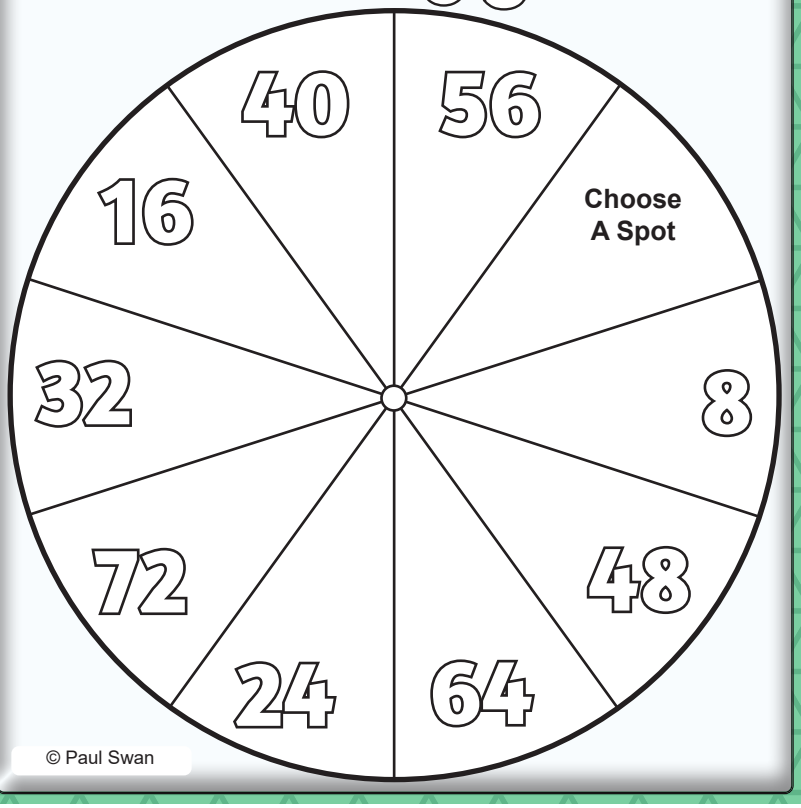
The 0.125 game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 0.125 game



The 0.125 Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **0.125x (of)** the number shown on the spinner. For example, if the spinner shows 56, the player would place a counter on 7.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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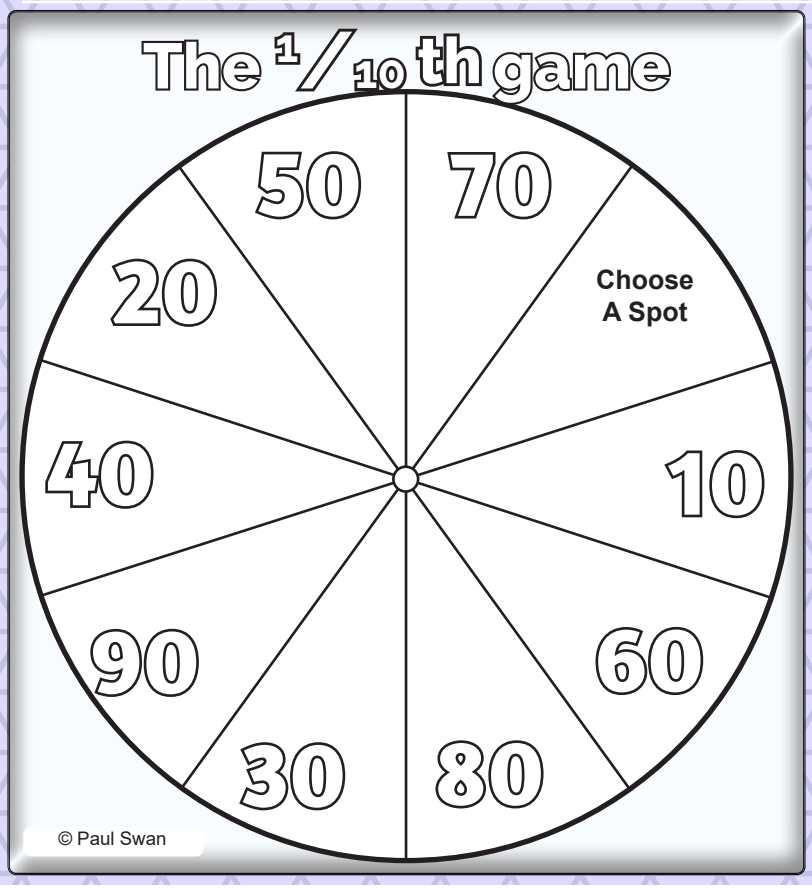
The $^1/_{10}$th Game | $^1/_{10}$ of ...

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4



The 1/10th Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents $^1/_{10}$**th** of the number shown on the spinner. For example, if the spinner shows 30, the player would place a counter on 3.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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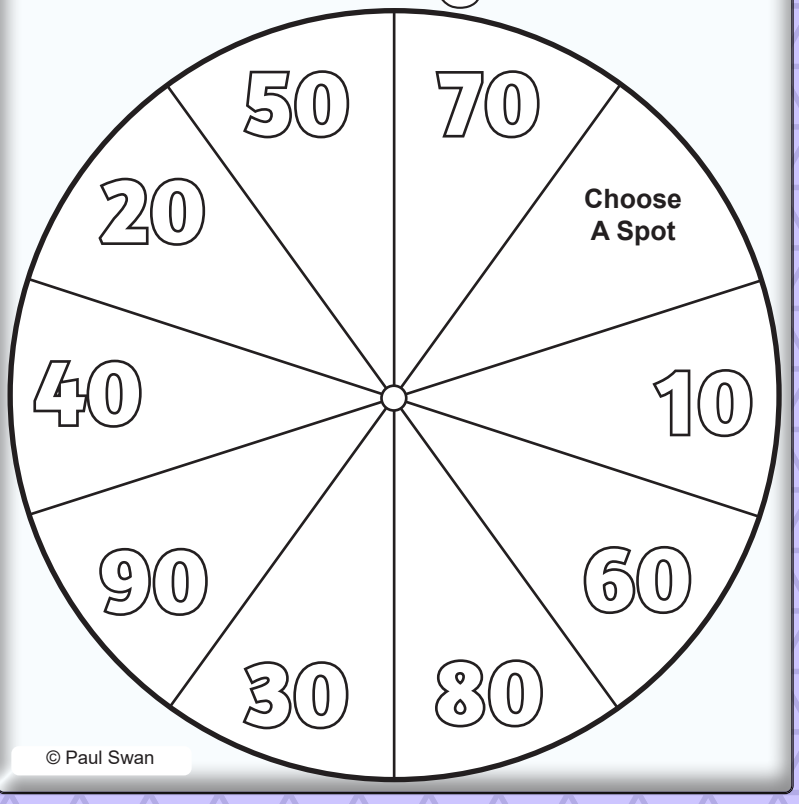
The 10% Game | 10% of ...

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 10% game



The 10% Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **10%** of the number shown on the spinner. For example, if the spinner shows 30, the player would place a counter on 3.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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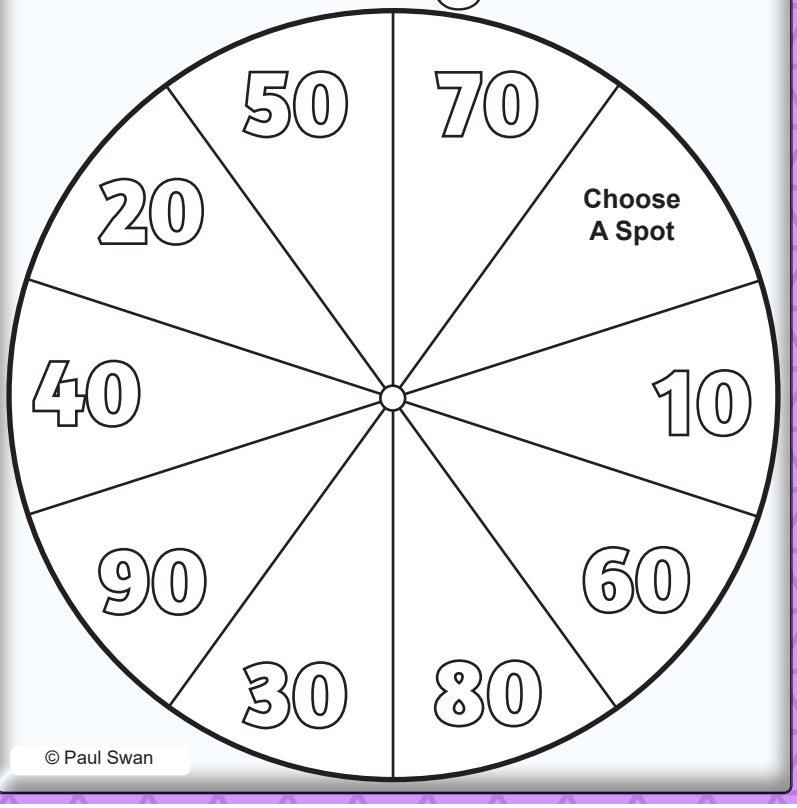
The 0.1 game

1	3	9	7	4	2
4	7	6	8	1	5
2	8	1	3	5	9
5	3	8	6	9	7
6	1	8	4	2	9
3	7	2	5	6	4

The 0.1 game



The 0.1 Game:

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on the board that represents **0.1x (of)** the number shown on the spinner. For example, if the spinner shows 40, the player would place a counter on 4.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

- Allow a 'bump off' rule

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