3-in-a-Row Magic Dice

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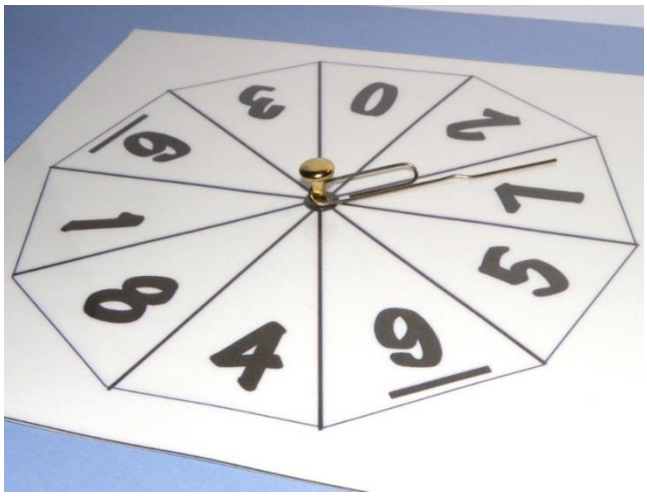
INTRODUCTION

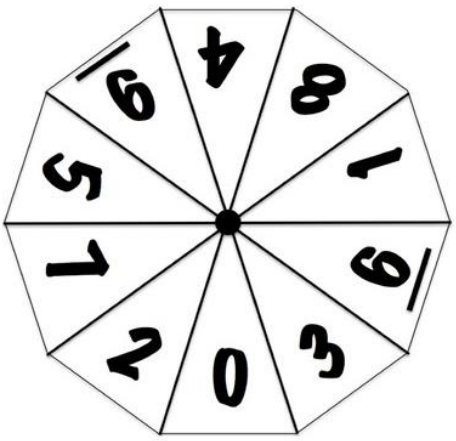
'3-in-a-row Magic Dice' is a simple, engaging and mathematically meaningful activity designed to reinforce count-on and count-back strategies, enhance pupils' mental computation skills and expose pupils to patterning and place-value concepts as they navigate the 100's chart. The game is primarily aimed at pupils around 7 to 8 years of age. However, with minor modifications it can be played by younger or older pupils as well.

MATERIALS

- 10-sided 10's dice (10, 20, 30 … 100)
- 10-sided 1's dice (0, 1, 2 … 9)
- 6-sided dice (the 'magic' dice)
- 20 (or more) distinctive counters per player (or whiteboard-marker friendly 100's charts and whiteboard markers)
- 100's or 120's chart[1] (perhaps laminated for durability and to enable use of whiteboard markers)

If you don't have 10-sided 1's and 10's dice available you can also improvise with 10-sided spinners.[2]





[1] Alternatively, play the game on an interactive 100's chart, e.g. http://www.primarygames.co.uk/pg2/splat/splatsq100.html

[2] See, for example, http://www.craftnhome.com/ten-sided-number-wheels.html

PLAYING THE GAME

- '3-in-a-row Magic Dice' is suitable for 2, 3 or 4 players.
- The winner of the game is the first player to score three different 3-in-a-rows on the 100's chart.
- 3-in-a-rows can be recorded by placing three consecutive counters either horizontally (e.g., 31, 32, 33), vertically (e.g., 64, 74, 84) or diagonally (36, 45, 54). Note that a 4-in-a-row only counts as one 3-in-a-row.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- The first player rolls the two different 10-sided dice (e.g., they roll a 50 and a 7). They have to add the two numbers together using their understanding of decomposition and 'recomposition' (i.e. knowing that 50 and 7 equals 57 because 57 is comprised of 50 and 7). If pupils are not confident using 'recomposition' they could potentially use a count-on procedure to 'check' the answer.
- The first player can then either place a counter over this number (57), or roll the magic (6-sided) die. Let's assume the player rolls the magic die. If the player rolls any number from 1 to 5 the player can choose either to count-on or count-back the number rolled, and place their counter over either of these new numbers instead. For example, if the first player's original number is 57, and they roll a 4 on the magic die, they could place their counter on 61 (57 + 4) or 53 (57 – 4). However, if the player rolls a 6 on the magic die then they miss their turn. This penalty adds to the suspense of the game by ensuring there is some trade-off between choice and risk.
- The next player then has their turn, and follows the same process.
- Only a single counter can occupy a given number square. Consequently, if a player lands on a number that is already occupied they miss their turn. It is for this reason that a player is forced to roll the magic die if they land on a square that already has a counter on it. If a player rolls the magic die and, after they count-on and count-back, both these new squares are also taken, then they miss their turn.

SUPPORTING THE MATHEMATICS

To ensure that pupils are actually using the count-on and count-back strategies, require pupils to state the numbers on the chart as they move their counter, rather than simply counting their moves (e.g., "58, 59, 60, 61" or "56, 55, 54, 53" rather than "1, 2, 3, 4").

Before they roll the magic die, encourage pupils to make predictions: What would they need to roll on the magic die to secure a 3-in-a-row, or to block their opponent? This tunes pupils into focusing on the relevant number patterns, as well as overall game strategy.

After they roll the magic die, encourage pupils to make predictions: Which square will they land on if they choose to count-on? What about if they choose to count-back? Such prompting questions are designed to move pupils from relying on counting strategies to directly recalling number facts. Count-on and count-back then become back-up strategies for checking the accuracy of their fact recall.

DIFFERENTIATING THE GAME

Older and/or higher-ability pupils can use an 8, 12 or 20 sided die (or spinner) as their magic die, and practise more sophisticated mental computation strategies involving partitioning, such as:

- number splitting, e.g. $56 + 13 = (50 + 10) + (6 + 3) = 60 + 9 = 69$
- bridging through 10, e.g. $56 + 8 = 56 + 4 + 4 = 60 + 4 = 64$
- near doubles, e.g. $56 + 7 = 56 + 6 + 1 = 62 + 1 = 63$

Younger and/or lower-ability pupils can use one regular 10-sided die as their initial roll, thereby keeping the numbers in the game below 20. This essentially removes the place-value component of the game so pupils can primarily focus on developing fluency with the count-on and count-back strategies.

CONCLUDING THOUGHTS

In my experience as a primary school teacher, pupils require regular practice with mental computation strategies in order to develop fluency with their fact recall. However, such fact practice can, at times, become rather repetitive and may not hold all pupils' interest. Through enabling pupils to practise important mental computation skills whilst playing an engaging game, the teacher can infuse fact practice with greater meaning and enhance pupils' motivation to actively participate in these sessions. '3-in-a-row Magic Dice' has the added advantage of also absorbing pupils in the imagery of the 100's chart, which can strengthen their rudimentary understanding of place value and number patterns. I hope other teachers find the activity '3-in-a-row Magic Dice' to be of use in their classrooms.