

# ARE YOU GAME?

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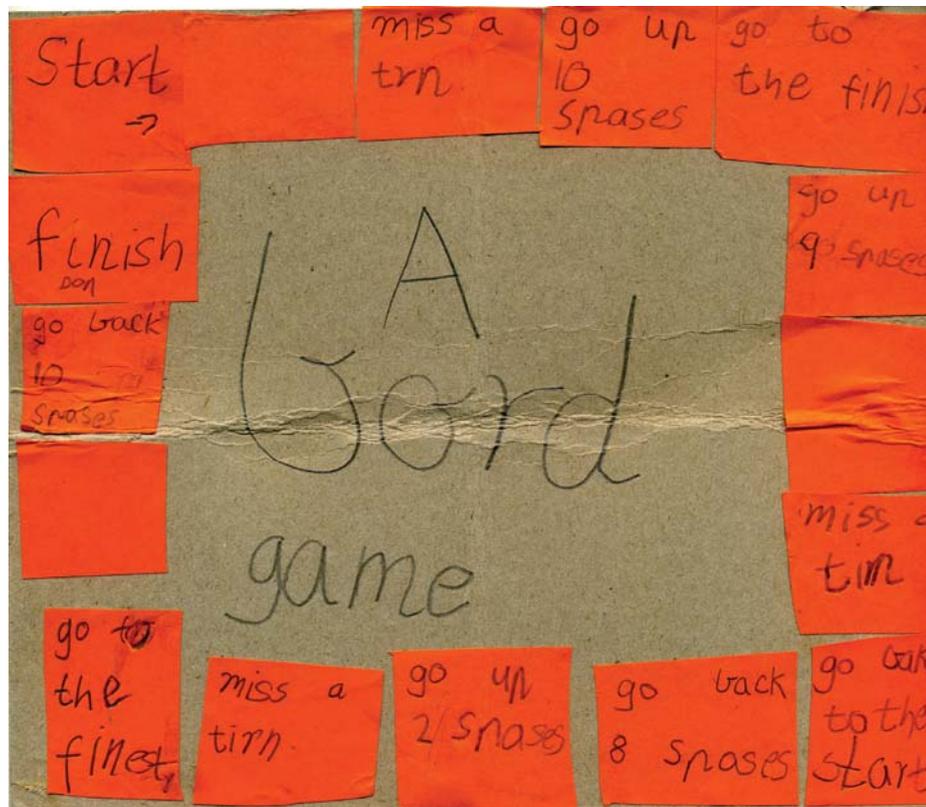


Figure 1.

Games are often employed as a pedagogical tool in mathematics lessons to lighten the mood or to encourage students to engage with particular concepts. Games may be used for a variety of purposes, including as a means of practising previously taught skills. They also have a place as an instructional tool (Booker, 2000). The use of games in the teaching of mathematics is often presented in a positive light. However, poor game choice, over-using a particular game, or using a game when the students are not ready for it will prove counterproductive (Bragg, 2006).

Consider Megan's game. Megan is my niece and took part in the testing of some mathematics games that I was developing. Here is her first attempt at creating a game. She was six years old at the time. Clearly this is a board game. Counting 10 spaces might be considered mathematical.

Let me describe a game with Megan. She always goes first. She does not roll the dice, but rather she 'plonks' it down with

the five showing uppermost. This means she lands on the cell that says 'go up 9 spaces', which in turn means that she lands on the cell which states, 'go back 10 spaces', which means that you land on 'go to the finish' – game over.

There is no doubt that Megan learned a great deal from creating this game. Unfortunately nobody wants to play with Megan. While it may be motivating for her, most opponents lose interest after they realise they can't win. This illustrates an important feature of games if they are to be effective – they must offer a level of challenge. Consider Noughts and Crosses; once you have learned a strategy to safeguard against losing the game, the challenge is removed and you soon become bored. Likewise if you play a game against a much weaker opponent, both players may soon become bored.

In this paper, suggestions will be made for maximising the learning that comes from playing a particular game.

In order to clarify and refine a set of criteria for choosing games, we will examine a variety of games. For the purpose of this paper a very loose definition of games as being 'game-like', that is, involving some rules, possibly some pieces or equipment such as cards, dice or a game-board, some form of objective or aim and some way of determining a winner. Clearly, for the game to be mathematical, the game must involve some mathematics.

## WHAT I LEARNED FROM CREATING SOME GAMES

Recently I was given the opportunity to create some board games that were based on the idea of moving around a track. After working with teachers and then trying the games with students, I was able to note various criteria that teachers and students consciously and sometimes unconsciously apply when choosing games and persisting with games.

Teachers typically look for games that have:

- clear maths content,
- understandable rules,
- use simple materials that may be easily replaced if lost, and
- that are short (10 – 15 min).

Students tend to look at the aesthetics of the game such as the colour, layout of the track, cartoon characters and the bonus or penalty spots on the board. For example when testing games with students they requested more 'miss a turn' spots. There is a certain level of glee experienced when an opponent lands on 'miss a turn' that tends to outweigh personal disappointment at landing on 'miss a turn'.

## FORMATIVE ASSESSMENT OF GAME PLAYING

Mathematics games are not simply time fillers. If a teacher is clear about the mathematics inherent in a mathematics

game then focused observations can be made as to whether a student has achieved a particular outcome. Clearly in a 10 – 15 minute game session a teacher cannot get around to monitor all students. As an alternative, one player can be nominated to monitor all moves made during a game, a bit like the banker in Monopoly. I also like this player to have a check sheet so they do not reinforce incorrect learning. It is also useful to have some way of recording what goes on in a game so that a teacher may review the moves that were made in the game. Recording sheets provide the teacher with valuable assessment data.

## SAMPLE GAMES

Games do not have to be commercially made to be effective. Consider the following games that have simple rules, may be easily modified and use readily available materials. Note that games that are easily modified may be differentiated to suit the needs of most students in the classroom setting.

### POP

POP is a simple card game that involves matching. Essentially it is a slow version of Snap where students aim to match equivalent representations of something.

For example in ‘POP Counting Coins’ a \$1 coin is matched with two 50c coins, five 20c coins and a card showing a 50c, 20c, 20c, and 10c coin. While the students in the class are playing, one student can be asked to help sort the cards. In sorting the cards a teacher can observe whether a student is linking the related cards.



For a further explanation of POP and sets of POP cards see [www.drpaulswan.com.au](http://www.drpaulswan.com.au).

## SNAP +/- 1 (SWAN, 1998)

**Materials:** A pack of playing cards with the picture cards removed.

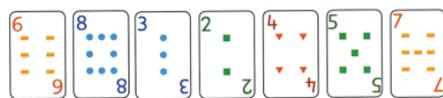
**Aim:** To be the first player to recognise a difference of one when two cards are laid on the table.

This game is played along similar lines to the standard game of Snap that involves being the first player to slap a deck of cards when a card that matches the one uppermost on the deck is discarded. In this case instead of a match the deck is slapped when there is a difference of one between the card uppermost on the deck and the one that is discarded.

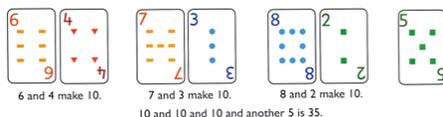
**Variation:** This game may be varied by changing the rule from a difference of one to a total of ten (Swan, 1998, p. 24).

## THE SEVEN-CARD GAME (SWAN, 2014)

The cards numbered 1 – 9 are separated from the remaining cards in the deck and are used to play the game. Each player is dealt seven cards (hence the name of the game).



Players turn their cards face-up and arrange them to make it easy to calculate the total.



The player with the largest total turns over a card from the remaining piles and keeps this as his/her total. This point allocation system keeps all students in the game as sometimes they may turn over a one, earning one point, or ten earning ten points.

Play continues for a set number of rounds. The player with the highest total is the winner. Observations of how the students group their cards will provide

valuable formative assessment as to what strategies are being used and whether the students correctly add the values on the cards.

## BUILD TO

Build To is a simple three-in-a-row bingo like game that is designed to help children become fluent with facts like  $7 + ? = 10$ . Players take turns to flick the spinner which is created by flicking a paper clip around a pencil point. If the spinner shows 6 the player would place a counter on 4, as 6 and 4 is 10. At first this might seem like a simple game, but consider how struggling players could be provided with ten frames to work out the answer. Later the students might be supported by being given images of a ten frame. The game may easily be modified to ‘Build to 30’, or perhaps, ‘Build to 100’, by modifying the spinner.

Once students understand the general game play and have access to counters and paperclips they could play any similar game. See for example, Money Match, Time Match and similar games at: [www.drpaulswan.com.au](http://www.drpaulswan.com.au).

## CONCLUSION

Teachers and students will have favourite games that they like to play. To avoid the ‘Goldilocks Syndrome’ ask yourself whether the game is too easy, too hard or just right for your students and modify it to suit their differing needs.

## REFERENCES

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