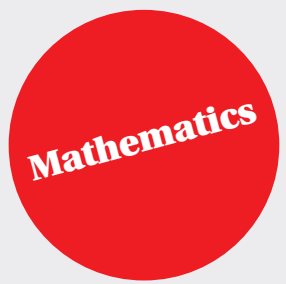


Satips

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Editorial

Welcome to the Summer 2019 maths broadsheet. In this term's broadsheet, I am quite excited to share with you an article written by Grant Whitaker, the Director of Studies/Head of Mathematics at Gayhurst School, in Gerrards Cross, Bucks. He shares Izak9, a new resource that is engaging the pupils at his school. I also share three games that initially look basically the same, but upon closer inspection, have small differences that allow the opportunity for simple but meaningful differentiation.

As you move through the term, please consider sharing with us your lesson ideas, your thoughts about mathematics, and your questions, particularly ways to provide our pupils with positive mathematical experiences. Please send them to the address above for inclusion in a future broadsheet.

Izak9 – A Game Changer!

In my career as a mathematics teacher, spanning over 30 years in a variety of settings, I have come across only a handful of resources that have given me the 'wow' factor, these include: Numicon, Polyhedra, Mathletics. However, it was by chance I discovered Izak9 and it quite simply blew me away. Having watched the videos on the website (www.izak9.com) I was captivated and I hastily arranged a flight to Ireland to find out more and to gain first-hand experience of this resource that I could see would revolutionise my teaching of mathematics.

It's very much a hands-on and tactile learning experience. Twenty-seven cubes, each with its own

unique six sides, are packed into a box. When the lid comes off the pupils are instantly engaged in a visually beautiful resource. There are geometric shapes on each side making up the six outside faces of a large cube. This is made up of smaller cubes, with each one containing combinations of numbers, percentages, fractions and colours.

Tasks and challenges are provided by an online tutorial introduced by two likeable characters named Helix and Abacus. Within each box of cubes there are three identical versions of the combinations of numbers available, allowing three teams to engage in the activities simultaneously. Two boxes of cubes are ideal for whole class use. I have found groups of three to five children, work perfectly. A team leader can be elected to coordinate each task as the pupils work collaboratively to solve the challenge. This is where Izak9 really comes alive. Pupils will be totally engaged in solving the task. The classroom is buzzing with cubes being stacked and ordered and rich mathematical language being exchanged and discussed. When the task is completed the pupils view the next challenge, new leaders are hastily appointed and off they go again. The pupils will moan and groan when the bell goes, keen to carry on, learning from each other, stimulated by the challenges, loving mathematics.

The package comes with an online subscription to the tasks and challenges. There is a huge bank of activities to choose from, using the cubes in a variety of imaginative ways. However, the challenges don't just stop there, as one of the most powerful activities is to get the pupils to set the challenges themselves. 🍷

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They have a wealth of resources at their fingertips – the possibilities are endless.

I have used the resource with Years 5 – 7 but there are tasks suitable for much younger pupils including EYFS. Number recognition, number ordering, properties of numbers, shape recognition and shape building are just a few activities suitable for the younger ones. The vast majority of the mathematics curriculum could be delivered using the Izak9 resource.

For a hands-on, collaborative mathematical experience you need look no further. This resource enables pupils to take control of their learning, it gives them confidence, engagement and at the same time challenges them to expand their knowledge and understanding.

Check out the website and watch Izak9 in action. I'm confident it won't be long before you are hooked!

Grant Whitaker
Director of Studies/Head of Mathematics
Gayhurst School, Gerrards Cross, Bucks.

Using, Modifying, and Extending Maths Games

In addition to teaching math to grade 5 (which corresponds roughly to year 6 in England), I also teach university students who are studying to become teachers. I recently found myself using a math activity with a group of struggling children and that experience became the basis of some rather interesting conversations with my university students.

The children were practising some basic addition and subtraction facts using the Tug of War math activity from the nrich website (nrich.maths.org/5897/index). Pairs of children have a number line numbered from zero to 27, a counter, and two dice. The counter is placed on the number line at 14. One child becomes 'Plus,' and the other becomes 'Minus.' Players take it in turns to roll the two dice, add the two numbers together, and then move the counter that number of spaces. Plus moves the counter to the left (thereby adding the new number to the number where the counter is), and Minus moves the counter to the right (subtracting the new number from the number where the counter is). Players continue taking it in turns until the counter reaches either 1 (in which case Minus wins) or 27 (in which case Plus wins).

Children are encouraged to consider whether or not they must land exactly on 1 or 27 or if they could be allowed to go past those numbers. The pairs of children might also consider what changes they might make to the rules and how those changes will impact the game. For example, rather than two-sided dice, they might want to use one or two 10-sided dice, or be allowed to pick addition or subtraction when rolling two dice.



The nrich website also offers a partner activity to Tug of War called Tug Harder (nrich.maths.org/5898/index). In this activity, partners have a number line from -13 to 13, a counter, and two dice. This time, the counter starts on zero, and players become 'Positive' and 'Negative' rather than Plus and Minus. Players still take it in turns to roll two dice, add the numbers together, and move that many spaces on the number line in their specific direction. After getting used to the game, players are challenged to consider what would happen if players were allowed to add, subtract, multiply, or divide the numbers on the two dice, as well as if they have to reach the end exactly or if they could go past -13 or 13.

A third, quite related activity, is called Red & Black Card Game and is found at the Mathematics Task Centre website (mathematicscentre.com/taskcentre/047redbl.htm). In this game, pairs of children shuffle a deck of cards and then deal the deck equally between them. The partners decide who will be 15 and who will be -15. They take turns flipping over the top card on their half-decks and, beginning at zero, add or subtract the number on their card (red cards subtract and black cards add; aces count as 1, and face cards count as 10). So, if the first player turns over a black 8, and the second player turns over a red King, the total so far is -2. Players continue taking it in turns to flip over cards and add or subtract from the total until the total is either 15 or -15. This activity challenges players to consider 'the viewpoint of a game manufacturer who wants a game which takes, on average, 10 cards to finish. That is, 5 turns each for a round. What should the target number be to achieve this?'

After playing these three difference games (not all at the time, but over a period of several weeks), my university students noted that each of these games is actually the same game. Upon further

discussion, they decided that the basic game play is the same – players take it in turns to move back and forth along a number line, starting in the centre, and ending when they reach one end or the other. What is different, however, are the details. The basic game, Tug of War, has players add the numbers on the dice and then add or subtract on the number line. Tug Harder adds in negative numbers. In both of these games, one player adds along the number line the entire game while the other player subtracts. Red & Black Card Game gives both players the opportunity to do adding and subtracting, depending on the flip of the cards. It also does away with the number line, asking players to do mental calculations instead.

This closer investigation gave us the opportunity to discuss the finer points of choosing maths activities for our classes and to consider variations or modifications that might be valuable. Do I want my pupils to focus on simple addition and subtraction? Is one dice sufficient rather than adding numbers on two? Could I make it more difficult by swapping one or two 6-sided dice for 10-sided dice? Perhaps I could use a number line from zero to 100, rather than zero to 27. Do I provide everyone a number line, or do some partners use only mental maths? It might be that I make the modifications to the games, or perhaps I ask players to come up with some of their own. Games such as these often lend themselves to simple differentiation. While one set players uses the rules as set out above, I might modify the rules one way for a second group, and a different way for a third.

Maths games are a brilliant way to build fluency in number facts. As we can see from comparing three games that are basically the same (moving back and forth along a number line), it is the details of the game play that really allow us as teachers to tailor the games to the specific needs of our pupils.

