



**A G.A.T.E.WAYS Journey  
for gifted children in Year 3 and 4  
with a love of maths and dragons  
'Astara, Emmitt and the  
Great Dragon Race'**

**G.A.T.E.WAYS** is an independent organisation offering challenging and enriching activities and experiences to develop and extend highly able children.

The town of Mireu is a quirky little community. It is not unusual to find a resident with a pet unicorn in the backyard, or another who transforms into a werewolf when the moon is full. However, when a young girl discovers a small nest of dragons in the forest over her back fence, that's when the adventures really begin! Join Astara, her younger brother Emmitt and their fellow villagers as they hatch a plan, enhanced by their knowledge of mathematics, to coach the dragons to compete in the Great Dragon Race. Can you help them to guarantee a victory?

### **Session One – The Hatchlings Cause A Headache**

#### **Maths focus: Long-run, experimental and theoretical probability**

Peering into the nest, Astara notices that some of the dragons have already hatched but others are still in their eggs. So far they've identified a Black Kur, two Ruby Dreks, a Golden Ladon and three Eastern Greens – all with very different habits and temperaments! Emmitt wonders if it is possible to calculate exactly how many of each there will be when they have all hatched? What if they were to find there was a large colony in the forest and not just a nest? Today we'll make predictions then conduct trials to see if we can identify trends in the number of each species. Then we might be able to work out just how much trouble (or fun) Astara and Emmitt might be in for with their new scaly neighbours! Let's hope there won't be an over abundance of the bad-tempered and uncooperative Dreks!

### **Session Two – The Fledglings Create a Fuss**

#### **Maths focus: Mathematical 'fairness' and conditional probability**

The fledgling dragons are growing, but there are so many of them to keep fit and out of trouble that Mayor Maurice decrees that each villager must train a dragon to compete in the Great Dragon Race, a timed obstacle course of epic proportions. Looking at the race terrain and distance on old course maps, some trainers (including Emmitt) complain that their dragon is too small, too slow, too young or too weak to complete the tricky course and it just isn't fair, whilst others argue that their big dragons are actually the ones at a disadvantage as they won't be able to navigate the sharp bends and narrow passes! This prompts Astara to wonder what exactly fair means? Does it always mean 'equal'? Mayor Maurice shows you and Astara a trick or two to measure and model whether outcomes can be achieved fairly. Using these, you will try to calculate exactly how many of our current crop of dragons could have completed last year's course. And can you help Astara and Emmitt design a course for this year that gives everyone an equal chance to win? We'll need to try our best so the Kurses and Lardens don't end up in a brawl!

### **Session Three – The Dragonet Dilemma**

#### **Maths focus: Sample spaces and bias**

It's a hot day in Mireu and Astara, Emmitt and their dragons, Dante and Inferno, are taking a break from training outside. Armed with the profiles of all the competing dragons, including their pedigrees, they are working out each dragon's chance of winning. But something is bothering Astara. The calculations look far too... neat. And when they apply their prediction strategy to last year's competitors, the one they thought should have won - didn't! Mayor Maurice suggests they go back and look at the profiles and pedigrees again for clues that could explain the results.

Was the Blue Bearded Dragon REALLY tall enough to leap a mountain... or did he have help? Did the Turquoise Tatsu ACTUALLY have a wingspan that could enable her to soar over a mighty chasm... or was she secretly wearing fins? Astara and Emmitt are on the hunt to discover if last year's race was won by the most deserving dragon – or if the trophy was taken home by a cheating trainer! The Golden Ladons have a very well-developed sense of justice – let's hope we can avoid them having a melt-down!

## **Session Four – The Great Dragon Race**

### **Maths focus: Tournament brackets and the probability of gameplay**

It's the day Astara and Emmitt have been waiting for! Their dragons will take to the skies. They'll slip, skid and slide through muddy swamps, dive beneath the deep blue sea and overcome all sorts of unusual obstacles as they compete for first place in the Great Dragon Race. As they enter the arena, they find the other trainers crowded around a noticeboard. Mayor Maurice has just posted the draw listing the dragons in each heat as well as the order of the heats. Astara and Emmitt huddle together with Dante and Inferno and discuss how the draw will affect on their dragons' chances at success. Just because they're smaller than their first opponents, does that mean they're doomed to lose from the beginning? Put what you've learnt about the maths of probability to help Astara, Emmitt and the Mayor of Mireu predict which dragon might win.

It's time to race! The warning bell rings to signal for dragons and trainers to assemble at the start line. But as you get your dragons ready, you notice an ominous plume of smoke rising in the distance – right where the finish line should be...! Can the dragons can still find a way to complete the course?

### **Homework Requirements & Assessment**

Homework may be set after each session to give students extra time to explore the new concepts. At the end of the program a short, written report will be completed on each student and forwarded home to parents. A copy should be made and forwarded to the school.

**What to bring:** Please bring a labelled, small photograph of yourself; a snack (no nuts please), a hat, and a stamped, self-addressed DL envelope for your report (please also write the student's name on the back). Also bring a well-stocked pencil case (grey lead pencils, coloured pencils or textas, a rubber, sharpener, glue and scissors) and a notebook (at least A5 size).

### **About the Presenter**

**Ang Hewasiribaddana** is a Montessori and mainstream qualified primary and secondary teacher, currently studying for her Masters of Education (Gifted Education). She has a passion for bringing unusual, abstract maths to life in innovative and creative contexts for the students she has the privilege of working with.

