Lazy Lemur Multiplication

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Error-detection by
Mr. Meyers's 5th grade math class
Spring Avenue Elementary
LaGrange, Illinois

MathPickle

Standards for Mathematical Practice

All MathPickle puzzles including Lazy Lemur Multiplication are guaranteed to engage a wide spectrum of student abilities while targeting the following Standards for Mathematical Practice:

MP1 Toughen up!
This is problem solving where our students develop grit and resiliency in the face of nasty, thorny problems. It is the most sought after skill for our students.

MP3 Work together!
This is collaborative problem solving in which students discuss their strategies to solve a problem and identify missteps in a failed solution. MathPickle recommends pairing up students for all its puzzles.

MP6 Be precise!
This is where our students learn to communicate using precise terminology. MathPickle encourages students not only to use the precise terms of others, but to invent and rigorously define their own terms.

MP7 Be observant!
One of the things that the human brain does very well is identify pattern. We sometimes do this too well and identify patterns that don't really exist.

(http://www.corestandards.org/Math/Practice/)

Common Core State Standards

Lazy Lemur Multiplication targets the following grade 4/5 Common Core State Standards:

CCSS.MATH.CONTENT.4.NBT.B.5
Multiply a whole number of up to four digits by a one-digit whole number.

CCSS.MATH.CONTENT.5.NBT.B.5
Fluently multiply multi-digit whole numbers using the standard algorithm.

Note to Teachers

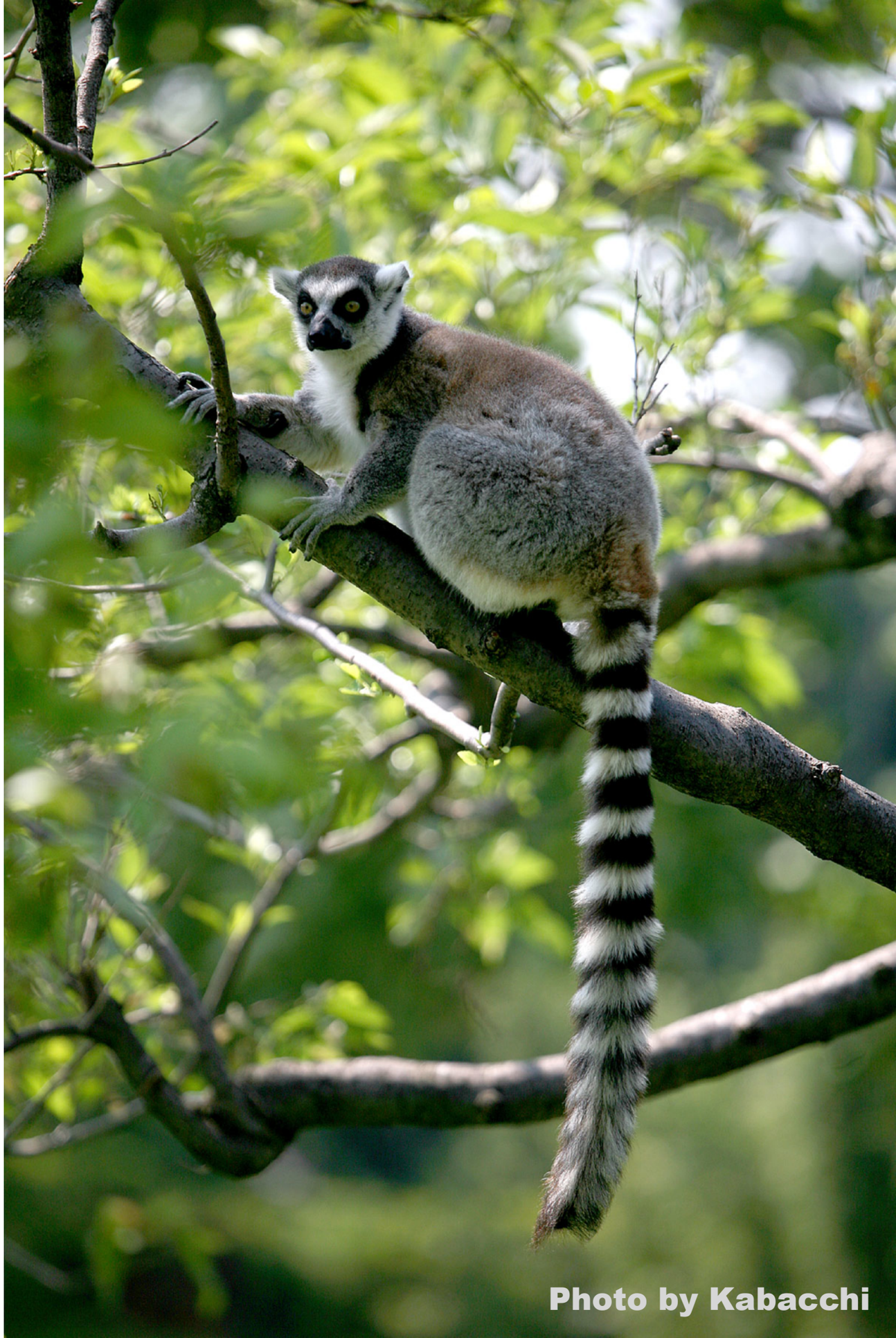
Lazy Lemur Multiplication keeps students aware and focussed as they use the standard multiplication algorithm. Too often I was seeing students just blindly jumping into an algorithm and then letting their mind wander. Sloppy work was the result. Lazy Lemur Multiplication keeps students on their toes as they must stop the standard algorithm midway-through if they see an unwanted digit.

Lazy Lemur Multiplication

02997 is good for lazy lemur multiplication because you can multiply it by a digit greater than one so that all five digits get shuffled, but remain the same. Students are lazy lemurs. As soon as they discover that a product produces an incorrect digit, they should stop and try multiplying with a different number...

02997^{1}	02997^{6}	02997^{54}	02997^{2664}
x 2	x 9	x 6	x 7
4	3	82	20979

So lazy! After discovering a 4, 3 and 8, the first three product calculations are skipped... so without exerting themselves too much, the lemurs have found that multiplying by 7 shuffles the digits. That's lazy lemur multiplication: 02997 x 7 = 20979. The lemurs write these in white loops around their tails.




0 2 9 9 7 x7 2 0 9 7 9
Photo by Tim Parkinson

0 1 7 4 6

Lemur class puzzle.
Solve together.

Photo by Josef Vybíral

0 1 7 4 6 x6

2 1 6 7 8 ⬭

Another one.
Solve together.

Photo by Josef Vybíral

0 1 7 4 6 x6

2 1 6 7 8 x4

Now split into lemur pairs.

Photo by Josef Vybíral

0 0 0 1 5

0 0 0 4 5

0 0 1 5 0

0 0 4 5 0

0 1 5 0 0

0 4 4 9 1

1 4 0 8 5

1 0 8 9 9

1 0 9 8 9

0 8 5 1 4

0 1 0 8 9

1 3 9 8 6 ⬭

1 3 8 6 0 ⬭

1 3 5 9 9 ⬭

1 3 5 9 0 ⬭

1 6 7 8 2

1 5 1 9 2

1 4 8 5 9

1 3 0 2 9

1 2 9 0 3

1 1 8 8 3

nasty!

0 2 9 6 7

0 2 9 1 3

0 2 8 2 6

0 2 7 4 5

0 1 7 8 2

0 1 4 1 3

nasty!

0 3 1 7 7

0 3 1 6 8

0 2 6 9 1

0 2 6 7 3

0 1 6 7 4

0 1 3 0 5

Shuffle the 5 digits by multiplying with an integer greater than 10.

nasty!

0 0 0 1 5 x7

0 0 0 4 5 x9

0 0 1 5 0 x7

0 0 4 5 0 x9

0 1 5 0 0 x7

0 4 4 9 1 x9

solution

1 4 0 8 5 x6

1 0 8 9 9 x9

1 0 9 8 9 x9

0 8 5 1 4 x6

0 1 0 8 9 x9

solution

1 3 9 8 6 x6

1 3 8 6 0 x6

1 3 5 9 9 x7

1 3 5 9 0 x7

solution

1 6 7 8 2 x4

1 5 1 9 2 x4

1 4 8 5 9 x6

1 3 0 2 9 x7

1 2 9 0 3 x7

1 1 8 8 3 x8

solution

0 2 9 6 7 x7

0 2 9 1 3 x7

0 2 8 2 6 x8

0 2 7 4 5 x9

0 1 7 8 2 x4

0 1 4 1 3 x8

0 3 1 7 7 x23

0 3 1 6 8 x12

0 2 6 9 1 x11

0 2 6 7 3 x12

0 1 6 7 4 x24

0 1 3 0 5 x23

Shuffle the 5 digits by multiplying with an integer greater than 10.

solution

The black rings on the tails are also the by-product of this sort of lemur laziness.... Multiply the a number by an integer so that the resulting number has all the unused digits shuffled up in some way.

05832×5	05832×4	05832×3
0	8	17496

Again, the lemurs are lazy. If they start to solve a multiplication and find a duplicate digit like 0 or 8, they stop and have a sleep.

PS. Why are there never more than 16 black rings on a Lemur's tail? Because they have only found 16 five digit numbers that work.

Photo by Sonja Pauen

1 3 4 5 8

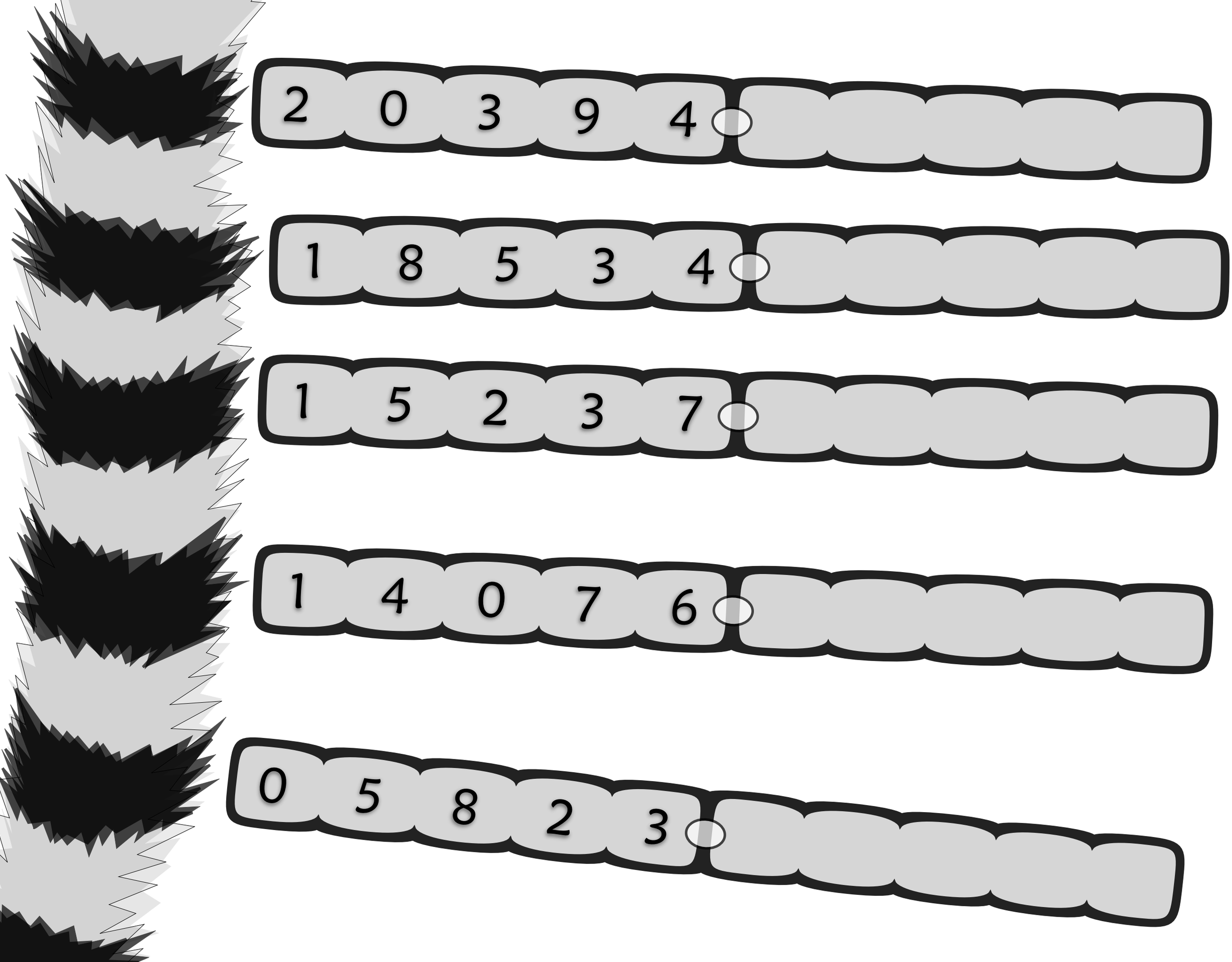
Photo by Adam W.

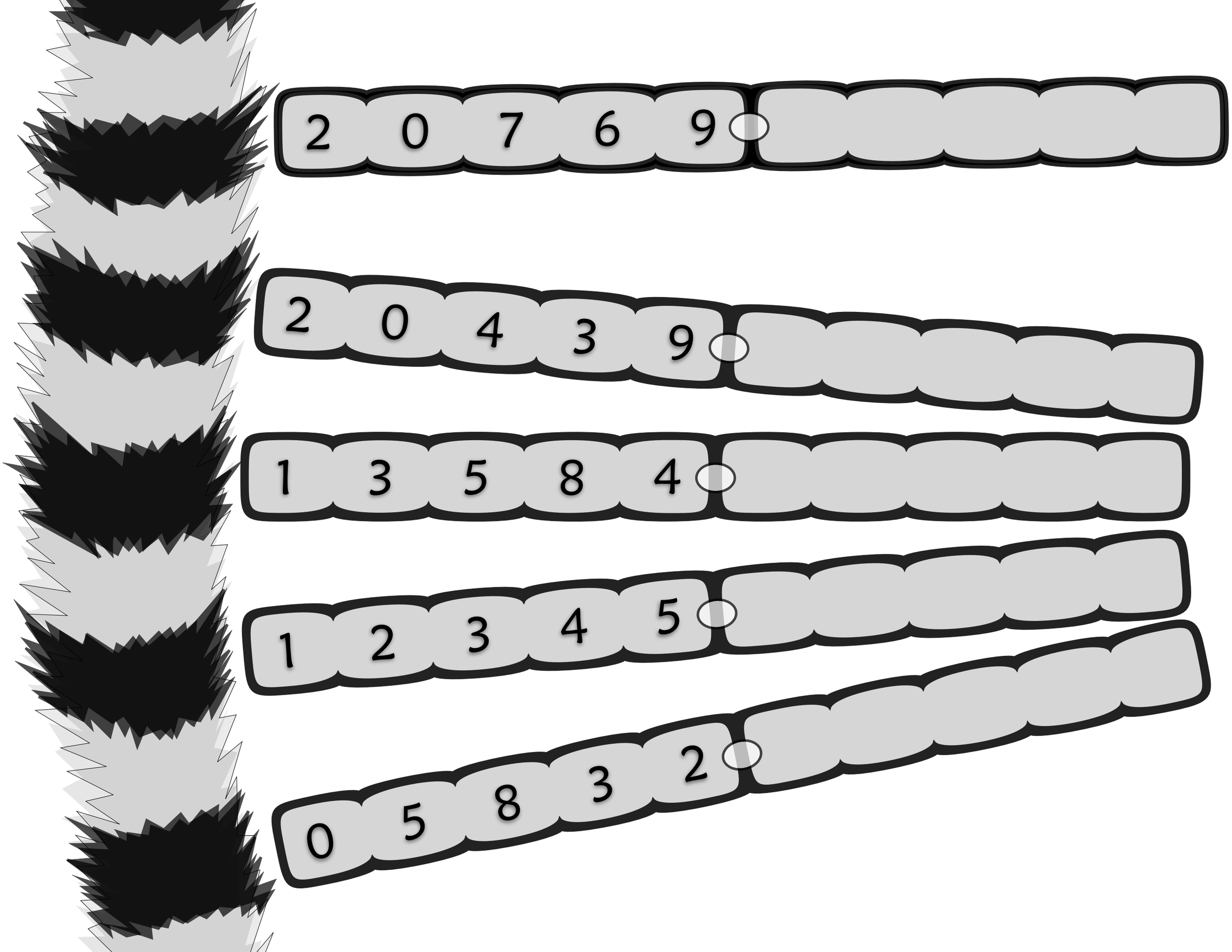
1 3 4 5 8 x5

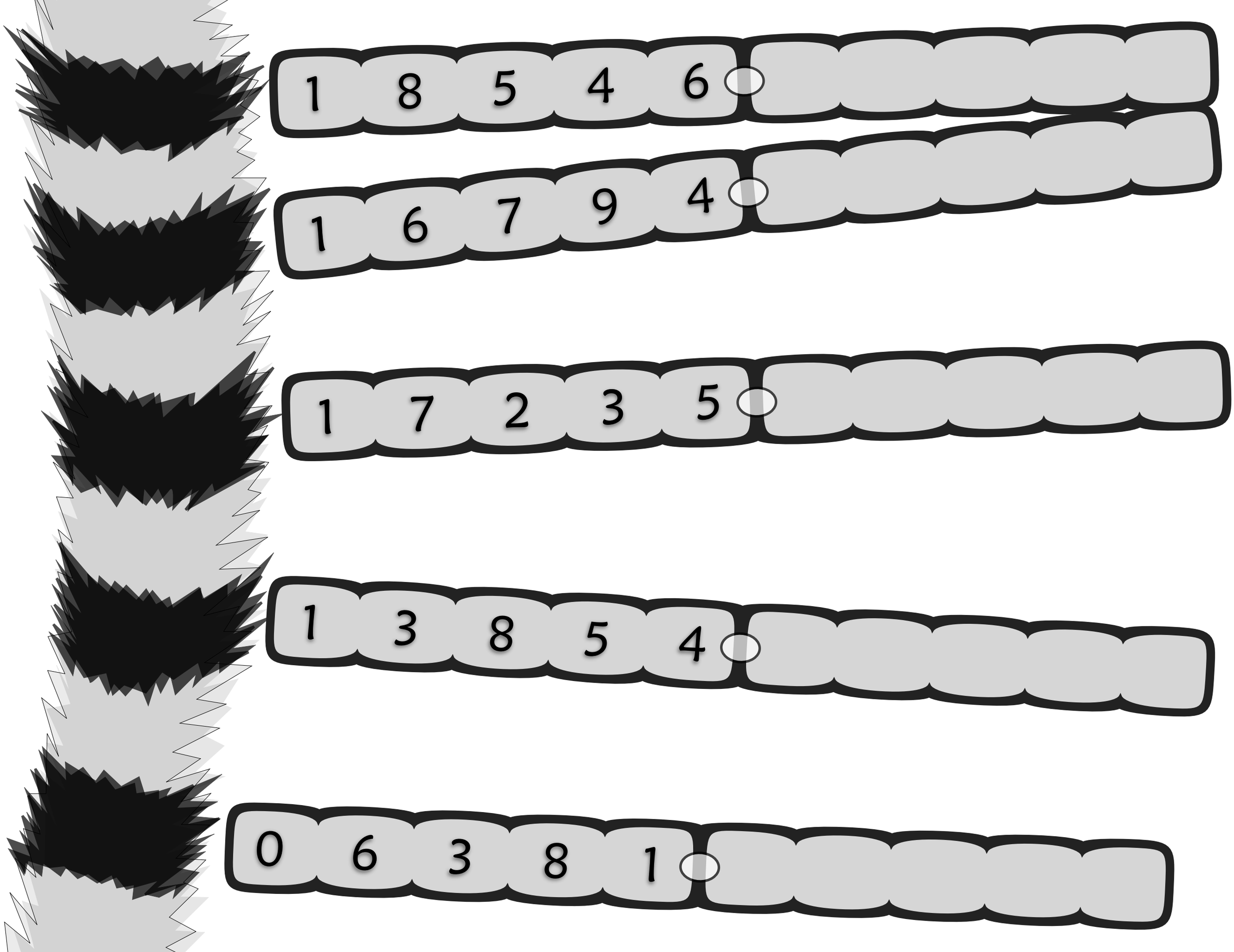
adam w

Photo by Adam W.


0 2 9 9 7 ×7 2 0 9 7 9
0 5 8 3 2 ×3 1 7 4 9 6
Photo by Tim Parkinson


2 0 3 9 4
1 8 5 3 4
1 5 2 3 7
1 4 0 7 6
0 5 8 2 3


2 0 7 6 9
2 0 4 3 9
1 3 5 8 4
1 2 3 4 5
0 5 8 3 2


1 8 5 4 6
1 6 7 9 4
1 7 2 3 5
1 3 8 5 4
0 6 3 8 1

2 0 3 9 4 x4

1 8 5 3 4 x5

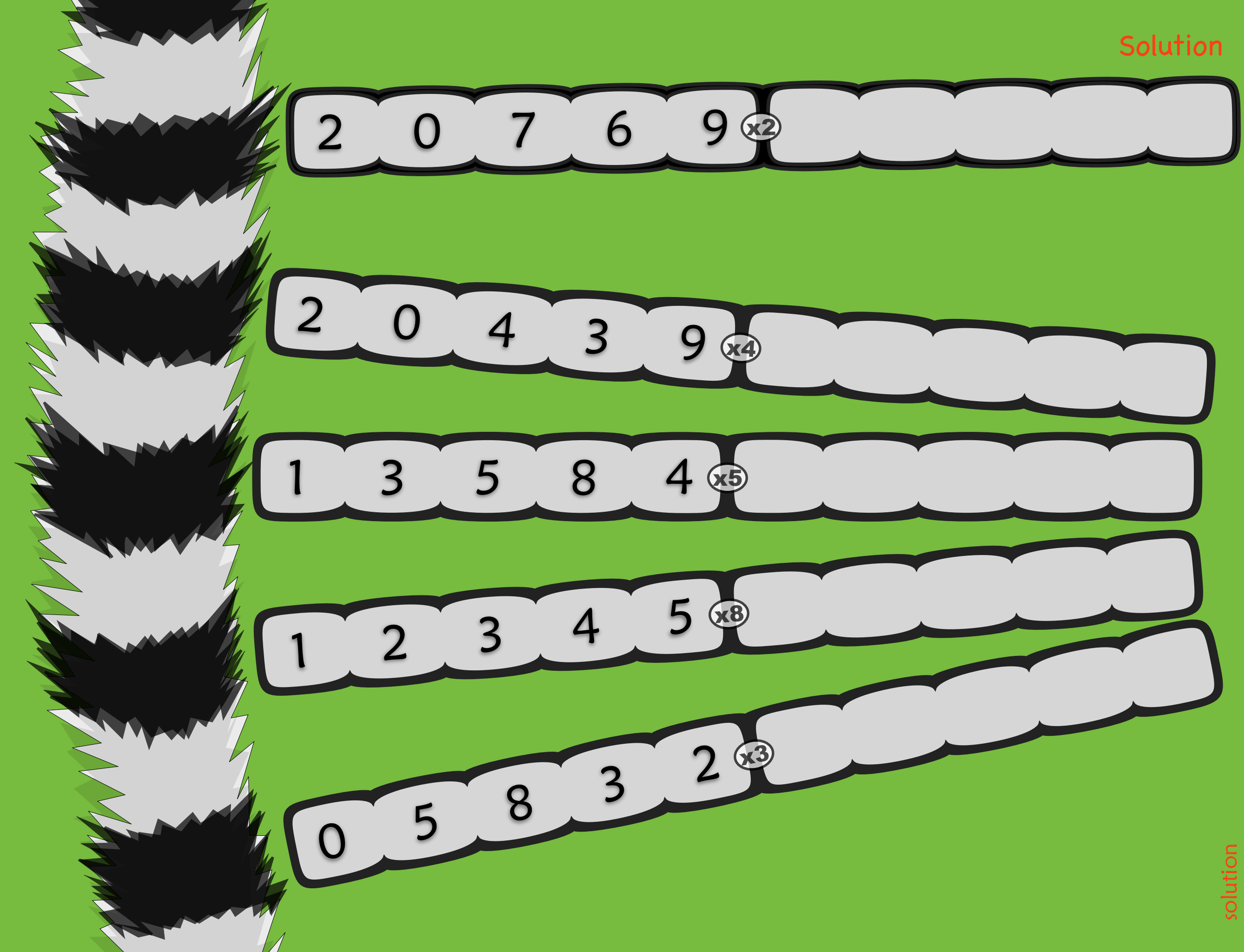
1 5 2 3 7 x4

1 4 0 7 6 x7

0 5 8 2 3 x3

solution

Solution



solution

1 8 5 4 6 x5

1 6 7 9 4 x3

1 7 2 3 5 x4

1 3 8 5 4 x5

0 6 3 8 1 x9

solution

Put Your Students in a Pickle!

I'm a father of two elementary school children, a mathematician, and designer of puzzles and board games. Students call me Dr. Pickle. There is nothing I enjoy more than stumping students and having them stump me.

I founded MathPickle.com in 2010 to inject new ideas into the classroom. MathPickle's primary objective is to get thirteen curricular unsolved problems into classrooms worldwide - one for each grade K-12. A conference in November 2013 established the thirteen unsolved problems. To aid with the dissemination of these awesome problems, MathPickle is looking at setting up a $1,000,000 reward for each - the prize money to be split between the person who solves the problem and their most inspirational K-12 educator.

MathPickle is also developing a range of curricular puzzles like the ones you'll find at TpT. These help teachers them with their number one challenge:

"How to engage the spectrum of student ability?"

Whenever an elementary school teacher wants to teach addition, she will invariably face 20% of students who already know how to add and another 20% who are struggling with last year's curriculum. How can she engage the top students without losing the bottom students? How can she engage the bottom students without boring the top students?

One solution: Parents of top students often ask that their child be allowed to accelerate through the curriculum. This exacerbates the problem for future teachers, and sets up a failure-impoverished education experience for the bright student.

A wiser approach is to use curricular puzzles, games and mini-competitions to simultaneously teach curriculum to the students who need it, and to deflect top students into tough problem solving activities. This is never time wasted, because problem solving is the primary reason we teach mathematics.

The experience of mathematics should be profound and beautiful. Too much of the regular K-12 mathematics experience is trite and true. Children deserve tough, beautiful puzzles.

Gordon Hamilton
MMath, PhD