Metastory

We acted the introduction to the paper; the story also appears in the slides below (we read the lines directly off these slides)

Erik played Yogi, Corina played Booboo (in volume I) and Ranger Smith (in volume II), and Mihai was the narrator.

After volume I and II, we presented the technical material using hand-drawn slides.

Finding a Divisible Pair and a Good Wooden Fence

…or, a Day in the Life of Yogi Bear

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M.I.T.

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Introducing… Yogi Bear!

Ranger Smith (Corina)

Boo Boo Bear (Corina)

Yogi Bear (Erik)

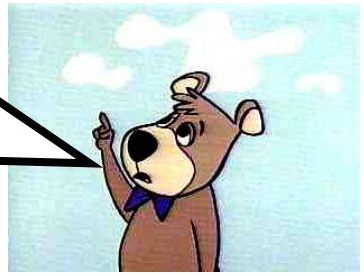
Hanna Barbera Cartoons

Our Story Begins…

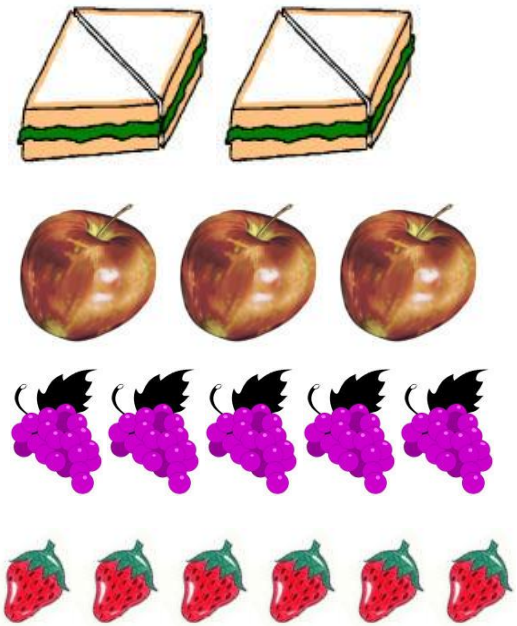
Yogi Bear is on his constant search for picnic baskets in Jellystone National Park, while his sidekick Boo Boo Bear tries to distract Yogi by teaching him some mathematics. The bears came across a large camping ground—the campers were on a hike. Yogi, being smarter than the average bear, seized the opportunity to steal several picnic baskets and take them back to his cave.

There are so many different kinds of food that I don't know which to eat first.

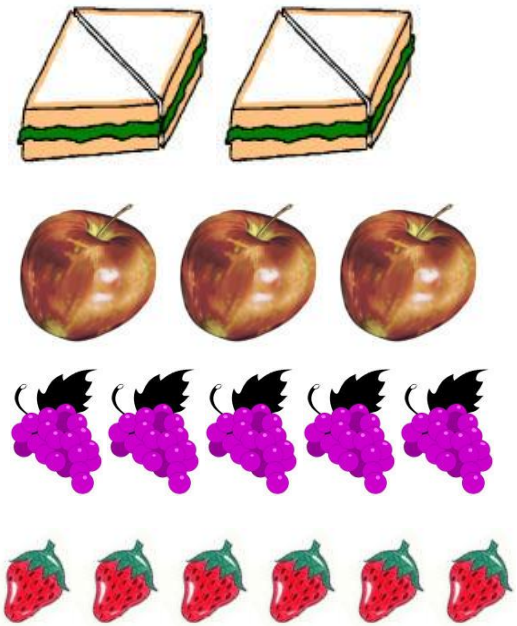
Then why don't you eat two kinds of food first?



But look at this basket, Boo Boo. There are 2 sandwiches, 3 apples, 5 bunches of grapes, and 6 strawberries. You've taught me enough about numbers to know that none of these numbers are the same. If I ate a grape with each apple, I'd have two grapes left over. That's not a balanced diet.



You are too abstract, Boo Boo.
I see only 5 grapes.



But Yogi, here is where you can use division. Suppose there were 6 grapes. You can break 6 grapes into 3 groups of 2—3 divides 6—so you can eat 2 grapes for every apple and everything will balance."

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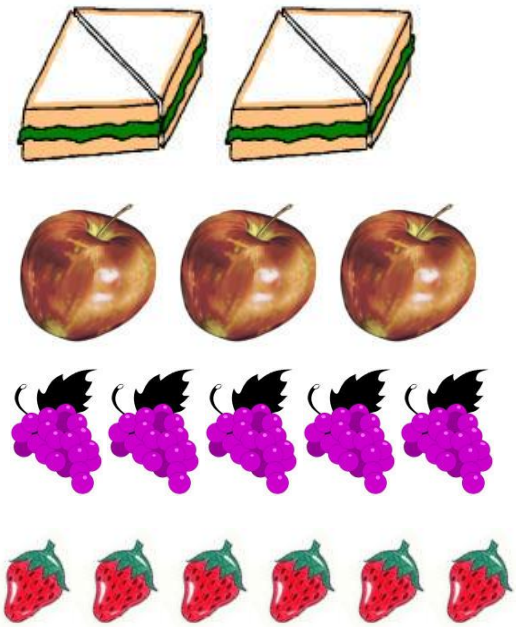
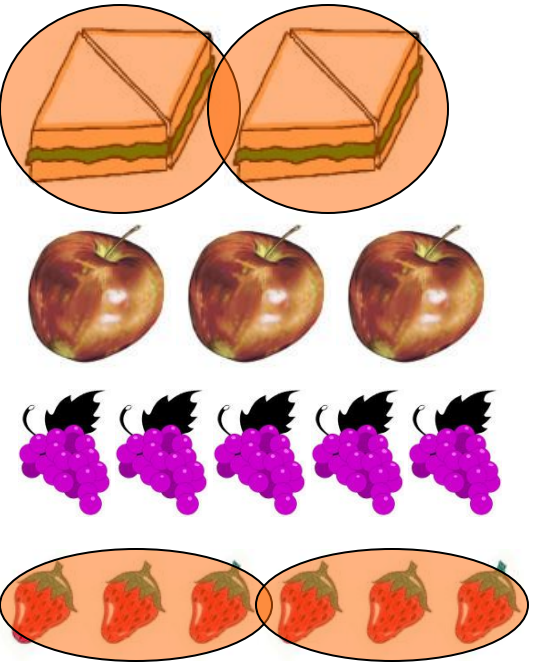


That's true, but even in this basket there are divisible numbers.
Can you find them?"

Hmmm… Aha! I can put 3 strawberries on each of the 2 sandwiches.



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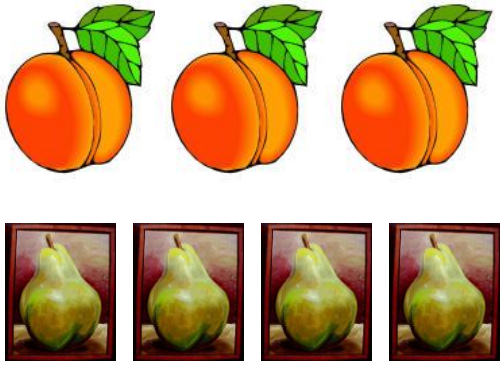
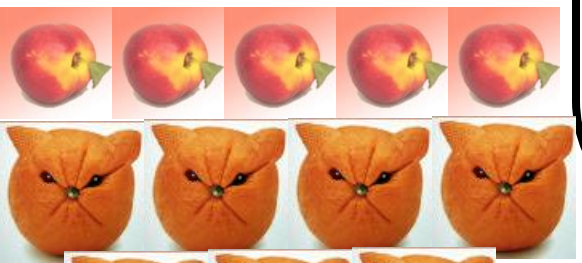
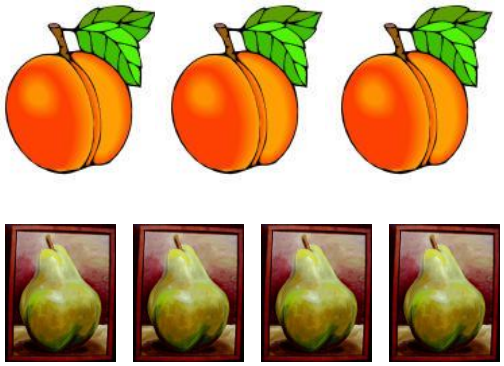


Very good, Yogi! Now, what about this basket? There are 3 peaches, 4 pears, 5 nectarines, 7 oranges, and 9 peanuts."



This is getting hard, Boo Boo. Is there some easy way to find divisible numbers?"



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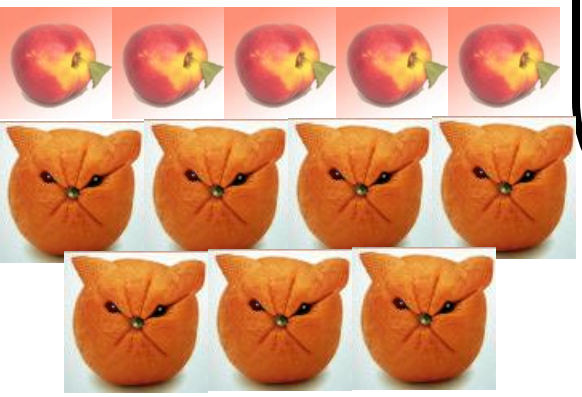
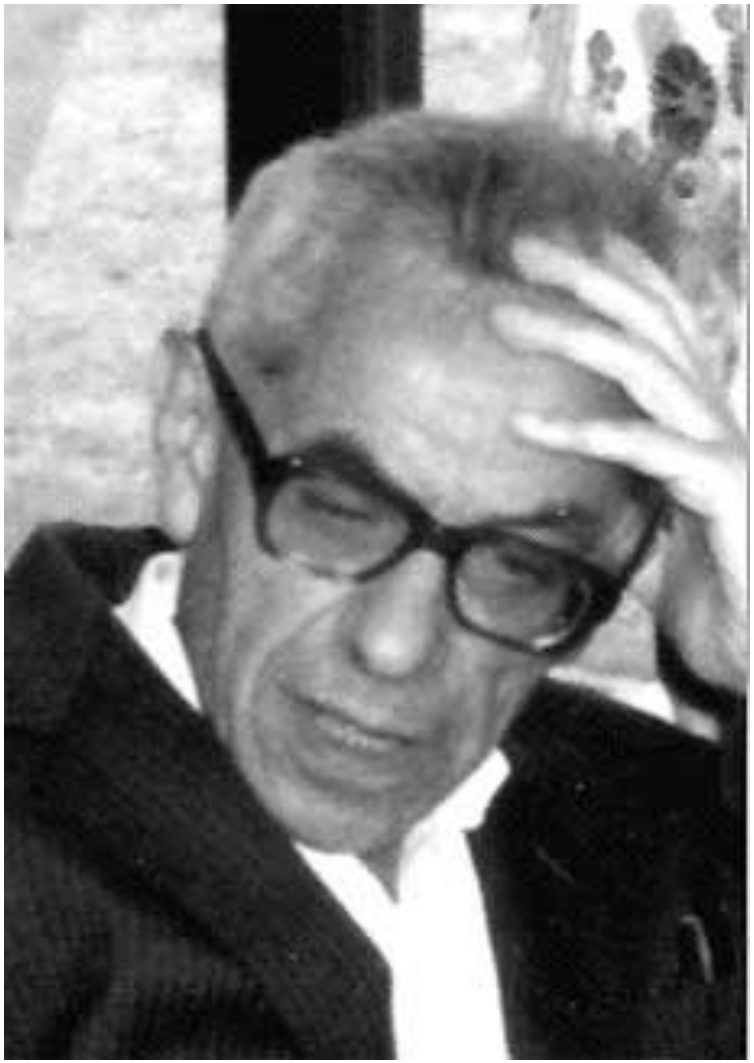


The Algorithms Thicken…

Boo Boo got out some chalk and started writing on the cave wall. He noticed that the baskets encountered so far always have the property that the size of the largest group is at least two less than twice the number of groups. In other words, the group sizes form a subset of {1, 2, …, 2n} of size at least n + 1. Luckily, he observed, such sets always contain a divisible pair of numbers. But can he develop fast algorithms to find such pairs?

Boo Boo follows in Erdős's Footsteps…

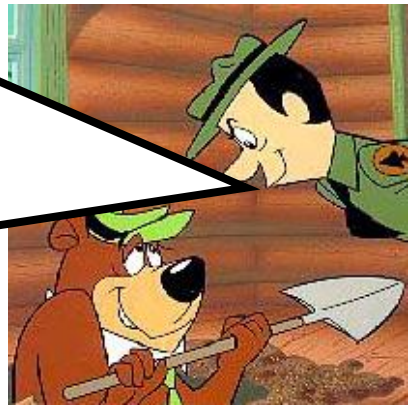


Volume II: The Wooden Fence

After Yogi had a balanced diet of the foods he could pair together, he and Boo Boo went back to the campsite to return the rest of the food. To Yogi's great surprise, they found a group of angry campers talking to Ranger Smith. When Ranger saw them, he got angry too.

But Ranger, I brought back what I didn't eat.

Yogi, you have to stop stealing picnic baskets!



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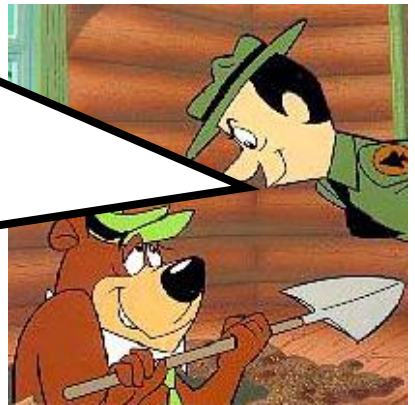
It doesn't matter, Yogi. This stealing must end. I'm putting up a fence around the whole forest to keep bears ***out***.



Wait a minute, Ranger. Where are you going to get the wood for your fence?

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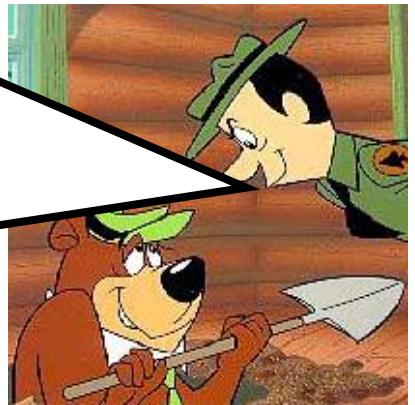
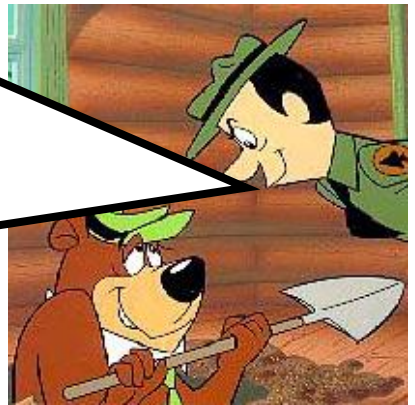


Wait a minute, Ranger. Where are you going to get the wood for your fence?

I guess I'll get the wood by cutting down a few trees from the forest.



Ah ha. But you don't want to cut down too many trees in our beautiful Jellystone.

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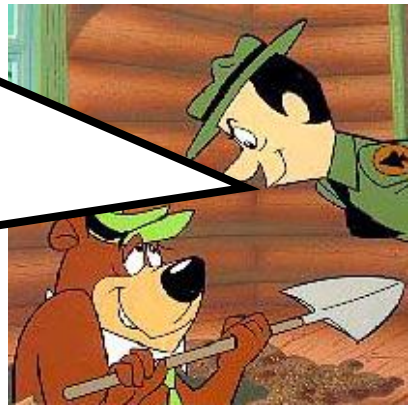


Ah ha. But you don't want to cut down too many trees in our beautiful Jellystone.

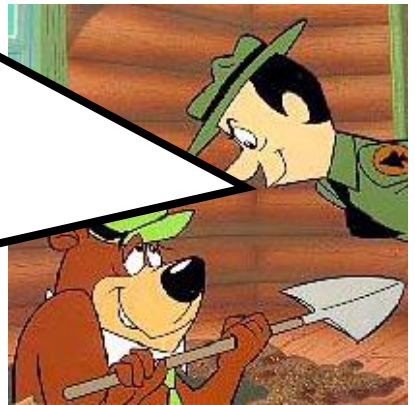
Of course not. But if I cut down trees along the perimeter, I'll have a smaller region to fence off.

Ah ha. But the trees in the middle of the forest are larger and offer more wood. So wouldn't it be more beneficial to cut them?

Of course not. But if I cut down trees along the perimeter, I'll have a smaller region to fence off.

Ah ha. But the trees in the middle of the forest are larger and offer more wood. So wouldn't it be more beneficial to cut them?

I certainly want to cut the minimum number of trees. There seems to be a trade-off between cutting fat trees and cutting trees that reduce the perimeter…



The Algorithms Thicken…

Ranger is left with a challenging optimization problem, which we show how to solve in polynomial time.