

2007 Bellevue BATH Competition

Room 355 A

There are 17 trees in my backyard and 32 rocks, and I've seen 14 squirrels that I tagged. Squirrels reproduce (increase in population) at a rate of 2 per year. Trees reproduce at a rate of 1 every 5 years, and rocks 'reproduce' at a rate of 2 every 31 years. Good thing there are no woodcutters around here, but there are beavers! Beavers cut branches off so they don't hurt trees too much, but about every 7 years they run out of branches and have to bite down the entire tree. From all the trampling of the beavers, the rocks get eroded at half a rock every 35 years. The squirrels erode 1 rock every 140 years. Beavers don't like squirrels because they occupy the trees that the beavers try to cut, so every time an entire tree is cut by the beaver, 12 squirrels die. Then I come every 100 years and eat 5 rocks and 5 trees in my famous 'Backyard Rock Soup.'

So which of the four (trees, rocks, squirrels, beavers) will disappear first? (And make me sad because of no chittery squirrels or no famous 'Backyard Rock Soup?') Take the product of the number of vowels and the number of consonants in the word to get your answer.

Answer: 4.

2007 Bellevue BATH Competition

Room 434 B

Each hill in Crazy Land can hold 7 houses and each house has 3 people living in it. It takes 2 people to run 1 bulldozer. Each hill in Insane Land holds 10 houses with each having 4 people in them, and each bulldozer requires 3 people to run. Insane Land has 8 hills and Crazy Land has 4 hills, but Crazy people are smarter and each of their bulldozers can take out 2 of each of Insane Land's bulldozers. In this Battle of the Hills, when bulldozers clash, their riders are injured and sent to the hospital. If one side does not have enough people to run a bulldozer, they lose.

After this battle, how many healthy people are left on the winning side?

Answer: 68.

2007 Bellevue BATH Competition

Room 506 B

Happily jumping across the ravines, FroggyMan prays to the god of Frogs - the Crane - that he won't fall into the ravine or be eaten by The Crane. There is a $\frac{1}{7}$ probability that FroggyMan will be eaten after he makes it across the ravine. FroggyMan is as timid as TadpoleMan (who happens to be the child of FroggyMan), but there is a $\frac{2}{5}$ probability that he will attempt the ravine in front of him. There is a $\frac{1}{4}$ probability that he will trip on his floppy feet and fall to his doom in the ravine, and if he makes it in the air, there is a $\frac{4}{9}$ probability that he didn't use enough power and won't make it across and end up falling to his doom. There is a treasure of a bottle of experimental fruit flies (the fattest and juiciest of them all) across the ravine from FroggyMan.

The probability that he will make it to the treasure alive is $\frac{m}{n}$. What is $m + n$?

Answer: 8.

2007 Bellevue BATH Competition

Room 352

There are 2 chandeliers in a house and 6 in a mansion. Each chandelier has 12 'candles' (the fake electric ones), and a candle burns for 7 months. Every house has 1 child and every mansion has 2 children. Children (for reasons unknown) like to swing on chandeliers and shout *AAA-AAAaaaAA-AAaaaaaAAA* (like Tarzan). Once every year, each child swings on exactly one chandelier; they are then grounded for the remainder of the year while the parents replace the chandelier for \$100. In this neighborhood I was visiting, I counted 4 houses and 6 mansions.

If I observe this neighborhood for 5 years, how many thousands of dollars of money will be spent on chandeliers?

Answer: 8.

2007 Bellevue BATH Competition

Room 504 A

I have recently been taught how to play the Ocarina! I have little knowledge of music, but I have finally successfully learned the Song of Time, Epona's Song, Bolero of Fire, Requiem of Shadow, Zelda's Lullaby, and Saria's Song. I need to play more to learn more songs.

Anyway, the Ocarina has 5 holes in it and I can play 3 different octaves from each hole by blowing at different pressures, so how many different notes can I play?

Answer: 15.

2007 Bellevue BATH Competition

Room 401 A

I have finally achieved the ability to summon Eidolons (Gotta Catch 'Em All™), strengthening my ability to rid the world of **Evil**. Too bad I'm never giving you this power of mine. It's too sacred to me. My powers are within the realms of water, fire, thunder, shadow, light, and non-elemental. Fire is strong against thunder, which is strong against water, which is strong against fire. Light is strong against shadow, which is strong against light.

If we both choose elements to fight with and face off against each other, the probability that one of us will easily defeat the other is $\frac{m}{n}$, where m and n are relatively prime positive integers. What is n ?

Answer: 9.

2007 Bellevue BATH Competition

North Courtyard B

A pair of Dark Templars can join together to become a Dark Archon, and a pair of High Templars can join to become an Archon, but if a Dark Templar attempts to join with a High Templar, they will be disintegrated as punishment for their Crime Against Nature™.

If there are 4 High Templar and 4 Dark Templar blindly running around until they have either all merged or all been disintegrated as punishment for their Crimes Against Nature™, the probability that exactly 1 Dark Archon and 1 Archon are formed is $\frac{m}{n}$, where m and n are relatively prime positive integers. What is $n - m$?

Answer: 11.

2007 Bellevue BATH Competition

Room 436

I'm a humble little farmer with my own little plot of land. I need grass to feed my cows, and each pack of seeds creates a 3×3 plot of grass (anything off the plot or on an existing grass space does not grow). Cows like to eat grass, and once a cow eats a 1×1 spot of grass, which each cow does each day, it takes 7 days for the grass to grow back. I don't want my cows to die and I have 5 cows. I have a 4×11 plot available for grass.

What is the least number of seed packs needed to feed all of my cows for a week?

Answer: 5.

2007 Bellevue BATH Competition

Room 503

There are 8 chickens in my pen. Each one lays eggs every day, but sometimes I can't find them. On average, I find 6 of the eggs they lay each day, which I sell for \$300 each. The remaining 2 eggs hatch into chicks, which sell for \$500 each. It costs me \$100 a day to feed each of my chickens.

After a week, how many hundreds of dollars do I make?

Answer: 140.

2007 Bellevue BATH Competition

Room 403 A

I have 16 sheep (yes, my barn is expanded and crammed to the max). My sheep give me 1 unit of wool every time I shear them. 4 of my sheep give me small wool, which sells for \$100 per unit. 4 of my sheep give me medium size wool, which is \$150 per unit. Another 4 sheep give me large wool, which is \$250 per unit. And finally, my 4 prize sheep give me such good quality wool that it sells for \$500 per unit.

I can only shear the sheep once a week, so how many thousands of dollars do I make in one week?

Answer: 4.

2007 Bellevue BATH Competition

Brandy West Courtyard A

$\triangle ABC$ is inscribed in circle O . \overline{AB} is the circle's diameter. What is the measure of $\angle C$ in degrees?

Answer: 90.

2007 Bellevue BATH Competition

Room 434 A

My plot of land is a 20×7 piece of land. It is all plowed and ready for the planting of my corns. I plant them in 3×3 blocks that must all lie in my land (that is just how the seeds are). My awesome watering can water a 3×3 space directly in front of me. I take up 1×1 space on the ground, and while watering, I must have space between my crops to stand on as well as a path from the edge of my land to the places I must water from.

How many fully watered 1×1 spaces of corn can I have?

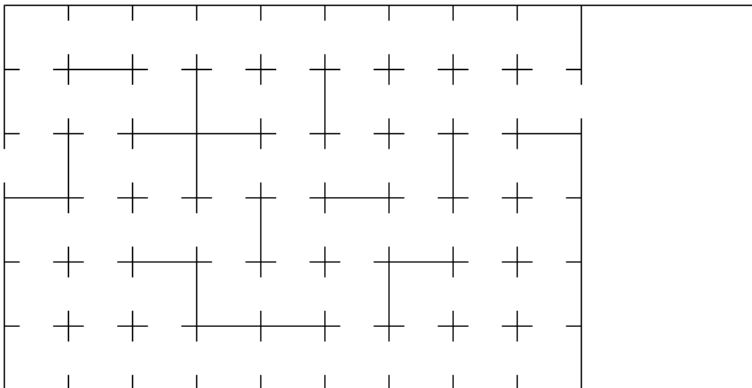
Answer: 108.

2007 Bellevue BATH Competition

Room 504 B

My wonderful 54 room castle needs to be shown off to my subjects (this is only the first floor; my private rooms are upstairs, all nice and private). I want to lead them through each room only once and to bring them from the front door entrance to my 5 star combo kitchen dining room. Not all the rooms have doors on all sides so it's gonna take some ingenuity to figure out a way to get through it all.

Can you find a path through my maze?



2007 Bellevue BATH Competition

Brandy West Courtyard B

Dark, clammy, gloomy, smelly, dank
I landed in this place when my ship sank
500 bats I see on the ceiling of this cave
In nighttime they swarm out in a wave
This is when they go out to feed
And when mosquitoes hope to breed
Down a bat swoops towards the bug
And eats the mosquito without a shrug
Each night it takes 2 to fill one bat
This is great for us, because bugs suck
So much blood they take, just our luck
1 mosquito takes only one little drop
It takes 125 drops to fill a cup to the top
Counting all the drops in the mosquitoes in the bats
In a single night without any rats
Blood from the fountain in the wall
How many cups in all?

Answer: 8.

2007 Bellevue BATH Competition

Room 357

Find the sum of the first 2 positive squares, the first 3 positive cubes, and the first perfect number.

Answer: 47.

2007 Bellevue BATH Competition

Room 435

A bottle of shampoo contains 30 oz. of shampoo. A bottle of conditioner contains 50 oz. of conditioner. Every morning when you shower you use 3 oz. of shampoo and 2 oz. of conditioner. Whenever you run out of either, you buy a new full bottle of that product later that day.

If you start in the morning of Day 0 with full bottles of both, on what day will you completely use up bottles of both?

Answer: Day 99.

2007 Bellevue BATH Competition

Room 403 B

I'm listing primes at a rate inversely proportional to the value of the previous prime listed. If it takes 2 seconds for me to list the prime 2 and 4 more seconds to list 3, what is the largest prime I list in the first minute of listing?

Answer: 13.

2007 Bellevue BATH Competition

Room 401 B

I am adding the positive odd numbers in order from smallest to largest. Currently, I have a sum of 289. What was the last number I added?

Answer: 33.

2007 Bellevue BATH Competition

Room 355 B

At the beginning of every minute, I shut 4 windows (or all open windows if there are less than 4 open). At the end of every two-minute period, a monkey will open 1 window. BHS is currently infested with two monkeys.

If BHS has 15 open windows at minute 0, what is the first minute during which all the windows will be closed?

Answer: 4.

2007 Bellevue BATH Competition

North Courtyard A

If $n = (1 \star 2) \star 3$, where each star stands for either addition, multiplication, subtraction, or division, how many possible positive values of n are there?

Answer: 9.

2007 Bellevue BATH Competition

Room 506 A

Factor $ioe - ive + lou - loe + lve - iou + ivu - lvu$. Evaluate the expression for $i = 2009$, $o = 2008$, $e = 2007$, $u = 2006$, $v = 2005$, and $l = 2004$.

Answer: $(i - l)(o - v)(e - u)$ and 15.

2007 Bellevue BATH Competition

Baseball Field A

Andreea has 3 sun dresses, 4 pairs of sunglasses, 3 hats, 7 sandals, and 2 purses (all of which are distinct, of course). Let d be the number of dates to the beach Andreea can go on with Qiaochu before running out of outfits. Find the sum of the digits of x .

Answer: 9.

2007 Bellevue BATH Competition

Baseball Field B

n is a positive integer such that the base two representation of n contains only 1s and the base three representation of n has a single 2. What is the base ten representation of the smallest such n ?

Answer: 7.

2007 Bellevue BATH Competition

Parking Lot

There are a number of cars in a parking lot. If I arrange them in rows of 7, there are exactly 2 left over. If I arrange them in rows of 11, there are 10 left over. If I arrange them in rows of 26, there are 5 left over. Assuming the parking lot can only fit 1000 cars, how many cars must there be in the parking lot?

Answer: 681.