ROUND 1: THE RAFT WARS

1. According to Raft Wars lore, after Simon and Calvie (Simon's brother) rescue their parents, their parents suddenly betray them, ditching them on the island while the parents go to dig up the treasure Simon and Calvie have discovered. However, Simon and Calvie find an old boat that can go 5 miles an hour. If their parents had a 3 mile head start on a boat with a speed of 2 miles per hour, how many hours would it take for Simon and Calvie to catch up to them?

2. Simon from Raft Wars has a single hair and a single tooth (as he's still an infant). If Simon's brother gave him a hair growth serum (that grows 2 hair strands per minute) and injected him with tooth generation medicine (that grows 7 teeth per minute), what is the total number of hair strands and teeth Simon will have after 3 minutes?

3. How many distinct words can you make from rearranging the letters of RAFTWARS?

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ROUND 2: DUCK LIFE

1. In Duck Life 3, your duck "The Duck" is up against the Champion Duck in your final competition. With the finish line only 15 miles away and the Champion Duck already 6 miles ahead of you and flying at 2 miles per minute, what is the minimum speed "The Duck" must go to cross the finish line at the same time as the Champion Duck? (Express your answer as a fraction in simplest form in miles per minute.)

2. After reaching ultimate form in Duck Life 4, "The Duck" evolves into the Supreme Duck (a fish-bird-human-duck hybrid). Supreme Duck realizes that it can now teleport. The amount of energy it takes to teleport can be expressed with the function E(t) = |t2-7t+12|, with t representing time. There are two points in time where the Supreme Duck has depleted its energy. What is the sum of those two numbers?

3. Doris Dewdrop, after becoming The World Champion Duck and earning enough money to rebuild her tornado-stricken farm, has now retired and is content to swim in a pond, which can be represented using the equation $(x - 3)^2 + (x + 3)^2 = 9$. If she swims 3 times around the circumference of the pond, the distance she's swam can be expressed in the form $a\pi$. What is the value of $\frac{a}{2}$?

ROUND 3: RUN 3

1. In a Run 3 level, a series of conveyor tiles rotates the level. A right conveyor belt rotates the level 18 degrees clockwise while a left conveyor belt rotates the level 18 degrees counterclockwise. If there are 13 conveyor belts and the net rotation is 54 degrees counterclockwise, what is the amount of right tiles there are? And what is the amount of right tiles there are? Both parts must be answered correctly to get the point.

2. In the "Naming" cutscene, the Runner must rename 5 different tunnels using unique names chosen from a list of 7 candidate names. How many different name combinations are possible?

3. In the "Planet Missing" cutscene, the location of the missing planet is given by the circle equation $x^2 + y^2 + 6y + 9 - 4x = 0$. If the center can be expressed as *(a, b)* and the radius *r*, what is a + b + r?

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ROUND 4: MINECRAFT

1. In Minecraft, players build beacons to receive buffs such as haste or regeneration. One popular design uses layers of square platforms with side lengths decreasing by 2 each time. For example, the max level beacon pyramid is built with a base of 9×9 blocks and has layers of sizes 7×7, 5×5, 3×3. If Steve uses iron, how many iron ingots will it take to build the entire pyramid? 1 iron block is 9 iron ingots.

2. To craft a golden apple in Minecraft, you need 8 gold ingots and 1 apple. Lets say a villager is trading gold at a rate of 2 ingots per emerald, and apples are traded at 3 emeralds each. How many emeralds are required to craft 5 golden apples?

3. In Minecraft, suppose a zombie has a 50% chance to drop a carrot when defeated. If you defeat 4 zombies, what is the probability that exactly 2 of them drop a carrot?

ROUND 5: ANGRY BIRDS

1. Angry Birds are slingshotted towards the pig's wooden base, where their height in meters is represented by the equation h(t) = -(t-17)(t+5). t is the time in seconds after being slingshotted. How many seconds will it take for the angry birds to be at the same height of the pig's wooden base, 72 meters tall?


Day 1   Day 2   Day 3   Day 4

2. The pigs are rebuilding a layer of their wooden base that the angry birds knocked down. It is built from the sticks that have fallen over and structured with equilateral triangles, and their total build by the end of the day is represented by the figure shown. How many days will it take to use up all 77 sticks?

3. The Angry Birds want to know how big their target to hit the pig's home base is! The front side of the home base on this specific level of Angry Birds 2 is shaped like a regular hexagon, with a height of 8. When you finish solving for the area of the base, your notation should look like this: $\frac{A}{\sqrt{3}}$. For your answer, please write the value of A.
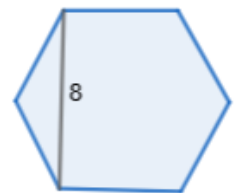
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ROUND 6: AMONG US

1. In an Among Us game, there are 10 players(2 impostors and 8 crewmates). During an emergency meeting, 3 players are randomly chosen to speak. What is the probability that at least one of the chosen players is an impostor?

2. In Among Us, a crewmate earns points by completing tasks: each simple task gives 5 points, and each complex task gives 8 points. If a crewmate scored exactly 61 points and completed at least one of each type of task, determine the number of possible combinations of tasks.

3. In an Among Us game, three crewmates, Alice, Bob, and Charlie, are assigned to repair the reactor. Their work speeds relate as follows. Alice works twice as fast as Bob and three times as fast as Charlie. Bob works twice as fast as Charlie. When all three work together, they finish the repair in 8 minutes. How long would it take for Bob and Charlie working together without Alice to complete the repair in minutes?

ROUND 7: PAPA'S CUPCAKERIA

1. The job as a baker at Papa's Cupcakeria exponentially gets more and more difficult. The difficulty is represented by $d(t) = t^{1.25} + 2$ where t is the time in days after being hired. Within 1 difficulty, what integer day after being hired are you 1/8 the difficulty of 81 days post-hire?

2. While working at Papa's Cupcakeria, a customer orders cupcakes that are 4, 6, 7, 8, and 2 dollars. If the customer orders one more cupcake, the average is equal to the value of one of the cupcakes in the set. What is the sum of all the possible positive values of that last cupcake? Express answer in simplest form.

3. You've come up with a specialty square cupcake (as shown in the diagram). If the side length of the outside square is 9 units and the area of each of the 4 squares in the corners of the larger square has an area of 4, what is the sum of the shaded area (the 4 larger triangles)? The tilted quadrilateral in the center is a square.
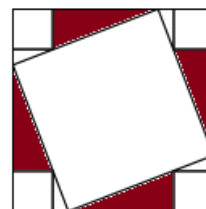
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ROUND 8: CUPCAKE 2048

1. The school administration blocked Cupcake 2048, and now you only have access to an off-brand website that does this in base 16. 2048 in base 16 is what number in base 10?

2. School administration has blocked 2048, so you've decided to code Cupcake 2048 from scratch. In doing so, you need to create the icing design for the cupcake valued at 2048, as shown in the design to the right. Starting with a radius 1 and sharing a point, you create an even number of circles whose radii increase by 2 units each time. By the time you have 2048 circles, the area of the shaded portion can be expressed in the form $a\pi$. What is the value of $\frac{a}{8192}$?
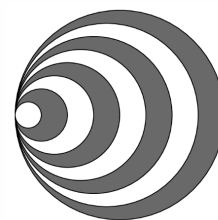
3. In 2048 there is a 4x4 block grid, as shown from the image on the right. An ant can crawl up the edges of the grid going upwards and right, but is unable to move left, down, or not on an edge. How many different paths are there for the ant to reach the upper rightmost point of the grid from the lower leftmost point of the grid?
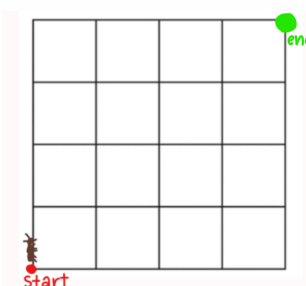
ROUND 9: DUOLINGO

1. Duo is unhappy about the number of days you've missed, and threatens to kidnap your family. In order to stop Duo, you need to calculate exactly how many days you've missed, which just so happens to be the volume of a triangular prism. The sides of the prism's triangular faces can be found by calculating the roots of the equation $f(x) = x^3 - 12x^2 + 47 - 60,$ and the length of the prism is equal to how many possible positive factors of 112 exist. What is the area of the prism/the days you've missed, so you can save your family?

2. Duo the bird is allowing you to save your daily streak if you can find the four digit number that Duo is thinking of. The number has an odd number of factors, the four digits add up to 18, is divisible by 7 and 4, and contains the digit 5. What number will save your daily streak?

3. The Duolingo owl faked their death in February! You are a detective and are actively searching to find the cause of Duo's death. A mathematician has insider evidence of what might've happened, but your detective group must solve a question to get the information. How many palindromes are there from 100-9999?

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