

GMC Individual B

1. Ayush the astronaut is on a mission to find "Who asked?". To do this, Ayush wants to orbit Earth at a constant height of 100 miles above the equator. However, he realizes there is a satellite in the way so he decides to increase his orbit height to 200 miles. How many additional miles will he travel with this new orbit? Round your answer to the nearest mile.
2. Arul the ant walks 1 mile on Monday. On each consecutive day he walks 1 more mile than the previous day. How many miles will he have walked by the end of Sunday?
3. Alice's empty swimming pool will hold 30,000 gallons of water. Two hoses that supply 5 gallons of water per minute each are used to fill the pool. How many **hours** will it take to fill Alice's pool?
4. A pouch had 20 candies. Alice took $\frac{2}{5}$ of the candy to eat. Bob took $\frac{2}{3}$ of the remaining candy after Alice took some. Charlie then took all the remaining candies from the pouch. How many candies did Charlie take?
5. Two concentric circles have radii of 3 and 4, respectively. The area of inside the larger circle but outside the smaller circle can be expressed as $k\pi$ for some value of k . What is k^2 ?
6. In an alternate universe, the acceptance rate for Gunn High School is 10% and the acceptance rate for Paly High School is 90%. If Sarah applies to both schools, what is the percentage probability that she will be accepted to **only Paly**?
7. Let $S = 1! + 3! + 5! + 7! + 9! + \dots + 99!$. What are the last two digits of S ?
8. Daniel and Stephen each choose a random integer from 1 to 22 inclusive. The probability that Daniel's number is strictly greater than Stephen's can be expressed in simplest terms as $\frac{m}{n}$. What is $n - m$?
9. A dartboard is created by drawing 2022 concentric circles with radii from 1 to 2022. The point values of the 2022 sections created by the circles are proportional to the area of the section, with the center section having point value 1. What is the point value of the outermost section?
10. Let $S(n)$ denote the number of factors of an integer n . Let $T(n)$ denote the number of odd factors of an integer. For how many positive integers $n < 1000$ is $S(n) = 7 \cdot T(n)$?