Bergen County Math League

Calculators Permitted

Good Luck to You

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Contest #3   **2023-2024   12 minutes**   **Questions 1 & 2**

3-1.   A rope maker cut a cord into three pieces. Let's name the pieces X, Y, and Z. X is three feet long. Y is three feet long plus one-fourth the length of Z. Z is as long as X and Y together. How long was the cord?

3-2. A and B have a and b cents, respectively. After A gives B as many cents as B has, and then B gives A twice as many cents as A then has, each has 18 cents. Find the ordered pair (a, b).

3-3. Very few people are aware of the growth pattern of Jack's beanstalk. On the first day, it increased its height by a factor of $\frac{1}{2}$, on the second day by a factor of $\frac{1}{3}$, on the third day by a factor of $\frac{1}{4}$, and, in general, on the nth day, it increased its height by a factor of $\frac{1}{n+1}$. How many days did it take to achieve its maximum height of 100 times its original height?

3-4. In a single-knockout, elimination-type tournament, each match pits two contestants against each other. The winner of a match continues to play further matches, while the loser is eliminated from further competition. The matches continue until an overall winner is determined. If 100 players originally enter the tournament, how many matches must be played for an overall winner to be determined? (Note that a bye round, in which a player does not actually compete, but is permitted to continue to play in future matches, does not count as a match.)

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Contest #3   2023-2024   12 minutes   Questions 5 & 6

3-5.   The primes p_1 and p_2 are "consecutive" primes (that is, $0 < p_1 < p_2$ and there is no positive prime p_3 such that $p_1 < p_3 < p_2$) whose product is 8633. Find the ordered pair (p_1, p_2).

3-6.   What is the absolute value of the difference between the area of the darker shaded region and the area of the lined region?