Non-trivial Problems

1. A camel can carry at most 1000 dates and eats one date at the end of each mile. Starting with 3000 dates, how many dates can the camel deliver to a market 1000 miles away?

2. An absent-minded professor walked slowly down a down-moving escalator and, as was his habit, counted the number of his steps. It took him 50 steps to reach the bottom of the escalator. Unable to resist the temptation to run up the down-moving escalator, he ran up- at a rate five times as fast as he went down, again counting his steps. It took him 125 steps to reach the top. If the escalator stopped, how many steps are on the escalator?

3. Find the sum of the coefficients of \((5x - 2)^{16}\).

4. A bug begins at one end of a rubber rope that is three inches long. The bug crawls toward the other end at one inch per second. At the end of each second the rope is instantly stretched another three inches. The stretching is uniform, like the stretching of a rubber band. How long does it take the bug to reach the end of the rope, or doesn’t he?
5. How many non-similar integer angled triangles are there?

6. You have a book with some consecutive pages missing. If the sum of the page numbers of the missing pages is 8656, what are the missing pages?

7. The figure above represents the sides of 4 dice. You are playing a game with a friend in which you each choose one die, you roll your die and the player with the higher number wins. Which die would you choose to give you the best chance of winning?

8. After getting three hits in four times at bat, a baseball player’s average changes from .233 to .252. After the game, how many times had the player been at bat during the season?
9. In the figure below, $Q$ is a point on the semicircle whose radius is 1. \( OQ = OR = x \) and $P$ is the point where \( \overrightarrow{RQ} \) intersects the $x$-axis. Find \( \lim_{x \to 0} OP \). (Warning: figure not drawn to scale)

10. In the figure below, $Q$ is a point on the semicircle whose radius is 1. Arc $OQ = OR = x$ and $P$ is the point where $\overrightarrow{RQ}$ intersects the $x$-axis. Find $\lim_{x \to 0} OP$. (Warning: figure not drawn to scale)