Let a quadrilateral be given with sides $a$, $b$, $c$ and $d$. Suppose the quadrilateral is cyclic, and that it also has a circle inscribed in it. Show that its area is given by $\sqrt{abcd}$.

Arjuna, exasperated in combat, shot a quiver of arrows to slay Carna. With half his arrows he parried those of his antagonist; with four times the square root of the quiverful he killed his horse; with six arrows he slew Salya (Carna's charioteer); with three he demolished the umbrella, standard and bow; and with one he cut off the head of the foe. How many were the arrows which Arjuna let fly?

A man left to his oldest son one gold coin and a seventh of what was left; then from the remainder, to his next son he left two gold coins and a seventh of what was left; then from the remainder, to his third son, he left three gold coins and a seventh of what was left. He continued this way, giving each son one gold coin more than the previous son and a seventh of what remained. It so happened that the last son received all that was left and all the sons shared equally. How many sons were there and how large was the man’s estate? Explain without guess and check.

The traveler and her companion stay in an inn in El Cairo named The Four Fours. The traveler states that this is very propitious since every digit can be made with exactly four fours, and the arithmetic operations. More explicitly, for each digit, 0 through 9, find (for each of the digits) the right combination of symbols among $+\ , -\ , \times$ and $\div$ to fill in the blanks (and parentheses) with repetitions allowed so that the we have equality: $4 __ 4 __ 4 __ 4$ digit. **Bonus:** Try to do it without repetitions of the symbols $+\ , -\ , \times$ and $\div$. 