The Thrifty Merchant

Shylock sells rare spices by the gram. He puts iron weights of various sizes (that are certified accurate) into one or both pans of his balance, then adds spice to the upper pan until the balance becomes level. A pan can hold up to 40g of spice. (Note: iron fills less space per gram than spice does.)

Certified weights are very expensive, so Shylock owns the minimum number of these that enables him to measure any whole number of grams from 1g to 40g in a single weighing.

(a) How many certified weights does Shylock own and what does each one weigh?

(b) Shylock buys a new balance whose pans can hold up to 360g of spice. How many extra certified weights will he need to measure any whole number of grams up to 360g in a single weighing?