4. [9 points] The $M$-scale $M$ of an object in outer space with diameter $D$, in thousands of miles, is given by

$$M = f(D) = 2 + 11.5 \log \left( \frac{D}{d_0} \right)$$

where $d_0$ is a positive constant.

a. [4 points] If the $M$-scale of a planet is 10, what is its diameter? Solve algebraically showing all your steps. Your answer may depend on the constant $d_0$.

Answer: ........................................

b. [5 points] Let $D_B$ and $D_M$ be the diameters of two planets, planet Blue and planet Maize, respectively. If the diameter of planet Blue is double the diameter of planet Maize, then what is the difference between $M$-scale values of planet Blue and planet Maize? Show all your computations step by step. *Simplify your answer as much as possible.*

Answer: ........................................