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(c) $\frac{b_n}{b_{n-1}} = \frac{2^{a_n}}{2^{a_{n-1}}} = \frac{2^{a_{n-1}+d}}{2^{a_{n-1}}} = 2^d$ $\quad b_n = b_1 q^{n-1} = 2^{a_1} \cdot 2^{d(n-1)}$

(a) $a_1 = 1$ $\quad b_5 + b_9 = 40$

$2^{a_1} \cdot 2^{4d} + 2^{a_1} \cdot 2^{8d} = 40$

$2 \cdot 2^{4d} + 2 \cdot 2^{8d} = 40 \;/:2 \rightarrow$ $\quad t^2 + t - 20 = 0$

$t = -5$

$t = 4 \rightarrow 2^{4d} = 4 = 2^2$

$4d = 2$

$\boxed{d = \frac{1}{2}}$

(e) $b_n = 2^1 \cdot 2^{\frac{1}{2}(n-1)} = 2^{\frac{1}{2}n + \frac{1}{2}}$

$2^{\frac{1}{2}n + \frac{1}{2}} > 1{,}000{,}000$

$\frac{1}{2}n + \frac{1}{2} > 19\ldots$

$\boxed{n \geq 39}$