

4.34 (a) This part of problem asks that we compute the number of grains per square inch for an ASTM grain size of 6 at a magnification of 100x. All we need do is solve for the parameter  $N$  in Equation 4.16, inasmuch as  $n = 6$ . Thus

$$\begin{aligned} N &= 2^{n-1} \\ &= 2^{6-1} = 32 \text{ grains/in.}^2 \end{aligned}$$

(b) Now it is necessary to compute the value of  $N$  for no magnification. In order to solve this problem it is necessary to use Equation 4.17:

$$N_M \left( \frac{M}{100} \right)^2 = 2^{n-1}$$

where  $N_M$  = the number of grains per square inch at magnification  $M$ , and  $n$  is the ASTM grain size number. Without any magnification,  $M$  in the above equation is 1, and therefore,

$$N_1 \left( \frac{1}{100} \right)^2 = 2^{6-1} = 32$$

And, solving for  $N_1$ ,  $N_1 = 320,000 \text{ grains/in.}^2$ .