7.23 (a) Perhaps the easiest way to solve for σ_0 and k_y in Equation 7.7 is to pick two values each of σ_y and $d^{-1/2}$ from Figure 7.15, and then solve two simultaneous equations, which may be set up. For example

$d^{-1/2}$ (mm) $^{-1/2}$	σ_y (MPa)
4	75
12	175

The two equations are thus

$$75 = \sigma_0 + 4k_y$$

$$175 = \sigma_0 + 12k_y$$

Solution of these equations yield the values of

$$k_y = 12.5 \text{ MPa (mm)}^{1/2} \quad \left[1810 \text{ psi (mm)}^{1/2}\right]$$

$$\sigma_0 = 25 \text{ MPa} \quad (3630 \text{ psi})$$

(b) When $d = 2.0 \times 10^{-3}$ mm, $d^{-1/2} = 22.4 \text{ mm}^{-1/2}$, and, using Equation 7.7,

$$\sigma_y = \sigma_0 + k_y d^{-1/2}$$

$$= (25 \text{ MPa}) + \left[12.5 \text{ MPa (mm)}^{1/2}\right]\left(22.4 \text{ mm}^{-1/2}\right) = 305 \text{ MPa} \quad (44,200 \text{ psi})$$