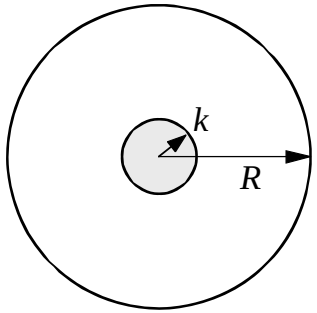
Remarks: See §3.2.4, example 8, pages 116 till119
See §4.9, pages 203 till 208

Answer:

$k = 50$ mm



Explanation:

$I = \frac{1}{4}\pi R^4$

$W = \frac{I}{R} = \frac{1}{4}\pi R^3$

$k = \frac{W_z}{A} = \frac{\frac{1}{4}\pi R^3}{\pi R^2} = \frac{1}{4}R = 50$ mm