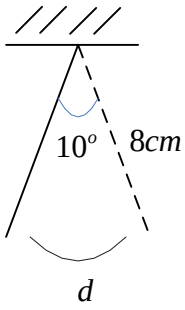
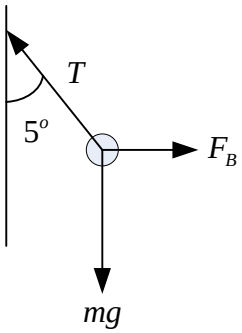
5-16





$0.3\frac{g}{cm} = 0.03\frac{kg}{m};\ I = ?$

$F_B = ILB = IL\frac{\mu_0 I}{2\pi d} = \frac{\mu_0 I^2 L}{2\pi d}$

$d = 2(8\sin 5^o)cm = 0.01394m$

$mg = (0.03\frac{kg}{m})(L)(9.8\frac{N}{kg}) = 0.294L$

$T\cos 5^o = mg$

$\Rightarrow T = \frac{mg}{\cos 5^o} = 0.295L$

$T\sin 5^o = F_B$

$(0.295\not{L})\sin 5^o = \frac{\mu_0 I^2 \not{L}}{2\pi(0.01394)}$

$I^2 = \frac{0.00253}{\mu_0} = \frac{0.00253}{4\pi\times 10^{-7}} = 1793$

$I = 42.3A$