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To separate two fluids, they are placed in a centrifuge whose arm is $4.5in$ long. The acceleration they undergo must be at least $25g$ to separate them in a timely manner. What is the maximum period of rotation T that will provide the needed acceleration?

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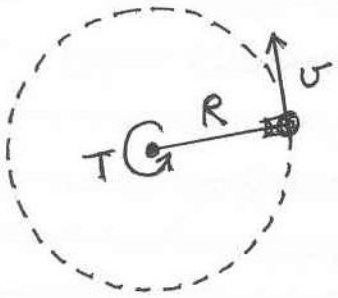
$T_{max} =$ 0.136 s

$R = 4.5\,in = 4.5\,in \times \left(\frac{.0254\,m}{1\,in}\right)$

$= .1143\,m$



$v = \frac{2\pi R}{T}$, $a = v^2/R$

$\Rightarrow a = \left(\frac{2\pi R}{T}\right)^2 / R = 4\pi^2 R / T^2$

$T = \sqrt{\frac{4\pi^2 R}{a}} = 2\pi\sqrt{\frac{R}{25g}}$

$= 0.135713\,s \approx .136\,s$