Estimate of Solid Angle Multiply Area

In[1]:=
```
{a, b, c, d, R, h, L, m} =
 {10, 10, 7.33, 5.26, 16.475 / 2, 6.45 + 2.825000 / 2, 36, 4.833333} (*unit: cm*)
```

Out[1]= {10, 10, 7.33, 5.26, 8.2375, 7.8625, 36, 4.83333}

In[2]:=
$$A = a\,b + (b + d) / 2 \sqrt{c^2 - \frac{(b - d)^2}{4}}$$

Out[2]= 152.924

In[3]:=
$$\gamma = \frac{\left((R + h)^2 - R^2\right)}{R + h}$$

Out[3]= 11.8853

In[4]:=
$$\beta = \frac{R \sqrt{(R + h)^2 - R^2}}{R + h}$$

Out[4]= 7.07763

In[5]:=
$$\text{NIntegrate}\left[\frac{\gamma}{\left((x - x_0)^2 + (y - y_0)^2 + \gamma^2\right)^{3/2}}, \{x, -L/2, L/2\}, \{y, -\beta/2, \beta/2\}, \{x_0, L/2 - m - a, L/2 - m\}, \{y_0, -b/2, b/2\}\right]$$

Out[5]= 83.0584

Error Propagation

In[6]:=
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Needs["NumericalCalculus`"]
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In[7]:=
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Clear[h]
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In[10]:=
$$\text{ND}\left[\text{NIntegrate}\left[\frac{\gamma}{\left((x - x_0)^2 + (y - y_0)^2 + \gamma^2\right)^{3/2}} /. \left\{\beta \to \frac{R \sqrt{(R + h)^2 - R^2}}{R + h}, \gamma \to \frac{\left((R + h)^2 - R^2\right)}{R + h}\right\}, \{x, -L/2, L/2\}, \{y, -\beta/2, \beta/2\}, \{x_0, L/2 - m - a, L/2 - m\}, \{y_0, -b/2, b/2\}\right], h, 6.45 + 2.825000/2\right]$$

Out[10]= 8.81774