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: ELECT/ELECT
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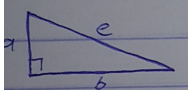
ypotenus of a right angled triangle is denoted as C and the other two sides are denoted as
t the possible error of measurement and b ± 1.5% find the maximum possible error in the
area of the triangle b) The length of the hypotenus



Area of triangle = $\frac{1}{2}at$

$A = \frac{1}{2}ab$, let $A = f(a,b)$ $\Rightarrow \frac{\partial A}{\partial a} = \frac{b}{2}$ $\Rightarrow \frac{\partial A}{\partial b} = \frac{a}{2}$

$\delta A = \frac{\partial A}{\partial a}\cdot\delta a + \frac{\partial A}{\partial b}\cdot\delta b = \frac{b}{2}\cdot\left[\frac{\pm 1.5a}{100}\right] + \frac{a}{2}\cdot\left[\frac{\pm 1.5b}{100}\right]$

$\Rightarrow \frac{ab}{2}\left[\frac{\pm 1.5}{100}\right] + \frac{ab}{2}\left[\frac{\pm 1.5}{100}\right] \Rightarrow \pm\frac{ab}{3}\left[\frac{1.5}{100}\right] + \left[\pm\frac{ab}{2}\right]\left[\frac{1.5}{100}\right]$

$\Rightarrow \pm\frac{ab}{2}\left[\frac{1.5}{100} + \frac{1.5}{100}\right] \Rightarrow \pm\frac{ab}{2}[0.015 + 0.015] \Rightarrow \pm 0.03\frac{ab}{2}$

Recall

$A = \frac{ab}{2} \Rightarrow \delta A = \pm 0.03A \Rightarrow \pm 3\%A$

b $C^2 = a^2 + b^2$

$\Rightarrow C = \sqrt{a^2+b^2} = (a^2+b^2)^{\frac{1}{2}}$

(let $C = f(a,b)$

$\frac{\partial c}{\partial a} = a(a^2+b^2)^{-\frac{1}{2}}$

$\frac{\partial c}{\partial a} = \frac{a}{\sqrt{a^2+b^2}}$

$\frac{\partial c}{\partial b} = b(a^2+b^2)^{-\frac{1}{2}}$

$\frac{\partial c}{\partial b} = \frac{b}{\sqrt{a^2+b^2}}$

$\delta c = \frac{\partial c}{\partial a}\cdot\delta a + \frac{\partial c}{\partial b}\cdot\delta b \Rightarrow \delta c = \frac{a}{\sqrt{a^2+b^2}}\left(\frac{\pm 1.5a}{100}\right) + \frac{b}{\sqrt{a^2+b^2}}\left(\frac{\pm 1.5b}{100}\right)$

$\Rightarrow \frac{1}{\sqrt{a^2+b^2}}\cdot\left[\frac{\pm 1.5}{100}a^2\right] + \frac{1}{\sqrt{a^2+b^2}}\left[\frac{\pm 1.5}{100}b^2\right]$

$\Rightarrow \pm\frac{1}{\sqrt{a^2+b^2}}\cdot\left[\frac{1.5a^2}{100} + \frac{1.5b^2}{100}\right] \Rightarrow \pm\frac{1}{\sqrt{a^2+b^2}}$

$[0.015a^2) + 0.015b^2)$

$\Rightarrow \pm\frac{1}{\sqrt{a^2+b^2}}\cdot 0.015(a^2+b^2)$

$= \pm\frac{1}{C}\cdot 0.015C^2$

$= \pm\frac{1}{C}\cdot 0.015C^2 = \pm 0.015C$

$\therefore \pm 1.5\%C$