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ENG 241
17/ENG04/015
Elect/Elect

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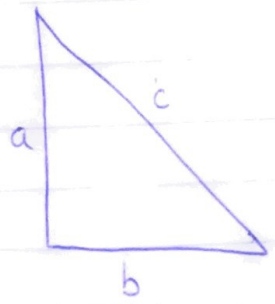

Area $A = \frac{1}{2}ab$

$\frac{\delta A}{da} = \frac{1}{2}b \qquad \frac{dA}{db} = \frac{1}{2}a$

$\delta a = \pm 0.015a \qquad \delta b = \pm 0.015b$

$\delta A = \frac{\delta A}{\delta a} \cdot \delta a + \frac{\delta A}{\delta b} \cdot \delta b$

$\Rightarrow \frac{b}{2}\left[\pm 0.015a\right] + \frac{a}{2}\left[\pm 0.015b\right]$

$\pm \frac{ab}{2}(0.015 + 0.015) = \pm \frac{ab}{2}(0.03)$

$+\frac{a \cdot b}{2}(0.03) \qquad$ but $\frac{a \cdot b}{2} = A$

$0.03A$

3% of the original area

b $c = \sqrt{a^2+b^2}$ ← hypotenuse

$c = (a^2+b^2)^{1/2}$

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

$a(a^2+b^2)^{-1/2}$

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

$b(a^2+b^2)^{-1/2}$

$\delta a = \pm 0.015a$

$\delta b = \pm 0.015b$

$\delta c = \frac{\delta c}{\delta a}\cdot\delta a + \frac{\delta c}{\delta b}\cdot\delta b$

$\Rightarrow (a(a^2+b^2)^{-1/2})(\pm 0.015a) + (b(a^2+b)^{-1/2})(\pm 0.015b)$

$\pm 0.015(a^2+b^2)^{-1/2}[(a\cdot a)+(b\cdot b)]$

$\pm 0.015 \quad [a^2+b^2]$

$\sqrt{a^2+b^2}$

by rationalising

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

$\pm 0.015\sqrt{a^2+b^2}$

but $c = \sqrt{a^2+b^2}$ = hypotenuse

$\Rightarrow \pm 0.015c$

which is $\pm 1.5\%$ change in hypotenuse