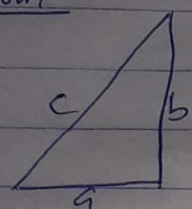
1) The hypotanuse of a right-angled triangle is denoted as c, and the other two sides are denoted as a and b. is ±1.5%, and the maximum possible error in calculating
a) The area of the triangle, and
b) The length of the hypothanues

Soln



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

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

(a) $A = \frac{1}{2} bh = \frac{1}{2} ab$

$\partial A / \partial a = \frac{1}{2} b \quad , \quad \partial A / \partial b = \frac{1}{2} a$

$$\partial A = \frac{\partial A}{\partial a} \partial a + \frac{\partial A}{\partial b} \partial b$$

$$\partial A = \frac{1}{2} b \cdot \frac{1.5}{100} a + \frac{1}{2} a \cdot \frac{1.5}{100} b$$

$$\partial A = \frac{1}{2} ab \left(\frac{1.5}{100} + \frac{1.5}{100} \right)$$

$$= \frac{1}{2} ab \left(\frac{3}{100} \right)$$

$$= A \left(\frac{3}{100} \right)$$

$$\partial A = \pm 3\% A.$$

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

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

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

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

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

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

$$\partial r/\partial b = b(a^2+b^2)^{-1/2}$$

$$\partial r = \frac{\partial c}{\partial a} \cdot \partial a + \frac{\partial c}{\partial b} \cdot \partial b$$

$$\partial r = a(a^2+b^2)^{-1/2} \cdot \frac{1.5}{100} a + b(a^2+b^2)^{-1/2} \cdot \frac{1.5}{100} \cdot b$$

$$\partial c = a^2 \frac{1.5}{100}(a^2+b^2)^{-1/2} + b^2(a^2+b^2)^{-1/2} \cdot \frac{15}{100}$$

$$\partial c = (a^2+b^2)^{-1/2}\left(a^2 \frac{1.5}{100} + b^2 \frac{1.5}{100}\right)$$

$$\partial c = (a^2+b^2)^{-1/2} \times \frac{1.5}{100} \times (a^2+b^2)$$

$$\partial c = \frac{1.5}{100} \times (a^2+b^2)^1 \times (a^2+b^2)^{-1/2}$$

$$\partial c = \frac{1.5}{100} \times (a^2+b^2)^{1-1/2}$$

$$\partial c = \frac{1.5}{100} \times (a^2+b^2)^{1/2}$$

$$\partial c = \pm 1.5\% c.$$