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Solution

1) $\text{Area} = \frac{1}{2}bh$

$A = \frac{1}{2}a \times b$

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

$\frac{\partial A}{\partial a} = \frac{b}{2} \qquad \frac{\partial A}{\partial b} = \frac{a}{2}$

$\delta a = \frac{\pm 1.5a}{100} \qquad \delta b = \frac{\pm 1.5b}{100}$

$\therefore \delta A = \frac{b}{2}\left(\frac{\pm 1.5a}{100}\right) + \frac{a}{2}\left(\frac{\pm 1.5b}{100}\right)$

$\delta A = \frac{ab}{2}\left(\frac{\pm 3}{100}\right)$

but $\frac{ab}{2} = A$

$\therefore \frac{\delta A}{} = \frac{\pm 3}{100}(A)$

$\therefore$ Change in area is $\pm 3\%$ when change in a and b is $\pm 1.5\%$

b) $h = \sqrt{a^2+b^2}$

$$\delta h = \frac{\partial h}{\partial a} \cdot \delta a + \frac{\partial h}{\partial b} \cdot \delta b$$

let $h = \sqrt{u}$

where $u = a^2+b^2$

$$\frac{\partial u}{\partial a} = 2a \qquad \frac{\partial u}{\partial b} = 2b$$

$$\frac{\partial h}{\partial u} = \frac{1}{2} u^{-\frac{1}{2}}$$

$$\therefore \frac{\partial h}{\partial a} = \frac{1}{2} u^{-\frac{1}{2}} \times 2a$$

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

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

$$\frac{\partial h}{\partial b} = \frac{1}{2} u^{-\frac{1}{2}} \times 2b$$

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

$$\delta a = \frac{\pm 1.5a}{100} \qquad \delta b = \frac{\pm 1.5b}{100}$$

$$\delta h = \frac{\partial h}{\partial a} \delta a + \frac{\partial h}{\partial b} \cdot \delta b$$

$$= \frac{a}{\sqrt{a^2+b^2}} \left(\frac{\pm 1.5a}{100}\right) + \frac{b}{\sqrt{a^2+b^2}} \left(\frac{\pm 1.5b}{100}\right)$$

$$= \frac{\pm 15a^2}{100\sqrt{a^2+b^2}} + \frac{\pm 15b^2}{100\sqrt{a^2+b^2}}$$

$$= \frac{\pm 3}{100}\left(\frac{a^2+b^2}{\sqrt{a^2+b^2}}\right)$$

$$= \frac{\pm 3\left(\sqrt{a^2+b^2}\right)}{100}$$

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

$$\therefore \delta h = \frac{\pm 3}{100}(h)$$

∴ Change in h is ±3% when there is a change of ±15% in the "a" and "b"