

Problem 75

- (a) A person's blood pressure is measured to be 120 ± 2 mm Hg. What is its percent uncertainty?
(b) Assuming the same percent uncertainty, what is the uncertainty in a blood pressure measurement of 80 mm Hg?
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Solution

Part (a)

Use the formula for percent uncertainty and plug in the numbers.

$$\text{Percent Uncertainty} = \frac{\delta A}{A} \times 100\% = \frac{2 \text{ mm Hg}}{120 \text{ mm Hg}} \times 100\% \approx 2\%$$

Part (b)

Start with the same formula.

$$\text{Percent Uncertainty} = \frac{\delta A}{A} \times 100\%$$

Assume that the percent uncertainty is the same as in part (a) and that the blood pressure is 80 mm Hg.

$$\frac{2 \text{ mm Hg}}{120 \text{ mm Hg}} \times 100\% = \frac{\delta A}{80 \text{ mm Hg}} \times 100\%$$

Solve for δA , the uncertainty.

$$\frac{2}{120} = \frac{\delta A}{80 \text{ mm Hg}}$$

Multiply both sides by 80 mm Hg.

$$\delta A = \frac{2(80)}{120} \text{ mm Hg} = \frac{4}{3} \text{ mm Hg} \approx 1 \text{ mm Hg}$$

Consequently,

$$\text{Minimum Blood Pressure: } 80 \text{ mm Hg} - \frac{4}{3} \text{ mm Hg} \approx 79 \text{ mm Hg}$$

$$\text{Maximum Blood Pressure: } 80 \text{ mm Hg} + \frac{4}{3} \text{ mm Hg} \approx 81 \text{ mm Hg}.$$