2018A F=ma Exam: Problem 25

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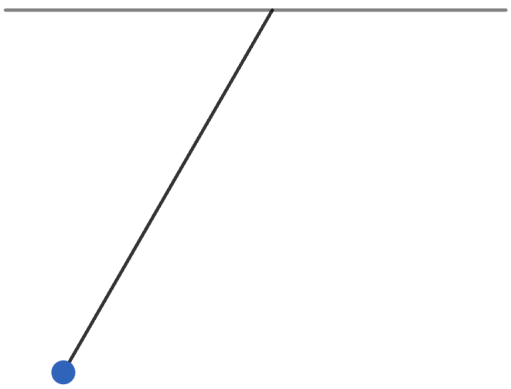

$\boldsymbol{T \pm \Delta T}$

We have

$$A : T_A \pm \Delta T_A$$
$$B : T_B \pm \Delta T_B$$

with $\Delta T_B = 2\Delta T_A$. Recall when two uncorrelated quantities are added, their uncertainties add in quadrature. Thus, the uncertainty in

Method 1 (A):

$$\Delta T_A$$

Method 2 ($\frac{A}{2} + \frac{B}{2}$):

$$\sqrt{\left(\frac{\Delta T_A}{2}\right)^2 + \left(\frac{\Delta T_B}{2}\right)^2} = \sqrt{\left(\frac{\Delta T_A}{2}\right)^2 + \left(\frac{2\Delta T_A}{2}\right)^2} = \frac{\sqrt{5}}{2}\Delta T_A$$

Method 3 ($\frac{4A}{5} + \frac{B}{5}$):

$$\sqrt{\left(\frac{4\Delta T_A}{5}\right)^2 + \left(\frac{\Delta T_B}{5}\right)^2} = \sqrt{\left(\frac{4\Delta T_A}{5}\right)^2 + \left(\frac{2\Delta T_A}{5}\right)^2} = \frac{2}{\sqrt{5}}\Delta T_A$$

so the answer is $\boxed{\text{B}}$.