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STUDENT VERSION
TIME OF DEATH

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Abstract: Students are asked to determine the time of death given both environmental temperature situations and two observations of body temperature under several different circumstances.

SCENARIO DESCRIPTION

It was hot for this London fall day – 70°F. Holmes arrived at Baker Street Annex to find the inspector hunched over the body. “It is important that we determine the exact time of death, sir, for in that way we may immediately determine the motive,” said the inspector. Not wishing to pursue the unpursuable *non sequitur*, Holmes took out his thermometer and after a few moments of discrete (!) investigation, announced, “I say! 94.6°F. (What, no metric system?) And it is presently noon.” With that he departed into the London fog, to return to the body at the same spot in one hour. After performing another investigation Holmes declared, “93.4°F at 1 o’clock.” And then silence…

“Inspector, the murder occurred at exactly 8:58.51204 o’clock a.m. Good day to you, sir!” Later in their chambers Watson asked, “I say! (The British always say by saying, unlike the Hsitirb’s who say by not saying.) How did you do that, Holmes?” “Elementary, my dear Watson. A simple application of a law of Newton,” said Holmes.

“Here, here Holmes, you don’t mean to say he fell out of a window?” snapped Watson, sensing the gravity of the issue.

Remaining cool Holmes began at the beginning, where he always began with Watson, “You see …”

Activities

1. Use a mathematical model to either refute or corroborate Sherlock Holmes’ conclusion. Be sure you state your assumptions and defend the use of your model.

2. Suppose the forensic folks confirm that the victim had viral evidence of fever with a body temperature of 103.2°F at the time of death. How does this change the evidence you offer in (1)?
3. What assumption are you making about the environmental temperature during the period from death until discovery? Drop this simplifying assumption and offer up a more realistic model. Then address (1) again in this context. How does this change the evidence you offer in (1)? How does Holmes predictive abilities look now? Hint: See Table 1.

Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Temp	60.8	59.	57.2	55.4	55.4	53.6	55.4	57.2	59.	62.6	66.2	68.	69.8	71.6	73.4	73.4	73.4	69.8	69.8	68.	66.2	62.6	59.	57.2	55.4

Table 1. London temperature in degrees Fahrenheit at hours past midnight ($t = 0$) on the day of the murder.