

IM 2 Enrichment 4.1

Newton's Law of Cooling states that upon death a body begins to cool at an exponential rate. This cooling can be modeled by the equation exponential equation...

The Case of the Cooling Corpse

The coroner's office is kept at a cool 17°C.

$$\begin{aligned}y &= \text{temp} \\x &= \text{time} \\a &= \text{starting temp} \\b &= \text{cooling rate} \quad y = a \cdot b^x + c \\c &= \text{temp of surrounding environment}\end{aligned}$$

Agent Smith kept pacing back and forth trying to keep warm as he waited for any new information about his latest case. For over three hours now, **Dr. Dedman** had been performing an autopsy on the **Slasher's** latest victim, and **Agent Smith** could see that it was starting to get to Dr. Dedman.

"Dr. Dedman, don't you need to take a break?" Agent Smith queried. "You've been examining this dead body for hours! Even if there were any clues, you probably wouldn't see them at this point."

"I don't know." Dr. Dedman replied. "I just have this feeling something is not quite right. Somehow the Slasher slipped up with this one and left a clue. We just have to find it."

"Well, I have to check in with HQ," Shulist stated. "Do you mind if I step out for a couple of hours?"

"No, that's fine," Dr. Dedman responded. "Maybe I'll have something by the time you return."

Sure, **Smith** thought to himself. Someone always wants to be the hero and solve everything himself. The doctor just does not realize how big this case really is. Shulist left, closing the door quietly. As he walked down the hall, Agent **Smith** saw old **Tony Rawlings** who was busy mopping the floor and then bumped into one of the doctors.

"Dedman still at it?"

"Sure is, Dr. Peralta. He's totally obsessed. He's certain there is a clue."

As usual, leaving the courthouse, **Smith** had to sign out.

“How’s it going down there, Agent Smith?” **Sergeant Santowski** asked.

Santowski spent most of his shifts monitoring the front door, forcing all visitors to sign in, while he recorded the time next to the signature.

“Dr. Dedman is convinced he will find something soon. We’ll see!” **Agent Smith** responded.

He noticed the time: Ten minutes before 2:00. Would he make it to HQ before the chief left?

“Well, good luck!” Santowski shouted as Smith headed out the door.

Agent Smith sighed deeply when he returned to the courthouse. **Santowski** gave his usual greeting: *“Would the secret guest please sign in?”* he would say. How annoying... except it was kind of helpful cause he knew by quickly scanning the list that **Dr. Dedman** had not left.

As he approached the coroner’s office, he had a strange feeling that something was wrong. When he opened the door, the sight inside stopped him in his tracks. Evidently, **Dr. Dedman** was now the *newest* victim of the **Slasher**. But wait! The other body, the one the doctor had been working on, was gone!

Then the sign in list came to mind... if he could determine the time of **Dr. Dedman’s** death, he might be able to scan the list to find the murderer! Quickly, he grabbed the thermometer to measure the Doctor’s body temperature. He turned around and hit the security buzzer. He knew the building would be sealed off instantly.

“My God!” Santowski cried as he rushed in. *“What a tragedy! I was talking with Dr. Dedman less than an hour ago.”*

He had stopped long enough to check the doctor’s body temperature: 27°C. That was 10°C below normal. They then began looking for the tape recorder. Maybe that would give them a clue... But no... the **Slasher** had been too careful for something like that. He must have taken it. Exactly an hour had passed during the search and Agent Smith noticed that the thermometer still remained in **Dr. Dedman’s** side. The thermometer clearly read 24°C. Agent Smith knew he could now determine the time of death precisely. When did **Dr. Dedman** die? Who is the murderer?

Check in Sheet

Coroner's Office- Please Sign IN		
Kyle Purpura	12:22	1:38
Micheal Walters	12:51	1:25
Fred Olson	1:00	2:45
Agent Smith	1:30	1:50
Dr. Peralta	1:43	2:10
Peter Thorpe	2:20	2:45
Maggie Aschenben	3:52	5:00
Mary Poppins	3:56	4:45
Marta Frey	4:08	4:23
Peter Williams	4:26	4:50
Alberto Sanchez	4:35	
Dr. Baker	4:48	4:57
Dr. Hyun	5:04	
Agent Shulist	5:05	
Security Officers	5:12	