

The murderer is...  
**SERGEANT FOUST**

**WHAT TIME DID DR. DEDMAN DIE?**

In order to approximate the time of Dr. Dedman's death, we have to create an equation modeling the rate at which his body is cooling.

$$y = ab^x + k$$

We can plug in our two points, (0, 27) and (1, 24), in order to solve for the a and b values of the equation. Our k value will be 17, as the asymptote of the graph, as determined earlier, is 17.

$$27 = ab^0 + 17 \quad 24 = ab^1 + 17$$

$$10 = ab^0 \quad 7 = ab^1$$

$$10 = a(1) \quad 7 = 10b^1$$

$$10 = a \quad 0.7 = b$$

$$y = 10(0.7)^x + 17$$

TheCaseSolutions.com

**WHAT TIME DID DR. DEDMAN DIE?**

This is further confirmed by using the exponential regression feature on a graphing calculator.

TheCaseSolutions.com

**WHAT TIME DID DR. DEDMAN DIE?**

After deriving an equation from our two points, we can use this equation to solve for the time when Dr. Dedman's body temperature was last at 37°C, normal body temperature.

$$y = 10(0.7)^x + 17$$

$$37 = 10(0.7)^x + 17$$

$$20 = 10(0.7)^x$$

$$2 = 0.7^x$$

$$\log_7 2 = -1.04$$

Thus, Dr. Dedman was killed 1.04 hours, or 1 hour and 56.4 minutes before 9:00pm.

Loading the time of Dr. Dedman's murder to be approximately...  
**8:09 PM**

**WHO KILLED DR. DEDMAN?**

TheCaseSolutions.com

After finding that Dr. Dedman died at approximately 2:58 p.m., we went to the check-in register to find out who checked out of the office around 2:00 p.m. Making sure everyone signed their signed outside of the office between 2:51 p.m. and 2:58 p.m., we approximately the time of the murder, points to Sergeant Foust's direction as the murderer.

**IS THERE AN ASYMPTOTE?**

TheCaseSolutions.com

**WHAT TYPE OF FUNCTION IS THIS?**

TheCaseSolutions.com

**DR. DEDMAN**

When Agent 008 checked the the doctor's body temperature, Dr. Dedman had a body temperature of 27°C. At exactly 1 hour later, Agent 008 checked the thermometer again and saw Dr. Dedman's body temperature had fallen to 24°C.

Thus, with these two pieces of information, we are able to create two points (in terms of hours):

(0, 27)  
(1, 24)

TheCaseSolutions.com

**WHAT WERE THE EVIDENCE?**

TheCaseSolutions.com

**FOUST'S ARREST**

However, we couldn't be sure. Why would Foust want to kill Dr. Dedman? Well, after looking back at Agent 008's thoughts, he noted the "happiest" aspect of law enforcement: the "happiest" of being a little bit crazy sitting behind a desk most of the day.

This further points to Sergeant Foust being the murderer. Then we thought back to when Agent 008 returned. Foust said that he spoke to Dr. Dedman one hour ago even though Dr. Dedman was killed about two hours ago. That further confirmed that Sergeant Foust was the infamous "Madman", as he made up false information just to cover himself up as the murderer.

The murderer is...  
**SERGEANT FOUST**

### WHAT TIME DID DR. DEDMAN DIE?

In order to approximate the time of Dr. Dedman's death, we have to create an equation modeling the rate at which his body is cooling.

$$y = ab^x + k$$

We can plug in our two points, (0, 27) and (1, 24), in order to solve for the a and b values of the equation. Our k value will be 17, as the asymptote of the graph, as determined earlier, is 17.

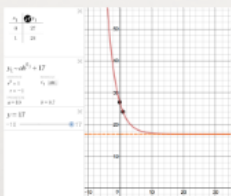
$$\begin{aligned} 27 &= ab^0 + 17 & 24 &= ab^1 + 17 \\ 10 &= ab^0 & 7 &= ab^1 \\ 10 &= a(1) & 7 &= 10b \\ 10 &= a & 0.7 &= b \end{aligned}$$

$$y = 10(0.7)^x + 17$$

TheCaseSolutions.com

### WHAT TIME DID DR. DEDMAN DIE?

This is further confirmed by using the exponential regression feature on a graphing calculator.



TheCaseSolutions.com

### WHAT TIME DID DR. DEDMAN DIE?

After deriving an equation from our two points, we can use this equation to solve for the time when Dr. Dedman's body temperature was last at 37°C, normal body temperature.

$$y = 10(0.7)^x + 17$$

$$37 = 10(0.7)^x + 17$$

$$20 = 10(0.7)^x$$

$$2 = 0.7^x$$

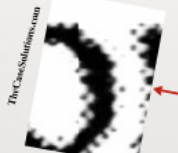
$$\log_7 2 = -1.04$$

Thus, Dr. Dedman was killed 1.04 hours, or 1 hour and 56.4 minutes before 9:00pm.

Loading the time of Dr. Dedman's murder to be approximately...

**8:09 PM**

### WHO KILLED DR. DEDMAN?



After finding that Dr. Dedman died at approximately 2:58 p.m., we went to the check-in register to find out who checked out of the office around 2:00 p.m. Making sure everyone signed their signed outside of the office between 2:51 p.m. and 2:58 p.m., we approximately the time of the murder, points to Sergeant Foust's direction as the murderer.

### DR. DEDMAN

When Agent 008 checked the doctor's body temperature, Dr. Dedman had a body temperature of 27°C. At exactly 1 hour later, Agent 008 checked the thermometer again and saw Dr. Dedman's body temperature had fallen to 24°C.

Thus, with these two pieces of information, we are able to create two points (in terms of hours):

(0, 27)  
(1, 24)

TheCaseSolutions.com

### WHAT TYPE OF POISON TO DRUG?

We can determine that this substance will be an exponential decay function, as Dr. Dedman's body temperature is decreasing over time, and we are given two data points to use to determine the equation.



TheCaseSolutions.com

### IS THERE AN ASYMPTOTE?

We can see that the function has an asymptote at y = 17, as the body temperature is 17°C, and Dr. Dedman's body temperature cannot go any lower than that temperature.



TheCaseSolutions.com

### WHAT WERE THE EVIDENCES?

There were several pieces of evidence that pointed to Sergeant Foust as the murderer. First, he was the only person who checked out of the office around 2:00 p.m. Second, he was the only person who signed outside of the office between 2:51 p.m. and 2:58 p.m. Third, he was the only person who was in the office at the time of the murder.



### FOUST'S ARREST

However, we couldn't be sure. Why would Foust want to kill Dr. Dedman? Well, after looking back at Agent 008's thoughts, he noted the "strange" aspect of law enforcement: the "thought" of being a sergeant. Foust's job, he would get a little bit crazy, sitting behind a desk most of the day.

This further points to Sergeant Foust being the murderer. Then we thought back to when Agent 008 returned. Foust said that he spoke to Dr. Dedman one hour ago even though Dr. Dedman was killed about two hours ago. That further confirmed that Sergeant Foust was the obvious "murderer", as he made up false information just to cover himself up as the murderer.

# DR. DEDMAN

When Agent 008 checked the the doctor's body temperature, Dr. Dedman had a body temperature of  $27^{\circ}\text{C}$ . At exactly 1 hour later, Agent 008 checked the thermometer again and saw Dr. Dedman's body temperature had fallen to  $24^{\circ}\text{C}$ .

Thus, with these two pieces of information, we are able to create two points (in terms of hours):

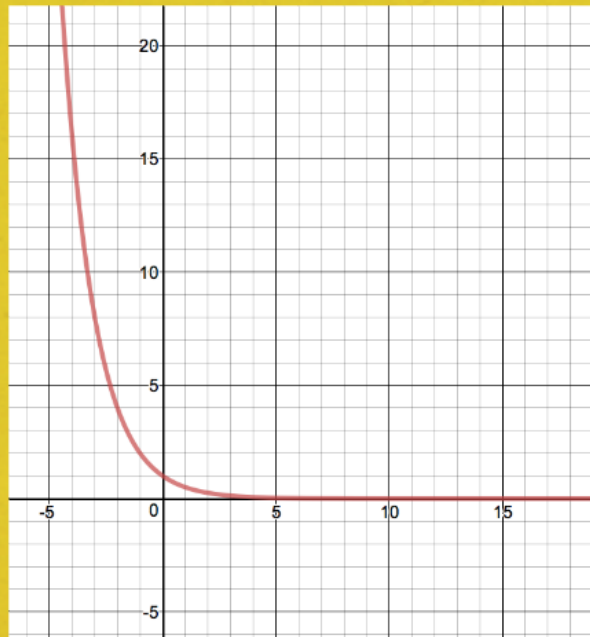
	$(0, 27)$
<b>TheCaseSolutions.com</b>	$(1, 24)$



# WHAT TYPE OF FUNCTION IS THIS?

We can determine that this function will be an exponential decay function, as Newton's Law of Cooling is in exponential decay form, and we are trying to determine a function for Dr. Dedman's cooling body.

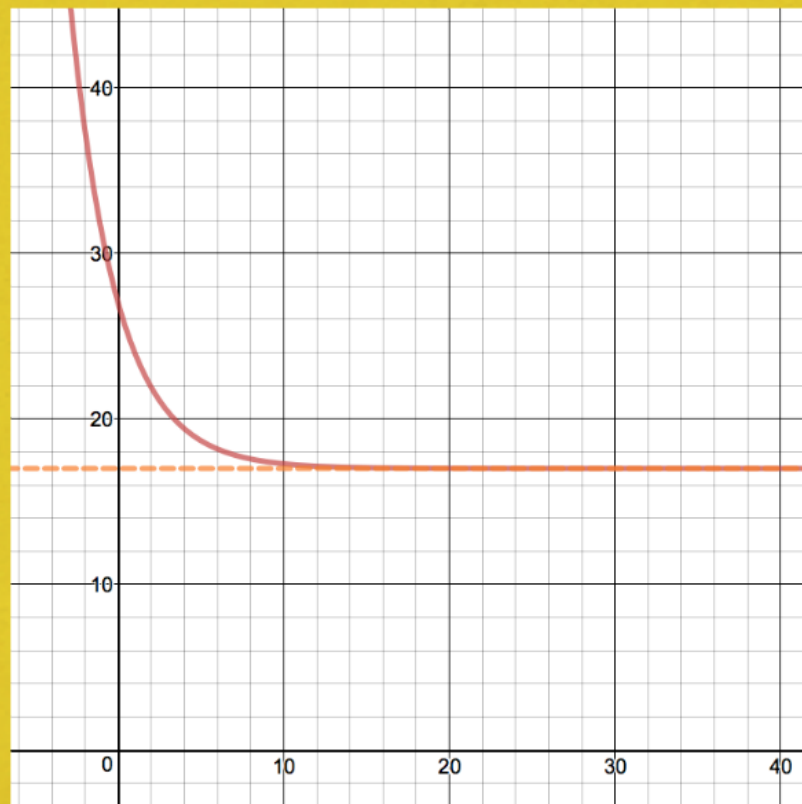
**TheCaseSolutions.com**



# IS THERE AN ASYMPTOTE?

**TheCaseSolutions.com**

We can also determine that this function will have an asymptote at  $y=17$ , as the room temperature is  $17^{\circ}\text{C}$ , and Dr. Dedman's body temperature cannot go any lower than room temperature.



## WHAT TIME DID DR. DEADMAN DIE?

In order to approximate the time of Dr. Dedman's death, we have to create an equation modeling the rate at which his body is cooling.

$$y = ab^x + k$$

We can plug in our two points, (0, 27) and (1, 24), in order to solve for the  $a$  and  $b$  values of the equation. Our  $k$  value will be 17, as the asymptote of the graph, as determined earlier, is 17.

$$\begin{aligned} 27 &= ab^0 + 17 \\ 10 &= ab^0 \\ 10 &= a(1) \\ 10 &= a \end{aligned}$$

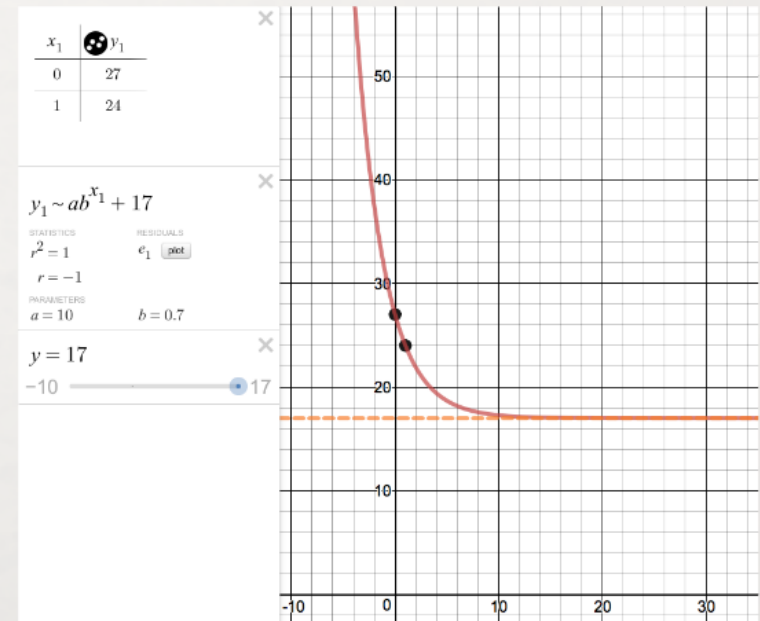
$$\begin{aligned} 24 &= ab^1 + 17 \\ 7 &= ab^1 \\ 7 &= 10b^1 \\ 0.7 &= b \end{aligned}$$

$$y = 10(0.7)^x + 17$$

TheCaseSolutions.com

## WHAT TIME DID DR. DEADMAN DIE?

This is further confirmed by using the exponential regression feature on a graphing calculator.



TheCaseSolutions.com

## WHAT TIME DID DR. DEADMAN DIE?

In order to approximate the time of Dr. Dedman's death, we have to create an equation modeling the rate at which his body is cooling.

$$y = ab^x + k$$

We can plug in our two points, (0, 27) and (1, 24), in order to solve for the  $a$  and  $b$  values of the equation. Our  $k$  value will be 17, as the asymptote of the graph, as determined earlier, is 17.

$$27 = ab^0 + 17$$

$$10 = ab^0$$

$$10 = a(1)$$

$$10 = a$$

$$24 = ab^1 + 17$$

$$7 = ab^1$$

$$7 = 10b^1$$

$$0.7 = b$$

$$y = 10(0.7)^x + 17$$

**TheCaseSolutions.com**

$x_1$	$y_1$
0	27
1	24

$$y_1 \sim ab^{x_1} + 17$$

STATISTICS

$$r^2 = 1$$

$$r = -1$$

PARAMETERS

$$a = 10$$

$$b = 0.7$$

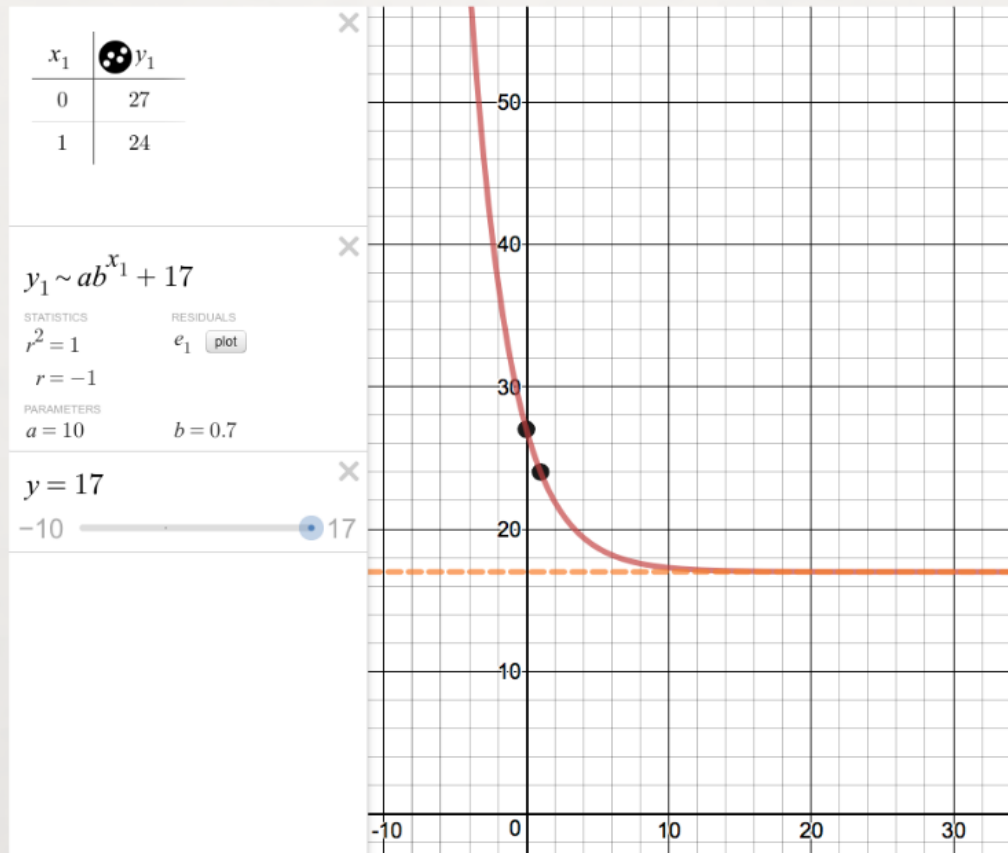
$$y = 17$$

$$-10$$

The

# WHAT TIME DID DR. DEADMAN DIE?

This is further confirmed by using the exponential regression feature on a graphing calculator.





## WHAT TIME DID DR. DEADMAN DIE?

After deriving an equation from our two points, we can use this equation to solve for the time when Dr. Dedman's body temperature was last at 37°C, normal body temperature.

$$y = 10(0.7)^x + 17$$

$$37 = 10(0.7)^x + 17$$

$$20 = 10(0.7)^x$$

$$2 = 0.7^x$$

$$\log_{0.7} 2 = -1.94$$

Thus, Dr. Dedman was killed 1.94 hours, or 1 hour and 56.4 minutes before 5:05pm.

Leading the time of Dr. Deadman's murder to be approximately...

**3:09 PM**

## WHO KILLED DR. DEDMAN?

*TheCaseSolutions.com*

Coroner's Office - Please Sign In		
Name	Time In	Time Out
Li. Borman	12:08	2:47
Alice Bingham	12:22	1:38
Chuck Miranda	12:30	2:45
Harold Ford	12:51	1:25
Ajax Boraxo	1:00	2:30
D.C. Quincy	1:10	2:45
Agent 008	1:30	1:50
Ronda Ripley	1:43	2:10
Jeff Dangerfield	2:08	2:48
Stacy Simmons	2:14	2:51
Brock Ortiz	2:20	2:43
Pierce Bronson	3:48	4:18
Max Sharp	3:52	5:00
Maren Ezaki	3:57	4:45
Caroline Cress	4:08	4:23
Milly Osborne	4:17	4:39
D.C. Quincy	4:26	4:50
Vinny Gumbatz	4:35	4:57
Cory Delphene	4:48	
Max Crutchfield	5:04	
Agent 008	5:05	
Security	5:12	

After finding that Dr. Dedman died at approximately 3:09 p.m., we went to the check-in register to find our murderer. After looking at the sign-in sheet, there seemed to be no one that had signed into or out of the office around 3:09 p.m. Making sure everyone signed into and out of the office between 2:51 p.m. and 3:48 p.m., have signed into/out of the time of the murder, points in Sergeant Foust's direction as the murderer.