 Matching activity for Newton’s law of cooling

Activity

Match the initial condition, an additional data point, the exponential equation and dN/dt.

Note: k values have been rounded to 4 decimal places.

Initial condition

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| A hot item at 40 degrees Celsius in placed in a room which has a constant temperature of 15 degrees Celsius |
| A hot item at 40 degrees Celsius in placed in a room which has a constant temperature of 15 degrees Celsius |
| A hot item at 40 degrees Celsius in placed in a room which has a constant temperature of 10 degrees Celsius |
| A hot item at 40 degrees Celsius in placed in a room which has a constant temperature of 10 degrees Celsius |
| A hot item at 80 degrees Celsius in placed in a room which has a constant temperature of -5 degrees Celsius |
| A hot item at 80 degrees Celsius in placed in a room which has a constant temperature of -5 degrees Celsius |
| A hot item at 55 degrees Celsius in placed in a room which has a constant temperature of 5 degrees Celsius |
| A hot item at 55 degrees Celsius in placed in a room which has a constant temperature of 5 degrees Celsius |

Additional data point

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| After 12 minutes the temperature of the item has dropped to 35 degrees Celsius |
| After 6 minutes the temperature of the item has dropped to 22 degrees Celsius |
| After 6 minutes the temperature of the item has dropped to 34 degrees Celsius |
| After 10 minutes the temperature of the item has dropped to 35 degrees Celsius |
| After 8 minutes the temperature of the item has dropped to 25 degrees Celsius |
| After 8 minutes the temperature of the item has dropped to 67 degrees Celsius |
| After 10 minutes the temperature of the item has dropped to 20 degrees Celsius |
| After 12 minutes the temperature of the item has dropped to 30 degrees Celsius |

Exponential equation

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| N = 10+30e-0.0182t | N = 15+25e-0.1609t | N = 10+30e-0.0372t | N = -5+85e-0.0207t |
| N = 5+50e-0.1145t | N = 15+25e-0.0186t | N = -5+85e-0.1911t | N = 5+50e-0.0578t |

dN/dt

|  |  |  |  |
| --- | --- | --- | --- |
| dN/dt = -0.0186(N - 15) | dN/dt = -0.1609(N - 15) | dN/dt = -0.0372(N - 10) | dN/dt = -0.0207(N + 5) |
| dN/dt = -0.0182(N - 10) | dN/dt = -0.0578(N - 5) | dN/dt = -0.1145(N - 5) | dN/dt = -0.1911(N + 5) |