Circuit: Separable Differential Equations Name_____

Directions: Beginning in the first cell marked #1, find the requested information. To advance in the circuit, hunt for your answer and mark that cell #2. Continue working in this manner until you complete the circuit. If you do not have enough space in the cell, you may work on a separate sheet of paper and attach. You may not need to separate in every problem.

Ans: $y = 19e^{t^2}$ _#1_ Solve for y. $\frac{dy}{dt} = 2t$ $\int dy = \int 2t\, dt$ $y = t^2 + c$ Find a function that might be y.	Ans: $y = 5e^{2t}$ _7_ Solve for y. $\frac{dy}{dt} = 2$ $\int dy = \int 2\, dt$ $y = 2t + c$ Find a function that might be y.
Ans: $y = \frac{1}{2}t + 7$ _3_ Solve for y. $\frac{dy}{dt} = \frac{1}{2}t$ $\int dy = \int \frac{1}{2}t\, dt$ $y = \frac{1}{4}t^2 + c$ Find a function that might be y.	Ans: $y = -\sqrt{3t^2 + 2t + 1}$ _10_ Solve for y. $\frac{dy}{dt} = \frac{3t^2y + 3ty}{y} = \frac{y(3t^2 + 3t)}{y} = 3t^2 + 3t$ $\int dy = \int (3t^2 + 3t)dt$ $y = t^3 + \frac{3}{2}t^2 + c$ Find a function that might be y.
Ans: $y = 2t - 5$ _8_ Solve for y. $\frac{dy}{dt} = \frac{3t}{y}$ $\int y\, dy = \int 3t\, dt$ $\frac{1}{2}y^2 = \frac{3}{2}t^2 + c_1$ $y^2 = 3t^2 + c$ $y = \pm\sqrt{3t^2 + c}$ Find a function that might be y.	Ans: $y = \frac{1}{3}t^3 - 4$ _5_ Solve for y. Sometimes, you'll need to factor to help separate. $\frac{dy}{dt} = 2ty - 8t = 2t(y - 4)$ $\int \frac{dy}{y - 4} = \int 2t\, dt$ $\ln\lvert y - 4\rvert = t^2 + c$ $y - 4 = e^{t^2 + c}$ $y = e^c e^{t^2} + 4$ Find a function that might be y.

Circuit: Separable Differential Equations

Ans: $y = \frac{1}{4}t^2 - 2$

__4__ Solve for y.

$\frac{dy}{dt} = t^2$

$\int dy = \int t^2\, dt$

$y = \frac{1}{3}t^3 + c$

Find a function that might be y.

Ans: $y = t^3 + \frac{3}{2}t^2 + \frac{1}{2}$

__11__ Solve for y.

$\frac{dy}{dt} = -\frac{3t}{y}$

$\int y\, dy = \int -3t\, dt$

$\frac{1}{2}y^2 = -\frac{3}{2}t^2 + c_1$

$y^2 = -3t^2 + c$

$y = \pm\sqrt{-3t^2 + c}$

Find a function that might be y.

Ans: $y = -\sqrt{9 - 3t^2}$

__12__ Solve for y.

$\frac{dy}{dt} = 2ty$

$\int \frac{dy}{y} = \int 2t\, dt$

$\ln|y| = t^2 + c$

$y = e^{t^2+c}$

$y = e^c e^{t^2}$

Find a function that might be y.

Ans: $y = 3e^{t^2} + 4$

__6__ Solve for y.

$\frac{dy}{dt} = 2y$

$\int \frac{dy}{y} = \int 2\, dt$

$\ln|y| = 2t + c$

$y = e^{2t+c}$

$y = e^c e^{2t}$

Find a function that might be y.

Ans: $y = t^2 + 8$

__2__ Solve for y.

$\frac{dy}{dt} = \frac{1}{2}$

$\int dy = \int \frac{1}{2} dt$

$y = \frac{1}{2}t + c$

Find a function that might be y.

Ans: $y = -\sqrt{3t^2 + 9}$

__9__ Solve for y.

$\frac{dy}{dt} = \frac{3t + 1}{y}$

$\int y\, dy = \int (3t + 1) dt$

$\frac{1}{2}y^2 = \frac{3}{2}t^2 + t + c_1$

$y^2 = 3t^2 + 2t + c$

$y = \pm\sqrt{3t^2 + 2t + c}$

Find a function that might be y.