Provide a clear and organized presentation. Show absolutely all of your work and completely simplify your answer. Give exact values only.

A water collection system has three water supplies: the first supplies 0.1 gal/min, the second supplies 0.3 gal/min, the third supplies 0.6 gal/min. The first has a concentration of the pollutant *algebranium* at 5 g/gal, the second has a concentration of this pollutant at 2 g/gal, and the third is clean. This water collection system irrigates a field by dispensing 1.5 gal/min. and is well mixed. Initially, the tank is full and has a capacity of 100 gallons and contains 310 g of this pollutant. Write a differential equation that mathematically models the rate at   which the amount of this pollutant is in this water system and solve this differential equation. How much pollutant is in this water collection system when it is half full?