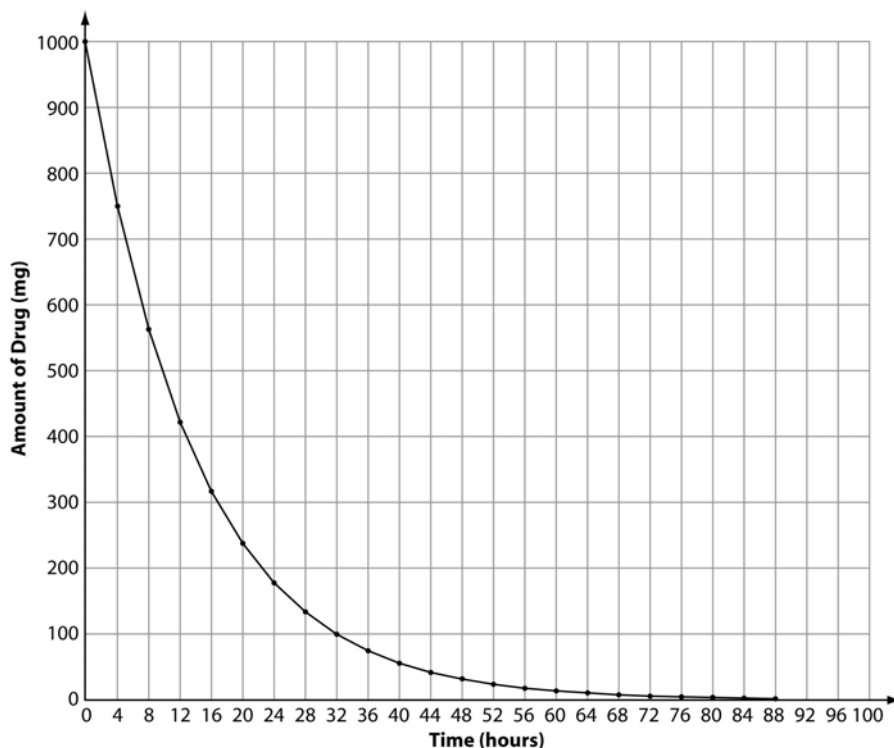


## Drug Filtering – Answer Key

1. Assume that your kidneys can filter out 25% of a drug in your blood every 4 hours. You take one 1000-milligram dose of the drug. Fill in the table showing the amount of the drug in your blood as a function of time. The first two data points are already completed. Round each value to the nearest milligram.

TIME SINCE TAKING THE DRUG (HR)	AMOUNT OF DRUG IN YOUR BLOOD (MG)
0	1000
4	750
8	[563]
12	[422]
16	[317]
20	[238]
24	[178]
28	[134]
32	[100]
36	[75]
40	[56]
44	[42]
48	[32]
52	[24]
56	[18]
60	[14]
64	[11]
68	[8]

2. Graph the data below.



3. How many milligrams of the drug are in your blood after 2 days?

Since 2 days is equal to 48 hours, check the table or the graph to find the answer. Both representations show that 32 mg remain after 48 hours.

4. Will you ever completely remove the drug from your system? Explain your reasoning.

No. Your kidneys can only remove 25% every 4 hours, so after each four-hour period, 75% of the previous amount remains. Though the numbers get very small, they will never reach 0. Said another way, 75% of a number greater than 0 will always be greater than 0.

5. A blood test is able to detect the presence of the drug if there is at least 0.1 mg in your blood. How many days will it take before the test will come back negative? Explain your answer.

128 hours, or 5 days, 8 hours.  
 The amount remaining after each four-hour period is 75% of the previous amount. After  $n$  four-hour periods, there are  $1000 \times 0.75^n$  milligrams of drug remaining. The first time the amount is less than 0.1 is when  $n = 42$ , which corresponds to  $4 \times 42 = 128$  hours.