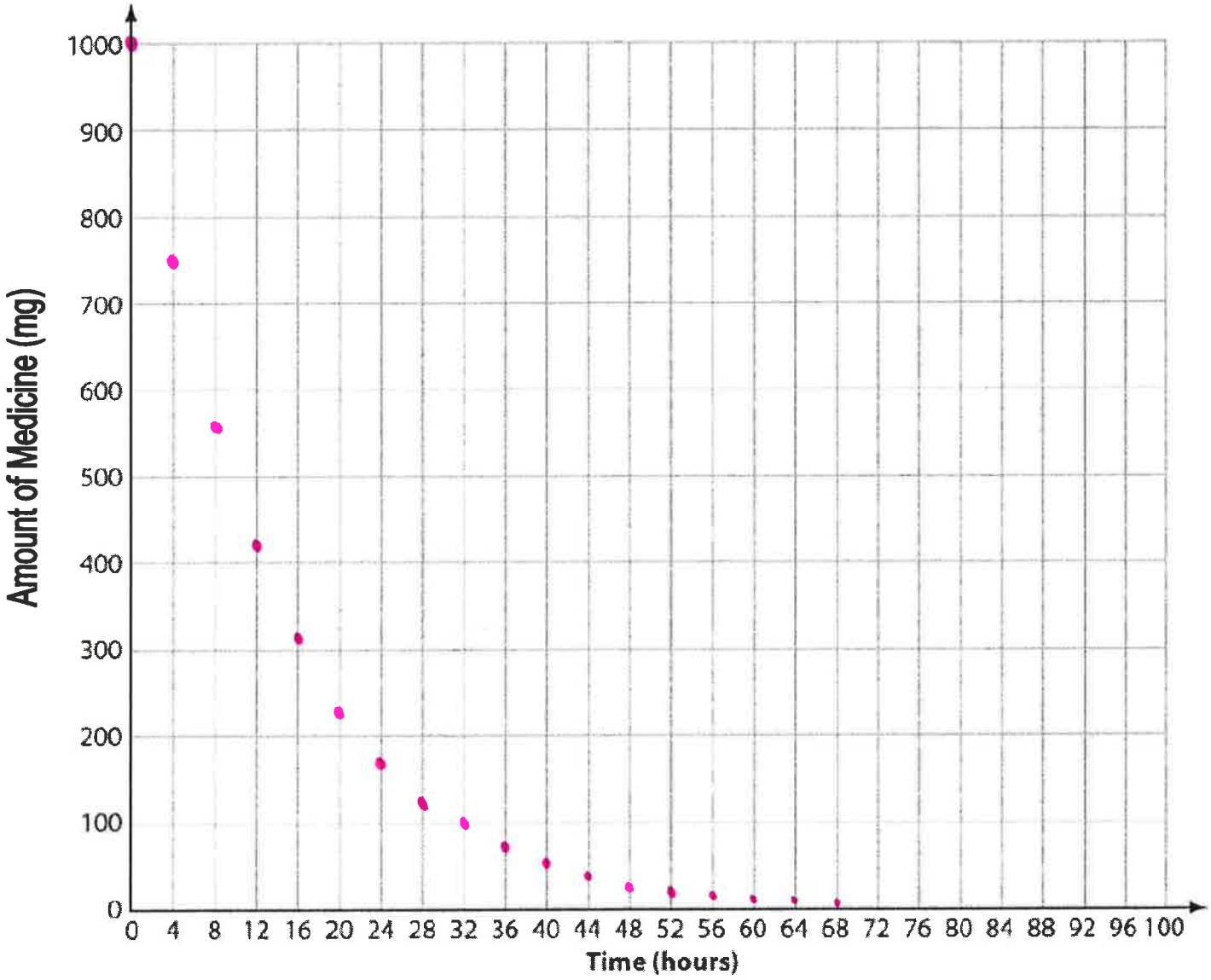
Medication

Assume that your kidneys can filter out 25% of a drug in your blood every 4 hours. You take one 1000-mg 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 Medicine (hours)	Amount of Medicine in your Blood (mg)
0	1000
4	750
8	563
12	422
16	316
20	237
24	178
28	134
32	100
36	75
40	56
44	42
48	32
52	24
56	18
60	13
64	10
68	8

2. Graph the data below.



3. What is the common ratio?

0.75

4. Use your common ratio from #3 to write a NOW-NEXT function for the situation.

NEXT = NOW (0.75)

5. How many milligrams of the drug are in your blood after 2 days? = 48 hours

32 mg

6. Will you ever completely remove the medicine from your system?

not completely - it will get close to zero mg, but will never truly reach zero.

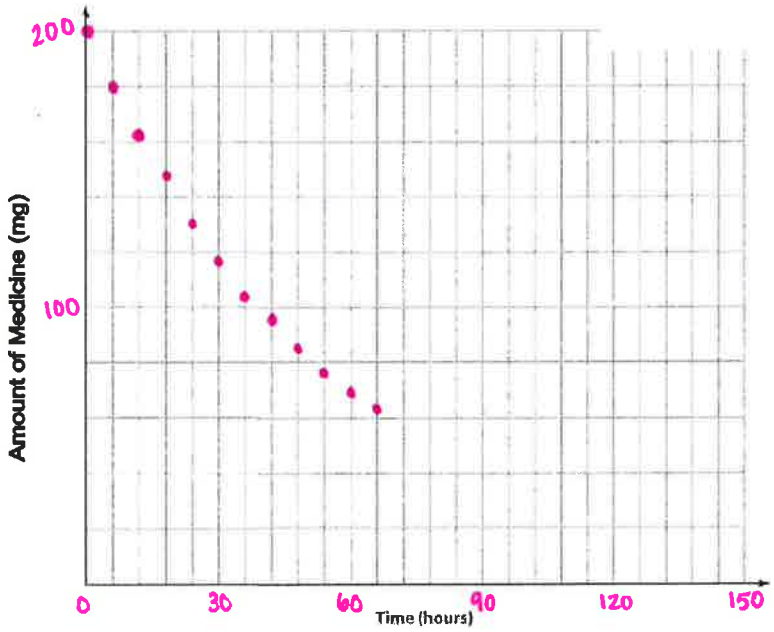
7. A blood test is able to detect the presence of this medicine if there is at least 0.1 mg in your blood. How many days will it take before the test will come back negative? Explain your answer.

about 129 hours or 5.375 days. You can keep using the NOW-NEXT function, or write an explicit function & check the table

Other Medication Filtering Problems

1. Assume that your kidneys can filter out 10% of a medication in your blood every 6 hours. You take one 200-milligram dose of the medicine. Fill in the table showing the amount of the medicine in your blood as a function of time. The first two data points are already completed. Round each value to the nearest milligram. Graph the data on the coordinate plane below. Make sure to label your axes.

TIME SINCE TAKING THE MEDICINE (HR)	AMOUNT OF Medicine IN YOUR BLOOD (MG)
0	200
6	180
12	162
18	146
24	131
30	118
36	106
42	96
48	86
54	77
60	70
66	63



A. What is the common ratio?

0.90

B. Use the common ratio you calculated in Part A to write a NOW-NEXT equation.

NEXT = NOW(0.90)

C. How many milligrams of the medicine are in your blood after 2 days? = 48 hours

86 mg

D. A blood test is able to detect the presence of the medicine 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.

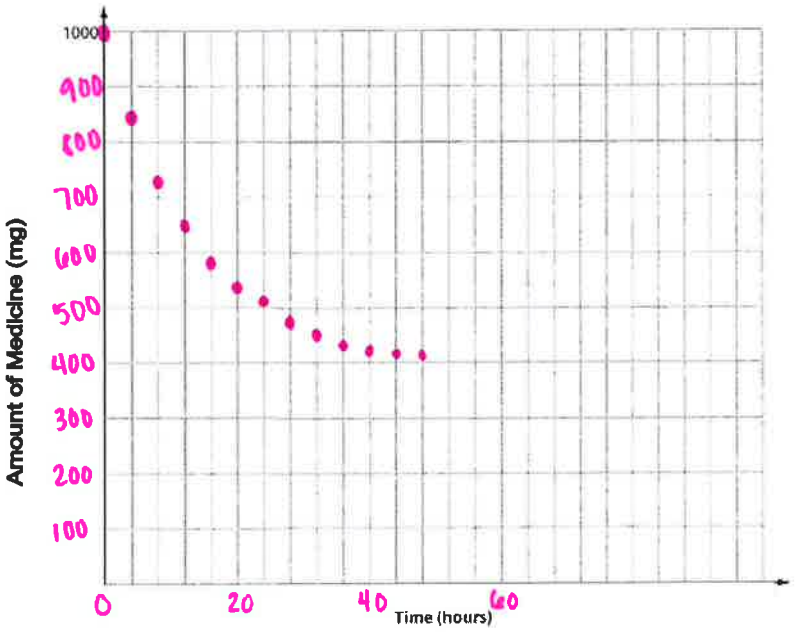
433 hours or 18.04 days

Continue with the NOW-NEXT function, or write an explicit function $y = 200(.9)^{(x/6)}$ and look at the table.

2. Calculate the amount of medicine remaining in the blood if you take an initial dose of 1000 mg, but instead of taking just one dose of the drug, now take a new dose of 100 mg every four hours. Assume the kidneys can still filter out 25% of the drug in your blood every four hours. Make a complete a table and graph of this situation (be sure to label the axes). Use your data table and graph to justify their responses.

TIME SINCE TAKING THE MEDICINE (HR)	AMOUNT OF Medicine IN YOUR BLOOD (MG)
0	1000
4	850
8	738
12	653
16	590
20	542
24	507
28	480
32	460
36	445
40	434
44	425
48	419

Graph the data below.



A. How do the results differ from the situation explored during the main lesson?

It still appears exponential, but adding the 100 each time keeps it from decreasing as much.

B. As you noted in part A, this problem is a little different, but you can write a NOW-NEXT equation for it. Give it a try. How does your equation compare with your classmates'? Do you get the same results when you use each of the equation?

NEXT = NOW(0.75) + 100

(students may write NEXT = (NOW + 100)(.75) & get different results

C. How many milligrams of the medication are in your blood after 2 days? = 48 hours

419 mg

D. A blood test is able to detect the presence of the medicine 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.

You will never reach 0.1 mg. your body will always have more than 400 mg of the drug in it.