

Modeling Medication Absorption

Ms. Pykosh has been stressed lately and the doctor prescribed a medication. She is to take a dose of 300 mg every day at 6:00 a.m. We will assume that the effect is immediate. The body processes the medication such that every 24 hours, 50% of the medication is eliminated by the body, meaning that 50% of the medication remains.

1) Determine the amount of medication in the body for the first 4 days immediately following the injection.

Complete the table.

DAY	AMOUNT OF MEDICATION (in mg)
1	300
2	450
3	525
4	562.5
5	581.25

$$.5(300) + 300$$

$$.5(450) + 300$$

$$.5(525) + 300$$

2) Create a mathematical model that will allow you to determine the amount of medicine in the body. Make sure that your model accurately reproduces the results from the table above.

$$A(n) = .5A_{n-1} + 300$$

3) This medication is considered "safe" if its level in the body never exceeds 600 mg. Use your model to determine whether this medication is safe.

Yes, it does not exceed
600 mg

4) This medication becomes "effective" when its level never falls below 280 mg. On which day is this medication first considered effective. (Remember, the level is at its lowest immediately before the daily ingestion)

1 -	Before 0	After 300
2 -	150	450
3 -	225	525
4 -	262.5	562.5
5 -	<u>281.25</u>	

After 4th injection

5) After many days of using the medicine, the amount of medication in the patient's body just after the dosage gets closer and closer to 600 mg.

a) What is the amount of medication in the patient immediately before each day's injection?

$\approx 300 \text{ mg}$

b) Assume that a patient misses a daily dosage. How long will it take for the medication to become effective (remember, this means never falling below 280 mg)?

Day	Before	After
Before missing	300	600
Day missed	300	300
+ 1 Day	150	450
+ 2 Days	225	525
+ 3 Days	262.5	562.5
+ 4 Days	<u>281.25</u>	

It takes 4 Days
(after 3rd injection)