

Sections 1.5, 1.6, 1.7
Exponentials and Logarithms

1. An air freshener starts with 30 grams and evaporates. In each of the following cases, write a formula for the quantity, Q (grams), of air-freshener remaining t days after the start and sketch a graph of the function. The decrease is:
 - (a) 2 grams a day
 - (b) 12% a day

2. A fishery stocks a pond with 1000 young trout. The number of trout t years later is given by $P(t) = 1000e^{-0.5t}$.
 - (a) How many trout are left after six months? after 1 year?

 - (b) Find $P(3)$ and interpret it in terms of trout.

 - (c) At what time are there 100 trout left?

 - (d) Graph the number of trout against time, and describe how the population is changing.

3. The half-life of nicotine in the blood is 2 hours. A person absorbs 0.4 mg of nicotine by smoking a cigarette.

(a) Fill in the following table with the amount of nicotine remaining in the blood after t hours.

t (hours)	0	2	4	6	8	10
Nicotine (mg)	0.4					

(b) Use the above table to estimate the length of time until the amount of nicotine is reduced to 0.04 mg.

4. Owing to an innovative rural public health program, infant mortality in Senegal, West Africa, is being reduced at a rate of 10% per year. How long will it take for infant mortality to be reduced by 60%? Give your answer to one decimal place.

5. Solve the following equation for t in two ways (by hand and with your calculator): Give your answer to 3 decimal places.

$$7 \cdot 3^t = 5 \cdot 2^t$$