Math Diversion Problem 826

P. Reany

October 6, 2025

An ounce of prevention is worth
a pound of cure.
— Popularized by
Benjamin Franklin

```
Source: The Ether of Great Mathematical Ideas
Title: A word problem, mixed rate
  Presenter:  Patrick
```

1 Problem

A pump can fill a tank in 3 hours. This time, the tank a sprung a leak and now it take 3.5 hours to fill the tank. How long does it take the leak to empty the tank?

2 Solution

Let R_P be the rate in job/hours for the pump to fill the tank. Let R_L be the rate in job/hours for the leak to empty the full tank. Since the leak works against filling the tank, R_L gets a negative sign in front of it.

$$R_P T_P - R_L T_L = 1[\text{job}]\,. \tag{1}$$

Substituting in the values we know, we get

$$(\frac{1}{3} - R_L)(3.5) = 1\,. \tag{2}$$

with solution $R_L = \dfrac{1}{21}$ job/hour or 21 hours to do the job.