**GIVEN**: A person is trying to fill a 10.0 gal bucket by hand with a dipper.



**FIND**: How long does it take to fill the bucket with water?

**SOLUTION**: The mass rates are given; therefore the conservation of mass in rate form is the proper starting equation to apply to the bucket,



The unknown in this problem is the net gain of water in the bucket, 



The mass rate can be converted to a volume rate since we know the weight of the water per gallon,



We know that the bucket has a total capacity of 10.0 gal. Therefore, the time to fill the bucket is,



**REFLECTION:** In order to transform the mass rate of change in the bucket to a volume rate, we had to multiply by *g*/*gc*.