

05/30/24

Your car runs out of gas by an abandoned gas station that has a sign saying: "Next gas, 68 miles". You get out and look around and find a scale as well as a container with some gasoline in it. You weigh the container and find that it weighs 18.7 pounds. You then empty the container into your car's gas tank. When you reweigh the empty container you find that it weighs 4.4 pounds. You know that the density of gasoline is 0.85 grams per cubic centimeter. You also know that your car gets 32 miles per gallon. Are you going to make it to the next gas station?

$$\begin{aligned}
 18.7 \text{ lb} - 4.4 \text{ lb} &= 14.3 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 6500 \text{ gram gasoline} \times \frac{1 \text{ cm}^3}{0.85 \text{ g}} \\
 &= 7647 \text{ cm}^3 \text{ gasoline} \\
 7647 \text{ cm}^3 \times \frac{1 \text{ L}}{1000 \text{ cm}^3} \times \frac{1 \text{ gallon}}{3.7 \text{ L}} &= 2.07 \text{ gallons} \\
 2.07 \text{ gallons} \times \frac{32 \text{ miles}}{\text{gallon}} &= 66 \text{ miles} - \underline{\text{almost}}
 \end{aligned}$$

While scavenging through a wrecked Corellian freighter you find a shiny piece of beskar that weighs 51 quads. You take the beskar to the scrap market on Jakku where they offer you a price of 17 quasi-farthings per ounce (note that 11 quads is equivalent to 72 grams). At the currency exchange, 9.1 imperial credits can be traded for 4.6 quasi-farthings (and vice-versa). You can buy 2 days worth of rations for 9 pieces of standard scrip – but they will not accept imperial credits (the café owner is making a political statement). Luckily you find a Wookiee who will exchange your imperial credits for standard scrip – but at an extortionary rate of 3.7 imperial credits for 2 pieces of scrip. If you sell the beskar how many days of food can you buy?

$$51 \text{ quads} \times \frac{72 \text{ g}}{11 \text{ quads}} \times \frac{1 \text{ kg}}{1000 \text{ g}} \times \frac{2.2 \text{ lb}}{1 \text{ kg}} \times \frac{16 \text{ oz}}{1 \text{ lb}} \times \frac{17 \text{ qf}}{\text{oz}} = 200 \text{ qf}$$

$$200 \text{ qf} \times \frac{9.1 \text{ credits}}{4.6 \text{ qf}} \times \frac{2 \text{ scrip}}{3.7 \text{ credits}} = 213.9 \text{ scrip}$$

$$\frac{213.9}{9} = 23.76 \rightarrow \text{so you can buy 23 2-day rations} = 46 \text{ days}$$

and you have 6.9 scrip left