Problems & Solutions

Fall is a beautiful time of year to take a hot air balloon ride! You may not be able to take a balloon ride, but we hope you enjoy solving this week’s problems.

Melrose’s hot air balloon is a sphere of diameter 100 feet. How many cubic feet of air will Melrose’s hot air balloon hold when completely filled? Express your answer as a decimal to the nearest tenth.

\[
\text{The formula for the volume of a sphere is } \frac{4}{3} \times \pi \times r^3. \text{ Since we know the diameter of the balloon is 100 feet and the radius } r \text{ is half the diameter, it follows that the radius is 50 feet. Substituting, we see that, completely filled, Melrose’s balloon will hold } \frac{4}{3} \times \pi \times (50)^3 = 523,598.8 \text{ ft}^3 \text{ of air.}
\]

Coco takes a hot air balloon trip over part of the Alleghany Mountains with her dad. They travel at an average speed of 40 mi/h for 120 miles before they land to take a 45-minute lunch break. After lunch, they fly 175 miles at an average speed of 35 mi/h. Including, the lunch break, how many hours was their entire trip? Express your answer as a decimal to the nearest hundredth.

\[
\text{To solve this problem, we will be using the equation distance } = \text{ rate } \times \text{ time. We’ll let } T_1 \text{ be the number of hours it took them to travel 120 miles at an average speed of 40 mi/h. So, we have } 120 = 40T_1 \rightarrow T_1 = 120/40 = 3 \text{ hours. We’ll let } T_2 \text{ be the number of hours it took them to travel 175 miles at an average speed of 35 mi/h. So, we have } 175 = 35T_2 \rightarrow T_2 = 5 \text{ hours. The lunch break was 45 minutes } = 45/60 = 0.75 \text{ hours. Therefore, the entire trip, including the lunch break, took } 3 + 0.75 + 5 = 8.75 \text{ hours.}
\]

Rhonda found that 10 super-sized helium balloons provide just enough lift to carry her 3-pound toy. At that same rate, how many super-sized balloons would be required to carry Rhonda’s 81-pound Alaskan malamute?

\[
\text{If 10 balloons lift exactly 3 pounds, then each balloon lifts the equivalent of 3/10 pound. Dividing 81 pounds by 3/10 pound, we see that the number of balloons required to lift her dog is } 81/(3/10) = 81 \times 10/3 = 810/3 = 270 \text{ balloons.}
\]
Melrose’s hot air balloon is a sphere of diameter 100 feet. How many cubic feet of air will Melrose’s hot air balloon hold when completely filled? Express your answer as a decimal to the nearest tenth.

Coco takes a hot air balloon trip over part of the Alleghany Mountains with her dad. They travel at an average speed of 40 mi/h for 120 miles before they land to take a 45-minute lunch break. After lunch, they fly 175 miles at an average speed of 35 mi/h. Including, the lunch break, how many hours was their entire trip? Express your answer as a decimal to the nearest hundredth.

Rhonda found that 10 super-sized helium balloons provide just enough lift to carry her 3-pound toy. At that same rate, how many super-sized balloons would be required to carry Rhonda’s 81-pound Alaskan malamute?