

# MATHCOUNTS® Problem of the Week Archive

## Thirst Quencher – August 7, 2023

### Problems & Solutions

In the summer months, a common problem people suffer from is dehydration – not enough water in their body. Waiting until you feel thirsty is not a good indicator that it's time to drink water. In fact, once thirst has settled in, you are already dehydrated! A general guideline is that people should drink eight 8-ounce glasses of water per day. According to this guideline, how many gallons of water should a person drink in a day, given that 1 gallon = 4 quarts and 1 quart = 32 ounces? Express your answer as a decimal to the nearest tenth.

*Eight 8-ounce glasses of water is  $8 \times 8 = 64$  ounces of water. Since it takes exactly double that amount, or 128 ounces, to make a gallon, the guideline for water consumption is **0.5** gallons of water per day.*

When dehydrated, your body needs water. Juices and sodas are not the optimal beverages for replenishing your body with the water it needs. And if you take cost into account, you'll definitely want to grab a glass of water! It is estimated that 4000 glasses of tap water cost the same as a six-pack of soda. If a six-pack of soda costs \$2.99, how many glasses of water would have a cost of 10¢? Express your answer to the nearest whole number.

*If a six-pack of soda costs \$2.99, then a glass of water would cost  $2.99 \div 4000 = 0.0007475$  cents. To determine how many glasses have a cost of 10 cents, we multiply the ratio of glasses to cents by 0.10 to get  $(1/0.0007475)(0.10) \approx 133.779$ . So, the number of glasses of water that have a cost of 10 cents is about **134** glasses of water.*

Lake Tahoe is the second deepest lake in the U.S. and it holds 40 trillion gallons of water – enough to cover the state of California to a depth of 14 inches! Given that  $1 \text{ ft}^3 = 7.48$  gallons and 1 mile = 5280 ft, how many square miles are in the area of California? Express your answer to the nearest thousand.

*First, 40 trillion gallons of water is equivalent to  $[(40 \times 10^{12})/7.48] = [(10 \times 10^{12})/1.87] \text{ ft}^3$  of water. Next, we are told that this water would have depth 14 inches  $\times 1/12 = 7/6$  feet. At that depth,  $[(10 \times 10^{12})/1.87] \text{ ft}^3$  of water would cover  $[(10 \times 10^{12})/1.87]/(7/6) = [(10 \times 10^{12})/1.87](6/7) \text{ ft}^2$ . Finally, since  $(1 \text{ mi})^2 = (5280 \text{ ft})^2$ , it follows that the number of square miles covered would be  $[(10 \times 10^{12})/1.87](6/7)/(5280)^2 \approx 164,415.8790 \text{ mi}^2$ , which means that the area of California is about **164,000**  $\text{mi}^2$ .*

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### ***Problems***

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