



Grade 6 Math Circles

March 26-28, 2024

Measurement & Number Systems - Problem Set

- Which measurement unit (inches, feet, yards or miles) would be most appropriate to measure the following lengths?
 - The length of your hand
 - The distance between Toronto and Paris
 - The length of a football field
- Which measurement unit (teaspoons, fluid ounces, cups or gallons) would be most appropriate to measure the following volumes?
 - The volume of water required to fill a pool
 - The exact amount of vanilla to add to a pancake recipe
 - The amount of liquid in a water bottle
- A team of engineers from all around the world are working hard to build a spaceship. They have lots of great ideas, but they cannot decide which measurement system to use: US customary or metric. What system might you suggest? Why?
- Over time, the exchange rate between the Canadian dollar (CAD) and US dollar (USD) has fluctuated. 50 years ago, in 1974, \$1.00 CAD was approximately \$1.01 USD. Today, a \$30.00 CAD calculator would cost \$22.09 USD.
 - What is the conversion factor from CAD to USD for each year?
 - How much would a \$50 CAD bill be worth in USD for each year?
- The Saltwater Crocodile has one of the most powerful bites of any animal. The strongest recorded bite was 3,700 pounds of force per square inch (pound-force/in², or 'PSI'). How many Pascals (Pa) was this bite? Why is PSI a more suitable measurement?
- The way we measure temperature varies around the world. Suppose the temperature in Celsius is C . The temperature in Fahrenheit, F , is calculated using the formula:

$$F = (1.8 \times C) + 32$$

- If Anu (who lives in Canada) measures the temperature to be 25°C, what temperature in Fahrenheit does Rachel (who lives in the United States) measure?



- (b) Explain why this question can't be solved using conversion factors.
7. Convert each of the following binary numbers into decimal.
- (a) 101 (b) 10010 (c) 11011101
8. When handling data and information, we say 1 byte is equivalent to 8 bits. This is where the terms 'megabytes', 'gigabytes', and so on come from.
- (a) How many bytes is a 32-digit binary number?
- (b) What is the largest possible binary number we can make with this number of bytes? What is its decimal representation?
9. Harry plans on travelling to Mexico for the summer. According to his research, the hotel will cost 950 Mexican pesos per night, his food will cost 200 pesos per day, his rental vehicle will cost 520 pesos per day, and all other expenses will cost about 350 pesos. If he plans to stay in Mexico for two weeks, how much money should Harry plan to spend in Canadian dollars?
Note: \$1.00 CAD is equal to 12.37 Mexican pesos.
10. * A farmer hires 12 workers to pick apples in an orchard. Each group of 3 apples weighs one pound, and each worker can pick 23 pounds of apples per hour and work an 8-hour shift. If each apple is sold for 50¢, how much money (in dollars) does the farm make every day if it is open for 16 hours a day?