

Midterm Review

Problems for Dimensional Analysis (i.e. conversion problems)

Use the following equalities (conversion factors in disguise) to solve the next 4 problems.

7 days = 1 week, 1 day = 24 hours, 1 hour = 60 minutes, 1 mile = 1760 yards, $1 \text{ ft}^3 = 1728 \text{ in}^3$, 1 in = 2.54 cm, 1 kg = 2.205 lbs

1. Convert a distance of 7 miles into yards.
2. Convert 4 weeks into minutes.
3. If you sleep an average of 7.5 hours per night, how many hours do you sleep in a year?
4. Convert 5.5 grams per cubic cm to pounds per cubic feet.

Venn Diagram Problems

5. Place the integers between 1 and 20 in the a Venn diagram described as follows. Let the universal set (ie everything that we care about) be the integers between 1 and 20. Let set A be the prime numbers between 1 and 10. Let set B be the odd numbers between 1 and 20, and let set C be anything in the universal set that divides 36.

Logic Problems

6. Do the following logic puzzle.
 - (a) The giraffes were fed before the zebras but after the monkeys.
 - (b) The bears were fed 15 minutes after the monkeys.
 - (c) The lions were fed after the zebras.

Table 1: Logic at the Zoo

	6:30 am	6:45 am	7:00 am	7:15 am	7:30 am
bears					
giraffes					
lions					
monkeys					
zebras					

7. Determine whether the following arguments are deductive or inductive. If they are deductive state whether the argument is valid or not, and whether or not it is sound. If the argument is inductive, state whether or not the argument is strong or weak with an explanation.
- (a) Premises: Doctors know anatomy. Cardiologists know anatomy. Conclusion: Cardiologists are doctors.
 - (b) Premises: All salty foods cause high blood pressure. Apples do not cause high blood pressure. Conclusion: Apples are not salty foods.
 - (c) There are 24 court cases today. For the first 22 cases the defendant was guilty. So we know that all defendants were guilty today.
8. Following will be two statements a and b. Does a imply b? Does b imply a? If a implies b, state the contrapositive. If b implies a, state the contrapositive.
- (a) Scott is a pianist.
 - (b) Scott is a musician.

Percentage Problems

9. Find the absolute/relative change. The average temp. in CA is 75° during April, the average temp. in CO is 55° during April. Compare the average temp. in CA to CO and the average temp. in CO to CA.

10. A Presidential candidate promises to reduce taxes by 20% for each of their first three years as President, for a total of 60%. Evaluate the promise. Is it mathematically correct using %?

Estimating Problems

11. Round 212,000 to the hundred thousands place, and round 678 to the tens place.
12. Your rent and utilities come to \$1784.31 for Jan. There are three people in your house. Estimate how much each will owe by rounding the rent to the thousands, hundredth, and tenth. Compare the three answers.

Scientific Notation Problems

13. Calculate:
- (a) $3.6 \times 10^3 + 5.1 \times 10^4$
- (b) $\frac{8.7 \times 10^1}{2.4 \times 10^{-2}}$
14. There are approximately 132 million births worldwide a year. Express this quantity in births per minute using scientific notation

Compound Interest Problems

15. Define APR and APY
16. Suppose you start saving for a \$10,000 down payment on a house you want to put down in 10 years. Assume you make no deposits after your initial deposit. If your account compounds daily with an APR of 4%, how much does your initial deposit need to be?
17. The set up is the same as problem 16. Except we have two different accounts, one that compounds annually with an APR of 5% and one that compounds quarterly with an APR of 4.5%. Which account should we choose to make the most money and how much money do we make with that account after the 10 years?

Loan Payments

18. We have a student loan of \$12000 at a fixed APR of 8% for 10 years.
 - (a) Calculate the monthly payment.
 - (b) Determine the total payment over the term of the loan.
 - (c) Determine how much of the total payment over the loan term goes to principal and how much to interest.

19. Assume you have a \$2500 balance on your credit card and make no additional charges. The credit card APR is 22% and you want to pay off the balance in 1 year. Calculate the monthly payment and total payment.