Break the following problems down into subproblems, solve each subproblem, and then solve the main problem.

**10 points**

5 points for breaking the problem into subproblems with questions written in words, 3 points for detailed numeric solution for each question, 2 points for final answer \*circled\*.

1. Renee made 96 of 220 shots during the season up until tonight’s basketball game. She figures she’ll get about 20 shots tonight. What percentage must she shoot tonight to raise her shooting percentage to exactly 45% for the season if she takes 20 shots? (Shooting percentage is determined by dividing the number of baskets by the number of shots taken.)
2. Three years ago Brett bought a music synthesizer that had a list price of $500. He also paid tax on the purchase at 7.25%. Because of depreciation, the synthesizer is now worth 30% less than its original list price. Brett managed to sell the synthesizer to Becca for $40 more than it is worth now. (There was no tax on this transaction.) What is the difference between the amount that Brett paid for the synthesizer and the amount Becca paid?
3. A camp stove uses up its gas in 195 minutes when it is set on low. It uses about 71⁄2 times as much gas when it is set on high. The stove has been set on low for 30 minutes. How much longer can the stove operate if it must be run on high to boil water?

Use unit analysis (dimensional analysis) to solve the following questions…

**10 points**

5 points for detailed solution (all steps to change units), 3 points for a summary of your approach, 2 points for final answer \*please circle\* (Machine’s new rate in cases of tennis balls per hour).

1. Zeke and three friends drove for 300 minutes, using 8 gallons of gas. They got 30.5 miles per gallon with a total fuel cost of $33.84. Find the following:
2. Miles
3. dollars per gallon
4. miles per hour
5. passenger-miles per gallon
6. cents per passenger-mile
7. If the horse Seabiscuit travels at a constant speed of 40 miles per hour, how many seconds will it take Seabiscuit to run a race of 6 furlongs? (Note: 1 furlong = 1/8 mile)
8. If Kenny can limp at a speed of 2 miles per hour, how many seconds does it take him to get from the theatre to the V-building, a distance of 140 yards? (Round your answer to the nearest one-hundredth of a second.)
9. At 9:30 AM, Alexandra is 440 yards away from class and is walking 4 miles per hour towards class. Also at 9:30 AM, Sam is walking towards class at 4.5 miles per hour from some unknown distance. They arrive at class at exactly the same time. How many seconds after 9:30 AM did they arrive at class and how far away was Sam from class at 9:30 AM?
10. Logan (the former state champion runner in New York) runs to his next class at a speed of 18 miles per hour. How many seconds will it take him to get to his next class, a distance of 250 yards? (Answer to the nearest one-hundredth of a second.)

Working backward to solve the following problems…

**10 points**

5 points for detailed solution (break the problem into steps), 3 points for a summary or outline of your approach, 2 points for final answer \*please circle\*

1. I hate taking my little brother, Cal, to the park. All he does is find ways to cause trouble. For example, the other day he took a bunch of pennies to the park. He promptly lost 2⁄5 of them and cried. I stopped swinging and helped him look for them. He managed to let three more fall out of his pocket while we were looking. When I tried to grab them before they sank in the sand, he threw a temper tantrum and lost another 1⁄3 of the pennies he had left. I gave him ten pennies from my pocket to try to stop him from crying, but that didn’t help. He then got mad and started throwing them. He threw away 3⁄4 of his remaining pennies and ended up with seven. We looked for them some more but found a lot of cigarette butts and no pennies. How much money did my brother lose at the park? I don’t know, but I would have gladly paid him that much not to go to the park. Find out how much Cal lost at the park.
2. My mother told us kids that if we wanted to go on this camping trip, we had to plan the meals. No problem. We planned to have hot dogs. That’s not all, of course. We also took along mustard, relish, catsup, and buns. We figured we had it made. However, after setting up the tent, we didn’t make sure that the food was safe. Raccoons got into it and ate 1⁄3 of the hot dogs. After discovering the loss, our family had 6 hot dogs with our eggs for breakfast. When we went out sightseeing, we just left the hot dogs on the table and returned to find that jays had eaten another 1⁄4 of our remaining supply. Despite our bad luck with the food, we continued to enjoy the camping trip. We went to the store and bought 12 hot dogs and added them to our supply. Then some of our campsite neighbors had a hankering for normal food and “borrowed” 2⁄5 of the remaining hot dogs. At our dinner that evening, we ate 10 hot dogs. That night, bears got 3⁄4 of the last part of our supply, and in the morning we all shared the remaining 2 hot dogs. How many hot dogs did we start with?

Use a venn diagram to solve the following problems…

**10 points**

4 points for detailed solution (draw the venn diagram), 4 points for an outline of your approach (list the clues in the order that you use them and show any mathematical calculations), 2 points for final answer \*please circle\*.

1. There are many houses on Warp Drive in Kirk, Missouri. Ninety houses have cable TV. Fifty-two houses have a pool. Sixty-eight are one-story houses. There are 49 houses that have a pool and cable TV. There are 43 one-story houses with pools. There are 57 one-story houses with cable TV. There are 42 one-story houses with cable TV and a pool. And there are 4 houses that are not one-story and do not have a pool or cable TV.
2. How many houses are on Warp Drive?
3. How many houses don’t have a pool?
4. How many houses have cable TV but are not one-story?
5. How many one-story houses have cable TV but no pool?
6. How many houses have a pool but don’t have cable TV and are not one-story?
7. Ameen owns an apartment building. Thirty-five apartments have a patio. Forty-one apartments have a dishwasher. Fifty-two are two-bedroom apartments. There are 13 apartments that have a dishwasher and a patio. There are 26 two-bedroom apartments with dishwashers. There are 15 two-bedroom apartments with a patio. There are 9 two-bedroom apartments with a patio and a dishwasher. And there are 7 apartments that are not two-bedroom and do not have a dishwasher or a patio.
8. How many apartments are in the building?
9. How many apartments don’t have a dishwasher?
10. How many apartments have a patio but are not two-bedroom?
11. How many two-bedroom apartments have a patio but no dishwasher?
12. How many apartments have a dishwasher but don’t have a patio and are not two-bedroom?
13. A marketing company did a survey to find out what kinds of soda people drink. The survey found that 59 drink cola, 43 drink root beer, and 51 drink lemon-lime. Of those, 23 drink cola and root beer, 35 drink cola and lemon-lime, 22 drink root beer and lemon-lime, 15 drink all three kinds of soda, and 2 drink none of these three kinds of soda.
14. How many people were surveyed?
15. How many people do not drink cola?
16. How many people drink root beer but not lemon-lime?
17. How many people drink cola and lemon-lime but not root beer?
18. How many people drink only root beer?
19. A group of people was surveyed about the kind of food they like. Fifty-four people like Mexican food. Forty-five people like Italian food. Forty-seven people like Chinese food. There are 29 people that like Mexican food and Italian food. There are 26 people that like Mexican food and Chinese food. There are 20 people that like Italian food and Chinese food. There are 11 people that like Mexican food, Italian food, and Chinese food. And there are 5 people that don’t like Mexican food, Italian food, or Chinese food.
20. How many people were surveyed?
21. How many people don’t like Mexican food?
22. How many people like Italian food but don’t like Chinese food?
23. How many people like Mexican food and Chinese food, but don’t like Italian food?
24. How many people like Mexican food but don’t like Chinese food and Italian food?

Start with guess-and-check and move to algebra to solve the following problems…

**10 point each**

4 points for guess-and-check table (at least 3 guesses/checks), 4 points for algebra formula derived from the guess-and-check table (show your work to solve the equation), 2 points for final answer \*please circle\*.

1. Clarence and Stephanie are each thinking of a number. If you multiply Stephanie’s number by 3 and subtract 2, you get Clarence’s number. If you take half of Clarence’s number and then subtract 2, you get Stephanie’s number. What number is each thinking of?
2. Rachael is mixing some fruit juice for tomorrow’s party. She has 46 quarts of 29% juice and a whole bunch of 17% juice. She thinks that 29% juice is too strong and 17% juice is too weak. She wants to make 25% juice. So she plans on mixing all 46 quarts of 29% juice with some amount of 17% juice in order to make 25% juice. How much 17% juice should she use?
3. Terry goofed up mixing 10 gallons of grape juice. He made a grape juice mix that was 20% juice concentrate instead of the usual 30% juice concentrate. How much juice concentrate does he need to add to the 10 gallons already mixed to bring it up to 30% juice concentrate?
4. MaryLou made some money on her investments. She made twice as much money on her investment at 8% than on her 5% investment. In all, she made $600 in one year. How much did she have invested at each percentage rate?
5. Bernice paid $2,970 in state income tax last year. The first part of her income was taxed at the rate of 7%, and the next (higher) part of her income was taxed at 9%. She had $42,000 in taxable income. How much was taxed at 7%, and how much was taxed at 9%?

Draw a picture and move to algebra to solve the following problems…

**6 point each**

2 points for the diagram, 3 points for algebra formula derived from the diagram (show your work to solve the equation), 1 point for final answer \*please circle\*.

1. A rectangle with perimeter 104 centimeters has a width 18 centimeters less than its length. What is its area?
2. The larger of two complementary angles is 3 degrees more than twice the smaller of the two angles. What is the measure of each angle?