Math 105 - Homework 6   Name: _____

Solve all of the following without using a calculator.

1. There are 3 teaspoons in a Tablespoon, there are 4 Tablespoons in a quarter cup. A cup is 8 ounces. How many ounces is a teaspoon? *Be sure to show your conversion factors here.*

2. A cubic centimeter is the same as one milliliter (mL). One milliliter of water weighs one gram. How much would a cubic meter of water weigh in kilograms? Hint: *One meter is 100 cm, but one cubic meter is not 100 cm^3, it is $(100\ cm)^3$. There's a big difference!*

3. If a car can drive 30 miles per gallon of gas, and gas costs $2 per gallon, then how much money will it cost to drive 100 miles?

4. If the same car in the previous problem were to drive a 50 miles per hour for 30 minutes, how many gallons of gas would that take?

5. How many hundredths are in an eighth?

6. A furlong is an eighth of a mile. If someone takes 3 minutes to walk 1 furlong, then how fast did they walk in miles per hour?

7. 40 is what percent of 200?

8. 60 is 20% of what number?

9. 100% is what percent of 40%?

10. What is 120% of 50%?

11. All of the students in a class took an exam. Each student either passed or failed. 85% of the students passed and 3 students failed. How many students are in the class?

12. A baseball team won 30 of their first 50 games. How many of the remaining 40 games would the team need to win in order to finish the season having won exactly 70% of their games?

13. A marine biologist tags 50 fish in one lake and releases them. Five days later, he captures 60 fish, of which 3 have already been tagged. Assuming that the number of fish in the lake is constant, and that 3 out of 60 is an accurate estimate for the proportion of fish in the lake that are tagged, how many fish are there in the lake?

14. An athlete's target heart rate is 80% of the theoretical maximum heart rate. The maximum heart rate, in beats per minute, is found by subtracting the athlete's age, in years, from 220. Find a formula for an athlete's target heart rate based on their age x.

15. Pressure increases linearly as you go deeper underwater. The pressure at the surface is 1 atmosphere (atm), and it increases by 1 atm every 10 meters deeper you get. Find the function for pressure P as a function of depth y underwater. What is the slope?

16. Suppose that coffee costs $0.60 per pound and tea costs $1.20 per pound. A supplier has space for 50 pounds of coffee or tea. If the supplier purchases x pounds of coffee and then uses the remaining space for tea, how much will the supplier pay as a function of x?

17. Alan and Ben are running for class president. After 80% of the ballots are counted, Ben is ahead with 60% of the counted votes while Alan has 40%. Let F denote the final percent of the vote that Alan ends with in the previous problem. Express F as a function of p, where p is the proportion of the last 20% of the votes that Alan receives. Then clearly graph $F(p)$ for p between 0 and 1.

18. Sam has a mix of 5 and 10 dollar bills in his wallet. If he has 3 more five dollar bills than tens, and has a total of $150 in his wallet, then how many ten dollar bills does he have?

19. A rectangular billboard is 6 meters wider than it is tall and has a total area of 160 square meters. Find the height of the billboard.

20. The hypotenuse of a right triangle is 9 inches longer than the shortest side. The other side of the right triangle is 1 inch longer than the shortest side. How long is the shortest side? Hint: *use the Pythagorean theorem* $a^2 + b^2 = c^2$ *where c is the length of the hypotenuse.*