There are **30** questions. Place your answer in the appropriate blank on the answer sheet provided. Include units when applicable. If your answer has more than 3 decimal places round it to the nearest thousandths. Do not give answers as fractions.

1. A 5000-seat theater has tickets for sale at $28 and $35. How many $35 tickets should be sold for a sellout performance to generate a total revenue of $163,450?

2. A company is planning to manufacture mountain bikes. The fixed monthly cost will be $300,000 and it will cost $300 to produce each bicycle. What is the average cost if 500 bicycles are produced in a month?

3. A company that manufactures small canoes has a fixed cost of $24,000. It costs $120 to produce each canoe. The selling price is $320 per canoe. How many canoes does the company need to make and sell to have a profit of $30,000?

4. A thief steals several rare books from a library. On the way out, the thief meets three security guards, one after another. To each security guard, the thief is forced to give one-half of the books that he still had, plus 2 more. Finally, the thief leaves the library with 10 books. How many books were originally stolen?

5. According to statistics, a person will devote 37.5 years to sleeping and watching TV over their lifetime. The number of years sleeping will exceed the number of years watching TV by 7.5. Over their lifetime, how many years will the person spend sleeping?

6. After a 20% markup, you purchase a new car for $39,000. What was the original price of the car?

7. An iguana's tongue length, T, varies directly as its body length, B. An iguana with a body length of 15.5 inches has a tongue length of 4.5 inches. What is the tongue length of an iguana whose body length is 17.7 inches?

8. When a shot-put is released at a given angle and velocity, its height, $h(x)$, in feet, can be modeled by $h(x) = 5 + 1.5x - 0.05x^2$, where x is the shot's horizontal distance, in feet, from its point of release. What is the maximum height of the shot-put?

9. At the north campus of a science and math school, 20% of the students are math majors. At the south campus, 40% of the students are math majors. The campuses are merged into one central campus. If 28% of the 1000 students at the central campus are math majors, how many students did the north campuses have before the merger?

10. Farmer Ed has 1,200 meters of fencing and wants to enclose a rectangular plot that borders on a river. If Farmer Ed does not fence the side along the river, what is the largest area that can be enclosed?

11. Find the sum of the first 275 positive integers.

12. Find the sum of the squares of the first 35 positive integers.

13. How many different four-letter passwords can be formed from the letters A, B, C, D, E, F, and G if repetition of the letters is allowed?

14. How many ounces of a 12% alcohol solution must be mixed with 5 ounces of a 20% alcohol solution to make a 16% alcohol solution?

15. If two angles are complementary and one is 12 degrees larger than the other, what is the measure of the smaller angle?

16. In January of 1887, $42 was invested in a bank account paying an annual rate of 4% interest, how much would the investment have been worth in January 2022 if interest were compounded monthly? Round your answer to the nearest dollar.

17. Susan invested part of her $27,500 bonus in a fund that paid an 8% profit and invested the rest in stock that suffered a 4% loss. Find the amount invested at 8% if her overall net profit was $1,300.

18. A car averages 27 miles per gallon. If gas costs $4.04 per gallon, how much would the gas cost for this car to travel 2,727 typical miles?

19. The number of houses that can be served by a water pipe varies directly as the square of the diameter of the pipe. A water pipe that has a 10-centimeter radius can supply 50 houses. How many houses can be served by a water pipe that has a 16-centimeter radius?

20. When $x = 3$ and $y = 5$, by how much does the value of $3x^2 - 2y$ exceed the value of $2x^2 - 3y$?

21. The ratio of boys to girls in a class is 12:7. If the class has 418 students, how many are girls?

22. The sum of the lengths of the sides of a right triangle is 80 inches. The hypotenuse is 12 inches less than the sum of the lengths of the legs. What is the length of the hypotenuse?

23. The water temperature of the ocean varies inversely as the water's depth. At a depth of 1000 meters, the water temperature is 8.4° Celsius. What is the water temperature at a depth of 1500 meters?

24. Four consecutive odd integers have a sum of 88. What is the product of the largest and smallest of these integers?

25. Three friends got prize money worth $5,200. The first friend would get twice the amount of the third friend's portion. The third friend would get four times the amount of the second friend's portion. Determine the amount the third friend would receive.

26. If $xy = 144$, $x + y = 30$, and $x > y$, what is the value of $x - y$?

27. Tim and Kay, working together, can build a storage shed in 10 days. If Tim built it by himself, it would take him 15 days. How long would it take Kay to build the storage shed if she worked alone?

28. A rectangle with a perimeter of 30 centimeters is twice as long as it is wide. What is the area of the rectangle in square centimeters?

29. Two bicyclists, 50 miles apart, begin riding toward each other on a long straight avenue. One cyclist travels 15 miles per hour and the other 10 miles per hour. At the same time, Spot (a greyhound), starting at one cyclist, runs back and forth between the two cyclists as they approach each other. If Spot runs 32.5 miles per hour and turns around instantly at each cyclist, how far has he run when the cyclists meet?

30. When a crew rows with the current, it travels 16 miles in 2 hours. Against the current, the crew rowed 12 miles in 2 hours. What is the rate of rowing in still water?

Thank you for competing.