CATS contest[1]   Name _____

2 November 2013
                                                              Grade_____

   Write your answer in the box provided. Answers must be exact. Thus, if the answer is 1/3, 0.33 will not be marked correct. You may not use a calculator or cell phone. You may use scratch paper.

1. If today is Tuesday, what day will it be in 10 days?

2. A car goes 51 miles per hour for 2 hours and then 66 miles per hour for 3 hours. What is the average speed of the car for the 5 hour trip?

3. Write the following fraction in reduced form: $\dfrac{132}{165}$.

4. Given that $\dfrac{9}{x^2 + x - 2} = \dfrac{A}{x - 1} + \dfrac{B}{x + 2}$, find A and B.

5. Britta bought 27 pieces of fruit at a market; she got apples, bananas and oranges. She bought twice as many apples as bananas, and twice as many oranges as apples and bananas in total. How many bananas did she buy?

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[1]CATS stands for CATS Are Top Solvers

6. Suppose train A starts 210 kilometers ahead of train B, train A travels at 70 Km/h and train B travels at 100 Km/h. Assuming that train A and train B travel in the same direction, how long, in hours, until the trains meet?

7. Annie has a drawer with 16 loose socks: 4 white socks, 4 grey socks, 4 black socks and 4 brown socks. If Annie pulls two socks from the drawer at random, what is the probability that they are the same color?

8. Find all real solutions x to the equation $2^{x^2+1} = 4^x$.

9. The number $n!$ is the product $n(n-1)(n-2)\cdots 1$. How many zeros are at the end of 16!?

10. A brick with a square base and perfectly vertical sides is one foot tall. It was made with 300 cubic inches of cement. In inches, what is the perimeter of the base of this brick?

11. Solve the inequality $|3x - 7| < 10$.

12. The sum of two numbers is 64. The positive difference of the same two numbers is 40. What is the product of these two numbers?

13. Shirley has $2.08 in some combination of pennies and nickels. She has more pennies than nickels. What is the maximum number of nickels that Shirley could have?

14. What is the next term in the following sequence?
$$0, 3, 8, 15, 24, ...$$

15. Trapezoid $ABCD$ has $m\angle ABC = 112°$ and $m\angle BCD = 147°$. What is $m\angle CDA$ in degrees?

16. A shipping container is 24 feet long, 6 feet wide, and 8 feet tall. In feet, what is the maximum distance between two corners of the container?

17. A circle has an area of 38π meters square. What is the diameter of the circle?

18. What is the area of a regular hexagon inscribed in a circle of radius 1?

19. What is the smallest perfect square that is divisible by 41?

20. Find the sum $1 + 2 + 3 + ... + 37$.

21. We say that a square is *awesome* if each of its vertices lies at an ordered pair containing two integers (x, y), where both x and y are no greater than 3 and no less than 0. How many distinct *awesome* squares are there?

22. Suppose we have a bag with 7 balls of different colors. How many distinct ways are there to choose 3 of them?

23. Find the roots of $x^3 + 10x^2 + 17x - 28$.

24. What is the digit in the ones place of 2013^{2013}?

25. A shift for a worker is 7 hours long. Suppose the first worker starts his shift at $00:00$. What is the minimum number of workers (no breaks in between) it takes for the final shift to end at $13:00$ (not necessarily on the same day)?