First name: _____ Last name: _____ Student ID: _____

Algebra Homework

Calculate without calculator.

1. Simplify $\sqrt{\sqrt{1+\sqrt{\sqrt{76+\sqrt{25}}}}-1}$

2. Simplify: $\frac{2^{\frac{1}{4}} \cdot 8^{\frac{2}{3}} \cdot 4^{\frac{1}{4}}}{\sqrt[4]{8}}$

3. Simplify: $(8^{\frac{2}{3}} + 9^{\frac{3}{3}} + 25^{\frac{1}{2}})^{\frac{1}{2}}$

4. Simplify $(\sqrt[3]{81} - \sqrt[6]{9})^3$

5. Simplify $\sqrt{3+2\sqrt{2}}+\sqrt{3-2\sqrt{2}}$

Full Solutions

1. On a thirty-question test, each correct answer is worth 7 points, each unanswered question is worth 2, and each incorrect answer is worth 0 points, which of the following scores is NOT possible?
a) 135 b) 136 c) 148 d) 204

2. The digits 2, 3, 4, 5 and 7 are each used once to form the smallest possible even five- digit number. What is the digit in the tens place?

3. If it takes 2007 digits to number the pages of a book consecutively, beginning with page 1, how many pages are in the book?

4. What is the L. C. M. of 24, 64, and 156?

5. Find the tens' digit of the product $5^{2005} \times 2005^5$.

6. Each of the numbers 1, 2, 3, and 4 is substituted, in some order for p, q, r, and s. what is the greatest possible value of $p^q + r^s$?

7. The largest four-digit number whose digits add to 17 is 9800. What is the 5th largest four-digit number whose digits have a sum of 17?

8. The product of the ages of three children is 1872. The age of the middle child is the average of the ages of the other two children. What is the sum of their ages?

9. A king hires a crew of 30 workers, who can build a castle wall in 60 days. However 10 days after the wall was started, it is decided that the wall must be finished in a total of 40 days. How many additional workers must be hired?

10. Two ships, one 200 metres in length and the other 100 metres in length, travel at constant but different speeds. When travelling in opposite directions, it takes 10 seconds for them to completely pass each other. When travelling in the same direction, it takes 25 seconds for them to completely pass each other. What is the speed of the faster ship, in metres per second?

11. A deck of 100 cards is numbered from 1 to 100. Each card has the same number printed on both sides. One side of each card is red and the other side is yellow. Barsby places all the cards, red side up, on a table. He first turns over every card that has a number divisible by 2. He then examines all the cards, and turns over every card that has a number divisible by 3. How many cards have the red side up when Barsby is finished?

12. The left most digit of an integer of length 2000 digits is 3. In this integer, any two consecutive digits must be divisible by 17 or 23. The 2000th digit may be either 'a' or 'b'. What is the value of $a + b$?