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

Algebra Homework

Basic problems

1. Simplify. Leave your answer in exponential form.

1. $9^4 \times 3^6$	2. $(\sqrt{6})^{32} \times 6^2$	3. $4^{-5} \div 8^{-3}$

2. Solve each inequality.

4. $23 \le 2q - 3$	5. $2 + 2d \ge d + 18$	6. $\frac{1}{5} + b \ge \frac{3}{4}$

3. Simplify.

1. $(x - 9) - (4x + 17)$	2. $(2x + 6) + (5x - 9) - 3x$	3. $(3x^2 - 8x + 43) + (11x^2 + 13x - 35)$

4. Simplify.

1. $\frac{(-10r^6o^2)(-5r^5o^3)}{2r^2}$	2. $\frac{-d^5}{(-11d^3)(-2d^2t^3)}$

Challenge problems

1. Given $x^2 + y^2 = 28$ and $xy = 14$; what is the value of $x^2 - y^2$?

2. The numbers 1, 3, 6, 10, 15, . . . are known as triangular numbers. Each triangular number can be expressed as $\frac{n(n+1)}{2}$ where n is a natural number. What is the largest triangular number less than 500?

3. If a pup is worth a pooch and a mutt, a pup and a pooch are worth one bird dog, and two bird dogs are worth three mutts, then what is the number of pooches a pup is worth?

4. What is the digit that must be placed in front of the five digit number 56734 to produce a six digit number that is divisible by 11?

5. Let D be a two digit number. If half of D exceeds one third of D by the sum of the digits in D, then what is the sum of the digits in the number D?

6. A small school has 100 students and rooms A, B and C. After the first period, half of the students in room A move to room B, one fifth of the students in room B move to room C, and one third of the students in room C move to room A. After the move, the total number of students in each room is the same as it was before. How many students are in room A?

7. The integer 9 is a perfect square that is both two greater than a prime number 7, and two less than a prime number 11. What is another such perfect square?

8. How many solutions does the equation $|2x - 2| = x$ have?

9. Calculate $x + y + z$ given that

$$\begin{cases} 2x + y + 3z = 12 \\ 3x - 2y - 5z = 7 \\ x + 3y + 4z = 1 \end{cases}$$

10. Two years ago Pete was three times as old as his cousin Claire. Two years before that, Pete was four times as old as Claire. In how many years will the ratio of their ages be 2 : 1 ?