Name: _____

Heatherwood Mathletes

Heatherwood Math Olympics 2005-2006: Red Belt Test 1

December 14, 2005

1. Express 315 as a product of prime factors in index notation.

2. For the pair of numbers 54 and 135, find

   (a) the Highest Common Factor (HCF) and (b) the Least Common Multiple (LCM).

3. There are two flashing lights. The red light flashes on every 15 seconds, and the blue light flashes on every 20 seconds. Every so often they flash at the same time. If you see them flash at the same time, how long before they'll flash together again?

4. Express 0.36 as a fraction in lowest terms.

5. Express the following fractions as decimals:

(a) 3/8 and (b) 2/9.

6. Evaluate the following expressions:

(a) $2\frac{4}{5} + 3\frac{3}{10} =$

(b) $5\frac{3}{4} + 1\frac{1}{3} - 2\frac{1}{12} =$

(c) $1\frac{1}{3} \times 1\frac{1}{4} \div 2\frac{1}{2} =$

(d) $\left(2\frac{1}{2} - \frac{1}{3}\right) \div 3\frac{1}{4} =$

7. Evaluate the following:

(a) 8.306 + 12.45 - 3.6 =

(b) $3.80 \times 1.25 =$

8. A fraction is halfway between 3/4 and 1. Write the fraction in lowest terms.

9. Evaluate the following expressions:

(a) $(-3) \times (-4) \times (-5) =$

(b) $15 \times (-2) + (-11) \times 5 =$

10. Chemical X is stored in a freezer in a laboratory at -6°C. It is heated until its temperature rises by 15°C. What's its new temperature?

11. If the product of five numbers is positive, at most how many of the five numbers can be negative?

12. Solve the following equations:

(a) $3(4x-9) = 81$

(b) $5(x+2)-3(x-1)=15$

(c) $2x+3(x+4) = 23-(4x-7)$

(d) $\dfrac{2}{x}=3$

(e) $\dfrac{3x+5}{6}-\dfrac{x}{3} = 0$

(f) $\dfrac{2x-1}{2}-\dfrac{5(x-1)}{3}=\dfrac{1}{2}$

13. Add the following polynomials: $2x^3 + 3x^2 - 5x + 8$ and $5x^3 - x^2 + 6$.

14. Solve the following pairs of simultaneous equations for x and y.

(a) $2x + 3y = 8$
$3x - y = 1$

(b) 2x - 5y = 16
2x + 3y = 0

15. I'm thinking of a number. If I add 4 to the number and then multiply the result by 3, the answer is the same as subtracting 5 from the number and then multiplying the result by 2.

(a) Letting x be the number, write an equation in terms of x.

(b) Solve the equation and find the number I'm thinking of.

16. A class with 26 students is divided into three groups: A, B, and C. Given that group B has two more students than group A, and group C has twice as many students as group B.

(a) Write an equation to find the number of students in group A.

(b) Solve the equation to find the number of students in group A.

17. The sum of two numbers is three times their difference. Three times the smaller number exceeds the larger number by 4.

(a) Let x be the larger number and y the smaller number. Write a pair of equations in x and y describing the relationship between the numbers.

(b) Solve the pair of equations to find x and y.