1. Set A contains 15 elements, Set B contains 11 elements, and the intersection of Set A and Set B contains 6 elements. Find the number of elements in the union of Set A and Set B.

2. Find the value for x for which $3(x - 1.2) = 7.8$. Express your answer as an exact decimal.

3. If $a = 2.1$, and $b = -3.4$, find the value of $-ab^2$. Express your answer as an exact decimal.

4. If $2x + 7$ and $5x$ represent two consecutive odd integers, find the larger of the two odd integers.

5. If $1.27\overline{6}$ represents a repeating decimal where only the 6 is repeated an infinite number of times, express this repeating decimal as an improper fraction reduced to lowest terms.

6. An office water cooler holds a 6 gallon jug of water. At 11:00 A. M., there is a random amount of water in that 6 gallon jug. Find the probability that at 11:00 A. M., there is between 1.5 and 3 gallons of water in that 6 gallon jug. Express your answer as a common fraction reduced to lowest terms.

7. Five distinct numbers are represented respectively by k, x, y, z, and w such that $w - z = z - y = y - x = x - k$. If $k = 17$ and $w = 73$, find the value of z.

8. A quantity y varies directly as the quantity x minus z, and z varies directly as the sum of x and y. If $y = -12$ and $z = 60$ when $x = 24$, find the value of $y + z$ when $x = 4$.

9. Assume that on May 1, 2002, there are 320 members in the Math Solvers Club. Assume that the only change in the membership of the Math Solvers Club takes place on April 30 of each year when there is a 50% increase in the membership. How many members will be in the Math Solvers Club on May 1, 2007?

10. Find the ordered pair of real numbers that is a solution to the following system. Express your answer as an ordered pair of the form (x, y).

$$y^2 = 2x - 8$$
$$x^2 + y^2 = 16$$

11. The equation $(x - 5)(3x - 18)(x + 2)(7x - 700)(8x + 22)(3x - 15)(x + 1000) = 0$ has a rational root between two consecutive integers k and w where $k < w$. Find the value of $k + w$.

12. If $f(x) = x^2 + 5$ and $g(x) = 7x - 1$, find the value of $f(424) + g(317)$.

13. The roots for x of the equation $x^2 + kx + w = 0$ are 2 and 7. Find the value of $k + w$.

14. Let $f(x) = 2^{x+1} + 3^x$ for all positive integers x such that $1 \le x \le 10$. Find the sum of all x for which $f(x)$ is **not** a prime positive integer.

15. If w is a positive integer, is it possible that the solution set for x of the equation $x^2 + 73x + w = 0$ is $\{18, 42\}$? Write **Yes** or **No**, whichever is correct.

16. Hilda has a certain amount of money invested in stock A, which has a 3% annual rate of dividend. She has \$200 more than her investment in stock A invested in stock B, which has a 4% annual rate of dividend. Hilda also has \$400 more than her investment in stock A invested in stock C, which has a 5% annual rate of dividend. If her total dividend for these 3 stocks for one year is \$748, find the number of dollars that Hilda has invested in stock A.

17. A coin purse contains nickels, dimes, and quarters. The total number of these three types of coins is 51. If the total monetary value of each of the three types of coins is the same, find the number of dimes.

18. Mike is 0.625 of the way across a 0.5 km railroad bridge. He hears a train approaching, and incredibly, he can run in either direction and **just** get off the bridge before the train arrives. (Assume both the train and Mike run at constant rates.) Find the number of kilometers that the train is from the end of the bridge that is nearest the train. Express your answer as an exact decimal.

19. $\dfrac{2\sqrt{3}+5}{k\sqrt{w}-p} = \dfrac{74+53\sqrt{3}}{227}$. If p is an integer and if $k\sqrt{w}$ is in simplest radical form, find the value of $k+w+p$.

20. All the positive integers are arranged in a spiral-like fashion as shown below:

21	20	19	18	17	16	
22	7	6	5	4	15	
23	8	1	2	3	14	...
24	9	10	11	12	13	32
25	26	27	28	29	30	31

The coordinate axes are then superimposed on this rectangular array with (0, 0) located where 1 is in the array, (1, 0) at the location of 2 in the array, (2, 0) at the location of 3 in the array, (0, 1) at the location of 6 in the array, (0, 2) at the location of 19 in the array, etc. Find the positive integer associated with (10, 7).

A

Algebra I

Name R02

School _____

_____ Correct X 2 pts. ea. = [ ]

School Code _____

Note: All answers must be written legibly in simplest form, according to the specifications stated in the Contest Manual. Exact answers are to be given unless otherwise specified in the question. No units of measurement are required.

1. 20
2. 3.8 (must be this decimal)
3. –24.276 (must be this decimal)
4. 15
5. $\frac{383}{300}$ (must be this reduced improper fraction)
6. $\frac{1}{4}$ (must be this reduced common fraction)
7. 59
8. 8
9. 2430
10. (4, 0) (must be this ordered pair)
11. –5
12. 181999
13. 5
14. 25
15. No
16. 6000 (dollars optional)
17. 15
18. 0.75 or .75 (must be this decimal) (km optional)
19. 16
20. 322