AMTNJ
38th Annual Contest
Solutions Key

1) 120 Nothing more than a counting problem.

2) 0 Drawing the altitude to the base creates two 6-8-10 triangles for each given triangle. Therefore the areas are equal.

3) $5\sqrt{2}$ Points of intersection are (-3,3) and (2,8).

4) -64 Solving m=-3 and n=1/3 therefore $m^2 = 9 \; and \; n^2 = 1/9$. Therefore p=9, q=-82, and r=9.

5) 406.87 Area of circle is $12.5^2\pi$ and area of triangle is ½(7)(24)

6) 1/9 Of the 18 possible 4 digit numbers only 4021, 4201, 2401, and 2041 are possible primes with 4021 and 4201 being the primes.

7) 32 Let the roots be a-d, a, and a+d. Solving a=8 and d=3.

8) $\frac{1}{2}xy$ Let one diagonal be the base of two adjacent triangles.

9) $\frac{25A-50}{24}$ Of the 48 remaining numbers, their sum is 50A-100.

10) $log_c(\frac{b^a}{a^b})$ Rules of logarithms

11) $\frac{1}{2}z$ Triangle AXC has the same base as ABC and ½ the height because EF is a midline. Therefore ½ the area.

12) 10.5 Use either the remainder theorem or synthetic division.

13) 2:5 Area of smaller square is $4R^2/5$ and area of larger square is $R^2/2$, therefore $(\frac{4R^2}{5}) \div (\frac{R^2}{2})$

14) 13 $\left(\frac{12!}{5!\times7\times6!}\right)+\left(\frac{12!}{6\times5!\times6!}\right)=\left(\frac{6\times12!+7\times12!}{6\times5!\times7X6!}\right)=(\frac{13!}{6!\times7!})$

15) $\frac{\sqrt{3}}{2}$ cos(x)=cos(47+13)=cos(60)