Nassau County Interscholastic Mathematics League

Solutions **2003-2004**
Contest # 1

1. The number is two more than a multiple of 5 and 7(hence of 35) and 1 more than a multiple of 3. So it's **37.**

2. Draw the altitude to the "16-side" which is also a median since the triangle is isosceles. Now there are two right triangles with hypotenuse 17 and one leg 8. That makes the altitude **15**.

3. There are 13 spades and 4 aces, but subtract one so we don't count the ace of spades twice. Hence the probability is $\frac{16}{52} = \frac{\mathbf{4}}{\mathbf{13}}$.

4. $3^{9c} = 27 = 3^3$, so $9c = 3$ and $c = \frac{\mathbf{1}}{\mathbf{3}}$.

5. Note that $x > 0$. Taking the reciprocal of each side $\frac{x}{4} < \frac{1}{2}$, $so\ x < 2$. **0 < x < 2** Note: taking the reciprocal of both sides of an inequality only reverses the sense of the inequality when both members have the same sign. Since $x > 0$, this is a valid strategy.

6. By (1), Barry does not do tennis or track. By (2), Bill does not play baseball or tennis. By (3), neither Bill nor Bruce play hockey. So Bill must run track. Now, by (4), Bob does not play tennis, so Bruce plays tennis. Also by (4) Bob does not play hockey, so Bob plays baseball and thus Barry plays hockey.
$\left(\mathbf{Hockey, Baseball, Track , Tennis}\right)$ or $\left(\mathbf{Hockey, Baseball, 100\ m\ dash , Tennis}\right)$