Mixed Team Competition 2007

Instructions: Do as many problems as possible, and write your answers on the answer sheet provided. You may not use a calculator. Be sure to work as a TEAM and Have Fun!

1. There are two brothers whose combined age is eleven years. One is ten years older than the other. What are their ages?

2. A certain animal weighed sixty pounds plus one third of his weight. How much did he weigh?

3. A group of friends went into an inn to have a meal. The bill amounted to 24 coins of equal value, which the men agreed to split equally. But then they discovered that two of the men had slipped away without paying their shares, and so each of the remaining men had to pay one coin more. How many men were originally in the group?

4. A thief broke into Christopher’s shop and robbed him of some diamonds. Fortunately they were all recovered, and then it was determined that the thief was either Mary Margaret, Mary Catherine, or Mary Ellen. At the trial, each of the three accused the others, but Mary Ellen is the only one who lied. Is Mary Ellen guilty?

5. Soon after there was another robbery, and the suspects - Mary Ann, Mary Sue, and Mary Grace were put on trial. They made the following statements:
   Mary Sue: Mary Grace never committed the robbery.
   Mary Grace: That is true.
   Mary Ann: Mary Sue is innocent.
   Curiously enough, the actual thief told the truth but they didn’t all tell the truth. Who committed the robbery?

6. Now Mary Kate, Mary Rose, and Mary Beth were on trial and it was known that one and only one of them was guilty. Mary Kate claimed to be innocent; Mary Rose agreed that Mary Kate was innocent; and Mary Beth claimed that she herself was the guilty one. As it turned out, the guilty one lied. Which was one was guilty?
7. There was another robbery. This time someone stole a third of Christopher’s emeralds. Then another robber came along and stole two thirds of the remaining emeralds. There were then twelve emeralds left. How many emeralds did the first robber find?

8. Kate was a good friend of both Margie and Sarah. The following facts are true about them:

   (a) Either Margie or Sarah is the oldest of the three.
   (b) Either Kate is the oldest or Margie is the youngest.

Who is the oldest and who is the youngest?

9. A man was being tried for robbing a caravan. Three witnesses came forth and made the following statements:
   FIRST WITNESS: The defendant has committed over a dozen robberies in the past!
   SECOND WITNESS: That is not true!
   THIRD WITNESS: He has certainly committed at least one robbery!
   As it turned out, only one of the witnesses had told the truth. Did the defendant rob the caravan?

10. A hermit started walking up a mountain trail at eight o’clock in the morning, climbing at a rate of one and a half miles an hour. When he reached the top he spent twelve hours meditating and resting. He went down the same trail at four and half miles an hour, reaching the bottom at noon the next day. How long was the trail?

11. Lewis Carroll, the author of *Alice in Wonderland* was not only a writer but a mathematician. He devised scores of charming logic puzzles such as

   (a) Everyone who is sane can do logic.
   (b) No lunatics are fit to serve on a jury.
   (c) None of your sons can do logic.

What logical conclusion can you draw from using all three of these premises?
12. Below are five vertical pairs of symbols:

\[
\begin{array}{cccc}
\vdash & \vdash & \vdash & \triangleleft \\
\triangleleft & \triangleleft & \propto & \propto \\
\end{array}
\]

Determine a pair of symbols to complete the set from among the five possible solutions shown here:

(a) \[\begin{array}{c}
\triangleleft \\
\triangleleft \\
\end{array}\]  

(b) \[\begin{array}{c}
\triangleleft \\
\propto \\
\end{array}\]  

(c) \[\begin{array}{c}
\triangleleft \\
\vdash \\
\end{array}\]  

(d) \[\begin{array}{c}
\propto \\
\triangleleft \\
\end{array}\]  

(e) \[\begin{array}{c}
\vdash \\
\vdash \\
\end{array}\]  

Explain your answer.
13. A Sudoku puzzle consists of a nine by nine square grid subdivided into nine three by three boxes. Some of the squares contain numbers. The object is to fill in the remaining squares so that every row, every column, and every three by three box contains each of the numbers one through nine exactly once. Solving a Sudoku puzzle involves pure logic. No guesswork is needed or even desirable. Be careful not to repeat a number where you shouldn’t, because a wrong answer may force you to start over. Try to solve the following Sudoku puzzle. Have fun!