Math Field Day

Mad Hatter A sample questions

(taken from previous years)

Note: the problems given below are examples of problems given in previous years. They do not cover all the topics that can occur on the contest this year. They are only intended to give you a rough idea of the difficulty of the problems that may be given.

1. You have 16 pairs of socks, 8 black and 8 blue, but they are not paired up. Instead, they are all mixed up in a drawer. It's early in the morning, and you don't want to turn on the lights in your dark room. How many socks must you pull out to guarantee that you have a pair of one color?

   (a) 2
   (b) 3
   (c) 4
   (d) 5
   (e) None of the above

2. If $5^{3\log_5 x} = 64$ then

   (a) $x = 15$
   (b) $x = 125$
   (c) $x = \frac{64}{3}$
   (d) $x = 4$
   (e) None of the above

3. If the diagonals of a rhombus are 6 and 8, then the side of the rhombus is:

   (a) 3
   (b) 4
   (c) 5
   (d) 6
   (e) None of the above

4. At a sandwich shop there are 2 kinds of bread, 5 kinds of cold cuts, 3 kinds of cheese, and 2 kinds of dressing. How many different sandwiches can be prepared using one kind of bread, cold cuts, cheese, and dressing?

   (a) 12
   (b) 50
   (c) 42
   (d) 30
   (e) None of the above

5. Solve: $|2x + 5| > 9$

   (a) $-7 < x < 2$
   (b) $x > 2$
   (c) $x > 2$ or $x < -2$
   (d) $x > 2$ or $x < -7$
   (e) None of the above

6. What is the probability of flipping a penny three times and seeing at least one head?

   (a) 25
   (b) 50
   (c) 75
   (d) 87.5
   (e) None of the above

7. Given that the statement *"all Glock numbers are divisible by 3 and are multiples of 7"* is **true**, find which one of the following statements is **true**:

   (a) 42 is a Glock.
   (b) All Glock numbers are divisible by 21.
   (c) All numbers divisible by 21 are Glocks.
   (d) 7 is a Glock.
   (e) None of the above is true or more than one true statement.

8. A car leaves point A going at 28 miles/hour. Five hours later another car leaves point A going at 63 miles/hour. How long will it take the second car to catch up with the first?

   (a) 5 hours
   (b) 12 hours
   (c) 4 hours
   (d) 7 hours 18 minutes
   (e) None of the above

9. Is the sum of two irrational numbers also an irrational number?

   (a) Always
   (b) Sometimes
   (c) Never
   (d) None of the above

10. How many different factors does the number 72^3 have?

    (a) 40
    (b) 50
    (c) 60
    (d) 70
    (e) None of the above

11. Suppose that a given square and a given circle have the perimeter and circumference equal to each other. Find the ratio of the circle's area to the square's area.

    (a) 4
    (b) π
    (c) $\pi/4$
    (d) $4/\pi$
    (e) None of the above