OKLAHOMA MATH DAY

INSTRUCTIONS FOR THE SOONER MATH BOWL

1. The team event will be run in three stages.

2. Each team may have 3–5 students and a school can send in as many teams as they like. Teams of sizes less than 3 or more than 5 will not be permitted.

3. Stage I consists of **4** rounds. In each round the teams will work on a problem or a set of problems together and write the answer on the sheet provided. Each round is timed and at the end of the allotted time the team will hand over their answer sheet to the monitor assigned to the team. Each round will be scored and the top **3** teams from Stage 1 will go on to compete in Stage 2. Only one team per school will be allowed to compete in Stage 2.

4. In Stage III the top two teams from Stage II will square off in soccer-style "penalty kick" rounds. At the end of these, if there is a tie, then a timed question will be used to determine a winner.

5. Calculators will **NOT** be allowed for the team event.

6. Scratch paper is provided. You may discuss the problem only with your team mates.

7. You must turn in the answer sheet when asked to do so since time is limited.

8. Since there are several teams competing we ask that you remain with your team at all times and not move about the room unless asked to do so.

Stage I: Round 1.

In the game of SCRABBLE what natural number equals its score when spelled out?

Note the following points for the letters:

A, E, I, O, U = 1 point each.

B, C = 3 points each.

D, G = 2 points each.

F, H, V, W = 4 points each.

J, X = 8 points each.

K = 5 points.

L, N, R, S, T = 1 point each.

M, P = 3 points each.

Q, Z = 10 points each.

Stage I, Round 2: Blitz Round.

You have 3 minutes to answer the following questions:

(a) Find the missing term in the Fibonacci sequence

$$1, 1, 2, 3, 5, 8, 13, \quad , 34, \ldots$$

(b) 10% of 20 is $x\%$ of 10; what is x?

(c) Which of the following is **not** a prime number:

79, 91, 101, 113, 127.

(d) There are infinitely many prime numbers: TRUE or FALSE?

(e) Consecutive prime numbers are separated by gaps. For instance, 2 and 3 are separated by a gap of 1; 17 and 19 are separated by a gap of 2. What is the largest gap between consecutive primes less than 100?

(f) How many edges does a cube have?

(g) Calculus was created in which century?

(h) At a dinner party for 5 people everyone shakes hands with everyone else. How many handshakes are exchanged?

(i) Today November 16th, 2002 is a Saturday. What day of the week will it be a year from now?

(j) Suppose you start from Norman and drive 500 miles due North, then 500 miles due East, then 500 miles due South and finally 500 miles due West. Where are you now in relation to Norman?

Stage I, Round 3.

Suppose you have tied a rope tightly around a basketball. How much longer would you have to make the rope so that it is suspended 1 foot above the equator of the basketball at all points?

Now suppose you have tied another rope tightly about the equator of Earth. How much longer would you have to make the rope so that it is suspended 1 foot above the surface of Earth at all points?

Note: The radius of a basketball is about 8 inches and the radius of Earth is about 4000 miles. 1 mile = 5280 feet; 1 foot = 12 inches.

Stage I, Round 4: Blitz Round.

You have 3 minutes to answer the following questions.

(a) Between noon and midnight, how many times do the hands of a clock coincide (including noon and midnight)?

(b) 3 married couples go to the theater. In how many ways can they be seated on 6 seats so that every person is seated next to their spouse?

(c) What is the smallest integer greater than $\frac{\sqrt{3}+\sqrt{7}}{2}$?

(d) Consider the number $N = 562847$ (which has 6 digits). How many digits does $\sqrt{N}$ have? (Ignore anything after the decimal.)

(e) Find the next row in the following sequence:

$$1$$

$$1\ 1$$

$$2\ 1$$

$$1\ 2\ 1\ 1$$

$$1\ 1\ 1\ 2\ 2\ 1$$

$$\vdots$$

Question 1 (a). How many squares in the figure below? (Which is a 3×3 square grid.)

(b) Now make a guess as to the number of squares on a chessboard. Recall that a chessboard is an 8×8 square grid.

Question 2. An ant finds itself on the Cartesian plane at the point with coordinates $(2, 3)$. It decides to move 1 unit along the line of slope $\frac{1}{2}$. What are the coordinates of its location after it has moved 1 unit?

Question 3. Tony has a large marble collection which he normally stores in 5 bags with an equal number of marbles in each bag. However, on Tuesdays he likes to put the marbles in three glass jars with an equal number of marbles per jar. But placing the marbles in jars requires that two marbles get left out of the jars. If Tony has over 100 marbles what is the smallest possible number of marbles that he could have?

Penalty kick-off round.

• What is the largest prime number less than 100?

• Suppose you are given a square and a circle and they both have the same area. The circle has radius 1. What is the length of a side of the square?

• If a square has diagonal $\sqrt{2}$, then what is its area?

• What is the most number of pieces you can cut a cake into by making three straight cuts?

• How many two digit numbers have at least one "2" in them?

• Which is larger: $\frac{1}{\sqrt{2}}$ or $\frac{7}{10}$?

• Which is larger: $(215)^{\frac{1}{3}}$ or $\sqrt{37}$?