Welcome to the 2018 Interschool Test!

You will be teased and tested on your knowledge of seven to ten trivia questions in each of five categories based on the word GAMES:

Geography and Other Fun Facts about the United States
All You Ever Wanted to Know About Mu Alpha Theta
Math and Science
Entertainment, Sports, and Literature
Seven Falls—"The Grandest Mile of Scenery in Colorado"

The answer to each trivia question is a non-negative number. These answers are to be used to solve the equation found at the end of each section for each letter G, A, M, E, and S.

But wait, there's more!! Once you have found the value of G, A, M, E, and S, you will substitute these values into the final equation to find the value of x.

Some general overall rules:

1. **NO TECHNOLOGY OF ANY KIND MAY BE USED ON THIS TEST.**
2. In determining the answers to the trivia questions, do not strain to find unusual ways to interpret any of the questions. Some may be difficult, but in each case the answer we believe to be correct is the most literal and straightforward one.
3. Do not round off any numbers unless specifically instructed to do so.
4. Where a square root appears, evaluate it as the positive square root only. Throughout the test, standard mathematical usage is in effect.
5. The values for G, A, M, E, S, x, and all trivia questions that appear on your answer sheet must be expressed in simplest form. For example, if your answer were $\frac{10}{5}$, you would write it as 2; if your answer were $\frac{10}{4}$, you would write it as $2\frac{1}{2}$ or 2.5.

Scoring:

Each correct trivia question answer is worth 2 points.
Each correct answer for G, A, M, E, S is worth 10 points.
The correct answer for x is worth 50 points.
Ties will be broken in the following manner:
   a. Correct answer for x
   b. Correct answer for G, A, M, E, S using the sudden death method
   c. Correct answer for trivia using sudden death method based on the order presented.

G=Geography and Other Fun Facts about the United States

a. Number of states that are singly, doubly, or triply landlocked (the state does not touch an ocean, gulf or bay)
b. House address of the official residence of the Vice President of the United States
c. Number of counties in Colorado
d. First three digits of the zip code of Las Vegas (site of the next National Convention) – First three digits of the zip code of this convention
e. Number of states that border the Colorado River
f. The combined age of the people pictured on Mount Rushmore on their last birthday
g. The total number of roller coasters in the four parks of the Walt Disney World resort in Orlando, FL
h. The number of state flags that are strictly red, white and blue
j. The quotient of the number of years between the oldest and the youngest living presidential children who coincidentally celebrate their birthdays one day apart (3/19 and 3/20) and the number of living presidential children:
k. The number of states admitted to the Union since 1900

Use your answers from this section in the following equation to find the value of G:

$$G = \frac{f^{(g-e)}\left(\dfrac{c}{j}\right)}{\left(\dfrac{d-a}{k}\right) + \left(h-b\right)}$$

A = All You Ever Wanted to Know About Mu Alpha Theta

   a. 2018 is the nth National Convention. What is n?
   b. The sum of the digits in the phone number for the National Office of Mu Alpha Theta
   c. As of this convention, the number of years that the Mathematical Association of America (MAA) has been a primary sponsor of Mu Alpha Theta
   d. The difference between the number of states that have hosted Mu Alpha Theta National Conventions (including this one) and the number of states that have never hosted a Mu Alpha Theta National Convention
   e. The number of Mu Alpha Theta National Officers
   f. The product of the number of conventions hosted by Mr. Todd Taylor and the number of conventions hosted by Dr. Thom Morris
   g. The year the official journal of Mu Alpha Theta, *The Mathematical Log*, was issued in print form
   h. The year the last issue of *The Mathematical Log* ran
   j. The number of Kalin Award recipients (including this year)
   k. The difference in the number of Student Delegate officers and Mu Alpha Theta Regions

   Use your answers from this section in the following equation to find the value of A:

$$A = \left(\sqrt{\dfrac{a+c}{\dfrac{f}{e} + j^k}} + (h-g) \right)^{(b-d)}$$

M = Math and Science

   a. $\sqrt[4]{384160000}$
   b. Reciprocal of 0.012345679
   c. Federal standards require Gigantic Motors to sell cars that average 27.5 miles per gallon. If the fleet average was 25 miles per gallon for the first 150,000 cars they sold, how many cars averaging 35 miles per gallon must they sell to bring the fleet average up to 27.5 miles per gallon?
   d. The difference between the largest value and smallest value numbers that can be written using the Roman numerals I, V, X, L, C, D, M only once.
   e. The average of the unique three digit numbers of Boeing Jets currently being used commercially
   f. I have a unique clock that displays the digits as words, not numerals. For example at 8:40 pm, its appearance is two zero: four zero. How many times each day does my clock show four different words in alphabetical order from left to right?

g. A sales director who lives in city A is required to fly to regional offices in cities B, C, D, and E. The chart below shows the one-way airfares between the cities. What is the difference between the cost using the Nearest Neighbor method and the optimal cost using the Brute Force method?

	A	B	C	D	E
A		180	114	147	128
B	180		116	145	195
C	114	116		169	115
D	147	145	169		194
E	128	195	115	194	

h. On New Year's Eve, the probability of a person driving while intoxicated or having a driving accident is 0.35. If the probability of driving while intoxicated is 0.32 and the probability of having a driving accident is 0.09, find the probability of a person having a driving accident while intoxicated

j. The book (and movie) *The Diving Bell and the Butterfly* tells the true story of Jean-Dominique Bauby (we will refer to him as J-DB). He was paralyzed from his chin down. He couldn't write, talk or even swallow, but he could think, turn his head a few degrees and blink his left eyelid. Whenever J-DB wanted to say something, he had to spell it out letter by letter. To assist him, his nurses and visitors would say the alphabet, or point to the letters of the alphabet on a card, and when they got to the right letter, he blinked. Then, they would go on to the next letter, starting over with the alphabet. This was a slow process, but was sped up by arranging the letters in frequency order, that is, the letters are listed by how often they are used in the written language—most to least. In English, the generally accepted order is **e, t, a, o, i, n, s, h, r, d, l, c, u, m w, f, g, y, p, b, v, k, j, x, q, z.** Using this order, the word *plus* would have the frequency order 19+11+13+7=50. What would be the frequency order of *mathematics*?

k. The number of elements in the periodic table that begin with the letter Z

Use your answers from this section in the following equation to find the value of M:

$$M = \left(\frac{ch}{a+e+g} \right)^{\left(\frac{j-k}{d-\sqrt{b}+f+10} \right)}$$

E = Entertainment, Sports, and Literature
a. Number of MLB franchises to have never won a division title (as of June 2017):
b. Number of tracks on the official *Hamilton* cast album.
c. If Prince William becomes King William, what number king will he be?
d. The number of people who have won an EGOT (Emmy, Grammy, Oscar, Tony) in a competitive, individual (non-group) category.
e. The difference of the largest number of MLB World Series championships won by one team and the largest number of NFL Super Bowls won by one team
f. $\left[\dfrac{\text{Jules Verne}}{\text{Ray Bradbury} \ \times \ \text{Joseph Heller}} \ \text{, George Orwell}\right]$ Hint: Think book titles
g. The sum of the number of times the words "one", 'five", "ten", "twenty" and "fifty" are spelled out on their respective Federal Reserve Notes
h. The number of the longest chapter in the Bible or the difference in the number of chapters in Psalms and the number of chapters in Proverbs
j. The sum of the number of "classic" Nancy Drew books and the number of original Hardy Boys books
k. The number of laps completed in the 'Indianapolis 500' race

Use your answers from this section in the following equation to find the value of E:

$$E = \frac{\left(\dfrac{f}{k}\right)}{h-j} + \sqrt[c]{dg-e} + \frac{b}{a}$$

S = Seven Falls—"The Grandest Mile of Scenery in Colorado"
a. This is the number of steps for the staircase from the base of the falls to the peak
b. This is the number of steps that the wheelchair accessible elevator bypasses to get to The Eagle's Nest Observation Platform:
c. The falls tumble this many feet down the head of the canyon:
d. The Pillars of Hercules are this high from the floor of the canyon:
e. Across from the pillars is the George Washington profile. At this point the canyon walls are this many feet apart.
f. There are this many hiking trails that begin at the top of Seven Falls.
g. You can recharge at Restaurant _____ after hiking the falls.

Use your answers from this section in the following equation to find the value of S:

$$S = \left(g - e^f\right) - \left(\frac{d-a}{b-c}\right)$$

Now use the answers from each section (G, A, M, E, S) in the following equation to find the value of x.

$$x = \left(\frac{A}{M-G}\right)\left(\frac{E}{S}\right)$$