2019 Southern Nevada Girls Math Tournament

Grade 7 Contest
General Round

Name: _____

RULES

1. The General Round consists of 25 problems.
2. The General Round must be completed individually.
3. You will have 40 minutes to complete the General Round.
4. You will receive 1 point for each correct answer.
5. There is no penalty for incorrect answers.
6. You may NOT use a calculator on this round.
7. Answers are to be written on the provided lines. Units are not required.

Score: ____/25 pts

1. _____ Aashrith, Bulmanese, and David each have 4 oranges. If Aashrith and Bulmanese give all of their oranges to David, how many oranges would David have?

2. _____ What is the largest number you could reach if you started counting by 2s and stopped before you went over 60?

3. _____ There exists a language called Flexiconian. In Flexiconian, each letter of the English language has n words that can be started using that letter. n is defined by the place of that letter. For example, there are ten words in Flexiconian starting with J, because J is the tenth English letter. In Flexiconian, how many words start with consonants that are not the letter N? (no words in Flexiconian start with N, and Y is considered a consonant in Flexiconian).

4. _____ Two fair six-sided dice are rolled. 5 faces can be seen, as one face must be on the ground. What is the probability that the sum on the five faces showing on each die is less than 30?

5. _____ Write $\frac{1+3+9+27}{81+243+729+2187}$ as a common fraction.

6. _____ I am a world-class water drinker. If I can drink 3 cups of water per second, how long in minutes will it take me to drink 100 gallons of water if there are 16 cups in a gallon?

7. _____ There are ten businessmen at a party. If each businessman shakes hand with others, how many handshakes take place?

8. _____ The radius of a 2-inch radius orange is increasing at a rate of 1 inch per second. What is the ratio of the volume of the orange now to the volume of the orange 1 second from now?

9. _____ What is the sum of the legs of all right triangles which have hypotenuse 25?

10. _____ A sphere is constructed with a diameter equal to that of the hypotenuse of a right triangle with legs 6 and 8. What is the volume of this sphere?

11. _____ A man has a plan to ban cans from the grand Japan dam. I am not a fan of the man's plan to ban cans, so I cram and slam cans onto the dam. I also demand Denny's Grand Slams™ with Fanta cans. The man bans cans, so I slam and cram Fanta cans onto the dam. If the dam can handle 300 cans, and I am able to snag 10 cans per Grand Slam, and each Grand Slam costs $10, how much money do I plan to spend to slam and cram cans onto the dam until it can't handle them?

12. _____ Everyone loves a "Moto-Moto chunky" circle. For a circle to be "Moto-Moto chunky", a circle has to have an area of 8π. If a circle's current diameter is 4, then by how much should the diameter expand to fulfill chunky requirements? Express the answer in the form $a\sqrt{b} - c$.

13. _____ Find the perimeter a the quadrilateral that, in order, has lengths 3,5,8, and D if it has an incircle.

14. _____ Sid slowly slips across steps as she senselessly sips on soda. For each sip, Sid slips six steps south. Sid sips six sips per second, so she stops every sixty slips for six sips. If she

should slip six hundred and six steps, for how many seconds did she sip?

15. _____ Across the Las Vegas valley, math girls are hailed as the coolest kids around (obviously). This creates a mad dash for girls to sign up for the All-Girls Math Tournament. In the first year of the tournament, 252 girls signed up. The next year, the top 40% of the girls from the previous year were invited back, along with 252 new girls. Each year this process repeats, with the top 40% of the girls being invited back alongside 252 new girls. Eventually, this will approach a constant number of n girls. What is n?

16. _____ Anna, Branna, Channa, Danna, Elanna, Franna, Gianna, and Hanna are seated around an octagonal table. How many distinct ways can the girls sit around the table, assuming any seating arrangement is the same when rotated?

17. _____ When Young LaFlame gains enough chakra, he enters Sicko Mode. When he enters Sicko Mode, LaFlame goes to the ranch, and creates a crop triangle. LaFlame creates an equilateral triangle ABC with side length 2, and appoints M the midpoint of BC. LaFlame, chooses points X and Y and traces them on AB and AC respectively such that triangle XMY is an isosceles right triangle with a right angle at M. What is the length of XY?

18. _____ Mateo sold two Louis Vuitton bags for $5,000 each. The first bag sold for a profit of 22%, and the second sold at a loss of 7%. What was the total percent profit on the sale of the two bags? Round to the nearest percent.

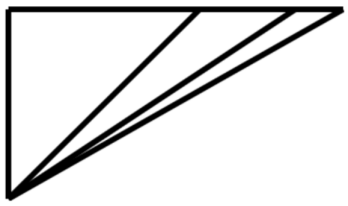
19. _____ How many permutations are there of the word MOTOMOTO?

20. _____ A box contains 4 fidget spinners and 1 fidget cube. Mateo and Hikmet take turns drawing a fidget toy out of the box without replacing it. Whoever draws the fidget cube wins. Mateo draws first. What is the probability that Hikmet wins?

21. _____ Bortman and his sidekick, Reuben, have been cooped up in the Bortcave for too long and need something to do. They begin to play a game where they take turns counting from one to one number more than the last number said by the other superhero. Bortman starts, saying, "1", and Reuben follows with "1,2." Bortman then says "1,2,3" and the game continues. However, the duo's nemesis, the Jonker, interrupts them immediately after the number 13 is said, and the duo stops playing this terrible game to bring the Jonker to justice. How many numbers in total were said by Bortman and Reuben?

22. _____ If $n!$ is equal to $(n)(n-1)(n-2)(n-3)...(2)(1)$, what is the greatest possible value of x if 2^x is a factor of 19! ?

23. _____ A right isosceles triangle with leg length 2 has infinite additional triangles with base length equal to half of the previous triangle constructed on the hypotenuse. What is the area of the figure?



24. _____ A magician tricks his audience into believing he can guess what card they pick by inconspicuously swapping out all of the cards in a normal deck for Kings of Hearts. However, this time he is getting cocky, so he picks a card at random from the normal deck to keep in the trick deck, with the rest of the cards being replaced by Kings of Hearts. What is the probability the audience member does not pick a King of Hearts out of the trick deck on their first pick, ousting the magician as a fraud and forever tarnishing his reputation?

25. _____ A Quambird is a bird whose diet consists of seeds and grain. For every 2 ounces of grain the Quambird eats, it eats 1 ounce of seeds. If the Quambird is locked in a dungeon with a cone-shaped mound of seeds and a cone-shaped mound of grain. The mound of grain has a height of $\frac{6}{\pi}$ in and a circular base with radius 2 in. The mound of seeds has a height of $\frac{3}{\pi}$ in and a circular base with radius 1 in. Both grain and seed have a weight of 1 ounce per cubic in. What is the weight of the remaining grain after all the seed is eaten?

2019 Southern Nevada Girls Math Tournament

Grade 7 Contest
Target Round

Name: _____

RULES

1. The Target Round consists of 8 problems.
2. The Target Round must be completed individually.
3. You will have 6 minutes to complete each pair of questions.
4. The Target Round consists of 4 pairs, or 8 questions.
5. You will receive 2 points for each correct answer.
6. There is no penalty for incorrect answers.
7. You may use a calculator on this round.
8. Answers are to be written on the provided lines. Units are not required.

Score: ____/16 pts

1. _____ Diesel and Braxxxtyn both take an IQ test, but Braxxxtyn isn't that bright. When Diesel asked what Braxxxtyn scored, he said embarrassedly, "My score is the value of x that satisfies: $x = \sqrt{x + \sqrt{x + \sqrt{x + \sqrt{x + \sqrt{x....}}}}}$ If it is literally impossible to score a zero on an IQ test, what was Braxxxtyn's score?

2. _____ Miss Rhodes is running a single elimination tournament where there are N teams. It is noticed that thirteen teams play at least seven games. Find the largest possible value of N.

3. _____ How many ways can one arrange four As,Bs,Cs in a line such that no As appear in the first four letters, no Bs appear in the next four letters, and no Cs appear in the next four letters?

4. _____ If $x + \frac{1}{x} = 3$, what is the value of $x^4 + \frac{1}{x^4}$?

5. _____ I have found that the only way I can defeat my haters is by dabbing on them. However, I am unsure how many haters I have or how long it will take me to defeat them. My accountant and my secretary both are tasked with calculating how long it will take me to defeat my haters. They both know how many haters I have, but I do not know yet. If my accountant calculates how long it will take if I defeat 10 haters a day and my secretary calculates how long it will take if I defeat 100 haters a week, and my secretary calculates a number of days 60 days shorter than my accountant, how many haters do I have?

6. _____ Famed singer/songwriter T-Pain is having a friend over for pie. However, T-Pain only baked one circular, two-dimensional pie, so, instead of just cutting the pie in half like a normal person, T-Pain cuts 2 smaller circular pies out of the first pie, where the diameter of the smaller pies are the radius of the larger pie. After cutting the 2 pies out, T-Pain uses his math genius to see that he has exactly 32π in^2 of the original pie left over. What is the radius of one of the smaller pies?

7. _____ Huhueyhewtohuen has a perfectly spherical afro. If the radius of his afro grows at a rate of 1 inch per day, how large is his afro after 15 days if he started bald?

8. _____ Find the ratio of the radius of the incircle of a 3,4,5 right triangle and the circumradius of the same triangle.

2019 Southern Nevada Girls Math Tournament

Grade 7 Contest
Team Round

Team Name: _____

RULES

1. The Team Round consists of 10 problems.
2. The Team Round must be completed in teams of up to 4.
3. Your team will have 20 minutes to complete the Team Round.
4. Your team will receive 1 point for each correct answer.
5. There is no penalty for incorrect answers.
6. You may use a calculator on this round.
7. Answers are to be written on the provided lines. Units are not required.

Score: ___/10 pts

1. _____ Yanny, Laurel and several friends are standing next to each other in line for Jonas Brothers tickets. They are each given a number in the line. Since they are standing next to each other, they are all given consecutive numbers. What is the maximum possible number of Jonas Brothers Fans in Yanny and Laurel's group (including Yanny and Laurel) if the sum of everyone's numbers is exactly 100 and no one has a negative number?

2. _____ Personality Dr. Phil has a perfectly hemispherical head. On the other hand, singer Ariana Grande has a perfectly cone-shaped chin. If you combined these two, what would be the volume of the head of "Phil Grande" if the height of Ariana Grande's cone chin is 3 inches, the hemispherical head of Dr. Phil has radius 6, and the two shapes have the same base?

3. _____ Call a currency "Ashish" if it has coins in denominations 1,b, b^2, and b^3, measured in Alexes. If the sum of all possible 2 coin arrangements for an "Ashish" currency is 255, find the value of the most valuable coin in Alexes.

4. _____ How many ways are there to arrange the digits 1 through 9 in a 5×2 grid, such that the numbers are increasing from left to right in each row and increasing from top to bottom in each column?

5. _____ There is a very tall man outside my window, standing on the ground. I live on the 6th floor of my apartment complex. His head is just tall enough so that it reaches the same height as my ceiling. The height of each floor in my complex, from floor to ceiling, is determined by the function where the nth floor has height of $[\frac{n^2}{3}]$ feet and there are 4 inches of insulation between floors. If the floor of the first floor is at the same height as ground level, how tall is the man outside my window in feet?

6. _____ Spencer is following a trail of sushi. Once he reaches the first piece, the second piece is twice as far from that point than the first piece of sushi was from Spencer's starting point. Once he reaches the second piece, the third piece is as far from that point as the second piece of sushi was from the first piece of sushi, and so on. If the first piece is now 1 foot from Spencer, how far does Spencer have to walk to eat 7 pieces of sushi?

7. _____ Jake Paul currently has 18,000,000 subscribers. Pewdiepie currently has 90,000,000 subscribers. If Jake Paul's new single, "I'm Single", is boosting his subscriber count 5 subscribers every second. Pewdiepie only gains 1 subscriber per second. How many hours will it take Jake Paul to pass Pewdiepie?

8. _____ I have three circles: one with radius 1, one with radius $\frac{4}{9}$ and one with radius R. The three circles are all externally tangent to one another. Find the value of R such that all three circles are all tangent to a single line.

9. _____ Find the number of strings of 1s and 0s (beginning with 1) of length 12 that have more 1s than 0s.

10. _____ Neo is fighting Agent Smith in the Matrix. The only way for Neo to beat Agent Smith is to become the one! To become the one, Neo must receive one as an output from this piecewise function. How many values could Neo input from 1-20 so that the function eventually ends up being a one? Example: Neo chooses n = 4. Neo receives 2, then 2 plugged in again receives 1.
{When n is even f(n)= n/2
{When n is odd f(n)= $n^2 - 1$