

Gauss School and Gauss Math Circle
2019 Gauss Math Tournament
Grade 3-4 (Gut Round 60 minutes, 7 Rounds each with 3 Problems)

Round 1 (3 Points)

1.1 If $\frac{1}{3}$ of 20 percent of a number is 12, what is the number?

1.2 How many ways are there to arrange 3 yellow and 3 pink frogs given that yellow frogs are indistinguishable from each other and pink frogs are also indistinguishable?

1.3 Susan and Douglas are running to a race. Doug runs a lap in 20 seconds and Susan runs it in 26 seconds. Given that Susan and Doug start together at the start line, after how many seconds would Susan and Doug be arrive at the start line again together?

Name _____

1.1. _____

1.2. _____

1.3. _____

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Round 2 (4 Points):

2.1 Consider a geometric series with first term $\frac{1}{8}$. If the 5th term is 162, what is the 6th term?

2.2 If a fair six-sided die is rolled twice, what is the probability that the sum is 10?

2.3 If $a=15$, $b=29$ and $c=30$, what is $\frac{a^2+b^2+c^2+ab+ac+bc}{(a+b)^2+(a+c)^2+(b+c)^2}$?

Name _____

2.1. _____

2.2. _____

2.3. _____

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Round 3 (6 Points)

3.1 What is the largest possible area of a rhombus with side length 6?

3.2 How many ways are there to use 4 letters from the word GAUSS to make a new sequence of letters? (Note: GAUS is different from SUAG)

3.3 What is the smallest positive integer with at least 15 factors?

Name _____

3.1. _____

3.2. _____

3.3. _____

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Round 4 (7 Points)

4.1 Simon has a fancy machine that takes any number x , and outputs the value $x^2 - 6x + 7$. What is the sum of the values of x that outputs -1 ?

4.2 Given that the value $12x + 7y$ is a multiple of 17 , what is the remainder when $11x + 5y$ is divided by 17 ?

4.3 What is the area of the incircle of a triangle with side lengths 13 , 14 , and 15 ?

Name _____

4.1. _____

4.2. _____

4.3. _____

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Round 5 (8 Points):

5.1 If we roll 4 dice, what is the probability that the product will equal to 4?

5.2 What is the sum of $1^2 + 2^2 + 3^2 \dots + 30^2$?

5.3 Leo's favorite number is the least perfect square that is divisible by 60, what is it?

Name _____

5.1. _____

5.2. _____

5.3. _____

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Round 6 (10 Points):

6.1: A bag of chips contains 49 good chips and 2 bad chips. However, the bad chips are twice as likely to get picked up as the other 49 chips. What is the probability that Jason will pick a bad chip?

6.2: A snail is climbing up from a hole. Everyday it goes up by 5 meters however every night it goes down by 3 meters. Provided that that snail starts at the bottom of a hole of height 15 meters, how many days would it take for the snail to arrive at the top?

6.3: The sum of 8 distinct positive integers is 500. Provided that at least 5 of them are even, what is the largest possible number for any one of these integers?

Name _____

6.1. _____

6.2. _____

6.3. _____

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Round 7 (12 Points)

7.1: A triangle with 3 integer lengths is formed. Two of the side lengths are 2 and 3, however, the third length is unknown. Heron is plugging in integers for the third side length that make a triangle. What is the largest possible area of the triangle?

7.2: Simon is trying to factor this equation, but to no avail. Determine how many positive integer solutions there are to $xy - 2x - 2y + 3 = 0$.

7.3: How many rectangles are there in a 4 by 4 board?

Name _____

1. _____

2. _____

3. _____

Gut Round Answers:

Round 1:

1.1: 180

1.2: 20

1.3: 260

Round 2:

2.1: 972

2.2: $1/12$

2.3: $\frac{1}{2}$

Round 3:

3.1: 36

3.2: 36

3.3: 144

Round 4:

4.1: 6

4.2: 0

4.3: 16π

Round 5:

5.1: $5/32$

5.2: 9455

5.3: 900

Round 6:

6.1: $4/53$

6.2: 9

6.3: 466

Round 7:

7.1: $3\sqrt{15}/4$

7.2: 2

7.3: 100