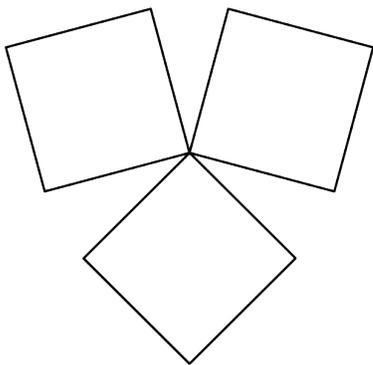


**Gauss School and Gauss Math Circle**  
**2017 Gauss Math Tournament**  
**Grade 3-4 (Sprint Round 50 minutes, 40 Questions)**

1. What is  $2007 \cdot 2006 - 2006 \cdot 2005$ ?
2. John flips a fair two sided coin twice. What is the probability of obtaining two heads?
3. Given that  $x+1=7$ , what is  $3x+4$ ?
4. A rectangle has side lengths 3 and  $x+3$ . The area of the rectangle is 33. What is the value of  $x$ ?
5. Betsy Ross can sew 18 flags in one day. Given that Betsy sews for 16.5 days, how many flags has Betsy created?
6. How many 1 by 1 by 1 cubes can fit inside a 5 by 10 by 15 box?
7. Susan Boyle is famous for being rich. She originally has 7 million dollars. However, she decided to donate 400,000 dollars to charity. How many dollars does Susan have left?
8. Given that  $7x=15y$ ,  $3y=19z$ , how many  $x$  is equal to  $95z$ ?
9. Babe Ruth hits a baseball and sends it flying. The ball flies for 100 seconds, and traveled 1,250 feet. What is the average speed of the ball in feet per second? (Round your answer to the nearest tenth.)
10. What is the sum of the first 21 positive integers?
11. Solve the following system of equations:
  - $x+1=2y+3$
  - $2x+3y=7$Provide your answer as an ordered pair  $(a,b)$ . Use fractions if necessary.
12. Sarah has 20 socks in her sock drawer: 5 blue socks, 5 red socks, 5 yellow socks, and 5 orange socks. She takes out socks one at a time. How many socks does she have to take out to be sure she has two of the same color?
13. It takes 60 workers 10 days to make 4800 pairs of shoes, assuming that all workers work at the same rate each day. Under the same conditions, how many days does it take for 100 workers to make 2000 pairs of shoes?
14. Donald eats 5 Cheetos per minute and Eric eats 3 Cheetos per minute. How long, in minutes, will it take for Donald and Eric together to eat a bag of 64 Cheetos?
15. There are 20 cookies in a jar. Alice eats  $\frac{1}{2}$  of them, and Bob eats  $\frac{1}{5}$  of the remaining cookies. How many cookies are left?

16. Carla's dad is 4 times her age. Carla's younger sister, Maria, is  $\frac{1}{3}$  of Carla's age. How many times Maria's age is her dad's age?
17. What is the sum of the first 7 prime numbers?
18. How many  $2 \times 1$  floor tiles would be needed to tile a  $5 \times 10$  floor?
19. Kelly runs a lemonade stand. If each cup of lemonade costs \$1 to make and sells for \$1.50, how many cups would she have to sell to make a profit of \$7.50?
20. Kevin has 7 shirts, 4 pairs of pants, and 3 pairs of shoes. Given that an outfit consists of 1 shirt, 1 pair of pants, and 1 pair of shoes, how many different outfits can he make?
21. Al and Bob run a 12-mile race. If Al runs at 5 miles per hour and Bob runs at 4.5 miles per hour, by how many minutes does the winner beat the loser?
22. If a chicken is worth 4 ducks and a turkey is worth 55.5 chickens, how many ducks are 4 turkeys worth?
23. In Paul's zoo, there are donkeys and elephants. The elephants are mutant elephants, and have 2 legs instead of 4. If there are 435 total animals and 1258 total legs, how many elephants are there in the zoo?
24. In 15 years, Sam's age will be 3 years less than twice his age now. How old was he 2 years ago?
25. Daniel slept for 10 hours and 26 minutes. He fell asleep at 9:35pm. What time did he wake up?
26. Felicity, Scott, Tim, and Frank ran a race. Scott finished third; Tim finished neither directly before nor directly after Scott; and Felicity finished after Frank. Which runner placed fourth?
27. James and Mike have a total of 45 marbles. If James has 3 marbles for every 2 marbles Michael has, how many marbles does James have?
28. Bob calculates  $(5-2)*3-(2+1)*2$ . Tom calculates  $5-2*3-2+1*2$ . What is the absolute value of the difference between their results?
29. The perimeter of a regular pentagon is 60. The perimeter of a square is 52. Which has the larger side length?
30. Simplify  $x + 2 + x + 2 + x + 2 + x + 2 + x + z + x + 2 + x + 2 + x + 2 + x + 2$ .
31. What is the next number in this sequence? 2, 6, 11, 17, ...
32. Which number is closer to zero,  $-\frac{4}{5}$  or  $\frac{5}{4}$ ?
33. Find the sum of all two-digit integers which are both prime and are 1 more than a multiple of 10.

34. How many ways are there to choose 3 vertices from a regular hexagon such that no two vertices share a common side? (Rotations and reflections are considered distinct.)
35. Seven boys and three girls are playing basketball. How many different ways can they make two teams of five players so that both teams have at least one girl?
36. Which one of the following gives an odd integer?  
(A)  $12^2$  (B)  $35-17$  (C)  $98*241$  (D)  $96/8$  (E)  $19*41$
37. The diagram below shows a 12-sided figure made up of three congruent squares. The figure has total perimeter 60. Find its area.



38. The clock reads 4:36pm. What is the degree measure of the smaller angle formed by the hour and minute hands?
39. How many numbers between 1 and 343 are divisible by at least one of 2, 3, and 5?
40. Spot the dog is tied by a 3-meter leash to one vertex of the outside of a building that is shaped like a regular hexagon, whose sides each measure 2 meters long. Assuming that Spot cannot stretch or break the leash, and assuming he cannot go inside the building, what is the area of the region he has access to? Give your answer in terms of  $\pi$ .

### **Sprint Round Ends**

**Gauss School and Gauss Math Circle**  
**2017 Gauss Math Tournament**  
**Grade 3-4 (Target Round 20 minutes)**

1. Given a triangle with coordinates  $(2, 3)$ ,  $(2, 7)$ , and  $(17, 2017)$ , find the area of the triangle.
2. John like to eat pie. He eats 1 slice of pie on day one, 4 slices of pie on day two, 9 slices of pie on day three. In general he eats  $n^2$  slices of pie on day  $n$ . Find the amount of pie he would eat in 20 days.
3. In a kingdom there are two types of people: Knaves and Knights. Knaves will always lie and Knights would always tell the truth. John, Jacob, and Jonas are people who live in this kingdom. Given that one of them is a Knight, and the others are all Knaves determine the person who is the Knight, given these statements.
  - i. John: Jacob is knave.
  - ii. Jacob: John is a knave.
  - iii. Jonas: John am a Knight.
4. Given a  $2*6$  domino, how many ways are there to tile it with  $1*2$  dominos.
5. Gary, the snail is in a hole 10 feet deep. Everyday, Gary climbs 3 feet, but at night he moves down 2 feet. Determine the amount of days Gary takes to get out of the hole.
6. Susan Boyle, takes drugs to lose weight. Given that her  $1/10$  of the drugs she takes disappear from her systems after one hour. How much drugs would be in her system in the third hour if she take 1000 mg of drugs in the 0th hour, 1st hour, 2nd hour, and 3rd hour.
7. Marvin the frog jumps either left, right, up or down one unit on a plane. Given that Marvin starts at the origin. Determine the probability that Marvin moves to the point  $(2,0)$  at the end of 6 minutes.
8. What is the smallest integer  $n$ , such that the  $1445n$  is a perfect cube?

**Target Round Ends**

Name: \_\_\_\_\_ Grade: \_\_\_\_\_ Division 1

Sprint Round Answers:

1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	

17		37	
18		38	
19		39	
20		40	

Target Round Answers:

1		5	
2		6	
3		7	
4		8	

## **Grade 3 and 4 Answer Key**

### **Sprint Round**

1. 4012
2.  $\frac{1}{4}$
3. 22
4. 8
5. 297
6. 750
7. 6,600,000
8. 7
9. 12.5
10. 231
11.  $(\frac{20}{7}, \frac{3}{7})$
12. 5
13. 2.5
14. 8
15. 8
16. 12
17. 58
18. 25
19. 15
20. 84
21. 16
22. 888
23. 241
24. 16
25. 8:01 (am)
26. Felicity
27. 27
28. 4
29. Square
30.  $9x + 16 + z$
31. 24
32.  $-\frac{4}{5}$

33. 215

34. 2

35. 105

36. E

37. 75

38. 78

39. 251

40.  $19 \frac{1}{3}$

Target Round Answer Key:

1. 34

2. 2870

3. Jacob

4. 13

5. 8

6. 3439

7.  $\frac{225}{4096}$

8. 425