

**2004 Mount Rainier Math Invitational
Sixth Grade Individual Test**

Written by Kristina, Cyurry, Jerrad, and Anna

Reduce all fractions and answers should be left in terms of π .

Questions 1-20 are worth 2 points each

1. What is the probability of flipping three heads in a row on a fair coin?
2. Toni wants to buy a veil, which costs \$7.95 each. If she has \$22, how many complete veils can she buy?
3. Evaluate: $(263 + 2) \div 5 - 6 + 2 \times 4$
4. What is the product of the first 11 whole numbers?
5. Evaluate the following: $1/3 + 5/8 + 7/12$
6. What is the greatest common factor of 54 and 81?
7. What is the sum of $1 + 2 + 3 + \dots + 8 + 9 + 10$?
8. What is the positive square root of 25?
9. What is the next number in the sequence? 2, 4, 6, 8, 10, ?
10. How many inches are in 2.5 feet?
11. What is the maximum number of points of intersection between a circle and a square?
12. Evaluate $((((2!)!)!)!) + 3$
13. A square has area 6. When the sides of the square are doubled, what is the new area?

(next page)

14. If the sum of the squares of the legs of a right triangle is 144, what is the length of the hypotenuse?
15. $3x + 2y = 9$
 $2x + 2y = 7$
What is the value of y ?
16. What is the maximum number of pizza slices you can get by making 5 cuts in a single pizza? Assume that the pizza is 2-dimensional, and stacking slices is forbidden by math world.
17. Schmatt has a standard 52 card deck. What's the probability of drawing a queen or a heart?
18. What is the volume of a cube with side length $4\sqrt{6}$?
19. Neff has 6 hats, 3 sweatshirts, 12 t-shirts, and 2 pairs of pants. If an outfit consists of 1 hat, 1 sweatshirt, 1 t-shirt, and 1 pair of pants, how many distinct outfits does he have?
20. Eric sleeps 5 hours a night. Kristina sleeps 3 hours a night. After 7 nights, how many more hours of sleep did Eric get than Kristina?

Questions 21-30 are worth 3 points each

21. What is the number of diagonals in a regular decagon?
22. How many distinct ways are there to arrange the letters in the word RAINIER?
23. Rachel is twice as old as Kate. In five years, Kate will be two-thirds as old as Rachel. How old is Kate now?

(next page)

24. Anna has 2 dogs. Nick has 5 parrots. Robert has 12 goldfish. Alan has 7 baboons. Michelle has 4 snakes. If all the pets with fur turn into snakes, how many pets stayed in their original form?
25. Anne, Annie, Anna, Annabel, and Anastasia went to the office supply store to buy scientific calculators, but there were only three calculators available. How many possible ways are there for the girls to distribute the calculators?
26. Mt. Rainier plays ultimate Frisbee against Bellevue, TJ, and Garfield. How many total games were played if each team had to play every other team three times?
27. A frog is trying to climb up a 49 foot high well. The frog climbs up 6 feet during the day but slips down 4 feet during the night. In how many days does the frog climb out of the well?
28. The area of a rectangle is 240. The longer side has length 24. What is the length of the diagonal of the rectangle?
29. Mr. Tosch, Ms. Smith, Mr. Roths, and Mr. Norris are doing the hokey-pokey. Chick, Neff, and Mak are playing DDR. Nick, Rachel, Long, John, Chi-Ming and Robert are dancing in the rain. Andrew, Anna, and Justin are reciting poetry. Triple C, Krusty, Aeriq, Portopoise, Snuck, and Seamus are playing video games. How many times does the letter "R" appear in this problem, including this sentence?
30. Josh, Jon, Joel, Jie, Jerrad, and Jack are in a race. Joel does not finish last. Jack did not finish in the top two or bottom three. The probability of Jon winning is zero. Josh gets sidetracked and did not win but did not lose. Jerrad finishes in the top half. Jie runs really fast and wins. Who finishes second?

2004 Mount Rainier Math Invitational
Sixth Grade Team Geometry

Written by Nick Moen

Leave answers in terms of π .

Questions 1-5 are worth 2 points each

1. How many edges can be drawn connecting any two dots in a plane containing 9 distinct dots placed around a circle?
2. Jahon and Chi-Ming are walking around a $\frac{1}{4}$ mile track at constant. When Jahon has finished his third lap, Chi-Ming has finished his second lap. How many laps will Jahon have done when Chi-Ming has finished his 12th lap?
3. How many squares of any size can be found in a 4x5 checkerboard?
4. What is the volume of a cone with base area 3π and height 4?
5. If a right triangle with integral sides has a perimeter of 36, and the hypotenuse is 15, then what is the ratio of the smaller leg to the larger leg?

Questions 6-10 are worth 3 points each

6. How many square tiles with side length 3 inches are required to cover a rectangular floor with side lengths 5 feet and 8 feet?
7. Robert is 6 feet tall. His shadow is 15 feet long. At the same time, Justin, who is 4 feet tall measures his shadow. How long is his shadow in feet?
8. One interior angle of a nonagon is 60° . The other 8 angles are of equal measure. What is the measure of one of the other 8 interior angles?
9. A geometric sequence starts with 3, 9,... What is the 5th term?
10. What is the distance between the points (3, 5) and (-3, -3)?

**2004 Mount Rainier Math Invitational
Sixth Grade Team Algebra**

Written by Alan Mak

Questions 1-5 are worth 2 points each

1. Solve for x : $3x + 4 - 6 + x = 2 + x - 3$
2. Evaluate when $A=2$ and $B=4$: $A-B(A+B)/A$
3. I want to buy a Radio that costs \$250. But there is a 30% discount on the price due to a sale. How much will I pay after the discount?
4. The sum of two numbers is 47 and their difference is 15. What are the two numbers arranged higher to lower?
5. Alan picks a number. First he subtracts 4, and then he adds 6, then multiplies it by 3, and finally subtracts 3 ending up with 129. What is his number?

Questions 6-10 are worth 3 points each

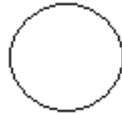
6. Find all possible values of x in the equation: $x^2 + 5 = 21$
7. MakII built a rectangular aviary for his flying ninjas to sleep in. Its length is 4 times as long as its width. Its area is 324 square feet. What is the length of his aviary in inches?
8. If y is positive, what is the value of y when x is 11 in the expression:
 $y^2 = x^2 + 9x - 24$
9. Simplify (by multiplying) the expression: $(3x + 2)(2x + 4)$
10. Mak, Paul, Neff, and Chick form a bicycle relay team each racing 1 mile. Their average speeds were: Mak (30 mph), Paul (20 mph), Neff (10 mph) and Chick (12 mph). What was their average speed over the 4-mile course in mph?

2004 Mount Rainier Math Invitational
Sixth Grade Team Who Wants to be a Mathematician
Written by Ryan Mak

Any wrong answer and you will lose any points past the last "safe zone" (after questions 4 and 8). You may use up to two Lifelines by putting "LL" as the answer for a question. There is no credit for the questions with "LL" as an answer but they are not counted as a wrong answer.

Questions 1-4 are worth 1 point each

1. Name the shape below, (yes it is perfectly round, and is not a square).



- (A) Circle (B) Square (C) Football (D) Diamond
2. What is 42% of 100?
(A) 42 (B) 12 (C) 100 (D) 84
3. What is the area of the shape from problem 1, (which is a circle if you couldn't tell), if its diameter is 8?
(A) 16π (B) 8π (C) 64π (D) 44π
4. If Crazy Jane drives at 60 miles per hour how long, in minutes, will it take her to go 4692 miles?
(A) 69 (B) 4080 (C) 68 (D) 4692

Questions 5 - 8 are worth 2 points each

5. If the sum of 2 numbers is 9 and their difference is 11, what is the smaller of the 2 numbers?
(A) 10 (B) 0 (C) -1 (D) 1
6. If Eric has got 34, 87, 27, and 65 on his last four tests, what must he get on his next test if he wants his average to be 62?
(A) 97 (B) 62 (C) 54 (D) 43

(next page)

7. Yoyo's mother is three times as old as he is today. In ten years, she will only be twice his age. How old is Yoyo now?
 (A) 12 (B) 5 (C) 16 (D) 10
8. In how many ways can I arrange the letters in the word "Eternity"?
 (A) 40322 (B) 10080 (C) 5040 (D) 20160

Questions 9 - 11 are worth 3 points each

9. On my way to St. Ives I met with a very interesting man who had a lot to tell me about. This man you see had seven wives each with seven cats. Each cat had seven sacks filled with seven necklaces. While I was listening I found some coins on the ground. There were five pennies, two nickels and one dime. How many different sums of change could I make if I didn't have to use all the coins but could? And each of those necklaces in the bags had seven pearls imbedded in them. A lot could have been going to St. Ives.
 (A) 1 (B) 16807 (C) 29 (D) 25
10. Divide 1837342038 by 87 and call this number A. Now sum the digits of A. Now divide the sum of the digits by the last digit of A to get the number B. How many distinct positive factors does B have?
 (A) 6 (B) 4 (C) 3 (D) None of These
11. Find the mean of the mode and median of the following set of data, (1, 2, 5, 5, 6, 2, 3, 7, 4, 2, 6, 5, 8, 2, 1, 4, 1, 5, 1, 9, 6, 3, 8, 8, 5, 6, 1, 2, 8, 7, 6, 5, 21, 2, 4, 11, 4, 4, 9, 7, 3, 5, 4, 5, 1)
 (A) 4.5 (B) 5 (C) 5.5 (D) 6

Question 12 is worth 4 points

12. Find the next term in the following sequence that describes the past, with each term being inside the brackets: (1), (11), (21), (11,12), (31,12), (21,12,13), (31,22,13).....
 (A) (13,22,31) (B) (41,12,13,14) (C) (21,22,23) (D) None of These

2004 Mount Rainier Math Invitational
Sixth Grade Team Pressure Round

Written by Jerrad Neff

Reduce all fractions. You must turn in an answer to a problem at 3, 6, 9, 12 and 15 minutes. The first answer turned in is worth 3 points, the second 4 points, ..., and the fifth is worth 7 points.

1. If the hypotenuse of a right triangle is 39 units long, and one of the legs is 15 units long, what is the area of the triangle in units squared?
2. Paul has 47 pairs of white socks, 64 pairs of grey socks, 23 pairs of green socks, and 4 pairs of orange socks. If he picks at random, how many socks will he have to pick to guarantee that he gets at least 3 separate matching pairs?
3. Jerrad can mow a lawn in 27.2 minutes, Tony can mow the same lawn in 1.5 hours, and Alan can mow the same lawn in 3 hours. How many minutes will it take Tony and Alan to mow the same lawn working together, if Jerrad is too lazy to do it?
4. Evaluate: $9!$
5. Find the sum of the solutions of the equation: $9x^2 - 27x + 18 = 0$