

2002 Mount Rainier Math Invitational
Sixth Grade Individual Test
written by Jack Bader, Elaine Hart and Dylan Harper

Reduce all fractions and answers may be left in terms of π or use 3.14 for π .

Questions 1- 20 are worth 2 points each

1. Dylan washed his blue car exactly once every three weeks for three years. How many times did he wash his car in the three years? (Assume that there are 52 weeks in a year)
2. If it rains $1\frac{2}{7}$ inches per hour for 24 hours in Seattle and $\frac{47}{3}$ inches per hour for 2 hours in New York, then how much more does it rain in New York than in Seattle?
3. George W. Bush went to the store and saw that artichokes were on sale, four for \$2.50. If he bought six, how much did he pay?
4. If the sum of the squares of the legs of a right triangle is 81, what is the length of the hypotenuse?
5. If Alison wins two out of every five scrabble games she plays, how many will she win in her next twenty games?
6. What is the least common multiple of 21 and 49?
7. If Abel, Bob, and Chris each get a dollar for each hour they Jump Rope for Heart, and Abel jumps $3\frac{1}{2}$ hours, Bob jumps $2\frac{3}{4}$ hours, and Chris jumps $4\frac{1}{5}$ hours, how much money do they raise?
8. Find $A + B + C + D$ in the following expression, if there are all distinct single digits.

$$\begin{array}{r} \text{DAC} \\ \times \text{A} \\ \hline \text{BDA} \end{array}$$

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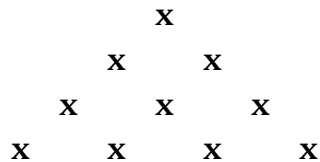
9. During the past six weeks, Ashley has spent between \$10 and \$16 on lunch every day. Between what two numbers is the total amount of money that Ashley has spent on lunch during this time?
10. What is $120 - 13 \times 3 + 5$?
11. Sarah bought four packets of note cards with 16 cards in each packet, and used all but six of them. How many did she use?
12. What is $3 \frac{5}{7}$ divided by $\frac{3}{8}$?
13. If Mt. Rainier High School paid \$3870 for its new display board in 18 equal payments, then how much was each payment?
14. What is the tenth number of the following sequence: 1, 21, 40, 58, 75, 91...?
15. If Dylan's car loses 10% of its value each year, and it is worth \$10,000 now, how much will it be worth in three years?
16. Chang makes \$2.32 an hour. How much money does he earn in 7.5 hours?
17. A square has area 5. When the sides of the square are doubled, what is the area of the new square?
18. If a football field is 120 yards by 1800 inches, how many square feet does it cover?
19. What is the value of $8(3x + 2)$ when $2x + 3 = 9$?
20. If Shang is a friend to all of Brian's friends, and Shang is a friend to Porter, does Brian have to be a friend to Porter?

Questions 21- 30 are worth 3 points each

21. If there are 2 boys to every 4 girls in Group A, which has 24 total people, and there are 5 boys to every 3 girls among the 16 people not in Group A, how many total boys are there?

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22. What is the 8th number in the following sequence: 0, 3, 8, 15, 24...?
23. Ashley is three years older than Blake. Four years ago, she was twice as old as he was. How old is Blake now?
24. If two fair dice are thrown, what is the probability that the sum is prime?
25. If the diameter of a circle is the same as the side of a square with area 36, what is the area of the circle (in terms of π)?
26. In a bucket with 5 blue marbles and 3 red marbles, what is the probability that two consecutive red marbles will be drawn, without replacement?
27. Jeanie has 45 plants. If she wants to arrange them in a triangle like the pattern below, how many rows will her triangle have?



28. The area of a rectangle is 240. The longer side is length 24. What is the length of a diagonal of the rectangle?
29. Jim has a gym in Jamestown (population: 31,415,926). In Jamestown, everyone is always at either Jim's Gym or Jen's Jewelry Shop, buying gems. Jim's Gym only has 15 fitness stations. In order for Jim to be jolly, there must be at least one, but no more than two people at each fitness station. When Jim is jolly, what is the difference between the maximum and the minimum number of people that are buying Jen's gems?
30. How many times can 8 lines intersect each other in a single plane?

2002 Mount Rainier Math Invitational
Sixth Grade Team Algebra Test
written by Daniel Walton

Reduce all fractions and answers may be left in terms of π or use 3.14 for π .

Questions 1- 5 are worth 2 points each

1. Solve for x: $3x = x + 6$
2. Evaluate: $3 - 2 \cdot 5 + 4 / 2$
3. Find the positive value of x where: $\frac{12}{x^2} = 3$
4. A Nuclear plant was recently constructed near Old McDonald's farm. Instead of raising normal cows and chickens, he now raises chickens with one head and three legs and cows with one head and one leg. Not including Old McDonald himself, there are 23 legs and 11 heads. How many three-legged chickens does Old McDonald have?
5. If $x^2 = 9$, then find all possible values of x.

Questions 6- 10 are worth 3 points each

6. If the notation $f @ g = f + g - (f \cdot g)$, find $3 @ -1$.
7. Simplify completely: $\frac{x^{12}y^3z^5}{x^{11}y^2z^4}$
8. Solve for x: $3x + 8 = 20 - 4x$

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9. There are 20 Nutra-grain bars in a box. Randi and her brother each eat two bars a day. If their mom can only buy whole boxes of Nutra-grain bars, how many boxes would she need to buy to last one month (31 days)?

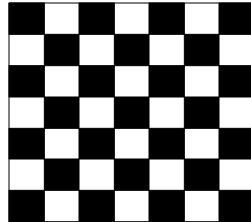
10. Nolan and Kjell are running in a cross-country race. Nolan can run at 3 meters per second while Kjell can only run at 2 m/s. Because he is nice, Nolan lets Kjell start the race 10 meters in front of the starting line. If they both start at the same time, how many meters from the starting line is the point where Nolan catches Kjell?

2002 Mount Rainier Math Invitational
Sixth Grade Team Geometry Test
written by Kristina Haller

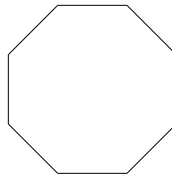
Reduce all fractions and answers may be left in terms of π or use 3.14 for π .

Questions 1- 5 are worth 2 points each

1. How many squares of any size can be formed in a 7x7 chessboard?



2. What is the number of diagonals that can be formed in the regular polygon below?



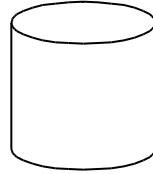
3. Given a rectangle whose perimeter and area are numerically the same with a length of 6, what is the width?
4. What is the area of a triangle with side lengths of 5, 12, and 13 inches?
5. What is the volume of a cube with side length 6, minus the surface area of the same cube?

Questions 6- 10 are worth 3 points each

6. If the circumference of a circle equals 14, what is the area of the circle?

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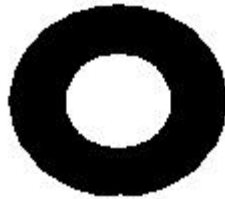
7. If you added the number of sides in a decagon to the number of degrees in one internal angle of a regular pentagon, the result would be?
8. What is the surface area (top, bottom and sides) of the cylinder below, given the height is 12 and the diameter is 8?



9. What is the number of letters in the alphabet below with rotational symmetry?

a b c d e f g h i j k l m n o p q r s t u v w x y z

10. What is the area of the shaded region if the radius of the large circle is 20 and the diameter of the small circle is 10?



2002 Mount Rainier Math Invitational
Sixth Grade Team Pressure Round
written by Kjell Hansen

Reduce all fractions and answers may be left in terms of π or use 3.14 for π . 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. I take $\frac{1}{4}$ of a pizza of diameter 16" by removing a circle of pizza from the pizza's center. What is this piece's diameter?
2. Mykel is 4 years older than Carli. 8 years ago, Mykel was twice as old as Carli. How old is Carli?
3. Every 4 weeks one of my socks gets lost in the laundry. I lost a sock yesterday and now have 6 identical pairs. I'll buy new socks when I have less than two pairs left. How many weeks from now will I buy new socks?
4. It is 12:17 now. In how many minutes will the hour and minute hands be 165 degrees apart?
5. If $28=kx^2$ when $x=2$, then what does x equal when $63=kx^2$

2002 Mount Rainier Math Invitational
Sixth Grade Team Who Wants to be a Mathematician
written by Sara Hughes

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 that question but it does not count as a wrong answer. You will have 20 minutes for this test.

Questions 1- 4 are worth 1 point each

1. How many sides does a hexagon have?
A) 5 B) 6 C) 7 D) 8
2. What is $47 + 35$?
A) 82 B) 71 C) 96 D) 87
3. How many prime numbers are between 30 and 50?
A) 4 B) 3 C) 7 D) 5
4. What is the next number in the sequence: 1, 1, 2, 3, 5, 8, 13, ___ ?
A) 18 B) 21 C) 15 D) 24

Questions 5- 8 are worth 2 points each

5. If two angles of a triangle are 30° and 60° , what is the number of degrees in the other angle?
A) 30° B) 60° C) 90° D) 120°
6. If I roll two fair six-sided dice, what is the probability that the numbers add up to 4?
A) $\frac{1}{12}$ B) $\frac{1}{3}$ C) $\frac{2}{9}$ D) $\frac{5}{36}$
7. Solve for x: $2x + 14 = 4x + 2 - x$
A) 15 B) 4 C) 12 D) 8

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8. What is the area of a circle with a circumference of 12 ?
A) 24 B) 48 C) 36 D) 144

Questions 9- 11 are worth 3 points each

9. How many 3x3 squares are in a square with an area 81 units?
A) 9 B) 36 C) 27 D) 25
10. In how many ways can I arrange the letters in the word "RAINIER"?
A) 28 B) 1260 C) 2520 D) 5040
11. What is the units (ones) digit of 4 raised to the power of 2002?
A) 2 B) 4 C) 6 D) 8

Question 12 is worth 4 points

12. What is the area of the figure below if each triangle is a right triangle with side lengths 5, 12, and 13 units?
A) 240 B) 120 C) 360 D) 480

