

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Individual Test**

Student Name: \_\_\_\_\_ Team #: \_\_\_\_\_

School Name: \_\_\_\_\_

Problems 1-20		2 pts each	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Subtotal			

Problems 21-30		3 pts each	
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational**  
**Sixth Grade - January 27, 2006**  
**Individual Test**

written by Kate Iwamoto and Michelle Fong

Put all answers on the colored answer sheet. All fraction answers must be reduced. You should leave appropriate answers in terms of  $\pi$ .

<b>Problems 1 through 20 are worth 2 points each</b>	
1	What is the slope of the line that goes through the points (2,3) and (7,15)?
2	Jane flips a fair coin three times and gets two heads and one tail. What is the probability of flipping the coin again and getting a head?
3	What is the probability of rolling a sum of three or twelve when rolling two fair six-sided dice?
4	What is the volume, in cubic meters, of a box with height 3 meters and a base with area 25 square meters?
5	What is $111 \cdot 999$ ?
6	What is the hypotenuse in a right triangle with bases (legs) 7 cm and 24 cm?
7	If bananas cost \$0.23 each and Anna has \$2.00, how many bananas can she buy?
8	If Catherine has the first four Harry Potter books, how many different ways can she arrange them on her bookshelf?
9	What is $1+1+1+1+1+1+1$ ?
10	Chris played Scrabble four times every four weeks for four years. How many times did he play Scrabble in four years? (Assume that there are 52 weeks in a year.)
11	What is the positive square root of $35-19$ ?
12	Kate and Michelle are throwing a Frisbee back and forth. If Michelle always throws a Frisbee so that Kate must walk 5 meters to retrieve it and Kate walks a total 600 meters to retrieve the Frisbee, how many times has Michelle thrown the Frisbee?
13	What is the sum of the first 20 positive integers?
14	What percent of 20 is 7?
15	There are 14 bagels for every 2 bodles, there are 7 bodles to one bickle, and there are 3 bickles to one yodel. How many bagels are in 4 yodels?
16	What is the sum of the first 14 positive odd integers?
17	Evaluate: $2+6(4^2)-9/3+16-3(5+2)$

18	What is the next number in the series 3, 9, 21, 45, ___?
19	How many ways can you arrange the letters in the word SHOES?
20	The measures of the angles of a triangle are in the ratio of 4:5:6. What is the measure of the smallest angle?
<b>Problems 21 through 30 are worth 3 points each</b>	
21	There were 10,000 people living in Mathville in 2003. The next year, the population decreased by 10%. The year after, the population in Mathville increased by 10%, what was the final population?
22	In a basketball game, the Sonics have four times as many points as the Lakers. The Lakers make a three-point shot. The Sonics and Lakers are now tied. How many points does each team have?
23	What is the area of a circle with a circumference of $20\pi$ ?
24	$11111 + 22222 + 33333 + 44444 = 22222 \times \underline{\hspace{2cm}}$ ?
25	Joe gives his Ichiro baseball card to Jack. Then he gives away $\frac{2}{3}$ of his baseball cards to Michelle and then sells three of his remaining cards to Robert. If he gives $\frac{1}{2}$ of what is left to Anna and then only has five baseball cards, how many did he originally have?
26	How many diagonals can be drawn in a regular nonagon?
27	What is the 6 <sup>th</sup> number in this sequence: 2, 5, 17, 65, ...?
28	If Harry Potter's wand loses 10% of its value each year, and it is worth \$30,000,000 now, how much will it be worth in 5 years?
29	What day of the week is 365 days from this Friday?
30	Twelve people attended a party. All the males ate 5 cookies each and all the females ate three cookies each. If a total of 48 cookies were eaten, how many males attended the party?

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Individual Test**

Student Name: KEY

Team #: KEY

School Name: \_\_\_\_\_

Problems 1-20		2 pts each	
1	12/5		
2	1/2		
3	1/12		
4	75 [cu. m]		
5	110889		
6	25 [cm]		
7	8 [bananas]		
8	24 [ways]		
9	8		
10	208 [times]		
11	4		
12	120 [times]		
13	210		
14	35		
15	588 [bagels]		
16	196		
17	90		
18	93		
19	60 [ways]		
20	48 [degrees]		
Subtotal			

Problems 21-30		3 pts each	
21	9900 [people]		
22	4 [points]		
23	$100\pi$		
24	5		
25	40 [cards]		
26	27 [diagonals]		
27	1025		
28	\$17,714,700		
29	Saturday		
30	6 [males]		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Algebra Test**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

Problems 1-5		2 pts each	
1			
2			
3			
4			
5			
Subtotal			

Problems 6-10		3 pts each	
6			
7			
8			
9			
10			
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Algebra Test**

written by Anna Cunningham and Micaiah Michaela

Put all answers on the colored answer sheet. All fraction answers must be reduced. You should leave appropriate answers in terms of  $\pi$ .

<b>Problems 1 through 5 are worth 2 points each</b>	
1	If $a=2$ , $b=5$ and $c=-4$ , what is $ab - ac + bc$ ?
2	What is the point of intersection of the lines $y=2x-1$ and $x+2y=8$ ?
3	Robert is asking a girl out. In response, she will say yes, say no, or slap him. There is a $\frac{2}{5}$ chance of her saying no, and a $\frac{1}{3}$ chance of him being slapped. What is the probability that she will say yes? Express your answer as a common fraction?
4	Find the 17 <sup>th</sup> number in the sequence 5, 9, 13, 17, ...
5	Micaiah and Robert play Warcraft from 9:00pm until 10:30pm. If Robert kills one monster every three minutes, and Micaiah kills seven monsters for every five that Robert kills, how many monsters did they kill all together?
<b>Problems 6 through 10 are worth 3 points each</b>	
6	If $5x-7 = x+3$ , what is $x^2$ expressed as a decimal to the nearest tenth?
7	Roysch is writing a program. If he pushes a wrong button twice every minute and has to press the "delete" key to fix it, and it takes 2000 presses for the delete key to stop working, how many hours will it take until Roysch's "delete" key stops working? Assume Roysch doesn't stop to eat or sleep while he is programming. Express your answer as a mixed number fraction.
8	The amount of girlfriends Andrew has is $(c^3-8)/14$ , where $c$ equals the number of computers he owns. If Andrew owns four computers, but then half of girlfriends break up with him, how many girlfriends does he currently have?
9	There are penguins and polar bears in the Coca-Cola commercial. If a skeptical viewer (who knows that penguins and polar bears live on opposite poles) counts 54 feet and 20 heads, how many penguins are there in the commercial?
10	What is the largest prime factor of 2006?

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Algebra Test**

School Name: KEY

Team #: KEY

Problems 1-5		2 pts each	
1	-2		
2	(2,3)		
3	4/15		
4	69		
5	72 [monsters]		
Subtotal			

Problems 6-10		3 pts each	
6	6.3		
7	16 2/3 [hours]		
8	2 [girlfriends]		
9	13 [penguins]		
10	59		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Geometry Test**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

Problems 1-5		2 pts each	
1			
2			
3			
4			
5			
Subtotal			

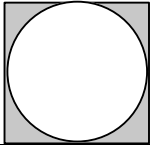
Problems 6-10		3 pts each	
6			
7			
8			
9			
10			
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational**  
**Sixth Grade - January 27, 2006**  
**Team Geometry Test**

written by Robert Cunningham

Put all answers on the colored answer sheet. All fraction answers must be reduced. You should leave appropriate answers in terms of  $\pi$ .

<b>Problems 1 through 5 are worth 2 points each</b>	
1	A square has a perimeter of 16. What is its area?
2	Trevor is installing a tile floor in his 12 foot by 4 foot kitchen. The tiles are 6 in. square and cost \$1.50 each. How much will Trevor have to pay to tile his floor?
3	The ratio, width to height, of all TV screens on planet Jeshika is 4 to 3. TV screen size is measured by the distance from top left corner to bottom right corner. Eric has a 10 inch TV and Andrew has a 20 inch TV. What is the ratio of Andrew's TV to Eric's in terms of screen area?
4	An ant sits at one corner of a sugar cube with side length 1 cm. If he walks along the edges and faces, what is the shortest length he walks to the farthest corner on the other side of the cube?
5	In the drawing below, a circle is inscribed inside a square with side length 8 in, what is the area of the shaded region? 
<b>Problems 6 through 10 are worth 3 points each</b>	
6	A person 4 feet tall casts a shadow 7.5 feet long. What is the length, in feet, from the tip of the person's head to the tip of the shadow's head?
7	A pentagon has two interior angles measuring 72 degrees and 33 degrees respectively. What is the average of the remaining interior angles, in degrees?
8	A triangle has two sides of length 9 feet and 3 feet. What is the difference between the longest and shortest possible integer lengths of the third side?
9	What is the volume of a rectangular prism with sides of length 5.5, 4, and 3.5?
10	After acting very strangely, Matt was sent to a home where he lives in a padded room with a base of 20 feet by 20 feet and a height of 12 feet. To keep him occupied, his doctors gave him paint and told him to paint every wall and the ceiling. One bucket of paint covers 100 square feet. How many whole buckets of paint did Matt need to complete the task?

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Geometry Test**

School Name: KEY

Team #: KEY

Problems 1-5		2 pts each	
1	16		
2	\$288		
3	4:1 or 4		
4	$\sqrt{5}$ [cm]		
5	$64-16\pi$ [sq. in]		
Subtotal			

Problems 6-10		3 pts each	
6	8.5 [feet]		
7	145 [degrees]		
8	4 [feet]		
9	77		
10	14 [buckets]		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

<b>Round</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Question #</b>					
<b>Points</b>	0 or 3	0 or 4	0 or 5	0 or 6	0 or 7
				<b>Total</b>	

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

<b>Round</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Question #</b>					
<b>Points</b>	0 or 3	0 or 4	0 or 5	0 or 6	0 or 7
				<b>Total</b>	

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 1

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 1

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 2

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 2

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 3

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 3

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 4

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 4

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

## Round # 5

Question #	Answer

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

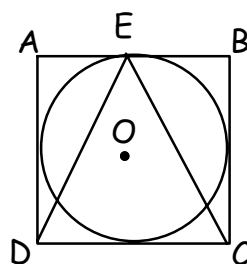
## Round # 5

Question #	Answer

**Mount Rainier Math Invitational**  
**Sixth Grade - January 27, 2006**  
**Team Pressure Round**

written by Trevor Thompson and Matt Hin

Put all answers on the colored answer sheet. All fraction answers must be reduced. You should leave appropriate answers in terms of  $\pi$ . The first answer submitted is worth 3 points, the second 4 points, ..., and the fifth answer is worth 7 points. You may turn in your answers in any order but each question may only be answered once!

1	<p>Each letter stands for a digit and</p> $\begin{array}{r} \text{EARS} \\ + \text{EARS} \\ \hline \text{SPEAR} \end{array}$ <p>What does <math>P \times E</math> equal?</p>
2	 <p>Square ABCD circumscribes triangle DEC and circle O. The area of triangle DEC is 8, what is the area of circle O.</p>
3	What is the sum of all prime numbers between 0 to 30?
4	If Trevor flips 6 coins, what is the probability that he gets a head on his 1 <sup>st</sup> , 3 <sup>rd</sup> , and 5 <sup>th</sup> coins only?
5	Evaluate: $\frac{2[4^2 - 2 - 6 \cdot (-2)]}{(-3 + 4)^2}$

Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team Pressure Round

School Name: KEY

Team #: KEY

1	48
2	$4\pi$
3	129
4	$1/64$
5	52

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team "Who Wants to be a Mathematician"**

School Name: \_\_\_\_\_ Team #: \_\_\_\_\_

Problems 1-4		1 pt each		
1				
2				
3				
4				
Problems 5-8		2 pts each		
5				
6				
7				
8				
Problems 9-11		3 pts each		
9				
10				
11				
Problem 12		4 pts		
12				

TOTAL	
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**Mount Rainier Math Invitational**  
**Sixth Grade - January 27, 2006**  
**"Who Wants to be a Mathematician"**  
 written by Anna Cunningham

Put all answers on the colored answer sheet. Answers left blank will not be scored; any wrong answer will result in no further answer being scored. Be careful, check your work and don't guess!

<b>Problems 1 through 4 are worth 1 point each</b>	
1	Square ABCD has side length two. What is its perimeter? A) 2                      B) 4                      C) 6                      D) 8
2	Catherine has three lions, two tigers and seven bears (oh my!) How many animals does she have all together? A) 17                      B) 12                      C) 23                      D) 10
3	What is 87 divided by 3? A) 29                      B) 37                      C) 27                      D) 28
4	How many ways are there to arrange the letters in the word RUNNER? A) 180                      B) 120                      C) 720                      D) 240
<b>Problems 5 through 8 are worth 2 points each</b>	
5	Evaluate: $2 \times 3 + 4 \times 5$ ? A) 50                      B) 26                      C) 32                      D) 23
6	Anna and Andrew are running a 5-kilometer race. If Anna runs 15 kph and Andrew runs 10 kph, how many more minutes will it take Andrew to finish the race than Anna? A) 5                      B) 10                      C) 15                      D) 20
7	Constance and Nicole are practicing their scales for band. If Constance has a $\frac{3}{4}$ chance of playing all the notes correctly and Nicole has a $\frac{1}{5}$ chance of missing one or more notes, what is the probability that both girls play every note correctly? A) $\frac{3}{20}$ B) $\frac{12}{20}$ C) $\frac{3}{5}$ D) $\frac{4}{5}$
8	If Devon flips four fair two-sided coins, what is the probability that he gets exactly three heads? A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$
<b>Problems 9 through 11 are worth 3 point each</b>	
9	What is the area of a circle with circumference $8\pi$ ? A) $16\pi$ B) $64\pi$ C) $4\pi$ D) $8\pi$

10	Find the 15 <sup>th</sup> term in the sequence: 4, 6, 9, 13, ... A) 51                      B) 120                      C) 123                      D) 133
11	A rectangular prism has side of areas 28, 36 and 63. What is the volume of the prism? A) 127                      B) 254                      C) 189                      D) 252
<b>Problem 12 is worth 4 points</b>	
12	Eric Bredberg and Matt Perry are entering a beauty contest. The first place prize is \$20, the second place prize is \$10 and the third place prize is \$5. If there is only one other person in the contest and the judges randomly pick the prize order, what is the probability that Eric and Matt's combined winnings total at least \$25? A) 2/3                      B) 1/3                      C) 1/2                      D) 3/5

**Mount Rainier Math Invitational  
Sixth Grade - January 27, 2006  
Team "Who Wants to be a Mathematician"**

School Name:     **KEY**     Team #:     **KEY**    

Problems 1-4		1 pt each		
1	D			
2	B			
3	A			
4	A			
Problems 5-8		2 pts each		
5	B			
6	B			
7	C			
8	C			
Problems 9-11		3 pts each		
9	A			
10	C			
11	D			
Problem 12		4 pts		
12	A			

TOTAL	
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**Mount Rainer Math Invitational**  
**January 27, 2006**  
**Sixth Grade Puzzle Answers**

- 1) It seems like there should be multiple answers since the score and the number of problems only gives two equations but there are three possible scores for each question. The fact that the numbers of questions have to be integers gives us the third statement to be true. In fact, after a little algebra: 7 times the correct answers plus 2 times the blanks equals 88. The number of correct answers must be 10.
  
- 2) The two numbers are 16 and 17. Naturally, a prime number may not go into a number even if all the integers less than it do. It is also true that the power of a prime number has the same property.
  
- 3) Without being cut the surface area would be 6 faces times 9 sq. meters or 54 sq. m. Each face now is missing the center 1 sq. m. but has a hole whose outside has 4 faces of 1 sq. m. The total surface area is then  $54 + 6 \times 3 = 72$  sq. m.

**Mount Rainer Math Invitational**  
**January 27, 2006**  
**Sixth Grade Puzzles**

- 1) You had to answer 20 questions on a test. For every correct answer you get 5 points, but for every incorrect answer you lose 2 points. If you do not answer a question, you get 0 points for it. One of your classmates received 48 points on this test. How many correct answers did she give?
  
- 2) In a math class the teacher wrote a number on the board. One of the students said: "It is divisible by 31." Another student said: "It is also divisible by 30." the third student said: "It is also divisible by 29." And so on, and finally the 30th student said: "It is also divisible by 2." Then the teacher said that out of all of these observations only two consecutive statements were incorrect. Which two consecutive numbers did not divide into the number on the board equally?
  
- 3) You have a cube; each edge is 3 meters long. In the middle of every face you cut a 1 meter by 1 meter square-shaped hole all the way through to the opposite face. The edges of the holes are parallel to the edges of the cube. What is the total surface area of this solid?