

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
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
Fifth Grade - January 23, 2009
Individual Test

Put all answers on the colored answer sheet. All fraction answers must be reduced.

Problems 1 through 20 are worth 2 points each	
1	Evaluate: $\left(\frac{3}{8} + \frac{1}{8}\right)$
2	Kelsey has 5 shirts, 3 pairs of jeans, and 2 pairs of boots. How many outfits can she make if an outfit consists of one shirt, one pair of jeans, and one pair of boots?
3	Ignoring units, what is the numerical sum of the area and the perimeter of a square with a side length of 4?
4	Tim likes to garden. His rectangular garden has an area of 80 square feet. $\frac{1}{4}$ of his garden is tulips, $\frac{1}{8}$ is roses, $\frac{3}{8}$ is potatoes, and $\frac{1}{4}$ is corn. How many square feet of the garden has flowers if potatoes and corn are not considered as flowers?
5	A duck has two legs and one head. A sheep has four legs and one head. If Stacey counts 24 legs and 7 heads outside her bedroom window, how many sheep did she see?
6	What is the probability of rolling an even number on a six-sided die?
7	How many sides does a dodecagon have?
8	How many 2x2 squares fit into a 8x12 rectangle?
9	Solve for x: $3x + 17 = 50$.
10	Fleur owns a flower boutique. A complete bouquet consists of 3 roses, 4 daisies, and 2 cabbages. If Fleur has 60 roses, 76 daisies, and 32 cabbages in stock, how many complete bouquets can she make?
11	True or false: $3 + 5 > 2 + 7$?
12	Kayleigh has a jar containing 3 blue marbles, 5 yellow marbles, and 12 puce marbles. If she randomly picks a marble from the jar, what is the probability that it will be yellow?
13	What is the sum of the integers between 1 and 20, inclusive?
14	Spencer earns 100 dollars for every eye exam he gives. He wants to save up enough money for a \$10,000 car. What is the least amount of eye exams will he have to give?
15	Evaluate the sum of the following sequence: -3, -2, -1, 0, 1, 2, 3, 4, 5
16	How many diagonals can be drawn in a regular decagon?

17	A triangle has an area of 72 and base of 12. What is the height of the triangle?
18	Simba, Nala, Timon, and Pumbaa are watching the "Lion King." They ate $\frac{2}{3}$ of their food when Scar crashes their party and eats $\frac{1}{2}$ of their remaining food. What fraction of the food is left?
19	What is the difference between the areas of a circle with radius 15 and a circle with radius 9?
20	What is the surface area of a rectangular prism with side lengths 4, 5, and 10?
	Problems 21 through 30 are worth 3 points each (Congratulations. Pat yourself on the back when you get to this point.)
21	Evaluate: $\frac{1}{17} + \frac{2}{3} \times \frac{9}{16} \times \frac{24}{27} \times \frac{33}{34}$
22	Matt and Moth are crocheting sweaters for their cats. Matt can crochet a sweater, by himself, in five minutes. Moth can crochet a sweater by himself in four minutes. If Matt and Moth work together to crochet 81 sweaters, how long (in hours) would it take?
23	How many ways can the word CUIDADO be rearranged?
24	There are six fish in a pond. Moth eats five of them (RAW). If two of the fish are radioactive, what is the probability that Moth ate at least one contaminated fish?
25	My refrigerator is running. It runs at a constant speed of 48 miles/hour. If my refrigerator starts running from my house at 2:00 pm, and I don't notice that it's missing until 3:00 pm, at what time will I catch it (assuming that I take the same path it does and I run at a constant speed of 60 miles/hour)?
26	Every time a cat washes its hands, Qayleigx throws 2 waters bottles off a cliff. For every time Qayleigx throws a water bottle off a cliff, Stacey stomps her foot 2 times. For every time Stacey stomps her foot, Buerta visits 3 U.S. state capitols. If Buerta visits 48 state capitols, how many times did a cat wash its hands?
27	Stacey is playing her piccolo in my ear. I take out my French horn and break her piccolo. She begins to cry and wail out the prime factors of 1001. What numbers does she wail?

28	There are 6 weeks until swim season starts. To prepare for swim season, Berta swims one mile a day for the first week. She swims two miles a day for the second week, three miles a day for the third week, and so on. How many total laps did she swim (during the six weeks) if there are 32 laps in a mile?
29	Spencer and Jon are having a contest. They take turns flipping a fair coin until one of them gets a "head" and that person is declared the winner. If Spencer goes first, what is the probability that he will eventually win?
30	How many ordered pairs of integers (x,y) are there such that $x^2 + y^2 \leq 16$?

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Individual Test

Student Name: KEY

Team #: KEY

School Name: _____

Problems 1-20		2 pts each	
1	$\frac{1}{2}$		
2	30		
3	32		
4	30 [sq. ft.]		
5	5		
6	$\frac{1}{2}$ or 50%		
7	12		
8	24		
9	11		
10	16		
11	False		
12	$\frac{1}{4}$ or 25%		
13	210		
14	100		
15	9		
16	35		
17	12		
18	$\frac{1}{6}$		
19	144π		
20	220		
Subtotal			

Problems 21-30		3 pts each	
21	$\frac{13}{34}$		
22	3		
23	2520		
24	1 (or 100%)		
25	7:00pm		
26	4		
27	7, 11, 13		
28	4704		
29	$\frac{2}{3}$		
30	49		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
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
Fifth Grade - January 23, 2009
Team Algebra Test**

Put all answers on the colored answer sheet. All fraction answers must be reduced.

	Problems 1 through 5 are worth 2 points each
1	Complete the arithmetic sequence: 4, 11, 18, __, __
2	What is the next prime number after 53?
3	What is the least common multiple of 4, 5, and 12?
4	Suhmiin has a fish tank filled with 25 fish. If all but 5 die, how many fish are left in the fish tank?
5	Which is larger: 3^2 or 2^3 ?
	Problems 6 through 10 are worth 3 points each
6	Solve for z: $28 + 6z = 16 + 12z$
7	In March, Ken gave Barbie a bracelet with 60 rubies. Unfortunately the bracelet was poorly manufactured and every month 3 rubies fall off! If Barbie now has 42 rubies on her bracelet, what month is it?
8	A \$20 sweater is on sale for 20% off. If Kayleigh only has \$10.24 in her piggy bank, how much should she ask her mother for if she only needs enough money to pay for the sweater? (Exclude tax.)
9	Harry is studying for his potions examination, Professor Snape assigns 28 potions to be memorized. If Harry memorizes 1 potion the first hour, 2 more potions the second hour, and 3 more potions in the third hour and so on... How many hours will it take to memorize all 28 potions?
10	Tim leaves Seattle at 2:00pm going to Chicago in a plane traveling 200mph. Mary leaves Chicago at 3:00pm going to Seattle in a plane traveling 300mph. If it is 2000 miles between Seattle and Chicago, how far has Tim traveled when the planes pass each other?

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Algebra Test**

School Name: KEY

Team #: KEY

Problems 1-5		2 pts each	
1	25, 32		
2	59		
3	60		
4	5		
5	3^2		
Subtotal			

Problems 6-10		3 pts each	
6	2		
7	September		
8	\$5.76		
9	7 [hours]		
10	920 [miles]		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Geometry Test**

School Name: _____ Team #: _____

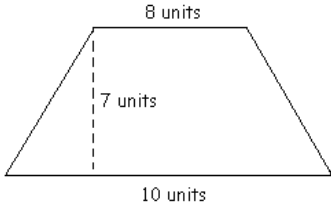
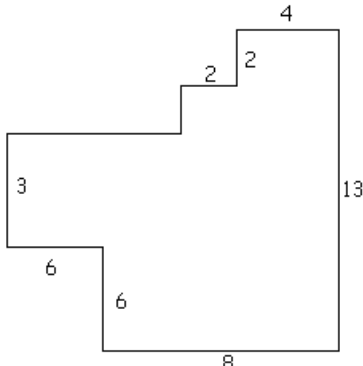
Problems 1-5		2 pts each	
1			
2			
3			
4			
5			
Subtotal			

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

TOTAL		
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**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Geometry Test**

Put all answers on the colored answer sheet. All fraction answers must be reduced.
Leave answers in terms of π .

Problems 1 through 5 are worth 2 points each	
1	What is the y-intercept of the line that goes through the points (6,5) and (0,3)? Use (a,b) notation.
2	What is the perimeter of a regular hexagon with side length 7?
3	True or False: A dodecagon has 52 diagonals.
4	What is the surface area of a cube with a side length of 6?
5	Ignoring units, what is the product of the area of a square with side length 5 and the area of the trapezoid below?
	
Problems 6 through 10 are worth 3 points each	
6	I have six sticks. They have lengths of 1, 2, 3, 4, 5, and 6. How many distinct triangles can I form? I can reuse the sticks to make a different triangle.
7	There is a tap dancing dolphin on my shoulder. He hops off and tap dances along the perimeter of my rectangular rug. My rug is 6' x 10' and the tap dancing dolphin dances at a constant rate of 60 steps per 4 feet. How many steps does the dolphin take?
8	What is the area of the following shape?
	
9	What is the sum of the interior angles of a nonagon?
10	What is the area of an isosceles right triangle with a hypotenuse of 7?

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Geometry Test**

School Name: KEY

Team #: KEY

Problems 1-5		2 pts each	
1	(0,3)		
2	42		
3	False		
4	216 (units ²)		
5	1575 (units ²)		
Subtotal			

Problems 6-10		3 pts each	
6	7		
7	480 [steps]		
8	110 (units ²)		
9	1260(°)		
10	$\frac{49}{4}$ (units ²)		
Subtotal			

TOTAL		
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**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round	1	2	3	4	5
Question #					
Points	0 or 3	0 or 4	0 or 5	0 or 6	0 or 7
				Total	

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round	1	2	3	4	5
Question #					
Points	0 or 3	0 or 4	0 or 5	0 or 6	0 or 7
				Total	

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 1

Question #	Answer

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 1

Question #	Answer

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 2

Question #	Answer

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 2

Question #	Answer

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

School Name: _____ Team #: _____

Round # 3

Question #	Answer

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

School Name: _____ Team #: _____

Round # 3

Question #	Answer

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 4

Question #	Answer

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round**

School Name: _____ Team #: _____

Round # 4

Question #	Answer

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

School Name: _____ Team #: _____

Round # 5

Question #	Answer

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

School Name: _____ Team #: _____

Round # 5

Question #	Answer

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

Put all answers on the colored answer sheet. All fraction answers must be reduced. 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	How many distinct factors of the number 100 are divisible by 5?
2	There are 13 apples on the table. Your friends takes two, eats one, then puts one back onto the table. You take five, eat two, and put two apples back onto the table. How many apples do you have?
3	I have a standard deck of 52 cards. If I remove the 'Jack of Diamonds', the 'Seven of Spades', the 'Two of Diamonds', the 'Ace of Hearts', and all of the Kings from the deck, then what is the probability of drawing a card of the 'Clubs' suit?
4	Let A = the number of prime numbers between 1 and 50, and B = the sum of $\sqrt{169}$ and $\sqrt{144}$. What is $A + B$?
5	A store sells lime sodas for \$2.50 per can and cherry sodas for \$3.00 per can. If I have \$75 and buy 12 cans of lime soda, how many cans of cherry soda can I get with the rest of my money?

Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team Pressure Round

School Name: KEY

Team #: KEY

1	6
2	1
3	3/11
4	40
5	15

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
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
Fifth Grade - January 23, 2009
"Who Wants to be a Mathematician"

Put all answers on the colored answer sheet. Answers left blank will not be scored; any wrong answer will result in losing the value of the question. Be careful, check your work and don't guess!

Problems 1 through 4 are worth 1 point each	
1	Matt is running from the law and needs to get to his hideout. If he is 4 km away from his hideout and the cops, traveling 90 mph, are 6 km away, what is $2 + 5$? A) 6 B) 7 C) 3 D) 20 km/h
2	The math team needs 20 recruits before the new year. If, by December, they have 8 new recruits how many must they recruit in the month of December? A) 12 B) 8 C) 20 D) 2
3	Stacey has 14 jackets and 1 sweatshirt in her closet, what is the probability that she randomly draws a sweatshirt out? A) $\frac{1}{14}$ B) 1 C) $\frac{1}{15}$ D) $\frac{14}{15}$
4	Evaluate: $3 - 4 \times 2 + 7$ A) 5 B) -9 C) 8 D) 2
Problems 5 through 8 are worth 2 points each	
5	The probability of it raining on a single day is $\frac{1}{3}$, if there are 30 days in April, how many rainy days would you expect in April? A) 3 B) 10 C) 20 D) 30
6	I have \$100 in my pocket. My friend Bertha borrows \$12. Stacey takes \$25 from my pocket as I'm lending Bertha the money. I pay back my mom twice as much money as the amount Stacey took. Bertha pays me back $\frac{3}{4}$ of the amount that she borrowed from me. After all of these transactions, how much money do I have in my pocket? A) \$13 B) \$34 C) \$8 D) \$22
7	How many 2 in. x 2 in. x 2 in. cubes does it take to build a 10 ft x 10 ft x 10 ft cube? A) 125 B) 1,500 C) 216,000 D) 512,000
8	What's the largest prime factor of 2008? A) 251 B) 3 C) 2 D) 1

Problems 9 through 11 are worth 3 points each	
9	<p>Bert and Ernie are tired of living together. Bert kicks Ernie out so Ernie has to find an apartment to live in for 3 months (his mother will take him in after the 3 months). If he finds two apartments, one with a down payment of \$300 and a monthly rate of \$150 and another with a down payment of \$400 and a monthly rate of \$100. How much money will he save if moves into the second apartment?</p> <p>A) 25 B) 100 C) 200 D) 50</p>
10	<p>Tom takes a 2×2 square piece of paper and cuts it in two along the main diagonal. He then takes one of the halves and cuts it into two equal pieces from the right angle to the hypotenuse. Finally, he again takes one of these halves and cuts it again into two equal pieces from the right angle to the hypotenuse. How long was this last cut?</p> <p>A) $\frac{\sqrt{2}}{3}$ B) $\frac{\sqrt{2}}{2}$ C) 1 D) $\sqrt{2}$</p>
11	<p>Eight friends are running a relay race. Bertha receives the baton from Stacey. Ryan has the baton before Trevor, but after Matt. Eric gives the baton to Trung, only after receiving it from Ryan. Bertha does not have the baton before Trung. No one passes the baton to Anna. Bertha passes the baton to Trevor, who finishes the race with it. In which order did Ryan receive the baton?</p> <p>A) 2nd B) 3rd C) 4th D) 5th</p>
Problem 12 is worth 4 points	
12	<p>John can eat an entire plate full of snicker doodles in 2 hours, while John and Mark together can eat the 8 plates of snicker doodles in 9 hours. At this rate, how long will it take Mark by himself to consume 7 plates of snicker doodles?</p> <p>A) 10 hours B) 14 hours C) 18 hours D) 20 hours</p>

**Mount Rainier Math Invitational
Fifth Grade - January 23, 2009
Team "Who Wants to be a Mathematician"**

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

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

TOTAL	
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Mount Rainer Math Invitational
January 23, 2009
Puzzle Answers

1) $g+b=30$ means g and b are both odd or both even, in either case they differ by an even number. We $gx+by=gy+bx+2$ or $g(y-x)=b(y-x)-2$ or $g=b-2/(y-x)$. So $y-x$ must be 1 or 2. It can't be 2 because then g would be 1 less than b . So $g=14$ and $b=16$.

2) A lot of trial and error got me: 76,543,210.

3) (1) Andrew and Burt are the same
(2) Charlie and Danny are different
(3) Eli, Andrew are the same
(4) Burt, Charlie are different
(5) Danny is a FROG, so
Only Charlie is a Kangaroo and there are 4 Frogs

Mount Rainer Math Invitational - January 23, 2009
Puzzles

Name: _____

School: _____

- 1) There are 30 students in a class, more boys than girls. One night they all went to the theater. In the first intermission every girl bought a cookie, and every boy bought a coke. (A cookie and a coke each cost a whole number of dollars.) In the second intermission every girl bought a coke and every boy bought a cookie. The class spent \$2 less in the second intermission than in the first one. How many boys and girls are there in this class?

- 2) Find the greatest whole number with all different digits in which the sum of any three digits is not divisible by 19.

- 3) Andrew, Burt, Charlie, Danny, and Eli are playing a game in which everybody is either a frog or a kangaroo. The frogs' statements are always false, the kangaroos always tell the truth.
 - (1) Andrew says that Burt is a kangaroo.
 - (2) Charlie says that Danny is a frog.
 - (3) Eli says that Andrew is not a frog.
 - (4) Burt says that Charlie is not a kangaroo.
 - (5) Danny says that Eli and Andrew are different animals.How many frogs are there among the 5 boys?