"Math is Cool" Masters-2004

Sponsored by: Lukins & Annis P.S.

6th Grade - May 15, 2004

Individual Contest

Express all answers as fractions unless stated otherwise.
Leave answers in terms of π where applicable.
Do not round any answers unless stated otherwise.
Record all answers on the colored cover sheet.

1	What is 5! ÷ 5?
2	Simplify: $\dfrac{4 \times 3 + 2}{\sqrt{4} \times (10^2 + 19)}$
3	If a triangle has side lengths 7 and 13, what is the largest integer side length the third side could be?
4	If Kai jogs 1/6 of the football field, sprints 2/3 of the field, then jogs the rest of the way, what fraction of the field did he jog?
5	Homer's Doughnut Shop has 200 doughnuts to be put in boxes that hold a dozen doughnuts at a time. How many boxes are needed?
6	What is 1/3 of 1/2 of 2/3?
7	Teddy has 266 miles to go on his Superbike. If he wants to get there in 14 hours, how fast should his average speed be in miles per hour?
8	Justine has 30 pairs of flip flops. Suppose she wears them in cycles of 30 days where she cannot wear the same pair of flip flops twice in a cycle. How many full cycles would she go through in a 365-day year?
9	Solve for x: 9x + 19 = -17x - 33
10	Whitney says he will help Keisha write "Math is Cool" tests, but he never does. If Keisha expects Whitney to write 1/5 of the 40 questions, and finds out he didn't write them 1/5 of an hour before the deadline, how many questions must she write per minute to finish by the deadline? Express as a fraction.
11	Fill in the blank: 2 × 7 × 5y + 14 × 3 = 2 (35y + __)
12	What is the sum of 124 base 10 and 289 base 10 in base 2?
13	Out of 91 people, 65 are boys. What fraction of the people are girls?

14	Josh builds a fence that has the shape that of a regular hexagon. He has 24 feet of fence. How much area does the fence enclose, in square feet?
15	If Peter has 24 cookies and eats half, gives Teddy half of the remaining, then gives Kai half of the remaining, and then Peter eats the rest, how many cookies did he eat?
16	Kai is 2 years older than Teddy. The sum of their ages is 34. What is the difference of their ages in 17 years?
17	There are lanky ostriches and mooing cows in a field. If Farmer Sampson counts 30 heads and 86 legs, how many cows are there?
18	Find the next number in the sequence: (2, 2/3 , 2/9 , 2/27 , ...)
19	How many arrangements are there of the letters in the word "AVERAGE"?
20	How many prime numbers less than 100,000 are perfect squares?
21	What is the sum of the first 5 terms of the Fibonacci sequence?
22	If a triangle has 2 congruent angle measures and the third angle has a measure of 68E, what is the measure, in degrees, of one of the congruent interior angles?
23	Libbey and Keisha take belly dance lessons on Thursdays. Keisha pays $8 weekly while Libbey takes advantage of a deal of buying four weeks of lessons for $25. After 16 weeks of lessons, how much money does Libbey save, in dollars?
24	Colin finished a math test at 1:45 pm and Keisha took the same test starting at the same time and finished at 2:17 pm. How many seconds separated Colin's time from Keisha's?
25	The sum of two numbers is 143. Their positive difference is 27. What is the smaller number?
26	If there are 3 Luz in 7 Ers and 9 Ers in 6 Pells, how many Luz are in 28 Pells?
27	Luke tries to play tennis but can only hit the ball 20% of the time. If 60 balls are hit to Luke, how many balls can you expect him to hit?
28	Keisha fills her water bottle each morning. Keisha drinks 1/3 of her water before lunch, one half of the remaining water at lunch, two cups after lunch and then has two cups remaining. How many cups of water did Keisha have at the beginning of the day?
29	Ingrid's phone rings in two classes each day. After three, 5-day school weeks containing no days off, how many times will her phone ring in class?

Challenge Questions

30	Biff is pushing a rock up a 72-foot hill. He pushes it up 7 feet every day, and Eho, at night, pushes it down 2 feet. How many days will it take Biff to push the rock to the top of the hill?
31	A right triangle is drawn inside a circle. If the hypotenuse has a length of 25 and a leg has a length of 7, what is the other leg length?
32	I'm thinking of a 2-digit number. When I switch the digits, the new number is 27 less than the original, and the sum of the two numbers is 99. What is my original number?
33	A group of math students stands in a circle. Each is assigned one number starting at 1 and increasing in order around the circle by 1. Person 57 is across from Person 163. Who's number is across from Person 33?
34	If the circumference of a circle inscribed inside a square is 6π, then what is the area of the square?
35	Two standard 6-sided dice are rolled. The probability of rolling a sum of x is 1/12. Find the product of all possible integers of x.
36	On a plane, two men together had 135 kilograms of luggage. The first paid $1.35 for his excess luggage and the second paid $2.70 for his excess luggage. Had all the luggage belonged to one person, the excess luggage charge would have been $8.10. At most how many kilograms of luggage is each person permitted to bring on the plane free of additional charge?
37	[In this problem, use the facts that 1 ton = 2000 lbs and 1 mile = 5280 feet.] An elephant weighing 2.64 tons and a rabbit weighing 1 lb. Are balanced on a very long, perfectly rigid teeterboard (seesaw). If the elephant starts sliding toward the fulcrum at the uniform rate of 1 foot per minute, how many miles per hour must the rabbit run in order to maintain balance?
38	The squash season is nearing its end, and the current individual standings are shown in the chart. Each of the 8 players must still play 28 games, 4 with each of the other players. How many players still have a theoretical chance to at least tie for the championship? Player: A B C D E F G H Games Won: 92 91 90 71 67 66 44 39 Games Lost: 48 49 50 69 73 74 96 101
39	Some workers were asked to mow two fields, one twice as big as the other. They all mowed the larger field for half of a day; then they split in half. One group finished the larger field at the end of the day. The others mowed the smaller field; but at the end of the day, there remained a part to do. This part was finished by one worker in a single day. How many workers were there?
40	A fuel tank receives a continuous, steady flow of 2000 liters per hour. The tank experiences a steady rate of fuel usage within each of the 6 consecutive 4-hour periods every day. Every day, usage during these periods is, respectively, 6000, 13500, 7300, 10000, 8000 and 3200 liters. What is the capacity, in liters, of the smallest tank which could ensure there would always be at least 200 liters of fuel in the tank?

"Math is Cool" Championships-2004

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6th Grade - May 15, 2004

Team Multiple Choice Contest

Mr. Willoughby's English class has the following summer reading list. Each student of his must read at least one book from the list. As they cannot do math very well, help Mr. Willoughby's English students with their calculations about their summer reading.

Title	**Author**	**Price ($)**	**Pages**	**Weight (ounces)**
"Tom Sawyer"	Mark Twain	5.95	298	18
"Treasure Island"	Robert Louis Stevenson	3.95	224	16
"20,000 Leagues Under The Sea"	Jules Verne	3.99	320	19
"The Time Machine"	H. G. Wells	3.99	144	10
"Robinson Crusoe"	Daniel Defoe	2.50	288	17
"Gulliver's Travels"	Jonathan Swift	4.95	311	20

Questions

1	Carl wants to read all six books in five days. How many pages must he read per day? A) 5 B) 25 C) $25.33 D) 317 E) 1585
2	The Book Shipping Company charges 20 cents per ounce plus a 4 dollar flat rate to ship books. How much will it cost to ship all six books? A) $16 B) $20 C) $24 D) $26 E) $104
3	The Text Transport Company charges 4 dollars and 50 cents per book plus 2 dollars to ship books. How much will they charge to ship all six books? A) $24.00 B) $24.25 C) $24.50 D) $24.75 E) $29.00
4	Kyle is buying all six books from a bookstore. The bookstore charges 8% tax on all sales. How much must Kyle pay rounded to the nearest cent? A) $27.36 B) $28.00 C) $25.33 D) $2.03 E) answer not given
5	Anthony starts to write the letter series: A, C, E... If he wants to read a book by the author whose first name begins with the 7th letter in the series, what book does he read? A) "Tom Sawyer" B) "Treasure Island" C) "20,000 Leagues Under The Sea" D) "The Time Machine" E) answer not shown
6	What is the average price per ounce of "Gulliver's Travels" rounded to the nearest cent? A) $0.20 B) $0.25 C) $99 D) $0.30 E) $0.24
7	How many ways can you arrange the letters of the last name of the author of "20,000 Leagues Under The Sea?" A) 5 B) 9 C) 20 D) 60 E) 120

8	Over the next two days, Tom is going to read the two books that weigh a prime number of ounces. On average, how many pages does he read per day? A) 2 B) 152 C) 304 D) 608 E) answer not shown
9	Timothy reads 2 pages every 5 minutes. If he read a book in 12 hours, which book did he read? A) “Tom Sawyer” B) “ Treasure Island” C) ”Gulliver’s Travels” D) ”The Time Machine” E) answer not given

"Math is Cool" Masters-2004

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6th Grade - May 15, 2004

Team Contest

Leave answers in terms of π where applicable.
Do not round any answers unless stated otherwise.
Record all answers on the colored cover sheet.

1	What is the smallest positive integer that leaves a remainder of 10 when divided into 90?
2	At the bank, Al exchanged a $10 bill for an equal number of nickels, dimes, and quarters. How many of each type of coin did Al receive?
3	Matt's hair grows 2 inches per month. If he cuts his hair once every three months and only cuts off half an inch, how long will his hair be after one year? (Assuming that he shaves his head at the beginning of every year)
4	If 94 students and 21 adults are going to Mexico to build houses, how many houses can be built if at least 10 students and exactly 2 adults must work on each house the entire time? Each group of people can build one house in the time they're in Mexico.
5	Find the sum of the following sequence: 3 + 9 + 15 + ...+ 105 + 111
6	Will has a door that is two and a half feet wide and 8 feet tall. He removes the door and cuts it into two congruent rectangles. He then takes one of the halves and cuts it into two congruent triangles. What is the area of one of the triangles?
7	12 boys and 12 girls attend prom at Columbia High School. If each of the boys dances once with each of the girls, how many dances occur total?
8	Shaun is three times as old as Kayla and four times as old as Rayann. If Rayann will be 4/5 of Kayla's age in two years, how many years old will Shaun be in 5 years?
9	Aaron fills out college applications at a rate of one application every 77 minutes. Keisha fills out two applications simultaneously every 54 minutes. If Libbey takes 8/7 as long as Aaron to fill out an application, how many more complete applications can Keisha fill out in a 24 hour day than Libbey?
10	The probability Lee dresses as a clown on any given day is 1/9. The probability Colin dresses as a clown is 9/1000000 on any given day. According to these probabilities, Colin and Lee should independently dress as a clown on the same day once every how many years? Answer as a decimal rounded to the nearest hundredth and assumes all years have 365 days.

6th grade

	Relay 1 (6th)	
1	How many ways can you arrange the letters in the word MATH?	24
2	Find the reciprocal of the following: the quantity TNYWG-4, times the number of sides in a heptagon.	1/140
3	What is $(2^3)(7)(5)$(TNYWG)?	2
4	What is the area of a right triangle with legs of lengths TNYWG and 5 squared	25

	Relay 2 (6th)	
1	What is the probability of rolling a two or a four on a regular 6-sided dice?	1/3
2	Evaluate: TNYWG times the square root of 81.	3
3	Find the positive difference between TNYWG and the smallest prime number greater than 30.	28
4	What is the number of feet in TNYWG miles - the square root of 121?	147829

"Math is Cool" Masters-2004

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6th Grade - May 15, 2004

Mental Math Contest

Express all answers in terms of radicals and π, where applicable, unless otherwise instructed.

Person #1		
1	If x equals 3 what is 3x plus 5?	14
2	What is one- half plus one-fourth?	3/4
3	What is the mean of the following set of data? (3,4,5,6,7,8,9)	6
4	Kai has $3.50 in dimes. How many dimes does he have?	35
Person #2		
1	What is the area of a circle with a diameter of 8 inches?	16π
2	Solve for x: 2x + 7 = 19	6
3	How many interior degrees are in a pentagon?	540 [E]
4	What is the angle measure between the hour hand and the minute on an analog clock when it is 10:00 am?	60 [E]
Person #3		
1	What is the product of 9 and 8 divided by 3?	24
2	What is the difference between 291 and 152	139
3	What is the sum of the first 7 positive whole numbers?	28
4	What is 20% of 400?	80
Person #4		
1	What is the area of a square with perimeter 100?	625
2	What is $\frac{1}{2}$ + 1/3 + 1/6?	1
3	If I have 50 dimes, and Teddy has the same amount in quarters, how many quarters does Teddy have?	20
4	Evaluate: 7 × 13 + 9	100

"Math is Cool" Masters-2004

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6th Grade - May 14, 2004

College Knowledge Bowl Questions #1		
1	Katherine is four years younger than Jon, who is two years older than Tony. If Tony is 15, how old is Katherine?	13
2	Kai, Teddy, and Peter each have a fair coin. If they all flip their coins, what is the number of possible outcomes with 1 or more heads showing?	7
3	How many prime numbers are there between 80 and 100?	3
4	20 consecutive integers have a sum of 10, what is their product?	0
5	What is the probability of rolling a sum of 1 with 2 dice?	0
6	How many feet are in 6 miles?	31680
7	Evaluate: 2 to the tenth power	1024
	Number ***8*** is an extra question. Only use it if needed.	
8	A right triangle has leg lengths of 6 and 8, what is the measure of the hypotenuse?	10

"Math is Cool" Masters-2004

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6th Grade - May 14, 2004

College Knowledge Bowl Questions #2		
1	When Kandy wakes up, she randomly draws two socks out of her sock drawer. If she has 2 pink socks, 3 rainbow socks, and 1 Barbie sock, what is the probability that she is wearing 1 pink sock and 1 rainbow sock today?	1/5
2	If Josh can mow a lawn in 1 hour and Colin can mow the same lawn in 40 minutes, how long will it take them to mow the lawn together?	24 [minutes]
3	Evaluate three squared plus the quantity five times seven, all divided by eleven.	4
4	How many inches are in one mile?	63,360 [inches]
5	What is the area of a circle with a diameter of 12 inches, in terms of pi?	36 π [inches squared]
6	The math team is having a meeting. If 6 people are present and they all shake hands with each other, how many handshakes occur?	15 [handshakes]
7	Kai and Whitney are playing a fair game. If Kai has won 9 out of the last 12 games, what is the probability that Kai will win the next game?	1/2
Number ***8*** is an extra question. Only use it if needed.		
8	What is the perimeter of a regular heptagon with side length of 6?	42

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6th Grade - May 14, 2004

College Knowledge Bowl Questions #3		
1	If Steven is exactly 47 years old on the 215th day of 2004, in what month was he born?	August
2	How many prime numbers are between 10 and 30?	6
3	What is the probability of rolling a sum of 12 with two standard dice?	1/36
4	A tortoise and a hare are running a 10 mile race. If the tortoise runs at 1.5 miles per hour and the hare runs at 2 miles per hour, and the hare starts 1 and a half hours after the tortoise, who will win?	Hare
5	Lee has five thousand dollars in a bank account. The interest rate for his account is 10% every year. How much money will Lee have in his bank account after three years?	($)6655
6	Luke can answer one math problem for every three that Kai answers. If Kai answers 51 math problems, how many does Luke answer?	17
7	What is the sum of the interior angles of a pentagon?	540
Number ***8*** is an extra question. Only use it if needed.		
8	What is 12 squared times 12?	1728

"Math is Cool" Masters -- 2004

6th grade - May 14, 2004

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Full Name:_____

1st Score

Out of 40

Individual Contest - Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	24		
2	1/17		
3	19		
4	1/3		
5	17[boxes]		
6	1/9		
7	19 [mph]		
8	12 [cycles]		
9	[x=] -2		
10	2/3 [questions per minute]		
11	21		
12	$110011101_{[2]}$		
13	2/7		
14	$24\sqrt{3}$ [square feet]		
15	15[cookies]		
16	2[years]		
17	13 [cows]		
18	2/81		
19	1260 [arrangements]		
20	0		

	Answer	1 or 0	1 or 0
21	12		
22	56[E]		
23	[$] 28		
24	1920 [seconds]		
25	58		
26	18[Luz]		
27	12 [balls]		
28	12 [cups]		
29	30 [times]		
30	14[days]		
31	24		
32	63		
33	139[person]		
34	36 [units squared]		
35	40		
36	45[kilograms]		
37	60 [mph]		
38	5[players]		
39	8[workers]		
40	7000 [liters]		

"Math is Cool" Masters -- 2004

6th grade - May 14, 2004

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Team Multiple Choice Contest-Score Sheet

1st Score

Out of 18

Correct responses are worth 2 points, incorrect responses are worth -1 point and no response is 0 points.

DO NOT WRITE IN SHADED REGIONS

	Answer	-1, 0 or 2	-1, 0 or 2
1	D		
2	C		
3	E		
4	A		
5	A		
6	B		
7	D		
8	C		
9	E		

"Math is Cool" Masters -- 2004

6th grade - May 14, 2004

School Name_____Team #_____

Proctor Name_____Room #_____

Key

1st Score

Out of 10

Team Contest-Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	16		
2	25 [coins]		
3	22 [inches]		
4	9 [houses]		
5	1083		
6	5 [square feet]		
7	144[dances]		
8	29[years old]		
9	36[applications]		
10	2739.73 [years]		

"Math is Cool" Masters -- 2004

6th grade - May 14, 2004

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Relay Contest - Score Sheet

Answer for relay #1
24
1/140
2
50
Answer for relay #2
1/3
3
28
147829