"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Individual Contest

Written by: Cherie Clymer

GENERAL INSTRUCTIONS

Good sportsmanship is expected throughout the competition by all involved. Bad sportsmanship may result in disqualification. Calculators may not be used on any portion of this contest. Express all non-integer answers as fractions unless stated otherwise or it is a problem dealing with money and in that case, a decimal answer should be given. For fifth and sixth grade, all fractions and ratios must be reduced. Units are not necessary unless it is a problem that deals with time and, in that case, am or pm is needed. However, if you choose to use units, they must be correct. Leave all answers in terms of B where applicable. Do not round any answers unless stated otherwise. Record all answers on the colored cover sheets in the answer column only. Make sure all answer sheets have all the information filled out at the top of the sheet. ***Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets. Blank answer sheets and answer sheets with no name will also be scored as a 0.***

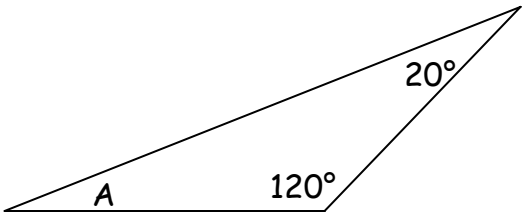
INDIVIDUAL TEST - *35 minutes*

When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. This test is scored as a 1 or 0. Express all non-integer answers as fractions unless stated otherwise or it is a problem dealing with money and in that case, a decimal answer should be given. For fifth & sixth grade, make sure all fractions and ratios are reduced. Units are not needed except on questions that deal with time and, in that case, a.m. or p.m. is needed. If you choose to use units, you must use them correctly. Record your answers on the score sheet. No talking during the test.

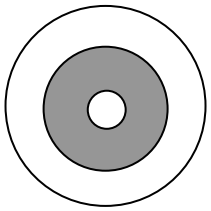
Record all answers on the colored cover sheet.

1	How many diagonals can be drawn in a square?
2	Find the sum of the three numbers: 832, 981, and 653
3	Find the product of 8 and 21.
4	Find the quotient of 126 and 7.
5	Find the difference between 9102 and 8987.
6	It takes four sheep to make one coat. How many sheep does it take to make 20 coats?
7	A circle has diameter 12. What is its radius?

8	I have 56 pieces of candy to divide evenly among my 7 friends. How many pieces of candy does each of my friends get?
9	How many sides does a hexagon have?
10	Biff did a survey of his class to find out how many gold fish are owned by his classmates. In the class of 20 classmates, 17 students didn't own any. Of the three who did, one owned 17, another 15, and the last classmate owned 12. How many total fish are owned by Biff's classmates?
11	What is the mean of the data set {8, 3, 7}?
12	At the end of a soccer match, every player shakes hands with every other player. If there are 5 players on each team, how many handshakes will take place?
13	The sum of three consecutive numbers is 27. What is the smallest of the three numbers?
14	The scores on the individual "Math is Cool" test for Math Academy School was 23, 25, 27, 25, 32, 15, 15, 25. What was the mode of the individual score for Math Academy School?
15	What is the sum of the digits of the number you find after you round 38,129,450 to the nearest 10,000?
16	How many counting numbers are between 5 and 20, inclusive?
17	Five people go to a movie and sit together in a row. How many different ways can they sit in a row?
18	When I divide a certain number by 6, the quotient is 7 and the remainder is 4. What is the number?
19	What's the smallest palindrome larger than 1001?
20	On the first day that I began cross-country skiing, I went 1 km. If I double the distance I ski each day, on which day did I first ski over 20 km in a single day?
21	How many perfect squares are between 10 and 20?
22	What is the largest integer you can add to 43 that yields a result less than 200?
23	When two six-sided dice are rolled, how many different sums are possible?
24	Biff and Eho decided to go backpacking in the Cabinet mountains in Montana, 210 miles away. 60 miles away from home, Eho realized he forgot his backpack, so they went back. How many miles did they travel, total, to get to the Cabinet mountains?
25	What is the area of a right triangle with legs of lengths 3 and 4?
26	Bubble gum costs 7 cents each piece. If I have $2.00, how many pieces of bubble gum can I buy?

27	In the figure shown, what is the measure, in degrees, of angle A? 
28	If today is Tuesday, what day was it 70 days ago?
29	An item that originally cost $100.00 was discounted by 30%. What is the new price of the item, in dollars?

Challenge Questions

30	The probability that our math team will win a trophy is 7/10. What are the odds in favor of our team winning? [Express answer in the form of a:b.]
31	What is the sum of the next two terms in the following sequence? 1, 8, 27, 64,…
32	The length and width of a rectangular prism are tripled, but the height remains the same. By what factor is the volume increased?
33	The mean average of three numbers is 3. If two of the three numbers are 1, what is the other number?
34	A rectangular playing field is 40 yards wide and 30 yards long. How far is it diagonally across this field, in yards?
35	What is the sum of all integers that make the following inequality true? $\lvert x \rvert < 3$
36	Express 1011_2 as a base 10 number.
37	Mathland Middle School's math team members all participate in at least one of three other school activities: band, leadership, and track. Of the 40 members of the team, 15 are in leadership, 23 are on the track team, 4 are in both leadership and band, 6 are in both leadership and track, 3 are in band and track, and 2 students are in all three activities. How many students are in the band, total?
38	The entrance to a railroad tunnel in the Cascade mountains is in the shape of a semi-circle. Seven feet from the center of the tunnel, the height of the entrance is 24 feet. How tall is the tunnel at its center, in feet?
39	What is the volume of a cone, in cubic feet, with a height of 1 foot and a radius of $\frac{1}{4}$ foot?
40	Dart players are aiming at the bulls eye as shown below. Given that all the dart players will hit the target with a dart, what is the probability their dart will hit the shaded area? The radius of the large circle is 5; the radius of the medium circle is 3, and the radius of the small circle is 1. 

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Team Multiple Choice Contest

Written by: Joel Turtle

TEAM MULTIPLE CHOICE - 15 minutes

This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. When you are prompted to begin, tear off the colored sheet, pass out a copy of the test to each team member, and begin testing. Since this is a multiple choice test, ONLY a letter response should be listed as an answer on the answer sheet.

A coach is examining his quarterbacks in order to find out who he should start in the state playoffs. In football, a quarterback is the player who throws the ball to his receivers. A completion is a pass that is caught, and each completion is measured for distance in terms of yards. In the following scenario, quarterbacks may gain yards only by making completions. Below is a chart comparing the three quarterbacks after the team's first 10 games.

Quarterback	Completion Percentage	Total Number of Passes Completed	Total Number of Passes	Yards per Game	Minutes per Game	Yards per Pass
Biff	68.75%	110	160	242	22	22
Eho	48%	120	250	168	42	14
John	34%	170	500	204	51	12

1	What is the total number of passes John has thrown?				
	A) 110	B) 120	C) 170	D) 204	E) Answer not given
2	How many passes per 16 throws should Biff complete?				
	A) 21	B) 12	C) 11	D) 19	E) Answer not given
3	How many games should it take Eho to gain 1008 yards?				
	A) 4	B) 6	C) 8	D) 10	E) Answer not given
4	Between Biff, Eho and John, what is the range of the total number of passes completed?				
	A) 50	B) 10	C) 60	D) 115	E) Answer not given

5	What is the average number of passes John completes per game? A) 12 B) 17 C) 11 D) 19 E) Answer not given
6	If Biff gets paid $50 per pass completed, how much has he earned? A) $2,300 B) $5,500 C) $6,700 D) $8,975 E) Answer not given
7	Eho makes $100,000 plus $25 for each completed pass and $2 for each minute he plays. How much has Eho earned? A) $103,840 B) $116,790 C) $164,320 D) $183,460 E) Answer not given
8	John is paid $1,000 per game plus $5 per yard gained. How much has he made? A) $15,400 B) $13,970 C) $14,940 D) $20,200 E) Answer not given
9	If Biff throws 32 passes, how many yards would be expected to be gained? A) 318 B) 421 C) 456 D) 484 E) Answer not given

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Team Contest – Written by Tom Clymer

TEAM TEST - 15 minutes

When you are prompted to begin, tear off the colored sheet and give a copy of the test to each of your team members and begin testing. This test is scored as a 1 or 0. Express all non-integer answers as fractions unless stated otherwise or it is a problem dealing with money and in that case, a decimal answer should be given. For fifth & sixth grade, make sure all fractions and ratios are reduced. Units are not needed except on questions that deal with time and, in that case, a.m. or p.m. is needed. If you choose to use units, you must use them correctly.

1	How many positive three-digit numbers are composed of three different odd digits?
2	A snake's length is equal to 80 centimeters plus one third of its length. How long is the snake, in centimeters?
3	How many ways can you make change for $2.00 using only quarters, dimes, and/or nickels?
4	What is the result when I begin with the number 12, square it, subtract 50, divide by 2, and add 16?
5	How many diagonals can be drawn in a convex octagon?
6	Express as a mixed number: 175% of the sum of $9\frac{3}{5}$ and 4.8
7	If hamburgers cost $2.15 each, french fries cost $1.50 per order, and beverages cost $0.95 each, how much, in dollars, will a family of four spend on dinner if each person orders a hamburger, french fries, and a beverage?
8	A prime number is a counting number greater than one which does not have any factors other than itself and one. For example, 11 and 13 are prime numbers, but 12 is not. What is the sum of the squares of the prime numbers less than 10?
9	Anand, Bob, and Ciara seat themselves in three of five empty desks. How many ways can they do this?
10	Arrange the letters A-D in increasing order, if $A = 4 \times 3 + 9$ $B = \frac{88}{4}$ $C = 5^2 - 3^2$ $D = \frac{8^2}{9}$

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Relay Contest – Written by Tom Tosch

RELAYS - 5 minutes per relay

There is no talking during this event and you must always be facing forward. Person #1 will be given an answer sheet(s) and will need to fill out the top. The proctor will hand out a strip of paper to each person. These need to be face down on your desk until it is time for the relay to start. Once the relay begins, everyone may turn over their strip of paper and begin working. You may write on the strip of paper to come up with your answer. However, when person #1 figures out his/her problem, he/she will record ***just his/her final answer*** *on the answer sheet and pass only the answer sheet back to the person behind. This continues until person #4 puts an answer on the answer sheet and gives it to the proctor. A correct answer from person #1, #2 and #3 is worth 1 point each. A correct answer from person #4 is worth 2 points making each relay worth 5 points. You will see the expression* ***TNYWG*** [Proctor: write this on the board] *which means: "the number you will get". This is where you put your teammate's answer that they pass back to you, and then you should be able to solve your question. Once the relay begins, turn over your strip of paper and* ***make sure you have the right person number.*** *Remember, no talking and remain facing forward to avoid being disqualified!*

	Relay #1	Answer
Person 1	How many sides does a pentagon have?	5
Person 2	What is TNYWG squared?	25
Person 3	What is the smallest prime number larger than TNYWG?	29
Person 4	What is the remainder when TNYWG is divided by 3?	2
	Relay #2	Answer
Person 1	What is 5 + 7 + 9 + 11?	32
Person 2	What is the difference between TNYWG and (8 + 3 – 2 + 11 + 16 – 16)?	12
Person 3	What is the probability of rolling a sum of TNYWG with two fair six sided dice?	1/36
Person 4	What is the reciprocal of TNYWG?	36

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Final Score:

KEY

School Name_____Team #_____

Proctor Name_____Room #_____ Division: ____

Mental Math Contest

When it is time to begin, I will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not erase or cross out answers once you have written an answer down****. If there are eraser marks or crossed out answers, they will be marked wrong. Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds from the second reading of the question before another question is asked. The value of each question is a one or zero. Each student will be asked four questions, then another member of your team will come up.*

PERSON 1 NAME:		**1 or 0**
1.1	What is the sum of seventeen and thirty-one?	48
1.2	What is the quotient of forty-eight and four?	12
1.3	What is 13 squared?	169
1.4	The area of a triangle is 18. The height and base are equal. What is the height?	6
PERSON 2 NAME:		
2.1	What is the positive difference between nine and fifty-three?	44
2.2	What is the product of seven and twelve?	84
2.3	What is the difference between the sum of the first two even positive integers and the product of the first two odd positive integers?	3
2.4	How many different outfits can be made from four shirts, five pairs of pants and three hats?	60 [outfits]
PERSON 3 NAME:		
3.1	What is the sum of forty-three and twenty-eight?	71
3.2	What is the product of fourteen and six?	84
3.3	What is the perimeter of a rectangle with sides measuring four centimeters by nine centimeters?	26 [cm]
3.4	How many sides does a dodecagon have?	12
PERSON 4 NAME:		
4.1	What is the positive difference between sixty-seven and thirty-nine?	28
4.2	What is the quotient of ninety-one and seven?	13
4.3	How many feet are in a mile?	5280 [ft]
4.4	What positive number, when multiplied by itself, results in forty-nine?	7

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Division 1 & 2

Written by Tom Tosch

COLLEGE KNOWLEDGE BOWL ROUND #1

#	Problem	Answer
1	Joe has 24 identical math books that weigh a total of 72 pounds. How much, in pounds, does two math books weigh?	6 [lbs]
2	What is 487 less than 734?	247
3	When you flip a fair coin two times, what is the chance of getting two heads?	$\frac{1}{4}$
4	A sunburst star is made by drawing an outward-pointing equilateral triangle on each side of a regular octagon where each side of the equilateral triangle is the same length as each side of the regular octagon. How many sides does this sunburst star have?	16 [sides]
5	What is the smallest number that is greater than 1 that has a remainder of 1 when you divide by each of 2, 3 and 5?	31
6	What is the greatest number of days possible in two consecutive months?	62 [days]
7	The ratio of boys to girls in a classroom is 4:5 and there are 27 students total. How many girls are there in the classroom?	15 [girls]
	Extra Problem – Only if Needed	
8	If "x" equals two, what is three "x" minus ten?	-4

"Math is Cool" Masters – 2004-05

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4th Grade – May 14, 2005

Division 1 & 2

Written by Tom Tosch

COLLEGE KNOWLEDGE BOWL ROUND #2

#	Problem	Answer
1	How many prime numbers are between 20 and 40?	4 [numbers]
2	David bought an ocelot for $1.79, and paid for it with a $5 bill. He got as much of his change as possible in quarters. How many quarters did he get?	12 [quarters]
3	What time is one hour and thirty-nine minutes after 10:43AM?	12:22 PM
4	Amy has 3 cats, 2 turtles and 3 birds as pets. How many total feet does her pets have?	26 [feet]
5	Mike lives 120 miles from his friend George. His parents drive him to George's house at 30 miles per hour and they return at 40 miles per hour. How many hours did they spend traveling?	7 [hours]
6	What is the sum of the first 5 positive odd numbers?	25
7	If I double the side length of a square with an area of 9, what is the area of the new square?	36
	Extra Problem – Only if Needed	
8	What is the total value of three quarters, five dimes, two nickels and four pennies, in cents?	139 [cents]

"Math is Cool" Masters – 2004-05

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4th Grade – May 14, 2005

Division 1 & 2

Written by Cameron Frederick

COLLEGE KNOWLEDGE BOWL ROUND #3

#	Problem	Answer
1	Josh jumps on his trampoline 5 times every 10 seconds. How many times does he jump on his trampoline in 6 minutes?	180 [times]
2	How many fluid ounces are in a quart?	32 [ounces]
3	David buys three DVDs and two boxes of candy for $59.05. If the DVDs cost $17.85 apiece, how much, in dollars, is a box of candy?	[$] 2.75
4	A football field is 100 yards long. How long, in feet, are 4 football fields?	1200 [ft]
5	What is the mean of the numbers 28, 25, 33 and 34?	30
6	How many different ways can I reorder the letters in the word "F-O-O-D"?	12 [ways]
7	Roger Rabbit eats 17 carrots, 11 cabbages, 4 radishes, and 8 beets from Farmer Frank's field. How many vegetables did he eat in all?	40 [veggies]
	Extra Problem – Only if Needed	
8	What is the next number in the sequence: 1, 3, 9, 27, …?	81

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

Final Score:
KEY

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____Division: _____

Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	2 [diag]		
2	2466		
3	168		
4	18		
5	115		
6	80 [sheep]		
7	6		
8	8 [pieces]		
9	6		
10	44 [goldfish]		
11	6		
12	45 [handshakes]		
13	8		
14	25		
15	15		
16	16		
17	120 [ways]		
18	46		
19	1111		
20	6^{th} [day]		

	Answer	1 or 0	1 or 0
21	1		
22	156		
23	11 [sums]		
24	330 [miles]		
25	6 [un^2]		
26	28 [pieces]		
27	40 [°]		
28	Tuesday		
29	[$] 70.00		
30	7:3		
31	341		
32	9		
33	7		
34	50 [yards]		
35	0		
36	11		
37	13 [students]		
38	25 [feet]		
39	$\frac{1}{48}\pi$ [ft^3]		
40	8/25		

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

School Name_____Team #_____

Proctor Name_____Room #_____

Division: _____

Final Score:
KEY

First Score

(out of 18)

Team Multiple Choice Contest – Score Sheet

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	E (500)		
2	C		
3	B		
4	C		
5	B		
6	B		
7	A		
8	D		
9	D		

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

Final Score:
KEY

First Score

(out of 10)

School Name_____Team #_____

Proctor Name_____Room #_____

Div: _____

Team Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	60 [numbers]		
2	120 [cm]		
3	97 [ways]		
4	63		
5	20 [diag]		
6	$25\frac{1}{5}$		
7	[$] 18.40		
8	87		
9	60 [ways]		
10	DCAB		

"Math is Cool" Masters -- 2004-05

KEY

4th Grade – May 14, 2005

School:_____Team #_____

Proctor: _____ Room #_____Div _____

Written by Tom Tosch

RELAY # 1

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
5	**25**	**29**	**2**
1 or 0	1 or 0	1 or 0	2 or 0

RELAY # 2

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
32	**12**	**1/36**	**36**
1 or 0	1 or 0	1 or 0	2 or 0

"Math is Cool" Masters – 2004-05

Sponsored by: American Chemical Society

4th Grade – May 14, 2005

Final Score:
(Out of 16)

School Name_____Team #_____

Proctor Name_____Room #_____ Division: ____

When it is time to begin, I will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not erase or cross out answers once you have written an answer down.*** *If there are eraser marks or crossed out answers, they will be marked wrong. Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds from the second reading of the question before another question is asked. The value of each question is a one or zero. Each student will be asked four questions, then another member of your team will come up.*

PERSON 1 NAME:		**1 or 0**
1.1		
1.2		
1.3		
1.4		
PERSON 2 NAME:		
2.1		
2.2		
2.3		
2.4		
PERSON 3 NAME:		
3.1		
3.2		
3.3		
3.4		
PERSON 4 NAME:		
4.1		
4.2		
4.3		
4.4		

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

Final Score:

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____Division: _____

Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

	Answer	1 or 0	1 or 0
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

Final Score:

First Score
(out of 18)

School Name_____Team #_____

Proctor Name_____Room #_____

Division: _____

Team Multiple Choice Contest – Score Sheet

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			
2			
3			
4			
5			
6			
7			
8			
9			

"Math is Cool" Masters – 2004-05

4th Grade – May 14, 2005

School Name_____Team #_____

Proctor Name_____Room #_____

Div: _____

Final Score:

First Score
(out of 10)

Team Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			