"Math is Cool" Masters – 2006-07

Sponsored by: Wenatchee Valley Clinic

5th Grade – May 19, 2007

Individual Contest

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by all involved. Bad sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise:*
  - *For problems dealing with money, a decimal answer should be given.*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *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 π 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. Each problem is scored as a 1 or 0. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute warning.

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5th Grade – May 19, 2007

Individual Contest

Record all answers on the colored cover sheet.

1	Evaluate as a decimal: 28.42 ÷ 0.4
2	What is the sum of 2.18 and 21.8, expressed as a decimal?
3	What is the least common multiple of 48 and 80?
4	What is the sum of $\frac{7}{2}$ and $\frac{4}{3}$? [Give your answer as a reduced common fraction.]
5	What is the product of $\frac{15}{4}$ and $\frac{14}{9}$? [Give your answer as a reduced common fraction.]
6	Danielle has some cookies with four layers of frosting each and some cookies with only three layers of frosting each. If she has a total of 38 cookies with a total of 120 layers of frosting, how many cookies with four layers of frosting does she have?
7	When a single marble is drawn from a bag containing two red, five green, and five blue marbles, what is the probability that it is red? [Give your answer as a reduced common fraction.]
8	What is the next term in the sequence 6, 12, 24, 48, ___ ?
9	What is the area, in square centimeters, of a circle with a diameter measuring 18 cm?
10	What is the area, in square centimeters, of a right triangle with legs measuring 12 and 17 cm?
11	What is the average of 19, 22, and 55?
12	What is the area, in square centimeters, of a rectangle with sides measuring 15 and 32 cm?
13	What is the total surface area, in square centimeters, of a right circular cylinder with a base radius of 3 cm and a height of 12 cm?
14	What is the volume, in cubic centimeters, of a right circular cylinder with a base radius of 12 cm and a height of 4 cm?
15	When two cards are drawn from a standard 52-card deck [without replacing the first card], what is the probability that they are the same suit? [Give your answer as a reduced common fraction.]

16	What value(s) of g satisfy $2(4g - 3) - 3(g + 8) = -75$?
17	How many squares of any size are there in a four-by-four grid of unit squares?
18	When one card is drawn from a standard 52-card deck, what is the probability that it is a red card or a Jack?
19	When I double my age, in years, and then add 19 years, the result is 85 years. How old am I in years?
20	In how many ways can first, second, and third-place medals be awarded in a competition involving nine people, if no ties are allowed?
21	A rectangular picture measuring 13 cm by 18 cm is to be glued to a rectangular piece of paper measuring 19 cm by 24 cm so that 3 cm of paper shows on all sides of the picture. What is the area, in square centimeters, of the paper that is not covered by the picture?
22	How many diagonals can be drawn in a convex decagon (10-gon)?
23	In how many distinguishable ways can five people be seated at a round table?
24	How many distinguishable arrangements are there of the letters in the word "letters"?
25	How many positive three-digit numbers contain exactly two distinct digits (e.g. 343 or 772, but not 589 or 111)?
26	Pat can build a house in 6 weeks, while Tom can build one in 15 weeks. How many **days** would it take the two of them to build a house working together? [Assume that there are 7 work-days in a work-week.]
27	Two marbles are drawn without replacement from a bag of marbles containing 4 red, 6 green and 3 purple marbles. What is the probability both marbles are green.
28	Biff ran 4 times as fast as Eho. In fact, he ran 80 miles in 2 hours less than it took Eho to run 28 miles. How fast did Eho run?
29	Tickets on a bus were $4.00 and $6.00. A total of 45 tickets were sold and $230 earned. How many $4.00 tickets were sold?

Challenge Questions

30	A cow is tied to an external corner of a rectangular barn with sides measuring 15 and 25 m. If the cow's tether is 30 m long, what is the area, in square meters, of the region the cow can graze? [Give your answer as a reduced common fraction in terms of π.]
31	If eight "aarghs" are worth six "blahs", and ten "blahs" are worth three "crikeys", how many "crikeys" would 120 "aarghs" be worth?
32	Anne's Game Farm has only ten-point bucks and six-point bucks. If there are a total of 87 bucks with a total of 602 points between them, how many six-point bucks are there?
33	If P pizzas can be purchased for D dollars, how many **cents** would be necessary to purchase 3 pizzas?
34	When the digits of a positive two-digit number are reversed, the result is a positive two-digit number 18 greater than the original number. What is the smallest possible value of the original number?
35	If it takes two chickens three days to lay five eggs, how many eggs will nine chickens lay in fourteen days?
36	How many positive two-digit numbers contain at least one digit of 1 but not the digit2?
37	Tealah drove her car 4,240 miles last year, and her car averaged 20 miles per gallon of gas. How much, in dollars, did she spend on gas last year if gas costs $2.95 a gallon?
38	Silas buys 2 bags of potato chips and 3 boxes of pretzels for $2.35. He then buys another bag of potato chips and 2 more boxes of pretzel for $1.37. Find the cost, in dollars, of one bag of pretzels.
39	Circles A and B are concentric, and a chord of circle B that is tangent to circle A measures 14 m. What is the area, in square meters, of the region between the two circles?
40	Biff, Eho and Frank are tossing a coin to see who can gets the first head. As soon as a head appears (even if each has not had an equal number of tosses) the game is over. If Biff tosses first, then Eho, then Frank, with the order repeated (possibly indefinitely) until the first head appears, what is the probability that Frank will win? [Express your answer as a reduced common fraction.]

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5th Grade – May 19, 2007

Team Multiple Choice Contest

Four married couples (Kelly & Jacob, Mary & Nick, Carla & Danny, Brenda & Ted) visit the Lake de Puddle Resort for lunch and a day of boating. The lunch menu is shown in the table on the left, and the boat rental prices in the table on the right. For the lunch menu, on any given day only one kind of each item is available (for example, only one kind of sandwich or one kind of pie).

Main Dish	Cost		**Drinks**	Cost
Chef's Salad	$2.50		Milk	$1.50
Pizza	$4.00		Soda	$___
Sandwich	$5.50			
			Dessert	
Side Orders			Cake	$2.00
French Fries	$1.00		Pie	$2.50
Bacon	$0.75			

Type of boat	Cost
Rowboat	Flat fee of $30, plus $8 per hour
Canoe	$18 for the first hour, plus $6 for each additional half-hour
Motorboat	$45 per hour plus $1.50 per mile

1	A side order of bacon consists of one slice. Jacob ordered a chef's salad, 3 slices of bacon and a glass of milk. How much did he pay? A) $5.75 B) $6.00 C) $6.25 D) $7.00 E) answer not given
2	Mary ordered a chef's salad and Nick ordered 3 pieces of cake. They each had a soda. How much less did Mary's lunch cost than Nick's? A) $3.50 B) $3.65 C) $3.75 D) $4.00 E) answer not given
3	Carla and Danny together order one of everything on the lunch menu. If the average price of the 9 items they order is $2.40, what is the price of one soda? A) $1.50 B) $2.40 C) $2.00 D) $1.75 E) answer not given
4	Brenda definitely wants one main dish, one drink, and one dessert. She might have one side order, or she might not have any side order. If one possible drink is water (free), how many different lunches could Brenda order? A) 12 B) 54 C) 48 D) 18 E) answer not given
5	Kelly and Jacob plan a boat trip to Deer Glade, which is 12.5 miles away. If they rent a rowboat and travel at 5 miles per hour, how many minutes long will the one-way trip be? A) 120 B) 135 C) 150 D) 165 E) answer not given
6	Kelly and Jacob want to spend exactly an hour at Deer Glade before heading back. How much would it cost them to rent a rowboat for their trip to Deer Glade and back, assuming they row at a constant rate of 5 miles per hour?

	A) $54	B) $70	C) $38	D) $90	E) answer not given
7	Kelly and Jacob might rent a motorboat instead for their trip to Deer Glade and back (again spending exactly one hour at Deer Glade before returning). How much would it cost them if the motorboat's speed is a constant 25 miles per hour? A) $108.75	B) $82.50	C) $127.50	D) $90	E) answer not given
8	Ted is really fast at paddling a canoe. His average speed is 6.25 miles per hour. How much would it cost him to rent a canoe to paddle at this rate to Deer Glade and back, if he stays 30 minutes at Deer Glade before returning? A) $60	B) $48	C) $24	D) $36	E) answer not given
9	Mary and Nick rent a rowboat, Carla and Danny rent a canoe, and Brenda and Ted rent a motorboat. They each stay away for a whole number of hours (not necessarily the same for each couple). However, the bill for each couple is the same: $54. What is the total number of hours for which the three couples rented the boats? A) 11	B) 10	C) 7	D) 8	E) not enough information

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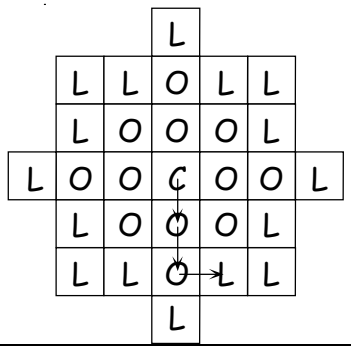
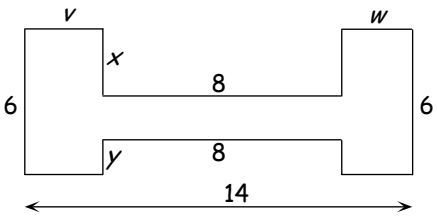
5th Grade – May 19, 2007

Team Contest

1	Jeff adds 3 counting numbers (w + x + y) and correctly gets an even sum. Karen adds 2 of the same numbers as Jeff added, plus a different third number (w + x + z) and correctly gets an odd sum. Is the sum of y + z even or odd? If there is not enough information to be sure, answer "can't tell".
2	My calculator had a traumatic experience involving a cat. It still correctly adds the numbers I enter, but now it randomly inserts one extra digit in the display for each addend I enter, and also for the sum. (For example, if I enter "12 + 4", it might display "172 + 94 = 168".) The display on my calculator reads "37846 + 27491 = 66378". List, in order, the extra digit my calculator has inserted into the display for the first addend, the second addend, and the sum.
3	Starting from the C in the center of the figure and moving from square to adjacent (neighboring) square either horizontally or vertically (but not diagonally), how many ways are there to trace "COOL" in 3 moves? (As an example, one way is indicated by the arrows. Include this way in your count.) 
4	Biff started counting at 7 by 4's. Eho started counting at 9 by 5's. What is the first number both say that will be the same?
5	The average weight of my dog, my cat, and my rabbit is 29 pounds. The average weight of my dog and my cat is 41 pounds. How many pounds does my rabbit weigh?
6	If 10,000 people each pay $30.50 to get into a football game, how many <u>cents</u> did they pay in all?
7	The figure shown has an area of 48 square units, and all corners are square. Given that x is twice y, find the length of the vertical line segment x. 
8	My number is an odd counting number greater than 1 thousand. Its first digit is 4 times its last digit. The sum of its digits is 30, and all its digits are different. What is the smallest my number could be?
9	Aleta and Beth each have the same amount of money, all in coins (chosen from pennies, nickels, dimes, quarters, and half-dollars). The amount for each person is less than $1.00. However, they do not have any of the same type coins. (For example, if Aleta has one or more nickels, then Beth cannot have any nickels.) What is the greatest possible difference between the number of coins Aleta could have and the number of coins Beth could have?
10	Fifty years ago, the oak tree in my yard was twice as old as the spruce tree. In 30 years, the spruce tree will be 100 years old. How many years old is the oak tree now?

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Relay Contest

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	What is the mean of 5, 7, 9, 11, and 13?	9
Person 2	What is the next number in the sequence 1, TNYWG, 17, 25, ____?	33
Person 3	The ratio of dogs to cats was 1 to 2. There was a total of TNYWG dogs and cats. How many cats were there?	22 [cats]
Person 4	Keith traveled at 30 mph for 6 hours and then TNWG mph for 3 hours. How many miles did Keith travel?	246 [miles]
	Relay #2	Answer
Person 1	Two interior angles of a triangle are 47° and 28°. What is the measure, in degrees, of the third angle?	105 [°]
Person 2	Find the smallest of the three consecutive counting numbers, such that the sum of the three numbers is TNYWG.	34
Person 3	Find the difference between TNYWG and the remainder of 149 divided by 15.	20
Person 4	Sally was TNYWG miles ahead of Steve when he started chasing her. If he caught her in 5 hours and traveled twice as fast as she traveled, how many miles did he have to go to catch her?	40 [miles]

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5th Grade – May 19, 2007

Final Score:
KEY

School Name_____Team #_____

Proctor Name_____Room #_____ Division: ____

Mental Math Contest

PERSON 1 NAME:		**1 or 0**
1.1	What is the sum of 67 and 48?	115
1.2	What is the product of 6 and 13?	78
1.3	Jim needs 1000 signatures to get a ballot passed. Jim has 654 signatures, how many more does he need?	346 [sig]
1.4	The number of boys in Triscia's class exceeded the number of girls by 7. If there were a total of 29 pupils in her class, how many were boys?	18 [boys]
PERSON 2 NAME:		
2.1	What is 9 squared?	81
2.2	What is the positive square root of 121?	11
2.3	How many minutes have passed between 11 o'clock am and 1:17pm?	137[min]
2.4	Joe made 60% more points at his basketball game this time than he did at his last basketball game. If he made 32 points this game, how many points did he make at the last game?	20 [pts]
PERSON 3 NAME:		
3.1	How many sides does a decagon have?	10
3.2	Jill made 8 dozen brownies. How many brownies did she make?	96 [brownies]
3.3	108 doughnuts are put into boxes with a dozen in each box. How many boxes are needed to hold the doughnuts?	9 [boxes]
3.4	The average of the first 7 numbers was 21. The average of the next 3 numbers was only 11. What was the over all average of the all the numbers?	18
PERSON 4 NAME:		
4.1	What is the area, in square units, of a square whose perimeter is 12?	9 [un^2]
4.2	What time is it 24 minutes before 7:18 pm?	6:54 pm
4.3	A hole of Frisbee golf takes ten minutes to complete. How many hours will it take to complete eighteen holes of Frisbee golf?	3 [hours]
4.4	Parking fees in Mathville are calculated on a weighted value. The first hour is weighted at 5 times the cost of each of the other hours following. What is the charge, in dollars, for 6 hours of parking if the second hour cost $1?	[$] 10.00

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May 19, 2007

5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #1

#	Problem	Answer
1	What is the units digit of 120 times 15 times 22?	0
2	Henry has 16 pairs of socks. He has 4 yellow pairs, 4 red pairs, 4 green pairs, and 4 purple pairs. What percentage of Henry's socks are not purple?	75 [%]
3	Sally's fishbowl can hold 40 fluid ounces of water. The directions say to fill the bowl to three-fourths full. How much water should Sally put in the bowl?	30 [oz]
4	I can stack the fish I caught today in piles of 2, 3, 4, 5, or 6 with none left over. What is the least number of fish I could have caught?	60 [fish]
5	It takes three gallons of maple sap to make a pint of maple syrup. How many gallons of sap does it take to make eight gallons of syrup?	192 [gallons]
6	Eho opened his math book and multiplied the numbers of the two pages and got 182. What is the smaller of the two page numbers?	13
7	The ratio of fish to frogs in 2:3. There are a total of 100 fish and frogs in a pond. How many frogs are in the pond.	60 [frogs]
	Extra Problem – Only if Needed	
8	Andrew finished his homework at 6:10 PM. If he spent 80 minutes working and took one 15-minute break, at what time did Andrew start his homework?	4:35 PM

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5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #2

#	Problem	Answer
1	On a 600-mile trip, how many minutes do you save by traveling 60 mph instead of 50 mph?	120 [minutes]
2	Aaron adds 10 pounds to his bench press every day. If he bench-pressed 340 pounds the day before yesterday, how many pounds will he bench press a week from today?	430 [pounds]
3	How many ways are there to arrange the letters in MOMMY, spelled M-O-M-M-Y, with all capital letters?	20 [ways]
4	Trevor the lumberjack has a 72-foot long log. If he makes eight cuts, how long, in feet, are his pieces of wood if they are all equal in length?	8 [feet]
5	There are thirty storage bins in a line numbered one through thirty. Bin #15 is full of apples and bin #27 is full of pears. The bins in between are full of grain. How many bins of grain are there?	11 [bins]
6	What is the largest area in square units you can create with a quadrilateral with perimeter 36?	81 [un^2]
7	What is the 59^{th} even number?	118
	Extra Problem – Only if Needed	
8	How many lines of symmetry can be drawn through a regular pentagon?	5

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May 19, 2007

5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #3

#	Problem	Answer
1	What is the positive square root of 121?	11
2	Three miles is how many yards?	5280 [yards]
3	What is the probability of drawing an ace or a jack from a deck of playing cards?	$\frac{2}{13}$
4	Trevor is playing nine holes of Frisbee golf. If he scored four on each of the first three holes and five on the fourth hole, what score does he need to average on the last five holes to have an average a score of three over the entire course?	2
5	What day of the week will it be this 4^{th} of July, 2007?	Wednesday
6	The product of my two numbers is 12 and their sum is seven. What is their positive difference?	1
7	What is the product of the first five odd positive integers?	945
	Extra Problem – Only if Needed	
8	A box of crayons holds 36 crayons. There are 12 boxes in a crate of crayons. How many crayons are in a crate?	432 [crayons]

"Math is Cool" Masters – 2006-07

5th Grade – May 19, 2007

Final Score:
KEY

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____Division: _____

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	71.05		
2	23.98		
3	240		
4	29/6		
5	35/6		
6	6 [cookies]		
7	1/6		
8	96		
9	81π [cm^2]		
10	102 [cm^2]		
11	32		
12	480 [cm^2]		
13	90π [cm^2]		
14	576π [cm^3]		
15	4/17		
16	-9		
17	30 [Squares]		
18	7/13		
19	33 [yrs]		
20	504 [ways]		

	Answer	1 or 0	1 or 0
21	222 [cm^2]		
22	35 [diagonals]		
23	24 [ways]		
24	1260 [ways]		
25	243 [numbers]		
26	30 [days]		
27	5/26		
28	4 [mph]		
29	20 [tickets]		
30	$1475\pi/2$ [m^2]		
31	27 [crikeys]		
32	67 [6 pt bucks]		
33	300D/P		
34	13		
35	105 [eggs]		
36	16 [numbers]		
37	[$] 625.40		
38	[$] .39		
39	49π [m^2]		
40	1/7		

"Math is Cool" Masters – 2006-07

5th Grade – May 19, 2007

School Name_____Team #_____

Proctor Name_____Room #_____Division: _____

Final Score:
KEY

First Score

(out of 18)

Team Multiple Choice Contest – Score Sheet

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.

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	C		
2	A		
3	E [$1.85]		
4	B		
5	C		
6	D		
7	C		
8	A		
9	D		

"Math is Cool" Masters – 2006-07

5th Grade – May 19, 2007

School Name_____Team #_____

Proctor Name_____Room #_____Div: _____

Final Score:
KEY

First Score

(out of 20)

Team Contest – Score Sheet

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. Each problem is scored as a 2 or 0.

DO NOT WRITE IN SHADED REGIONS

	Answer	2 or 0	2 or 0
1	odd		
2	7, 4, 8		
3	28 [ways]		
4	19		
5	5 [pounds]		
6	30,500,000 [cents]		
7	[x=] 3 [units]		
8	426,891		
9	91		
10	90 [years]		

"Math is Cool" Masters -- 2006-07

KEY

5th Grade – May 19, 2007

School:_____Team #_____

Proctor: _____ Room #_____Div _____

RELAY # 1

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
9	**33**	**22 [cats]**	**246 [miles]**
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
105[°]	**34**	**20**	**40 [miles]**
1 or 0	1 or 0	1 or 0	2 or 0