"Math is Cool" Championships 2002-03

November 15, 2002

Individual Contest, Grades 7 and 8

Student Name:		Total
School:		
Team Number:		

Scoring +1 for a correct answer, 0 for an incorrect or blank answer. Do not write in shaded area.

Prob.	Answer	Score (0 or 1)	
1			
2			
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12			
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18			
19			
20			

Prob.	Answer	Score (0 or 1)	
21			
22			
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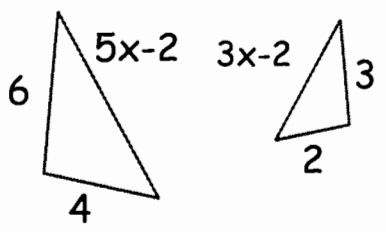
38			
39			
40			

"Math is Cool" Championships-2002-03

7th and 8th Grade - November 15, 2002
Individual Contest

Express all answers as reduced 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 the first prime number larger than 15?
2	What is the remainder when 120 is divided by 7?
3	Solve for x: $5(2x+3) = 25$
4	What is the slope between the points (3,5) and (5,11)?
5	What is the sum, in degrees of the interior angles of a triangle?
6	How many positive factors does 49 have?
7	How many feet does a football player run if he runs 13 yards?
8	The difference in age between Biff and Eho is 9 years. What will be the difference, in years, between their ages in 31 years?
9	If Michah runs 3.5 miles a day, how far in miles does he run in 2 weeks if he takes Sundays off?
10	If a left angle were defined as a supplement of a right angle, then the measure of the left angle would be _____ degrees.
11	If Barry Bonds hit 70 home runs in 2001 and played in 162 games that year, what was the average number of home runs hit by Bonds per game in 2001? [Write answer as a decimal rounded to the nearest thousandth]
12	Mrs. Hochstatter's class has 12 boys and 15 girls when everyone is present. Today 1/4 of the boys and 1/3 of the girls are absent. How many students are present in her class today?
13	Six people, Susan, Audrey, Hannah, Rachel, Jeff and Mark, are standing in line for "The Price is Right". Mark is directly behind Susan. Susan is 3 people behind Jeff and Jeff is before Audrey. Rachel is directly before Jeff and Hannah is the third person after Rachel. Who is 4th in line?
14	What fraction of an hour passed between 1:55 am today and 2:19 am today?

15	A smaller box is placed inside a larger box. If the box on the outside has dimensions of 10" x 10" x10" and the box on the inside has dimensions of 5" x 5" x 5", how much of the volume, in in^3, of the outside box is not taken up by the inside box?
16	For what value of x will the two triangles be similar? 
17	Simplify: $1-\dfrac{1}{1-\dfrac{1}{1-\dfrac{1}{2}}}$
18	Cindy checked out 5 books from the library, but she realized that she only had time to read 3 books before the due date. How many different groups of 3 books could she read?
19	At the Moses Lake Farmer's Market, a red delicious apple cost 23¢, a bunch of Chiquita bananas cost 79¢, and a sack of potatoes cost $1.39. If you needed 3 bunches of bananas and 2 sacks of potatoes, how many apples should you buy to spend as much as possible of the $8.00 you have in your pocket?
20	At 10:00 am, the hands of an accurate school clock make an acute angle of what degree measure?
21	Mob Barley is 5 years older than Himi Jendrix. If their combined ages twenty years ago was 21, how old in years, is Mob Barley now?
22	Find x: $2^6 + 2^6 = 4^x$
23	If Pat is $33\frac{1}{3}\%$ taller than Joel, then Joel is what percent shorter than Pat?
24	Find x: $\frac{1}{8}+\frac{3}{8}=\frac{1}{7}+\frac{x}{7}$ [Write answer as an improper fraction.]
25	What is the tens digit of 5^{35}?
26	A sailboat sails 8 km south and then 6 km east. At that moment, how far in km is it from its starting point?
27	The sum of the perimeters of three squares is 24 inches. What is the smallest possible sum of their areas in inches squared?

28	Pablo starts running at 11:00 a.m. He was going 10 mph when he started running and with each hour that passes he gets 1 mph slower. By 3 p.m., how many miles has Pablo run?
29	A ball is dropped 250 feet. Each time it hits the ground, it bounces back up $\frac{1}{2}$ the height it has fallen. Find the total distance, in feet, traveled when the ball hits the ground for the 4^{th} time.

Challenge Questions

30	A Michael Jackson commemorative alarm clock-radio-toaster all-in-one that cost \$250 ten years ago, now costs \$100. What is the percentage decrease in price?
31	A new barn containing 100 stalls has just been completed. John was hired to paint the numbers 1 to 100 on the stall doors. How many times will John have to paint the numeral 9?
32	Evaluate the sum: $\frac{1}{\sqrt{14}+2\sqrt{3}}+\frac{1}{2\sqrt{2}+\sqrt{6}}+\frac{1}{4+\sqrt{14}}+\frac{1}{\sqrt{10}+2\sqrt{2}}+\frac{1}{\sqrt{6}+2}+\frac{1}{2\sqrt{3}+\sqrt{10}}$
33	Find the greatest n for which 6^n evenly divides 10!.
34	On five 60 question tests Bobby Joe received 90%, 75%,95%,90% and 85%. What is the total number of questions Bobby Joe answered correctly?
35	Find the greatest integer x for which $2^{15} > 24^x$.
36	Solve for z: $\frac{10}{z+4}=\frac{30}{2z+3}$
37	Find two 5-digit numbers whose product is $3^{12} + 15^6 + 625^3$.
38	A side of an equilateral triangle is 4 inches. A side of a square is 8 inches. The triangle is inside the square. Find the area, in in^2, outside the triangle and inside the square.
39	A paper cone, when cut along its slant height and opened out, forms a semicircle of radius 10. What is the altitude of the original cone?
40	9 congruent spheres are packed into a unit cube in such a way that one of them has its center at the center of the cube and each of the others is tangent to the center sphere and to 3 faces of the cube. What is the radius of each sphere?

"Math is Cool" Championships 2002-03

November 15, 2002

Individual Multiple Choice, Grades 7 and 8

School:
Team Number:

Scoring +2 for a correct answer, 0 for a blank, -1 for an incorrect answer

Problem	Answer	Score (+2, 0 or -1)	
1			
2			
3			
4			
5			
6			
7			
8			
9			
		Total	

"Math is Cool" Championships-2002-03

7th and 8th Grade - November 15, 2002
Individual Multiple Choice Contest

Buzzies Bus Line

Bus Type	Maximum # of passengers	Cost of Operation	Price paid by a passenger to ride bus	Average Speed (mph)
Redhat	32	$C = 0.35x+8.00$	$P = 0.1x+5.00$	35
Mandrake	15	$C = 0.2x+4.00$	$P = 0.15x+3.00$	40
Suse	60	$C = 4x+25.00$	$P = 0.05x+6.00$	20

x= miles

Map of Cities Serviced by Buzzies Bus Line

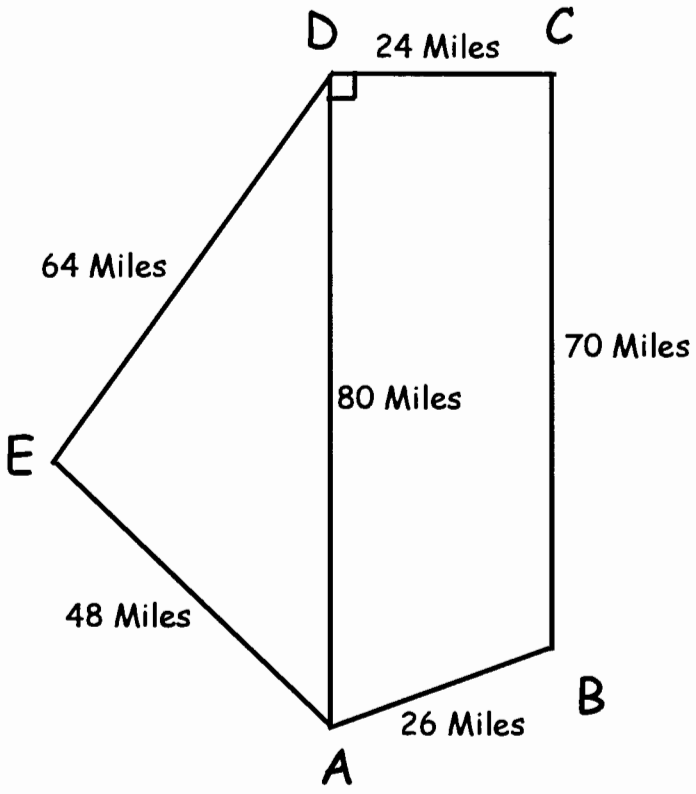


Figure not to scale

Always take the shortest route unless otherwise specified.

1	What is the shortest road distance, in miles, from City E to City C? A) 90 B) 144 C) 80 D) 87 E) Answer not given
2	How many hours would it take to drive a Suse bus from city A to City C? A) 4 B) 4.5 C) 5 D) 5.5 E) Answer not given
3	What is the combined bus fare, in dollars, for all the passengers for a full Suse Bus from City E to City A? A) 504 B) 8.4 C) 9.8 D) 12 E) Answer not given
4	What is the total cost, in dollars, to operate the Mandrake Bus from City C to City B? A) 15 B) 17 C) 18 D) 405 E) Answer not given
5	What is the simplified profit equation for one Mandrake Bus and one Redhat Bus, to each take one trip between the same two cities? Assume both the buses are filled to maximum capacity. [Hint: Profit = Total money made from passengers - cost to operate bus] A) $P = 3x + 218.9$ B) $P = 11.85x + 427$ C) $P = 4.9x + 193$ D) $P = 0.34x + 3$ E) Answer not given
6	Which bus makes the highest profit, in dollars, after the first hour of travel? Assume all the buses are filled to maximum capacity. A) Redhat B)Mandrake C)Suse
7	For a 1 hour trip on a Mandrake Bus, what is the minimum number of passengers that need to be on the bus so the bus line does not lose money? A) 2 B) 10 C) 12 D) 15 E) Answer not given
8	The local area road department decided to build a road that runs directly from City A to City C. What is the length of the road in miles? A) $8\sqrt{91}$ B) $8\sqrt{109}$ C) 56 D) 104 E) Answer not given
9	A bus driver drives from City D to City A, passing through city E. By what degree measure must the bus driver alter his course at city E, so that he continues on the road to city A? A) 45° B) 90° C) 105° D) 180° E) Answer not given

"Math is Cool" Championships 2002-03

November 15, 2002

Team Contest, Grades 7 and 8

School:
Team Number:

Scoring +1 for a correct answer, 0 for an incorrect or blank answer

Problem	Answer	Score (0 or 1)	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
		Total	

"Math is Cool" Championships-2002-03

7^{th} and 8^{th} Grade - November 15, 2002

Team Contest

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

1	If $a \blacktriangle b \blacktriangle c = \frac{a^b + bc + c^a}{b^a}$, then $2 \blacktriangle 3 \blacktriangle 5 = ?$
2	Find the equation of a line in standard form ($Ax + By = C$) that goes through the points (3,-4) and (2,7).
3	Factor completely: $x^3 + 2x^2 - x - 2$
4	Sarah's basketball team has won three games and lost two. How many different orders could they have won and lost their games?
5	What is the probability of getting a perfect score on a five question true/false test by guessing randomly the answer for every question?
6	How many sides does a dodecagon have?
7	What is the area of a trapezoid if the two parallel sides measure 7 and 9 and the other two sides both measure 5?
8	How many three digit numbers have at least two sevens in them?
9	A group of seven people needs to average 80% on their test. Two people get 70%. One person got 80%, two students got 75% and one got a 90%. What percentage does the last person need to get in order for the group to average 80%?
10	There are three stages required to grind wheat, and at each stage 10% of the product is lost. How much wheat, in pounds, is left after the final stage if we started with 50 pounds?

"Math is Cool" Championships-2002-03

7^{th} and 8^{th} Grade - November 15, 2002
Pressure Round

1	In a group of 31 people, how many handshakes would occur if each person shakes hands just once with everyone else.
2	Evaluate: $((2x)^{2x})^{x}$ when $x = 2$
3	The average value of 7,5,7, 5 and 2x is x. What is the value of x?
4	Two nonadjacent vertices of a rectangle are (12,-5) and (-12,5) and the coordinates of the other two vertices are integers. How many of these rectangles exist?
5	A piece of graph paper is folded once so that (5,2) is matched with (0,6) and (-3,0) is matched with (a,b). What is a + b?

"Math is Cool" Championships 2002-03

November 15, 2002

Mental Math, Grades 7 and 8

School:	
Team Number:	
Room Number:	

	Answer	Score
Person 1		
1		
2		
3		
4		
Person 2		
1		
2		
3		
4		
Person 3		
1		
2		
3		
4		
Person 4		
1		
2		
3		
4		
Total		

"Math is Cool" Championships-2002-03

7^{th} and 8^{th} Grade - November 15, 2002

Mental Math

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

Person 1		
1	Write 7/20 as a percent.	35[%]
2	How many minutes are there inclusively between 11:26 a.m. and 1:57 p.m.?	151[minutes]
3	If two angles of a triangle are 35° and 67°, what is the third angle, in degrees?	78[°]
4	What is the difference between 2^4 and 2^3?	8
Person 2		
1	What is the volume of a cylinder with height 3 and radius 7?	147π
2	What is the greatest common factor of 28 and 56?	28
3	A square pyramid has how many faces?	5 [faces]
4	What is the largest acute angle, in degrees, that is a whole number?	89 [°]
Person 3		
1	If it takes 5 seconds to strike a bell 6 times, how many seconds would it take to strike the same bell 12 times? The bell rings when you start timing.	11 [sec]
2	What is $5^3 + 5^2 - 20$?	130
3	The sum of Harry and Lloyd's ages is 25. What will the sum of their ages be in 8 years?	41
4	True or False: The product of an even number and an odd number is always odd.	False
Person 4		
1	Point 3 percent is what as a fraction?	3/1000
2	22 percent of 99 equals 99 percent of what?	22
3	Carol bought 10 pens at 92 cents each. If she used a ten dollar bill to pay, how much change in cents did she receive?	80 [¢]
4	What is the cube root of 27?	3

"Math is Cool" Championships 2002-03

November 15, 2002

College Bowl, Grades 7 and 8

School:
Team Number:
Room Number:

	Score
Round 1	
Round 2	
Round 3	
Total	

"Math is Cool" Championships-2002-03

7th and 8th Grade - November 15, 2002

College Knowledge Bowl Questions #1

1	A board is 12 feet long. If it is to be cut into pieces that are two feet long, how many cuts are needed?	5 [cuts]
2	With a toss of two six-sided dice, what are the odds in favor of getting the numbers showing on the two dice to add up to more than 7? (Give answer as a fraction.)	5/12
3	How many integers between 199 and 301 are divisible by both 4 and 10?	6 [integers]
4	The radius of a wheel is 4 cm. How many revolutions will it make if it is rolled a distance of 400π cm?	50 [rev]
5	Mr. & Mrs. Hochstatter have more than 10 children. The sum of the squares of the number of boys and the number of girls in the family equals 100. How many children do they have?	14 [children]
6	What is the 8th term in the sequence 2,6,11,17,24,...?	51
7	The price of an item was reduced by 20%, then later reduced by 5%. The two reductions were equivalent to the single reduction of what percent?	24 [%]
	Extra Question: Only use it if needed	
8	Ten gallons of gas were added to a tank that had been 1/4 full. If it is now 7/8 full, how many gallons does the tank hold when it's full?	16 [gal]

"Math is Cool" Championships-2002-03

7th and 8th Grade - November 15, 2002

College Knowledge Bowl Questions #2

1	In a class of 54 students, 12 are pre-Advanced Placement students. What fraction of the class are not pre-Advanced Placement students?	7/9
2	If a car took 5 hours to complete a 275 mile trip, what was the car's average speed in miles per hour?	55 [mph]
3	What is the slope of the line that passes through the points (-2,5) and (3,4)?	-1/5
4	Erin has $37.00 to spend at the grocery store. What percent, rounded to the nearest whole percent, does she have left after she buys a $3.00 box of cookies? (Round to the nearest whole number.)	92 [%]
5	How many cups are in 64 fluid ounces, 3 pints and 2 gallons?	46 [cups]
6	If Erin can read 12 pages in 10 minutes and Peter can read 14 pages in 10 minutes, how many more pages will Peter read than Erin in 5 hours?	60 [pages]
7	Jared has $5.33. Erin has 6 times as much money as Jared. Peter has $60.48. Daniel has 3/8 as much money as Peter. Together, how much money, in dollars, do Erin and Daniel have? Round to the nearest penny.	[$] 54.66
	Extra Question: Only use it if needed	
8	If Jared's subtotal at Safeway is $56 and the sales tax is $4.48, what percentage of the subtotal is sales tax?	8 [%]

"Math is Cool" Championships-2002-03

7^{th} and 8^{th} Grade - November 15, 2002

College Knowledge Bowl Questions #3

1	How many ways can you arrange Joel, Stephanie, Michah, Daniel, Peter, Melissa and Susan in a circle?	720 [ways]
2	If a shirt costs $44.16 after an 8% discount, what was the original price of the shirt, in dollars?	[$]48.00
3	What are the angle measures, in degrees, of a triangle with side-length ratios of $1:1:\sqrt{2}$?	45[°], 45[°], 90[°]
4	What is 3^{32} divided by 3^{29} minus the cube root of 27?	24
5	Which number is greater: 3^5 or 2^8?	2^8
6	William opened his yearbook and multiplied the two page numbers that were facing him. The product was 20,306. What was the smaller of the page numbers facing him?	142
7	How many positive prime numbers have a remainder of zero when divided by 2001?	None or 0
	Extra Question: Only use it if needed	
8	A ton is 2000 pounds. If 4/5 of a ton of bowling balls costs $627, what is the cost of 1200 pounds of bowling balls, in dollars?	[$]470.25

"Math is Cool" Championships -- 2001-02

7th and 8th Grade - November 15, 2002

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	17		
2	1		
3	1		
4	3		
5	180 [°]		
6	3		
7	39 [feet]		
8	9 [years]		
9	42 [miles]		
10	90 [°]		
11	.432 [hits/game]		
12	19 [students]		
13	Hannah		
14	2/5 [of an hour]		
15	875 [in^3]		
16	2		
17	2		
18	10 [books]		
19	12 [apples]		
20	60 [°]		

	Answer	1 or 0	1 or 0
21	33 [years]		
22	3.5 or 7/2		
23	25 [%]		
24	5/2		
25	2		
26	10 [km]		
27	12 [in^2]		
28	34 [miles]		
29	687.5 [ft]		
30	60 [%]		
31	20 [times]		
32	1		
33	4		
34	261 [questions]		
35	3		
36	-9		
37	19729 and 12979		
38	$64 - 4\sqrt{3}$		
39	$5\sqrt{3}$		
40	$\sqrt{3} - \frac{3}{2}$		

"Math is Cool" Championships -- 2001-02

7th and 8th Grade - November 15, 2002

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	16/3		
2	11x + y = 29		
3	(x+1)(x-1)(x+2) [order doesn't matter]		
4	10 [orders]		
5	1/32		
6	12 [sides]		
7	$16\sqrt{6}$		
8	27 [numbers]		
9	100 [%]		
10	36.45 [lbs]		

"Math is Cool" Championships -- 2001-02

7th and 8th Grade - November 15, 2002

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Individual 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	E		
2	E		
3	A		
4	C		
5	C		
6	C		
7	A		
8	B		
9	B		

1. 88 miles
2. 4.8 hours

"Math is Cool" Championships -- 2001-02

7th and 8th Grade - November 15, 2002

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Pressure Round - Score Sheet

	Answer		
1.	465 [handshakes]		
2.	65,536		
3.	8		
4.	5		
5.	-100/41		