"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

PreAlgebra – December 7, 2007

Individual Contest

Tear this sheet off and fill out top of answer sheet on following page prior to the start of the test.

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 rounded to the nearest cent.*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *All radicals must be simplified and all denominators must be rationalized.*
- *Units are not necessary unless it is a problem that deals with time and in that case, a.m. or p.m. 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 at the top of the sheet filled out.*
- *Tests will be scored as a 0 if answers are not recorded 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 1 or 0. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.

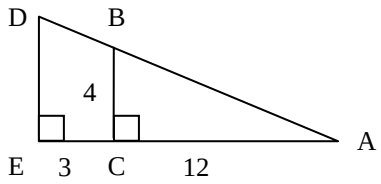
"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

PreAlgebra – December 7, 2007

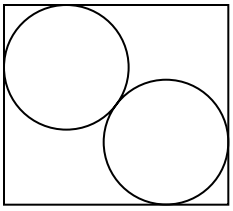
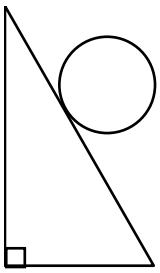
Individual Contest

1	Evaluate: 2 + 3 x 7 – 5
2	If Bjorn can eat one sandwich every 15 minutes, how many minutes will it take him to eat 7 sandwiches?
3	Between which two digits would you place a decimal point if you want the following number to have a value between 100 and 1000? 1234567890
4	Three sodas cost $2.37. What do five sodas cost, in dollars?
5	If n equals the largest two-digit integer and m equals a perfect square between 5 and 10, what is the value of n divided by m?
6	If today is Friday, what day of the week will it be 90 days from now?
7	Evaluate: One plus two times three minus four divided by five. If your answer is not an integer, give it as a fraction.
8	How many digits are in the quotient of the following problem: 1,000,000 ÷ 4?
9	Give the larger of the two <u>answers</u> to the following multiplication problems: a) $38 \times \frac{1}{2}$ b) 4 x 5
10	What percent of 80 is 45? Give your answer as a decimal to the nearest hundredth.
11	A pad of sticky notes in the shape of a rectangular prism has dimensions 1 cm by 4 cm by 6 cm. How many square centimeters are in the surface area of the pad?
12	What is the largest prime factor of 495?
13	What is $1\frac{1}{4}$ expressed as a percent?
14	Find the sum of $\frac{1!}{4} + \frac{2!}{3} + \frac{3!}{2}$, and give your answer as a mixed number.
15	What is the positive difference between rounding the following number to the nearest hundred and rounding it to the nearest ten? If your answer is not an integer, give it as a decimal. 326.049
16	Brenda has 512 pennies. She gives away half of her pennies to her best friend on Monday, then gives half of what remains to her second best friend on Tuesday, and continues giving away pennies in this pattern until she has one penny left, which she keeps for herself. On what day of the week does she last give away pennies?
17	The radius of a spherical orange is 2 inches. An ant is standing at point A. Point B is at the opposite side of the sphere from point A. How many inches are in the shortest possible path which begins and ends at point A, follows the peel of the orange, and passes through point B at least once?
18	Evaluate: 897 x 903

19	Let the letters a, b, c and d have the following values. a = $\sqrt{9.61}$ b = π c = $\sqrt{10}$ d = $\frac{22}{7}$ Write the letters a, b, c and d in order from least to greatest value.
20	In the following diagram, AC = 12 cm, CE = 3 cm and BC = 4 cm. How many centimeters are in the length of DE? 
21	What is the difference between the largest and smallest positive integer factors of 210?
22	A line passes through the points (3,4) and (4,3). As an ordered pair, (x,y), what are the coordinates of the point where the line crosses the y-axis?
23	Two standard die are rolled. The sum of the top faces is 8. What is the probability that both dice have the same number on their top faces?
24	A fish tank in the shape of a rectangular prism has length 16, width 12 and height 11 inches. The manufacturer recommends keeping the water level of the tank 1 inch below the top. Georgia has 3 goldfish, each with a volume of 2 cubic inches. How many cubic inches of water should Georgia put in the tank, assuming she meets the manufacturer's recommendation?
25	A middle school has 960 students. The ratio of eighth graders to seventh graders is 9:7, and of the eighth graders, the ratio of boys to girls is 7:11. Of the seventh graders, the ratio of boys to girls is 13:8. What is the ratio of eighth grade boys to seventh grade girls? Express your answer as m:n, where m and n are integers with no common factors (other than 1).
26	Dexter is mixing chemicals in his lab. If he has 800 grams of a mixture that is 30% radium and 70% curium, how many grams of pure radium must he add to make the mixture 40% curium?
27	The geometric mean of two positive integers is the positive square root of their product. For positive integers *a* and *b*, their geometric mean is 10 and their arithmetic mean (average) is an integer. What is the largest possible difference between *a* and *b*?
28	The same number is added to both the numerator and the denominator of the fraction $\frac{3}{4}$ to create a new fraction. The product of $\frac{3}{4}$ and this new fraction is 1. What is the number added?
29	Scooby, Shaggy, and Scrappy are ordering lunch. Scooby bought 11 hamburgers and 5 milkshakes for $35, Shaggy bought 9 hamburgers and 7 milkshakes for $33, and Scrappy bought 2 hamburgers and 2 milkshakes. How much, in dollars, did Scrappy pay?

Challenge Questions

30	Mickey walks 18 yards in a straight line across a field. He then turns around and kicks a soccer ball in a parabolic arc through the air back toward where he started. If he manages to kick the ball so that it bounces exactly at his starting point, how many yards are in the horizontal distance traveled by the ball when it is at it's highest point?
31	Two dozen widgets have a total cost of $\$\underline{a}.9\underline{b}$, where $\underline{a}$ and $\underline{b}$ stand for digits, not necessarily different. Each widget costs the same whole number of cents. What is the greatest possible cost, in cents, of each widget?

32	Mary walks into a casino and bets \$50 in a game called Shenanigans. In Shenanigans, there are four possible outcomes. There is a $\frac{1}{10}$ chance that Mary wins her money back plus \$50 more. There is a one-quarter chance that she wins her money back plus \$25, and there is a 30% chance that she breaks even (gets her bet money back but nothing else). The last possibility is that Mary loses all her bet. On average, how many dollars would Mary gain or lose each time she bets \$50? If she gains, your answer will be positive, and if she loses, your answer will be negative.
33	How many <u>ordered</u> triples (a, b, c) exist such that a, b, and c are positive integers and the product abc = 36?
34	One event at a math contest is the Topic Test, for which each participant is randomly assigned one topic from four possibilities (algebra, arithmetic, geometry, probability). What is the minimum number of Columbia Middle School Math Team members who must participate to guarantee that at least 3 team members take the same topic test?
35	From an urn with only green and blue marbles in it, one marble is selected at random. The probability that a blue marble is chosen is $\frac{3}{5}$ of the probability that a green marble is chosen. What is the probability that a green marble is chosen?
36	Let $a@b=\frac{a+b}{ab}$. If $(2@x)@4=1.25$, what is x? If your answer is not an integer, express it as a fraction.
37	Emily has 2 cats (Gato and Tiger) and 3 dogs (Fido, Rover, and Spot), but has set out a row of only 4 food bowls, all containing the same pet food. How many ways are there to arrange 4 animals at the food bowls (one animal per bowl), if 2 of the animals must be Gato and Tiger?
38	Three points (P, Q, and R) are marked on a number line, with $P<Q<R$. If $P+R=0$, then give the letters of all of the following 5 statements that <u>must</u> be true. a) $Q=\frac{P+R}{2}$ b) $P<Q<0$ c) $\lvert P\rvert>Q$ d) $R-Q>P+Q$ e) $P\cdot Q<R\cdot Q$
39	Two congruent circles of radius 4 cm are inscribed in a square as shown. What is the number of square centimeters in the area of the square? 
40	A circle of radius 2 inches rolls along the entire perimeter of a right triangle with sides 8, $8\sqrt{3}$ and 16 inches. How many inches are traveled by the center of the circle? 

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

Algebra I – December 7, 2007

Individual Contest

Tear this sheet off and fill out top of answer sheet on following page prior to the start of the test.

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by <u>all</u> 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 rounded to the nearest cent..*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *All radicals must be simplified and all denominators must be rationalized.*
- *Units are not necessary unless it is a problem that deals with time and in that case, a.m. or p.m. 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 at the top of the sheet filled out.*
- *Tests will be scored as a 0 if answers are not recorded 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 1 or 0. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

Algebra I – December 7, 2007

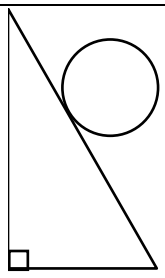
Individual Contest

1	Evaluate: 2 + 3 x 7 – 5
2	If Bjorn can eat one sandwich every 15 minutes, how many minutes will it take him to eat 7 sandwiches?
3	How many digits are in the quotient of the following problem: 1,000,000 ÷ 4?
4	Evaluate: One plus two times three minus four divided by five. If your answer is not an integer, give it as a fraction.
5	Give the larger of the two <u>answers</u> to the following multiplication problems: a) $38 \times \frac{1}{2}$ b) 4 x 5
6	What percent of 80 is 45? Give your answer as a decimal to the nearest hundredth.
7	A pad of sticky notes in the shape of a rectangular prism has dimensions 1 cm by 4 cm by 6 cm. How many square centimeters are in the surface area of the pad?
8	What is $1\frac{1}{4}$ expressed as a percent?
9	Find the sum of $\frac{1!}{4} + \frac{2!}{3} + \frac{3!}{2}$, and give your answer as a mixed number.
10	Brenda has 512 pennies. She gives away half of her pennies to her best friend on Monday, then gives half of what remains to her second best friend on Tuesday, and continues giving away pennies in this pattern until she has one penny left, which she keeps for herself. On what day of the week does she last give away pennies?
11	What is the positive difference between rounding the following number to the nearest hundred and rounding it to the nearest ten? If your answer is not an integer, give it as a decimal. 326.049
12	What is the largest prime factor of 495?
13	The radius of a spherical orange is 2 inches. An ant is standing at point A. Point B is at the opposite side of the sphere from point A. How many inches are in the shortest possible path which begins and ends at point A, follows the peel of the orange, and passes through point B at least once?
14	Let the letters a, b, c and d have the following values. a = $\sqrt{9.61}$ b = π c = $\sqrt{10}$ d = $\frac{22}{7}$ Write the letters a, b, c and d in order from least to greatest value.
15	Evaluate: 897 x 903
16	What is the difference between the largest and smallest positive integer factors of 210?
17	A line passes through the points (3,4) and (4,3). As an ordered pair, (x,y), what are the coordinates of the point where the line crosses the y-axis?

18	Evaluate: $\left(5^9\right)^{\frac{1}{3}}$
19	Mickey walks 18 yards in a straight line across a field. He then turns around and kicks a soccer ball in a parabolic arc through the air back toward where he started. If he manages to kick the ball so that it bounces exactly at his starting point, how many yards are in the horizontal distance traveled by the ball when it is at it's highest point?
20	A fish tank in the shape of a rectangular prism has length 16, width 12 and height 11 inches. The manufacturer recommends keeping the water level of the tank 1 inch below the top. Georgia has 3 goldfish, each with a volume of 2 cubic inches. How many cubic inches of water should Georgia put in the tank, assuming she meets the manufacturer's recommendation?
21	The geometric mean of two positive integers is the positive square root of their product. For positive integers a and b, their geometric mean is 10 and their arithmetic mean (average) is an integer. What is the largest possible difference between a and b?
22	A six-foot-tall woman is standing 30 feet from a streetlight, which causes her shadow to be 12 feet long. How many feet tall is the streetlight?
23	Dexter is mixing chemicals in his lab. If he has 800 grams of a mixture that is 30% radium and 70% curium, how many grams of pure radium must he add to make the mixture 40% curium?
24	How many <u>ordered</u> triples (a, b, c) exist such that a, b, and c are positive integers and the product abc = 36?
25	The same number is added to both the numerator and the denominator of the fraction $\frac{3}{4}$ to create a new fraction. The product of $\frac{3}{4}$ and this new fraction is 1. What is the number added?
26	Scooby, Shaggy, and Scrappy are ordering lunch. Scooby bought 11 hamburgers and 5 milkshakes for $35, Shaggy bought 9 hamburgers and 7 milkshakes for $33, and Scrappy bought 2 hamburgers and 2 milkshakes. How much, in dollars, did Scrappy pay?
27	Three standard dice are rolled. The sum of the top faces is 9. What is the probability that all three dice have the same number on their top faces?
28	Two dozen widgets have a total cost of $\$\underline{a}.9\underline{b}$, where <u>a</u> and <u>b</u> stand for digits, not necessarily different. Each widget costs the same whole number of cents. What is the greatest possible cost, in cents, of each widget?
29	Mary walks into a casino and bets $50 in a game called Shenanigans. In Shenanigans, there are four possible outcomes. There is a $\frac{1}{10}$ chance that Mary wins her money back plus $50 more. There is a one-quarter chance that she wins her money back plus $25, and there is a 30% chance that she breaks even (gets her bet money back but nothing else). The last possibility is that Mary loses all her bet. On average, how many dollars would Mary gain or lose each time she bets $50? If she gains, your answer will be positive, and if she loses, your answer will be negative.

Challenge Questions

30	Evaluate: $12012_3 + 101_2$ in base 10
31	Point P is translated 4 units left and 2 units up, and then reflected over the line $y = -x$. The final image point resulting from these transformations has coordinates (7, -3). As an ordered pair (x, y), what are the coordinates of the original point P?

32	Let $a@b=\frac{a+b}{ab}$. If $(2@x)@4=1.25$, what is x? If your answer is not an integer, express it as a fraction.
33	Three points (P, Q, and R) are marked on a number line, with $P<Q<R$. If $P+R=0$, then give the letters of all of the following 5 statements that must be true. a) $Q=\frac{P+R}{2}$ b) $P<Q<0$ c) $\lvert P\rvert>Q$ d) $R-Q>P+Q$ e) $P\cdot Q<R\cdot Q$
34	Solve for x: $\lvert x+5\rvert<15+(-3)$
35	Tony jumps out of a plane. His height from the ground (h) is given by the formula $h=-16t^2+1024$, where h is in feet and t is time in seconds. How many seconds will it take Tony to hit the ground?
36	Zeus could bench-press 340 pounds last week. This week he can bench-press 380 pounds. If, every week, he improves by a number of pounds equal to three-quarters of the previous week's improvement, and if Zeus lives forever, what is the maximum number of pounds Zeus will be able to bench-press?
37	Indiana Jones needs to cross a 12-foot wide pit in the ground. There is an overhanging tree limb 16 feet above ground level, directly above the middle of the pit. By standing on tiptoe and stretching out his arm above his head, Indiana reaches 8 feet straight up in the air (above ground level) and is still able to grip his whip. In order to hold his weight, 12 inches of the whip must wrap around the tree limb. How many feet long must his whip be in order for Indiana to use his whip in this way to cross the pit?
38	Trevor wants to photograph a badger from at most 200 yards away. Trevor is running towards the badger at fifteen yards per second. He needs six seconds standing still before he can take the picture. The badger is 300 yards from Trevor and running away at five yards per second. After how many seconds can Trevor photograph the badger?
39	Ms. Henderson has 10 boys and 14 girls in one of her math classes. Students are assigned to seats at one of six tables in the classroom. Ms. Henderson randomly assigns 2 boys and 2 girls each to tables one through five. The four remaining girls are assigned to table six. What is the probability that Morelle, Gwyn, Sonja and Christine get to sit together at table six?
40	A circle of radius 2 inches rolls along the entire perimeter of a right triangle with sides 8, $8\sqrt{3}$ and 16 inches. How many inches are traveled by the center of the circle? 

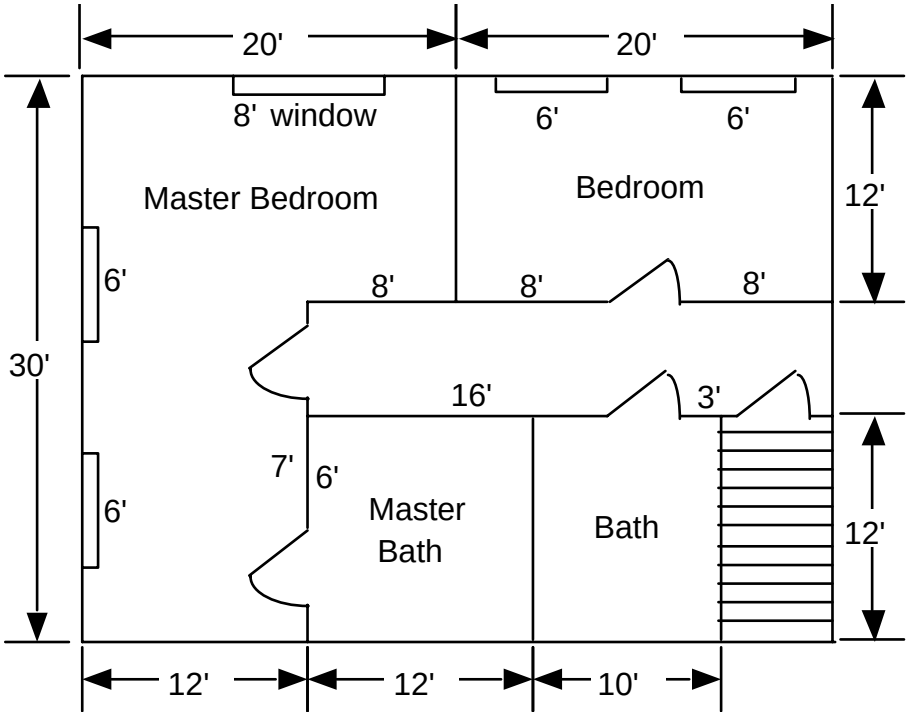
"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

Individual Multiple Choice Contest

Mrs. Copernicus wants to have the upstairs of her house painted, not including the stairs, windows, doors, walking surface or ceiling. She decides to hire Joel, an excellent painter to do the job for her. The blueprint of the upstairs of her house is shown below:



1	How many square feet are in the master bedroom of this house? A) 336 B) 360 C) 456 D) 600 E) answer not given
2	Mrs. Copernicus installed the five 4 foot tall windows when her house was built. With these specifications, how many square feet of windows are there on this story? A) 80 B) 96 C) 120 D) 128 E) answer not given
3	Painters follow the 4-to-1 rule with ladders. This rule states that for every 4 feet long your ladder is, you must place the base 1 foot away from the base of the wall on which you are working. Following this rule, how high would the tip of a 20 foot ladder be when leaned against a wall? A) 15 feet B) 16 feet C) 18 feet D) 20 feet E) answer not given

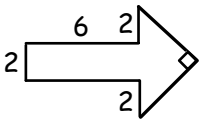
4	Joel wants to lay a piece of cloth over the staircase so no paint is spilled on the new carpeting. Joel must make sure that the cloth is in contact with the stairs at every point (horizontal and vertical sections) so that no one can trip over the cloth. How many square feet of cloth does Joel need to cover the entire staircase if every story in the house is 8 feet tall? A) 48 B) 72 C) 96 D) 168 E) answer not given
5	Mrs. Copernicus has her favorite floor mat in her unfinished master bathroom. The mat is circular with a radius of 6 feet. Joel accidentally drips a drop of paint from the top of his ladder. If the paint drop lands randomly, what is the probability it doesn't hit Mrs. Copernicus' mat? A) $\frac{\pi}{4}$ B) $\frac{\pi}{2}$ C) $\frac{4-\pi}{4}$ D) $\frac{4-\pi}{2}$ E) answer not given
6	Alone, Joel can paint a room in 4 hours. Kim could paint the same room alone in 6 hours. Working as a group of three, Joel, Ron, and Kim could paint the same room in 2 hours. How long would it take Ron to paint the room by himself? A) 4 hours B) 6 hours C) 9 hours D) 12 hours E) answer not given
7	Joel charged Mrs. Copernicus by the hour. Joel told her that his hourly rate was the smallest number of dollars that left a remainder of 1 when divided by 7, a remainder of 4 when divided by 5 and a remainder of 12 when divided by 13. If it took Joel 9 hours to complete the job, how much does Mrs. Copernicus owe him? A) \$261 B) \$387 C) \$576 D) \$3,897 E) answer not given
8	When Joel took a break he accidentally left a brush hanging over the edge of one of his paint cans. Starting 15 seconds after Joel left for break, the brush began to drip on the floor every three minutes. The first drop of paint off the brush contained 1 ounce of paint, the second two thirds of an ounce and the brush continued to drip paint in a geometric sequence throughout Joel's break. If Joel took a 15 minute break, how much paint did he have to clean up when he returned? A) $\frac{3}{2}$ oz B) $\frac{164}{81}$ oz C) $\frac{221}{81}$ oz D) 3 oz E) answer not given
9	Joel is painting one of the 12 foot walls in the master bedroom. He is using a roller with a radius of $3/\pi$ inches and that is 8 inches long. If Joel does not overlap with the roller, how many times will the roller spin while covering the wall? A) 16 B) 144 C) 192 D) 288 E) answer not given

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

Team Contest

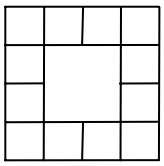
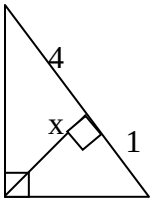
1	Line segment AB is 50% longer than segment BC, and segment CD is 20% longer than segment BC. Then segment AB is what percent longer than segment CD?
2	The arrow shown at right is made up of a rectangle plus an isosceles right triangle, with measurements as indicated. In square units, what is the area of the arrow? 
3	Find the sum of all whole number values of n for which $2^n + 3^n$ has $n-2$ digits.
4	On a 20-question multiple-choice quiz, a correct answer scores x points, a question left blank scores y points, and a wrong answer scores 0 points (where x and y are positive integers). Jamie and Rosa each scored 80 points on this quiz. Jamie correctly answered 10 questions and left all others blank. Rosa correctly answered 13 questions, left one blank, and missed all others. Find the score on this quiz for a student who had 9 correct answers and 4 wrong answers.
5	Four different numbers (A, B, C, and D) are chosen from the following list: 1, 3, 7, 10, 13, 16. In simplest fraction form, what is the smallest positive value of $\frac{A-B}{C-D}$?
6	My 4-digit house number is 2 times the quantity $a!$ and also 10 times the quantity b^2, where a and b are natural numbers. What is $a + b$?
7	A piece of toast is in the shape of a rectangular prism with length 5 inches, width 3 inches and height 0.5 inches. It has butter on one of its two largest surfaces. If the toast falls on the floor, then the probability of landing on any one of the 6 faces of the prism is determined by the ratio of the area of that face to the total surface area of the prism. What is the probability that the toast lands butter-side down?
8	A watch set correctly at 8 AM shows 11:40 AM when it is actually noon that same day. When the watch next shows 3 PM, how many minutes past 3 PM is it really? If your answer is not a whole number, give it as a mixed number.
9	Dana's boat takes half an hour to travel 14 miles against a current of 7 miles per hour (mph). At this rate, how many minutes would it take the boat to travel 80 miles with the help of a current of 5 mph?
10	If $a+b=1$, $c+d=2$, $e+f=3$, and so on through the entire alphabet, evaluate the sum of a + b + c + . . . + x + y + z.

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

Pressure Round Contest

1	What is $20^2 - 19^2 + 18^2 - 17^2 ... + 2^2 - 1^2$?
2	How many rectangles of any size or orientation exist in the figure? 
3	A bag contains 4 red, 3 white, and 2 blue marbles. What is the probability that when two marbles are drawn, at least one of them is blue?
4	How many positive integer factors does the cube of the square of 2007 have?
5	Find x in the diagram at right. 

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

Mental Math Contest

PERSON 1		
1.1	Evaluate: five times six times seven	210
1.2	Find the area of a triangle with side lengths three, four, and five.	6 [units^2]
1.3	If Bob is cutting a five-foot log into four-inch chunks, how many cuts will he make?	14 [cuts]
1.4	What is the square root of 686?	$7\sqrt{14}$
PERSON 2		
2.1	How many ways can five people arrange themselves in a line?	120 [ways]
2.2	If a cricket chirps forty times a minute, how many times will it chirp in twelve seconds?	8 [times]
2.3	What is the area of a circle with a diameter of six inches?	9π [sq in]
2.4	Thirty percent of 160 is what percent of 60?	80
PERSON 3		
3.1	Kyle has five dimes and seven nickels. How many cents does he have?	85 [cents]
3.2	If Teddy divides 72 doughnuts between his five jolly friends and himself, how many doughnuts does he have for himself?	12 [doughnuts]
3.3	What is the smallest integer greater than 1 that is both a perfect square and a perfect cube?	64
3.4	Pippy the Pig devours 7 chips in a minute. How many minutes will it take her to eat a bag of 105 chips?	15 [min]
PERSON 4		
4.1	Solve for x: three x minus sixteen equals seventeen	[x=] 11
4.2	Evaluate: two to the seventh power	128
4.3	How many ways can a committee of 3 people be chosen from 8 people?	56 [ways]
4.4	A rectangle has length four inches longer than the width, and the width is three inches. What is the area of the rectangle in square inches?	21 [sq in]

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

COLLEGE KNOWLEDGE BOWL ROUND #1

#	Problem	Answer
1	An ogre is pushing a boulder up a 110-foot hill. The first hour he pushes the boulder up twenty feet. He tires, and each hour after that, he only manages two feet less than the hour before. In which hour will he reach the top of the hill?	8 [th]
2	The numbers A and B are part of the arithmetic sequence: 12 comma A comma B comma 16, and so on. What is A plus B?	28
3	What is the remainder when six point one seven times ten to the third power is divided by nine?	5
4	A cake in the shape of a regular pentagon is cut along each of its diagonals and the resulting pieces separated. How many pieces are there?	11
5	Ashley eats ice cream every night, choosing a flavor at random. The probability that she eats vanilla is one-half, the probability that she eats chocolate is one-third, and the probability that she eats caramel is one-sixth. What is the probability that she doesn't eat vanilla ice cream all week?	1/128
6	How many positive integers less than 50 have exactly three positive integer factors?	4
7	If three Googles are equal to two Froogles, and four Yahoos are equal to one Froogle, how many Googles are in sixteen Yahoos?	6 [Googles]
	Extra Problem – Only if Needed	
8	What is the sum of the first 10 positive integers that are not multiples of 3?	75

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

COLLEGE KNOWLEDGE BOWL ROUND #2

#	Problem	Answer
1	My cat Fluffy cleans herself six times each day for 15 minutes each time. What fraction of each day does Fluffy clean herself?	1/16
2	A partial deck of cards only has the cards tens, jacks, queens, kings, and aces. When one card is drawn from this partial deck, what is the probability of getting a red jack?	1/10
3	At what time between 1:00 pm and 2:00 pm, to the closest minute, are the minute and hour hand exactly on top of each other?	1:05 pm
4	A car averages 40 miles per hour for its entire trip. If the round-trip journey is 60 miles long and the trip there takes an hour, what is the average speed in miles per hour for the trip back?	60 [miles per hour]
5	Sarah accidentally multiplied her number by four and subtracted eleven instead of multiplying by two and adding five; but she got the right answer anyway. What was her number?	8
6	It takes 60 strawberries to make eight smoothies. How many strawberries are needed to make six smoothies?	45
7	What is the side length of a cube whose volume has the same numeric value as its surface area?	6 [units]
	Extra Problem – Only if Needed	
8	Anna has made 44 out of 50 free throws so far this season. In her next 30 free throws, how many must she make to raise her free throw percentage to 90 percent?	28 [free throws]

"Math is Cool" Championships – 2007-08

Sponsored by: Western Polymer Corporation

7th Grade – December 7, 2007

COLLEGE KNOWLEDGE BOWL ROUND #3

#	Problem	Answer
1	Amanda and Beth are jogging around a 400 meter track. Amanda runs 200 meters per minute while Beth runs 175 meters per minute. After how many minutes has Amanda run a full lap more than Beth?	16 [minutes]
2	Stephanie's iPod has 8,400 songs which are, on average, three and a half minutes long. If she were to play all her songs consecutively, how many days, to the closest day, would the music last?	20 [days]
3	Yosemite Sam becomes enraged if he draws a numbered card less than a 6 from a standard deck of cards. If an ace is not considered to be a numbered card, and he draws a single card, what is the probability that he will become enraged?	4/13
4	Anna is making a rectangular bed frame out of wood. She wants the area of the bed to be 12 square units, and all the dimensions to be integers. How many different shapes are possible for Anna's bed, if a bed with dimensions A by B is considered to be the same as one with dimensions B by A?	3
5	What is the volume of a rectangular box in cubic centimeters if three of the faces have areas of two, eight, and nine square centimeters?	12 [cu. cm]
6	If there are 19 socks in a drawer and 8 of them are red, 7 of them are blue, and 4 of them are green. How many socks should be taken to ensure a pair of each color?	17 [socks]
7	When two integers are multiplied together, the product is two-thousand seven. If one is a three-digit integer less than 500, what is the other integer?	9
	Extra Problem – Only if Needed	
8	If Sandra is driving a bus at a speed of 50 miles per hour and Keanu is driving another at 60 miles per hour; how many minutes longer will it take Sandra to drive 95 miles than Keanu?	19 [minutes]

"Math is Cool" Championships – 2007-08

Algebra I – December 7, 2007

Final Score:

KEY

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	18		
2	105 [min]		
3	6 [digits]		
4	31/5		
5	20		
6	56.25 [%]		
7	68 [cm^2]		
8	125 [%]		
9	$3\frac{11}{12}$		
10	Tuesday		
11	30		
12	11		
13	4π [in]		
14	a, b, d, c		
15	809991		
16	209		
17	(0,7)		
18	125		
19	9 [yds]		
20	1914 [in^3]		

	Answer	1 or 0	1 or 0
21	48		
22	21 [feet]		
23	600 [grams]		
24	36 [triples]		
25	-7		
26	[$] 8 or [$] 8.00		
27	1/25		
28	33 [cents]		
29	[$] -6.25		
30	$145_{[10]}$		
31	(7, -9)		
32	[x =] 2		
33	c, d		
34	$-17 < x < 7$ or (-17,7)		
35	8 [sec]		
36	500 [pounds]		
37	11 [ft]		
38	19 [seconds]		
39	1/1001		
40	$4\pi + 24 + 8\sqrt{3}$ [in]		

"Math is Cool" Championships – 2007-08

PreAlgebra – December 7, 2007

School Name_____Team #_____

Proctor Name_____Room #_____

Final Score:

KEY

First Score

STUDENT NAME_____

Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	18		
2	105 [min]		
3	3 and 4		
4	[$] 3.95		
5	11		
6	Thursday		
7	31/5		
8	6 [digits]		
9	20		
10	56.25 [%]		
11	68 [cm^2]		
12	11		
13	125 [%]		
14	$3\frac{11}{12}$		
15	30		
16	Tuesday		
17	4π [in]		
18	809991		
19	a, b, d, c		
20	5 [cm]		

	Answer	1 or 0	1 or 0
21	209		
22	(0,7)		
23	1/5		
24	1914 [in^3]		
25	21:16		
26	600 [grams]		
27	48		
28	-7		
29	[$] 8 or [$] 8.00		
30	9 [yds]		
31	33 [cents]		
32	[$] -6.25		
33	36 [triples]		
34	9 [members]		
35	5/8		
36	[x =] 2		
37	72 [ways]		
38	c, d		
39	$96 + 64\sqrt{2}$ [cm]		
40	$4\pi + 24 + 8\sqrt{3}$ [in]		

"Math is Cool" Championships – 2007-08

7th Grade – December 7, 2007

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

Final Score:
KEY

First Score

(out of 18)

INDIVIDUAL 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. It is not necessary to write your personal name on the test, but you may put it at the bottom of the test so your coach will be able to give you back the correct test. This test is taken individually, but it is part of your team score, including zeros for missing team members. Your team score will be calculated by taking the mean of your four team members' scores. When you are prompted to begin, tear off the colored sheet and begin testing. ***Since this is a multiple choice test, ONLY a letter response should be indicated as an answer on the answer sheet.*** *No talking during the test.*

DO NOT WRITE IN SHADED REGIONS

	Answer	-1, 0 or 2	-1, 0 or 2
1	C		
2	D		
3	E ($5\sqrt{15}$ feet)		
4	E (120 ft^2)		
5	C		
6	D		
7	C		
8	C		
9	D		

"Math is Cool" Championships – 2007-08

7th Grade – December 7, 2007

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

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 ***2 or 0****. Record all answers on the colored answer sheet.*

DO NOT WRITE IN SHADED REGIONS

	Answer	2 or 0	2 or 0
1	25 [%]		
2	21 [un^2]		
3	9		
4	68 [points]		
5	$\frac{1}{5}$		
6	18		
7	$\frac{15}{38}$		
8	$38\frac{2}{11}$ [min]		
9	120 [min]		
10	91		

First Score

"Math is Cool" Championships – 2007-08

7th Grade – December 7, 2007

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

PRESSURE ROUND - 10 minutes

When it is time to begin, you will be handed a packet of questions. There is a copy of the questions for each team member. Two minutes after the start of the test you are expected to submit an answer for one of the questions (it can simply be a guess). The maximum value of this answer is 1 point. In another two minutes you are expected to submit another answer to one of the four remaining questions; its maximum value is two points. This process will continue until all the questions are answered and each consecutive question's worth will go up by one point. You must submit your answers on the colored sheets given to you. If you do not have an answer at the end of a two minute period, you must still submit an answer sheet with an identified question number on it. Failure to do so will result in loss of points. This event is timed, and you will be given a verbal 5 second warning and told to hold your answer sheet up in the air. You may keep working as the sheets are collected.

Pressure Round Answers

	Answer
1	210
2	52
3	$\frac{5}{12}$
4	91 [factors]
5	[x=] 2 [units]