"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Sponsored by:

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by all involved (competitors and observers). Display of poor sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise:*
  - *Express all rational, non-integer answers as common fractions, except in problems dealing with money.*
  - *For problems dealing with money, give the answer as a decimal rounded to the nearest cent.*
  - *For fifth and sixth grade, all fractions and ratios must be reduced to simplest form.*
  - *Do not round or approximate answers.*
  - *Leave answers in terms of π or other irrational quantities (e.g., √2), where applicable.*
- *Units are not necessary as part of your answer unless it is a problem that deals with time, in which case, a.m. or p.m. is required. However, if you choose to use units, they must be correct.*
- *Record all answers on the colored cover sheets in the answer column only.*
- ***Be sure that the name, team number, etc. at the top of every answer sheet has been filled out.***
- *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 be scored as a 0.*

FINAL SCORES AND AWARDS

Individual awards are determined by both the Mental Math and Individual Test scores. Individual ties are broken based on the following, in this order: total scaled individual points, total number of correct answers on the Individual Test, Mental Math raw score, number of correct answers from Individual Test #31-40, number of correct answers from Individual Test #16-30, highest numbered question answered correctly on the Individual Test working backwards from #40.

Team (School) awards are based on the highest score from amongst each of the school's teams-of-4 students in each event and is calculated as 2·(Sum of highest 3 Mental Math scores) + 2·(Multiple Choice) + 6·(Team) + 3·(Relay) + 1·(College Bowl), for approximate weights of 25%, 20%, 30%, 15% and 10% respectively. Team ties are broken based on highest event score in order of the events, starting with Mental Math.

MENTAL MATH TEST - 30 sec./quest., 8 problems, ~8%/25% of individ./team scores

The proctor will read each question twice. You may not do any writing or talking while arriving at a solution. Record only your answer on your answer sheet. You may not change, cross out, erase, or write over an answer once you have written it down. The maximum wait time is 30 seconds after completion of the second reading of the question. Correct answers receive 1 point.

INDIVIDUAL TEST - 35 minutes, 40 problems, ~92% of individual score

When you are prompted to begin, tear off the colored answer sheet and begin testing. No talking during this individual test. You will be given a 5 minute time warning. Correct answers receive 2 points for problems 1-30 and 3 points for 31-40 (in the scaled score).

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 8)*

Room #	School Name	Student Name	Team #

Mental Math – ~25% of team score & ~8% of individual score

All students in the room will concurrently be asked the same eight questions in this individual test. When it is time to begin, the proctor 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 change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, 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 or her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before the next question is read. You may continue to work on a problem (in your head) while the next question is being read. The raw score is 1 point per correct answer.*

STUDENT: DO NOT WRITE IN SHADED REGIONS (or anywhere else, other than the answer box)

	Answer	Scorer 2 0 or 1	Scorer 1 0 or 1
1			
2			
3			
4			
5			
6			
7			
8			
	TOTAL:		

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Proctor Copy

Mental Math Contest

MENTAL MATH – 30 seconds per question – ~25% of team score & ~8% of individual score

All students in the room will concurrently be asked the same eight questions in this individual test. When it is time to begin, the proctor 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 change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, 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 or her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before the next question is read. You may continue to work on a problem (in your head) while the next question is being read. The raw score is 1 point per correct answer.*

1	Bruce is 19 years old and his cousin, Kate, is 31 years old. How much older is Kate than Bruce?	
2	How many sides does a nonagon have?	
3	What is the perimeter, in inches, of an equilateral triangle with each side measuring 32 inches?	
4	If Edward has 39 oranges and he eats 3 oranges a day, how many days does it take him to eat all of the oranges?	
5	A single card is drawn from a standard 52-card deck. What is the probability that the card drawn is a four?	
6	What is three to the third power, minus two to the second power?	
7	What is six divided by six divided by six divided by one-sixth?	
8	Twenty-four is what percent of one hundred sixty?	

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

Mental Math Contest – Answer Key

SCORERS — Write-overs, Cross-outs, and Erasures Must be Marked Incorrect (0)

	Answer
1	12 [years]
2	9 [sides]
3	96 [inches]
4	13 [days]
5	1/13 or 2/26 or 4/52
6	23
7	1
8	15 [percent]

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

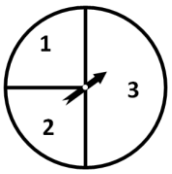
Key

Individual Contest

Record all answers on the colored cover sheet.

35 minutes, 40 problems, ~92% of individual score. No talking during this individual test. A 5-minute time warning will be given.

	Questions 1-30: 2 points each
1	What is the sum of 90 plus 400 plus 13?
2	Find the product of the digits in the following number: 621,847,593,932,303,278,347
3	What digit is in the ten-thousands place of the number 486,137?
4	How many months are in five years?
5	Evaluate: 642 – 492
6	What is the range of the set {21, 13, 16, 27, 19}?
7	Find the next number in the following addition pattern: 5, 12, 19, 26, ___.
8	True or false: 4, 3, and 8 are the lengths of the sides of a triangle.
9	What fraction of the square diamond in the figure is shaded? 
10	Melissa has 12 coins in her pocket that are either dimes or nickels. If at least one third of the coins are dimes and at least one third are nickels, what is the difference between the greatest and least amount of money she might have? Answer in cents.
11	Stacey has seven less than three dozen eggs with which to make omelets. How many eggs does she have?
12	Evaluate: -9 – (-8)(6) – (-3)(-2)
13	Twenty-five game show contestants, including Olivia, are lined up on stage. Ben, the host, randomly selects one contestant to play the Big Finale game. As a percentage rounded to the nearest whole number, what is the likelihood that Olivia is selected?
14	What is the median of the following set of numbers? {1, 4, 2, 8, 5, 9, 5, 1, 6, 4, 8}
15	A pasture is defined to be a rectangular area that is completely enclosed by fencing. You have 400 feet of fencing. What is the area, in square feet, of the biggest pasture you can create?

16	Find the following sum and state the answer as a fraction: $\frac{2}{5}+\frac{1}{3}$
17	What is the remainder when the number of days in the year 2016 (which is a leap year) is divided by nine?
18	What is 632 divided by 79?
19	Which is largest: $\frac{7}{13}$ or $\frac{6}{11}$ or $\frac{5}{9}$?
20	Donald Trump wants Donald Duck to agree to be his vice-president. Donald Duck says he will do it only if he is paid 50 boxes of crackers a day. How many boxes of crackers will Donald Trump have to give Donald Duck in one, non-leap year?
21	Given the spinner board shown in the figure, what is the probability that Betsy spins a "2" on a single spin? State your answer as a common fraction. 
22	At the start of every hour, a koala bear grabs 5 eucalyptus leaves, eats three, and sets the rest aside. How many hours will pass before the koala bear has set aside 18 leaves?
23	Harry uses Hermione's time turner to turn in a late homework assignment to Snape's Potions class. For every time he fully turns the device, he goes back in time by one hour. It is 6:34 PM right now and Potions class started at 9:15 AM this morning. How many times should he fully turn the time turner to hand in his homework assignment on time?
24	What is the next term in the sequence 1, 3, 7, 15, 31, 63, …
25	The sum of two numbers is 45 and their difference is 17. What is the larger of the two numbers?
26	Every time Dimitri plays his drums, there is a 2/5 chance that he will break them. If he has to play at three shows this week, what is the chance that Dimitri will NOT break his drums this week?
27	Big Vince can solve 8 math problems in four and a half minutes. Eddy can solve 4 math problems in the same time. Together, how many math problems can they solve in 15 minutes?
28	How many zeros are between the decimal point and the first nonzero number to the right of the decimal point in the product of 0.01×0.001 ?
29	A small coal-fired power plant releases carbon dioxide gas out the smokestack at a rate of 25 grams per second. How many kilograms per hour are being released?
30	Nikhil's favorite number has three digits. The second digit is four times as big as the third digit, while the first digit is three less than the second digit. What is the largest possible value for Nikhil's favorite number?

Continued on Next Page

Challenge Questions: 3 points each	
31	The ® operator is defined as follows: a ® b = (a × b) × (a – b) + (a + b). Evaluate the expression: 8 ® 9.
32	Katie is four times as old as Isaac, but in six years she will only be twice his age. How many years old will Katie be then?
33	On her computer graphics program, Maria draws two horizontal lines. She rotates one of the lines counterclockwise 140 degrees. Maria rotates the second line counterclockwise 27 degrees and places it across the first line. What is the degree measure of the smallest angle formed between these two lines?
34	There are cows and chickens in the pasture. Biff counts 27 heads and Eho counts 84 legs. How many cows are in the pasture?
35	There are 5 Danums in 3 Benums, 7 Danums in 4 Calums, and 11 Calums in 5 Hugums. How many Benums are there in 100 Hugums?
36	An abundant number is one whose proper factors sum to a value greater than the number itself. Given a sequence comprised of factorial numbers (1!, 2!, 3!, …), which term (i.e., 1^{st} or 2^{nd} or so on) of the sequence is the first to be an abundant number?
37	The average score on a test taken by all 30 students in Mr. Matsumoto's class was 86%. The average score for the 20 boys in the class was 81%. What was the average score of the 10 girls in the class?
38	Susan has 5 pairs of differently colored hoop earrings jumbled together in a drawer. If she chooses two earrings at random without looking, what is the probability that she will pick a matching pair?
39	Mrs. Arthur is putting down two red plates and four blue plates around a circular table to indicate seating positions for lunch. In how many ways can she arrange the red and blue plates around the table?
40	What is the distance between the points (-3, 6) and (2, -6)?

"Math Is Cool" Championships – 2015-16

Total Correct (all columns)

Room # _____ SCHOOL NAME _____ STUDENT NAME _____ Team # _____

Individual Contest – Score Sheet

STUDENTS: 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			
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
31-40 TOTAL:			

4th Grade

April 15, 2016

Scorers: Just score as 0 or 1 and add up those values (i.e., just work with number correct).

"Math Is Cool" Championships – 2015-16

KEY

Individual Contest – Answer Key

SCORERS: Just score as 0 or 1 and add up those values to reflect total correct. First Scorer use the right-hand columns.

	Answer
1	503
2	0
3	8
4	60 [months]
5	150
6	14
7	33
8	False
9	3/8
10	20 [cents]
11	29 [eggs]
12	33
13	4 [percent]
14	5
15	10,000 [sq. ft]

	Answer
16	11/15
17	6
18	8
19	5/9
20	18250 [boxes]
21	1/4
22	8 [hours]
23	10 [times]
24	127
25	31
26	27/125
27	40 [problems]
28	4 [zeros]
29	90 [kg/h]
30	582

	Answer
31	-55
32	18 [years]
33	67 [degrees]
34	15 [cows]
35	231 [Benums]
36	4 [th term]
37	96 [percent]
38	1/9
39	3 [ways]
40	13 [units]

4th Grade

April 15, 2016

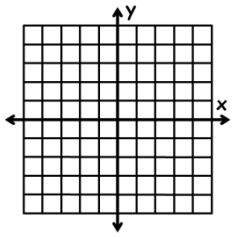
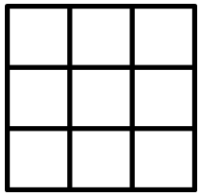
"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Team Multiple Choice Contest

	USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #1 THROUGH #4. Mrs. Casto copied a cookie recipe from the internet and pasted it as plain text into a file to print out for her after-school Cooking Club as the activity for their next meeting. The printed ingredient list is shown at left. The cookie recipe makes 32 cookies. 11/2 c. flour 1 c. sugar 2 eggs 3 tsp. vanilla 1 c. milk 2 tsp. baking powder 1/4 tsp. salt
1	The twelve Cooking Club students split up into groups of three, with each group making a batch of cookies. If the students split the cookies evenly and give the remainder to Mrs. Casto, how many cookies does Mrs. Casto get? A) 0 B) 2 C) 4 D) 8 E) 10
2	Peter wants to make a triple batch of cookies. What fraction of a gallon of milk will he use? A) 1/2 B) 3/16 C) 3/8 D) 3/4 E) Answer Not Given
3	Being a Math Is Cool veteran, Alana reads the quantity of flour as a fraction. In reality, the quantity was a mixed number. As Alana mixed the batter, she realized there was too much flour. How much extra flour did Alana use? A) 1.5 c. B) 3 c. C) 4 c. D) 5.5 c. E) Answer Not Given
4	Jim's group is low on ingredients and only has $1\frac{1}{2}$ tsp. baking powder and $^{2}/_{3}$ c. sugar. If they reduce the recipe to account for their ingredient limitations, what is the greatest number of whole cookies they can make? A) 21 B) 22 C) 23 D) 24 E) Answer Not Given

Continued on Back Side

	USE THE FOLLOWING FIGURES TO SOLVE PROBLEMS #5 AND #6.  
5	Four children are playing a game by making patterns of dots on an x-y graph like that shown in the left-hand figure above. They take turns in sequence. The first child draws a dot in Quadrant I, the second in Quadrant II, the third child in Quadrant III, and the fourth child in Quadrant IV. In which Quadrant (I, II, III, or IV) is the 55^{th} dot drawn? A) point is on the axis B) I C) II D) III E) IV
6	What is the total number of rectangles of all sizes that are found in a 3×3 grid (like shown in the right-hand figure above)? A) 10 B) 16 C) 32 D) 35 E) 36
7	In a certain time period, the second hand of an analog clock rotates the same number of degrees as the sum of the degree measures of the interior angles of a decagon. How many complete revolutions of the clock's second hand is this? A) 4 B) 5 C) 6 D) 10 E) Answer Not Given

	USE THE FOLLOWING INFORMATION TO SOLVE PROBLEMS #8 THROUGH #10. A prime number is a positive number that has exactly two distinct factors: itself and 1. A composite number has more than two factors. 2, 3, and 5 are examples of prime numbers. 4, 6, and 9 are examples of composite numbers. Factors of number N are the numbers that multiply together to give the product N. Proper factors are all the factors except for the number itself.
8	To the nearest tenth, what is the average of the first ten prime numbers? A) 10.1 B) 11.1 C) 12.9 D) 15.8 E) Answer Not Given
9	The number 90 is a composite number. How many factors does the number 90 have? A) 6 B) 8 C) 11 D) 12 E) Answer Not Given
10	How many prime numbers are there between 60 and 90? A) 7 B) 8 C) 9 D) 10 E) Answer Not Given

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 20)*

Room # _____ **School Name** _____ **Team #** _____

Team Multiple Choice Contest – 15 minutes – ~20% of team score

This test is the only test where you will be penalized for incorrect responses. You will receive two points for a correct letter response, zero points for leaving it blank and minus one point for an incorrect response. When you are prompted to begin, tear off the colored answer 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 this answer sheet.***

Correct responses are worth 2 points, incorrect responses are worth -1 point, and absence of a response is worth 0 points.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	Scorer 2 -1, 0, or 2	Scorer 1 -1, 0, or 2
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	TOTAL:		

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

Team Multiple Choice Contest – Answer Key

This test is the only test where you will be penalized for incorrect responses. You will receive two points for a correct letter response, zero points for leaving it blank and minus one point for an incorrect response. When you are prompted to begin, tear off the colored answer 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 this answer sheet.***

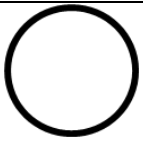
Correct responses are worth 2 points, incorrect responses are worth -1 point, and absence of a response is worth 0 points.

	Answer
1	D
2	B
3	C
4	A
5	D
6	E
7	A
8	C
9	D
10	A

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Team Contest

1	When you divide Christina's number by 15 and add 22 you get 50. What is Christina's number?
2	The set {2, 5, 6, 4, 1, 3, 2, 4, 9, x, y} has a mean (average) of 10. What is x + y ?
3	Taylor Swift is having a concert and you are going! Your ticket was $256 and parking was $12. Plus, you bought a T-shirt for $23.50, and you enjoyed popcorn and a coke for $8.25. Thankfully, your mom is paying for half of the ticket price. How much did you spend, in dollars, for this concert?
4	Applewood High School did a disaster relief fundraiser with a goal of raising $500. If they exactly met their goal and individual students contributed either $2 or $3, what is the fewest possible number of students who contributed to the fundraiser?
5	Penguins need their enclosure kept at a chilly 30°F. The cost to cool their enclosure is $100 per day, plus an additional $20 for every degree Fahrenheit that the average outdoor temperature is above 70°F. In the first week of March, the average outdoor temperatures (°F) were: 72, 70, 75, 80, 71, 65, and 60. How many dollars did it cost to cool the penguin enclosure during this week?
6	What is the surface area, in square meters, of a right rectangular prism with edges measuring 2 m, 4 m, and 5 m?
7	The dragon population on the Island of Berk is booming! In January, 2016, there were 200 dragons on Berk. Hiccup determines that future dragon populations can be modeled by the equation $P = 73 \times T + 200$, where P is the number of dragons and T is the time in months since January, 2016. Using this model, in how many months will there be 638 dragons on Berk?
8	Euclid and Janine spend a ***lot*** of time together. Janine plays her violin daily for 8 hours, while Euclid listens. Euclid writes math questions daily for 2 hours while Janine watches. Every Monday, they go out on a coffee date for 3 hours. Given that February 1st is a Monday, what fraction of Euclid's time was NOT spent with Janine in February of 2016.
9	When the digits of a positive integer are written in reverse to form a new positive integer with the same number of digits (e.g., 1234 → 4321), the new number is 90 less than the original. What is the smallest possible value of the original number?
10	Pablo draws a pizza on his paper. What is the maximum number of pieces into which this drawing of a circular pizza can be divided with four straight cuts? 

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 10)*

Room # **School Name** **Team #**

Team Contest – 15 minutes – ~30% of team score

When you are prompted to begin, tear off the colored answer sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as a 1 or 0. Record all answers on this colored answer sheet.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

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

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

Team Contest – Answer Key

	Answer
1	420
2	74
3	[$] 171.75
4	167 [students]
5	[$] 1060
6	76 [sq. meters]
7	6 [months]
8	$^{391}/_{696}$
9	1101
10	11 [pieces]

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Robert Dirks' Relay Contest – Questions & Key

RELAYS - 2 relays, 5 minutes per relay, 4 problems per relay, ~15% of team score

There is no talking during this event and you must always be facing forward. The proctor will hand out a strip of paper to each person containing problem(s). These need to remain 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, but first make sure you have the right person number. Person #1 receives a full problem to solve. Questions 2-4 will be missing a number and will show the acronym "TNYWG" (meaning "the number you will get") as a placeholder in the problem statement. The answer for the previous question (i.e., received from the teammate in front of you) should be inserted into the problem statement in place of "TNYWG." Person #1 will have problem #1 on his/her paper. Person #2 will have problems #1 and #2 printed on his/her paper. Person #3 will have problems #2 and #3 on his/her paper and Person #4 will have problems #3 and #4 on his/her paper. You may write on the strip of paper to come up with answers to the problems on your strip of paper. However, when person #1 figures out his/her problem, he/she will record ONLY his/her final answer on the answer sheet and pass only the answer sheet back (without turning around) to the person #2. Person #2 has the option of changing Person #1's answer if he/she wants, by crossing it out and putting a new answer. Once Person #2 records at least an answer for problem #2 on the answer sheet, he/she passes only the answer sheet behind to Person #3. Repeat these steps until person #4 puts an answer on the answer sheet and gives it to the proctor. Teams with only three members can position themselves in positions 2-4 and thus provide answers for all four problems. The raw score will be 1 point for correct answers to problems 1-3 and 2 points for question 4. Any non-answer text (i.e., scratch work or notes) on the answer sheet will result in a score of 0 for the entire relay.

Robert Dirks' Relay Practice		**Answer**
Quest. 1	What is the next number in the arithmetic sequence: 1, 3, 5, 7, __ ?	9
Quest. 2	What is the positive square root of TNYWG?	3
Quest. 3	What is the product of TNYWG and 11?	33
Quest. 4	Find the difference between TNYWG and 17.	16
Robert Dirks' Relay #1		**Answer**
Quest. 1	Evaluate: $10^2 - 8 \times 4 + 4$	72
Quest. 2	Adding TNYWG to 420 gives the same result as subtracting what number from 500?	8
Quest. 3	Ten of the ranch hands standing around the corral are wearing cowboy hats. TNYWG of the ranch hands are holding lassos. Six of the ranch hands both have lassos and are wearing cowboy hats. How many ranch hands are standing around the corral?	12 [ranch hands]
Quest. 4	When a whole number is multiplied times itself and TNYWG is added to the result, the final value is 133. What is the whole number?	11
Robert Dirks' Relay #2		**Answer**
Quest. 1	What is 220% of 5?	11
Quest. 2	What is the area of a trapezoid with a height of 3 cm and base lengths of 15 cm and TNYWG cm?	39 [cm]
Quest. 3	The sum of two whole numbers is TNYWG. What is the greatest possible product that those two numbers could make?	380
Quest. 4	What time is it TNYWG minutes after 10:34 AM?	4:54 PM

"Math Is Cool" Championships — 2015-16

Robert Dirks' RELAY INSTRUCTIONS – 5 min. per relay – ~15% of team score

Tear off this sheet and fill out the top portion of all the answer sheets in this packet.

There is no talking during this event and you must always be facing forward. The proctor will hand out a strip of paper to each person containing problem(s). These need to remain 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, but first make sure you have the right person number. Person #1 receives a full problem to solve. Questions 2-4 will be missing a number and will show the acronym "TNYWG" (meaning "the number you will get") as a placeholder in the problem statement. The answer for the previous question (i.e., received from the teammate in front of you) should be inserted into the problem statement in place of "TNYWG." Person #1 will have problem #1 on his/her paper. Person #2 will have problems #1 and #2 printed on his/her paper. Person #3 will have problems #2 and #3 on his/her paper and Person #4 will have problems #3 and #4 on his/her paper. You may write on the strip of paper to come up with answers to the problems on your strip of paper. However, when person #1 figures out his/her problem, he/she will record ONLY his/her final answer on the answer sheet and pass only the answer sheet back (without turning around) to the person #2. Person #2 has the option of changing Person #1's answer if he/she wants, by crossing it out and putting a new answer. Once Person #2 records at least an answer for problem #2 on the answer sheet, he/she passes only the answer sheet behind to Person #3. Repeat these steps until person #4 puts an answer on the answer sheet and gives it to the proctor. Teams with only three members can position themselves in positions 2-4 and thus provide answers for all four problems. The raw score will be 1 point for correct answers to problems 1-3 and 2 points for question 4. Any non-answer text (i.e., scratch work or notes) on the answer sheet will result in a score of 0 for the entire relay.

"Math Is Cool" Championships — 2015-16

Robert Dirks' RELAY INSTRUCTIONS – 5 min. per relay – ~15% of team score

Tear off this sheet and fill out the top portion of all the answer sheets in this packet.

There is no talking during this event and you must always be facing forward. The proctor will hand out a strip of paper to each person containing problem(s). These need to remain 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, but first make sure you have the right person number. Person #1 receives a full problem to solve. Questions 2-4 will be missing a number and will show the acronym "TNYWG" (meaning "the number you will get") as a placeholder in the problem statement. The answer for the previous question (i.e., received from the teammate in front of you) should be inserted into the problem statement in place of "TNYWG." Person #1 will have problem #1 on his/her paper. Person #2 will have problems #1 and #2 printed on his/her paper. Person #3 will have problems #2 and #3 on his/her paper and Person #4 will have problems #3 and #4 on his/her paper. You may write on the strip of paper to come up with answers to the problems on your strip of paper. However, when person #1 figures out his/her problem, he/she will record ONLY his/her final answer on the answer sheet and pass only the answer sheet back (without turning around) to the person #2. Person #2 has the option of changing Person #1's answer if he/she wants, by crossing it out and putting a new answer. Once Person #2 records at least an answer for problem #2 on the answer sheet, he/she passes only the answer sheet behind to Person #3. Repeat these steps until person #4 puts an answer on the answer sheet and gives it to the proctor. Teams with only three members can position themselves in positions 2-4 and thus provide answers for all four problems. The raw score will be 1 point for correct answers to problems 1-3 and 2 points for question 4. Any non-answer text (i.e., scratch work or notes) on the answer sheet will result in a score of 0 for the entire relay.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # _____ **School Name** _____ **Team #** _____

ROBERT DIRKS' RELAY — PRACTICE ROUND

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
0 or 1	0 or 1	0 or 1	0 or 2
Proctor — (circle value)	Proctor — (circle value)	Proctor — (circle value)	Proctor — (circle value)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # _____ **School Name** _____ **Team #** _____

ROBERT DIRKS' RELAY — PRACTICE ROUND

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
0 or 1	0 or 1	0 or 1	0 or 2
Proctor — (circle value)	Proctor — (circle value)	Proctor — (circle value)	Proctor — (circle value)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # _____ **School Name** _____ **Team #** _____

ROBERT DIRKS' RELAY #1

Answer for question # 1		Answer for question # 2		Answer for question # 3		Answer for question # 4	
0 or 1		0 or 1		0 or 1		0 or 2	
Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # _____ **School Name** _____ **Team #** _____

ROBERT DIRKS' RELAY #1

Answer for question # 1		Answer for question # 2		Answer for question # 3		Answer for question # 4	
0 or 1		0 or 1		0 or 1		0 or 2	
Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # **School Name** **Team #**

ROBERT DIRKS' RELAY #2

Answer for question # 1		Answer for question # 2		Answer for question # 3		Answer for question # 4	
0 or 1		0 or 1		0 or 1		0 or 2	
Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Final Score *(out of 5)*

Room # **School Name** **Team #**

ROBERT DIRKS' RELAY #2

Answer for question # 1		Answer for question # 2		Answer for question # 3		Answer for question # 4	
0 or 1		0 or 1		0 or 1		0 or 2	
Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)	Scorer 1 (circle value)	Scorer 2 (checkmark)

Fill in your answer and pass this sheet back to the next person without turning around.
No scratch work is allowed on this answer sheet.

Robert Dirks' Relay Practice – Person 1	
Question 1	What is the next number in the arithmetic sequence: 1, 3, 5, 7, __ ?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay Practice – Person 1	
Question 1	What is the next number in the arithmetic sequence: 1, 3, 5, 7, __ ?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay Practice – Person 2	
Question 1	What is the next number in the arithmetic sequence: 1, 3, 5, 7, __ ?
Question 2	What is the positive square root of TNYWG?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay Practice – Person 2	
Question 1	What is the next number in the arithmetic sequence: 1, 3, 5, 7, __ ?
Question 2	What is the positive square root of TNYWG?

Robert Dirks' Relay Practice – Person 3	
Question 2	What is the positive square root of TNYWG?
Question 3	What is the product of TNYWG and 11?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay Practice – Person 3	
Question 2	What is the positive square root of TNYWG?
Question 3	What is the product of TNYWG and 11?

Robert Dirks' Relay Practice – Person 4	
Question 3	What is the product of TNYWG and 11?
Question 4	Find the difference between TNYWG and 17.

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay Practice – Person 4	
Question 3	What is the product of TNYWG and 11?
Question 4	Find the difference between TNYWG and 17.

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 1	
Question 1	Evaluate: $10^2 - 8 \times 4 + 4$

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 1	
Question 1	Evaluate: $10^2 - 8 \times 4 + 4$

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 2	
Question 1	Evaluate: $10^2 - 8 \times 4 + 4$
Question 2	Adding TNYWG to 420 gives the same result as subtracting what number from 500?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 2	
Question 1	Evaluate: $10^2 - 8 \times 4 + 4$
Question 2	Adding TNYWG to 420 gives the same result as subtracting what number from 500?

Robert Dirks' Relay #1 – Person 3	
Question 2	Adding TNYWG to 420 gives the same result as subtracting what number from 500?
Question 3	Ten of the ranch hands standing around the corral are wearing cowboy hats. TNYWG of the ranch hands are holding lassos. Six of the ranch hands both have lassos and are wearing cowboy hats. How many ranch hands are standing around the corral?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 3	
Question 2	Adding TNYWG to 420 gives the same result as subtracting what number from 500?
Question 3	Ten of the ranch hands standing around the corral are wearing cowboy hats. TNYWG of the ranch hands are holding lassos. Six of the ranch hands both have lassos and are wearing cowboy hats. How many ranch hands are standing around the corral?

Robert Dirks' Relay #1 – Person 4	
Question 3	Ten of the ranch hands standing around the corral are wearing cowboy hats. TNYWG of the ranch hands are holding lassos. Six of the ranch hands both have lassos and are wearing cowboy hats. How many ranch hands are standing around the corral?
Question 4	When a whole number is multiplied times itself and TNYWG is added to the result, the final value is 133. What is the whole number?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #1 – Person 4	
Question 3	Ten of the ranch hands standing around the corral are wearing cowboy hats. TNYWG of the ranch hands are holding lassos. Six of the ranch hands both have lassos and are wearing cowboy hats. How many ranch hands are standing around the corral?
Question 4	When a whole number is multiplied times itself and TNYWG is added to the result, the final value is 133. What is the whole number?

Robert Dirks' Relay #2 – Person 1	
Question 1	What is 220% of 5?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #2 – Person 1	
Question 1	What is 220% of 5?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #2 – Person 2	
Question 1	What is 220% of 5?
Question 2	What is the area of a trapezoid with a height of 3 cm and base lengths of 15 cm and TNYWG cm?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #2 – Person 2	
Question 1	What is 220% of 5?
Question 2	What is the area of a trapezoid with a height of 3 cm and base lengths of 15 cm and TNYWG cm?

Robert Dirks' Relay #2 – Person 3	
Question 2	What is the area of a trapezoid with a height of 3 cm and base lengths of 15 cm and TNYWG cm?
Question 3	The sum of two whole numbers is TNYWG. What is the greatest possible product that those two numbers could make?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #2 – Person 3	
Question 2	What is the area of a trapezoid with a height of 3 cm and base lengths of 15 cm and TNYWG cm?
Question 3	The sum of two whole numbers is TNYWG. What is the greatest possible product that those two numbers could make?

Robert Dirks' Relay #2 – Person 4	
Question 3	The sum of two whole numbers is TNYWG. What is the greatest possible product that those two numbers could make?
Question 4	What time is it TNYWG minutes after 10:34 AM?

"Math Is Cool" Championships — 2015-16, 4th Grade — April 15, 2016

Robert Dirks' Relay #2 – Person 4	
Question 3	The sum of two whole numbers is TNYWG. What is the greatest possible product that those two numbers could make?
Question 4	What time is it TNYWG minutes after 10:34 AM?

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Room #	School Name	Team #

Total Score for Each Round

College Bowl #1 (10 Possible)	College Bowl #2 (10 Possible)	College Bowl #3 (10 Possible)

DO NOT USE TALLY MARKS

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Room #	School Name	Team #

Total Score for Each Round

College Bowl #1 (10 Possible)	College Bowl #2 (10 Possible)	College Bowl #3 (10 Possible)

DO NOT USE TALLY MARKS

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

Robert Dirks' Relay Contest – Answer Key

(Proctor — Hide this Key from View of Competitors)

ROBERT DIRKS' RELAY — PRACTICE ROUND

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
9	3	33	16

ROBERT DIRKS' RELAY #1

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
72	8	12 [ranch hands]	11

ROBERT DIRKS' RELAY #2

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
11	39 [cm]	380	4:54 PM

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

COLLEGE KNOWLEDGE BOWL ROUND #1

#	Problem	Answer
1	The internal angles of an equilateral triangle each measure how many degrees?	60 [degrees]
2	What is the product of twelve and thirty-five?	420
3	What is the greatest possible remainder when George's favorite counting number is divided by twenty-two?	21
4	What is the product of the fourth and fifth positive composite whole numbers?	90
5	Darko is seven feet tall. How tall is he in inches?	84 [inches]
6	What is the sum of the number of tails and legs that four fish, two spiders, and four dogs have?	40
7	Sheldon's Meemaw is putting in a new fifteen-foot by thirty-five-foot rectangular pool in her back yard. What is the distance around the edge of the pool, in feet?	100 [ft]
8	Karen wants to buy a shirt that is fifteen dollars. The store is having a sale, and everything is twenty percent off. How much, in dollars, will her shirt cost?	twelve dollars (i.e., $ 12)
9	Apples cost seventy-five cents each and bananas cost one dollar and twenty-five cents each. How much, in dollars, did Jonah spend to buy six apples and eight bananas?	fourteen dollars and 50 cents (i.e., $14.50)
10	In the product of seven and thirteen, what is the tens digit?	9

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

College Knowledge Bowl Round #2

#	Problem	Answer
1	If there are fourteen Arctic foxes and twelve penguins, how many feet are there?	80 [feet]
2	How many meters are in 56 kilometers?	56,000 [meters]
3	What is the shorter side length of a rectangle with one side length of eight and a perimeter of twenty-eight?	6 [units]
4	What is the remainder when two thousand sixteen is divided by three?	0
5	Hannah flips a fair coin twice. As a common fraction, what is the probability that Hannah gets heads and then tails?	$\frac{1}{4}$ (or equivalent)
6	If one angle of a triangle is eighty-five degrees, what is the sum of the other two angles?	95 [degrees]
7	How many cookies can Adrienne bake in two hours, if it takes 40 minutes to bake a batch of cookies and there are 20 cookies in a batch?	60 [cookies]
8	What is the most specific name that can be given to every quadrilateral with four congruent sides?	Rhombus
9	What is the smallest prime number greater than the sum of 23 and 44?	71
10	From three-hundred seventy one, subtract the number of edges on a cube, and then add the number of faces on a cube. What is the resultant number?	365

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

COLLEGE KNOWLEDGE BOWL ROUND #3

#	Problem	Answer
1	Callum applies to 25 colleges and receives 17 acceptance letters. Express his success rate as a percentage to the nearest whole number.	68 [percent]
2	In which quadrant of the coordinate plane does the point negative two comma three lie?	II or 2 or second
3	What is the perimeter of a square that has an area of sixteen square inches?	16 [inches]
4	In how many distinguishable ways can you arrange the letters in the acronym "STEM", spelled S-T-E-M?	24 [ways]
5	What is the units digit of the result when nine is multiplied times itself nine times?	9
6	What is the mean of the following set of numbers: 6, 14, 45, 20, and 15? [proctor – say these somewhat slowly]	20
7	What is the sum of all positive integers between one and one hundred, inclusive?	five thousand fifty (i.e., 5050)
8	What is the name for the distance from the center of a circle to the circle itself?	Radius
9	If a woodchuck can chuck a log every three minutes, how long will it take the woodchuck to chuck eight logs?	24 [minutes]
10	Listing out the prime numbers in increasing order, what is the next prime number after 31?	37

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

College Knowledge Bowl Round #4

#	Problem	Answer
1	How many even numbers are greater than 60 and less than 99?	19 [numbers]
2	Sathvik had 24 burritos in his freezer. After 60 days, Sathvik has eaten three-quarters of the burritos. How many burritos are left in the freezer?	6 [burritos]
3	What is the product of the third prime number and the seventh prime number?	85
4	What is the largest angle that can be created between the hour and minute hand of an analog clock?	180 or 360 [degrees]
5	What is the probability of drawing a face card in a standard deck of cards, if you can only draw one card?	12/52 or 6/26 or 3/13
6	To make a ham and cheese sandwich, you need one slice of cheese, one slice of ham, and two slices of bread. How many sandwiches can you make with 70 slices of cheese, 50 slices of ham, and 80 slices of bread?	40 [sandwiches]
7	A right triangle has legs measuring six centimeters and eight centimeters. What is the length, in centimeters, of the hypotenuse?	10 [cm]
8	What is sixty-five squared?	four thousand, two hundred twenty-five (i.e., 4225)
9	An equilateral triangle has a perimeter of twenty-one. What is the product of its three side lengths?	343
10	What is the sum of the number of sides of an octagon, the number of full weeks in a year, and the number of donuts in a baker's dozen?	73

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

College Knowledge Bowl Round #5

#	Problem	Answer
1	What is the sum of the three smallest positive prime numbers and the three smallest positive composite numbers?	28
2	If there are seven people in a room, how many unique handshakes are possible?	21 [handshakes]
3	What is the side length of a cube with a volume of eight cubic inches?	2 [inches]
4	Jack's mom sent him to the store to buy some gum with 2 quarters, 3 dimes, 45 nickels, and 4 pennies. How much, in dollars, did she give Jack to buy gum?	three dollars and 9 cents (i.e., $3.09)
5	How many factors does the number eighteen have?	6 [factors]
6	Biff can jump four feet, seven inches and Eho can jump three feet, three inches. How many INCHES further can Biff jump than Eho?	16 [inches]
7	Chloe is counting backwards by sevens. The first number she says is sixty-seven. What is the smallest positive number that Chloe says?	4
8	If the side length of a square is doubled, by what factor does the area of the square increase?	4
9	Every minute, each amoeba splits into two amoebas. At 5 PM, Swetha put one amoeba into a box. At 6 PM, the box is full of amoebas. At what time was the box half full?	5:59 PM
10	What number is half the sum of seventy-eight and sixty-four?	71

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

College Knowledge Bowl Round #6

#	Problem	Answer
1	What is the perimeter, in meters, of an isosceles triangle with sides measuring seven meters and two meters?	16 [meters]
2	What is the least common multiple of 3, 4, and 15?	60
3	What is the measure, in degrees, of an angle that is supplementary to a 123-degree angle?	57 [degrees]
4	What is one thousand, six hundred thirty-two divided by eight?	204
5	If Jun eats a quarter of a pizza, Jason eats an eighth of the pizza, and Jacob eats three-eighths of the pizza, how much of the pizza is left for Joshua to eat? Answer as a common fraction.	1/4 (or equivalent) [of the pizza]
6	A bag has 3 red marbles, 1 blue marble, and 7 green marbles. What is the probability of drawing, without looking, a green marble?	7/11
7	Andrew, Bryan, Connar, and Scott are standing in a line at a new store. In how many orders can they stand in line, if Andrew has to be last in line?	6 [ways]
8	What is the area of a rectangle with a length of nine centimeters and a width of seven centimeters?	63 [sq. cm]
9	All twenty Boy Scouts in Troop 314 take off their hats and go swimming. When they scramble out of the water, they each grab a random hat. What is the probability that exactly 19 of the boys ends up wearing the same hat he started with?	0
10	If fence posts are spaced every eight feet, how many fence post holes will Tex the cowhand have to dig for a forty-eight-foot long stretch of fence?	7 [holes]

"Math Is Cool" Championships — 2015-16

4th Grade — April 15, 2016

Key

COLLEGE KNOWLEDGE BOWL ROUND — EXTRA Qs

#	Problem	Answer
1	What is the length of a side of a regular pentagon with a perimeter of 40 meters?	8 [meters]
2	What is the remainder when 1000 is divided by 26 ?	12
3	An outfit consists of a shirt, pants, and shoes. Each type of item (shirt, pants, shoes) comes in red, green, and blue. How many different combinations of outfits are possible?	27
4	A piece of cardboard has an area of 12 square yards. How large is its area in square feet?	108 [sq. ft.]
5	If a circle has a circumference of 24-pi inches, then what is the radius of the circle, in inches?	12 [inches]
6	In the United States, we use the short-scale system for naming large numbers. In this short-scale system, what name comes next in the sequence after million, billion, and trillion?	Quadrillion