"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Sponsored by:

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by <u>all</u> involved (competitors and observers). Display of poor sportsmanship will result in disqualification.*
- *Competitors may not use calculators or any other aids on any portion of this contest.*
- *Unless stated otherwise:*
  - *Express all rational, non-integer answers as common fractions, except in problems dealing with money, where you should give the answer as a decimal rounded to the nearest cent.*
  - *For 5th grade and up, all fractions and ratios must be reduced to simplest form, all radicals must be simplified, and all denominators must be rationalized.*
  - *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, AM or PM 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 student name, school, team number, etc. has been filled out at the top of each answer sheet.***
- *Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will 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·(Avg. of Top 3 Ind. Multiple Choice) + 6·(Team) + 2·(Pressure) + 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" Masters — 2022-23

11/12th Grade — January 11, 2023

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			
11/12th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

Mental Math Contest – Answer Key

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

SCORERS — Write-overs, Cross-outs, and Erasures Must be Marked Incorrect (0)
Bracketed items […] in the answer key are optional.

11/12th Grade

	Answer	
1	-11	The sum of the x and y coordinates of a point is 11. What is the sum of the x and y coordinates after the point is rotated 180° around the origin?
2	140 [dimes]	How many dimes have the same monetary value as 56 quarters?
3	-10	What is the sum of the first ten odd positive integers minus the sum of the first ten even positive integers?
4	70 [inches]	A 5-inch by 7-inch rectangle is cut out of a corner of a 16-inch by 19-inch rectangle. In inches, what is the perimeter of the remaining figure?
5	3 [sets]	How many distinct sets of three positive integers have a mean of 6, a median of 7, and no mode?
6	25 [feet]	On each bounce after being dropped from a height, a bouncy ball rises to 5/4 of its previous height. If the ball is initially dropped from a height of 16 feet, how high in feet does the ball rise after its second bounce?
7	6 [years]	One-third of Biff's current age is twice that of Biff's age five years ago. What is Biff's current age in years?
8	72 [arrangements]	Six people are to be seated at a round table. Two of the people refuse to sit next to each other. How many distinct arrangements of the six people are there? Rotations of an arrangement are not distinct to one another.

"Math Is Cool" Masters — 2022-23

January 11, 2023

High School Individual Contest

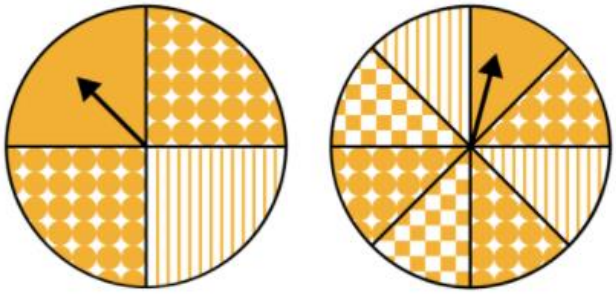
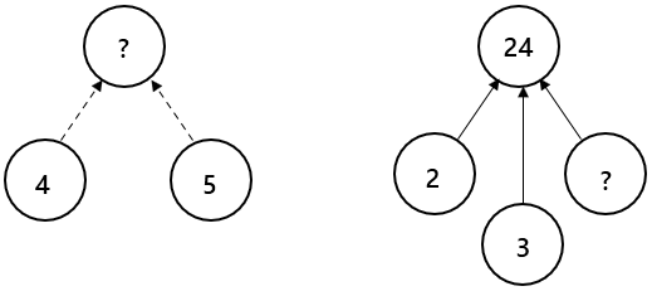
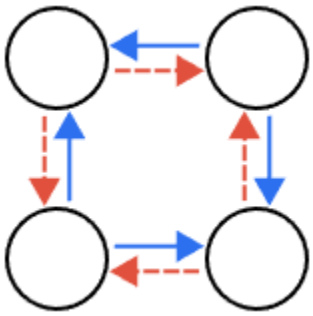
35 minutes, 40 problems, ~92% of individual score.
A 5-minute time warning will be given.

	Questions 1-30: 2 points each
1	Find r(3), given that: r(q) = 8q + 12
2	Thirteen is 20% of what number?
3	Two lines are perpendicular to each other. One line is rotated 13° clockwise, and the other line is rotated 46° counterclockwise. What is the measure, in degrees, of the smaller angle between the two lines after they have been rotated?
4	The mean of a set of 5 numbers is 6. Four of the numbers are 3, 5, 8 and 12. What is the fifth number?
5	What is the value of the discriminant of the following quadratic equation? $F(x) = x^2 - 5x + 8$
6	What is the greatest common factor of 36 and 27?
7	When a single fair coin is flipped twice, what is the probability in percent that the second flip shows heads?
8	Simplify: $128^{\left(\frac{5}{7}\right)}$
9	Solve for x: $\frac{x!}{(x-1)!} = 12$
10	A solid brass sphere has a diameter of 5 inches and a smaller solid brass sphere of the same density has a diameter of 2.5 inches. How many times the weight of the smaller sphere is the weight of the larger sphere?
11	Find the sum of the zeros of the following function. $f(x) = 5x - x^2$
12	Connie drank 6 cans of Red Bull, which have 110 mg of caffeine per can. If caffeine has a half-life of 5 hours, how much caffeine in mg will be left in her body after 10 hours, assuming that she started at 0 mg of caffeine?
13	An iPhone case that used to cost $40 has been repriced at $50. What was the percent increase in the price?
14	When the sum of 3x and 4 is divided by 5, the result is 11. What is the value of x?

Continued on next page.

15	The range of a data set {a, b, c, d, e} is 10. What is the range of the data set {5a, 5b, 5c, 5d, 5e}?
16	The corner ice cream shop has 10 flavors to choose from. Their specialty is a bowl with three scoops, each with a different flavor. How many distinct flavor combinations are possible?
17	How many minutes does it take a car averaging 24 miles per hour to travel 2.4 miles?
18	In degrees, what is the measure of the supplement of the complement of an angle whose measure is 39°?
19	The midpoint of the line segment connecting the points (-7, -3) and (3, -7) is (x, y). What is x + y?
20	Evaluate: $\frac{11^7}{121^2}$
21	There were 100 mints in a candy box. The box was passed down along a row of people. The first person took one mint. Each subsequent person took more mints than the person before them, until the box was empty. What is the largest number of people that could have been in the row?
22	In how many distinct ways can 3 different vases be arranged onto four shelves such that no two vases are on the same shelf?
23	Compute the number of zeros at the end of the following product: $1^1 \cdot 2^2 \cdot 3^3 \cdot 4^4 \cdot \ldots \cdot 24^{24} \cdot 25^{25}$
24	The following list of numbers consists of powers of two, going up to 64, where each number 'n' appears in the list 'n' times. What is the positive difference between the median and range of this set? {1, 2, 2, 4, 4, 4, 4, …, 64}
25	A region in the shape of a parallelogram is enclosed by the four lines with equations: y = 0.4x + 9 x = -10 y = 0.4x – 3 x = 5 What is the number of square units in the area of the parallelogram-shaped region?
26	Laysha has 12 coins, each of which is a nickel or a dime. There are exactly 17 different monetary values that can be obtained as combinations of one or more of her coins. How many dimes does Laysha have?
27	Sahir has made 82 out of 198 putts. How many consecutive putts must he make in order to raise his putt-making rate to 50%?

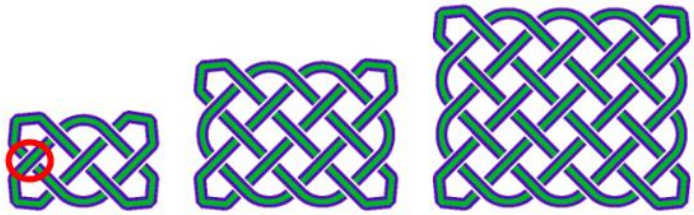
Continued on next page.

28	A game consists of spinning two spinners. The spinner on the left is divided into four equal sections, and the spinner on the right is divided into eight equal sections. You win the game if both arrows land on a section with the same pattern. The probability of winning can be written as a reduced common fraction A/B. What is A + B? 
29	In a circle puzzle like the ones shown here, dashed arrows mean to add and solid arrows mean to multiply. For example, the unknown value in the first puzzle is 9, because 4 + 5 = 9. The unknown value in the second puzzle is 4, because 2x3x4 = 24.  In the following circle puzzle, each circle contains a positive number. The product of the numbers in all four circles can be written as a reduced common fraction A/B. What is A + B? 
30	I have nine different pictures of my son taped to the shelf of my desk. How many different ways could I line them up from left to right, assuming that I always keep my favorite picture in the center position?

Continued on next page.

Challenge Questions: 3 points each

31 The following figure shows the first three iterations of a Celtic knot pattern. Iteration #1 contains 7 crossings, where a 'crossing' is indicated by the circle. If the pattern illustrated here continues, how many crossings will Iteration #20 contain?



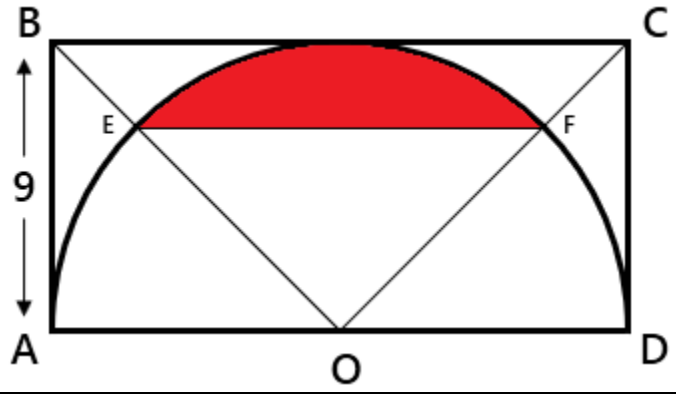
32 A 10-sided die has sides numbered 0 through 9. Assume that two of the fair 10-sided dice are thrown. What is the probability in percent that the sum of the numbers showing on the two dice is less than 10, given that the first die is showing a 7?

33 The rule of an "obstacle course" specifies that at the n^{th} obstacle, a person has to toss a 6-sided die (numbered 1 – 6) 'n' times. If the sum of the numbers showing on the 'n' tosses is greater than 2^n, the person is said to have crossed the obstacle. At most, how many obstacles can a person cross?

34 The sum of two numbers is 45. The sum of the quotient of the two numbers and its reciprocal is 2.05. Find the product of the two numbers.

35 Semicircle O, with diameter AD, is inscribed in rectangle ABCD, which has side length AB = 9. Lines have been drawn from B and C to point O, intersecting the semicircle at points E and F. The area of the shaded region, in square units, of the semicircle above EF can be written as a reduced fraction: $\frac{A\pi - B}{C}$, where A, B and C are positive integers.

What is A + B + C?



Continued on next page.

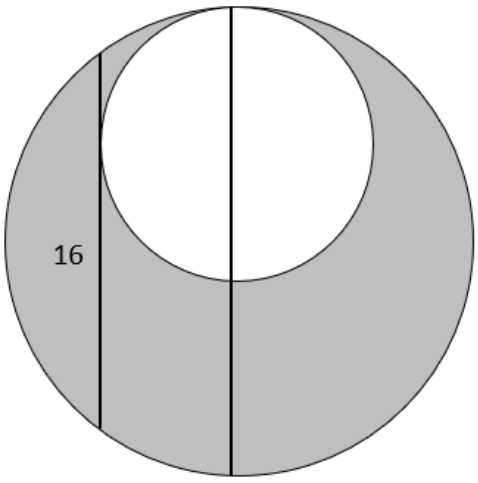
36 The following number pattern continues infinitely. Find the sum: A + B + C

1	3	9	3	11	18	13	19	27	55	A	...
2	6	2	7	15	8	17	24	34	29	B	...
3	1	5	12	5	13	21	21	23	30	C	...

37 The sum of four consecutive even integers is a 3-digit perfect square. What is the largest possible integer that could be the greatest of the four?

38 Evaluate: $-\log_2 \log_2 \sqrt{\sqrt{\sqrt{2}}}$

39 In the figure shown here, the larger circle has two parallel chords: one is a diameter and the other has length 16 and is tangent to the smaller circle. The diameter of the larger circle is collinear with the diameter of the smaller circle. The shaded area can be written as $A\pi$, where A is a positive integer. What is the value of A?



40 The rule of an "obstacle course" specifies that at the nth obstacle, a person has to toss a 6-sided (numbered 1 - 6) die 'n' times. If the sum of the numbers showing on the 'n' tosses is greater than 2^n, the person is said to have crossed the obstacle. The probability, as a reduced fraction, that a person crosses the first three obstacles can be written as a reduced common fraction A/B. What is A + B?

IF taking Pre-Calculus or Calculus, continue to Questions 41 - 45

41 A function z is defined as follows: $z = 5x + 15y$
The function z is subject to the following conditions:
$x + 3y \leq 60$
$x + y \geq 10$
$x - y \leq 0$
$x, y \geq 0$
What is the maximum possible value of z under these constraints?

Continued on next page.

42 An x-y plane curve is described parametrically by the following equations, for $-\infty < \theta < \infty$:

$$x = 8cos\theta$$
$$y = 4sin\theta$$

When $\theta = \frac{3\pi}{2}$, what is the sum x + y of the corresponding point (x, y) on the x-y plane?

43 In the following matrix, find the value of x such that the determinant of the matrix is equal to 12.

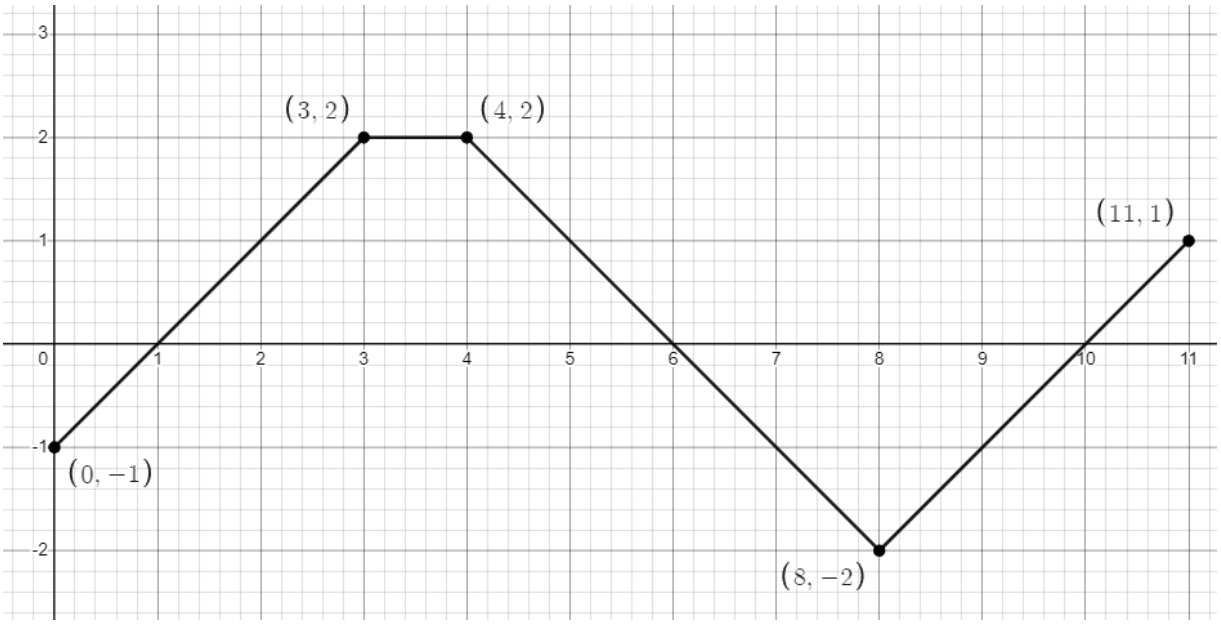
$$\begin{bmatrix} 2 & -2 & x \\ -3 & 1 & 2 \\ 1 & -3 & -1 \end{bmatrix}$$

44 Find the sum of any x-values at which the given function f(x) has a removable discontinuity. If there are no removable discontinuities, then enter 0 as your answer.

$$f(x) = \frac{x+2}{x^2 - 3x - 10}$$

45 The graph of f(x) consists of line segments, as shown here. Evaluate the following definite integral:

$$\int_0^{11} f(x)dx$$



"Math Is Cool" Masters – 2022-23

KEY

High School Individual Contest – Answer Key

SCORERS: Bracketed […] items in answer key are optional. Just mark the score as 0 or 1 and add up those values to reflect total correct. First Scorer – use the right-hand columns so 2nd scorer can do a blind scoring.

	Answer
1	36
2	65
3	31 [°]
4	2
5	[discriminant] = -7
6	9
7	50 [%]
8	32
9	[x =] 12
10	8 [times]
11	[sum] = 5
12	165 [mg]
13	25 [% increase]
14	17
15	[range =] 50

	Answer
16	120 [flavor combinations]
17	6 [minutes]
18	129[°]
19	[x + y =] -7
20	1331
21	13 [people]
22	24 [ways]
23	100
24	1
25	180 [units2]
26	5 [dimes]
27	34 [putts]
28	41
29	[A + B =] 65
30	40320 [ways]

	Answer
31	881 [crossings]
32	30 [%]
33	4 [obstacles]
34	[product] = 500
35	247
36	[A+B+C=] 153
37	228
38	3
39	64
40	[A + B =] 343
41	[z =] 300
42	[x + y =] -4
43	[x =] 0
44	-2
45	2

"Math Is Cool" Masters – 2022-23

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			
41			
42			
43			
44			
45			
31-45 TOTAL:			

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Individual Multiple Choice Contest

1 The lengths of all sides of a rectangle are multiplied by 5/3. As a result, how many times larger is the area of the new rectangle compared to the original rectangle?

A) 5/3 B) 10/3 C) 9/25 D) 10/9 E) Answer not given.

2 The value of $\log_2 14$ is:

A) Between 1 and 2 B) Between 2 and 3 C) Between 3 and 4
D) Between 4 and 5 E) Answer not given.

3 How many circles can be constructed that pass through the two points (2, 2) and (2, -2) on the coordinate plane?

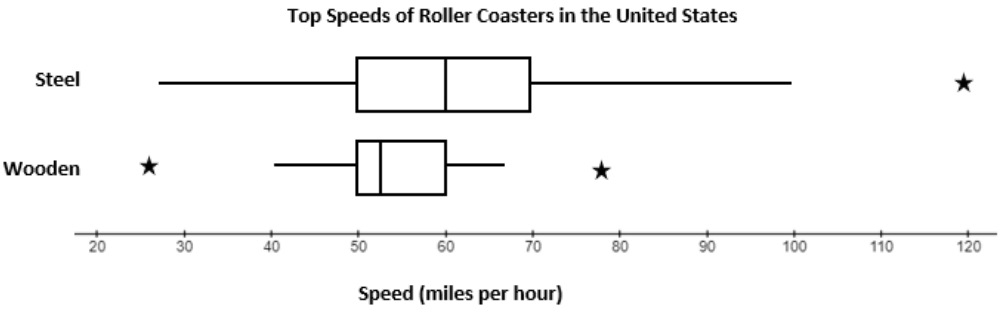
A) 1 B) 2 C) 3 D) Infinitely many E) Answer not given

4 In the cryptogram shown here, each letter corresponds to a different digit, and 0 cannot be a leading digit.
What is the sum EH + AH?

```
  H A
+ H A
+ H A
+ H A
-------
  E H
```

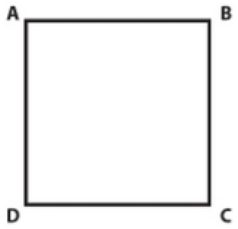
A) 84 B) 86 C) 92 D) 124
E) Answer not given.

5 The Roller Coaster DataBase contains extensive data on roller coasters around the world. The following boxplots show the distributions of top speeds for coasters in the United States, classified by whether the coaster is wooden or steel. The stars indicate outliers. Which type of coaster has a higher percentage of coasters with a top speed of 50 miles per hour or more?



A) Steel B) Wooden C) They are the same.
D) Impossible to determine from the boxplots E) Answer not given.

Continued on next page.

6	Arnav is making lemonade. He currently has 6 liters of lemonade that is 10% lemon juice. If he wants his final drink to be 20% lemon juice, how many liters of pure lemon juice should he add? A) 0.75 B) 1.0 C) 1.25 D) 1.5 E) Answer not given.
7	Kuniko is driving to visit a friend in another city that is 560 miles away. She begins driving at noon going 50 miles per hour. At some point she realizes that she is going to be late, so she speeds up to 60 miles per hour. She arrives at her friend's house at 10:00 pm that night. At what time did she decide to speed up? A) 2 pm B) 2:30 pm C) 3:30 pm D) 4 pm E) Answer not given.
8	The sum of an infinite geometric sequence is 2022, and its first term is 1685. What is the common ratio, r, of the sequence? A) 1/6 B) 335/2022 C) 47/7225 D) 3/5 E) Answer not given.
9	Consider a unit square ABCD. If a point Q is chosen at random inside the square, what is the probability that angle $\angle AQB$ is obtuse? A) $\frac{\pi}{24}$ B) $\frac{\pi}{16}$ C) $\frac{5\pi}{16}$ D) $\frac{\pi}{8}$ E) Answer not given. 
10	If p and q are the zeroes of the polynomial: $x^2 - x + 4$ what is the value of $\frac{1}{p^3} + \frac{1}{q^3}$? A) $\frac{-15}{64}$ B) $\frac{-5}{32}$ C) $\frac{-3}{16}$ D) $\frac{-11}{64}$ E) Answer not given

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

Individual Multiple Choice Contest – Answer Key

11/12th Grade

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

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

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Final Score *(out of 20)*

Room #	School Name	Student Name	Team #

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

This test is taken individually, but it is part of your team score, which will be calculated by taking the mean of the top 3 scores from your team. 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 and begin testing. **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.

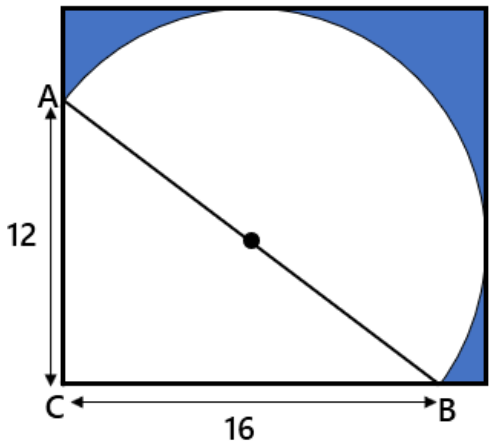
STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	Scorer 2 -1, 0, or 2	Scorer 1 -1, 0, or 2
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11/12th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Team Contest

1	Let the 3rd and 5th terms of an arithmetic sequence be 14 and 23 respectively. What is the 1st term of that sequence?
2	Simplify: $32^{\left(\frac{6}{5}\right)} \cdot 81^{\left(\frac{5}{4}\right)} \cdot 125^{\left(\frac{4}{3}\right)}$
3	In radians, what is the period of the graph of the following function? $$f(x) = 5 - 3cos\left[\frac{\pi}{3}\left(x - \frac{\pi}{4}\right)\right]$$
4	Three exterior angles of a triangle, one at each vertex, have degree measures in the ratio of 5:7:8. What is the measure in degrees of the triangle's smallest interior angle?
5	What is the smallest integer value of x that satisfies the following inequality? $4x^2 - 105 < 64$
6	The Overlook Hotel has 20 rooms in a row along one side of a hallway. Mr. Ullman, the front desk manager, assigns each guest to one of these rooms at random. What is the minimum number of guests that would guarantee that at least one group of three adjacent rooms are occupied?
7	What is the smallest positive integer that has a remainder of 3 when divided by 5, a remainder of 5 when divided by 7, and a remainder of 7 when divided by 9?
8	AJ randomly chooses a real number between 80 and 100, and Brady randomly chooses a real number between 70 and 90. The probability that Brady's number is greater than AJ's number can be written as a reduced common fraction A/B. What is A + B?
9	A 3-digit positive integer n = abc, where a, b, and c represent the three digits of 'n', which are not necessarily distinct. An isosceles (or equilateral) triangle will be constructed using a, b, and c as the lengths of the sides. How many different values of the 3-digit positive integer 'n' are possible?
10	A semicircle with diameter AB is inscribed in a rectangle. The area of the shaded region between the semicircle and the rectangle, given that AC = 12 and CB = 16, can be written as: X – Yπ, where X and Y are positive integers. What is the value of X + Y? 

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

Team Contest – Answer Key

11/12th Grade

	Answer
1	5
2	9720000
3	6 [radians]
4	36 [°]
5	-6
6	15 [guests]
7	313
8	[A + B =] 9
9	165 [values of n]
10	242 [X + Y =]

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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.

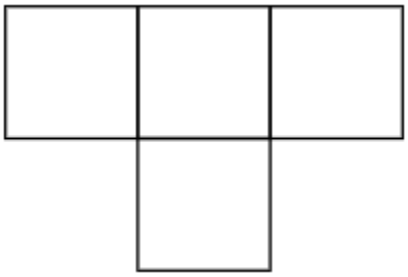
STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	Scorer 2 0 or 1	Scorer 1 0 or 1
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11/12th Grade	**TOTAL:**		

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Pressure Round Contest

1	In the following figure, composed of four unit squares, each square can be colored either apricot, bronze, crimson or emerald. A color may be used more than once. How many distinct ways are there to color in each square if no two adjacent squares can be the same color? Adjacent means sharing an edge, not just a vertex. 
2	Evaluate: $\frac{20!}{19!+18!}$
3	A new sequence is obtained from the sequence of the positive integers {1, 2, 3, …} by deleting all of the perfect squares. What is the 2023rd term in the new sequence?
4	In the following equation, how many times should 7^2 appear under the square root sign on the left-hand side to make the equation true? $$\sqrt{7^2 + 7^2 + \cdots + 7^2 + 7^2} = 7^2 + 7^2 + 7^2$$
5	A box contains eight cards numbered 1 through 8. Mateo needs a pair of cards that sum to 9, but may only select cards from the box at random. What is the minimum number of cards that Mateo must pull from the box to guarantee that he has a pair that sum to 9?

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Final Score *(out of 5)*

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

Pressure Round Score Sheet

Submittal # (order turned in)	1	2	3	4	5
Question #					
Score (circle value)	0 or 1	0 or 2	0 or 3	0 or 4	0 or 5
Scoring Room (checkmark)					

Team: Fill in the room, school, and Team #, then hand only this sheet to the Proctor.
Proctor: staple this to the top of the five submittals in order.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Final Score *(out of 5)*

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

Pressure Round Score Sheet

Submittal # (order turned in)	1	2	3	4	5
Question #					
Score (circle value)	0 or 1	0 or 2	0 or 3	0 or 4	0 or 5
Scoring Room (checkmark)					

Team: Fill in the room, school, and Team #, then hand only this sheet to the Proctor.
Proctor: staple this to the top of the five submittals in order.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
1 (at 2 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
1 (at 2 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
2 (at 4 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
2 (at 4 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
3 (at 6 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
3 (at 6 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
4 (at 8 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
4 (at 8 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
5 (at 10 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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

Pressure Round Answer Submittal

Submittal #	for Question #	Answer
5 (at 10 minute mark)		

Team: Fill in the room, school, and Team # before the round starts.
Write the question number being answered and the associated answer (or a blank).
You may answer questions in any order. A question may not be answered more than once.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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 ON THIS SHEET. WRITE THE TOTAL SCORE FOR EACH ROUND.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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 ON THIS SHEET. WRITE THE TOTAL SCORE FOR EACH ROUND.

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

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	The sum of the x and y coordinates of a point is 11. What is the sum of the x and y coordinates after the point is rotated 180° around the origin?	
2	How many dimes have the same monetary value as 56 quarters?	
3	What is the sum of the first ten odd positive integers minus the sum of the first ten even positive integers?	
4	A 5-inch by 7-inch rectangle is cut out of a corner of a 16-inch by 19-inch rectangle. In inches, what is the perimeter of the remaining figure?	
5	How many distinct sets of three positive integers have a mean of 6, a median of 7, and no mode?	
6	On each bounce after being dropped from a height, a bouncy ball rises to 5/4 of its previous height. If the ball is initially dropped from a height of 16 feet, how high in feet does the ball rise after its second bounce?	
7	One-third of Biff's current age is twice that of Biff's age five years ago. What is Biff's current age in years?	
8	Six people are to be seated at a round table. Two of the people refuse to sit next to each other. How many distinct arrangements of the six people are there? Rotations of an arrangement are not distinct to one another.	

"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

Pressure Round Contest – Answer Key

11/12th Grade

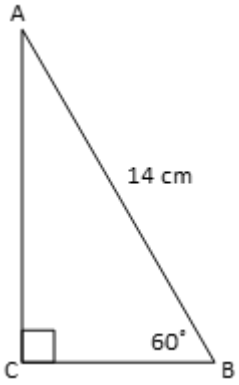
	Answer
1	108
2	19
3	2068
4	441
5	5 [cards]

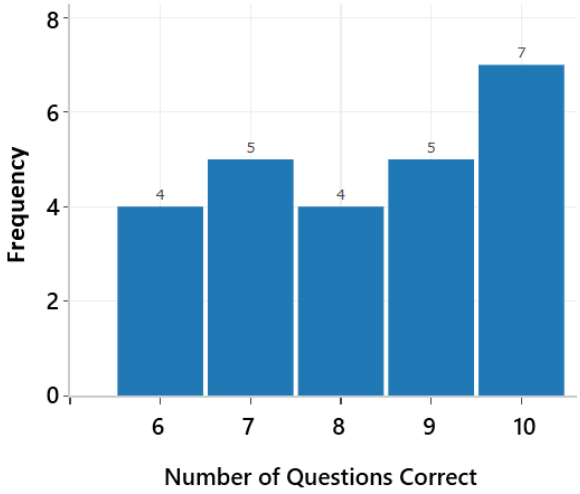
"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	Today, Nidhi is 6 times as old as Quinn. Four years ago, Quinn was 2 years old. How old in years was Nidhi 4 years ago?	32 [years]
2	Evaluate: $-6-\left[-6\left(-5+(-2)\right)\right]$	-48
3	A friend draws one card from a standard 52-card deck and truthfully reports that it is not a diamond. The probability that the card is the 2 of clubs can be written as a reduced common fraction A/B. What is A + B?	40
4	For right ΔABC, $m\angle B = 60°$ and $\overline{AB}$ = 14 cm. The length of $\overline{AC}$ in simplest radical form is $X\sqrt{Y}$ cm. What is the sum X + Y? 	10
5	How many 3-digit counting numbers have a tens digit that is a positive multiple of 2?	360
6	A sequence is defined as $a_n = \frac{1}{n} - \frac{1}{n+1}$ for n = 1, 2, 3, … The sum $a_3 + a_4 + \ldots + a_{18}$ can be written as a reduced common fraction A/B. What is A + B?	73
7	A solid cube will be intersected by a plane. The 2-dimensional region of intersection is called the cross-section. For example, the intersection of a sphere and a plane forms a circle. For a cube being intersected by a plane, how many different-sided polygons can be formed? Do not consider different specific shapes, only the number of sides.	4

8	What is the largest palindrome less than 95113? A palindrome is a number that reads the same forwards or backwards, such as 121 or 3443.	95059
9	Function G is defined as: $G(a, b) = a^2 + b$ Evaluate: $G(G(5, 3), G(-1, -7))$	778
10	The following histogram shows the results for students on a 10-question quiz. What was the median number of questions that were correct? 	8

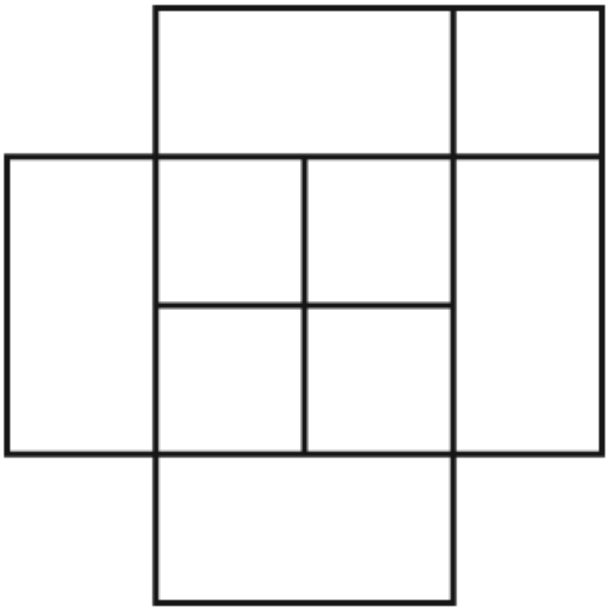
"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	Grace rode her bike 48 miles over the course of 5 hours, then rode for 3 more hours at an average speed of 8 miles per hour. What was her average speed for the entire journey, in miles per hour?	9 [mph]
2	What is the total value of 31 quarters, 12 dimes, 18 nickels, and 15 pennies expressed in dollars?	10 [$]
3	What is the arithmetic mean of the following numbers: 232, 226, 228, 230, 234, 229, 231	230
4	On a coordinate plane, the point (7, 10) is rotated 360 degrees about the origin tracing the path of a circle. In terms of π, the area of the circle is $A\pi$ square units. What is the value of A?	149
5	What is the sum of the positive integer factors of 200?	465
6	What is the next term of the following quadratic sequence? 2, 5, 27, 68, 128, …	207
7	Five bakers can prepare 30 pies in 2 hours. Working at the same rate, how many hours will 7 bakers need to prepare 63 pies?	3 [hours]
8	The surface area of a right circular cylinder with a base diameter of 6 meters and a height of 8 meters can be written as $A\pi$ square meters. What is the value of A?	66
9	A data set has a mean of 36, a median of 18, a range of 60 and a unique mode of 24. If each element in the data set is multiplied by 3, what is the median of the new data set?	54

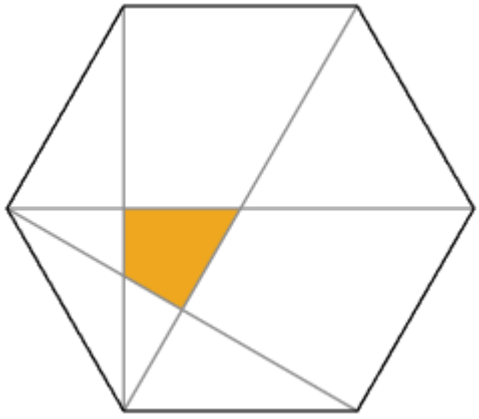
10	The following figure is composed of unit squares (1x1) and rectangles (1x2). In total, how many squares appear in the figure? 	11 [squares]

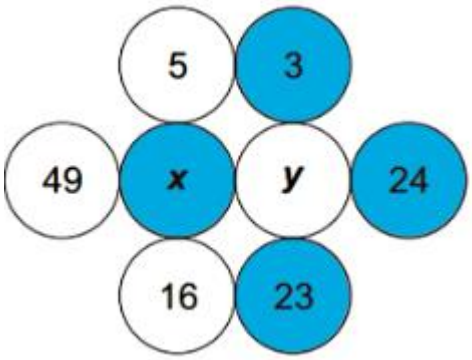
"Math Is Cool" Masters — 2022-23

11/12th Grade — January 11, 2023

Key

College Bowl Round #3

#	Problem	Answer
1	What is the slope of the line through the points (5, -2) and (6, -4)?	-2
2	In the following addition problem, X and Y represent digits from 1 through 9. If X ≠ Y, what is the value of Y? $$\begin{array}{r} X \\ +\ X\ X \\ \hline Y\ 4 \end{array}$$	8
3	Eho bought two different types of scratch-off lottery tickets. The first has a 10% chance of winning a prize, and the second has a 20% chance of winning a prize. What is the probability in percent that both of Eho's lottery tickets are winners?	2 [%]
4	A regular hexagon is shown, with some of its diagonals drawn. The fraction of the total area of the hexagon that is shaded can be written as a reduced common fraction A/B. What is A + B? 	19

5	Five people ran a race. One competitor, Foster, was neither the first nor the last finisher. In how many different ways could the competitors have finished the race?	72
6	What is the greatest integer x < 200 that has exactly 4 factors?	194
7	In the diagram, the value of x is the mean of the four numbers in the white circles. The value of y is the mean of the four numbers in the blue circles. What is the value of x – y? 	4
8	A polygon with 'n' sides has one exterior angle of 72°, one exterior angle of 35°, and the remaining exterior angles all measure 23°. What is the value of 'n'?	13
9	What is the sum of the following finite arithmetic sequence? 4 + 8 + 12 + … + 72 + 76 + 80	840
10	Given that the following equation is true, and 'a' and 'b' are non-zero numbers, what is the value of $\frac{a}{b}$? $(5^a)(5^b) = 1$	-1

Proctoring Overview

You will receive a room packet envelope with the schedule and College Bowl rotations on the front. Each room packet includes:

1) the proctor instructions and the general instructions that you will be reading,
2) the proctor question/answers packet (this needs to be carefully controlled), and
3) sets of Mental Math, Individual, Multiple Choice, Team, and Pressure Round tests. (If not in the room packet, the proctor supervisor will provide blank scratch paper.)

When you receive the room packet, count to ensure that you have the correct number of tests for each event (16 Mental Math & Individual, 4 of each of the team events).

Key Points

- Act professional; focus on what you are doing.
- Your job is to proctor the students; that is, you administer tests, give time warnings, & monitor students for proper test taking behavior to ensure competition integrity and avoid issues like failing to put answers on the answer sheet.
- The proctor packet has Mental Math, Pressure Round, and College Bowl questions/ answers. Keep the packet secure! Avoid opportunities for competitors to see tests or answers.
- Student/school names and team numbers are critical on the answer sheets. Make sure that students fill out such identifying information.
- Keep track of time, and provide appropriate time warnings. Keep to the schedule as close as possible. Wait between events, if needed.
- Read & know the rules—competitors & spectators will, and they will call you on it.
- On questions that you read, read smoothly, enunciate clearly, and don't read too fast.
- If unsure of how to deal with an issue/question/concern, flag down the proctor supervisor and ask.
- Be respectful of your classroom — leave it tidy and arranged exactly as you found it. We don't want any displeased teachers!!
- Use the quick-reference guide on the next page for room setup and key information.

Schedule

Each of the 6 events includes about 5 minutes at the start for reading instructions or rearranging the room.

3:30 - 4:00	Coaches register (Library)	6:10 - 6:40	Proctors get dinner in proctor room
4:05 - 4:15	Orientation (Gym)	6:45 - 6:55	College Bowl #1
4:15 - 4:20	Students go to testing rooms	6:55 - 7:05	College Bowl #2
4:20 - 4:35	Mental Math	7:05 - 7:15	College Bowl #3
4:35 - 5:15	Individual Test	7:15 - 7:25	College Bowl #4
5:15 - 5:35	Individual M.C. Test	7:25 - 7:35	College Bowl #5
5:35 - 5:55	Team Test	7:35 - 7:45	College Bowl #6
5:55 - 6:10	Pressure Round	8:00 - 8:30	Awards Ceremony (Gym)

1. Mental Math

Configuration: Students at individual desks spread out in the classroom. Alternating desks, students not next to teammates.

Scheduled Time: 4:20-4:35 PM (read instructions & test)

Duration: 30 seconds per question maximum (beginning after the 2nd reading)

Give Time warning at: 5 seconds

Number of questions: 8 (all students do the same questions)

Proctor Actions: Read each question twice, reading clearly and not too fast. Start the 30 second clock after the 2nd reading.

Key Points: Start by reading "General Instructions" then Mental Math instructions. Make sure everyone writes their name, school & team number on the answer sheet. No talking allowed. Except for the answer, no is writing allowed. Collect answer sheets and organize by team number, then alphabetically by first name of competitor, & staple sheets for the same team together.

2. Individual Test

Configuration: Students at individual desks; same arrangement as for Mental Math.

Scheduled Time: 4:35 PM (read instructions), 4:40-5:15 (test)

Duration: 35 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 40

Proctor Actions: Ensure appropriate test-taking behavior. Prep for next event (or read College Bowl questions to yourself).

Key Points: Read "Individual Test" instructions. Make sure everyone writes their name, team number, school, proctor name, & room number down on the answer sheet. Collect answer sheets, organize by team, then alphabetically by first name of competitor, and staple sheets for same team together.

3. Individual Multiple Choice Test

Configuration: Students at individual desks; same arrangement as for the Individ. Test.

Scheduled Time: 5:15 PM (read instructions), 5:20-5:35 PM (test)

Duration: 15 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 10

Proctor Actions: Ensure appropriate test-taking behavior. Prepare for next event.

Key Points: Read Multiple Choice instructions. This is an individual test.

4. Team Test

Configuration: Groups of 4 desks, with the groups spread out in the classroom.

Scheduled Time: 5:35 PM (read instructions), 5:40-5:55 PM (test)

Duration: 15 minutes

Give Time warning at: 5 minutes & 30 seconds

Number of questions: 10

Proctor Actions: Ensure appropriate test-taking behavior. Prepare for next event.

Key Points: Read Team Test instructions. Need to have school & team number on answer sheet. Students can talk quietly & work together.

5. Pressure Round

Configuration: Groups of 4 desks spread out in the classroom (same as Team Test).

Scheduled Time: 5:55 PM (read instructions), 6:00-6:10 PM (test)

Duration: 10 minutes (2 minutes per question)

Give Time warning at: 5 seconds before end of each 2-minutes

Number of questions: 5 (can submit answers in any order)

Proctor Actions: Ensure appropriate test-taking behavior. Score submittals as you go (without showing any answers to students).

Key Points: Students can talk quietly & work together. Proctor: keep answer sheets in order of submittal; make sure that you score the right question and give the right point value.

6. College Bowl

Configuration: Row of 9 desks (side by side) at the front of the room (CBA device on center desk).

Scheduled Time: 6:45 PM (read instructions), 6:50-7:45 PM (test)

Duration: 45 seconds per question (30 seconds per question if there is only one team, who will be only going against the clock)

Give Time warning at: 5 seconds

Number of questions: 10 per round, 6 rounds total

Proctor Actions: Read each question twice, reading clearly and not too fast. Start 45 (or 30) second clock after the 2nd full reading. Mark tally on white board as questions are answered and transfer the numeric total to the score sheets.

Key Points: Event is collaborative, talking is allowed. For a wrong answer, just say, "That is incorrect." (no verbal/visual clues that could be interpreted by the other team to arrive at an answer).

Summary of MIC Proctoring

(for proctors to read to themselves)

Pass out materials (answer sheet/test packets, scratch paper) for the current event to individuals or teams (as appropriate) so they can fill in the name, school, and team number information (very important!). Tell students to not lift the cover sheet or turn over the paper until you give the signal to start. Read the general instructions as the first item at the beginning of the competition (before Mental Math). Read the event-specific instructions just prior to each event and ask if there are any relevant questions. After reading the instructions, you can signal students to begin. Make sure one proctor is watching the time and giving appropriate time warnings (e.g., "five minutes remaining"). At the end of the event, tell competitors to stop work. Collect, sort, & staple the answer sheets (as appropriate) and keep them secure until handed off to a runner.

For the Mental Math/Individual tests, arrange students scattered throughout the classroom with **no student next to another student from their own school**. For the team tests, students will be in groups of 4 desks. College Bowl will require a line of 9 desks side-by-side across the front of the classroom.

For College Bowl, place the College Bowl apparatus (CBA) on a central desk in the line of desks at the front (4 desks on either side of the central one). One proctor will likely need to hold the CBA in place during the College Bowl rounds. Turn the apparatus on by depressing the button or flipping the dip switch. Students may try out the CBA prior to the 1st question. Note: while one light is blinking, the other light is locked out. There is no need to "reset" the device, just let the light finish blinking and it is ready to go.

Keep Pressure Round answers secure while you score the submittals because answers for all questions are on the same sheet. Do not read the answer for College Bowl when you read the question (they are both on the same page). In College Bowl, if an incorrect answer is given, simply say "That is incorrect" and do not give any other cues about the answer (e.g., don't say "sorry, you were close" or exhibit interpretable body language). If both teams fail to supply a correct answer, announce what the correct answer was.

If there is an irregularity (i.e., lack of honesty, poor sportsmanship), make a note of the circumstances, flag the answer sheet, and report the issue to the proctor supervisor.

At the end of the day, return the desks to their original arrangement, recycle any unwanted test materials & used scratch paper, erase any marks you made on the white-board, and generally make sure the classroom is tidied up. Return the CBA, the room packet envelope, the proctor instructions, the contest rules packet, the proctor packet of questions, extra scratch paper, and unused test material to the proctor supervisor.

Detailed Instructions for Proctors

Grades 9-12

NO CALCULATORS ALLOWED ON ANY TESTS!

1. Check to make sure you have everything in your packet.
   - A. ***Mental Math:***
     1. 16 - colored Mental Math answer sheets
     2. Mental Math questions with answers (in the Proctor Packet)
   - B. ***Individual Test:*** 16 individual tests, with colored answer sheets attached
   - C. ***Individual Multiple Choice Test:*** 16 individual multiple choice packets (stapled), with a colored answer sheet on top
   - D. ***Team Test:*** 4 team test packets (stapled), each containing 4 tests plus one colored answer sheet on top
   - E. ***Pressure Round:***
     1. 4 - blank answer sheet packets (with cover sheet/instructions)
     2. 4 – Pressure Round test sets
     3. Pressure Round Answer Key (in the Proctor Packet)
   - F. **College Bowl:**
     1. 4 - College Bowl score sheets
     2. College Bowl questions – 6 rounds (in the Proctor Packet)
   - G. Scratch paper (to be handed out as needed, but try not to waste it)
   - H. Electronic College Bowl Apparatus (CBA; usually distributed at dinner break)

   ALL *COLORED* ANSWER SHEETS WILL BE COLLECTED BY YOU AND WILL BE TAKEN TO THE SCORING ROOM (by RUNNERS) AS SOON AS THEY ARE FILLED OUT BY COMPETITORS (AND PERHAPS GRADED BY YOU). COMPETITORS CAN KEEP ALL OF THE WHITE SHEETS, IF THEY WOULD LIKE (OTHERWISE COLLECT THEM FOR RECYCLE).

   If you are missing anything, you can go get it before the opening ceremony. After the opening ceremony, contact the proctor supervisor/scoring room.

2. Take a photo of how the classroom is laid out (so that it can be returned to its original configuration following the competition). Then set up the classroom desks for the first event (Mental Math).

Respect the teacher whose room you are using. Do not touch their computer or other items. Do not erase anything on their board. Leave the room tidy & in the exact original layout.

Mental Math

3. Arrange desks in a configuration suitable for individual testing (rows/grid of desks all facing forward, students in separated/alternating desks).

4. Put the Mental Math answer sheets face up on the desks such that students are spread out. Wait for students to arrive. ~~You can fill out the proctor name and room number (and perhaps team numbers) on all blank answer sheets, if you like~~. Read over the questions so you will be prepared to read them out loud.

5. After students sit down, check to make sure that no one from the same team is seated next to each other (i.e., "Team xxx, raise your hands."). Ask them to move, if needed.

6. **Check to make sure that students put their full name, school name, team number, and room number on their answer sheet and that the information is legible**.

7. Read the "GENERAL INSTRUCTIONS" (in the Proctor Packet) to the students. Then, read the "MENTAL MATH" instructions (in the Proctor Packet) to the students.

8. Begin the testing. Read each of the eight Mental Math questions to all of the students in the room, per the instructions.

9. At the conclusion of Mental Math, collect the answer sheets. Organize the answer sheets by team number, then alphabetically by first name of competitor. Staple each team's set of four answer sheets together. Promptly hand the packets of answer sheets to your runner for conveyance to the scoring room.

Individual Test

10. The seating configuration will remain unchanged (no swapping seats).

11. Hand out Individual Test packets with the colored blank answer sheet facing up. **Check to make sure that students put their full name, school name, team number, and room number on their answer sheet and that the information is legible**.

12. Read the "INDIVIDUAL TEST" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.

13. While students are taking the Individual Test, monitor the students for proper test-taking behavior and watch the time to provide 5-minute and 30-second warnings. Make sure students are writing answers on the answer sheet (not the test question pages). During this time you can also get the Individual Multiple Choice tests ready, read through the rules of subsequent events, and (carefully/secretively) look ahead to review the College Bowl questions (i.e., to avoid stumbling over the wording when it comes time to read the questions aloud). You will have observers in the room watching the College Bowl rounds, so make sure you understand the rules, how timing works, etc.

14. At the conclusion of Individual Test, collect the answer sheets. Organize the answer sheets by team number, then alphabetically by first name of competitor. Staple each team's set of four answer sheets together. Promptly hand the packets of answer sheets to your runner for conveyance to the scoring room. Students may keep or recycle their test question packets.

Individual Multiple Choice

15. Keep the room in the same configuration as for the Individual Test.
16. Hand out the tests and have students fill out the top portion of the answer sheet. **Check answer sheets to make sure they are filled out correctly (school, team #, etc.).**
17. Read the "INDIVIDUAL MULTIPLE CHOICE" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.
18. Monitor the students for proper test-taking behavior (no talking permitted), watch the time, and provide 5-minute and 30-second warnings. While students are taking the Individual Multiple Choice test, get the Team Tests ready.
19. At the conclusion of the test, collect the answer sheets. Organize the answer sheets by team number, then alphabetically by first name of competitor, with the set of team answer sheets stapled together. Hand the answer sheets off to the runner.

Team Test

20. Change the room set-up to groups of 4 desks together so students can work as a team. Hand out the Team Test packets and have teams fill out the information at the top of the colored answer sheet. **Check the answer sheets to make sure they are filled out correctly (school, team #, etc.).**
21. Read the "TEAM TEST" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.
22. Monitor the students for proper test-taking behavior (talking is allowed), watch the time, and provide 5-minute and 30-second warnings. While students are taking the Team Test, get the Pressure Round tests ready.
23. At the conclusion of the test, collect the answer sheets & hand them off to the runner.

Pressure Round

24. Leave the desks in the same arrangement as the team test. Make sure that all teams can quickly and easily hand you their answer sheet every two minutes.
25. Hand out the colored half-sheet packets to each team so they can fill out their school name and team number on each sheet before testing begins.
26. Have each team tear off the first sheet and give it to you to keep score.

27. YOU WILL BE TIMING THIS EVENT FOR YOURSELF. GIVE THEM A VERBAL 5 SECOND WARNING AND TELL THEM TO HOLD THEIR ANSWER SHEETS UP IN THE AIR EVERY TWO MINUTES. Tell them when the time is up for each two-minute round and, if an answer sheet isn't up in the air all the way at this time, then collect, but score as a zero and just write "time" on the score sheet for that particular question.

28. While they are working on the next round, you need to grade the answer sheets that you just collected and score it on the score sheet. Stack each team's half-sheets in **the order that they were turned in**, keeping the score sheet on top. Remember, you are still timing while you are doing all this!

29. Read the "PRESSURE ROUND" instructions (in the Proctor Packet) to the students and begin the testing at the appointed time.

30. At the conclusion of the fifth round, staple each team's half-sheets together, with the score sheet on top. Wait for the runner to come pick up the four packets before leaving for break.

Dinner Break

31. AT BREAK — Eat dinner in the proctor room. Pick up your College Bowl apparatus (CBA) at this time. If you haven't already, you may want to read over the College Bowl questions to make sure you will be able to pronounce everything properly. Return to your room in time to place the CBA in position.

College Bowl Rounds

32. Place the CBA on the middle desk of the line at the front of the room (you may want to moisten the suction cups with a film of water). One proctor may need to hold the device down (and do timing). Do not press the button to "reset" the CBA (it's an on/off switch).

33. You will have the same teams that were previously in the room for the duration of all College Bowl rounds — if you have an extra/different team, they are in the wrong room and can be disqualified if they hear the questions! Help get them to the correct room.

34. Fill out the score sheets for each team in your room with their school name and team number. Call up the first 2 teams according to the sequence on the room envelope.

35. You will be reading Round #1 questions to two teams while the other two teams (and any spectators) wait in the back of the room out of line of sight of the competitors. Refer to the College Bowl schedule (on your room envelope) to see which two teams compete in each round. If a round only has one team, they will be competing against the clock and thus will have 30 seconds to answer, not 45 seconds. Record the final scores for each team on their score sheets (which you hold on to) after each round. Rounds 2-6 work the same way. Refer to the schedule to make sure the correct

teams are competing at the correct time. Don't get ahead of schedule (or behind, for that matter!). If you finish a round early, please wait until the appointed time to start the next round. If you have any problems (including anyone questioning the rules or a decision made by a proctor) contact the proctor supervisor.

36. Who is keeping score? Who is keeping track of the time? YOU ARE !!!
37. Read the "COLLEGE BOWL" instructions (in the Proctor Packet) to all the students (just one time), then begin the testing for each round at the appointed times.
38. If you mis-read a question, replace it with one of the extra questions.
39. If a parent/coach/student protests an answer, make a note of the situation (the test, the problem number, who answered, what their answer was, etc.) and kindly state that the coach should bring up the issue with the contest director. Proceed as normal, scoring the question based on the answer key.
40. At the conclusion of all College Bowl rounds, get the score sheets promptly to the scoring room (either yourself or via a runner).
41. Release your group to the awards ceremony no earlier than 7:45 PM to avoid causing a disruption to other rooms. Have students help re-set the room.
42. At the end of the day, return the desks to their original arrangement, collect all scratch paper, erase any marks you made on the whiteboard, and generally make sure the classroom is tidied up. Return the College Bowl apparatus, proctoring envelope, and residual material to the proctor supervisor.

General Instructions

- Good sportsmanship is expected throughout the competition by all involved (competitors and observers). Display of poor sportsmanship will result in disqualification.
- Competitors may not use calculators or any other aids on any portion of this contest.
- Unless stated otherwise:
  - All answers will be an integer, with the exception of the Multiple Choice test.
  - ~~Express all rational, non-integer answers as common fractions, except in problems dealing with money, where you should give the answer as a decimal rounded to the nearest cent.~~
  - ~~For fifth grade and up, all fractions and ratios must be reduced to simplest form, all radicals must be simplified, and all denominators must be rationalized.~~
  - ~~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, AM or PM 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 student name, school, team number, etc. has been filled out at the top of each answer sheet.**
- Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.
- Blank answer sheets and answer sheets with no name will be scored as a 0.

Mental Math Instructions

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.

Individual Test Instructions

You will have 35 minutes to work on the Individual test, which consists of 40 questions. 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. The first 30 questions are worth two points each and questions 31-40 are worth 3 points each. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute warning.

Individual Multiple Choice Instructions

You will have 15 minutes to answer 10 multiple choice questions. This test is taken individually, but it is part of your team score, which will be calculated by taking the mean of the top 3 scores from your team. 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 and begin testing. **ONLY a letter response should be listed as an answer on this answer sheet.**

Team Test Instructions

You will have 15 minutes to answer 10 questions as a team. 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.

Pressure Round Instructions

When it is time to begin, you will be handed a packet of five problems. There is a copy of the problems for each team member. Two minutes after the start of the test you are expected to submit an answer for one of the problems. The problems need not be submitted in order; you can submit an answer for any of the problems, and your answer can be a guess, if you like. The maximum value of this first submitted answer is 1 point.

In another two minutes, you are expected to submit another answer to any one of the four remaining problems (you cannot submit a new answer for a previously submitted problem). The maximum value is two points for this second submittal.

This process will continue until all of the problems are answered. Each consecutive submitted answer increases in score value 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 problem 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 prior to the end of each two-minute period. You will be told to hold your answer sheet up in the air for the proctor to collect. You may keep working as the answer sheets are collected. If a team answers the same question more than once, only the first answer will be scored and the other attempts will be ignored.

College Bowl Instructions

Read these to the competitors before the first round:

To maintain the integrity of the competition, spectators must stay in this room during a round of College Bowl questions. Once all readings for a round have been completed, you may leave.

All competitors must be facing the front of the room in one row. Teams not competing in the current round need to be behind the front row and in front of the spectators. All spectators need to be behind the competitors at the back of the room.

A maximum of ten questions per round will be scored. It is OK for both teams to score the same number of points! The proctor will record the points earned on each team's score sheet, which is retained by the proctor.

You may use scratch paper and pencil. You may talk with your team members while arriving at a solution.

An Electronic College Bowl Apparatus (CBA) will be used to identify the team who is first to have an answer.

During these rounds, each question will be read twice and a maximum time of 45 seconds after the second reading of the question is completed will be allowed for a team to answer. If a team buzzes in after the second reading and gives an incorrect response, the other team has the remainder of the 45 seconds to respond. A team is allowed only one attempt at buzzing in and answering per question. You may interrupt (buzz in) while a question is being read, however, if you do, the proctor will stop reading, and an immediate response is needed. If the correct response is given, the proctor will proceed to the next question. Otherwise, the question will be re-read for the other team, making sure it has two full readings. If an immediate response is not given after a team buzzes in, their lack of an answer in a timely manner is considered incorrect. In the event that only one team is competing in a round (i.e., one team is absent), the team competing will have a maximum of 30 seconds after the completion of the second reading in which to buzz in. The proctor will give a 5-second time warning.

Wait to be acknowledged by the proctor before giving an answer. This avoids the situation of blurting out an answer when the other team buzzed in first.

If two students from the same team answer at the same time with different answers, the answer will be considered incorrect.

If a problem arises with one of the questions, an extra question will be asked to replace that question.

If the round finishes early, you need to stay in the room for the remaining time.

Mental Math Questions

Pressure Round Answers

College Bowl Questions/Answers