"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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:*
  - *All answers are integers, and any non-integer answers will be "coded" as integers.*
  - *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, 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).

Final Score *(out of 8)*

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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

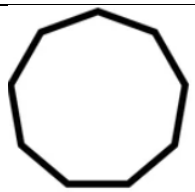
	Answer	
1	16 [gummy worms]	Keke has a bag of gummy worms. She gives half of them to her sister Coco, then she gives two of them to their dog Lulu. Now she has six gummy worms left. How many did she start with?
2	250 [bricks]	What is the minimum number of rectangular bricks, each measuring twelve inches by eighteen inches, needed to completely cover five flat rectangular surfaces, each measuring sixty inches by one hundred eighty inches?
3	5	What is the sum of the coordinates of the point at which y equals x minus three and y equals negative two x plus nine intersect?
4	5	What positive integer can be added to the set of integers: one, two, four, and eight, such that the new set of five integers has a median that is equal to its mean?
5	1	What is the units digit of three raised to the thirty-sixth power?
6	-8 [= y cubed]	A line with a slope of two passes through the points two comma six and negative two comma y. What is the value of y cubed?
7	20	What integer is closest to pi-squared times two?
8	17 [= A + B]	The first term of an arithmetic (pronounced air-ith-MET-ic) sequence is one-fourth, and the fifth term is one-half. As a reduced common fraction, the sum of the second, third and fourth terms is A over B. What is A + B?

"Math Is Cool" Masters — 2024-25

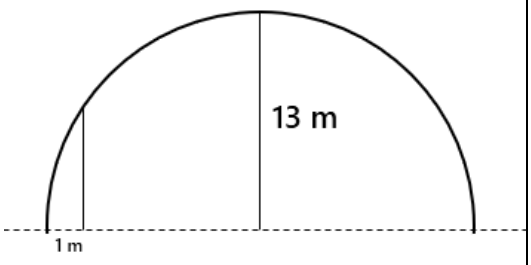
November 9, 2024

High School Individual Contest

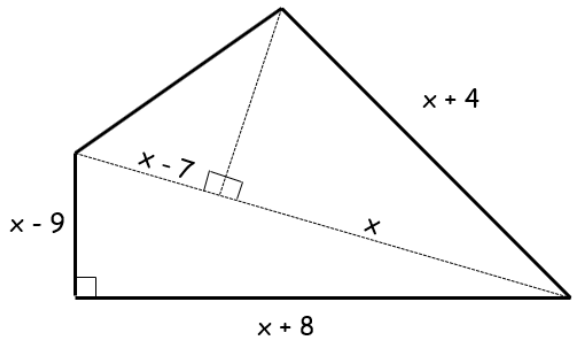
35 minutes, 40 problems, ~92% of individual score.
A 5-minute time warning will be given.

	Questions 1-30: 2 points each
1	Solve for x: 2(2x – 10) = 12
2	When the following subtraction is performed, what is the sum of the digits in the resulting difference? 1,020,945 – 199,621
3	Two sides of a triangle are twelve and fourteen units. What is the shortest possible integer length for the third side, in units?
4	What is the tenth term of the arithmetic sequence that begins as follows? -15, 4, 23, …
5	The following table summarizes Dr. Bartrand's calculus students at Columbia Basin College by whether or not they have a laptop and a graphing calculator. What is the probability in percent that a randomly selected student does not have a graphing calculator? | | Has a laptop | Does not have a laptop | | Has a graphing calculator | 12 | 6 | | Does not have a graphing calculator | 5 | 2 |
6	In the final step of a calculation, Hasan incorrectly divided by 1000 instead of multiplying by 1000. What number does he need to multiply his result by to get the correct answer?
7	What is the sum of the distinct prime factors of 2024?
8	The figure shown here is a regular polygon. In degrees, what is the smallest possible clockwise rotation around its center that will result in the figure being mapped to itself? 
9	If a and b are positive integers, and $(12^a)^b = 12^{13}$, what is the average of a and b?
10	What is the positive difference, in base 10, between the largest three-digit base 5 number and the smallest four-digit base 4 number?
11	As an integer, what is the value of the following: $(2.75 \times 10^3)^2$
12	At a math competition, a 1st, 2nd and 3rd place trophy will be given to the top three Geometry students and the top three Algebra students. If there are four Geometry students and six Algebra students in the competition, how many different ways could the six trophies be handed out?

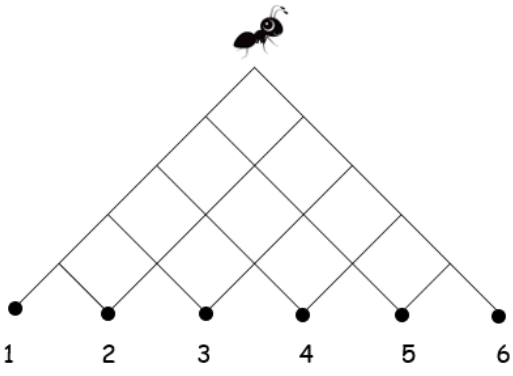
Continued on next page.

13	What is the positive difference between the range and the median of the set S consisting of the 10 smallest prime numbers?
14	In degrees, what is the sum of four of the interior angles of a regular pentagon?
15	The solution to the following compound inequality includes how many integer values of x? $-4x + 3 < -9$ and $-4x + 3 > -37$
16	What is the sum of all positive integers less than 25 that cannot be written as the sum of two (not necessarily distinct) prime numbers?
17	Triangle ABC has vertices A (9, -1), B (5, -9) and C (1, -7). After the triangle is reflected over the line y = 2x – 4, to new vertices A′, B′ and C′, what is the sum of the y-coordinates of A′, B′ and C′?
18	Given the following function, find the value of f(-3) + f(-6). $f(x) = \frac{10}{x+1}$
19	A group of friends divide up the following set of numbers among themselves, and then make the following statements. When Ana's numbers are arranged to make the smallest possible integer, what is her resulting integer? {1, 2, 2, 3, 4, 4, 5, 6, 6} Ana: Each of us has 3 numbers, and each of us has an odd sum. Beto: The product of my 3 numbers is the same as the product of Cesar's 3 numbers. Cesar: The sum of my 3 numbers is 2 more than the sum of Beto's 3 numbers.
20	The vertex of the parabola described by the following equation is at the point (a, b). What is a + b? $y = 7x^2 + 56x + 107$
21	An integer from 10 to 99, inclusive, is chosen at random. As a percentage, what is the probability that the integer contains at least one digit that is a 4?
22	An arithmetic sequence of integers with n terms has first term $a_1 = 11$, and nth term $a_n = 75$. What is the median of all possible values of n?
23	A semicircular arch has a height of 13 meters at its center point. In centimeters, what is the height of the arch exactly 1 meter from the edge of the base? 
24	A manned space mission to Mars will consist of 4 astronauts chosen from a short-list of 14 available astronauts. Five of the 14 astronauts are scientists. If the mission requires at least 2 scientists, in how many different ways can the crew of 4 be selected?
25	What is the smallest number of terms n in the following infinite series, that when added together gives a sum greater than 3? $1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n} + \cdots$
26	The line that contains the points (2, 3) and (-6, 1) also contains the point $\left(a, -\frac{1}{2}\right)$. What is a?

Continued on next page.

27	What is the smallest positive integer multiple of 37 that leaves a remainder of 3 when divided by 13?
28	In the following quadrilateral, some of the lengths are given (in units) in terms of x, and right angles are as indicated. In units, what is the perimeter of the quadrilateral? 
29	How many distinct sets of three positive integers have a mean of 8, a median of 9, and a range that is at least 4?
30	For what real value of k is the following polynomial divisible by the binomial x + 1? $P(x) = x^{100} + kx + 9$

Challenge Questions: 3 points each

31	A math competition (not this one!) has 16 schools competing, and a total of $8000 to award in prize money. The 16th place school will receive $275 in prize money, and the award increases by the same amount for each successive finishing place. In dollars, how much will the 2nd place school receive?
32	How many integer triples (x, y, z) satisfy the following properties: 1. x, y and z are positive integers less than 30, and 2. $xy^2z^3 = 10000$
33	Brent got a score of 775 on a standardized test that had a mean of 600 and a standard deviation of 100. A second test has a mean of 350 and a standard deviation of 40. What score (in points) does Brent need on the second test to do equivalently well as he did on the first test? All units are in points, and assume that the scores on both tests are normally distributed.
34	An ant is located at the top of a triangular grid, and will walk down along the lines to one of the points labeled 1 through 6. At each intersection, starting at the very top, the ant will randomly decide with equal probability whether to turn left or right, but always moving downward. The probability that the ant ends up at point 3 or 4 can be written as a reduced common fraction A/B. What is A + B? 
35	Eighteen dots are evenly spaced around the circumference of a circle. How many combinations of three dots can be selected from the 18 that do not form an equilateral triangle?

Continued on next page.

36	A cube contains an inscribed sphere, and also has a sphere circumscribed about it. As an integer, what is the ratio of the surface area of the circumscribed sphere to the surface area of the inscribed sphere?
37	Given the following two equations, where x and y are real numbers, what is the value of xy? $x^2 + xy = 20$ $y^2 + xy = 30$
38	The digits 1 through 9 are to be placed in a 3 by 3 grid, with each digit being used exactly once. Three sets of clues are given as follows. As a 3-digit integer, what number appears in the middle row? 5 6 _ / _ 4 7 / 2 _ _ — Four numbers are in the correct columns but are in the incorrect squares. No numbers are in the correct rows. _ _ 4 / _ _ _ / 3 5 _ — Two numbers are in the correct columns but are in the incorrect squares. One number is in the correct row, but in the incorrect square. _ _ _ / 8 2 5 / 7 1 4 — No numbers are in the correct columns. Five numbers are in the correct row but are in the incorrect squares. _ _ _ / ? ? ? / _ _ _
39	How many integers are there from 1 to 1000 inclusive whose smallest prime factor is at least 7?
40	Julia has a bag of numbers. The bag contains one set of integers from 1 through 9 inclusive, plus some extra 5s and some extra 8s. The mean of all of the numbers in the bag is 6.4. What is the smallest possible number of numbers in the bag?
IF taking Pre-Calculus or Calculus, continue to Questions 41 - 45	
41	In degrees, what is the solution for 'x' in the following equation, on the interval given in radians [π, 2π]? cos x = 0.5
42	Find the sum of all zeros of the following function. $P(x) = x^4 - 6x^3 + 14x^2 - 14x + 5$
43	Given the following functions, find: $(f^{-1} \circ g^{-1})(1)$ $f(x) = \frac{1}{8}x - 3 \qquad g(x) = x^3$
44	The equation of the tangent line to the graph of the following function at the point (0, 1) can be written as: y = mx + b. What is m + b? $y = e^{3x}$
45	Solve for the value of x that makes the following equation true: $\int_1^x \frac{3}{t}\,dt = \int_{1/4}^x \frac{1}{t}\,dt$

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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	8 [= x]
2	20
3	3 [units]
4	156 [= 10^{th} term]
5	28 [%]
6	1,000,000
7	36 [= sum]
8	40 [°]
9	7 [= the average]
10	60 [base 10]
11	7,562,500
12	2880 [ways]
13	15 [= difference]
14	432 [°]
15	6 [= integer values of x]

	Answer
16	57 [= sum]
17	-3 [= sum of y-coordinates]
18	-7 [= f(-3) + f(-6)]
19	256 [is Ana's integer]
20	-9 [= a + b]
21	20 [%]
22	9 [= median]
23	500 [cm]
24	455 [ways]
25	11 [= n]
26	-12 [=a]
27	185
28	66 [units]
29	5 [sets]
30	10 [= k]

	Answer
31	695 [$]
32	6 [triples]
33	420 [points]
34	13 [= A + B]
35	810 [combinations]
36	3
37	12 [= xy]
38	258
39	265 [integers]
40	30
41	300 [°]
42	6 [= sum of zeros]
43	32
44	4 [= m + b]
45	2 [= x]

"Math Is Cool" Masters – 2024-25

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 — 2024-25

11/12th Grade — November 9, 2024

Individual Multiple Choice Contest

1 Simplify: $2\sqrt[3]{8x^5} \div \sqrt[4]{16x^8}$

A) $\frac{2}{\sqrt[3]{x}}$ B) $\frac{1}{2x}$ C) $2x$ D) $\sqrt[3]{x}$ E) None of the above.

2 If x is a real number, and -1 < x < 0, then which of the following orderings is correct?

A) $x < x^2 < x^3 < x^4$ B) $x^3 < x < x^2 < x^4$
C) $x^4 < x^3 < x^2 < x$ D) $x < x^3 < x^4 < x^2$ E) None of the above.

3 Let S equal the set of all positive numbers n such that 1 < n < 100, and $\sqrt{n}$ is an integer. What is the mean of the members of set S?

A) 30.5 B) 35 C) 35.5 D) 40.5 E) None of the above.

4 What is the value of: $sin(-30°) + cos(-30°)$

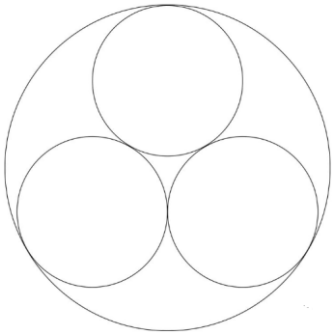
A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}-1}{2}$ D) $\frac{-\sqrt{3}+1}{2}$ E) None of the above.

5 Biff and Eho decide to make up their own base 6 system of numeration. The table shows how to translate their base 6 characters into our base 10 digits. Convert the number 472 (base 10) to its Biff & Eho equivalent.

Biff & Eho	%	@	$	?	#	&
Base 10	0	1	2	3	4	5

A) $ % # & B) $ $ % # C) @ % @ D) @ # ? E) None of the above.

6 Three smaller congruent circles are externally tangent to each other, and internally tangent to the larger circle. The smaller circles each have a radius of one unit. What is the radius of the larger circle?



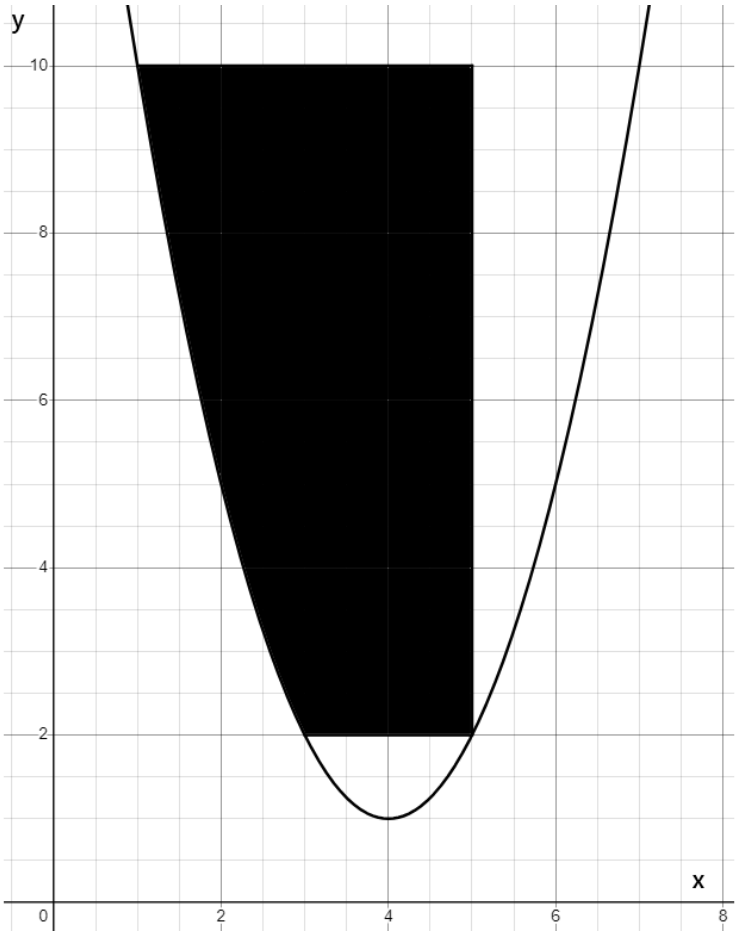
A) $\frac{3+2\sqrt{3}}{3}$ B) $\frac{2}{3}\sqrt{3}$ C) $2\sqrt{3}$ D) $\sqrt{3}+1$ E) Answer not given.

Continued on next page.

7 An infinite sequence of numbers begins as follows: 1, 3, 9, 27, 81, 242, … Gregg takes the log base x of each number and ends up with an arithmetic sequence that has a common difference of 2. What is the value of x?

A) $\sqrt{2}$ B) $\sqrt{3}$ C) 2 D) 3 E) None of the above.

8 Find the area of the shaded region in the graph:



A) $25\frac{1}{3}\ units^2$

B) $26\frac{2}{3}\ units^2$

C) $28\ units^2$

D) $34\frac{2}{3}\ units^2$

E) None of the above.

9 Ana, Bryson and Catalina are each given a positive integer. They do not know each other's integers, but they know that the sum of their three integers is 14.

Ana says: Bryson and Catalina have different numbers.
Bryson then says: I already knew that we each have different numbers.
Catalina then says: Now I know what all three numbers are.

What integer does Catalina have?

A) 1 B) 2 C) 4 D) 6 E) None of the above.

10 Two numbers, a and b, are chosen (with replacement) from the set of integers from 1 to 100, inclusive. What is the probability that the value of $3^a + 7^b$ has a units digit of 8?

A) $\frac{1}{16}$ B) $\frac{1}{8}$ C) $\frac{3}{16}$ D) $\frac{3}{8}$ E) None of the above.

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11/12th Grade — November 9, 2024

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

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

Team Contest

1	Biff and Eho live 1.08 miles away from each other. From their respective homes, they walk towards each other at a constant rate, with Biff walking at 2.5 miles per hour and Eho walking at 2.9 miles per hour. How many minutes will they each walk before meeting?
2	What is the smallest positive difference between the squares of two distinct positive four-digit integers?
3	The Hot Mess Burgers food truck sells only hamburgers, french fries and soft drinks. One day, exactly 120 customers bought something at Hot Mess. Half of the customers bought at least a hamburger, one-fourth of the customers bought at least french fries, and one-third of the customers bought only a soft drink. Of the customers who bought a hamburger, four-fifths of them bought at least one other item. How many customers bought a hamburger and soft drink, but not french fries?
4	Let f(0) = 5, and f(n) = f(n – 1) + 2. What is the value of P, where P is defined as follows? $$P = f^{-1}\Big(f\big(f(f(5))\big)\Big)$$
5	A secret code consists of four digits in a row, where the digits are from 0 to 9 inclusive, and no two digits are the same. Given the following clues, what is the correct 4-digit number? 2 3 4 5 — Two digits are correct but are in the wrong positions. 4 5 6 7 — Three digits are correct but are in the wrong positions. 6 9 0 1 — Nothing is correct. 3 4 1 5 — Two digits are correct, and one is in the correct position. 7 3 5 2 — Two digits are correct, and both are in the correct positions.
6	How many three-digit positive integers contain at least one 4?
7	A new function is defined as follows, where the inputs a, b, c, d and e are each positive integers. If ★a, b, c, d, e★ = $\frac{44}{389}$, what is the value of a + b + c + d + e ? $$\bigstar a, b, c, d, e\bigstar = \cfrac{1}{a + \cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\frac{1}{e}}}}}$$

Continued on next page.

8	Let ABCD be a rectangle, with AB = 12 units and BC = 6 units. Let M be the midpoint of AB, and let P be the intersection of MD and AC. If x is the length of AP, what is the value of x^2?
9	A bag contains five marbles, three are blue and two are green. Marbles are randomly removed one at a time without replacement until either all of the blue marbles are removed or all of the green marbles are removed. As a percentage, what is the probability that the last marble removed is green?
10	How many distinct three-digit positive integers can be written as a sum of a three-digit positive integer and its reversal (containing one, two, or three digits)? Comment: any reversals that result in leading zeros can just ignore the zeros. For example, the reversal of 100 is 001 = 1.

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Key

Team Contest – Answer Key

11/12th Grade

	Answer
1	12 [minutes]
2	2001
3	38 [customers]
4	35
5	7458
6	252 [3-digit positive integers]
7	19 [= a+b+c+d+e]
8	20 [= x^2]
9	60 [%]
10	85 [integers]

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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.

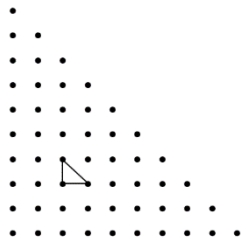
STUDENTS: DO NOT WRITE IN SHADED REGIONS

	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 — 2024-25

11/12th Grade — November 9, 2024

Pressure Round Contest

1	Square ABCD has vertices A (x_1, y_1), B (4, 10), C (x_2, y_2) and D (0, 2). What is the value of $x_1 + y_1 + x_2 + y_2$?
2	In the following equation, the value of x can be written as a reduced common fraction A/B. What is the value of A + B? $\sqrt[x]{4\sqrt{2\sqrt{2}}} = 32$
3	When the last digit (units place) of a positive 6-digit integer is moved to the first position (hundred thousands), and the other digits all shift one place to the right, the new 6-digit integer is exactly one-third of the original number. What is the sum of the six digits that make up the numbers?
4	If x is measured in radians, and $sin(x + \pi) = sin\left(x + \frac{\pi}{2}\right)$ for $2\pi < x < 3\pi$, then what is the measure of x, in degrees?
5	In the grid shown here, all dots are equally spaced both horizontally and vertically. One isosceles 45-45-90 triangle has been drawn. Including this triangle, how many triangles congruent to this one, in any orientation, can be drawn using the dots in the grid? 

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

Pressure Round Contest

1	Square ABCD has vertices A (x_1, y_1), B (4, 10), C (x_2, y_2) and D (0, 2). What is the value of $x_1 + y_1 + x_2 + y_2$?
2	In the following equation, the value of x can be written as a reduced common fraction A/B. What is the value of A + B? $\sqrt[x]{4\sqrt{2\sqrt{2}}} = 32$
3	When the last digit (units place) of a positive 6-digit integer is moved to the first position (hundred thousands), and the other digits all shift one place to the right, the new 6-digit integer is exactly one-third of the original number. What is the sum of the six digits that make up the numbers?
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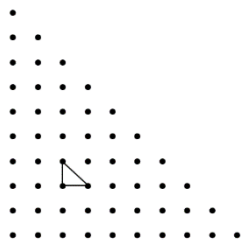
5	In the grid shown here, all dots are equally spaced both horizontally and vertically. One isosceles 45-45-90 triangle has been drawn. Including this triangle, how many triangles congruent to this one, in any orientation, can be drawn using the dots in the grid? 

Final Score *(out of 5)*

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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.

Final Score *(out of 5)*

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

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

Pressure Round Score Sheet

Submittal # (order turned in)	1	2	3	4	5
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Score (circle value)	0 or 1	0 or 2	0 or 3	0 or 4	0 or 5
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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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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 — 2024-25

11/12th Grade — November 9, 2024

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	Keke has a bag of gummy worms. She gives half of them to her sister Coco, then she gives two of them to their dog Lulu. Now she has six gummy worms left. How many did she start with?	
2	What is the minimum number of rectangular bricks, each measuring twelve inches by eighteen inches, needed to completely cover five flat rectangular surfaces, each measuring sixty inches by one hundred eighty inches?	
3	What is the sum of the coordinates of the point at which y equals x minus three and y equals negative two x plus nine intersect?	
4	What positive integer can be added to the set of integers: one, two, four, and eight, such that the new set of five integers has a median that is equal to its mean?	
5	What is the units digit of three raised to the thirty-sixth power?	
6	A line with a slope of two passes through the points two comma six and negative two comma y. What is the value of y cubed?	
7	What integer is closest to pi-squared times two?	
8	The first term of an arithmetic (pronounced air-ith-MET-ic) sequence is one-fourth, and the fifth term is one-half. As a reduced common fraction, the sum of the second, third and fourth terms is A over B. What is A + B?	

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

Key

Pressure Round Contest – Answer Key

11/12th Grade

	Answer
1	16 [= $x_1 + x_2 + y_1 + y_2$]
2	31 [= A + B]
3	27 [= sum of digits]
4	495 [°]
5	153 [triangles]

"Math Is Cool" Masters — 2024-25

11/12th Grade — November 9, 2024

Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	The radius of a circle is tripled. What is the percentage increase in the area of the circle?	800 [%]
2	When an integer n is divided by twelve, the remainder is six. What is the remainder when n is divided by six?	0 [= the remainder]
3	Biff won some goldfish at a carnival. During the first week, one-fifth of the fish died, and during the second week, three-eighths of the remaining fish died. What percentage of the original goldfish were still alive after two weeks?	50 [%]
4	The sum of eight consecutive integers is two hundred twelve. What is the largest of the eight integers?	30 [= largest integer]
5	What is the probability as a percentage that a randomly selected integer from one to one hundred inclusive contains the digit five or the digit six?	36 [%]
6	The difference in the degree measure of an interior and exterior angle of a regular polygon is one hundred degrees. How many sides does the polygon have?	9 [sides]
7	For one full week, Nate will do exactly one of the following activities per day: running, swimming or biking, and will not do the same activity on two consecutive days. He is going to swim on Wednesday. In how many different ways can he schedule his activities?	64 [ways]
8	Two hot dogs and a soda cost three dollars and twenty-five cents. Three hot dogs and a soda cost four dollars and fifty cents. In cents, how much do two sodas cost?	150 [cents]
9	What is the next number in the sequence that begins as follows: Ten, fifty, twenty, one hundred, seventy, three hundred fifty, three hundred twenty, and so on.	1600
10	If a is thirty percent greater than x, and b is twenty percent greater than y, then a times b is what percent greater than x times y?	56 [% times greater]

"Math Is Cool" Masters — 2024-25

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Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	What is the value of six factorial divided by the quantity five factorial plus four factorial?	5
2	The graphs of the equations x-squared plus y-squared equals one, and x plus y equals five, intersect in how many points?	0 [points]
3	If x and y are negative integers, and x minus y equals one, what is the least possible value of x times y?	2 [= xy]
4	What is the coefficient on the x-squared y-to the fourth term after expanding the quantity x minus two y raised to the sixth?	240
5	How many different six-letter code words can be made from the letters in the word eleven, spelled E-L-E-V-E-N, if the V must be in the first position?	20 [code words]
6	How many real numbers x satisfy the following equation: three raised to the x equals six x minus three	2 [values of x]
7	For the expression: one blank two blank three blank four blank five blank six blank seven blank eight blank nine, each blank will be filled in with a plus sign or a multiplication sign. What is the minimum possible value that can result?	44 [= minimum possible value]
8	x and y are positive integers. The mean of four, twenty and x is equal to the mean of y and sixteen. What is the smallest possible value of x plus y?	5 [= x + y]
9	The value of x is forty percent of y. What is the value of y as a percent of x?	250 [%]
10	What is the next number in the sequence that begins as follows: nine hundred fifty-one, eight hundred fifty-two, seven hundred fifty-three, six hundred fifty-four, and so on.	555 [= next number]

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Key

COLLEGE BOWL ROUND #3

#	Problem	Answer
1	One-eighth of a mile is how many yards?	220 [yards]
2	A rectangle has side lengths of two thousand inches and two thousand twenty-four inches, resulting in the same perimeter as square S. In inches, what is the side length of square S?	2012 [in]
3	A spinner is divided into ten equal regions, numbered one through ten. When it is spun one time, what is the probability in percent that it does not land on a prime number?	60 [%]
4	I have exactly five bills, worth one dollar, two dollars, five dollars, six dollars and ten dollars, respectively. What is the sum of the whole number dollar amounts from one dollar to twenty dollars inclusive, that I cannot pay exactly using one of more of these bills?	24 [$]
5	The mean of the integers seven, three, eleven, thirteen, five and x is four more than the mode of the integers. What is the value of x?	3 [= x]
6	If twenty-one is written as a sum of n consecutive positive integers, what is the greatest possible value of n?	6 [= n]
7	There are nineteen stations on the Ginza subway line in Tokyo, traveling from west to east. If a trip is defined as starting at one station and finishing at a different station, always moving eastward, how many total trips are possible on the Ginza line?	171 [trips]
8	Seventeen is what percent of eighty-five?	20 [%]
9	A circle with radius r has a circumference of at least twenty meters. In meters, what is the smallest possible integer value of the radius?	4 [meters]
10	If one-half of a number is eight less than two-thirds of the number, what is the number?	48

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Key

COLLEGE BOWL ROUND #4

#	Problem	Answer
1	One hundred liters of a salt and water solution contains one percent salt. After some of the water evaporated, the solution contains five percent salt. How many liters of water evaporated?	80 [liters]
2	What is six times the sum of the distinct prime factors of one hundred forty-four?	30
3	For how many positive integers n is it possible to have a triangle with side lengths five, twelve and n?	9 [values of n]
4	If x minus twelve times x plus twelve equals zero, what is the value of x minus one times x plus one?	143
5	ABCD is a square with side length four units, and AEFC is a rectangle with point B on side EF. In square units, what is the area of rectangle AEFC?	16 [square units]
6	Six positive integers have a mean of six, and a median of eight. What is the largest possible value of one of the six integers?	10
7	What is the sum of the finite series that begins with one minus two plus three minus four, continues in this manner, and ends with plus ninety-nine minus one hundred plus one hundred one?	51 [= sum=
8	How many solutions to the following equation exist where x and y are positive integers: two raised to the two x minus two raised to the two y equals fifty-five	0 [solutions]
9	If x plus two y plus three z equals six, two x plus three y plus z equals eight, and three x plus y plus two z equals ten, what is the value of x plus y plus z?	4 [= x + y + z]
10	How many positive proper fractions in lowest terms are there that have a denominator of twenty-six?	12 [fractions]

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Key

COLLEGE BOWL ROUND #5

#	Problem	Answer
1	If seventeen over x equals eleven over three hundred nineteen, what digit is in the tens place of x?	9 [= digit in tens place]
2	The ratio of the angles of a quadrilateral is three to four to five to six. How many degrees are in the largest angle?	120 [°]
3	Some students are in Mrs. Casto's classroom. Six new students enter the classroom, and two leave. Now there are three times as many students as there were originally. How many students are in the classroom now?	6 [students]
4	Given the sequence that starts as follows, what is the value of a plus b? three, nine, twelve, twenty-one, thirty-three, a, eighty-seven, b, and so on.	195 [= a + b]
5	Foster has ten nickels, ten dimes and ten quarters. In how many different ways can he make exactly forty-five cents?	8 [ways]
6	The mean of a set of n numbers is twenty-five, and the mean of a set of three n numbers is five. What is the mean when the two sets are combined?	10 [= mean]
7	When two six-sided dice are rolled, the probability that the sum of the numbers rolled is a multiple of three or four is a reduced common fraction A over B. What is A + B?	14 [= A + B}
8	What is the least possible sum of two positive integers whose product is one hundred eighty-two?	27
9	A Ford Expedition is currently valued at forty thousand dollars. Its value decreases by the same percentage every year. At the end of one year it will be worth thirty-six thousand dollars. How many dollars will it be worth at the end of three years?	29,160 [$]
10	What is the minimum function value of y equals three x-squared plus six x minus two?	-5 [= minimum function value]

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Key

COLLEGE BOWL ROUND #6

#	Problem	Answer
1	What is one hundred eighty-five squared?	34,225
2	A positive integer plus four times its reciprocal is equal to the product of the integer and four times its reciprocal. What is the integer?	2 [= the integer]
3	Tan flips a fair coin four times. As a percent, what is the probability that the coin comes up heads exactly one time?	25 [%]
4	What is the smallest integer n where n is greater than three, and seven n plus four is a perfect square?	11 [= n]
5	When the length of each edge of a cube is increased by one centimeter, the cube's total surface area increases by seventy-eight square centimeters. In centimeters, what is the length of an edge on the original cube?	6 [cm]
6	The positive integers are written in order, in rows of different lengths. The first row contains the number one. For every following row, the number of entries in the row is the sum of the numbers in the previous row. For example, row two contains the number two, and row three contains the numbers three and four. What is the last number in the fifth row?	67 [= last number in 5th row]
7	How many of the integers from ten through fifty inclusive have the sum of their digits equal to a perfect square?	9 [integers]
8	What is the range of the following set of numbers? one hundred five over nine, twenty-eight thirds, four and two-thirds, ten and two-ninths	7 [= range]
9	The point x comma y lies at the intersection of the lines y equals x and y equals negative two-thirds x plus five. What is x plus y?	6 [= x + y]
10	What is the value of the quantity twenty squared minus fifteen squared divided by the quantity eighteen squared minus seventeen squared?	5

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Key

COLLEGE BOWL – EXTRA QUESTIONS

#	Problem	Answer
1	What is the sum of the first one hundred twenty-three positive odd integers?	15129 [= sum]
2	What is the thirteenth number in the Fibonacci sequence that starts with one, one, two, and so on?	233
3	Three angles of a convex pentagon are one hundred, one hundred twenty and one hundred forty degrees. The remaining angles are congruent to each other. What is the measure of one of the remaining angles, in degrees?	90 [°]
4	The function f of x equals the quantity two x minus five divided by the quantity x plus one. What is f inverse of three?	-8 [= f inverse of 3]
5	What is the area in square centimeters of a square with a perimeter of one hundred eighty-eight centimeters?	2209 [sq cm]
6	Biff buys a sandwich that costs twelve dollars and twenty-five cents, and pays thirteen dollars and twenty-three cents total with the tax. As a percentage, what was the tax rate?	8 [%]
7	The hexadecimal number D three is equal to what base ten number?	211 [base 10]

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

7:35 - 7:45	College Bowl #6	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 whiteboard, 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