"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 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:*
  - *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).

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 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			
9/10th Grade	**TOTAL:**		

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 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.

9/10th Grade

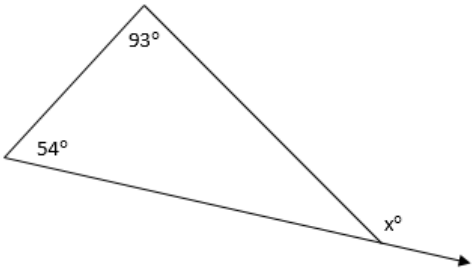
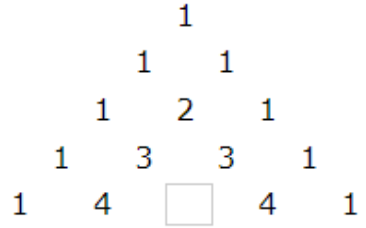
	Answer	
1	46	What is the value of ten times four and three-fifths?
2	16	The number one two one base three is equal to what number in base ten?
3	4 [= x]	Solve for x in the following equation: Two plus x minus one plus 3x equals seventeen
4	20 [in]	A circle has an area of twelve-hundred square inches. Approximating the value of pi as three, find the radius to the nearest inch.
5	12 [units]	Triangle ABC and triangle DEF are similar. If AB equals twelve units, DE equals eighteen units and BC equals eight units, what is the length of EF in units?
6	60 [ways]	In how many different ways can three people be seated in a row of five chairs?
7	9 [times]	The nine digit number nine eight seven six five four three two one is multiplied by nine. How many times does the digit eight appear in the product?
8	192	The first two terms of a sequence are one and two. Each of the following terms in the sequence is equal to the sum of all the terms that come before it in the sequence. What is the ninth term in the sequence?

"Math Is Cool" Championships — 2023-24

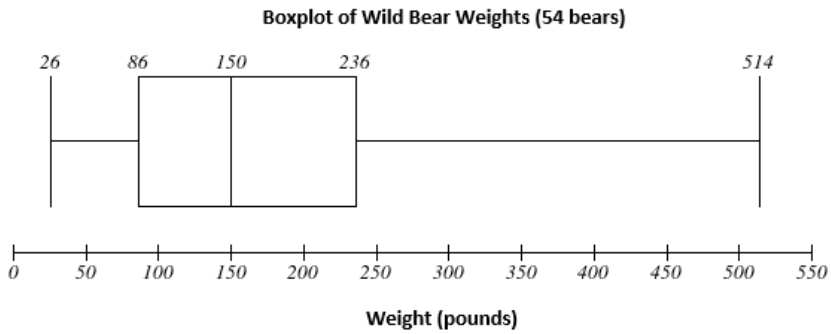
October, 2023

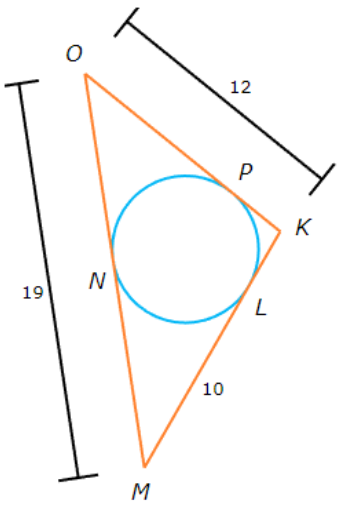
High School Individual Contest

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

	Questions 1-30: 2 points each
1	The expression $(b^3)^{-6}$ can be simplified as b^x. What is the value of x?
2	For the following triangle, what is the measure in degrees of exterior angle x? 
3	Packard flips a fair quarter and rolls a single 6-sided standard die. How many total outcomes are possible?
4	Solve for x in the following equation: -19x – 2x + 16x + 12 = -18
5	What missing number goes in the box in Row 4 of Pascal's Triangle? 
6	Find the sum x + y of the numbers in the following sequence: 57, 48, x, 30, y, 12, 3, …
7	There are four cards numbered 1, 2, 3 and 4. Two cards are selected randomly, one at a time, without replacement. As a percentage, what is the probability that the first card is a '4' and the second card is a factor of 48?
8	Two right circular cones are similar. The smaller cone has a slant height of 6 inches and a base radius of 3 inches. The larger cone has a slant height of 10 inches. What is the base radius of the larger cone, in inches?
9	The repeating decimal 0.777… can be written as a reduced common fraction A/B. What is A + B?

Continued on next page.

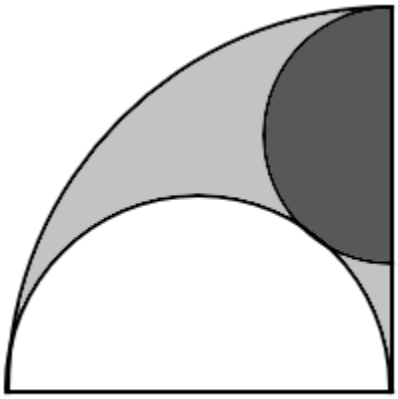
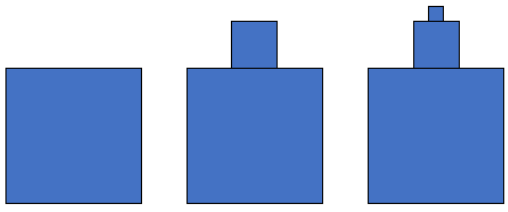
10	The following boxplot shows the weight measurements (in pounds) of 54 wild bears. What is the median weight of the bears, in pounds? 
11	A baseball mitt with a retail price of \$190 costs the customer \$209 once the sales tax is added. As a percentage, what is the sales tax rate?
12	How many of the numbers listed below provide a counterexample for the following conditional statement? "If a fraction can be reduced by removing a common factor, then its numerator and denominator are both even." $\frac{1}{2}, \frac{20}{60}, \frac{3}{5}, \frac{3}{21}, \frac{17}{51}, \frac{5}{20}, \frac{9}{36}, \frac{24}{120}$
13	Evaluate f(15) for the given function: $f(x) = \frac{120}{x} + 3$
14	A 2-gallon jug of apple cider costs \$10.24. In cents, what is the price per cup?
15	A sequence is defined by the following rule, for n = 1, 2, 3, … What is the value of the 4th term in the sequence, a_4? $a_n = 2 \cdot (3)^n$
16	Two positive integers have a product of 100, and neither of the two integers contains the digit '0'. What is the sum of the two integers?
17	Given the arrangement of letters, in how many different ways can you spell out the name BIFF? You must start with the B in the middle, and can move from one letter to an adjacent letter in a horizontal or vertical direction only (not diagonal). F F F F F F I F F F F I B I F F F F I F F F F F F
18	What is the maximum function value of the following parabola? $f(x) = -x^2 - 4x - 10$
19	The following data set, which consists of all integers, has a unique mode of 734 and a median of 736. What is the smallest possible value of n? 734 744 n 737 734 729 736
	Continued on next page.

20	A circle is inscribed in a triangle, with points of tangency at L, N and P. As shown, the length of OK = 12 units, OM = 19 units and LM = 10 units. In units, what is the length of KL? 
21	Fill in the boxes with the integers 1 through 5, using each one exactly once, so that the following equation is true. The proper order of operations must be followed. Which number is in the right-most box? □ + □ − □ × □ ÷ □ = 6
22	Find the sum of the first three partial sums of the following series. -4 + (-3) + (-2) + (-1) + 0 + 1 + 2 + …
23	Given the functions f(x) and g(x), find: (f − g)(−3) $f(x) = -x^2 + 2x + 6$ $g(x) = 2x^2 - 3x - 1$
24	What is the largest 4-digit number that has exactly three positive integer factors?
25	Solve for x: $\log_8 x - \log_8 13 = 2$
26	The following sample data represents the number of insect legs that were found in each of five chocolate bars that were sampled at a manufacturing plant. Find the standard deviation of the sample data, in units of insect legs. Number of insect legs: 20, 13, 4, 8, 10
27	A 9-foot long string, $\overline{AX}$, is attached to vertex X of equilateral triangle XYZ, which has a perimeter of 9 feet. The string is kept taut (pulled straight), and wrapped around the triangle by moving in a circular clockwise direction. The area swept out by the string as it moves around the triangle can be written as Bπ square feet, where B is a positive integer. What is B? 

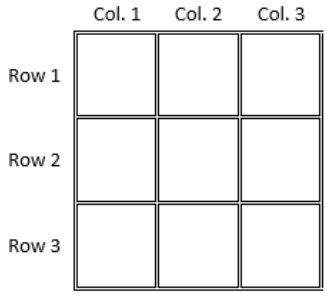
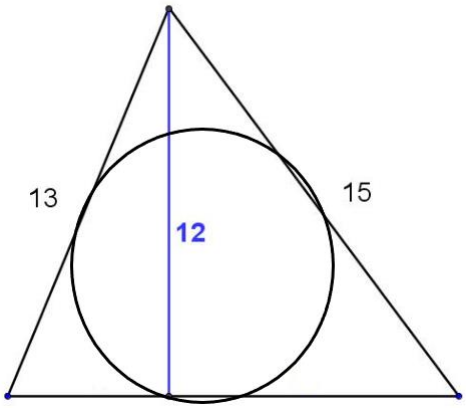
Continued on next page.

28	A ladder is resting flat against a wall. The base of the ladder is pulled out 4 feet away from the wall, causing the top of the ladder to slide down the wall a distance equal to one-fifth the length of the ladder. In feet, the length of the ladder can be written as a reduced common fraction A/B. What is A + B?
29	The product of the digits in the number 34 is 3x4 = 12. How many positive two-digit integers have an odd product of their digits? Note that a product of 0 is even.
30	A positive 5-digit integer has the sum of all five of its digits equal to five. The first digit is equal to the number of zeros in the number, the second digit is equal to the number of ones in the number, and so on. What is the number?

Challenge Questions: 3 points each

31	A quarter-circle has two smaller inscribed semi-circles, which are tangent to each other at one point. The radius of the quarter-circle and the diameter of the larger semi-circle (white) equal 2 units. The radius of the smaller semi-circle (dark shaded) can be written as a reduced common fraction A/B. What is A + B?  2
32	If two marbles are removed at random from an urn containing black and white marbles, the probability that they are both white is 1/3. Instead, if three marbles are removed at random, the probability that they are all white is 1/6. How many black marbles are in the urn?
33	A fractal is created by starting with a square of side length 1 unit. In each iteration, another square with side length equal to 1/3 the previous square's side length is placed on top of the previous square. After infinitely many iterations, the fractal's outer perimeter is P units and its area is A square units. The ratio of the two values can be written as a reduced common fraction P/A. What is P + A?  Iteration 0 Iteration 1 Iteration 2
34	For the parabola defined by the following equation, the directrix is defined by the line: $y = \alpha$. What is the value of α? $x^2 - 4x - 12y - 8 = 0$

Continued on next page.

35	In the following equation, each letter represents a different digit from 0 to 9. What is the value of the number MAGIC? $(M + A + G + I + C)^3 = MAGIC$
36	Each dimension of a rectangular prism is an integer number of inches. The volume of the prism is 2023 cubic inches. In square inches, what is the minimum possible surface area of the prism?
37	In the following grid, place each of the digits 1 through 9 into a box, using each digit exactly once, according to the following rules. What 3-digit integer is in Row 3, reading from left to right? 1. The three digits in the first row sum to 10. 2. The three digits in the second row sum to 13. 3. The three digits in the first column sum to 21. 4. The three digits in the second column sum to 16. 
38	A triangle has sides of length 13 and 15 units, and an altitude of length 12 units, as shown. A circle is constructed that passes through the following 9 points on the triangle: 1. The foot of each altitude of the triangle. 2. The midpoint of each side of the triangle. 3. The midpoint of the line segment from each vertex to the orthocenter of the triangle. The radius of this circle can be written as a reduced common fraction A/B. What is A + B? 
39	Three real numbers between 0 and 10 inclusive are randomly selected. As a reduced common fraction, the probability that the sum of the three numbers is 8 or less can be written as A/B. What is A + B?
40	The following polynomial function P(x) has two roots, r and s. Find the value of $r^{10} + s^{10}$. $P(x) = x^2 - x + 4$

"Math Is Cool" Championships – 2023-24

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	-18 [x =]
2	147 [°]
3	12 [outcomes]
4	6 [x =]
5	6
6	60
7	25 [%]
8	5 [in]
9	16 [= A + B]
10	150 [pounds]
11	10 [%]
12	4 [numbers]
13	11
14	32 [cents]
15	162

	Answer
16	29
17	28 [ways]
18	-6
19	738 [n =]
20	3 [units]
21	2
22	-20
23	-35
24	9409
25	832 [x =]
26	6 [insect legs]
27	42 [= B]
28	23
29	25 [integers]
30	21200

	Answer
31	5 [= A + B]
32	4 [black marbles]
33	49 [= P + A]
34	-4 [= α]
35	19683
36	1054 [sq in]
37	895
38	81 [=A + B]
39	407 [= A + B]
40	-223

"Math Is Cool" Championships – 2023-24

Total Correct (all columns)

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

Individual Contest – Score Sheet

STUDENTS: DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
1-15 TOTAL:			

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

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

High School

October, 2023

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

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 2023

Individual Multiple Choice Contest

1 A regular pentagon and a regular hexagon can intersect in which of the following?

A) A ray B) A line C) A line segment D) A rectangle E) None of these.

2 What is the next number in the series that begins as follows, where numbers have been rounded off to three decimal places of accuracy:

0.667, 0.750, 0.800, 0.833, …

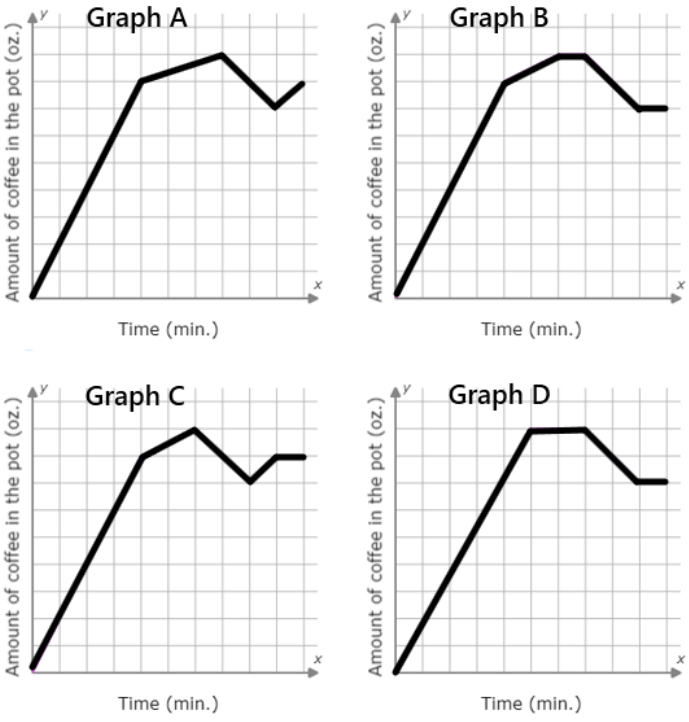
A) 0.841 B) 0.861 C) 0.865 D) 0.873 E) Answer not given

3 Given that x and y are both integers, which of the statements best describes the result of the following expression?

$(x^2 + x + 9)(2y + 1)$

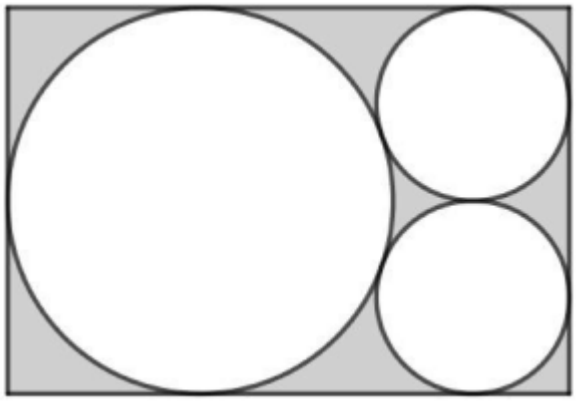
A) Odd integer always. B) Even integer always. C) Even integer if x is even.
D) Even integer if y is even. E) Answer not given.

4 Sheldon brews a pot of coffee for his roommate Leonard, who is sad and needs a hot beverage. The pot fills quickly at a constant rate until it is almost full, when it drops to a slower constant rate, then stops. After some time, Sheldon pours a cup of coffee for Leonard, and leaves the rest of the coffee in the pot. Which of the following graphs could show the amount of coffee in the pot as a function of time?



A) Graph A B) Graph B C) Graph C
D) Graph D E) Answer not given.

Continued on next page.

5	February 29, 2024 will fall on a Thursday. What day of the week will it be three days after the day before Christmas in 2024, which is celebrated on December 25th? A) Thursday B) Friday C) Saturday D) Monday E) Answer not given.
6	An urn contains 5 blue marbles and 5 red marbles. Three marbles are randomly selected one at a time, without replacement. What is the probability that the third marble selected is the same color as the first marble selected? A) 1/2 B) 1/3 C) 2/3 D) 4/9 E) Answer not given.
7	Two numbers sum to 200. What is the minimum possible value of the sum of one of the numbers and the square of the second number? A) 199.25 B) 199.5 C) 199.75 D) 200 E) Answer not given.
8	There are 306 prime numbers less than 2023. What is the sum of the prime numbers less than 2023? A) 283,081 B) 45,865 C) 24,299 D) 327,912 E) 545,634
9	Three circles are inscribed in a rectangle as shown. The smaller circles each have a radius of 1 unit and are tangent to the large circle, to each other, and to two sides of the rectangle each. The large circle has a radius of 2 units and is tangent to three sides of the rectangle. What is the area, in square units, of the shaded portion of the rectangle?  A) $12-8\sqrt{2}$ B) $8+8\sqrt{2}-6\pi$ C) $12+8\sqrt{2}-6\pi$ D) $16-8\sqrt{2}-6\pi$ E) Answer not given.
10	Mrs. Stephenson is running a carnival game at the Kamiakin High School senior party. There are ten cards, each with a different integer 1 through 10, placed face down on the table. A player randomly turns over three different cards. They win if the smallest of the three numbers is odd, and the next smallest number is even. What is the probability of winning the game? A) $\frac{1}{3}$ B) $\frac{29}{120}$ C) $\frac{29}{720}$ D) $\frac{13}{720}$ E) Answer not given.

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9/10th Grade — October, 2023

Key

Individual Multiple Choice Contest – Answer Key

9/10th Grade

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

	Answer
1	C
2	E (0.857)
3	A
4	B
5	B
6	D
7	C
8	A
9	C
10	A

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 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.

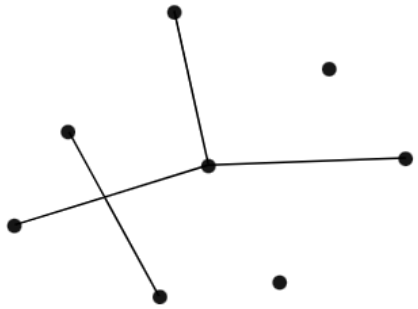
STUDENTS: DO NOT WRITE IN SHADED REGIONS

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

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 2023

Team Contest

1	Find the x-coordinate of the x-intercept of the following line: $y = \frac{2}{7}x - 2$
2	On the coordinate plane, find the distance in units between the points (6, 5) and (10, 2).
3	How many minutes before 10 AM is it now, if 90 minutes later it will be the same number of minutes after 11 AM?
4	Two cards will be selected from a standard deck of 52 playing cards, with replacement. As a percentage, what is the probability that the two cards are from different suits?
5	What is the 2023rd odd natural number?
6	Certain prime numbers can be written in the form: $N^2 + 1$, where N = 1, 2, 3, … For example, the two smallest prime numbers that can be written like this are 2 (= $1^2 + 1$) and 5 (= $2^2 + 1$). What is the value of the seventh smallest prime number that can be written in the form $N^2 + 1$?
7	In the following diagram, assume that no three points are collinear. How many additional lines are needed to connect each point to every other point in the diagram? 
8	A right triangle has legs a and b, with a < b, and hypotenuse c. The area of the triangle is 630 cm^2 and the perimeter is 126 cm. In centimeters, what is the length of the hypotenuse, c?

Continued on next page.

9 The positive integers are written in an array according to the following pattern. The first number in each row (in Column 1) indicates how many numbers are in that row. Each entry can be identified by its unique Row and Column number. Find the sum of the Row and Column number for the location of 2023.

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	…
Row 1:	1								
Row 2:	2	3							
Row 3:	4	5	6	7					
Row 4:	8	9	10	11	12	13	14	15	
…	…								

10 A 10^{th} positive integer, A, when added to the following set, results in the median of the set equaling the mean of the set. What is the sum of all possible values of A?

{13, 15, 21, 28, 33, 38, 42, 48, 51}

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 2023

Key

Team Contest – Answer Key

9/10th Grade

	Answer
1	7
2	5 [units]
3	15 [minutes]
4	75 [%]
5	4045
6	257
7	24 [lines]
8	53 [cm]
9	1011
10	113

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 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.

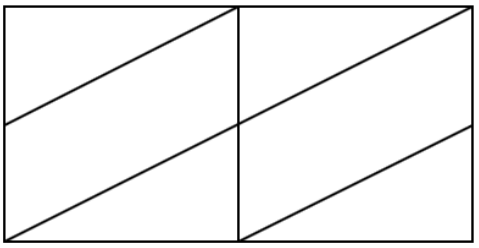
STUDENTS: DO NOT WRITE IN SHADED REGIONS

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

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 2023

Pressure Round Contest

1	The following terms are the first four 3-digit positive integers in an arithmetic sequence, where A, B, and C each represent a single digit from 1 to 9. As a 3-digit integer, what is the fifth term of the sequence? AB4, B03, B3C, BA1
2	Evaluate: $\frac{1}{4}(64^2 - 36^2)$
3	How many integers between 0 and 1000 contain at least one digit '4' but do not contain the digit '5'?
4	How many total convex polygons are included in the following figure? 
5	Two integers x and y are defined as follows. What is the greatest common factor of x and y? $x = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10$ $y = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10$

"Math Is Cool" Championships — 2023-24

9/10th Grade — October, 2023

Final Score *(out of 15)*

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" Championships — 2023-24

9/10th Grade — October, 2023

Final Score *(out of 15)*

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" Championships — 2023-24

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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" Championships — 2023-24

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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" Championships — 2023-24

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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" Championships — 2023-24

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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" Championships — 2023-24

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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" Championships — 2023-24

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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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

9/10th Grade — October, 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" Championships — 2023-24

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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	What is the value of ten times four and three-fifths?	
2	The number one two one base three is equal to what number in base ten?	
3	Solve for x in the following equation: Two plus x minus one plus 3x equals seventeen	
4	A circle has an area of twelve-hundred square inches. Approximating the value of pi as three, find the radius to the nearest inch.	
5	Triangle ABC and triangle DEF are similar. If AB equals twelve units, DE equals eighteen units and BC equals eight units, what is the length of EF in units?	
6	In how many different ways can three people be seated in a row of five chairs?	
7	The nine digit number nine eight seven six five four three two one is multiplied by nine. How many times does the digit eight appear in the product?	
8	The first two terms of a sequence are one and two. Each of the following terms in the sequence is equal to the sum of all the terms that come before it in the sequence. What is the ninth term in the sequence?	

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Key

Pressure Round Contest – Answer Key

9/10th Grade

	Answer
1	790
2	700
3	217 [integers]
4	20 [convex polygons]
5	5

"Math Is Cool" Championships — 2023-24

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Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	What is the product of one hundred thirteen and one hundred six?	11978
2	The surface area of a sphere with radius 4 units is equal to k times pi square units. What is the value of k?	64 [k =]
3	What is the median of the positive integral factors of twenty-four?	5 [= median]
4	When the integers from 10 to 20 inclusive are squared, how many of the resulting square numbers are palindromes, where a palindrome is a number that reads the same forwards and backwards.	1 [palindrome]
5	Juanita paid for a fifteen cent stamp with a one dollar bill, and received nine coins in change, consisting of quarters, dime, nickels and or pennies. How many different combinations of coins could she have received?	4 [combinations]
6	The first three terms of a sequence are one, two and three. Each subsequent term is the sum of the three previous terms. What is the ninth term in the sequence?	125
7	What is the probability in percent that a randomly selected positive multiple of three is also a multiple of five?	20 [%]
8	A zebra and five puppies together weigh the same as two tigers. A zebra weighs the same as twenty-nine puppies. How many puppies weigh the same as one tiger?	17 [puppies]
9	The midpoint of line segment JK is at eight comma six. Endpoint J is at seven comma eight. What is the sum of the coordinates x comma y at point K?	13
10	Evaluate the following expression when x equals negative six: The quantity negative x plus three divided by the quantity negative x minus seven.	-9

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Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	A line contains the points negative four comma three and three comma negative two. What is the value of the slope of the line times fourteen?	-10
2	What is forty-six squared?	2116
3	There are two hundred m&ms in a bag. Parker eats one m&m the first day, two m&ms the second day, four m&ms the third day, and continues to double how many he eats each day. After he has eaten the m&ms on the seventh day, how many m&ms remain in the bag?	73 [m&ms]
4	How many integers are there between the square root of eight and the square root of eighty?	6 [integers]
5	A quarter, a dime and a nickel are flipped. The probability that at least two coins show heads and one of them is the quarter can be written as a reduced common fraction A over B. What is A plus B?	11 [= A + B]
6	What is the last digit of two raised to the two thousand twenty-three times three raised to the two thousand twenty-three?	6
7	In how many ways can two standard six-sided dice be rolled such that the sum of the numbers showing on the dice is divisible by four?	9 [ways]
8	In simplified radical form, the value of the square root of the quantity two times three times four times five times six times seven times ten can be written as A times the square root of B. What is A?	60 [=A]
9	An angle measures forty-two degrees. In degrees, what is the measure of its complementary angle times two?	96 [°]
10	The expression eight y times y to the fifth divided by y to the negative two can be written as eight times y raised to what power?	8

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Key

COLLEGE BOWL ROUND #3

#	Problem	Answer
1	What is the largest integer such that the following statement is true: three x minus four is less than negative five.	-1 [= x]
2	Four point four is what percent of twenty?	22 [%]
3	Find the value of one hundred times the range of the following set of numbers: zero point two, zero point six, zero point zero eight, zero point five, zero point zero three.	57
4	What is the smallest positive integer that is divisible by each of the integers one through nine?	2520
5	The first Super Bowl game was played on January fifteenth of a particular year. No digit in the year is an eight. The hundreds digit of the year is three more than the tens digit. The sum of the digits in the year is twenty-three. What year was the first Super Bowl played?	1967
6	What is the sum of the terms in the finite arithmetic series: two plus five plus eight plus eleven plus dot dot dot plus eighty-three plus eighty-six?	1276
7	There are eight identical urns. Each one contains a different combination of quarters, dimes and nickels that total exactly forty-five cents. If an urn is randomly selected, what is the probability in percent that it contains at least three dimes?	25 [%]
8	The current year is two thousand twenty-three. What is the next year that is a palindrome?	2112
9	In degrees, what is the sum of the exterior angles of a regular pentagon?	360 [°]
10	When the graphs of y equals the absolute value of x and y equals x squared are plotted on the same coordinate plane, how many distinct points of intersection exist?	3 [points]

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Key

COLLEGE BOWL ROUND #4

#	Problem	Answer
1	What is the least common multiple of sixteen and twenty?	80 [= LCM]
2	The reciprocal of the number zero point two four can be written as a reduced fraction A over B. What is A plus B?	31 [=A + B]
3	Find the next term in the sequence that begins: negative forty-three, negative forty-one, negative thirty-seven, negative thirty-one, and so on.	-23
4	One-half of a number plus two-thirds of the same number equals 42. What is two times the number?	72
5	A fence is being built around a triangular garden that is twenty feet by twenty feet by ten feet. One post is placed at each vertex, and the posts are placed so that their centers are thirty inches apart. How many total posts are needed?	20 [posts]
6	A four-digit positive integer is made by randomly ordering the digits one, two, three and four, using each one exactly once. What is the probability in percent that a randomly selected integer from this list is divisible by four?	25 [%]
7	How many square tiles that are four inches on a side will be needed to completely cover a rectangular patio that measures eight feet by ten feet?	720 [tiles]
8	A doctor's office tracked the average waiting time each month. In March, the average waiting time was twenty minutes, and in July the average waiting time was twenty-eight minutes. What was the average rate of change in the waiting time between March and July in minutes per month?	2 [minutes per month]
9	What is the measure of acute angle x, in degrees, if cosine of x equals one-half?	60 [°]
10	Find the greatest common factor of the following monomials: fifteen x, forty-five y squared, and 30 z cubed	15

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Key

COLLEGE BOWL ROUND #5

#	Problem	Answer
1	What is the product of eleven, twenty-four and twenty-five?	6600
2	Four to the fourth power plus four squared plus four to the zero power equals what number in base four?	10101 [base 4]
3	On the coordinate plane, the point negative five comma two is reflected over the x-axis, then shifted two units to the right, then reflected over the y-axis to the point with coordinates x comma y. What is x plus y?	1 [= x + y]
4	Fifty percent more than what number is twenty-five percent less than sixty percent more than ten?	8
5	Two miles of fence is needed to enclose a square plot of one hundred sixty acres. How many acres can be enclosed in a square plot using four miles of fence?	640 [acres]
6	What is the sum of the terms in the finite geometric series: one plus four plus sixteen plus dot dot dot plus one thousand twenty-four?	1365
7	A sock drawer contains two black socks and three white socks. If two socks are randomly removed from the drawer without replacement, what is the probability in percent that they are the same color?	40 [%]
8	What is the maximum area in square units of a rectangle with a diagonal length of sixteen units?	128 [sq units]
9	On the coordinate plane, how many units away from the origin is the center of the circle described by the following equation? x-squared plus y-squared minus 14x plus forty-five equals zero.	7 [units]
10	The range of the function y equals x-squared minus two x minus five can be written as y is greater than or equal to q. What is the value of q?	-6

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Key

College Bowl Round #6

#	Problem	Answer
1	If one gram equals zero point zero four ounces, then how many grams are in eight point four ounces?	210 [grams]
2	If x equals five and y equals three, find the value of the quantity x minus y times the quantity x-squared plus xy plus y-squared.	98
3	An acute triangle has integer side lengths of two units, seven units and x units. In units, what is the largest possible value of x?	7 [units]
4	Letters are worth the following amounts: A is one cent, B is two cents, C is three cents, all the way up to Z is twenty-six cents. In cents, what would be the value of the phrase 'MATH IS COOL'?	115 [cents]
5	How many cards need to be drawn from a standard fifty-two card deck without replacement to make sure that at least two of them are hearts?	41
6	The first three terms in an arithmetic sequence are x, 2x plus eleven, and 4x minus three. What is the common difference between consecutive terms in this sequence?	36
7	If one integer from one to twenty inclusive is randomly selected, what is the probability in percent that it's spelling in the English language begins with a vowel?	20 [%]
8	As a base ten number, what is the value of: three one one four base five?	409 [base 10]
9	What is the area, in square units, of triangle ABC, with vertices at negative two comma seven, five comma two, and negative two comma negative five?	42 [square units]
10	If x-squared equals the quantity x plus fifty-six squared, what is the value of x?	-28

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Key

COLLEGE BOWL — EXTRA Questions

#	Problem	Answer
1	What is the value of seven point four one two times ten to the third power as an integer rounded to the nearest hundred?	7400
2	If the point eight comma nine is the center of a circle of radius ten units, at how many points does the circle intersect the coordinate axes?	4 [points]
3	Solve for x in the following equation: three times the quantity seven plus 2x equals thirty plus seven times the quantity x minus 1.	-2 [= x]
4	What number is one percent of one million?	10,000
5	Find the mean of the following data set: thirteen, thirty-two, twenty-five, twenty-seven, and thirteen	22
6	Solve the following equation for x: log base three of the quantity 2x plus three equals two	3 [=x]

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