"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

Sponsored by:

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by all involved (competitors and observers). Display of poor sportsmanship will result in disqualification.*
- *Competitors may not use calculators or any other aids on any portion of this contest.*
- *Unless stated otherwise:*
  - *Express all rational, non-integer answers as common fractions, except in problems dealing with money, where you should give the answer as a decimal rounded to the nearest cent.*
  - *For 5th grade and up, all fractions and ratios must be reduced to simplest form, all radicals must be simplified, and all denominators must be rationalized.*
  - *Do not round or approximate answers. Leave answers in terms of π or other irrational quantities (e.g., √2), where applicable.*
- *Units are not necessary as part of your answer, unless it is a problem that deals with time, in which case, AM or PM is required. However, if you choose to use units, they must be correct.*
- *Record all answers on the colored cover sheets in the answer column only.*
- ***Be sure that the student name, school, team number, etc. has been filled out at the top of each answer sheet.***
- *Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will be scored as a 0.*

FINAL SCORES AND AWARDS

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

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

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

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

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

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

"Math Is Cool" Championships — 2021-22

High School — Nov. 3, 2021

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			
High School	**TOTAL:**		

"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

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	165	What is the sum of the odd integers between 4 and 26?
2	16	What is 12 times the slope of the line with equation: 4x – 3y = –6 ?
3	5	If two fair six-sided dice are rolled, in how many ways can a sum of six be obtained?
4	9	If f of x equals one-third x minus eight, what is f-inverse of -5?
5	111 [base 4]	What is the sum of 32 base 4 and 13 base 4? Answer as a base 4 number, but do not include the base 4 in your response.
6	6	What is the area of an ellipse with a major axis of twelve over pi and a minor axis of 2?
7	-5	What is the sum of the roots of the following equation: x3 + 5x2 – 26x – 120 = 0
8	52	I am dealt three cards from a standard 52-card deck. In how many ways can I get a three of a kind, that is, three cards of the same value? For example, three fives, or three Jacks, etc.

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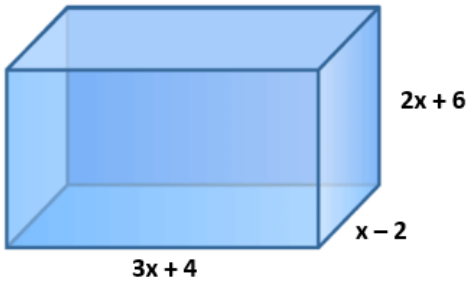
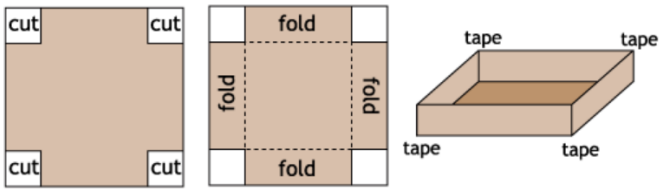
High School Individual Contest

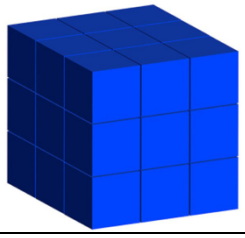
35 minutes, 40 problems, ~92% of individual score.
A 5-minute time warning will be given.

	Questions 1-30: 2 points each
1	An arithmetic sequence has a first term of 3 and a second term of 7. What is the value of the 4th term of the sequence?
2	Evaluate: $64^{\frac{2}{3}}$
3	A line has the equation $y = \frac{1}{8}x + 6$. What is the slope of a line that is perpendicular to it?
4	What is the measure of the angle in degrees that is complementary to the angle 42°?
5	A right triangle has a leg length of 8 cm and a hypotenuse of 17 cm. What is the length of the other leg in cm?
6	Solve the equation for 'x'. 5(3x + 2) = -5
7	When $(x^3y^2)^4$ is simplified to x^ay^b, what is the product ab?
8	The lines given by the following equations intersect at the point (1, 2). $3x + 2y = 7$ $4x - ay = -2$ What is the value of 'a' ?
9	What is 15 percent of 140?
10	Find the value of $f(-2)$ when $f(x) = -3x^2 + 5x - 11$.
11	The slope of a line passing through the points (x, 5) and (-2, 10) is 1. What is the value of 'x' ?
12	If the sequence 12, 36, n, ... is geometric, what is the value of 'n' ?
13	 If Ax +B is the sum of the twelve edges of the rectangular prism above, what is the value of A+B?

14	Given $f(x) = 5x + 7$, find the value of 'x' so that $f(x) = 22$.
15	What is the average of the values of x that satisfy the equation $x^2 - 8x - 20 = 0$?
16	Franny walked 1/8 of a mile in 1/16 of an hour. What is Franny's walking rate in miles per hour?
17	ASB members are placing boxes around the school to collect canned goods for a food drive. To make the boxes, they start with a square sheet of cardboard with a side length of 60 inches. They cut out congruent 15 by 15 inch squares from each corner of the cardboard sheet, then fold the sides up and tape the edges together as shown. What will be the volume of each box in cubic inches? 
18	Four blue gummy worms and three yellow gummy worms are placed in a bag and selected one at a time at random. The gummy worms are selected without replacement. The probability that three gummy worms of the same color were selected without replacement can be written as the reduced fraction A/B. What is A + B?
19	What is the largest prime factor of 2021?
20	What is the x-coordinate of the image of the point (–5, 7) after it is rotated 90 degrees counterclockwise around the origin?
21	How many square inches are in 5 square yards?
22	The number 1001 is raised to the 6^{th} power. What is the sum of the digits of the result?
23	What is the largest power of 2 that evenly divides into $19^4 - 13^4$?
24	Find the sum of the 3 smallest positive integers 'c' such that $\sqrt[3]{108c}$ is also an integer.
25	A 4-digit positive integer is divisible by 9. How many possible values are there for this integer, given that the last two digits of the number are 25?
26	How many points on a circle centered at the origin with radius 13 have both x and y coordinates that are integers?
27	Biff and Eho climbed to the top of a cliff 720 feet high and threw a ball straight down at a speed of 64 ft/sec. Use 32 ft/sec^2 as the gravitational constant. How many seconds will it take for the ball to hit the ground?
28	At the end of a treasure hunt, Parker discovers two treasure chests. One of them contains 100 gold coins, and the other contains 50 gold coins and 50 silver coins. Parker opens a chest at random, draws a coin from it at random, and it is gold. The probability that he opened the chest with 100 gold coins can be written as a reduced fraction A/B. What is A + B ?
29	I roll a fair six-sided die. What is the expected number of rolls until I get 2 sixes in a row?

30	Tom found the area of a regular hexagon with a perimeter of 12 units to be $x\sqrt{3}$ square units. What is the value of x?

Challenge Questions: 3 points each

31	How many positive integers less than 1000 have exactly 9 positive integer factors?
32	Let f(x) be defined for all real numbers and f(x – 4)f(x + 4) = 72 for all x, and f(x) = x + 12 on (–4, 4). What is f(2021)?
33	Let $a, b, c, x > 1$. Suppose $\log_{ab}(x) = 9, \log_{bc}(x) = 18, \log_{ac}(x) = 12$. What is $\log_{abc}(x)$?
34	How many (possibly empty) subsets of the following set of integers have no consecutive integers? {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
35	At the state math contest, each school brought 3 students to compete. As it turns out, each student had a different score. The student that had the median score was the highest from his school while his teammates were 44th and 78th respectively. How many schools attended the contest?
36	On the interval from $[0, \pi]$, how many solutions are there to the following equation? cos(3x) = cos(7x)
37	A 3x3x3 cube is painted blue on the outside, while the inside surfaces remain white. The cube is then cut into 27 1x1x1 cubes. One of the 27 cubes is chosen at random, and rolled like a 6-sided die. If the face that shows on the top is blue, the probability that it is the only blue face on that cube can be written as a reduced fraction A/B. What is A + B? 
38	The polynomial $x^3 - 6x^2 + 3x + n$ has three roots: r, s, and t. If r = s + t, what is the value of n?
39	The following fifteen integers are distributed to three friends, each getting five: 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5 After selecting their numbers, the friends make the following statements: Alice: The product of my five numbers is not divisible by 9 or 10. Benny: The product of my five numbers is not divisible by 5 or 6. Carli: The product of my five numbers is not divisible by 3 or 4. What is the sum of Carli's five numbers?
40	Savi is trying find all possible 4th vertices (a, b) of a parallelogram with vertices (2, 2), (3, 5) and (7, 10). What is the sum of all possible a's and b's ?

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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	15
2	16
3	[m=] -8
4	48[°]
5	15 [cm]
6	[x=] -1
7	96
8	[a=] 3
9	21
10	[f(-2)=] -33
11	[x=] -7
12	[n=] 108
13	56
14	[x=] 3
15	4

	Answer
16	2[mph]
17	13500 [cu in]
18	[A + B =] 8
19	47
20	[x=] -7
21	6480 [sq in]
22	28
23	128
24	72
25	10 [values]
26	12 [points]
27	5 [seconds]
28	[A + B =] 5
29	42
30	6 [sq units]

	Answer
31	8 [positive integers]
32	8
33	8
34	144 [subsets]
35	27 [schools]
36	7 [solutions]
37	[A + B =] 10
38	[n=] 18
39	10
40	29

"Math Is Cool" Championships – 2021-22

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

Nov. 3, 2021

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

"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

Individual Multiple Choice Contest

1 A point P with coordinates (x, y) is reflected across the x-axis to point P'. Which of the following is the rule for this transformation?

A) $P(x,y) \rightarrow P'(x,y)$ B) $P(x,y) \rightarrow P'(-x,y)$ C) $P(x,y) \rightarrow P'(-x,-y)$
D) $P(x,y) \rightarrow P'(x,-y)$ E) Answer not given.

2 A carpenter has a board 72 inches long that must be cut into 10 pieces of equal length. Each cut causes a waste of $\frac{3}{16}$ of an inch of board. How many total inches of board will remain after the cuts have been made?

A) $70\frac{1}{4}$ B) $70\frac{5}{8}$ C) $70\frac{5}{16}$ D) $70\frac{1}{8}$ E) Answer not given.

3 Put the following numbers in order from smallest to largest: 42_7 , 37_8 , 11101_2

A) $42_7 < 37_8 < 11101_2$ B) $11101_2 < 42_7 < 37_8$ C) $42_7 < 11101_2 < 37_8$
D) $37_8 < 42_7 < 11101_2$ E) Answer not given.

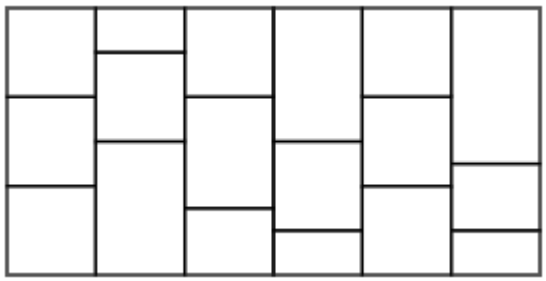
4 Pavarti has the following information about her box of "mixed chocolate" candies.

- There are 24 total candies.
- 9 of them contain both nuts and caramel.
- 8 of them contain neither nuts nor caramel.
- 13 candies in total contain caramel.

How many of the candies contain nuts, but no caramel?

A) 3 B) 5 C) 6 D) 7 E) Answer not given.

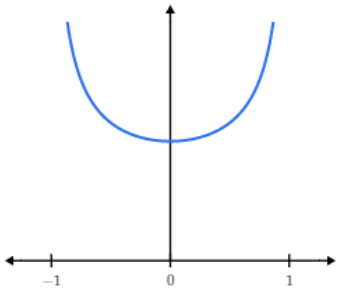
5 What is the minimum number of colors required to fill the regions of this graph so that no two adjacent (sharing the same border) regions are the same color?

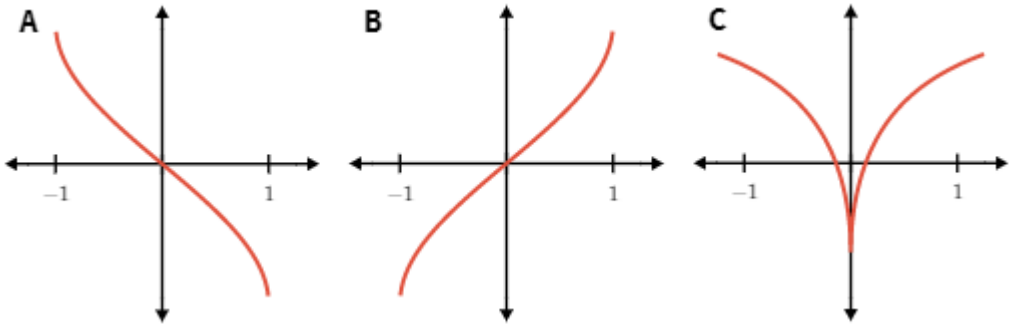


A) 3 B) 4 C) 5 D) 6 E) Answer not given.

Continued on next page.

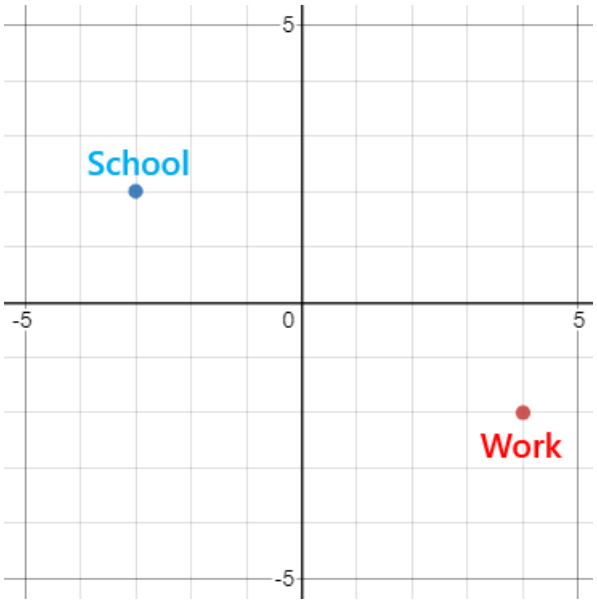
6 The following function may be the derivative of one of the functions shown below in graphs A, B or C. Which graph (if any) could it be the derivative of?





A) Graph A B) Graph B C) Graph C D) None of them. E) Answer not given.

7 In Calculusville, the streets follow a square grid, and all distances are measured in terms of vertical and horizontal units along these streets. For example, the distance from 'School' at (-3, 2) and the origin (0, 0) is 5 units, measured as 3 units over and 2 units down. Kazuma wants to live at exactly the same distance from both his work located at (4, -2) and his school located at (-3, 2). How many potential grid points with integer coordinates can he consider?



A) 1 B) 2 C) 4 D) 7 E) Answer not given.

Continued on next page.

8	Anthony and his family are riding the Seattle Great Wheel, which is a giant Ferris wheel at Pier 57 on Elliott Bay. Their vertical height H(t) (in meters) above the surface of Elliott Bay as a function of time t (in seconds) can be modeled with a sinusoidal expression of the form: a·cos(bt) + d At t = 0, when the Wheel starts moving, they are at a height of 5 m above the water surface of Elliot Bay, which is the lowest point of the ride. After 120 seconds, they reach the maximum height of 59 m. Which of the following is the correct function H(t)? A) $H(t) = 27 \cdot cos\left(\frac{\pi}{60}t\right) - 5$ B) $H(t) = 5 \cdot cos\left(\frac{\pi}{120}t\right) + 27$ C) $H(t) = -27 \cdot cos\left(\frac{\pi}{60}t\right) + 5$ D) $H(t) = -27 \cdot cos\left(\frac{\pi}{120}t\right) + 32$ E) Answer not given.
9	What is the domain of the following function? $$f(x) = log_{27}\left(log_9\left(log_3\left(log_{1/3}\, x\right)\right)\right)$$ A) $\left(0, \frac{1}{27}\right)$ B) $\left(0, \frac{1}{3}\right)$ C) $(0, 1)$ D) $(0, \infty)$E) Answer not given.
10	You have two beakers in chemistry lab, one that measures 75 milliliters and one that measures 90 milliliters. You can perform any of the following actions: • Completely fill a container from the tap. • Completely empty a container down the drain. • Pour a container into the other until it is completely full or the one pouring is completely empty. Your goal is to measure out exactly 32 milliliters of water. To accomplish this, you must start with some water in one of the containers. Which of the following amounts must you choose to start with? A) 2 ml B) 4 ml C) 6 ml D) 8 ml E) Answer not given.

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

"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

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

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

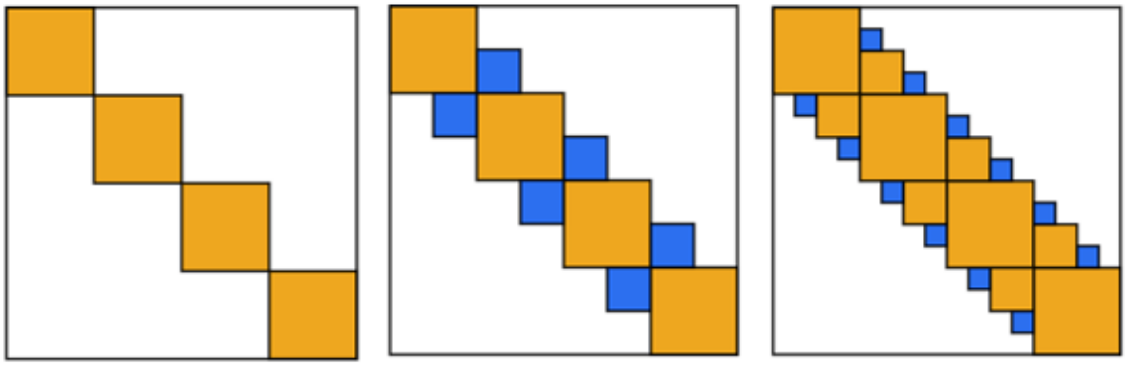
"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

Team Contest

1	If x = 5 and y = 3, calculate the value of: $(9x^4y^6)^{1/2}$
2	Nihal's job is to order food for a camp that has 250 campers attending the camp each week. Each camper eats 5/16 of a cup of gruel each week. Gruel comes in one gallon packages. What is the minimum number of one gallon packages Nihal will need to order for the 1st week of camp?
3	Rosa made a geometric solid called a tetrahedron by putting together 4 equilateral triangles with side lengths of 8 units. Find the volume of the tetrahedron in the form $\frac{a\sqrt{b}}{c}$, where $\sqrt{b}$ is a simplified radical and $\frac{a}{c}$ is a simplified fraction. What is the value of a + b + c?
4	One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd size had gone to the mountain slopes, and the remaining 15 camels from the herd stayed on the riverbank. How many camels are in the herd?
5	Hasan and Carli are playing the card game Slap Jack. They are playing a best-of-5 series, where they keep playing games until one person has won 3 games. There are no tie games. If the series lasts 5 games with Hasan winning, in how many different ways could the outcomes of the games occurred?
6	What digit is in the hundreds place of 5^{2021}?
7	What is the value of the following expression to the nearest integer? $\log_2(9) \cdot \log_3(125) \cdot \log_5(16)$
8	If three fair, six-sided dice are rolled, and the sum of the numbers rolled is even, the probability that all three numbers rolled were even can be written as a reduced fraction A/B. What is A + B ?

Continued on next page.

9	A fractal is created by starting with 4 identical squares, arranged along the diagonal of a larger square, as shown in Iteration 0. In Iteration 1, the corners between adjacent squares are filled with squares that have half the side length of the original four squares. The same method is used to create Iteration 2. If the pattern continues, the fraction of the larger square that is shaded after infinitely many iterations can be written as a reduced fraction A/B. What is A + B ?  Iteration 0 Iteration 1 Iteration 2
10	What is the minimum value of the function: $$f(x) = \left\lvert \frac{tan^2 x + 1}{sin^3 x \cos x} \right\rvert$$

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Key

Team Contest – Answer Key

11/12th Grade

	Answer
1	2025
2	5 [gallons]
3	133
4	36 [camels]
5	6
6	1
7	24
8	5
9	23
10	8

"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

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.

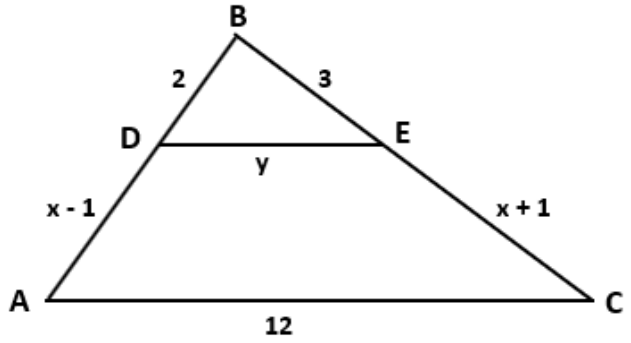
STUDENTS: DO NOT WRITE IN SHADED REGIONS

	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" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

Pressure Round Contest

1	In a jar of red, green, and yellow jelly beans, all but 6 are red jelly beans, all but 8 are green jelly beans, and all but 4 are yellow jelly beans. How many jelly beans are in the jar?
2	Row A in a certain section in a baseball stadium has 12 seats. Each row behind row A is labeled alphabetically (B, C, D, and so on) and has 6 more seats than the row immediately in front of it. How many total seats are in rows A through H of this section of the stadium?
3	The product symbol $\prod$ is used to express the product of a sequence of numbers. For example: $\prod_{k=1}^{2}(k+1) = (1+1)(2+1) = 6$ The following product can be written as A.B, where A is an integer (number of digits not specified), and B is the decimal portion of the number. Find A. $\prod_{k=2}^{2021} log_k(k+1)$
4	The surface of a cube of integer edge length 'x' is painted red and then cut into x^3 identical smaller cubes. If the number of small cubes that have no side painted and the number of small cubes that have one side painted are the same, what is the value of x?
5	In the following triangle, segment DE is parallel to segment AC. Find the product of x and y. 

"Math Is Cool" Championships — 2021-22

11/12th Grade — Nov. 3, 2021

Final Score *(out of 5)*

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

Pressure Round Score Sheet

Submittal # (order turned in)	1	2	3	4	5
Question #					
Proctor 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: write in question number for each submittal and circle the score. Add up total.

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Final Score *(out of 5)*

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

Pressure Round Score Sheet

Submittal # (order turned in)	1	2	3	4	5
Question #					
Proctor 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: write in question number for each submittal and circle the score. Add up total.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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 sum of the odd integers between 4 and 26?	165
2	What is 12 times the slope of the line with equation: $4x - 3y = -6$?	
3	If two fair six-sided dice are rolled, in how many ways can a sum of six be obtained?	
4	If f of x equals one-third x minus eight, what is f-inverse of -5?	
5	What is the sum of 32 base 4 and 13 base 4? Answer as a base 4 number, but do not include the base 4 in your response.	
6	What is the area of an ellipse with a major axis of twelve over pi and a minor axis of 2?	
7	What is the sum of the roots of the following equation: $x^3 + 5x^2 - 26x - 120 = 0$	5
8	I am dealt three cards from a standard 52-card deck. In how many ways can I get a three of a kind, that is, three cards of the same value? For example, three fives, or three Jacks, etc.	

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Key

Pressure Round Contest – Answer Key

11/12th Grade

	Answer
1	9 [jelly beans]
2	264 [seats]
3	[A =] 10
4	[x =] 8
5	20

In a jar of red, green, and yellow jelly beans, all but 6 are red jelly beans, all but 8 are green jelly beans, and all but 4 are yellow jelly beans. How many jelly beans are in the jar?

Row A in a certain section in a baseball stadium has 12 seats. Each row behind row A is labeled alphabetically (B, C, D, and so on) and has 6 more seats than the row immediately in front of it. How many total seats are in rows A through H of this section of the stadium?

The product symbol $\prod$ is used to express the product of a sequence of numbers. For example:

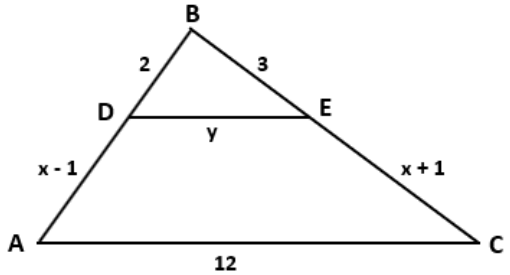
$$\prod_{k=1}^{2}(k+1) = (1+1)(2+1) = 6$$

The following product can be written as A.B, where A is an integer (number of digits not specified), and B is the decimal portion of the number. Find A.

$$\prod_{k=2}^{2021} log_k(k+1)$$

The surface of a cube of integer edge length 'x' is painted red and then cut into x^3 identical smaller cubes. If the number of small cubes that have no side painted and the number of small cubes that have one side painted are the same, what is the value of x?

In the following triangle, segment DE is parallel to segment AC. Find the product of x and y.



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Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	How many positive factors does 132 have?	12
2	What is the area of a rhombus with vertices at (8, 0), (14, -5), (8, -10) and (2, -5)?	60
3	Find the sum of the first twelve terms of the following arithmetic sequence: 8, 20, 32, …	888
4	Every day, Fatima saves a penny, a dime and a quarter. What is the least number of days required for her to save an amount equal to an integral (counting) number of dollars?	25
5	A game is played as follows. A single card is drawn from a standard 52-card deck. If the card is red or a King, the player wins $21. If the card is NOT red or a King, the player loses $18. What is the expected value of the game, in dollars?	3
6	Consider the set of numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. How many subsets of this set have more than two elements?	968
7	If the sum of two numbers is thirty, and the product is six, what is the sum of the reciprocals of the two numbers?	5
8	Six identical cookies are divided among three children. If each child gets at least one cookie, in how many ways can the cookies be distributed?	10
9	An ant farm starts with 50 ants. It doubles in size the first month, increases by 30 ants in the second month, and increases by 40% in the third month. How many ants are there after the third month?	182
10	What is the sum of the digits of 11 raised to the fourth power?	16

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Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	A square is inscribed in a circle of radius 4. What is the area of the square?	32
2	How many integers are between the cube root of 25 and the square root of 600?	22
3	A solid box is 8 inches by 11 inches by 12 inches and is made of 1-inch cubes. If the outside of the box is painted, how many unit cubes have exactly two of their faces painted?	100
4	A father has two children whose ages differ by 5 years. The sum of the squares of their ages is 97. The square of the father's age can be found by writing the squares of the children's ages one after the other as a four-digit number. How old is the father?	41
5	How many ways are there for a teacher to hand out one marker each to four different students, out of a set of 10 different colored markers?	5040
6	Three of the vertices of a cube are connected to form a triangle. The probability that all three vertices are on the same face of the cube can be written as a reduced fraction A/B. What is A + B?	10
7	The radius of a cylinder is increased by 40%, and the height of the cylinder is cut in half. What is the absolute value of the percent change in the volume of the cylinder?	2
8	What is the 2021st digit in the decimal expansion of 1/41?	0
9	A landscape maintenance service is spraying for weed control. Eight ounces of the chemical being used treats 500 square feet of lawn. How many ounces of the chemical will be needed for treating 3250 square feet of lawn?	52
10	The Mersenne numbers are generated by the formula M sub n equals 2 raised to the n (pause) minus 1, for n = 1, 2, 3, … What is the 12th Mersenne number?	4095

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Key

COLLEGE BOWL ROUND #3

#	Problem	Answer
1	What is the sum of the positive factors of 84?	224
2	A glass is three-fourths full of water, and one-eighth of the glass capacity is emptied to completely fill a 16 ounce container. How much water was originally in the first glass?	96
3	The mathematician Augustus De Morgan lived in the nineteenth century. It is claimed that he made the following statement: " I was 'x' years old in the year x^2 ". In what year was the mathematician born?	1806
4	Shonda can bike from home to work in 1.2 hours. By bus, the trip takes 0.4 hours. If the bus travels 20 miles per hour faster than Shonda rides her bike, how many miles is it from Shonda's home to work?	12
5	The weatherman has predicted a 30% chance of snow for each of the next three days. The probability that it will snow on at least one of the next three days can be written as a reduced fraction A/B. What is A + B?	1657
6	There are 15 points on a chalkboard numbered 1 through 15. How many lines must be drawn to connect every pair of points whose sum is odd, assuming each line connects only one pair of points?	56
7	An isosceles trapezoid has base angles of 60 degrees. The lengths of the bases are 5 and 21 units. What is the length of one of its diagonals?	19
8	When six gallons of gasoline are put into a car's tank, the indicator goes from $\frac{1}{4}$ of a tank to 5/8 of a tank. What is the total capacity of the gasoline tank in gallons?	16
9	What is the positive difference between the median and the mean of the following numbers: 19, 25, 20, 8, and 13?	2
10	What is the length of the space diagonal of a rectangular prism with sides of length 14, 5 and 2?	15

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Key

"Math Is Cool" Championships — 2021-22

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COLLEGE BOWL — EXTRA Qs

#	Problem	Answer
1	The decimal number 0.375 can be expressed as a reduced fraction A/B. What is A + B?	11
2	Find the largest solution to the following equation: $x^2-3x-28 = 0$	7
3	The line $3x + 4 = y$ is reflected over the y-axis to the line $ax + b = y$. What is the sum of a and b?	1
4	Anita rolls 2 identical fair n-sided dice, where $n > 5$, and the faces of the dice are numbered 1 through n. What is n, if the most probable sum of the numbers obtained is 17?	16
5	There are 50 unpaired socks in a sock drawer. Fifteen are pink, 15 are purple, and the rest are yellow. How many socks do you have to take out of the drawer to have guaranteed that at least one sock of each color was taken out?	36
6	What is the sum of the entries in a 4 by 4 identity matrix?	4

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.
- You will score the Pressure Round.
- 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	Team 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 furtively 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 (OTHEWISE 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 or draw a picture on the whiteboard 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:
  - 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., $\sqrt{2}$), 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