

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

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:*
 - *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., $\sqrt{2}$), where applicable.*
- *Units are not necessary as part of your answer. If you 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 $2 \cdot (\text{Sum of highest 3 Mental Math scores}) + 2 \cdot (\text{Avg. of Top 3 Ind. Multiple Choice}) + 6 \cdot (\text{Team}) + 2 \cdot (\text{Pressure}) + 1 \cdot (\text{College Bowl})$, for approximate weights of 25%, 20%, 30%, 15% and 10% respectively. Team ties are broken based on highest event score in order of the events, starting with Mental Math.

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

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

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

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

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

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

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

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	170	What is twenty-five percent of six hundred and eighty?
2	-24	What is the sum of the next three terms in the arithmetic sequence (pronounced air-ith-MET-ic) that begins as follows: Four, one, negative two, and so on.
3	240 [°]	In degrees, what is two times the measurement of an interior angle of a regular hexagon?
4	12 [= median]	What is the median of the first eleven positive composite integers?
5	25	What is the smallest two-digit positive integer that is equal to its units digit squared?
6	45 [= sum]	Dexter writes down seven consecutive positive integers. The sum of the smallest three is thirty-three. What is the sum of the largest three?
7	36 [%]	In the following sentence, if one letter is randomly selected, what is the probability as a percentage that it is a vowel? Loud wind shook the dark trees
8	14 [white marbles]	Caillou has fifty marbles, each of which is red, white or blue. The smallest number are red, and the largest number are blue. There are eleven times as many blue marbles as red ones. How many white marbles are there?

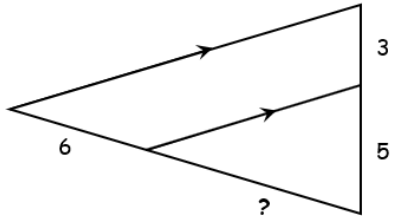
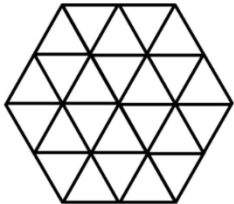
"Math Is Cool" Masters — 2025-26

October, 2025

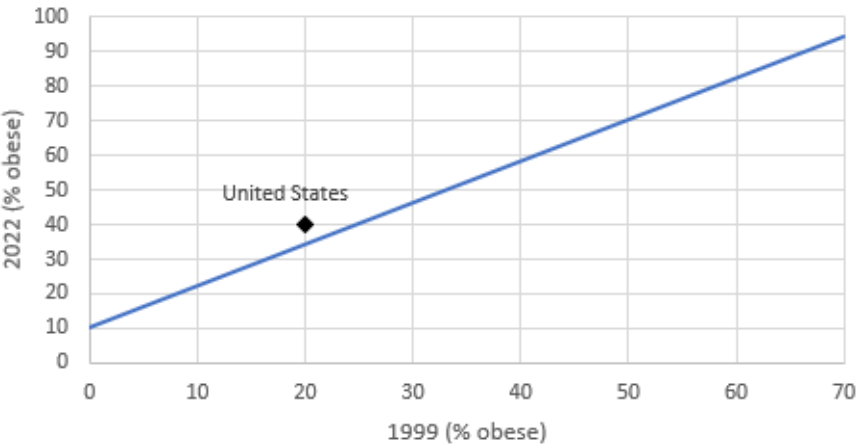
High School Individual Contest

35 minutes, 40 problems, ~92% of individual score.

A 5-minute time warning will be given.

Questions 1-30: 2 points each	
1	Solve for x: $-5\sqrt{x+1} + 12 = 2$
2	As an integer, what is the following quotient? $\frac{7.2 \times 10^2}{2.4 \times 10^{-2}}$
3	In degrees, what is the sum of all interior angles of a regular dodecagon (12 sides)?
4	An arithmetic series begins as follows. What is the sum of the first 12 terms? $3 + 7 + 11 + \dots$
5	The probability that any customer at Hot Mess Burgers will order a "Boring Mess" hamburger is 0.20. What is the probability as a percent that the next two customers will order a "Boring Mess"?
6	Five students (1, 2, 3, 4 & 5) were taking a math test. 1 finished before 2 but after 3. 4 finished before 5 but after 2. As a 5-digit integer, what was the finishing order from first to last?
7	How many of the positive integer factors of 2025 are less than 100?
8	The triangle contains two parallel lines as shown. In units, what is the length of the missing segment labeled with the question mark? 
9	What is the remainder when the following division is performed? $\frac{x^2 + 3x + 1}{x - 2}$
10	The number 2025_7 is equal to what number in base 10? You do not need to include the 'base 10' in your answer.
11	Bill and Eho collected $3\frac{1}{4}$ pound of candy together on Halloween. They split the candy evenly into 4 piles. How many ounces does each pile weigh?
12	The figure shown here is made up of congruent equilateral triangles. How many regular hexagons of any size are in the figure? 
Continued on next page.	

13	<p>The following dotplots show test scores for 2 classes, where all test scores are integer values. What is the positive difference between the median test scores for the 2 classes?</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Class 1 Test Scores</p> </div> <div style="text-align: center;"> <p>Class 2 Test Scores</p> </div> </div>	
14	A geometric sequence begins as follows. What is the 5 th term in the sequence? 64, 96, ...	
15	When the following number is fully simplified, it can be written as $\frac{\sqrt{A}}{B}$. What is B?	$\frac{\sqrt{6}}{2\sqrt{8}}$
16	What is the smallest positive odd integer 'n' such that $n^3 + 2$ is not a prime number?	
17	The three angles of a triangle have the following measures in degrees: $(7x + 25)$, $(5x + 18)$, and $(3x - 13)$. In degrees, what is the measure of the largest angle in the triangle?	
18	What is the smallest integer that is a solution to the following inequality? $-3(2x + 1) < 21$	
19	A game consists of flipping a fair coin and rolling a single 5-sided die (numbered 1 through 5). The player wins if the coin flip lands on heads or if the die shows a 5 (or both). What is the probability in percent of winning the game?	
20	Find the sum of all real solutions to the following equation: $x^2 - 4x = -6 + x$	
21	Gibson told Leon that he had 9 coins worth 45 cents. Leon mentioned that there was more than one possibility, and asked how many pennies Gibson had. After Gibson answered, Leon said that he knew exactly which coins Gibson had. How many nickels did Gibson have?	
22	Evaluate: $(3125)^{\frac{3}{5}} \times (729)^{\frac{5}{6}}$	
23	For angle measurements between 0° and 2000° , inclusive, how many angles have a tangent value equal to -1?	
24	How many ways are there to color the following diagram choosing from red, blue, green and yellow, such that each section is colored a solid color, and no two neighboring sections have the same color? A neighboring section is one that shares a boundary line or curve with another section.	
Continued on next page.		

25	Using a shift cipher, the word MATH is encoded as SGZN. As an integer, what does the following code represent? UTK NATJXKJ LOLZE-LUAX
26	Nineteen consecutive integers have a sum of 38. What is the median of the nineteen integers?
27	In Unluckyland, clocks are consecutively numbered 1 through 13 instead of 1 through 12. A jumping spider starts on number 1. It jumps one position to 2, then two positions to 4, three positions to 7, two positions to 9, and one position to 10. The spider continues jumping clockwise around the face following this 5-jump (1, 2, 3, 2, 1) pattern. What number does the spider land on after its 2025 th jump?
28	A regular octagon has multiple diagonals of varying lengths. What percent of the total diagonals have the longest possible length?
29	<p>The prevalence of obesity in 199 countries of the world in 2022 as a function of their prevalence in 1992 can be modeled with the following linear regression equation.</p> $\text{Predicted 2022 Obesity} = 1.2(\text{Actual 1992 Obesity}) + 10.3$ <p>The Obesity variables are given as a percentage of the country's adult population.</p> <p>The United States has the following actual data point: (20.0%, 40.3%). As an integer percent, what is the residual for this point?</p> <p style="text-align: center;">Prevalence of Obesity in 2022 vs. 1992</p> 
30	If $\log_a x = 4$, $\log_a y = 6$, and $\log_a z = 7$, what is the value of $\log_a \frac{x^2 z^2}{y^3}$?
Challenge Questions: 3 points each	
31	A right triangle has integral side lengths and an area of 84 square units. In units, what is the length of the hypotenuse?
32	When a certain positive integer is divided by 24, the remainder of that division has a remainder of 2 when divided by 6. What is the sum of all possible values of this integer that are less than 25?
Continued on next page.	

33	The mean age of a group consisting of assistant professors and full professors is 40 years. The mean age of the assistant professors is 35 years, and the mean age of the full professors is fifty years. How many associate professors are there for each full professor?
34	A standard 6-sided die is rolled three times. The probability that a two is rolled at least once, given that the third roll equals the sum of the first two rolls, can be written as a simplified fraction A/B . What is $A + B$?
35	Each side of a square is subdivided into 11 segments of equal length. How many different triangles can be created by selecting 3 of these points of subdivision as the vertices (excluding the corners of the square)? Count all triangles that have a unique set of three vertices.
36	A pyramid has a square base 6 meters on a side and a height of 9 meters. In cubic meters, what is the volume of the portion of the pyramid that lies beneath a plane which is parallel to its base, and which is 3 meters above the base?
37	Find the sum of the x-intercepts of the graph of the following equation: $y = x - 54 - 32 $
38	Two arithmetic integer sequences have their corresponding terms multiplied together to form a third sequence, which starts as follows: 468, 462, 382, ... What is the next term of this third sequence?
39	How many different right triangles can be created by connecting three vertices of a regular tetradecagon (14 sides)? Count all right triangles that use three different vertices.
40	Biff and Eho each run at a constant speed around a track. They both start at the same time in the same location, and run in the same direction. Eho is running faster than Biff. Eho takes 3 minutes to cover one lap, and he overtakes Biff for the first time after 8 minutes. How many seconds does it take Biff to run one lap?
IF taking Pre-Calculus or Calculus, continue to Questions 41 - 45	
41	On the coordinate plane, consider the area that lies within the square boundary formed by the points (10, 10), (10, -10), (-10, -10), and (-10, 10). Within this area, there are a total of 400 unit squares, where each unit square has integer grid points (x, y). When the following function is plotted, how many of these unit squares within the boundary does it pass through? $f(x) = e^x - 1$
42	Given the following matrices, perform the following operation: $3B - 2AC$ What is the sum of all elements in the matrix that results from the operation? $A = \begin{bmatrix} 3 & 2 & 0 \\ -1 & 4 & -6 \end{bmatrix}$ $B = \begin{bmatrix} 5 & -2 \\ 1 & 3 \end{bmatrix}$ $C = \begin{bmatrix} 2 & 0 \\ -1 & 6 \\ -3 & 7 \end{bmatrix}$

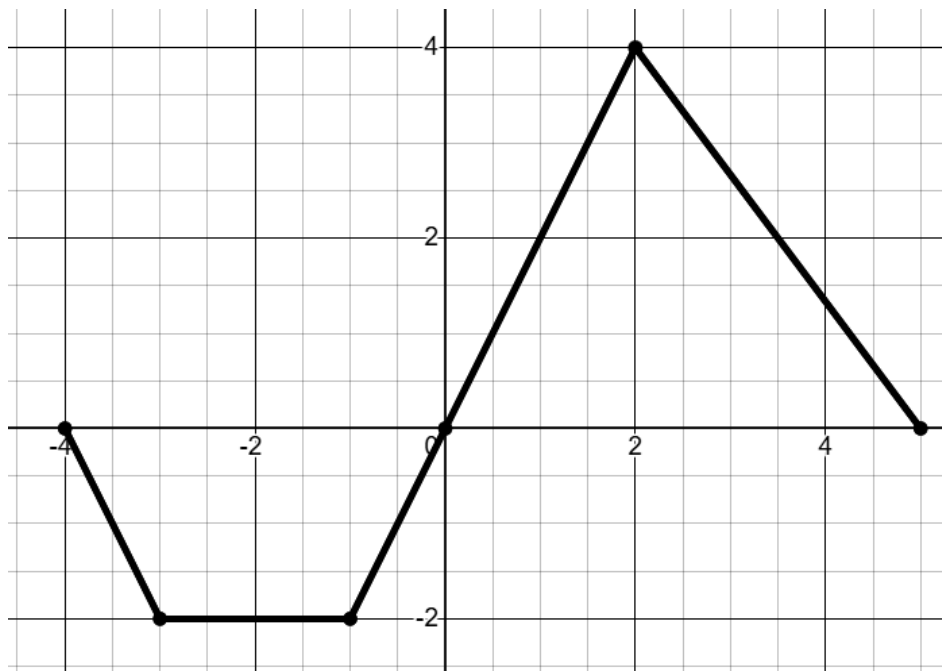
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43

The following graph shows the function $f(x)$. Define $g(x)$ as follows:

$$g(x) = -\frac{1}{2}f(x-1) + 3$$

Find the value of $g(-2)$.



44

Solve for x : $e^{\ln 2x} - 1 = 13$

45

The following function $f(x)$ has an inverse. For $a = 3$, find the value of $(f^{-1})'(a)$.

$$f(x) = \frac{x+6}{x-2}, x > 2$$

"Math Is Cool" Masters - 2025-26

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	3 [= x]
2	30000
3	1800 [°]
4	300 [= sum]
5	4 [%]
6	31245 [is the finishing order]
7	10 [factors]
8	10 [units]
9	11 [= remainder]
10	705 [base 10]
11	13 [ounces]
12	8 [regular hexagons]
13	3 [= positive difference in medians]
14	324 [= 5 th term]
15	4 [= B]

	Answer
16	7 [= n]
17	95 [°]
18	-3
19	60 [%]
20	5 [= sum of solutions=]
21	9 [nickels]
22	30375
23	11 [angles]
24	144 [ways]
25	154
26	2 [= median]
27	6
28	20 [%]
29	6 [%]
30	$4 [= \log_a \frac{x^2 z^2}{y^3}]$

	Answer
31	25 [units]
32	44
33	2 [associate professors]
34	23 [= A + B]
35	9400 [triangles]
36	76 [m ³]
37	108 [= sum]
38	228 [= next term]
39	84 [right triangles]
40	288 [seconds]
41	22 [unit squares]
42	1
43	4 [= g(-2)]
44	7 [=x]
45	$-2 [(f^{-1})'(a)] [(f^{-1})'(3)]$

"Math Is Cool" Masters - 2025-26

Total Correct (all columns)

Room #

SCHOOL NAME

STUDENT NAME

Team #

Individual Contest - Score Sheet

STUDENTS: DO NOT WRITE IN SHADED REGIONS

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

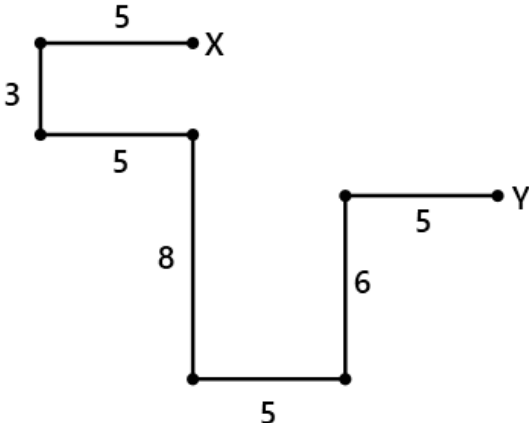
	Answer	1 or 0	1 or 0
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
31-45 TOTAL:			

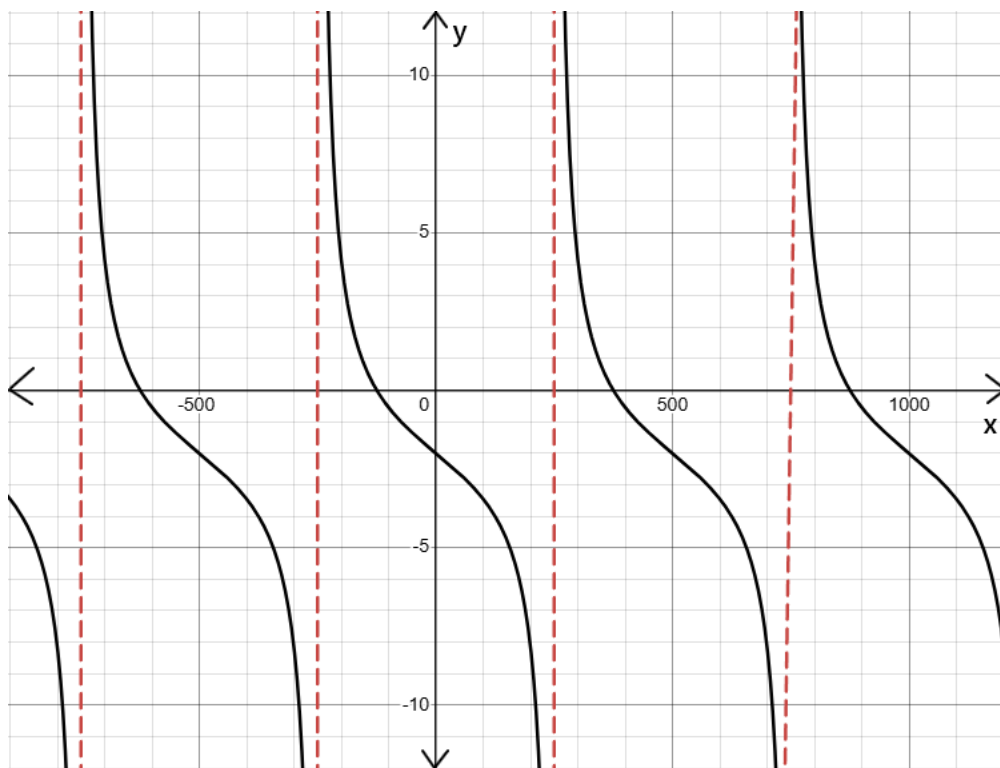
"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Individual Multiple Choice Contest

1	<p>Which of the following intervals contains all of the real zeros of the following function?</p> $f(x) = 2x^3 - 3x^2 + x$ <p>A) $(\frac{1}{4}, 2)$ B) $[-1, \frac{1}{4}]$ C) $[1, 2]$ D) $(-2, 1)$ E) None of the above.</p>
2	<p>All of the line segments shown here are vertical or horizontal, with their lengths in units indicated. What is the diagonal (shortest) distance from point X to point Y?</p>  <p>A) $\sqrt{210}$ units B) $\sqrt{255}$ units C) $4\sqrt{15}$ units D) $5\sqrt{5}$ units E) None of the above.</p>
3	<p>Which of the following is a formula for the n^{th} term of the sequence that begins as follows? The first term corresponds to $n = 1$.</p> <p>48, 12, 3, ...</p> <p>A) $a_n = 192\left(\frac{1}{4}\right)^{n-1}$ B) $a_n = 192\left(\frac{1}{4}\right)^{1-n}$ C) $a_n = 48\left(\frac{1}{4}\right)^{n-1}$ D) $a_n = 48\left(\frac{1}{4}\right)^{1-n}$ E) None of the above.</p>
Continued on next page.	

4 Which of the following equations corresponds to the graph shown here?



- A) $y = -2 \tan\left(\frac{\pi}{1000}x\right) - 2$ B) $y = -2 \tan\left(\frac{\pi}{500}x\right) - 2$
 C) $y = 2 \tan\left(\frac{\pi}{1000}x\right) - 2$ D) $y = -2 \tan\left(\frac{\pi}{500}x\right) + 2$
 E) None of the above.

5 Let W be the set of natural numbers n such that n is the sum of the squares of three consecutive positive integers. Which of the following statements must be true?

- A) All elements of W are even.
 B) No element of W is divisible by 3.
 C) No element of W is divisible by 5.
 D) No element of W is divisible by 11.
 E) All elements of W are odd.

6 A hospital wing has 8 rooms on one side of the hallway and 5 rooms on the other side. A nurse randomly chooses one room to start in, then he randomly chooses a second and a third room to visit, for a total of 3 different rooms. What is the probability that the nurse crosses to the other side of the hallway at least once?

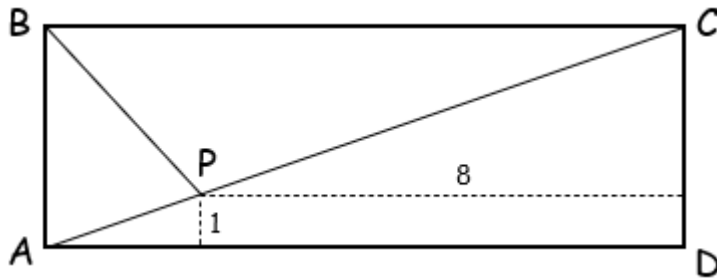
- A) $\frac{7}{11}$ B) $\frac{8}{15}$ C) $\frac{9}{14}$ D) $\frac{10}{13}$ E) Answer not given.

7 If $\cos \theta = \frac{5}{13}$ and $\tan \theta < 0$, what is the value of $\sin 2\theta$?

- A) $-\frac{5}{13}$ B) $\frac{12}{13}$ C) $-\frac{12}{13}$ D) $-\frac{120}{169}$ E) None of the above.

Continued on next page.

- 8 In rectangle $ABCD$, the angle bisector at B intersects the diagonal AC at point P . The perpendicular distance from P to CD is 8, and the perpendicular distance from P to AD is 1. What is the length of side AD ?



- A) $8 + 2\sqrt{2}$ B) $11 - \sqrt{2}$ C) $11 + \frac{\sqrt{2}}{2}$ D) 10 E) None of the above.

- 9 Packard wrote a program for a computer science assignment. The program takes two real numbers, X and Y , as input. The program triples X , then squares the result, then subtracts nine times X . This value is called A . Second, the program squares Y , then increases that value by four times Y . This value is called B . The program outputs the sum of A and B .

What is the minimum possible output value for $A + B$?

- A) -4 B) 2 C) $\frac{9}{4}$ D) $-\frac{25}{4}$ E) None of the above.

- 10 The number $\frac{1}{50^{2025}}$ is a terminating decimal. What is the last non-zero digit in the decimal representation of this number?

- A) 2 B) 4 C) 6 D) 8 E) None of the above.

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

Individual Multiple Choice Contest – Answer Key

11/12th Grade

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

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

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Final Score (out of 20)

Room #

School Name

Student Name

Team #

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

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.**

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

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Team Contest

1	Consider the addition problem: $8 + 88 + 888 + 8888 + \dots + 88888888888888888888$ (20-digit number) What digit is in the hundreds place of the sum?
2	Angle A of triangle ABC measures 60° , and angles B and C are in a ratio of 2 to 3, respectively. Point Q is the intersection of the angle bisectors of triangle ABC. Find the measure of angle AQB in degrees.
3	Solve the following equation for x: $\log_2(\log_2 x) = 2$
4	All non-empty subsets of the following set are selected. How many different sums do the elements of each of these subsets add to? $\{1, 3, 4, 6\}$
5	The digits one through nine are represented by nine different symbols in the equations below. Each symbol represents the same number throughout. If $\diamondsuit = 3$, what is the value of \odot ? $\odot - \diamondsuit = \yin yang \quad \blacksquare + \frown = *$ $\smile \times \blacklozenge = \star \quad \yin yang \div \diamondsuit = \blacklozenge$ $\odot = ?$
6	The United States Senate Committee on Indian Affairs has 11 total members, six of whom are Republicans, and five are Democrats (including Senator Maria Cantwell from WA). If four members are randomly chosen from the committee, the probability that two Republicans and two Democrats are selected can be written as a simplified fraction A/B . What is $A + B$?
7	If $f(x) = x^2 - x + 4$, find the sum of all x values satisfying: $f(x - 3) = 34$.
8	How many 3-digit positive integers have one digit that is equal to the mean of the other two?

Continued on next page.

9 Distribute the digits 1 - 9 in the following 9 boxes, using each number exactly once, and placing one digit per box. Distribute the digits according to the following rules.

What is the sum of the digits in the boxes that have an asterisk in the upper corner?

1. The boxes containing the 1 and 2 and all boxes between them add up to 12.
2. The boxes containing the 2 and 3 and all boxes between them add up to 23.
3. The boxes containing the 3 and 4 and all boxes between them add up to 34.
4. The boxes containing the 4 and 5 and all boxes between them add up to 45.

*		*		*		*		*

10 A 6-digit integer of the form $x2y308$ is divisible by 33, where x and y represent single (not necessarily unique) digits. How many unique solutions are there for the number?

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

Team Contest - Answer Key

11/12th Grade

Answer	
1	0
2	126 [°]
3	16 [= x]
4	12 [distinct sums]
5	7 [= 😊] [= smiley face]
6	16 [= A + B]
7	7 [= sum of x values]
8	121 [3-digit integers]
9	15 [= sum]
10	2 [solutions]

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Final Score (out of 10)

Room #

School Name

Team #

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

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.

STUDENTS: DO NOT WRITE IN SHADED REGIONS

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

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Pressure Round Contest - Cover Sheet

DO NOT LOOK BEYOND
THIS SHEET UNTIL THE
PROCTOR SAYS 'GO'!

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

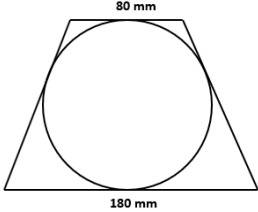
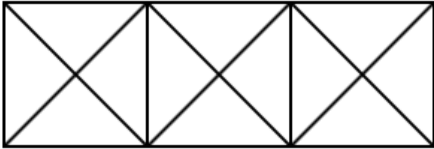
Pressure Round Contest - Cover Sheet

DO NOT LOOK BEYOND
THIS SHEET UNTIL THE
PROCTOR SAYS 'GO'!

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

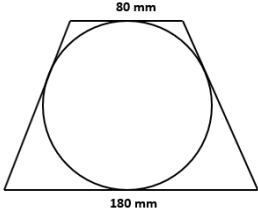
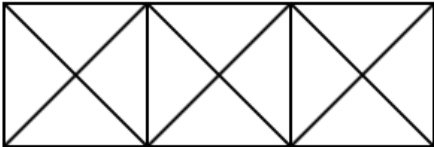
Pressure Round Contest

1	An isosceles trapezoid has bases measuring 80 mm and 180 mm. There is a circle inscribed in the trapezoid. In mm, what is the diameter of the circle?	
2	Biff and Eho want to fill their raised garden bed with soil. The garden is 4 feet long, 5 feet 6 inches wide, and 9 inches deep. The soil can be purchased in full bags of 1.75 cubic feet of soil. How many total bags will they need to purchase?	
3	Ten consecutive integers, each greater than 6 billion, are each raised to the 5 th power. These powers are added together. What is the units digit of the sum?	
4	Counting up from 1, the sequence 8, 9, 10 is the first occurrence of three positive consecutive integers that are composite. What is the smallest integer in the third occurrence of five positive consecutive integers that are composite?	
5	The figure shown here includes three unit squares and their diagonals. How many total squares and triangles of any size are included in the figure?	

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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.

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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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Submittal #	for Question #	Answer
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11/12th Grade — October, 2025

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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).

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Room #

School Name

Team #

Pressure Round Answer Submittal

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

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11/12th Grade — October, 2025

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).

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Room #

School Name

Team #

Pressure Round Answer Submittal

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

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11/12th Grade — October, 2025

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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School Name

Team #

Pressure Round Answer Submittal

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

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11/12th Grade — October, 2025

Room #

School Name

Team #

Pressure Round Answer Submittal

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

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Write the question number being answered and the associated answer (or a blank).

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School Name

Team #

Pressure Round Answer Submittal

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

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11/12th Grade — October, 2025

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 twenty-five percent of six hundred and eighty?	
2	What is the sum of the next three terms in the arithmetic sequence (pronounced air-ith-MET-ic) that begins as follows: Four, one, negative two, and so on.	
3	In degrees, what is two times the measurement of an interior angle of a regular hexagon?	
4	What is the median of the first eleven positive composite integers?	
5	What is the smallest two-digit positive integer that is equal to its units digit squared?	
6	Dexter writes down seven consecutive positive integers. The sum of the smallest three is thirty-three. What is the sum of the largest three?	
7	In the following sentence, if one letter is randomly selected, what is the probability as a percentage that it is a vowel? Loud wind shook the dark trees	
8	Caillou has fifty marbles, each of which is red, white or blue. The smallest number are red, and the largest number are blue. There are eleven times as many blue marbles as red ones. How many white marbles are there?	

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

Pressure Round Contest - Answer Key

11/12th Grade

Answer	
1	120 [mm]
2	10 [bags]
3	5 [= sum]
4	48 [= smallest integer]
5	33 [total squares and triangles]

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #1

#	Problem	Answer
1	Rectangles Q and R are similar. Q has a length of five and R has a length of four. If the area of rectangle R is six point four, what is the area of rectangle Q?	10 [= area of Q]
2	What is the largest perfect square less than five hundred that does not contain any digits greater than three.	121
3	Ryan's sock drawer contains eighteen white socks and eighteen red socks. What is the smallest number of socks that can be randomly selected to guarantee a matching pair of each color?	20 [socks]
4	Two years ago Biff was three times as old as Eho. In three years, Biff will be twice as old as Eho. How many years old is Eho now?	7 [years]
5	A fair coin is tossed four times. The probability that there are more heads than tails can be written as the simplified fraction A over B. What is A + B?	21 [= A + B]
6	How many points in the coordinate plane with positive integer coordinates x and y satisfy the following inequality: x plus y is less than or equal to five	10 [points]
7	How many five digit positive integers are there which only use the digits one, two and three, and in which consecutive digits always have a difference of one?	12 [integers]
8	How many x-intercepts does the following equation have? Y equals two x to the fourth minus eight x cubed plus eight x squared	2 [x intercepts]
9	The second term of an arithmetic (air-ith-MET-ic) sequence is negative one, and the tenth term is twenty-three. What is the common difference for the sequence?	3 [= d] [= common difference]
10	What is sixty divided by one-half plus ten?	130

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #2

#	Problem	Answer
1	Find the median of the following data set: Forty-eight, sixteen, eight, six, thirty-seven, twenty	18 [= median]
2	The following points form a parallelogram on the coordinate plane. In units, what is the perimeter of the parallelogram? Six comma one, nine comma five, one comma five, negative two comma 1	26 [units] [= perimeter]
3	Three numbers, when added two at a time, give the sums of ten, fourteen and eighteen. What is the largest of the three numbers?	11 [= largest]
4	What is the base ten number seventeen in base two?	10001 [base 2]
5	A spinner is split into six equal sections, with five of them numbered two, four, six, seven and fifteen. What is the smallest positive integer greater than one that could be added to the sixth section that will make it more likely for a random spin to land on an odd number rather than a prime number?	9
6	If x factorial divided by six factorial equals seven factorial, what is the value of x ?	10 [= x]
7	A hen and a half can lay an egg and a half in a day and a half. At this rate, how many eggs will six hens lay in six days?	24 [eggs]
8	The squares of two positive integers sum to one hundred. What is the product of the two integers?	48 [= product]
9	Yanett is ranked ninth from the top and thirty-eighth from the bottom in her class. How many students are in the class?	46 [students]
10	There are eight kids in the Adler family, each born two years apart. If the oldest Adler child is twenty-three, how many years old is the youngest Adler child?	9 [years]

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11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #3

#	Problem	Answer
1	Three friends eat a share size package of m&ms which contains one hundred twenty candies. Felipe eats half of the candies, Oksana eats one-third and Buffy eats one-tenth. How many m&ms are left?	8 [m&ms]
2	What is the area in square feet of a triangle with side lengths of five feet, five feet and eight feet?	12 [sq ft]
3	An eight-sided die, numbered one through eight, is rolled. What is the probability as a percent that the number showing is a prime number?	50 [%]
4	A sequence of shapes starts as follows, and then repeats itself indefinitely. How many sides does the two thousand twenty-fifth shape have? Triangle, pentagon, hexagon, square, octagon, trapezoid, and so on.	6 [sides]
5	Ben takes two hours to wash five hundred dishes, and Jerry takes three hours to wash four hundred fifty dishes. How many minutes will it take them working together to wash one thousand dishes?	150 [minutes]
6	Which digit, from zero to nine, appears least frequently when the integers from one to one thousand inclusive are written out?	0
7	A biased coin has a probability of flipping two heads in a row of zero point one six. On a single flip, what is the probability as a percentage of flipping a tail?	60 [%]
8	If f of x equals three x plus 2, find the value of: f of f of three	35
9	What is the sum in degrees of the interior angles of a regular pentagon?	540 [°]
10	Solve for x in the following equation: Eight raised to the four x equals sixteen raised to the quantity two x minus 1	-1 [= x]

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #4

#	Problem	Answer
1	Two space objects are traveling directly towards each other, one at nine thousand miles per hour and one at twenty-one thousand miles per hour. How many miles apart are they one minute before they collide?	500 [miles]
2	An integer from one to twenty inclusive is randomly selected. What is the probability as a percent that it is a perfect square or a perfect cube?	25 [%]
3	A rectangle has a perimeter of twenty-four inches. The length is twice the width. What is the area of the rectangle in square inches?	32 [sq inches]
4	How many digits are in the result when two raised to the twenty-one is multiplied by five raised to the seventeen?	19 [digits]
5	The area of circle P is sixty-four percent of the area of circle Q. The radius of circle Q is what percentage of the radius of circle P?	125 [%]
6	Composite deck planks are available in six, eight or ten foot lengths. Placed end to end, how many different lengths can be achieved using exactly three planks?	7 [different lengths]
7	The first term in a sequence is thirty-four. Each subsequent term is generated by adding eighteen to the product of the digits in the previous term. What is the fifth term?	30 [= fifth term]
8	What is the least common multiple of twenty, thirty-six and forty-two?	1260 [= LCM]
9	Brent bought a calculator and a backpack for one hundred and five dollars. The backpack cost sixty-five dollars more than the calculator. How many dollars did the backpack cost?	85 [\$]
10	Mary lights a candle every ten minutes. Each candle burns for exactly forty minutes. How many candles are burning exactly fifty-five minutes after Mary lit the first candle?	4 [candles]

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #5

#	Problem	Answer
1	What is one thousand plus forty plus one thousand plus thirty plus one thousand plus twenty plus one thousand plus one?	4091
2	Cookie added the lengths of three sides of a rectangle and got forty-four centimeters. Ron also added the lengths of three sides of the same rectangle and got forty centimeters. In centimeters, what is the perimeter of the rectangle?	56 [cm]
3	What is the degree of the following polynomial: In parentheses (pause) x to the fifth plus x squared end parentheses (pause) raised to the seventh	35 [= degree]
4	The first term in a geometric sequence is three-fourths, and the fourth term is six. What is the third term?	3 [= 3 rd term]
5	How many different integers between one and one hundred contain the digits two or eight or both?	36 [integers]
6	If the sum of two prime numbers is ninety-nine, what is the product of the two prime numbers?	194 [= product]
7	Two whole numbers are chosen at random. As a percent, what is the probability that their product is even?	75 [%]
8	A three digit whole number has three distinct digits. The tens digit is four times the units digit, and the hundreds digit is three less than the tens digit. What is the number?	582 [is the number]
9	One thousand seven hundred fifty dollars will be split between two people in the ratio of three to four. How many more dollars does one person get than the other?	250 [\$]
10	A three hundred foot train going three hundred feet per minute travels through a tunnel that is three hundred feet long. How many seconds will it take the entire train to travel through the tunnel?	120 [seconds]

"Math Is Cool" Masters — 2025-26

11/12th Grade — October, 2025

Key

COLLEGE BOWL ROUND #6

#	Problem	Answer
1	Gumballs cost twelve cents per dozen. How many gumballs can you get for one dollar?	100 [gumballs]
2	Zach put half of his money into the stock market, half of that amount into bonds, and one-sixth of his money into his savings account. He kept one thousand dollars in cash. How many dollars does Zach have in total?	12000 { \$ }
3	The two legs of a right triangle measure twelve centimeters and sixteen centimeters. In centimeters, what is the measure of the hypotenuse?	20 [cm]
4	In Ana's English class of twenty-five students, seventeen of them take Algebra and twenty-one of them take Spanish. Fifteen students take both Algebra and Spanish. If one student is chosen randomly, what is the probability in percent that they take Algebra or Spanish?	92 [%]
5	The product of the circumference and the diameter of a circle is one. What is eight times the area of the circle?	2 [= 8 times area]
6	A sequence of numbers begins with one, negative one, negative one. From the third term on, each subsequent term is equal to the product of the two preceding terms. What is the sum of the first one hundred terms?	-32 [= sum]
7	How many positive three digit integers can be written using no zeros and at least one five?	217 [integers]
8	What is the mean of the following data set: Sixty-six, One hundred and seven, eighty-four, One hundred and eighty, One hundred and twenty-eight	113 [= mean=]
9	How many seconds are in two days?	172,800 [seconds]
10	The digits one, three, four and eight are each used once to form the smallest possible odd four-digit integer. What digit is in the tens place?	8

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11/12th Grade — October, 2025

Key

COLLEGE BOWL — EXTRA Questions

#	Problem	Answer
1	In the finishing order of a race, there are twice as many runners behind Charles as there are before David, and one and a half times as many behind David as before Charles. Charles finished in twenty-first place. How many runners finished the race?	41 [runners]
2	If the mean of five numbers is twenty-seven, what is the sum of the five numbers?	135 [= the sum]
3	What is the smallest positive integer value of x for which fifty-four times x is a perfect square?	6 [= x]
4	Using a value of three to approximate pi, what is the surface area in square centimeters of a sphere with a diameter of eleven centimeters?	363 [cm^2]
5	What is the cube root of negative one thousand seven hundred twenty-eight?	-12 [= cube root]
6	A raffle has two hundred free tickets. One ticket will win a one-hundred seventy dollar prize. The remaining tickets will win nothing. If you have one ticket, what is your expected winnings in cents?	85 [cents]
7	The hexadecimal number D three is equal to what base ten number?	211 [base 10]
8	Biff buys a sandwich that costs twelve dollars and twenty-five cents, and pays thirteen dollars and twenty-three cents total with the tax. As a percentage, what was the tax rate?	8 [%]
9	What is the area in square centimeters of a square with a perimeter of one hundred eighty-eight centimeters?	2209 [sq cm]
10	The function f of x equals the quantity two x minus five divided by the quantity x plus one. What is f inverse of three?	-8 [= f inverse of 3]