"Math is Cool" Masters – 2016-17

December 10, 2016

Total Correct: KEY

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

Algebra 2 - Individual Contest – Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	-5		
2	14/9		
3	47		
4	$y = -\frac{2}{3}x - 4$		
5	-12		
6	$[N =]$ 9		
7	1260		
8	83		
9	8,191		
10	200		
11	3		
12	997		
13	33[°]		
14	16 [sides]		
15	16		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	386		
17	30 [diagonals]		
18	$\frac{48}{625}$ or 0.0768 or 7.68%		
19	-3		
20	$(65, -26)$		
21	486		
22	$6\sqrt{2}$		
23	2		
24	432π [m^3]		
25	1,068		
26	60 [3's]		
27	960 [ways]		
28	(5,-3)		
29	(1,3]		
30	$\frac{73}{441}$		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	61		
32	1716 [ways]		
33	[$] 3.50		
34	$(96, 94)$		
35	937.5 [L]		
36	10,816		
37	$BADC$		
38	1/48		
39	11		
40	[$] 21,000		
31-40 TOTAL:			

ALGEBRA 2

Total Correct:

"Math is Cool" Masters – 2016-17

December 10, 2016

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

Algebra 2 - Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
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7			
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10			
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14			
15			
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16			
17			
18			
19			
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26			
27			
28			
29			
30			
16-30 TOTAL:			

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

ALGEBRA 2

"Math is Cool" Masters – 2016-17

December 10, 2016

Total Correct: KEY

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

PRE-CALCULUS - Individual Contest – Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	-5		
2	14/9		
3	47		
4	$y = -\frac{2}{3}x - 4$		
5	-12		
6	$[N =]$ 9		
7	1260		
8	83		
9	8,191		
10	200		
11	3		
12	997		
13	33[°]		
14	5/9		
15	16		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	386		
17	30 [diagonals]		
18	$\frac{48}{625}$ or 0.0768 or 7.68%		
19	-3		
20	$(65, -26)$		
21	486		
22	$\frac{1}{\sqrt[3]{x}}$ or $x^{-\frac{1}{3}}$		
23	$\frac{\sqrt{3}}{3}$		
24	432π [m^3]		
25	1,068		
26	23 [stamps]		
27	960 [ways]		
28	(5,-3)		
29	(1,3]		
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16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	61		
32	1716 [ways]		
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35	937.5 [L]		
36	10,816		
37	$BADC$		
38	5		
39	11		
40	[$] 21,000		
31-40 TOTAL:			

PRE-CALCULUS

Total Correct:

"Math is Cool" Masters – 2016-17

December 10, 2016

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

PRE-CALCULUS - Individual Contest – Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
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10			
11			
12			
13			
14			
15			
1-15 TOTAL:			

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19			
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24			
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27			
28			
29			
30			
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31			
32			
33			
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36			
37			
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40			
31-40 TOTAL:			

PRE-CALCULUS

"Math is Cool" Masters – 2016-17

December 10, 2016

Total Correct: KEY

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

CALCULUS - Individual Contest – Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	-5		
2	14/9		
3	47		
4	$y = -8x - 2$		
5	-12		
6	$[N =]$ 9		
7	15/16		
8	83		
9	8,191		
10	200		
11	3		
12	997		
13	33[°]		
14	5/9		
15	16		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
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17	30 [diagonals]		
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35	937.5 [L]		
36	$\frac{40}{39}$		
37	$BADC$		
38	5		
39	2, 5		
40	[$] 21,000		
31-40 TOTAL:			

CALCULUS

Total Correct:

"Math is Cool" Masters – 2016-17

December 10, 2016

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28			
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30			
16-30 TOTAL:			

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

CALCULUS

"Math is Cool" Masters – 2016-17

Sponsored by:

December 10, 2016

High School Mental Math Contest

Follow along as your proctor reads these instructions to you. Your Mental Math score sheet is on the back.

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by <u>all</u> involved, both competitors and observers. Display of poor sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise, all rational, non-integer answers need to be expressed as reduced common fractions except in case problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the neares hundredth (ie, to the nearest cent).*
- *All radicals must be simplified and all denominators must be rationalized.*
- *Units are not necessary as part of your answer unless it is a problem that deals with time and in that case, a.m. or p.m. is required. However, if you choose to use units, they must be correct.*
- *Leave all answers in terms of π where applicable.*
- *Do not round any answers unless stated otherwise.*
- *Record all answers on the colored cover sheets in the answer column only.*
- *Make sure all answer sheets have all the information (name, team number, etc.) at the top of the sheet filled out.*
- *Tests will be scored as a 0 if answers are not recorded on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will be scored as a 0.*

<u>Mental Math</u> – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

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/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

"Math is Cool" Masters – 2016-17

Sponsored by:

High School – December 10, 2016

Mental Math Contest

Mental Math – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

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/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

#	Problem
1	What is the mode of the Fibonacci Sequence?
2	The sum of five consecutive integers is one-hundred sixty-five. What is the smallest of the five integers?
3	What is the perimeter, in meters, of a rectangle with a width of thirty-six meters and an area of seven-hundred fifty-six square meters?
4	If there's a room full of eleven people, and they all decided to exchange phone numbers with each other, how many phone number exchanges occur? Note: one exchange includes both people giving their phone number to the other.
5	How many vertices does a dodecahedron have?
6	Solve the following equation: "four-factorial plus three-X equals nine"
7	What is the sum of the prime factors of one-hundred twenty-seven?
8	What is the product of the zeroes of the function "F-of-X equals X-cubed minus four-X-squared minus six-X plus nine"?

“Math is Cool” Masters – 2016-17

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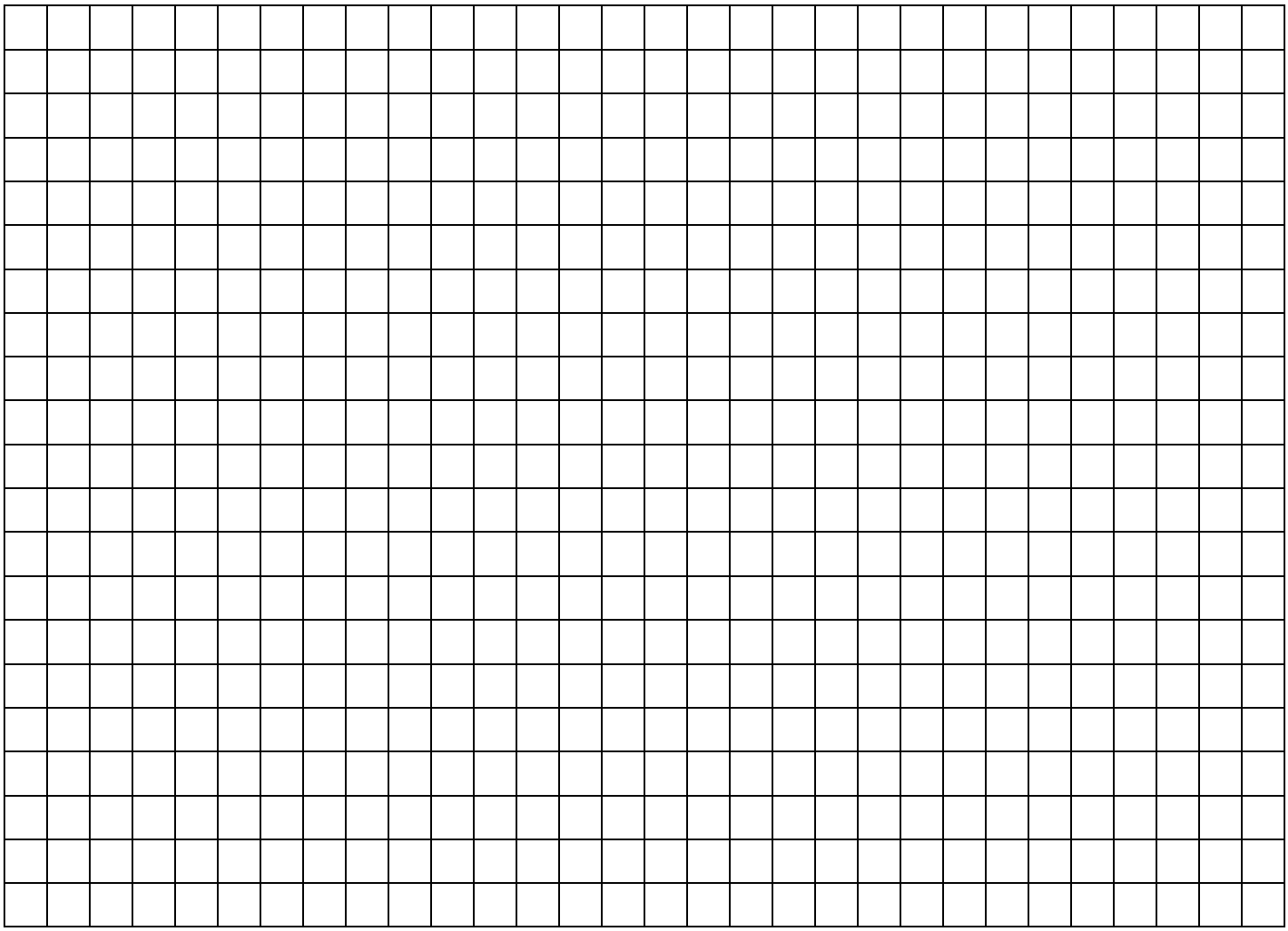
December 10, 2016

PRE-CALCULUS - Individual Contest

Tear this cover sheet and scratch paper off and fill out the top of the colored answer sheet prior to the start of the test. The graph below is for your use, if needed.

INDIVIDUAL TEST – PRE-CALCULUS - 35 minutes

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! 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 raw score will be 2 points for correct answers to problems 1-30 and 3 points for 31-40. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.



"Math is Cool" Masters – 2016-17

Sponsored by:

December 10, 2016

ALGEBRA 2 - Individual Contest

	Questions 1-30: 2 points each
1	Evaluate: $3 + 2 - \frac{[5*(7+1)]}{4}$
2	Evaluate: $\left(\frac{1}{2} + \frac{2}{3}\right) \div \frac{3}{4}$
3	Simplify in terms of i, where $i = \sqrt{-1}$: $3i^6 + (3 - 4i)(6 + 8i)$
4	What is the equation, in slope-intercept $(y = mx + b)$ form, of the line through the points $(-15, 6)$ and $(6, -8)$?
5	If $p(q) = \frac{q^3 - 2q^2 + 4q + 3}{q - 5}$, evaluate $p(3)$.
6	What value of N will make the system of equations $2p + 3q = 4$ and $6p + Nq = 8$ have no solution?
7	You have 5 (indistinguishable) red hats and 1 black hat. In how many (distinguishable) ways can you distribute these hats to your ten best friends? (Note that 6 friends will have a hat and 4 friends will be hatless).
8	Given the following functions: g(x) = 2x + 1 f(x) = 2x – 1 h(x) = 2x + 2 a(x) = 2x – 2 What is the value of g(f(g(h(a(g(1)))))) ?
9	Evaluate: $2^0 + 2^1 + 2^2 + 2^3 + \cdots + 2^{12}$.
10	A circle with radius 5 is inscribed in a square, which is inscribed in a circle, which is inscribed in another square. What is the area of the outermost square?
11	What value(s) of c satisfy $3 \cdot 2^{c+1} + 16 = 2^{2c}$?
12	Adam chooses a three-digit number and shows it to his three friends Billy, Cate, and Dina. Billy notices that Adam's number has a remainder of 1 when divided by 2. Cate, on the other hand, notices that it has a remainder of 1 when divided by 3. Dina notices that the number has a remainder of 1 when divided by 4. What is the largest possible value of Adam's number?
13	What is the complement of the supplement of the angle that is $34°$ smaller than the supplement of the complement of $67°$?
14	An exterior angle of a regular polygon measures 22.5 degrees. How many sides does this polygon have?
15	Ulrich won't sit by Val, Wally won't sit by Xena, and Yves won't sit by Zach. Val must sit by Zach, Xena must sit by Ulrich, and Yves must sit by Val. When they sit in a row of six chairs, how many seating arrangements are possible?
16	What is the fifteenth term in the sequence 5, 4, 8, 7, 14, 13, 26 ….

17	A regular 12-gon has sides measuring 10 m. How many diagonals can be drawn that are longer than 30 m?
18	Carlos is attempting to win a teddy bear at a carnival. However, the bear is merely the second prize, and he has to hit 4 out of 5 targets to win a bear. If his shooting skills give him a 40% probability to hit the target on any given shot, what is the chance of him getting a bear?
19	Ms. Takes accidentally taught her 1st grade students a lesson incorrectly! She told them that the "+" sign means division, the "-" sign means addition, the "x" sign means subtraction, and that the "/" sign means multiplication! Oh my! She gave her student Einstein the problem "Evaluate (4 + 2) – 1 x (2 / 3)." Assuming that Einstein never makes a mistake and that he solved the problem using the incorrect signs from Ms. Takes' lesson, what did Einstein get as an answer for the problem?
20	What point is three-fourths of the way from point A $(-7, -68)$ to point B $(89, -12)$ along segment $\overline{AB}$?
21	A sequence of numbers starts with the number 5. After the first term, each term is 3 more than twice the previous term. Find the sum of the first 6 terms of this sequence.
22	Nick is standing on the x axis. He throws a football according to the graph $y = -x^2 - 6x + 9$. The football lands on the x axis. How far horizontally did it travel?
23	Nancy and Oliver start at the same point on a quarter-mile track, running in the same direction. If their speeds are 6 miles per hour (mph) and 7 mph, and they run for 20 minutes, how many times will they be at the some point on the track, including the starting moment and perhaps the ending moment?
24	What is the volume, in cubic meters, of a right circular cylinder with a height of 12 m and a surface area of 216π m^2?
25	What is the smallest number greater than 1000 that leaves a remainder of 4 when it is divided by 56 and a remainder of 12 when it is divided by 48?
26	On his drive home, Jack passes houses numbered 200 - 400, and counts the number of times he sees a 3 on the even side of the street (i.e. Jack sees the houses numbered 200, 202, 204, etc). How many 3's does Jack see?
27	The Inn contains five Fighters, three Wizards, four Rogues, and two Clerics. In how many ways can a Patron hire a party of six adventurers that includes at least two Fighters and at least one of each of the four classes?
28	If a parabola of the form $y = ax^2 + bx + c$ passes through the points (1,1), (9,1), and (13,13), what is the vertex of the parabola?
29	What is the range, in interval notation, of the function $f(d) = \frac{d^2+3}{d^2+1}$?
30	You have two identical unfair dice. For each die, the probability of rolling a number is proportional to the number (e.g., the probability of rolling a 6 is two times the probability of rolling a 3). Suppose that you roll these two dice. Find the probability that the sum of the two numbers showing is a 10.

Challenge Questions: 3 pts each	
31	In a data set of seven integer test scores from 0 to 100 inclusive, the mean is 41, the mode is 67, and the range is 89. What is the largest possible value of the median?
32	If the BLUNICORN is dealt a 5 card hand, how many ways can the BLUNICORN be dealt two pair (2 of one rank and 2 of another rank (and 1 of a third rank))? Remember that BLUNICORNS use only the red cards from a standard 52-card deck.
33	Fred bought 3 notebooks and 7 erasers, spending a total of $14.50. George bought 5 notebooks and 4 erasers, spending a total of $16.50. How much would it cost to buy 1 notebook and 1 eraser?
34	When the point $(-36, -8)$ is rotated $90°$ clockwise about the point $(81, -23)$, what are the coordinates, in the form (x, y), of the new point?
35	Jack and Jill pour a pail of water into a water trough. The water trough is a right trapezoidal prism, with a base 1 meter by 3 meters, an opening at the top 3 meters by 3 meters, and a depth when full of 1 meter. If the water is currently 0.25 meters deep, how many water LITERS of water are in the trough (as a decimal)? Note: a liter is a cubic decimeter.
36	Evaluate: $32^3 - 28^3$
37	Arrange the variables A-D in descending order (e.g., your answer might be ABCD): $A = 8!$ $B = 8^8$ $C = 8^4$ $D = 3^8$
38	If a dodecahedral die (12 faces) is rolled three times, what is the probability that the sum of the rolls will equal ten?
39	Evaluate the determinant: $\begin{vmatrix} 3 & 0 & 5 \\ 6 & -1 & 8 \\ 4 & 0 & 3 \end{vmatrix}$?
40	The members of the Coopeville Carshare Cooperative each contribute equally to the purchase of a Mini-Cooper car, which they agree to share. If there had been one fewer member of the group, each member would have had to pay $100 more than they did. If there had been two fewer members than *that*, each member would have had to pay $350 more than they *actually did*. How many dollars did they pay for their Mini-Cooper?

ALGEBRA 2

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December 10, 2016

PRE-CALCULUS - Individual Contest

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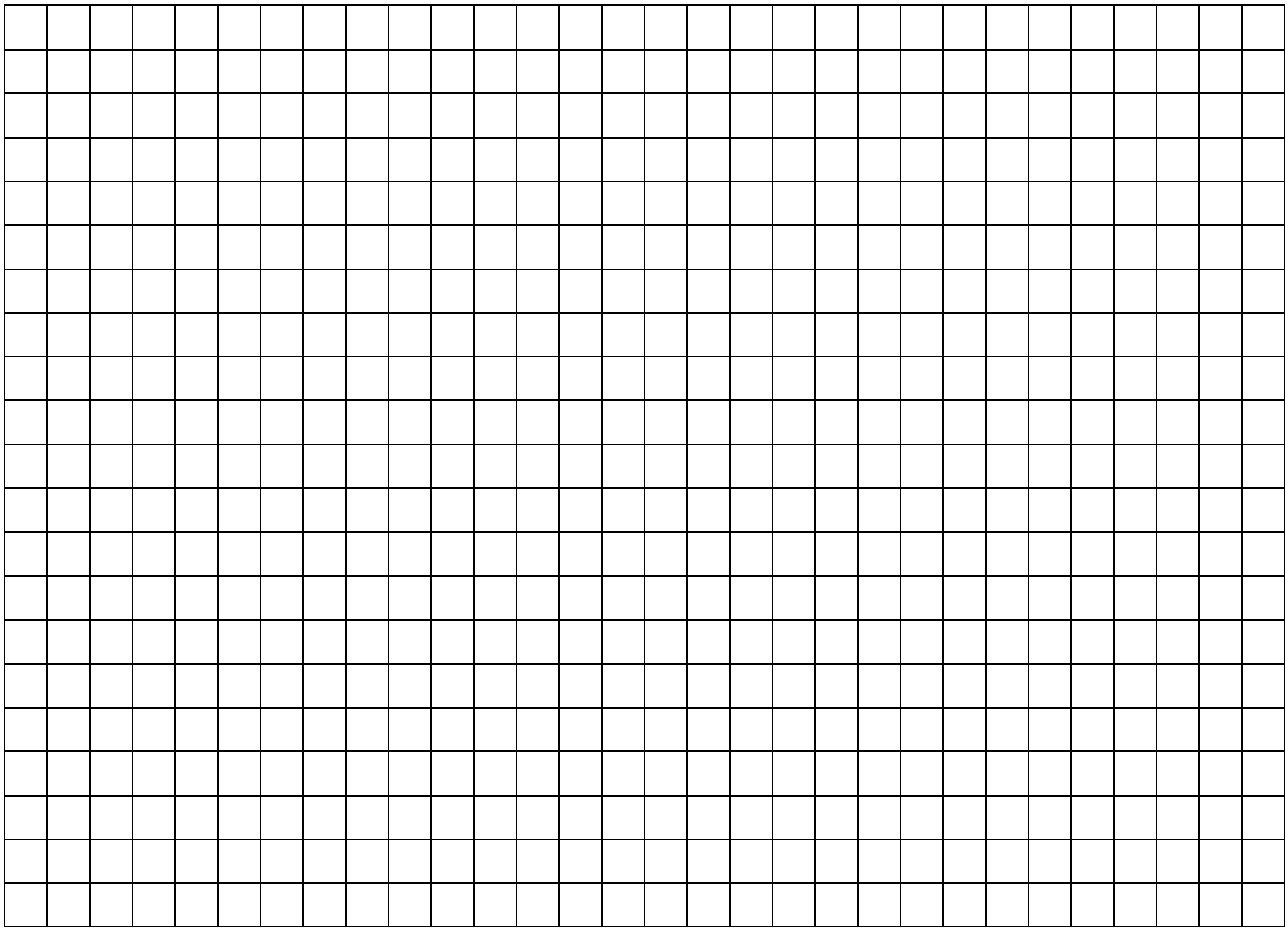

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PRE-CALCULUS - Individual Contest

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2	Evaluate: $\left(\frac{1}{2} + \frac{2}{3}\right) \div \frac{3}{4}$
3	Simplify in terms of i, where $i = \sqrt{-1}$: $3i^6 + (3 - 4i)(6 + 8i)$
4	What is the equation, in slope-intercept $(y = mx + b)$ form, of the line through the points $(-15, 6)$ and $(6, -8)$?
5	If $p(q) = \frac{q^3 - 2q^2 + 4q + 3}{q - 5}$, evaluate $p(3)$.
6	What value of N will make the system of equations $2p + 3q = 4$ and $6p + Nq = 8$ have no solution?
7	You have 5 (indistinguishable) red hats and 1 black hat. In how many (distinguishable) ways can you distribute these hats to your ten best friends? (Note that 6 friends will have a hat and 4 friends will be hatless).
8	Given the following functions: g(x) = 2x + 1 f(x) = 2x – 1 h(x) = 2x + 2 a(x) = 2x – 2 What is the value of g(f(g(h(a(g(1)))))) ?
9	Evaluate: $2^0 + 2^1 + 2^2 + 2^3 + \cdots + 2^{12}$.
10	A circle with radius 5 is inscribed in a square, which is inscribed in a circle, which is inscribed in another square. What is the area of the outermost square?
11	What value(s) of c satisfy $3 \cdot 2^{c+1} + 16 = 2^{2c}$?
12	Adam chooses a three-digit number and shows it to his three friends Billy, Cate, and Dina. Billy notices that Adam's number has a remainder of 1 when divided by 2. Cate, on the other hand, notices that it has a remainder of 1 when divided by 3. Dina notices that the number has a remainder of 1 when divided by 4. What is the largest possible value of Adam's number?
13	What is the complement of the supplement of the angle that is $34°$ smaller than the supplement of the complement of $67°$?
14	For an angle in Quadrant II, if cos(α) = -2/3, then what is $\sin^2 \alpha$?
15	Ulrich won't sit by Val, Wally won't sit by Xena, and Yves won't sit by Zach. Val must sit by Zach, Xena must sit by Ulrich, and Yves must sit by Val. When they sit in a row of six chairs, how many seating arrangements are possible?
16	What is the fifteenth term in the sequence 5, 4, 8, 7, 14, 13, 26 ….

17	A regular 12-gon has sides measuring 10 m. How many diagonals can be drawn that are longer than 30 m?
18	Carlos is attempting to win a teddy bear at a carnival. However, the bear is merely the second prize, and he has to hit 4 out of 5 targets to win a bear. If his shooting skills give him a 40% probability to hit the target on any given shot, what is the chance of him getting a bear?
19	Ms. Takes accidentally taught her 1st grade students a lesson incorrectly! She told them that the "+" sign means division, the "-" sign means addition, the "x" sign means subtraction, and that the "/" sign means multiplication! Oh my! She gave her student Einstein the problem "Evaluate (4 + 2) – 1 x (2 / 3)." Assuming that Einstein never makes a mistake and that he solved the problem using the incorrect signs from Ms. Takes' lesson, what did Einstein get as an answer for the problem?
20	What point is three-fourths of the way from point A $(-7, -68)$ to point B $(89, -12)$ along segment $\overline{AB}$?
21	A sequence of numbers starts with the number 5. After the first term, each term is 3 more than twice the previous term. Find the sum of the first 6 terms of this sequence.
22	If $f(x) = x^3$ and $g(x) = \frac{1}{x}$, what is $(f \circ g)^{-1}$?
23	If $x = \frac{1}{2}$, what is the value of $\tan(\arcsin(x))$?
24	What is the volume, in cubic meters, of a right circular cylinder with a height of 12 m and a surface area of 216π m^2?
25	What is the smallest number greater than 1000 that leaves a remainder of 4 when it is divided by 56 and a remainder of 12 when it is divided by 48?
26	You have a set of 5¢ stamps and a set of 7¢ stamps. Using these stamps, you could pay an exact postage of 48¢ (with four 5¢ stamps and four 7¢ stamps), but you could not pay an exact postage of 8¢. What is the largest integer amount of postage you could not pay exactly with your stamps?
27	The Inn contains five Fighters, three Wizards, four Rogues, and two Clerics. In how many ways can a Patron hire a party of six adventurers that includes at least two Fighters and at least one of each of the four classes?
28	If a parabola of the form $y = ax^2 + bx + c$ passes through the points (1,1), (9,1), and (13,13), what is the vertex of the parabola?
29	What is the range, in interval notation, of the function $f(d) = \frac{d^2+3}{d^2+1}$?
30	You have two identical unfair dice. For each die, the probability of rolling a number is proportional to the number (e.g., the probability of rolling a 6 is two times the probability of rolling a 3). Suppose that you roll these two dice. Find the probability that the sum of the two numbers showing is a 10.

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33	If $\cos a = \frac{3}{4}$ for $\pi < a < 2\pi$, evaluate $\sin\left(\frac{a}{2}\right)$.
34	When the point $(-36, -8)$ is rotated $90°$ clockwise about the point $(81, -23)$, what are the coordinates, in the form (x, y), of the new point?
35	Jack and Jill pour a pail of water into a water trough. The water trough is a right trapezoidal prism, with a base 1 meter by 3 meters, an opening at the top 3 meters by 3 meters, and a depth when full of 1 meter. If the water is currently 0.25 meters deep, how many water LITERS of water are in the trough (as a decimal)? Note: a liter is a cubic decimeter.
36	Evaluate: $32^3 - 28^3$
37	Arrange the variables A-D in descending order (e.g., your answer might be ABCD): $A = 8!$ $B = 8^8$ $C = 8^4$ $D = 3^8$
38	Jack and Jill walk up the hill (to fetch ***a*** pail of water). When they do, they can take one of a 1 liter pail, a 3 liter pail, or a 5 liter pail. They fill whichever pail they took and take it down the hill. If they need to, they go back up (perhaps with a different bucket), get some more, and repeat until they have brought exactly 5 L down. How many ways could they carry 5 liters of water down the hill, if the order of their trips matters, and they can empty a bucket at the bottom of the hill and reuse it on another trip?
39	Evaluate the determinant: $\begin{vmatrix} 3 & 0 & 5 \\ 6 & -1 & 8 \\ 4 & 0 & 3 \end{vmatrix}$?
40	The members of the Coopeville Carshare Cooperative each contribute equally to the purchase of a Mini-Cooper car, which they agree to share. If there had been one fewer member of the group, each member would have had to pay $100 more than they did. If there had been two fewer members than *that*, each member would have had to pay $350 more than they *actually did*. How many dollars did they pay for their Mini-Cooper?

PRE-CALCULUS

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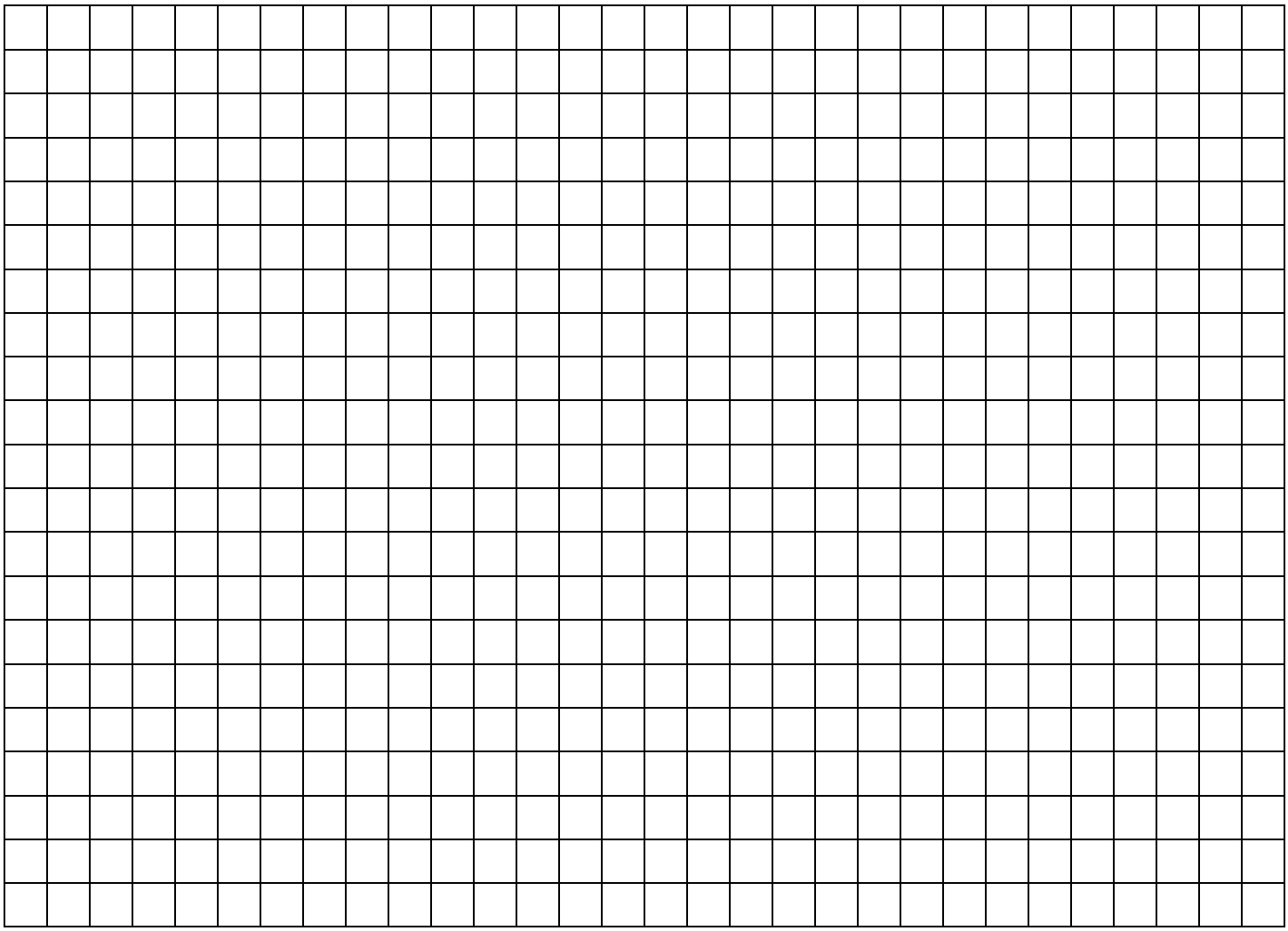
CALCULUS - Individual Contest

Tear this cover sheet and scratch paper off and fill out the top of the colored answer sheet prior to the start of the test. The graph below is for your use, if needed.

INDIVIDUAL TEST – PRE-CALCULUS - 35 minutes

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! 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 raw score will be 2 points for correct answers to problems 1-30 and 3 points for 31-40. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.



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CALCULUS - Individual Contest

	Questions 1-30: 2 points each
1	Evaluate: $3 + 2 - \frac{[5*(7+1)]}{4}$
2	Evaluate: $\left(\frac{1}{2} + \frac{2}{3}\right) \div \frac{3}{4}$
3	Simplify in terms of i, where $i = \sqrt{-1}$: $3i^6 + (3 - 4i)(6 + 8i)$
4	Find the equation, in slope-intercept $(y = mx + b)$ form, of the line that passes through the center of the ellipse $4x^2 + y^2 - 8x + 20y + 40 = 0$ and the vertex of the parabola $y = 2x^2 - 8x - 10$.
5	If $p(q) = \frac{q^3 - 2q^2 + 4q + 3}{q - 5}$, evaluate $p(3)$.
6	What value of N will make the system of equations $2p + 3q = 4$ and $6p + Nq = 8$ have no solution?
7	Penny wants to play a coin-flipping game with Nicole in which a coin is repeatedly flipped. When heads comes up 4 times in a row, Nicole wins. If a Tails is followed by 3 Heads in a row, Penny wins. What is the probability that Penny wins under these conditions?
8	Given the following functions: g(x) = 2x + 1 f(x) = 2x – 1 h(x) = 2x + 2 a(x) = 2x – 2 What is the value of g(f(g(h(a(g(1)))))) ?
9	Evaluate: $2^0 + 2^1 + 2^2 + 2^3 + \cdots + 2^{12}$.
10	A circle with radius 5 is inscribed in a square, which is inscribed in a circle, which is inscribed in another square. What is the area of the outermost square?
11	What value(s) of c satisfy $3 \cdot 2^{c+1} + 16 = 2^{2c}$?
12	Adam chooses a three-digit number and shows it to his three friends Billy, Cate, and Dina. Billy notices that Adam's number has a remainder of 1 when divided by 2. Cate, on the other hand, notices that it has a remainder of 1 when divided by 3. Dina notices that the number has a remainder of 1 when divided by 4. What is the largest possible value of Adam's number?
13	What is the complement of the supplement of the angle that is $34°$ smaller than the supplement of the complement of $67°$?
14	For an angle in Quadrant II, if cos(α) = -2/3, then what is $\sin^2 \alpha$?
15	Ulrich won't sit by Val, Wally won't sit by Xena, and Yves won't sit by Zach. Val must sit by Zach, Xena must sit by Ulrich, and Yves must sit by Val. When they sit in a row of six chairs, how many seating arrangements are possible?
16	What is the fifteenth term in the sequence 5, 4, 8, 7, 14, 13, 26 ….

17	A regular 12-gon has sides measuring 10 m. How many diagonals can be drawn that are longer than 30 m?
18	Carlos is attempting to win a teddy bear at a carnival. However, the bear is merely the second prize, and he has to hit 4 out of 5 targets to win a bear. If his shooting skills give him a 40% probability to hit the target on any given shot, what is the chance of him getting a bear?
19	Ms. Takes accidentally taught her 1st grade students a lesson incorrectly! She told them that the "+" sign means division, the "-" sign means addition, the "x" sign means subtraction, and that the "/" sign means multiplication! Oh my! She gave her student Einstein the problem "Evaluate (4 + 2) – 1 x (2 / 3)." Assuming that Einstein never makes a mistake and that he solved the problem using the incorrect signs from Ms. Takes' lesson, what did Einstein get as an answer for the problem?
20	What point is three-fourths of the way from point A $(-7, -68)$ to point B $(89, -12)$ along segment $\overline{AB}$?
21	Evaluate the limit $\lim\ m \to \infty \sum_{n=0}^{m} \left(\frac{1}{4}\right)^n$
22	If $f(x) = x^3$ and $g(x) = \frac{1}{x}$, what is $(f \circ g)^{-1}$?
23	If $x = \frac{1}{2}$, what is the value of $\tan(\arcsin(x))$?
24	What is the volume, in cubic meters, of a right circular cylinder with a height of 12 m and a surface area of 216π m^2?
25	What is the smallest number greater than 1000 that leaves a remainder of 4 when it is divided by 56 and a remainder of 12 when it is divided by 48?
26	You have a set of 5¢ stamps and a set of 7¢ stamps. Using these stamps, you could pay an exact postage of 48¢ (with four 5¢ stamps and four 7¢ stamps), but you could not pay an exact postage of 8¢. What is the largest integer amount of postage you could not pay exactly with your stamps?
27	The Inn contains five Fighters, three Wizards, four Rogues, and two Clerics. In how many ways can a Patron hire a party of six adventurers that includes at least two Fighters and at least one of each of the four classes?
28	If a parabola of the form $y = ax^2 + bx + c$ passes through the points (1,1), (9,1), and (13,13), what is the vertex of the parabola?
29	What is the range, in interval notation, of the function $f(d) = \frac{d^2+3}{d^2+1}$?
30	You have two identical unfair dice. For each die, the probability of rolling a number is proportional to the number (e.g., the probability of rolling a 6 is two times the probability of rolling a 3). Suppose that you roll these two dice. Find the probability that the sum of the two numbers showing is a 10.

Challenge Questions: 3 pts each	
31	In a data set of seven integer test scores from 0 to 100 inclusive, the mean is 41, the mode is 67, and the range is 89. What is the largest possible value of the median?
32	If the BLUNICORN is dealt a 5 card hand, how many ways can the BLUNICORN be dealt two pair (2 of one rank and 2 of another rank (and 1 of a third rank))? Remember that BLUNICORNS use only the red cards from a standard 52-card deck.
33	If $\cos a = \frac{3}{4}$ for $\pi < a < 2\pi$, evaluate $\sin\left(\frac{a}{2}\right)$.
34	When the point $(-36, -8)$ is rotated $90°$ clockwise about the point $(81, -23)$, what are the coordinates, in the form (x, y), of the new point?
35	Jack and Jill pour a pail of water into a water trough. The water trough is a right trapezoidal prism, with a base 1 meter by 3 meters, an opening at the top 3 meters by 3 meters, and a depth when full of 1 meter. If the water is currently 0.25 meters deep, how many water LITERS of water are in the trough (as a decimal)? Note: a liter is a cubic decimeter.
36	What is the sum of the first ten terms of the sequence $k_m = \frac{4}{m^2+5m+6}$? Assume that k_1 is the first term of the sequence.
37	Arrange the variables A-D in descending order (e.g., your answer might be ABCD): $A = 8!$ $B = 8^8$ $C = 8^4$ $D = 3^8$
38	Jack and Jill walk up the hill (to fetch ***a*** pail of water). When they do, they can take one of a 1 liter pail, a 3 liter pail, or a 5 liter pail. They fill whichever pail they took and take it down the hill. If they need to, they go back up (perhaps with a different bucket), get some more, and repeat until they have brought exactly 5 L down. How many ways could they carry 5 liters of water down the hill, if the order of their trips matters, and they can empty a bucket at the bottom of the hill and reuse it on another trip?
39	Find all eigenvalues of the matrix $\begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$.
40	The members of the Coopeville Carshare Cooperative each contribute equally to the purchase of a Mini-Cooper car, which they agree to share. If there had been one fewer member of the group, each member would have had to pay $100 more than they did. If there had been two fewer members than *that*, each member would have had to pay $350 more than they *actually did*. How many dollars did they pay for their Mini-Cooper?

CALCULUS

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Individual Multiple Choice Contest

1	How many positive integers less than 108 are relatively prime to it? A) 30 B) 36 C) 42 D) 48 E) Answer not given.
2	Jimmy has a budget of 30 dollars and can purchase apples for 4 dollars each and oranges for 6 dollars each (this is very high quality fruit!). If Jimmy spends all of his money and maximizes the number of pieces of fruit he gets, how many apples does he buy? A) 4 B) 5 C) 6 D) 7 E) Answer not given.
3	How many times will the hour hand and minute hand make a right angle in a 24 hour period starting at midnight? A) 40 B) 42 C) 44 D) 46 E) Answer not given.
4	What is the remainder when $3x^3 - 9x^2 + 6x + 19$ is divided by $x - 2$? A) 19 B) 20 C) 21 D) 22 E) Answer not given.
5	What is Sin(x)Sec(x) equal to? A) $\cos(x)$ B) $\csc(x)$ C) $\tan(x)$ D) 1 E) Answer not given.
6	Three burglars are arrested for a crime that only one person committed. Each says the following in interrogation: A: I did it. B: I didn't do it. C: A didn't do it. If only one is truthful, who did it? A) A B) B C) C D) Cannot Be Determined E) Answer not given.
7	A box contains 7 pink pens and 15 blue pens. Juanita takes two pens out of the box, without replacement. What is the probability that she chooses no more than 1 pink pen? A) $\frac{1}{462}$ B) $\frac{5}{22}$ C) $\frac{435}{484}$ D) $\frac{28}{33}$ E) Answer not given.
8	If Set T is the set of multiples of 7 less than 50, how many subsets of T contain at least one element containing the digit "1"? A) 32 B) 64 C) 96 D) 128 E) Answer not given.
9	Jack and Jill's farm has BLUNICORNS, a mythical blue beast with one head, four wings, and two legs, and one horn; and CHICKENS, a less mythical beast with one head, two wings, two legs, and no horns. Jill counts 56 legs and 82 wings. How many BLUNICORNS does the farm have? A) 10 B) 11 C) 12 D) 13 E) Answer not given.
10	Evaluate: $9 * (33^2) - 4 * (49^2)$ A) 177 B) 187 C) 197 D) 207 E) Answer not given.

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Team Contest

1	What is the sum of all the numbers between 60 and 360 which are not multiples of 2 nor multiples of 3?
2	Mr. Brands writes down a quadratic equation of the form $ax^2 + bx + c = 0$ and asks three students to solve for x. Rachel mistakenly writes down the wrong value of a, and finds that her equation has a solution of $x = 1$ or $x = 6$. Steve mistakenly writes down the wrong value of b, and finds that his equation has a solution of $x = 1$ or $x = 3$. Tristan mistakenly writes down the wrong value of c, and finds that his equation has a solution of $x = 1$ or $x = \frac{5}{2}$. Assuming that each student correctly solved their miscopied quadratic equation, what values of x solve Mr. Brand's original equation?
3	Find the real root(s) of: $x^3 - 9x^2 + 27x = 54$
4	What is the sum of the value(s) of b $(0 \leq b < 2\pi)$ satisfy $2\cos^2(2b) + \sin(2b) = 2$?
5	When four cards are drawn from a standard 52-card deck, what is the probability of drawing 4 aces?
6	A tessellation of a plane consists of only equilateral triangles and regular 12-gons. What fraction of the shapes are triangles?
7	What is the surface area, in square meters, of a right rectangular pyramid with a base measuring 28 m by 40 m and a height of 48 m?
8	A circle with a radius of one has a chord of length one with endpoints A and B. Points P and Q are chosen such that PQ is a diameter and the area of APB is maximized. What is the ratio of the areas of AQB and APB?
9	What is the equation, in the form $Ax + By + Cz = 1$, of the plane through the points $(4, 4, 5)$, $(-1, 2, 9)$, and $(2, -1, -6)$?
10	In the set of positive integers {56, 8, 91, 70, 3, 21, x, y, z}, the median is greater than the mean, which is greater than the mode. What is the largest possible value of $x + y + z$?

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Pressure Round Contest

1	What is the least common multiple of 846 and 348?
2	In a class of 6 students, the results of a test are 70, 80, 90, x, y and z. If the median is 93, the mean is 89 and the range is 30, what is xyz?
3	What is the area of the ellipse with equation $x^2 + 4y^2 - 8x + 64y = 0$?
4	In a new casino game, a player flips a fair coin repeatedly. If she gets three heads in a row before she gets two Tails in a row, she wins; otherwise she loses. What is the probability she wins?
5	If a parallelogram has vertices on the origin, (7,4), (5,1), and (12,5), what is the area of the parallelogram?

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COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	A triangle has sides of length six centimeters, eight centimeters, and ten centimeters. What is the area, in square centimeters, of the triangle?	24 [cm^2]
2	What is the area, in square meters, of an equilateral triangle with a perimeter of thirty-six meters?	$36\sqrt{3}$ [m^2]
3	What is the product of four-hundred ninety-eight and three-hundred twelve?	155,376
4	Jack and Jill flip a coin, and then roll three fair, six-sided dice to decide who has to carry the pails of water. Jack will carry the pail either if Heads is flipped OR the product of the numbers on the three dice is a multiple of two. What is the probability Jack carries the pail of water?	$\frac{15}{16}$
5	What is the smallest integer value of B satisfying six-to-the-B-power [PAUSE], plus seven-thousand nine-hundred twenty-four [PAUSE], is-greater-than-or-equal-to [PAUSE], forty-one-thousand three-hundred sixty-six?	6
6	How many positive integers are factors of one-thousand seven-hundred eighty?	12 [integers]
7	What is the arithmetic ("air-ith-MET-ic") mean of two-X-minus-three, four-X, and twelve-X-plus-nine?	$6x + 2$
8	Set R is the set of positive multiples of nine less than one-thousand and set S is the set of powers of three greater than ten. How many elements are in the intersection of sets R and S?	4
9	The mean class score for an assignment was ninety points. There are fifteen students in the class and thirteen of them had a combined score of one-thousand one-hundred. What is the combined score of the remaining two students?	250 [points]
10	What is the eighth term of a geometric sequence with first term thirteen and common ratio two?	1664

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COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	What is the median of the data set {51, 2, 68, 9, 34, 6, 78}?	34
2	What is the product of the roots of eight-G-cubed [PAUSE] minus five-G-squared [PAUSE] plus seven-G [PAUSE] plus twenty-three [PAUSE] equals zero?	$-\frac{23}{8}$
3	There are six-hundred Frisbees. Five-hundred forty-two of them are red, and two-hundred three of them have pictures on them. Every Frisbee is either red, has a picture, or both. How many Frisbees are both red and have a picture?	145 [Frisbees]
4	In a field of sheep and chickens, there are twenty heads and fifty-four feet. How many chickens are there?	13 [chickens]
5	Penelope visits a restaurant that has enormous food and orders a pizza that has a diameter of six feet. The smaller size has a radius of two feet. How much more area does the larger size pizza have than the smaller size, in square feet?	5π [ft^2] Five-pi
6	Evaluate three-hundred seventy-eight squared minus two-hundred twenty-two squared.	93,600
7	What are the coordinates, in the form X-comma-Y, of the leftmost X-intercept of Y-equals-two-X-squared-minus-seven-X-minus-thirty?	$\left(-\frac{5}{2}, 0\right)$
8	What is the eccentricity ("ex-en-TRISS-it-ee") of the conic X-squared-plus-two-X [PAUSE] plus-Y-squared-minus-fifty-six-Y [PAUSE] plus-one-hundred-twenty-four-equals-zero?	0 (it's a circle)
9	Sarah draws a square, which is inscribed inside a circle, which is itself inscribed inside of a square. If the innermost square has a side length of one meter, what is the area, in square meters, of the outermost square?	2
10	You drop a ball from a height of one meter. On the first bounce, it goes up point-nine meters above the ground, then falls back down. On the one after that, it bounces point-eight-one meters up and then back down. On each successive bounce, it rises to nine-tenths the height of the previous bounce. What is the total distance in meters (both up & down) covered by the ball as it bounces?	19 [meters]

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COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	Express the base six numeral three-five-one-two-base-six as a base ten numeral.	836
2	What is the measure, in degrees, of an interior angle of a regular twenty-four-gon?	165 [degrees]
3	A rectangular rose garden measures five meters by ten meters, and is surrounded by a rectangular walkway that is two meters wide on all sides of the garden. What is the area, in square meters, of the walkway?	76 [m^2]
4	What is the prime factorization of the product of the first five terms of a geometric sequence with first term twelve and common ratio three?	$2^{10} \cdot 3^{15}$
5	What is the sum of the number of bagels in a baker's dozen, the number of days in a leap year, and the number of prime numbers less than twenty?	387
6	Twenty-seven to the fifth power equals three to the ninth power times nine to what power?	3
7	Jack and Jill are playing poker with one of their BLUNICORNS. BLUNICORNS only play with the red cards in the deck. If the BLUNICORN is dealt a five-card hand, what is the probability it has a full house? Note: a full house is two of one rank and three of another rank.	0
8	When the secret number is multiplied by seven and this result is decreased by five-hundred seventy-four, the final result is one-thousand two-hundred sixty-seven. What is the secret number?	263
9	What is the area, in square meters, of a circle circumscribed about a rectangle measuring twenty-six meters by seventy-eight meters?	1690π [m^2]
10	A jacket shop sells jackets for twenty dollars each. A sales tax of ten percent is imposed on the jackets. The shop then decides to hold a sale, reducing the costs of all jackets by twenty-five percent. What is the final cost of a jacket, as a decimal number of dollars?	$16.50

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COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	In which quadrant of the Cartesian Plane does the point nine-thousand one-hundred thirty-four COMMA negative fifty-six-thousand seven-hundred eighty-nine lie?	IV or 4 or 4th
2	Carl wants to impress a girl named Ella. During lunch, he walks up and asks her to think about her favorite whole number. He tells her to cube it, subtract one and divide by one less than the number she originally picked (fortunately, her favorite number wasn't one, so this operation was possible). When he asks Ella for her result, she shrugs and tells Carl that she got ten-thousand one-hundred one. Then Carl utters her favorite number and dabs (as one should when accomplishing such a feat). What is this number?	100
3	A regular N-sided polygon can tessellate the plane. Find the sum of all possible values of N.	13
4	Find the median for the set {9, 12, 28, 37, 12, 74, 24}	24
5	What is the most specific name that applies to all quadrilaterals with diagonals that bisect one another?	Parallelogram
6	What is the mode of the data set {5, 8, 5, 2, 6, 90}?	5
7	Sharonda has six four-sided dice. If she rolls all of her dice, what is the chance that she will get exactly five even numbers?	$\frac{3}{32}$
8	Jack and Jill leave their houses and are walking towards each other (to go fetch a pail of water). Jack can walk from his house to Jill's house in ten minutes and Jill can walk from her house to Jack's house in fifteen minutes. If they both leave home at the same time and walk towards each other, how many minutes will it take them to meet?	6 [min]
9	How many non-congruent rectangles have perimeters of eighty meters and integer side lengths when measured in meters?	20
10	Jack gets the right medication and spends a few nights in the hospital with a concussion, but wants to get back to his tennis team. His doctor recommends a graduated return to play afterwards. The first week, Jack plays thirty minutes, and each week he plays twenty-five percent more than the prior week. How many hours will play in the fifth week, as a fraction?	$\frac{625}{512}$ [hrs]

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COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	What is the quotient when ninety-four-thousand one-hundred fifteen is divided by thirty-five?	2,689
2	How many numbers between one and twenty, including one and twenty, have an odd number of positive factors?	4
3	There are one-hundred socks in a sock drawer, with thirty of them green, thirty of them blue, and the rest white. 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?	71 [socks]
4	Lin is on vacation. She first drives twelve miles directly east from her house before turning and driving sixteen miles directly north. She then drives three miles directly west to the hotel where she will stay the night. How many miles is Lin from her house at this point?	$\sqrt{337}$ [miles]
5	What is the twelfth term of the sequence defined as "H-sub-J equals J-squared minus three-J plus seven"? Assume that H-sub-1 is the first term.	115
6	What is the area of a circle with a circumference of eighty-six-pi?	1849π
7	Solve for *x*: "three-X-squared minus sixteen-X plus sixteen equals zero".	$[x =] \frac{4}{3}, 4$
8	If the probability of Tom breaking a piñata is point-six on the first try, and every successive try has the chance of the piñata breaking increasing by point-one, what is the probability as a decimal that it will take Tom exactly three hits to break the piñata?	0.096
9	Sara is six times as old as her brother. In four years, Sara will be only twice as old as her brother. How old is Sara now?	6 [years old]
10	If you've already drawn a jack of clubs, a queen of diamonds, an ace of hearts, and a ten of clubs from a standard fifty-two-card deck, what are the chances that your fifth draw completes a straight? Note: a straight is five cards of five consecutive ranks.	$\frac{1}{12}$

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COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	What is the sum of six-hundred seventy-nine and eight-hundred thirty-five?	1,514
2	After three tests, Joanna's test average was eighty-eight. After the fourth test, Joanna's test average was ninety. If all four tests count equally in the average, what did Joanna score on her fourth test?	96
3	Evaluate one-hundred-four times ninety-six.	9,984
4	What is the slope of a line perpendicular to the line "fifty-six-X plus forty-nine-Y equals thirteen-thousand eight-hundred ninety"?	$\frac{7}{8}$
5	How many ones are in the binary representation of eight-hundred forty-seven?	7
6	Triangle ABC and Triangle DEF are similar triangles. If the ratio of the angles in Triangle ABC (in no particular order) are one-to-two-to-three what is the average of the angles in triangle DEF?	60 [degrees]
7	Jack has a bag that contains three fair coins and two coins that have a sixty percent chance of returning heads. If he pulls two coins, with replacement, and flips them, what is the probability that both coins are heads?	$\frac{729}{2500}$
8	Wendell has a dance floor in the shape of a parallelogram. The dance floor's diagonals measure twelve feet and sixteen feet, and are perpendicular to one another. If Wendell wants to put a string a lights around the perimeter of the dance floor for a greater visual effect, how many feet long does the string of lights need to be?	40 [ft]
9	What is the sum of the twenty smallest positive integers that are not multiples of seven?	234
10	Find the range of the mean, median, and mode of the following data: {31,17,31,20,16}	11

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COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	Express the cube root of three-thousand four-hundred fifty-six in simplest radical form.	$12\sqrt[3]{2}$
2	Arrange the fractions three-fourths, five-sevenths, and seven-ninths in DECREASING numerical order.	$\frac{7}{9}, \frac{3}{4}, \frac{5}{7}$ this order only
3	How many minutes pass between ten fifty-four AM and twelve thirty-four PM?	100
4	Two vertical lines are drawn in a plane. One of them is rotated one-hundred thirty-four degrees clockwise, and the other is rotated two-hundred forty-six degrees counter-clockwise. What is the measure, in degrees, of the smaller angle between the two lines?	$20°$
5	What are the coordinates, in the form X-comma-Y, of the center of the circle with equation "x-squared plus y-squared minus four-x plus six-y equals one-hundred"?	$(2, -3)$
6	Express the sum of the base-eight numerals three-four-five and two-four-six as a base-eight numeral.	613_8 (six-one-three base eight)

Final Score:

KEY

(Out of 8)

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School: _____ Room # _____ Team # _____

Name: _____Proctor: _____

High School **Mental Math** – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

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/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

	Answer	1 or 0	1 or 0
1	1		
2	31		
3	114 [m]		
4	55 [exchanges]		
5	20		
6	-5		
7	127		
8	-9		

Math is Cool" Masters – 2016-17

11th & 12th Grade – December 10, 2016

Final Score:

KEY

Student Name _____

Proctor Name _____ Room # _____

First Score

(out of 20)

SCHOOL NAME _____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. It is not necessary to write your personal name on the test, but you may put it at the bottom of the test so your coach will be able to give you back the correct test. This test is taken individually, but it is part of your team score, including zeros for missing team members. Your team score will be calculated by taking the mean of your four team members' scores. When you are prompted to begin, tear off the colored sheet and begin testing. ***Since this is a multiple choice test, ONLY a letter response should be indicated as an answer on the answer sheet.*** *No talking during the test.*

DO NOT WRITE IN SHADED REGIONS

Answer		-1, 0 or 2	-1, 0 or 2
1	B		
2	C		
3	C		
4	A		
5	C		
6	B		
7	E		
8	C		
9	D		
10	C		

"Math is Cool" Masters – 2016-17

11th & 12th Grade – December 10, 2016

Final Score: KEY

SCHOOL NAME _____ **Team #** _____

First Score

(out of 10)

Proctor Name _____ Room # _____

Team Contest – Score Sheet

TEAM TEST - 15 minutes – 30% of team score

*When you are prompted to begin, tear off the colored sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as **1 or 0**. Record all answers on the colored answer sheet.*

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	21,000		
2	2, $\frac{3}{2}$ [in any order]		
3	6		
4	6π		
5	$\frac{1}{270{,}725}$		
6	$\frac{1}{2}$		
7	4576 [m^2]		
8	$7-4\sqrt{3}$		
9	$2x-3y+z=1$		
10	254		

"Math is Cool" Masters – 2016-17

11th & 12th Grade – December 10, 2016

Final Score:
KEY

Proctor Name _____ Room # _____

First Score

SCHOOL NAME _____ Team #_____

PRESSURE ROUND - 10 minutes – 5 problems - 5 rounds – 15% of team score

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 (it can simply be a guess). The maximum value of this answer is 1 point. In another two minutes you are expected to submit another answer to one of the four remaining problems; its maximum value is two points. This process will continue until all the problems are answered and each consecutive problem's worth will go up 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 and told to hold your answer sheet up in the air. You may keep working as the 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.

Pressure Round Answers

	Answer
1	49,068
2	940,800
3	136π
4	$\frac{3}{10}$
5	13 [square units]

Final Score:

(Out of 8)

"Math is Cool" Masters -- 2016-17

School: _____ Room # _____ Team # _____

Name: _____Proctor: _____

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	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			

Math is Cool" Masters – 2016-17

11th & 12th Grade – December 10, 2016

Final Score:

Student Name _____

Proctor Name _____ Room # _____

First Score
(out of 20)

SCHOOL NAME _____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

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1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

"Math is Cool" Masters – 2016-17

11th & 12th Grade – December 10, 2016

Final Score:

SCHOOL NAME _____ **Team #** _____

First Score
(out of 10)

Proctor Name _____ Room # _____

Team Contest – Score Sheet

TEAM TEST - 15 minutes – 30% of team score

*When you are prompted to begin, tear off the colored sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as **1 or 0**. Record all answers on the colored answer sheet.*

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			