# "Math is Cool" Masters – 2011-12

Sponsored by: EKA Chemicals

December 3, 2011

Geometry & Algebra 2 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 all 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 of problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the nearest 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.*

## 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.*

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### Geometry & Algebra 2 – December 3, 2011

### 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 | Evaluate twelve [PAUSE] plus three times nine. |
| 2 | How many hours will it take Joseph to cross-country-ski twenty kilometers if he skis at a speed of eight kilometers per hour? |
| 3 | How many diagonals can be drawn in a convex fifteen-gon? |
| 4 | How many positive integers are factors of twenty-eight? |
| 5 | In a three-by-four array of unit squares, how many squares of any size are there? |
| 6 | If you can buy eight kilograms of flour for D dollars, how many dollars would it cost to buy K kilograms of flour, in terms of K and D? |
| 7 | Evaluate nine-fourths-raised-to-the-negative-three-halves-power. |
| 8 | If "S" of "T" equals five "T" minus thirteen, evaluate "S" inverse of forty two. |

# "Math is Cool" Masters – 2011-12

Sponsored by: EKA Chemicals

December 3, 2011

High School Individual Contest

## Tear this sheet off and fill out top of answer sheet on following page prior to the start of the test.

### 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 of problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the nearest 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.*

### INDIVIDUAL TEST - 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 – 2011-12

## Sponsored by: EKA Chemicals

December 3, 2011

Geometry & Algebra 2 High School Individual Contest

| | Questions 1-30: 2 points each |
|---|---|
| 1 | What is the remainder when 435 is divided by 13? |
| 2 | What is the missing term of the sequence 1, 2, 7, 16, 29, __, 67, 92, … |
| 3 | What is the maximum number of points at which a square and a triangle can intersect if none of their sides are collinear? |
| 4 | Evaluate: 6207 – 489 |
| 5 | Evaluate: $\frac{3}{16}+\frac{5}{24}$ |
| 6 | A bag of marbles contains nine red marbles, eleven white marbles, and 24 blue marbles. If a single marble is chosen, what is the probability that it is not blue? |
| 7 | What value(s) of $c$ satisfy $4c-1=c+17$? |
| 8 | What is the circumference, in meters, of a circle with an area of $169\pi$ $m^2$. |
| 9 | What is the slope of a line perpendicular to the line $y+3x=7$? |
| 10 | What is the sum of the positive integer factors of 36? |
| 11 | What is the name of a triangle with three non-congruent sides? |
| 12 | Express the number .005732 in scientific notation rounded to three significant digits. |
| 13 | What is the coefficient of the $k^2$ term when $(3k^2+2k+1)(2k^2-7k+3)$ is expanded and like terms are combined? |
| 14 | What is the area, in square meters, of a triangle with sides measuring 4, 5, and 7 meters? |
| 15 | What is the sum of the odd numbers between 30 and 68? |
| 16 | A square is inscribed in a circle with an area of $49\pi$ square meters. What is the perimeter, in meters, of the square? |
| 17 | In how many ways can eight people sit around a round table, if Fred and George must sit next to one another? |

| | |
|---|---|
| 18 | What is the coefficient of the $b^5$ term when $(2b-1)^8$ is expanded and like terms are combined? |
| 19 | Express the base-12 number $1212_{12}$ as a base-10 number. |
| 20 | Evaluate, where $i=\sqrt{-1}$: $2i^3-(4i)^5 i^6+\left((2i)^4 i\right)^3$ |
| 21 | When a coin is flipped six times, what is the probability that the third flip is heads and there are more tails than heads? |
| 22 | Evaluate the determinant: $\begin{vmatrix} 4 & -1 & 3 \\ 2 & 2 & 1 \\ -3 & 0 & 7 \end{vmatrix}$ |
| 23 | What is the product of the first four terms of a geometric sequence with first term 3 and common ratio 2? |
| 24 | Boxes B and C each contain a standard six-sided die. The boxes are shaken (rolling the dice) and set on the table, after which a trusted friend opens Box C and tells you that the die inside is not showing a five. What is the probability that the sum of the numbers shown on the two dice is six? |
| 25 | Simplify by dividing: $\dfrac{6j^4+3j^3-2j^2+7j+4}{2j+1}$ |
| 26 | What is the sum of the nine smallest positive perfect squares? |
| 27 | Harold and Isolde plan to meet for lunch, agreeing that each of them will arrive sometime between 11 AM and 1 PM and wait for one hour before leaving in disgust. Unfortunately, Harold forgot to adjust his watch for Daylight Savings Time, so he actually arrives sometime between noon and 2 PM. What is the probability that they do NOT meet each other? |
| 28 | Evaluate: $\dfrac{9+\dfrac{9+\cdots}{3}}{9+\dfrac{3}{3}}$ |
| 29 | The point $(-9,-4)$ is reflected across the line $y=1$ to point K, which is then rotated $450^\circ$ counter-clockwise about the point $(-1,5)$ to point L. What are the coordinates, in the form $(x,y)$, of point L? |
| 30 | A sequence begins with 1 and continues, including each successive integer so long as that number does not share a factor greater than one with two or more prior terms of the sequence. The sequence begins 1, 2, 3, 4, 5, 7, … because 6 shares a factor of 2 with both 2 and 4. What is the 40$^{th}$ term of this sequence? |

| Challenge Questions: 3 pts each | |
|---|---|
| 31 | The digits of a four-digit number sum to 19 and when the digits are reversed, the new number is 3726 greater than the original number. What is the largest possible value of the original number? |
| 32 | When six fair coins are flipped, what is the probability that exactly one series of exactly three flips in a row are identical? |
| 33 | If $AB_q + 100_{10} = ABC_q$, where A, B, and C are not necessarily different digits, what is the smallest possible value of $q$? |
| 34 | What is the largest number of non-overlapping (tangent is okay) circles with radii of 1 m that can fit inside a rectangle measuring 21 m by 13 m? |
| 35 | What is the positive difference between the squares of the roots of $4a^2 - 7a - 9 = 0$? |
| 36 | My piggy bank contains only nickels, dimes, and pennies. If there are twenty-three coins worth a total of \$1.54, how many dimes are there? |
| 37 | Bag A contains three blue marbles and one white marble. Bag B contains three blue marbles and two white marbles. Two marbles are drawn randomly from bag A and put in bag B. What is the probability that a marble then drawn from bag B is blue? |
| 38 | A collection of integers has distinct elements with the exception of two equal elements. If the median is less than the mode, which is less than the mean, what is the minimum possible value of the range? |
| 39 | If three faucets can produce five gallons of water in four minutes, how many minutes would it take two faucets to produce fifteen gallons of water? |
| 40 | If $c_0 = 12$ and $c_d = 100 - 7c_{d-1}$ for $d > 0$, evaluate $c_3$. |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### $9^{th}$ & $10^{th}$ Grade – December 3, 2011

### Individual Multiple Choice Contest

| | |
|---|---|
| 1 | Evaluate: $3^7$<br>A) 1237 B) 1839 C) 2187 D) 2879 E) Answer not given. |
| 2 | What are the coordinates, in the form $(x, y)$, of the point of intersection of the lines $2x + y = 7$ and $x - y = 8$?<br>A) $(5,-3)$ B) $(10,2)$ C) $(-3,13)$ D) $(1,5)$ E) Answer not given. |
| 3 | Evaluate: 27 * 48<br>A) 1156 B) 1296 C) 1556 D) 1986 E) Answer not given. |
| 4 | What is the sum of the twenty smallest positive even numbers?<br>A) 210 B) 320 C) 420 D) 640 E) Answer not given. |
| 5 | What is the measure, in degrees, of the smaller angle between the hour and minute hands of a standard twelve-hour clock at 7:18?<br>A) 111 B) $\frac{229}{2}$ C) 117 D) $\frac{243}{2}$ E) Answer not given. |
| 6 | When the vertices of a regular polygon are named in alphabetical order starting with A, $\overline{KC}$ passes through the center of the figure. What vertex lies directly across the center from P?<br>A) E B) F C) G D) H E) Answer not given. |
| 7 | If you deposit a million dollars in an account giving 12% annual interest compounded quarterly, how many dollars (rounded to the nearest cent) will be in the account at the end of one year?<br>A) \$1,124,608.81 B) \$1,125,942.81 C) \$1,120,000.00 D) \$1,121,121.12 E) Answer not given. |
| 8 | Two parallel lines are intersected by a pair of perpendicular lines. What is the smallest possible number of points of intersection?<br>A) 1 B) 2 C) 3 D) 5 E) Answer not given. |
| 9 | If Set A is the set of positive two-digit multiples of 3, and Set B is the set of positive multiples of six less than 1000, how many elements are in the set $\overline{A} \cap B$?<br>A) 0 B) 90 C) 120 D) 150 E) Answer not given. |
| 10 | How many positive integral factors of 120 are also factors of 210?<br>A) 4 B) 8 C) 12 D) 15 E) Answer not given. |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### 9th & 10th Grade – December 3, 2011

### Team Contest

| | |
|---|---|
| 1 | A hexagon has five angles measuring $51°$, $115°$, $151°$, $15°$, and $111°$. What is the measure of the sixth angle, in degrees? |
| 2 | Write the letters below (NOT the values or expressions) in order of ascending value:<br>A=1234+9753<br>B=43*59<br>C=1,000,000/99<br>D=34567-23581 |
| 3 | When my secret number is divided by two and this result is increased by three, the final result is four times the number that is five more than six. What is my secret number? |
| 4 | What is the equation, in slope-intercept form $(y = mx + b)$, of the line through the points $(1,4)$ and $(3,-2)$? |
| 5 | If $q(q(r)) = r + 48$, determine all possible values of $q(-9)$. |
| 6 | Express the base-eight number $12345_8$ as a base-four number. |
| 7 | A rhombus with sides measuring 12 m and an angle measuring $60°$ has vertices that are the midpoints of the sides of a rectangle, and the midpoints of its sides are the vertices of a rectangle. What is the difference in length, in meters, between the longest and shortest segments in these three shapes? |
| 8 | A group of friends contributes equally to rent a large beach house for Memorial Day weekend. If there had been two fewer friends, everyone would have paid $50 more. If the original group had invited Weird William, his wife would have contributed $500 to the rental (in addition to him paying his fair share of the remainder, even though she wouldn't have attended), so that everyone attending would have had to pay $50 less than the original group. How many dollars did it cost to rent the house for the weekend? |
| 9 | What is the sum of the number of vertices on a regular icosahedron, the number of tablespoons in a half gallon, and the number of seconds in four hours? |
| 10 | In the cryptarithm below, each letter represents a distinct digit (i.e. if an A is a 1, all A's are 1's and B's cannot be 1's). What is the largest possible value of the four-digit number ABCD?<br>$\begin{array}{r} AB \\ \times\, C \\ \hline BCD \end{array}$ |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### 9th & 10th Grade – December 3, 2011

### Pressure Round Contest

| | |
|---|---|
| 1 | What is the missing term of the sequence 1, 2, 3, 7, 13, 24, 45, __, 153, 282, 519, 955? |
| 2 | What value(s) of $p$ satisfy $\frac{p+3}{2p^2-5p+7}=\frac{3p+14}{6p^2-5p+7}$? |
| 3 | Evaluate: $\frac{(-3(-5)-(-4))^{-1}}{(-2-(-6)-1)(-1)}$ |
| 4 | In Replacement Poker, cards are "dealt" by being displayed, written down, and then reshuffled into the deck. When you are "dealt" three cards, what is the probability of getting an Impure Three-of-a-Kind, which is three cards of the same rank, but not all of the same suit? |
| 5 | An isosceles right triangle has legs of length 3 cm. The hypotenuse of this triangle is used as a leg of another isosceles right triangle that does not overlap any other triangles, and this process is continued until there are a total of seven triangles. What is the total area, in square centimeters, of these seven triangles? |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #1 - SET 1

| # | Problem | Answer |
|---|---|---|
| 1 | What is the quotient when two thousand, four hundred, eighty-four is divided by twelve? | 207 |
| 2 | Isabella runs the first kilometer of her five-kilometer race in five minutes. How many minutes should she take to run the remaining four kilometers if she wants to average fifteen kilometers per hour for the whole race? | 15 [min] |
| 3 | A recursive sequence has first term nine and subsequent terms each one less than twice the previous term. What is the fourth term of this sequence? | 65 |
| 4 | Evaluate five times the quantity eighteen plus thirty-one. | 245 |
| 5 | What is the surface area, in square meters, of a right rectangular prism with edges measuring nine, seven, and four meters? | 254 [$cm^2$] |
| 6 | What is the fourth term of a harmonic sequence beginning sixty, forty, thirty? | 24 |
| 7 | If two liters of a fifty-percent-acid solution are mixed with three liters of a five-percent acid solution, what percent of the resulting solution is acid? | 23 [%] |
| 8 | In how many ways can the letters in the word BUMBLEBEE (spelled B-U-M-B-L-E-B-E-E) be arranged? | 10,080 (ten thousand eighty) |
| 9 | What is the smallest possible integer number of meters in the length of the fourth side of a quadrilateral with three sides measuring eight, forty-one, and fourteen meters? | 20 |
| 10 | How many positive three-digit integers are factors of one million? | 10 |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #2 - SET 2

| # | Problem | Answer |
|---|---|---|
| 1 | What is the mode of the data set three [PAUSE] nine [PAUSE] five [PAUSE] three [PAUSE] four [PAUSE] one [PAUSE] four [PAUSE] six [PAUSE] nine [PAUSE] nine? | 9 |
| 2 | If Gary can write a math test in one hour and Harry can write one in forty minutes, how many minutes would it take them to write a math test if they worked together? | 24 [min] |
| 3 | What is the nineteenth term of an arithmetic sequence with first term thirty and common difference eleven? | 228 |
| 4 | How many real roots does five-M-squared-minus-fifty-M-minus-ninety have? | 2 [real roots] |
| 5 | What is the measure, in degrees, of an interior angle in a regular eighteen-gon? | 160 [°] |
| 6 | What is the area of a square with a perimeter of ninety-two? | 529 [$un^2$] |
| 7 | If five times the quantity two "D" plus one is equal to four more than three times the quantity "D" minus two, what is the value of "D"? | -1 |
| 8 | An unusual dartboard is a rectangle measuring thirty by forty-five centimeters, with a concentric twenty by thirty-five centimeter rectangular "cow's eye" within it, and a concentric ten by twenty-five centimeter "bull's eye" within that. What is the probability that a dart that hits this dartboard lands inside the "cow's eye" but not the "bull's eye"? | 1/3 |
| 9 | Evaluate the base-sixteen logarithm of one-hundred twenty-eight. | 7/4 (seven-fourths) |
| 10 | Five years ago, Nancy was twice as old as Martin. In six years, the sum of their ages will be 100. How old is Nancy now? | 57 |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### 9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #3 - SET 3

| # | Problem | Answer |
|---|---|---|
| 1 | What is the sum of the terms of an infinite geometric sequence with first term forty five and common ratio two-thirds? | 135 |
| 2 | Evaluate nineteen squared minus sixteen squared. | 105 |
| 3 | What is the dot product of the vectors four COMMA three COMMA two and one COMMA five COMMA six? | 31 |
| 4 | What is the least common multiple of eighteen and twenty-four? | 72 |
| 5 | What is the volume, in cubic meters, of a right circular cylinder with a base radius of seven meters and a height of six meters? | $294\pi$ [$m^3$] (294 "pie") |
| 6 | If five volleyballs can be traded for three umbrellas, and four umbrellas can be traded for six trucks, how many trucks can be traded for three-hundred volleyballs? | 270 [trucks] |
| 7 | What is the distance between the points five-COMMA-seven and two-COMMA-one? | $3\sqrt{5}$ (three-root-five) |
| 8 | Express nine-hundred-eighty-seven as a base-six number. | $4323_{[6]}$ |
| 9 | What is the area, in square meters, of a circle inscribed in an equilateral triangle with a perimeter of twenty-four meters? | $\frac{16\pi}{3}$ [$m^2$] sixteen-"pie"-over-three |
| 10 | Evaluate the product of the complex numbers four plus three "I" (PAUSE) and three minus "I". | $15+5i$ (fifteen-plus-five-I) |

# "Math is Cool" Masters – 2011-12

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### 9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #4 - SET 4

| # | Problem | Answer |
|---|---|---|
| 1 | What is the measure, in degrees, of an angle supplementary to an angle measuring eighty-three degrees? | 97 [°] |
| 2 | Evaluate six-factorial divided by three-factorial. | 120 |
| 3 | A set of three integer test scores from zero to one-hundred inclusive has a mean of eighty-one and a median of seventy-three. What is the largest possible value of its range? | 30 |
| 4 | How many numbers between one-hundred and one-hundred thirty are prime? | 6 [numbers] |
| 5 | What is the area, in square meters, of an equilateral triangle with sides measuring twelve meters? | $36\sqrt{3}$ [$m^2$] (36-root-3) |
| 6 | A line passes through the point five COMMA three and does not pass through the second quadrant. What is the minimum possible value of its slope? | 3/5 (three fifths) |
| 7 | A zoo exhibit contains bipeds and quadrupeds. If there are a total of 84 heads and 200 feet, how many quadrupeds are there? | 16 |
| 8 | How many positive integers are factors of forty-eight? | 10 |
| 9 | Two circles have radii of twelve meters and their centers are thirty meters apart. What is the length, in meters, of one of their common internal tangents? | 18 [m] |
| 10 | How many positive two-digit numbers are congruent to nine [PAUSE] "mod" thirteen? | 6 |

# "Math is Cool" Masters – 2011-12

## Sponsored by: EKA Chemicals

### 9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #5 - SET 5

| # | Problem | Answer |
|---|---|---|
| 1 | Using the digits two, six, and nine exactly once each and the operations of addition, subtraction, multiplication, and division (and parentheses) as much as you like, create an expression that evaluates to twenty-four. | $2 \times 9 + 6$ or $6 + 2 \times 9$ [the 2 and 9 could be reversed too] |
| 2 | What number is thirty eight more than half of three hundred fifty two? | 214 |
| 3 | How many minutes are there in three days? | 4320 [min] |
| 4 | If the probability of rain tomorrow is two-thirds and the probability of tomato soup for lunch tomorrow is three-fourths and these two events are independent, what is the probability of rain but NOT tomato soup for lunch tomorrow? | 1/6 |
| 5 | What is the sum of the roots of three-W-squared-plus-eight-W-equals-fifty? | -8/3 |
| 6 | Two concentric circles are drawn such that a chord of the larger circle is tangent to the smaller circle. If the chord is fourteen meters long, what is the area, in square meters, of the region inside the larger circle but outside the smaller circle? | $49\pi$ [$m^2$] (49 "pie") |
| 7 | A superset of the set of positive one-digit integers contains at least six prime numbers. What is the smallest possible number of elements in the superset? | 11 |
| 8 | What is the sum of the positive integers less than twenty that are divisible by either three or five (or both)? | 78 |
| 9 | What are the coordinates, in the form "X" comma "Y", of the center of the hyperbola with equation three "X" squared minus fifteen "Y" squared plus nine "X" plus sixty "Y" equals ninety? | $\left(-\frac{3}{2}, 2\right)$ |
| 10 | In how many ways can two co-captains be chosen on a fourteen-member track team? | 91 [ways] |

# "Math is Cool" Masters – 2011-12

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### 9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND #6 - SET 6

| # | Problem | Answer |
|---|---|---|
| 1 | What is the sum of the number seven thousand, three hundred, sixty-four and the number eighty-one thousand, nine hundred, fifty-two? | 89316 |
| 2 | What is the product, expressed as a mixed number, of two-and-two-fifths and two-and-two-ninths? | $5\frac{1}{3}$ (five and one third) |
| 3 | What are the coordinates, in the form "X" COMMA "Y", of the "X" intercept of the line two "X" plus five "Y" equals eighteen? | (9,0) (nine COMMA zero) |
| 4 | What is the sum of the positive odd numbers less than fourteen? | 49 |
| 5 | If "N" of "P" equals two "P" cubed minus-one, evaluate "N" of four. | 127 |
| 6 | Two triangles are similar. If the smaller has sides measuring three, five, and six meters, and the larger has two sides measuring ten and twenty meters, what is the length, in meters, of the third side of the larger triangle? | 50/3 (fifty thirds) |
| 7 | What is the sum of the integers from thirteen to thirty-one inclusive? | 418 |
| 8 | A bag contains four red and eight blue marbles. When two marbles are removed, what is the probability that they are both blue? | 14/33 (14 thirty-thirds) |
| 9 | Two numbers have a sum of fifty-nine and a difference of twenty-two. What is the larger of the two numbers? | 81/2 (81 halves) |
| 10 | You have six white Lego blocks and four green Lego blocks, but one white Lego block has been glued to the top of a green lego block. How many distinguishable vertical towers can be created by stacking all of these blocks on top of one another? | 209 |

# "Math is Cool" Masters – 2011-12

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9th & 10th Grade – December 3, 2011

## COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

| # | Problem | Answer |
|---|---|---|
| 1 | What is the tenth term of a geometric sequence with fifth term five and a common ratio of five? | 15625 |
| 2 | When five coins are flipped, what is the probability that there are at least two heads? | 13/16 |
| 3 | Express the square root of two-hundred-sixty in simplest radical form. | $2\sqrt{65}$ |
| 4 | If Lameness is inversely proportional to the square of Intelligence, and an Intelligence of three corresponds to a Lameness of eight, what is the Lameness of a person with an Intelligence of six? | 2 |

Final Score:

**KEY**

(Out of 8)

# "Math is Cool" Masters -- 2011-12

School:_____ Room # ____ Team #____

Name: _____Proctor: _____

Geometry & Algebra 2 **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** | 39 | | |
| **2** | 5/2 [hrs] | | |
| **3** | 90 [diagonals] | | |
| **4** | 6 [integers] | | |
| **5** | 20 [squares] | | |
| **6** | [$] $\frac{KD}{8}$ | | |
| **7** | 8/27 | | |
| **8** | 11 | | |
| | | | |

# Math is Cool" Masters – 2011-12

9th & 10th Grade – December 3, 2011

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 | C | | |
| 2 | A | | |
| 3 | B | | |
| 4 | C | | |
| 5 | A | | |
| 6 | D | | |
| 7 | E | | |
| 8 | C | | |
| 9 | E (151) | | |
| 10 | B | | |
| | | | |

# "Math is Cool" Masters – 2011-12

9th & 10th Grade – December 3, 2011

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 | 277 [°] | | |
| 2 | BCDA [in that order] | | |
| 3 | 82 | | |
| 4 | $y = -3x + 7$ | | |
| 5 | 15 | | |
| 6 | $1103211_4$ | | |
| 7 | $12\sqrt{3} - 6$ [m] | | |
| 8 | [$] 5600 | | |
| 9 | 14540 | | |
| 10 | 9672 | | |
| | | | |

# "Math is Cool" Masters – 2011-12

9th & 10th Grade – December 3, 2011

Final Score:

KEY

First Score

Proctor Name_____Room #_____

**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 | 83 |
| 2 | $\frac{77}{41}$ |
| 3 | $-\frac{1}{57}$ |
| 4 | $\frac{15}{2704}$ |
| 5 | $\frac{1143}{2}$ $[cm^2]$ |