"Math is Cool" Championships – 2017-18

January 26, 2018

Total Correct

KEY

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

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

7th-8th Grade Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	90 [miles]		
2	Sue		
3	84 [%]		
4	1/2		
5	14 [years]		
6	2		
7	12		
8	37		
9	5 [diagonals]		
10	189		
11	17		
12	20		
13	1000000 or 1 million [millimeters]		
14	18 [square units]		
15	8 [values]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	24/25		
17	61		
18	9		
19	9		
20	6		
21	21.6		
22	100		
23	15 [days]		
24	4 [normal dogs]		
25	3/8		
26	34 [feet]		
27	4 [dimes]		
28	1		
29	1185811		
30	27000 [ants]		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	0		
32	6 [cm]		
33	90 [seconds]		
34	20 [points]		
35	4 [ordered triples]		
36	-1/3		
37	$\frac{121\sqrt{3}}{4}$ [cm^2]		
38	54		
39	3822		
40	$8\sqrt{7} + 8\sqrt{3}$ [cm] or $8(\sqrt{7} + \sqrt{3})$ [cm]		
31-40 TOTAL:			

7th -8th Grade

"Math is Cool" Championships – 2017-18

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Total Correct

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

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

7th-8th Grade Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

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

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

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

7th -8th Grade

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7th - 8th Grade 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. Bad sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise:*
  - *For problems dealing with money, a decimal answer should be given.*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *For fifth and sixth grade, all fractions and ratios must be reduced.*
- *Counting or natural numbers refer to the numbers 1,2,3,4 and so on and do NOT include 0.*
- *Units are not necessary unless it is a problem that deals with time and, in that case, am or pm is needed. 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 filled out at the top of the 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 also 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

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! 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.*

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7th – 8th Grade – January 26, 2018

Mental Math Contest

Mental Math – 30 sec per question

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

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! 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 half of seventy-eight?
2	As a common fraction, what is the probability of getting two heads from two coin flips?
3	If Charles is driving at an average rate of fifty miles per hour, how many miles will he have driven in two and a half hours?
4	In terms of pi, what is the number of square inches in the area of a circle with a diameter of eight inches?
5	What is the remainder when one hundred and one is divided by twelve?
6	What is the greatest prime number that is less than twenty?
7	What is the length, in inches, of the longer leg of a right triangle if the shorter leg is six inches and the hypotenuse is ten inches?
8	What is the smallest positive integer value of x for which x squared plus x is greater than or equal to seventy-five?

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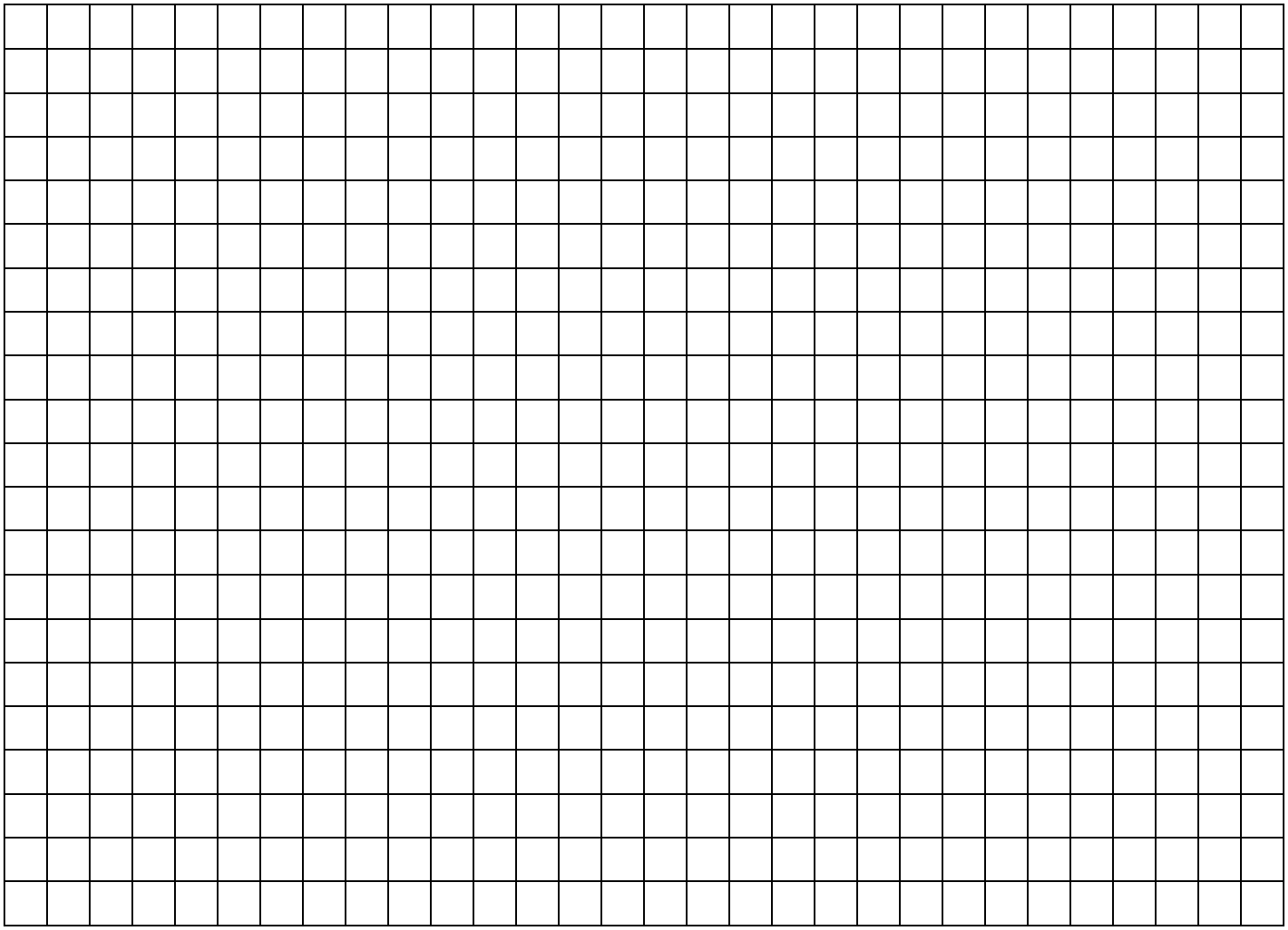
Individual Contest – 7th – 8th Grade

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 - 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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7th – 8th Grade – January 26, 2018

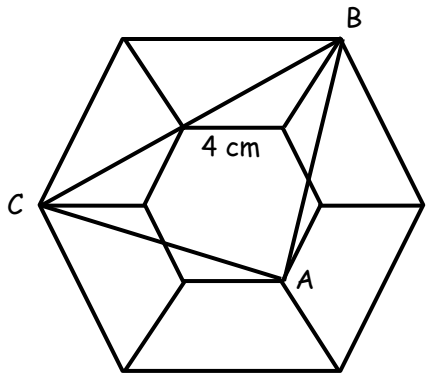
Individual Contest

Record all answers on the colored cover sheet.

	Questions 1-30: 2 points each
1	William spent two hours driving to visit his grandmother. His average speed during the trip was 45 miles per hour. In miles, what is the distance William drove?
2	Mary is taller than Sue, but shorter than Jane. Jane is shorter than Molly. Who is the shortest person out of Mary, Sue, Jane, and Molly?
3	If 4 out of 25 computers in the computer lab are broken, what percentage of the computers are still working?
4	You toss a fair coin ten times and get heads all ten times. As a common fraction, what is the probability you will get heads on the eleventh toss?
5	Robert, who is 45 years old, is three years older than three times the age of Tim. What is the number of years in Tim's age?
6	The sum of three consecutive numbers is 78. What is the positive difference between the largest and smallest of the three numbers?
7	What is the median of the following data set: {10, 13, 11, 19, 26, 9}
8	What is the sum of the first 5 composite numbers?
9	What is the maximum number of diagonals you can draw in a pentagon? A diagonal is a segment connecting any two non-adjacent vertices.
10	Evaluate: $(6-3)(6^2+18+3^2)$
11	What is the positive difference between 3^4 and 4^3?
12	What is the sum of the digits in the decimal representation of $\frac{7}{8}$?
13	There are 100 centimeters in 1 meter. There are 10 millimeters in 1 centimeter. There are 1000 meters in 1 kilometer. How many millimeters are there in 1 kilometer?
14	Square ABCD can be drawn on a coordinate plane. Its vertices are at the following points; A(0, 3), B(-3, 0), C(0, -3) and D(3, 0). What is the number of square units in the area of the square?
15	If $\frac{24}{b}$ is equal to a positive integer, what is the number of possible integer values of b?
16	If $\frac{x+10}{x}$ = 3, then, as a common fraction, what is the value of $\frac{x^2-1}{x^2}$?
17	Convert to base 10: 111101_2
18	What is the sum of the coordinates of the point of intersection of the lines with equations $5x - y = 9$ and $2y - 3x = 3$?
19	Find $f(4)$ if $f(x) = x^2 - 2x + 1$
20	The geometric mean of x and y is $\sqrt{xy}$. What is the positive difference between the geometric and arithmetic means of 12 and 48?
21	A certain geometric sequence increases by multiplying each term in the sequence by $\frac{5}{3}$ to get the next term. As a decimal, what is the fifth term in the sequence if the seventh term is 60?

22	If $a \# b = \frac{2a}{b}$, and b must be a positive integer with a value of 10 or less, what is the largest integer value of a that would satisfy the condition $a \# b \leq 20$?
23	Slimy the Slug is trying to climb a tree, which is 30 feet tall. Slimy can climb three feet each day, but he needs to rest at night. While he rests, he slides back down one foot each night. If he starts at the base of the tree, after how many days will Slimy reach the top of the tree?
24	You walk into a room of normal dogs and mutant dogs, which instead of having one head, have three heads. Each dog, whether normal or mutant, has exactly four feet. You count 44 feet and 25 heads. How many normal dogs are in the room?
25	Carter forgot to study for his true-false history test. He answered seven of the ten questions without guessing, but guessed on the remaining three. Assuming he got all of the seven questions on which he did not guess right, what is the probability that Carter got a score of exactly 90%?
26	In feet, what is the maximum possible integer value perimeter of a rectangle with an area of 16 square feet whose side lengths are also integers?
27	Matt asked Peter if he had change for a dollar. Peter counted all his pennies, dimes, quarters and half-dollars. He replied, "I have more than one dollar's worth of coins. It's the maximum monetary amount with which I still cannot make exact change for a dollar." How many dimes did Peter have in his pocket?
28	What is the units digit of seven to the power of 128?
29	A palindrome is a number that reads the same both forwards and backwards. For instance, 343 is a palindrome. What is the largest palindrome that is less than 1186458?
30	Paul's home is infested with ants. The population of ants in the basement triples every hour. If at 12:00 PM there are 1,000 ants in the basement, how many will there be at 3:00 PM?

Challenge Questions: 3 points each

31	The Thanksgiving Holiday in the United States is always celebrated on the fourth Thursday of the month of November. What is the probability that Thanksgiving will be on November 29 in a given year?
32	The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. What is the number of centimeters in the radius of a sphere with a volume of 288π cm^3?
33	A group of friends is walking together in the dark and need to get over a bridge. This bridge can't hold any more than two people at any given time, or else it will break. Ari takes 25 seconds to get across, Ben takes 15 seconds, Chloe takes 35 seconds, and Danielle takes 10 seconds. The group only has one flashlight, which must be used while walking, so each pair must go at the pace of the slower person. What is the shortest amount of time, in seconds, that it can take for all four friends to get across the bridge? Assume the bridge is too long for throwing the flashlight across to the other side.
34	The point P(3, 5) is reflected across the x-axis to P'. Then P' is reflected across the line with equation y = x to P". Points P, P' and P" are the vertices of a triangle. How many points along the sides of the triangle, including the vertices, have integer coordinates?
35	Uzeifa buys "a" adult tickets for $20 each, "b" senior tickets for $15 each, and "c" children's tickets for $10 each, and spends exactly $100. If $a \neq 0$, $b \neq 0$, and $c \neq 0$, what is the number of possible distinct triples in the order (a, b, c)?
36	What is the y-intercept of a line passing through the points $\left(-\frac{5}{4}, \frac{2}{3}\right)$ and $\left(-\frac{2}{3}, \frac{1}{5}\right)$?
37	In simplest radical form and as a fraction (one number divided by another), what is the number of square centimeters in the area of an equilateral triangle with a side length of 11 centimeters?
38	The mean of a list of twelve numbers is 13, and the modes are a, b, c, and d. If a + 2, b – 6, c + 1 and d – 3 are distinct numbers in the list, and none of them are modes of the list, what is the value of a + b + c + d?
39	What is the value of $3 \cdot (1 + 3 + 5 - 7 + 9 + 11 + 13 - 15 + \ldots + 89 + 91 + 93 - 95 + 97 + 99 + 101 - 103)$?
40	Six congruent isosceles trapezoids surround a regular hexagon with side length of 4 cm as shown. Each of the trapezoids has exactly half the area of the hexagon. In simplest radical form, what is the number of centimeters in the perimeter of ΔABC? 

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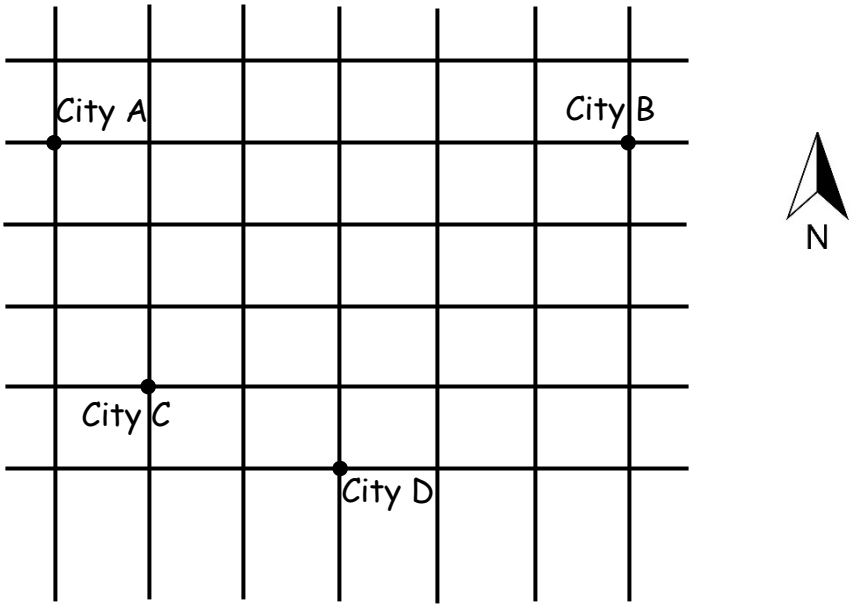
Team Multiple Choice Contest

Use the following map for problems 1 - 4

A group of friends are on a road trip.



The grid squares are 60 miles by 60 miles.

1	How many hours in total will the group spend driving between City A and City B, if they travel at an average speed of 60 miles per hour? A) 3 B) 4 C) 5 D) 6 E) 8
2	Let's say the group wanted to reduce their driving time from City A to City B by one hour compared the driving time that was the answer to problem 1. How fast would they have to drive in miles per hour? A) 80 B) 72 C) 70 D) 66 E) 64
3	Assume the grid lines represent the only roads that can be used to travel between cities. The shortest distance between City B and City D, as the crow flies, is not drivable by car. Let this distance be represented by M. Let N represent the shortest drivable distance between City B and City D. What is the value of N - M? A) 120 B) 180 C) 240 D) 300 E) 420

4	What is the number of possible routes the friends can take in order to start at City A and visit the four cities in alphabetical order if they must follow these rules: 1) drive the shortest route from one city to the next 2) drive either south or west between City B and City C 3) drive either south or east between City C and City D A) 59 B) 112 C) 168 D) 180 E) 210

Use the following stem-and-leaf plot for problems 5 – 7

1	1,1,1,2,3,3,4,5,7,8,9,9
2	0,2,3,3,3,3,5,6,6,8,9
3	1,1,2,5,5,7,8,8,8,9
4	1,1,2,2,2,3

A stem-and-leaf plot is a way of writing a large data set in a more abbreviated format. The numbers in the stem are tens digits and the leaves are ones digits. There are six numbers in the row where 4 is the stem and they are 41, 41, 42, 42, 42, and 43.

5	What is the median of the data in the stem-and-leaf plot? A) 25 B) 25.5 C) 26 D) 26.5 E) 27
6	There is a unique mode (most frequently occurring value) in the data. If all the numbers that equal the mode are removed from the data set, what is the new median? A) 23 B) 26 C) 27 D) 27.5 E) 28
7	The current data set has a mean that is not an integer. There is exactly one number in the data set, that when removed, results in the mean of the remaining numbers in the data set being an integer with no rounding. Which number is this? A) 18 B) 20 C) 28 D) 32 E) 42

The math convention known as simplest radical form is when you multiply a square root by the product of the square roots of any and all factors of the number inside the square root that are perfect squares. For example:

$$\begin{aligned}\sqrt{72} &= \sqrt{4 \cdot 9 \cdot 2} \\ &= \sqrt{4} \cdot \sqrt{9} \cdot \sqrt{2} \\ &= 2 \cdot 3 \cdot \sqrt{2} \\ &= 6\sqrt{2}.\end{aligned}$$

Note: it is also true that

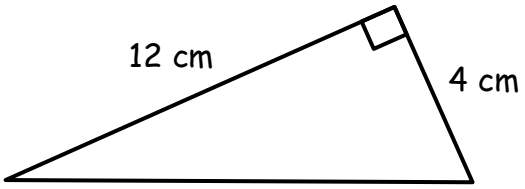
$$\begin{aligned}\sqrt{72} &= \sqrt{4 \cdot 18} \\ &= \sqrt{4} \cdot \sqrt{18} \\ &= 2\sqrt{18}\end{aligned}$$

but this is not considered *simplest* radical form, because the number inside the square root still has a factor that is a perfect square. This convention can be used when solving equations in which the variable is raised to the 2nd power. For example:

$$\begin{aligned}c^2 &= 5^2 + 10^2 \\ c^2 &= 25 + 100 \\ c^2 &= 125 \\ c &= \sqrt{125} \\ c &= \sqrt{25 \cdot 5} \\ c &= \sqrt{25} \cdot \sqrt{5} \\ c &= 5\sqrt{5}\end{aligned}$$

Problems 8 – 10 involve simplest radical form

8 What is the number of centimeters in the length of the hypotenuse of the right triangle below in simplest radical form?



A) $2\sqrt{40}$ cm B) $8\sqrt{20}$ cm C) $16\sqrt{10}$ cm D) $4\sqrt{10}$ cm E) $10\sqrt{4}$ cm

9 Solve the equation below for x in simplest radical form. Reminder: if $x^2 = 9$, then $x = 3$ and $x = -3$.

Solve this equation: $x^2 = 450$

A) $x = \pm 3\sqrt{50}$ B) $x = \pm 5\sqrt{18}$ C) $x = \pm 15\sqrt{2}$ D) $x = \pm 30\sqrt{15}$ E) $x = \pm 45\sqrt{10}$

10 Express the following in simplest radical form.

$$\sqrt{2\sqrt{65} + 18}$$

A) $\sqrt{5} + \sqrt{13}$ B) $10\sqrt{13} + 3\sqrt{2}$ C) $\sqrt{65} + 3\sqrt{2}$ D) $\sqrt{13} + 3\sqrt{2}$ E) Answer not given

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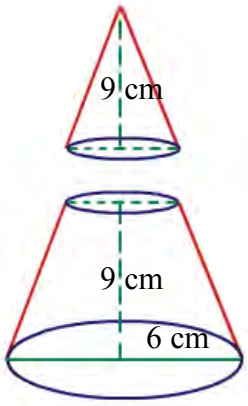
Team Contest

1	If a card is drawn at random from a standard deck of 52 cards, as a common fraction, what is the probability that it is an Ace?
2	What is the first integer greater than 12 to have proper factors that add up to more than the number itself? Proper factors of a number do not include the number itself. For example, the proper factors of 6 are 1, 2, and 3.
3	A cone has a radius of 6 centimeters and a height of 18 centimeters. The cone is divided into two pieces with a cut that runs parallel to the base, 9 centimeters down from the vertex. What is the number of centimeters in the radius of the top piece in the drawing below? 
4	What is the value of the largest term in an arithmetic sequence [1,7,13,19…] that is less than 100?
5	One farmer leaves for the market in a tractor towing his produce in a cart at an average rate of 10 miles per hour. A second farmer leaves from the same farm at the same time, headed for the same market by the same road as the first farmer, on a donkey at an average rate of 4 miles per hour. If it takes the second farmer 45 minutes longer to get to the market, how many miles is it from the farm to the market?
6	One way of generating a number series is by following these rules: 1) an even number is always followed by a new number that is half of the even number 2) an odd number is always followed by a number that is one greater than the odd number A particular number series follows these rules. It begins with 100 and ends with 1. What is the sum of the numbers in this series?

7	A 50-gallon container currently holds 1 gallon of liquid consisting of 30% anti-freeze. What is the number of gallons of pure anti-freeze that must be added in order for the liquid mixture to consist of exactly 50% anti-freeze? Answer as a reduced fraction.
8	A hockey team has six players. Each of the six players has a unique prime number on his/her jersey and these six prime numbers add up to 100. What is the largest product of the numbers on the jerseys of any two of the players?
9	Rounded to the nearest whole number, what is the average of all of the numbers that appear on a 12-month calendar? Only include the days of the months.
10	A cylindrical can has an inner radius of 4 cm and an inner height of 2 cm. A flat, rigid square is entirely enclosed inside the can and the square's four vertices all touch the interior surfaces or edges of the can. What is the number of square centimeters in the area of the largest possible such square?

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Robert Dirks' Relay Contest – Questions & Key

RELAYS - 5 minutes per relay – 15% of team score

There is no talking during this event and you must always be facing forward. Person #1 will be given an answer sheet(s) and will need to fill out the top. The proctor will hand out a strip of paper to each person. These need to be face down on your desk until it is time for the relay to start. Once the relay begins, everyone may turn over their strip of paper and begin working. You may write on the strip of paper to come up with your answer. However, when person #1 figures out his/her problem, he/she will record ***just his/her final answer*** *on the answer sheet and pass only the answer sheet back to the person behind. This continues until person #4 puts an answer on the answer sheet and gives it to the proctor. A correct answer from person #1, #2 and #3 is worth 1 point each. A correct answer from person #4 is worth 2 points making each relay worth 5 points. You will see the expression* ***TNYWG*** [Proctor: write this on the board] *which means: "the number you will get". This is where you put your teammate's answer that they pass back to you, and then you should be able to solve your question. Once the relay begins, turn over your strip of paper and* ***make sure you have the right person number.*** *Remember, no talking and remain facing forward to avoid being disqualified!*

	Practice Relay	Answer
Person 1	What is 12 times 8?	96
Person 2	What is half of TNYWG?	48
Person 3	How many factors does TNYWG have?	10
Person 4	What must be added to TNYWG to get a sum of 100?	90
	Relay #1	Answer
Person 1	What is the largest prime number less than ten?	7
Person 2	What is nineteen minus two times TNYWG?	5
Person 3	What is TNYWG factorial?	120
Person 4	What is the least common multiple of 50 and TNYWG?	600
	Relay #2	Answer
Person 1	What is 20 divided by 40?	$\frac{1}{2}$ or 0.5
Person 2	What is TNYWG times -4?	-2
Person 3	Solve for x: x + TNYWG = 12	14
Person 4	What is the cube of the sum of the digits of TNYWG?	125

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COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	How many two digit numbers contain a zero?	9
2	The average number of degrees in the angles of a triangle is T. The average number of degrees in the angles of a quadrilateral is Q. As a decimal, what is Q divided by T?	1.5
3	What is the sum of the first nineteen odd numbers?	361
4	What is two to the eighth power, minus two squared, minus two?	250
5	The longer leg of a right triangle is twenty-four inches and the hypotenuse is twenty-six inches. In inches, what is the length of the shorter leg of the triangle?	10 [inches]
6	If there are black marbles, red marbles, and yellow marbles in a jar how many marbles must be drawn from the jar to ensure that you have at least two marbles of the same color?	4 [marbles]
7	When rolling a pair of standard six-sided dice, as a common fraction, what is the probability of rolling a sum of five?	$\frac{1}{9}$ or "1 out of 9" or "1 over 9"
8	What is the measure of an interior angle of a regular hexagon?	120 [degrees]
9	In a farm full of chickens and pigs, there are fourteen heads and thirty-six feet. How many pigs are in the farm?	4 [pigs]
10	Jana added all but one of the integers from 1 to 21 together. The sum was a number that is a perfect cube. Which number did Jana leave out?	15

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COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	Julie is holding three cards, a two, a five and a six for a combined sum of thirteen. Wiley is holding two cards, a ten and a three, also for a combined sum of thirteen. What is the greatest difference in combined sums that can be created by trading one card?	16
2	How many non-overlapping circles with radius three centimeters can fit entirely inside a square with side length fourteen centimeters?	4 [circles]
3	What is the maximum area, in square inches, of a rectangle with a perimeter of forty-eight inches?	144 [square inches]
4	By using pennies, nickels, dimes, and quarters, what is the smallest number of coins than can be used to pay for an item that costs sixty-seven cents?	6 [coins]
5	Solve for x: two to the x equals one thousand twenty-four	[x =] 10
6	In soccer, Hope earned seventy-one shutouts in one hundred and fifty-two games that she played. To the nearest ten percent, what is her shutout success percentage?	50[%]
7	As a common fraction, what is the probability of consecutively drawing two queens, without replacement, from a standard deck of cards?	$\frac{1}{221}$ or "1 out of 221" or "1 over 221"
8	How many factors are in two thousand and eighteen?	4 [factors]
9	Steve is thinking of a two-digit number. What is the probability that the digits themselves are not prime?	$\frac{1}{3}$
10	What is the sum of the two solutions to the following equation: x squared plus eight equals thirty-three	0

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7th – 8th Grade – January 26, 2018

COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	What is the median of the list of positive multiples of eight that are less than one hundred?	52
2	The three angles of a triangle are in a ratio of two to four to six. What is the number of degrees in the largest angle?	90 [degrees]
3	Erik can fold ten paper cranes in one hour. Leanne can fold fifteen paper cranes in seventy-five minutes. How many more paper cranes has Leanne folded than Erik after an hour and a half?	3 [paper cranes]
4	A fair coin is tossed four times. As a common fraction, what is the probability that heads will appear at least once?	$\frac{15}{16}$ or "15 out of 16" or "15 over 16"
5	In how many ways can the letters of the word "college" be arranged, spelled C-O-L-L-E-G-E?	1260 [ways]
6	If each dimension of a cube is quadrupled, how many times greater is the new volume than the original volume?	64 [times]
7	What is the cube root of three hundred and forty-three?	7
8	In cubic centimeters, what is the smallest possible volume of a box with distinct dimensions, which are composite numbers of centimeters greater than ten?	2520 [cm^3]
9	How many consecutive zeroes are found at the end of the number represented by fifty factorial?	12 [zeros]
10	What is the sum of the two solutions to the equation x squared, minus x, equals 12.	1

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COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	As a common fraction, what is the probability that a randomly chosen positive two-digit integer is a factor of twenty-four?	$\frac{1}{45}$ or "1 out of 45" or "1 over 45"
2	Maya has made thirteen straight free throws. If she is going to shoot fifteen more times, what is the minimum number she needs to make to guarantee that her free-throws-made percentage is more than eighty percent?	10 [made free throws]
3	What is three to the sixth power?	729
4	The first three Fibonacci numbers are one, one, and two. What is the positive difference between the twelfth Fibonacci number and twelve dozens?	0
5	The measure of the angles of a triangle are in a ratio of four to five to six. In degrees, what is the measure of the smallest angle?	48 [degrees]
6	As a common fraction, what is the probability of rolling a non-composite number on a four-sided die?	$\frac{3}{4}$ or "3 out of 4" or "3 over 4"
7	What is the least common multiple of forty-nine and fifty-one?	2,499
8	Each side of a triangle has a different positive integer number of centimeters as its length. What is the least possible number of centimeters in the perimeter of this triangle?	9 [cm]
9	How many three-digit area codes are possible, assuming that the first digit is not zero and the digits cannot repeat?	648 [area codes]
10	Twelve people attended a party. The adults all ate two cookies each, while the kids ate seven cookies each. If a total of forty-nine cookies were eaten, how many adults attended the party?	7 [adults]

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COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	How many seconds are in three hours?	10,800 [seconds]
2	Evaluate five x squared, plus three x, plus two, if x equals five.	142
3	What is the number of two-digit integers in which the sum of their digits is ten?	9 [integers]
4	All the sides of a triangle have integer lengths in inches and the perimeter is seven inches. What is the number of inches in the smallest possible side length of a triangle matching this description?	1 [inch]
5	All the red cards are removed from a standard deck of fifty-two cards. What is the probability of drawing the king of hearts from the remaining cards?	0
6	What is the sum of adding the first five prime numbers and the first five composite numbers?	65
7	As a common fraction, what is the reciprocal of the sum of one-tenth and one-ninth?	$\frac{90}{19}$ or "90 over 19"
8	What is twenty-four as a base three number?	220 [base 3] or two two zero [base 3]
9	If five rabbits can dig ten burrows in four days, how many burrows can three rabbits dig in eight days?	12 [burrows]
10	The surface-area-of-a-cylinder formula is two-pi-R-squared plus two-pi-R-H. What is the surface area, in square inches, of a cylinder with a diameter of four inches and a height of seven inches? Answer in terms of pi.	36π [square inches]

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COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	There are five thousand two hundred and eighty feet in one mile. How many inches are in one mile?	63,360 [inches]
2	What is the number of ways to multiply three distinct positive integers such that the result is twelve?	2 [ways]
3	At three o'clock the hands of a clock form a ninety-degree angle and a two-hundred-and-seventy-degree angle. The ratio of these angles as a fraction is one over three. As a common fraction, what is the ratio of the angles formed by the hands at five o'clock?	$\frac{5}{7}$ or "5 over 7"
4	A CD is one hour and twenty minutes long. If songs last an average of four minutes and there must be a five-second gap between consecutive songs, what is the maximum number of songs that can be on the CD?	19 [songs]
5	Evaluate twelve factorial divided by ten factorial.	132
6	The price of the stamp went from forty-four cents to forty-seven cents. To the nearest whole percent, what was the increase in the price?	7 [%]
7	On one day, Leo noticed that the sun rose at seven thirty AM and set at nine PM. As a decimal number of hours, for how long was the sun *not* visible on that day?	10.5 [hours]
8	A bag contains one each of the twenty-six letters of our alphabet. The letters A, E, I, O, and U, are vowels. Three letters are randomly drawn from the bag without replacement. As a common fraction, what is the probability that all three are vowels?	$\frac{1}{260}$ or "1 out of 260" or "1 over 260"
9	Find the units digit of three to the one hundred and sixth power.	9
10	The volume formula for a pyramid is base area times height, divided by three. What is the number of cubic centimeters in the volume of a pyramid, whose square base has a diagonal of six times the square root of two centimeters, and a height of six centimeters?	72 [cm^3]

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COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	What is the number of centimeters in the length of the hypotenuse of a right triangle with legs of length twenty-four centimeters and forty-five centimeters?	51 [cm]
2	What is the remainder when one thousand is divided by seven?	6
3	How many more sides does a nonagon have than a heptagon?	2 [sides]
4	A certain baseball card currently has a value of one dollar and its value doubles each day, so in one day, it will have a value of two dollars. In how many days will its value exceed one million dollars?	20 [days]
5	Solve for x: three to the x power equals two hundred and forty-three.	[x=] 5
6	As a common fraction, what is the cube root of the quantity twenty-seven over seven hundred and twenty-nine.	$\frac{1}{3}$ or "1 over 3"

Final Score:

KEY

(Out of 8)

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Student Name _____ Team #_____

School Name _____ Proctor Name_____ Room #_____

7th – 8th Grade **Mental Math** – 30 sec per question

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

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! 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	1/4		
3	125 [miles]		
4	16π [in^2]		
5	5		
6	19		
7	8 [inches]		
8	[x =] 9		

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7th – 8th Grade

School Name_____Team #_____

Proctor Name _____Room #_____

Final Score: KEY
First Score (out of 20)

Team Multiple Choice Contest – 15 minutes – 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. When you are prompted to begin, tear off the colored sheet, pass out a copy of the test to each team member, and begin testing. ***Since this is a multiple choice test, ONLY a letter response should be listed as an answer on the answer sheet.***

Correct responses are worth 2 points, incorrect responses are worth -1 point and no response is 0 points.

DO NOT WRITE IN SHADED REGIONS

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

"Math is Cool" Championships – 2017-18

7^{th} – 8^{th} Grade

School Name_____ Team #_____

Proctor Name_____ Room #_____

Final Score: KEY
First Score (out of 10)

Team Contest – Score Sheet – 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 a 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	$\frac{1}{13}$		
2	18		
3	3 [cm]		
4	97		
5	5 [miles]		
6	250		
7	$\frac{2}{5}$ [gallons]		
8	1333		
9	16		
10	34 [cm^2]		

"Math is Cool" Championships -- 2017-18

7th – 8th Grade

KEY

PRACTICE RELAY

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
96	**48**	**10**	**90**
1 or 0	1 or 0	1 or 0	2 or 0

RELAY # 1

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
7	**5**	**120**	**600**
1 or 0	1 or 0	1 or 0	2 or 0

RELAY # 2

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
½	**-2**	**14**	**125**
1 or 0	1 or 0	1 or 0	2 or 0

Final Score:

"Math is Cool" Championships -- 2017-18

Student Name _____ Team #_____

School Name _____ Proctor Name_____ Room #_____

7th – 8th Grade **Mental Math** – 30 sec per question

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

"Math is Cool" Championships – 2017-18

7^{th} – 8^{th} Grade

Final Score:
First Score (out of 20)

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Proctor Name _____ Room #_____

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

"Math is Cool" Championships – 2017-18

7^{th} – 8^{th} Grade

Final Score:
First Score (out of 10)

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9			
10			