"Math is Cool" Championships – 2018-19

#sponsor

#date

7th-8th 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 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.*

<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.*

Final Score:
(Out of 8)

"Math is Cool" Championships -- 2018-19

School:_____ Room # _____ Team #_____

Name: _____ Proctor: _____

7th – 8th Grade **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			
2			
3			
4			
5			
6			
7			
8			

“Math is Cool” Championships – 2018-19

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7th-8th – #date

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 product of twelve and four?
2	A circle has an area of sixty-four pi square centimeters? What is the number of centimeters in the radius?
3	What is the remainder when four hundred and fifty-three is divided by five?
4	A right triangle has legs with lengths of three inches and four inches. What is the number of square inches in the area of the triangle?
5	What it one-third of one-tenth of ninety?
6	Solve the following equation for X: seven X plus two equals sixty-five
7	A field has only alpacas and ducklings. There are seven alpacas and a total of thirty-eight legs in the field. How many ducklings are in the field?
8	Angel writes down all the numbers from one to fifty-five. How many times does he write the digit five?

Final Score:

KEY

(Out of 8)

"Math is Cool" Championships -- 2018-19

School:_____ Room # _____ Team #_____

Name: _____ Proctor: _____

7th – 8th Grade **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	48		
2	8 [cm]		
3	3		
4	6 [in^2]		
5	3		
6	[x =] 9		
7	5 [ducklings]		
8	12 [times]		

"Math is Cool" Championships – 2018-19

#date

Total # Correct:

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

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

7th-8th 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:			

7^{th} -8^{th} Grade

“Math is Cool” Championships – 2018-19

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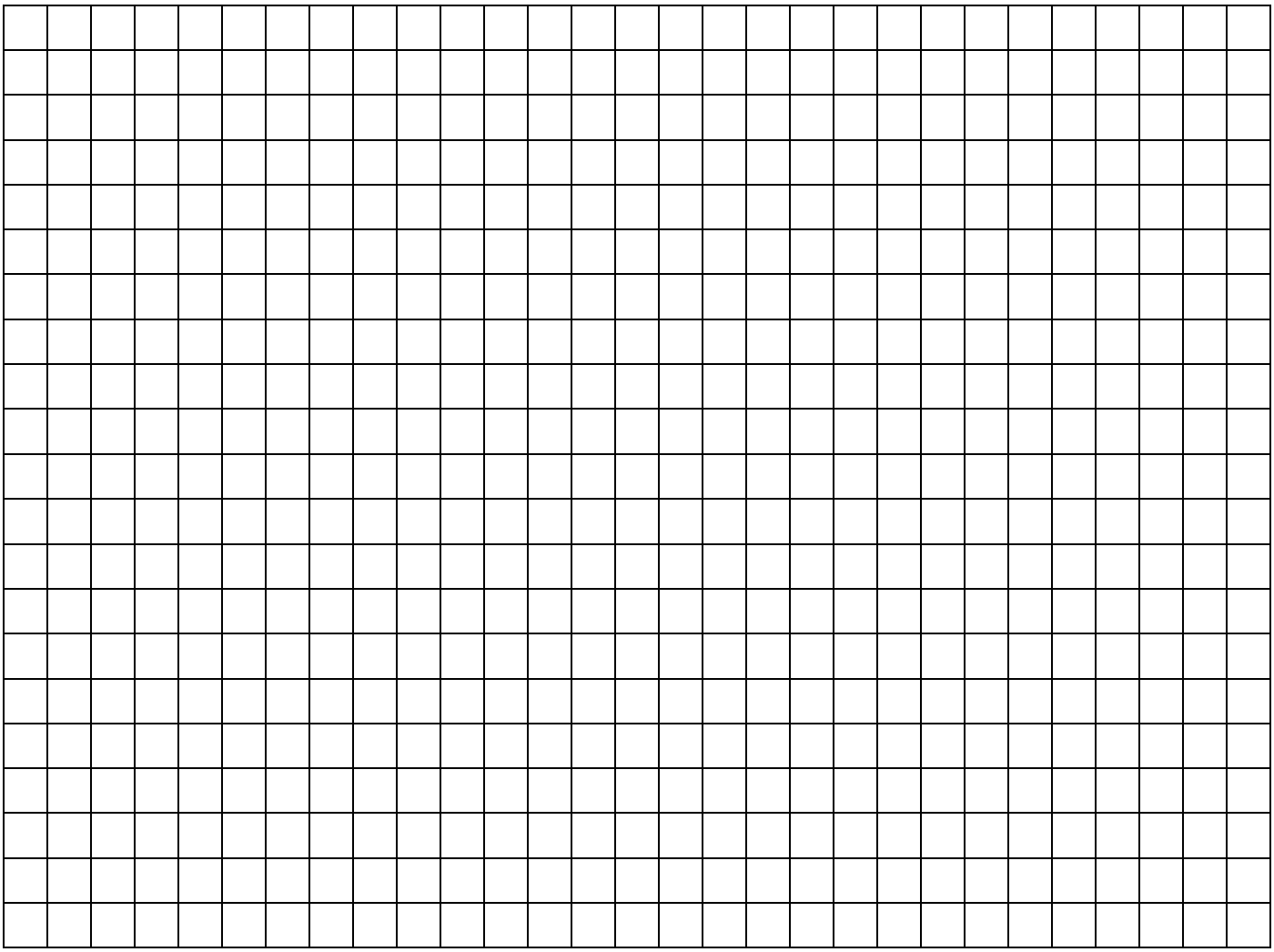
#date

7th-8th 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 - 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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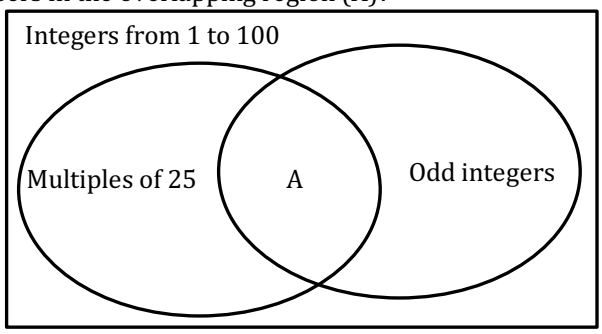
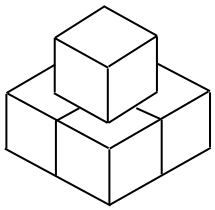
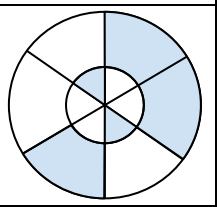
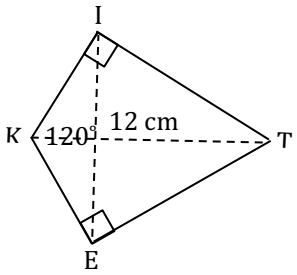
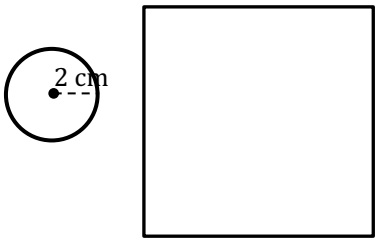
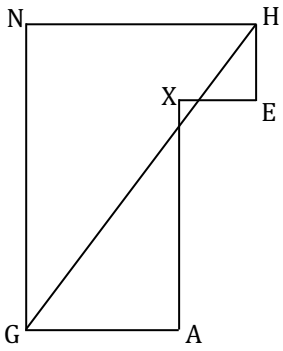
7th-8th Individual Contest

	Questions 1-30: 2 points each
1	What is 95% of 300?
2	What is the mean (average) of the set of numbers {10, 50, 100, 200, 500, 1000}?
3	A number is randomly selected from the list {2, 3, 4, 5, 7, 9, 11, 12, 13, 16, 18, 19, 20, 21}. As a common fraction, what is the probability that it is a multiple of 3?
4	Solve for x: $18x + 90 = -36$
5	In how many different orders can the numbers {1, 2, 3, 4} be listed such that they are <u>not</u> in order from least to greatest or from greatest to least?
6	Evaluate: $47 + 3(11 - 6)^2$
7	What is the number of inches in the height of a triangle whose area is 200 in^2 and whose base is 10 inches?
8	How many cups are in 3 quarts?
9	As a common fraction, what is $\frac{15}{35} \cdot \frac{14}{25} \cdot \frac{1}{3}$?
10	What is the median of the following set of data? {1, 1, 11, 111, 11, 111, 1, 1.1, 1}
11	Min has 7 quarters, 14 dimes, 21 nickels, and 37 pennies. How many cents does she have in total?
12	In a Fibonacci sequence, each term is the sum of the previous two terms. In this sequence, each term is the sum of the previous three terms. What is the missing number in this sequence: 1, 2, 3, 6, 11, 20, ___, 68?
13	What is the sum of the numbers in the overlapping region (A)? 
14	As a common fraction, what is $\frac{7}{15} \div \frac{3}{5}$?
15	Sandra earns $10 per hour plus tips at the Waffle House. On average, a person waiting tables at the Waffle House receives $75 in tips working a 6-hour weekend evening shift and $25 in tips working an 8-hour weekday shift. Sandra's schedule allows her to work three 8-hour weekday shifts and two 6-hour weekend evening shifts each week. In dollars, how much does she expect to earn in a week?

16	The perimeter of a rectangle is 58 inches. The length of the rectangle is 19 inches. What is the number of square inches in the area of the rectangle?
17	Farmer Larry and Farmer Sanjay harvest 6 corn fields together in 5 hours. Larry and Sanjay work at the same speed. How many hours would it take Larry to harvest 9 corn fields by himself?
18	How many digits are in the product of 123 and 871?
19	For the 10-digit number 1592670843, let A be the largest sum of any three consecutive digits, and let B be the smallest sum of any three consecutive digits in the 10-digit number. What is the positive difference between A and B?
20	A stack of cubes is formed such that each of the 4 corners of the base of any cube higher than the bottom level, must be resting on a distinct cube beneath it. Two levels are shown to the right. If there is only 1 cube at the top level, and there are 4 levels in total, what is the total number of cubes? 
21	Meg gives her brother exactly 20% and her sister exactly 15% of her crackers. She only gives her brother and sister whole crackers. After giving these crackers to her brother and sister, what is the minimum possible number of crackers that Meg could still have?
22	How many ways can you rearrange the letters in the word "MIRROR"?
23	Huey and Louey go to the store. Huey buys 3 towels and 2 boxes of detergent for a total of 29 dollars. Louey buys 2 towels and 1 box of detergent for a total of 18 dollars. How many dollars does a box of detergent cost?
24	Julian runs at an average rate of 8 miles per hour. How many seconds will it take him to run 3.5 miles?
25	What is the number of square units in the area of a polygon with vertices at (3,3), (11,3), (9,7), and (5,7) on a coordinate plane?
26	A certain antibiotic kills bacterial microorganisms exponentially at a rate of 50% per hour. For example, if there were 100 microorganisms when the antibiotic is applied, then after 1 hour there would be 50 microorganisms left, and after 2 hours there would be 25 microorganisms left. If there are 1536000 microorganisms before the antibiotic is applied, how many microorganisms would be left 3 hours after it is applied?
27	What is the value of $(x + y)(x - y)(x + y)(x - y)$, if $x = 13$ and $y = 12$?
28	A circle has a radius of 14 inches. In simplest radical form, what is the number of inches in the radius of a second circle whose area is twice the area of the first circle?
29	In the figure to the right, the radius of the smaller circle is 6 cm and the radius of the larger circle is 12 cm. Both circles are divided into 6 parts of equal area by the radii. In terms of π, what is the number of square centimeters in the combined areas of the shaded regions? 
30	Twin primes are prime numbers whose difference is 2. For example, 101 and 103 are twin primes. What is the sum of the next pair of three-digit twin primes after 101 and 103?

Challenge Questions: 3 pts each

31	Natural numbers of the form $F_n = 2^{2^n} + 1$ are called *Fermat Numbers*. What is the units digit of F_{2000}?
32	Each of the positive integers from 1 to 100 are written on 100 index cards with exactly one of the integers on each card. The cards with multiples of 3, multiples of 11, and multiples of 21 are removed. What is the sum of the integers on the remaining cards?
33	If the sum of a and b is 12 and their product is 8, what is $a^2 + b^2$?
34	Every day, six turtles line up randomly on a sunlit log. Three of them are outwardly identical green turtles and three are outwardly identical orange turtles. What is the probability that they line up one day with the same pattern of colors as the previous day, but with each individual turtle in a new spot?
35	Express the repeating decimal $0.34\overline{84}$ as a common fraction.
36	In kite KITE, $m\angle E = m\angle I = 90^\circ$, $m\angle K = 120^\circ$, and KT = 12 cm. In simplest radical form, what is the number of centimeters in the length of diagonal $\overline{EI}$? 
37	On a 40-question test, Tom can earn 5 points for a correct answer, 0 points for an incorrect answer, or 1 point for not answering. There are 6 scores less than 200 that are impossible to attain. What is the sum of the second lowest and the fourth lowest impossible score?
38	A square has area of 100 cm^2. How many complete circles with a radius of 2 cm can be drawn entirely inside the square, such that the circles do not overlap each other? 
39	For how many integer values of n between 9 and 9 million are both n + 1 and n – 1 palindromes? Reminder: single digit numbers are palindromes.
40	In HEXAGN all adjacent sides are perpendicular, HE = 2 cm, EX = 2 cm, NG = 8 cm, and NH = 6 cm. As a common fraction, what part of the segment $\overline{GH}$ lies outside the hexagon? 

"Math is Cool" Championships – 2018-19

#date

Total # Correct:

KEY

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

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

7th-8th Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	285		
2	310		
3	5/14		
4	[x =] -7		
5	22 [orders]		
6	122		
7	40 [inches]		
8	12 [cups]		
9	2/25		
10	1.1		
11	457 [cents]		
12	37		
13	100		
14	7/9		
15	[$] 585 [.00] [dollars]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	190 [in^2]		
17	15 [hours]		
18	6 [digits]		
19	5		
20	30 [cubes]		
21	13 [crackers]		
22	120 [ways]		
23	[$] 4[.00] [dollars]		
24	1575 [seconds]		
25	24 [units^2]		
26	192000 [microorganisms]		
27	625		
28	$14\sqrt{2}$ [inches]		
29	66π [cm^2]		
30	216		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	7		
32	3070		
33	[$a^2 + b^2$ =] 128		
34	1/9		
35	23/66		
36	$6\sqrt{3}$ [cm]		
37	390		
38	5 [circles]		
39	6 [integer values]		
40	1/12		
31-40 TOTAL:			

7^{th} -8^{th} Grade

Math is Cool" Championships – 2018-19

7th-8th – #date

Final Score:

School Name _____Team #_____

First Score

Proctor Name _____Room # _____

(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			
2			
3			
4			
5			
6			
7			
8			
9			
10			

"Math is Cool" Championships – 2018-19

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7th-8th – #date

Team Multiple Choice Contest

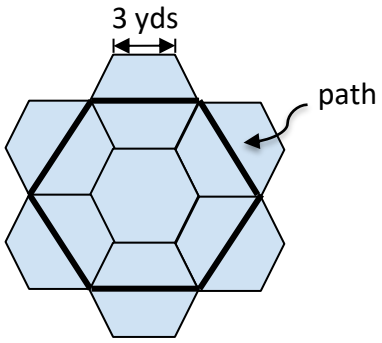
In the year 2050, according to one prediction, people will travel using three methods of transportation: a hoverboard, a hydrocar, or a hypertrain. It is estimated that hoverboards will cost $20, hydrocars will cost $150, and hypertrains will cost $3,500.

Average operating cost per 10 miles and maximum capacity of each vehicle		
HOVERBOARD	HYDROCAR	HYPERTRAIN
$2.40/10 miles	$14.00/10 miles	$480.00/10 miles
1 person max	6 people max	200 people max

Some imaginable scenarios are presented in questions 1-3.

1	A public hypertrain that is filled to 85% of capacity breaks down halfway to its destination. The government decides to use only hydrocars to transport all the people on the broken-down hypertrain the rest of the way. How many hydrocars would be needed? A) 27 B) 28 C) 29 D) 30 E) 31
2	A group of 3 friends wants to go on a road trip. Collectively, they have $250 saved up and they need to purchase hoverboards. Rounded to the nearest 10 miles, how many miles would they be able to travel with their new hoverboards before they run out of money? A) 260 B) 270 C) 780 D) 810 E) 840
3	A hoverboard will have the capacity to molecularly compress things so that you can still bring stuff with you when you travel with one. Its compressor will be able to quickly convert a 1-cubic-foot object into a smaller, geometrically similar version with a volume of 1 cubic inch and back again. Within the body of the hoverboard there will be a storage section with dimensions 2 inches by 3 inches by 8 inches. A typical suitcase has the shape of a rectangular prism and has dimensions 30 inches by 18 inches by 10 inches. What is the maximum number of compressed versions of these suitcases that could fit in the storage space on the hoverboard? A) 10 B) 12 C) 13 D) 14 E) 15

The figure at the right represents the design for a garden that is about to be constructed and is used for problems 4 - 7. In the design, there are 7 congruent regular hexagons whose edge lengths are all 3 yards and a hexagonal path around the interior of the garden. Each side of the hexagonal path divides one of the exterior hexagons exactly in half.



4	What is the number of yards in the perimeter of the garden? A) 18 B) 27 C) 36 D) 45 E) 54
5	What is the ratio of the area of the garden outside the hexagonal path to the area of the garden inside the path? A) 2:3 B) 2:5 C) 3:4 D) 3:7 E) 8:6
6	The garden will have three identical benches and three identical garden gnomes, which will be distributed among the 6 trapezoids inside the path. In how many ways can these objects be distributed among the 6 trapezoids, if each trapezoid has exactly one object? A) 6 B) 20 C) 36 D) 120 E) 400
7	The landscape architect who designed the garden originally wanted to include a circle of rocks tangent to the garden at all twelve of the outer vertices. What is the number of square yards in the area of this circle? A) 20.25π B) 36π C) 60.75π D) 63π E) 81π
Use the following scenario for problems 8 – 10. A rising pop singer named Gra-Sia will put on a concert for her fans. Ticket prices are \$25 for seniors, \$40 for adults, \$30 for teenagers, and \$20 for children.	
8	Gra-Sia wants to perform only her favorite 7 songs at the concert. In how many orders can she perform the 7 songs, if her most popular song must be last. A) 120 B) 240 C) 720 D) 1440 E) 5040
9	So far 75% of the tickets sold were purchased by teenagers, 17.5% were purchased by adults, 5% were purchased for children and 7 senior tickets have been purchased. To the nearest cent, what is the mean amount that has been spent on a ticket? A) \$28.75 B) \$28.76 C) \$31.12 D) \$31.13 E) \$32.16
10	Gra-Sia knows that there are 12 half-steps between notes that are separated by an octave and the frequencies of these notes make a geometric sequence with a common ratio of $\sqrt[12]{2}$ or 2^(1/12). For example, the note known as C_4 has a frequency of 261.6 Hz, and the first half-step above C_4 is $C^{\#}$, which has a frequency of $261.6 \cdot 2^{(1/12)}$. The second half-step above C_4 is D, which has a frequency of $261.6 \cdot 2^{(1/12)} \cdot 2^{(1/12)} = 261.6 \cdot 2^{(2/12)} = 261.6 \cdot 2^{(1/6)}$. One way to notate the sequence of twelve half-steps in ascending order of frequency is C_4, $C^{\#}$, D, $D^{\#}$, E, F, $F^{\#}$, G, $G^{\#}$, A, $A^{\#}$, B, C_5. When Gra-Sia sings a D and her back-up singer sings a different note from this sequence, the average frequency of the two notes is $\frac{261.6 \cdot 2^{(1/6)}(1 + 2^{(1/2)})}{2}$. What note is her back-up singer singing? A) $G^{\#}$ B) $F^{\#}$ C) E D) $C^{\#}$ E) Answer not given

Math is Cool" Championships – 2018-19

7th-8th – #date

Final Score:

KEY

School Name _____Team #_____

Proctor Name _____Room # _____

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

"Math is Cool" Championships – 2018-19

7th-8th – #date

Final Score:

First Score
(out of 10)

SCHOOL NAME _____ **Team #** _____

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

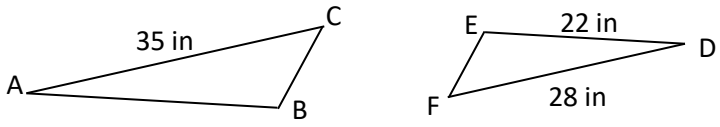
	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

"Math is Cool" Championships – 2018-19

#sponsor

7th-8th – #date

Team Contest

1	Solve the following equation for x: $3x + 27 = 10x - 29$
2	Evaluate and give your answer as a common fraction: $\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$
3	Moises has an average pulse of 60 beats per minute. Cassidy has an average pulse of 72 beats per minute. How many more times does Moises' heart beat in one 24-hour period than Cassidy's heart beats?
4	The operation • is defined as $a \bullet b = (a - 13)(12 + b) - 7$. What is $16 \bullet 5$?
5	Triangle ABC is similar for triangle DEF. As a decimal, what is the number of inches in the length of side $\overline{AB}$? 
6	Solve for x: $4 = \sqrt{4 + \sqrt{4 + x}}$
7	Albert, Beth, Callie, Dean, and Erin all sit in one row of a movie theater that has 7 seats. In how many different ways can they occupy five of the seven seats?
8	Evaluate: $\left(25^{1/2} \cdot \left(\frac{1}{2}\right)^{25}\right) / \left(\left(\frac{1}{4}\right)^{12} \cdot 4^2\right) \cdot \left(\frac{7^{12}}{7^{10}}\right)$. The answer is a mixed number and when it is simplified it has the form $A\frac{B}{C}$. What is the value of A + B + C?
9	Bob's ice cream parlor has 4 types of cones and 5 different ice cream flavors. When you order an ice cream cone you can have one, two, or three scoops. Whether you order one, two, or three scoops, each of the scoops may be any of the five flavors. What is the total number of distinct ice cream cones that can be made? Assume that a waffle cone with a scoop of strawberry on top of a scoop of vanilla is considered different than a waffle cone with a scoop of vanilla on top of a scoop of strawberry and that this assumption applies to all types of cone and all ice cream flavors.
10	The following two equations are graphed on a coordinate plane: $f(x) = \frac{1}{3}x^2 + 2$ and $g(x) = 3x - 40$ The line given by the equation $h(x) = -\frac{3}{2}x + 23$ intersects with each of them in the first quadrant. In simplest radical form, what is the number of units in the distance between the intersection points where h(x) passes through f(x) and g(x) in the first quadrant?

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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	[x =] 8		
2	1/720		
3	17280 [times]		
4	44		
5	27.5 [in]		
6	[x =] 140		
7	2520 [ways]		
8	60		
9	620 [ice cream cones]		
10	$4\sqrt{13}$ [units]		

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School:_____Team #_____

Proctor: _____ Room #_____

PRACTICE RELAY

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

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School:_____Team #_____

Proctor: _____ Room #_____

PRACTICE RELAY

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

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School:_____ Team #_____

Proctor: _____ Room #_____

RELAY #1

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

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School:_____ Team #_____

Proctor: _____ Room #_____

RELAY #1

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

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School:_____Team #_____

Proctor: _____ Room #_____

RELAY #2

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

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School:_____Team #_____

Proctor: _____ Room #_____

RELAY #2

Answer for question # 1	Answer for question # 2	Answer for question # 3	Answer for question # 4
1 or 0	1 or 0	1 or 0	2 or 0

Fill in your answer and pass back to the next person.

7th-8th Grade	Practice Relay – Person 1
Question 1	What is 8 times 4?

7th-8th Grade	Practice Relay – Person 1
Question 1	What is 8 times 4?

7th-8th Grade	Practice Relay – Person 2
Question 1	What is 8 times 4?
Question 2	What is TNYWG divided by 2?

7th-8th Grade	Practice Relay – Person 2
Question 1	What is 8 times 4?
Question 2	What is TNYWG divided by 2?

7th-8th Grade	Practice Relay – Person 3
Question 2	What is TNYWG divided by 2?
Question 3	What is the square root of TNYWG?

7th-8th Grade	Practice Relay – Person 3
Question 2	What is TNYWG divided by 2?
Question 3	What is the square root of TNYWG?

7th-8th Grade	Practice Relay – Person 4
Question 3	What is the square root of TNYWG?
Question 4	What is TNYWG plus 24?

7th-8th Grade	Practice Relay – Person 4
Question 3	What is the square root of TNYWG?
Question 4	What is TNYWG plus 24?

7th-8th Grade	Relay #1 – Person 1
Question 1	What is the sum of the digits in the number 12,345,678?

7th-8th Grade	Relay #1 – Person 1
Question 1	What is the sum of the digits in the number 12,345,678?

7th-8th Grade	Relay #1 – Person 2
Question 1	What is the sum of the digits in the number 12,345,678?
Question 2	What is TNYWG times 3?

7th-8th Grade	Relay #1 – Person 2
Question 1	What is the sum of the digits in the number 12,345,678?
Question 2	What is TNYWG times 3?

7th-8th Grade	Relay #1 – Person 3
Question 2	What is TNYWG times 3?
Question 3	As a decimal to the nearest tenth, what is TNYWG divided by 24?

7th-8th Grade	Relay #1 – Person 3
Question 2	What is TNYWG times 3?
Question 3	As a decimal to the nearest tenth, what is TNYWG divided by 24?

7th-8th Grade	Relay #1 – Person 4
Question 3	As a decimal to the nearest tenth, what is TNYWG divided by 24?
Question 4	On a certain trapezoid the length of the longer base divided by the length of the shorter base is TNYWG. The area of the trapezoid is 165 square centimeters and its height is a whole number of centimeters. What is the smallest possible number of centimeters in the height of the trapezoid?

7th-8th Grade	Relay #1 – Person 4
Question 3	As a decimal to the nearest tenth, what is TNYWG divided by 24?
Question 4	On a certain trapezoid the length of the longer base divided by the length of the shorter base is TNYWG. The area of the trapezoid is 165 square centimeters and its height is a whole number of centimeters. What is the smallest possible number of centimeters in the height of the trapezoid?

7th-8th Grade	Relay #2 – Person 1
Question 1	What is 72 divided by 6?

7th-8th Grade	Relay #2 – Person 1
Question 1	What is 72 divided by 6?

7th-8th Grade	Relay #2 – Person 2
Question 1	What is 72 divided by 6?
Question 2	How many distinct positive prime number factors does TNYWG have?

7th-8th Grade	Relay #2 – Person 2
Question 1	What is 72 divided by 6?
Question 2	How many distinct positive prime number factors does TNYWG have?

7th-8th Grade	Relay #2 – Person 3
Question 2	How many distinct positive prime number factors does TNYWG have?
Question 3	A rectangle with perimeter 124 inches has side lengths that differ by TNYWG inches. What is the number of square inches in the area of the rectangle?

7th-8th Grade	Relay #2 – Person 3
Question 2	How many distinct positive prime number factors does TNYWG have?
Question 3	A rectangle with perimeter 124 inches has side lengths that differ by TNYWG inches. What is the number of square inches in the area of the rectangle?

7th-8th Grade	Relay #2 – Person 4
Question 3	A rectangle with perimeter 124 inches has side lengths that differ by TNYWG inches. What is the number of square inches in the area of the rectangle?
Question 4	A number from 1 to TNYWG is randomly chosen. As a common fraction, what is the probability that it is a multiple of 35 but not a multiple of 6?

7th-8th Grade	Relay #2 – Person 4
Question 3	A rectangle with perimeter 124 inches has side lengths that differ by TNYWG inches. What is the number of square inches in the area of the rectangle?
Question 4	A number from 1 to TNYWG is randomly chosen. As a common fraction, what is the probability that it is a multiple of 35 but not a multiple of 6?

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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 8 times 4?	32
Person 2	What is TNYWG divided by 2?	16
Person 3	What is the square root of TNYWG?	4
Person 4	What is TNYWG plus 24?	28
	Relay #1	Answer
Person 1	What is the sum of the digits in the number 12,345,678?	36
Person 2	What is TNYWG times 3?	108
Person 3	As a decimal to the nearest tenth, what is TNYWG divided by 24?	4.5
Person 4	On a certain trapezoid the length of the longer base divided by the length of the shorter base is TNYWG. The area of the trapezoid is 165 square centimeters and its height is a whole number of centimeters. What is the smallest possible number of centimeters in the height of the trapezoid?	1 [centimeter]
	Relay #2	Answer
Person 1	What is 72 divided by 6?	12
Person 2	How many distinct positive prime number factors does TNYWG have?	2 [factors]
Person 3	A rectangle with perimeter 124 inches has side lengths that differ by TNYWG inches. What is the number of square inches in the area of the rectangle?	960 [in^2]
Person 4	A number from 1 to TNYWG is randomly chosen. As a common fraction, what is the probability that it is a multiple of 35 but not a multiple of 6?	23/960

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KEY

PRACTICE RELAY

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
32	**16**	**4**	**28**
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
36	**108**	**4.5**	**1 [cm]**
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
12	**2 [factors]**	**960 [in^2]**	**23/960**
1 or 0	1 or 0	1 or 0	2 or 0

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School: _____ Team #_____

Proctor: _____ Room #_____

College Bowl #1 10 Possible	College Bowl #2 10 Possible	College Bowl #3 10 Possible

Do not use tally marks.

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7th-8th

School: _____ Team #_____

Proctor: _____ Room #_____

College Bowl #1 10 Possible	College Bowl #2 10 Possible	College Bowl #3 10 Possible

Do not use tally marks.

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COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	Brian and Stewie are thinking of two whole numbers whose sum is twenty. What is the largest possible product of the two numbers?	100
2	A regular heptagon has a side length of seventeen inches. What is the number of inches in the perimeter of the heptagon?	119 [inches]
3	The first two numbers in a geometric sequence are four and one-fourth. As a common fraction, what is the third number in the sequence?	1/64 or "1 over 64" or "1 out of 64"
4	Skittles are produced at an average rate of thirty per second and a child eats skittles at an average rate of thirty-six per minute. How many skittles would remain after ten seconds with the one child eating skittles?	294 [skittles]
5	What is the median of the integers between seven and thirty-one?	19
6	Isabella randomly draws three cards from a standard fifty-two-card deck without replacement. As a common fraction, what is the probability that they are all threes?	1/5525 or "1 over 5525" or "1 out of 5525"
7	Two pyramids have identical square bases with side lengths of five yards. One of the pyramids has a height of four yards and the other has a height of ten yards. As a common fraction, what is the ratio of the volume of the shorter pyramid to the volume of the taller one?	2/5 or "2 over 5" or "2 to 5"
8	What is the square root of X if two X plus five equals one hundred and thirty-three?	[$\sqrt{x}$ =] 8
9	A baker can decorate five cupcakes in three minutes. How many cupcakes can two bakers decorate in nine minutes?	30 [cupcakes]
10	As a common fraction, what is the probability of rolling the same number two times in a row when rolling a fair twenty-sided die twice?	1/20 or "1 over 20" or "1 out of 20"

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COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	Jonathan writes three math questions every four minutes. How many seconds will it take for him the write forty-eight questions?	3840 [seconds]
2	Megan flips three coins. What is the probability that exactly two of them turn up heads?	3/8 or "3 over 8" or "3 out of 8"
3	What is the sum of the first twenty-two odd positive integers?	484
4	Greg tells two of his friends a secret. Ten seconds later, both of his friends tell two of their friends the secret. Ten seconds later, each friend who just heard the secret tells it to two more friends. This pattern continues. How many people, including Greg, will know the secret after thirty-five seconds?	31 [people]
5	As a decimal, what is the number of degrees in the acute angle formed by the minute hand and the hour hand of an analog clock at two-Oh-five PM?	32.5 [degrees]
6	As a common fraction, what is the probability of drawing either a red card or a face card from a standard fifty-two-card deck?	8/13 or "8 over 13" or "8 out of 13"
7	Bian orders a fifteen-dollar meal at a restaurant. She will pay nine percent tax on the price of the meal and leave a twenty percent tip based on the price of the meal, not including tax. In dollars and cents, how much total does she spend in the end?	[$}19.35 or "19 dollars and 35 cents" or "nineteen thirty-five"
8	Mitchell scored eighty-five percent on a test that had forty questions. How many questions did he get right?	34 [questions]
9	It takes Mai two days and twelve hours to drive from Seattle to New York. How long does this drive take, in minutes?	3600 [min]
10	Twenty-two-fourths plus thirteen-thirds equals the common fraction A over B. What is the value of A + B?	65

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COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	Three divided by eight is the same as what number divided by one hundred sixty-eight?	63
2	A semicircle has a radius of two-point-five inches. What is the number of inches in the length of the semicircle?	2.5π [inches] or 5π/2 or "five-halves pi" or "5 pi over 2"
3	What is the sum of one plus ten plus twenty plus one hundred plus two hundred plus three hundred plus one thousand plus two thousand plus three thousand plus four thousand?	10631
4	What is the sum of the digits of the decimal equivalent of the fraction five sixteenths?	11
5	What is the number of degrees in one of the interior angles of a regular eighteen-sided polygon?	160 [degrees]
6	How many ways are there for Dylan to rearrange seven books on his shelf, if his two favorite books must always be next to each other?	1440 [ways]
7	An equilateral triangle is drawn on a coordinate plane. Two of the vertices of the triangle have the coordinates one comma zero and negative one comma zero. In simplest radical form, what is the y-coordinate of the third vertex of the triangle, if it is positive?	$\sqrt{3}$ or "radical 3" or "root 3"
8	On average there are three blue M&Ms in a fun-size bag. How many blue M&Ms are there in total in ninety-seven fun-size bags?	291 [blue M&Ms]
9	Let A equal zero divided by fifty-seven. Let B equal six pi. What is the value of A plus B?	6π
10	A circular dart board has a radius of five inches and a bullseye painted in the center with radius one inch. What percent of the area of the board is covered by the bullseye?	4[%]

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COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	There are two blue marbles, three red marbles, one green marble, two pink marbles, and three orange marbles in a bag. How many marbles must be pulled out to ensure that there are at least two marbles of the same color?	6 [marbles]
2	How many distinct positive prime factors does one hundred thirty-two have?	3 [prime factors]
3	I am thinking of a positive integer N. When I square N, multiply the result by two, and add five, I get one hundred three. What is the value of N?	7
4	A yard has llamas and ostriches in it. There are forty-four feet and seventeen heads in the yard. How many ostriches are there?	12 [ostriches]
5	The numbers five-point-three times ten to the thirteenth and two-point-four times ten to the negative thirteenth are both in scientific notation. As a decimal to the nearest hundredth and not in scientific notation, what is the product of these two numbers.	12.72
6	In terms of pi, what is the number of square inches in the surface area of a sphere with a radius of three inches?	36π [in^2]
7	The lengths of the legs of a right triangle are five centimeters and thirteen centimeters. In simplest radical form, what is the number of centimeters in the length of the hypotenuse?	$\sqrt{194}$ [cm] or "radical 194" or "root 194"
8	As a common fraction, what is one-third divided by twelve-fifths?	5/36 or "5 over 36" or "5 out of 36"
9	The square root of fifteen lies between two consecutive integers. What is the sum of these two consecutive integers?	7
10	What is forty-five percent of sixty.	27

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COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	On average, Jonathan can calculate three math problems per minute and Layla can calculate five math problems per minute. How many more minutes will Jonathan take than Layla to calculate ninety math problems?	12 minutes
2	What is the product of twenty-seven and six?	162
3	What percent of eight to the second power is four to the second power?	25 [%]
4	What is the product of four-thirteenths times ninety-one-twenty-eighths?	1
5	Janet is selling popcorn served in cylindrical containers with base area nine pi square inches and height six inches. If Janet begins with one thousand pi cubic inches of popcorn, how many containers will she be able to fill completely?	18 [containers]
6	An arithmetic expression begins with one minus two plus three minus four plus five. What is the value of this expression when it consists of the first ninety-nine positive whole numbers being alternately subtracted and added in this way?	50
7	I have a deck of fifty cards labeled with the numbers one through fifty and I randomly draw one card. As a common fraction, what is the probability that the card is either a multiple of three or a multiple of five?	23/50 or "23 over 50" or "23 out of 50"
8	Spiderman shoots a web from the ground to the top of a fifteen-meter tall building. He is eight meters away from the base of the building, and the building forms a right angle with the ground. What is the number of meters in the length of his web?	17 [meters]
9	What is the mean of the following data set: thirty-six, fifty-nine, one hundred twenty-four, sixty-one	70
10	When I square X, then multiply the result by three and then subtract five, I get two hundred thirty-eight. What is the positive value of X?	[x =] 9

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COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	On average, a garbage truck takes on thirty-five pounds per stop. If one truck currently weighs six thousand and fifty pounds, how many stops will it take for the truck to weigh seven thousand one hundred pounds?	30 (stops)
2	Every third person who bought a ticket for a certain concert decided to return it for a full refund. In dollars, what was the total income from ticket sales if a ticket cost twenty-five dollars and six hundred tickets were sold?	[$] 10,000
3	What is three to the fourth power times eight?	648
4	What is two to the eighth power?	256
5	When you square the quantity X plus two, and then add nineteen, you get one hundred forty. What is the positive value of X?	[x =] 9
6	An equilateral triangle has side length of eight centimeters. In simplest radical form, what is the number of square centimeters in the area of the triangle?	$16\sqrt{3}$ [cm^2] or "16 root 3" or "16 radical 3"
7	Twelve jurors are sitting in two rows of six in the jury box. How many ways are there to rearrange the jurors, if nobody changes rows?	518400 [ways]
8	A car is driving at an average rate of thirty miles per hour. How many minutes will it take for the car to drive eighteen miles?	36 [mins]
9	What is the sum of the distinct positive prime factors of six hundred and twelve?	22
10	There are one hundred and twenty kids and fifteen parents going on a field trip. A fifty-four-passenger bus costs fifty dollars and a fourteen-passenger van costs twenty dollars. In dollars, what is the cost of the least expensive option to rent vehicles for the trip.	[$] 140

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COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	What is the remainder when two thousand and nineteen is divided by nine?	3
2	As a common fraction, what is the median of the following data set: four-fifths, two-sevenths, one-third, one-half	5/12 or "5 over 12" or "5 out of 12"
3	I draw two cards from a standard fifty-two-card deck without replacement. As a common fraction, what is the probability that they are both the same suit?	4/17 or "4 over 17" or "4 out of 17"
4	What is ten to the fifth power times two to the third power?	800,000
5	What is the number of inches in the perimeter of a square whose area is forty-nine square inches?	28 [in]
6	Solve the following equation for X: five X minus two equals two X plus twenty-two.	[x =] 8