"Math is Cool" Masters – 2018-19

#sponsor

#date

7th 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 <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" Masters -- 2018-19

School:_____ Room # _____ Team #_____

Name: _____ Proctor: _____

7th Grade Mental Math – 30 sec per question

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

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

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7th Grade – #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

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#	Problem
1	A runner can run three miles per day. How many total miles does the runner run in a week?
2	Andrew forgets to tie his shoes eighty percent of the time. How many days will Andrew forget to tie his shoes over a period of fifteen days?
3	A kitten's head is one-fifth of its total body length. If a kitten's total body length is twenty inches, what is the length of the kitten's head, in inches?
4	As a common fraction, what is the probability of getting heads at least once when you flip a coin twice?
5	A circle has an area of one hundred ninety-six pi square inches. What is the number of inches in its radius?
6	What is the mean of the following set of numbers: fourteen, seven, twenty-one, and two?
7	What is the degree measure of one interior angle of a regular eight-sided polygon?
8	A pentagon has five vertices. How many distinct sets of three vertices can be selected so that they can be used to form a triangle?

Final Score:

KEY

(Out of 8)

"Math is Cool" Masters -- 2018-19

School:_____ Room # _____ Team #_____

Name: _____ Proctor: _____

7th 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	21 [miles]
2	12 [days]
3	4 [inches]
4	3/4
5	14 [inches]
6	11
7	135 [degrees]
8	10 [sets]

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#date

Total # Correct:

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

Circle Math: **Pre-Algebra** **Algebra 1** **Geometry** Team #: _____ Room #: _____

7th 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	Math
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				**Algebra**
42				
43				**Geom.**
44				**only**
45				
31 – 45 Total				

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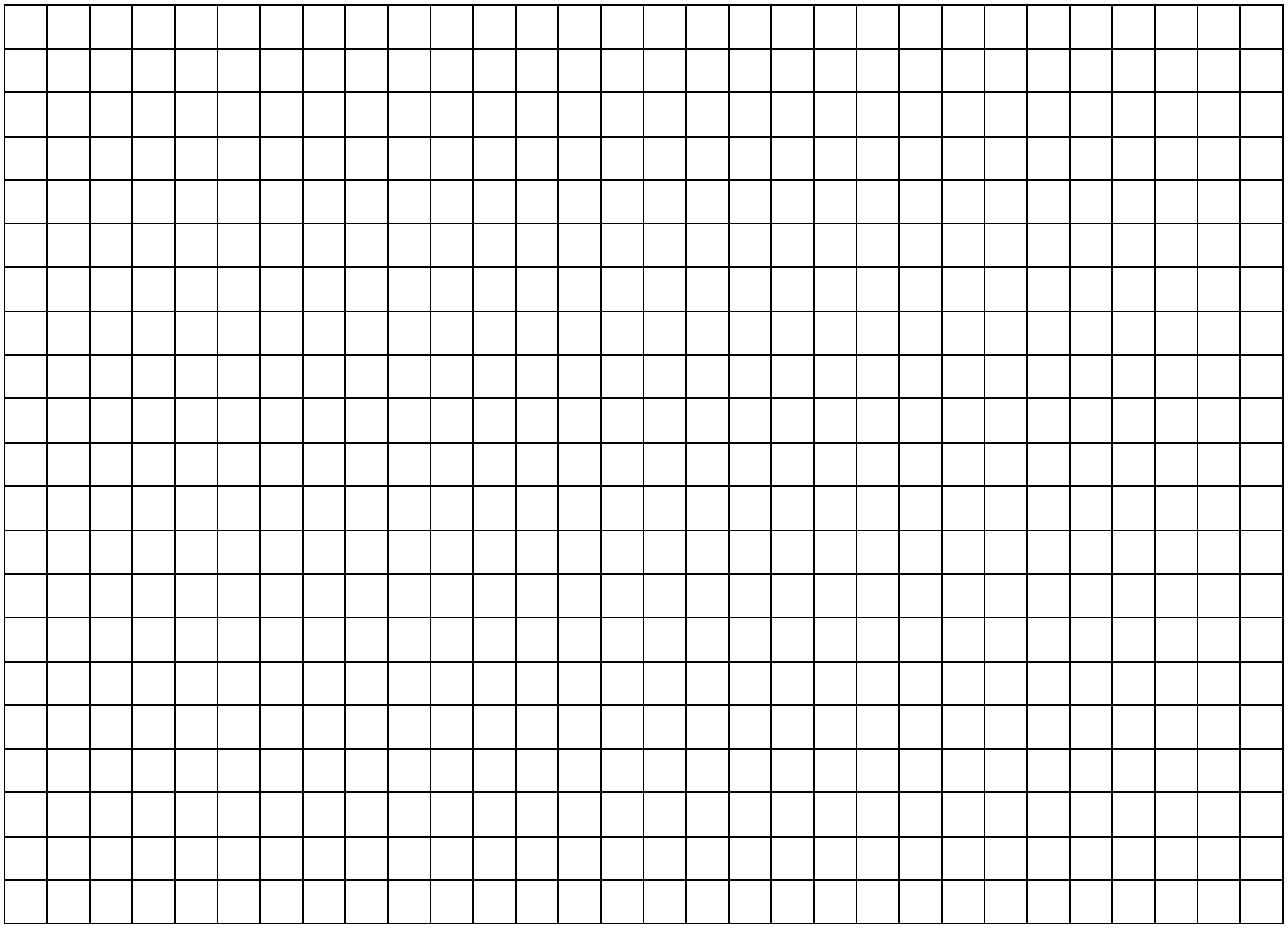
#date

7th Grade 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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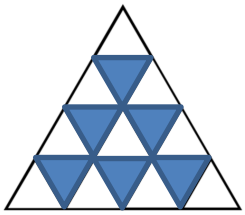
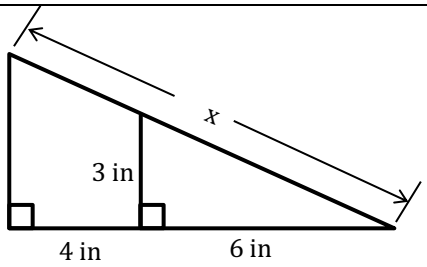
#date

7th Grade Individual Contest

	Questions 1-30: 2 points each
1	What is the product of 76 and 58?
2	What is 8735207 – 7849374?
3	What is the square root of 36 minus the square root of 16?
4	What is 43690000 in scientific notation?
5	What is the number of inches in the perimeter of a square with an area of 49 square inches?
6	I draw two cards from a standard 52-card deck. As a common fraction, what is the probability that I pick a red queen and then a black jack, if I don't replace the first card?
7	Solve for x: $\frac{7x}{3} - 6 = 1$
8	A lily pad doubles in size every day. After 10 days, the lily pad will cover the entire pond. After how many days will the lily pad cover half the pond?
9	How many ways can I have $18 using $1s, $5s, and/or $10s?
10	What is the coefficient (the number multiplied by x^2) of the x^2 term when you expand $(3x+2)^2$?
11	If there are 7 blips in 3 blaps, and 5 blaps in 9 blops, then how many blips are in 81 blops?
12	On a coordinate plane, quadrant I is in the northeast and the rest are numbered in counterclockwise order. In which quadrant is the point (-π, 7) located?
13	Evaluate: $\lvert 3 - 4 \cdot 7 \rvert$
14	How many distinct ways can you arrange the letters in the word TRUNCATE?
15	After 14! is evaluated, how many zeros are at the end of the number?
16	Brianna has 21 pencils. She finds 3 new pencils in the hallway every day. Her classmate Victoria breaks 2 of her pencils every other day. Biff and Eho each give her one pencil every 3rd day. How many pencils will she have after 12 days?
17	What is the number of degrees in the larger angle formed by the hands of an analog clock at 4:10 pm?
18	Each letter stands for a single-digit number. List the letters from greatest to least, based on the numbers they represent. 56A3 + 7B6C 1D145

19	The digits 1 through 9 are placed in the nine unshaded triangles so that the sum of the four digits along each edge is the same. What is the largest possible sum of the numbers in the three corner triangles? 
20	There are 150 people in a group. Fifty are scared of pickles. Twenty are scared of chocolate. Fifteen are scared of chocolate and pickles. How many are scared of neither chocolate nor pickles?
21	Biff and Eho live 1 mile away from each other. They both left their houses to walk to each other's houses. Biff averages 3 miles per hour and Eho averages 2 miles per hour. After Eho had walked for 4 minutes, he realized he'd forgotten his backpack, so he walked back home. Once he retrieved his backpack, which added 2 minutes to his overall walking time, he started walking to Biff's house again. When they met, they walked to Biff's house at Eho's average speed. How many minutes did it take Eho to get to Biff's house from the time he left his house the first time?
22	Winston invests $3000 compounded annually at a rate of 2%. In dollars and cents, how much will his investment be worth in 2 years?
23	Samantha has 125 cubes. She arranges them into one giant 5-by-5-by-5 cube. She then paints each exterior face of the giant cube red. How many of the little individual cubes have at least 2 faces that are painted red?
24	In golf the last couple of shots on any given hole are called putts and a round of golf consists of 18 holes. Felix sinks 18 out of 47 putts attempted during a round of golf. On 15 of the holes he attempts at least 2 putts, sinking one of them on each hole, and on the remaining 3 holes he sinks the one putt that he attempts. What is the smallest possible number of holes on which he could have attempted exactly 2 putts?
25	A drawer contains 3 green, 4 blue, 3 brown, and 5 black socks. As a common fraction, what is the probability that two randomly drawn socks make a match?
26	As a common fraction, what is the probability of getting at least 2 heads when you flip a fair coin 5 times?
27	Farmer Bean raises mutant chickens and mutant cows. Each chicken has 3 legs and 2 heads. Each cow has 5 legs and 3 heads. If there are 73 legs and 45 heads, then how many cows are there?
28	In simplest radical form, what is the number of inches in the value of x? 
29	What is the sum of the solutions to the given equation? $x^2 - 5x - 14 = 36$
30	In simplest radical form, what is the number of square inches in the area of a regular hexagon with side length of 6 inches?

Challenge Questions: 3 pts each

31 Nautilus buys Boots of Swiftness that allow him to get to the enemy nexus in one minute, which is an increase in his speed by 10%. In seconds, how long did it take him to get to the enemy nexus before he bought his Boots of Swiftness?

32 What is the sum of the geometric sequence: $9 + 3 + 1 + \frac{1}{3} + \frac{1}{9} + \ldots$

33 Let N equal the number of distinct sets of four integers in which three of the integers are in a ratio of 1:3:9 and the sum of all 4 integers is 360. In what fraction of these N sets is the ratio of all four integers 1:3:9:27? Answer as a common fraction and do not consider the order of the four integers.

34 A solid is formed by placing a cone with radius 3 cm on top of a cylinder with the same radius. The volume of the solid is 132π cm^3. Let the ordered pair (a, b) represent positive integer values for the height of the cylinder, a, and the height of the cone, b. What is the number of distinct ordered pairs (a, b)?

35 If p is the product of three consecutive even integers and $p = q \cdot 13 \cdot 17$, then what is the smallest possible integer value of q?

36 If $x + \frac{1}{x} = 9$, then what is the value of $x^3 + \frac{1}{x^3}$?

37 In the card game of Pishpash, the deck consists of three each of cards numbered 1 through 8, two each of cards numbered 9 through 15, and one each of cards numbered 16 through 21. When three cards are dealt from the deck, as a common fraction, what is the probability that each card is a distinct multiple of 6?

38 The following times table can be used as a method for multiplying polynomials together. When multiplying the two 4th degree polynomials $5x^4 + 4x^3 + 3x^2 + 2x + 1$ and $5y^4 + 4y^3 + 3y^2 + 2y + 1$ together, the result has 25 terms. Let S equal the sum of the exponents of x and y in each term. For example, the term $5x^4$ has an S-value of 4 and the term $6xy^2$ has an S-value of 3. The numerical coefficient of the term $25x^4y^4$ is 25. Let C equal the sum of the numerical coefficients for all terms with a given S-value. For example, when S = 3, C = 20. What is the largest C-value in this table?

	$5x^4$	**$4x^3$**	**$3x^2$**	**$2x$**	**1**
$5y^4$	$25x^4y^4$				
$4y^3$					$4y^3$
$3y^2$				$6xy^2$	
$2y$			$6x^2y$		
1	$5x^4$	$4x^3$			

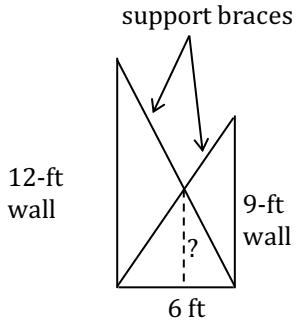
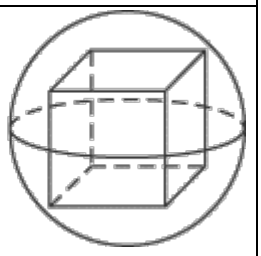
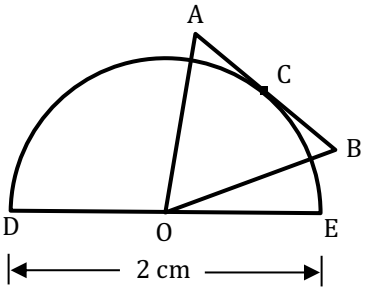
39 A set of three distinct 2-digit integers is randomly selected from the 2-digit integers less than (but not equal to) 50. As a common fraction, what is the probability that the range of the set is less than or equal to 10 and that the median of the set is the same as the mean of the set?

40 If $123_b = n^2 + 2$ and $321_b = (n + 6)^2 + 6$, for some $b < 10$, what is the value of n?

IF taking Algebra or Geometry, continue to questions 41 - 42

41	What is the sum of x, y, and z in the solution to the following system of equations? $\begin{Bmatrix} -9x + 9y + 8z = 155 \\ -x - 2y + 5z = 83 \\ 2x - 5y + 5z = 74 \end{Bmatrix}$
42	In the following equations a, b, c, and d, all represent positive integers. What is the sum of all possible values of d? $(ax - b)(ax - c) = dx^2 - dx + 8$ and $\frac{b}{a} + \frac{c}{a} = 1$

IF taking Geometry, continue to questions 43 - 45

43	In the construction of a house, one wall of height 12 ft and a second wall of height 9 ft are supported with braces as shown. The walls are parallel to each other and are 6 ft apart. As a common fraction, what is the number of feet in the height above the floor of the intersection of the two support braces? 
44	The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. The volume of a sphere is 2304π cm^3. What is the number of centimeters in the side length of the largest cube, with integer side lengths, that can fit completely inside the sphere? 
45	In the figure equilateral ΔAOB and a semicircle share point O, which is the center of the semicircle. Side $\overline{AB}$ of the triangle is tangent to semicircle O at C. Diameter $\overline{DE}$ has a length of 2 cm. A random point F is chosen from the perimeter of ΔAOB. In radical form and as a simplified fraction, what is the probability that ΔDFE is an obtuse triangle? 

“Math is Cool” Masters – 2018-19

#date

Total # Correct:

KEY

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

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

7th Grade Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answers
1	4408
2	885833
3	2
4	4.369×10^7
5	28 [inches]
6	1/663
7	[x =] 3
8	9 [days]
9	6 [ways]
10	9
11	105 [blips]
12	2 or II
13	25
14	20160 [ways]
15	2 [zeros]

	Answers
16	53 [pencils]
17	295[°]
18	ABDC
19	24
20	95 [people]
21	40 [minutes]
22	$3121.20 or 3121 dollars and 20 cents
23	44 [cubes]
24	1 [hole]
25	22/105
26	13/16
27	11 [cows]
28	$5\sqrt{5}$ [inches]
29	5
30	$54\sqrt{3}$ [in^2]

	Answers
31	66 [seconds]
32	13.5
33	1/26
34	14 [ordered pairs]
35	[q =] 4800
36	702
37	3/6622
38	[C =] 46
39	17/988
40	[n =] 10
41	13
42	[d =] 117
43	36/7 [ft]
44	13 [cm]
45	$\sqrt{3}/3$ or $\frac{1}{\sqrt{3}}$

Math is Cool" Masters – 2018-19

7th Grade – #date

Final Score:

First Score

(out of 20)

Student Name _____

Proctor Name _____Room # _____

SCHOOL NAME _____**Team #**_____

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.***

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			

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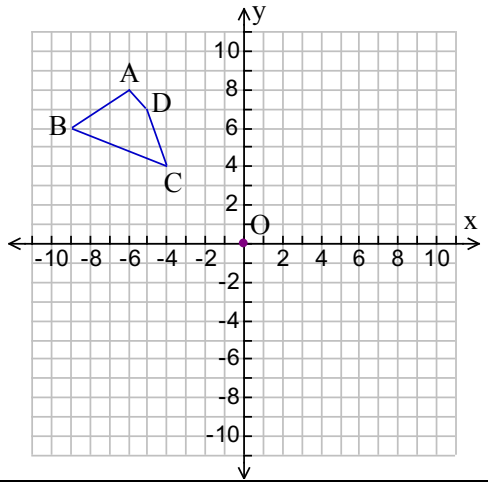
7th Grade – #date

Team Multiple-Choice Contest

Refer to the following diagram for problems 1 – 3. The vertices of the quadrilateral shown are: A(-6, 8), B(-9, 6), C(-4, 4), and D(-5, 7). Point *O* is at the origin, (0, 0).



1 Figure ABCD is reflected over the x-axis, resulting in the image A'B'C'D'. What is number of units in AA'?

A) 8 B) 10 C) 12 D) 14 E) 16

2 Figure ABCD is reflected over the y-axis and then translated down 15 units, resulting in the image A"B"C"D". What is the number of units in $\overline{CC''}$?

A) 15 B) $3\sqrt{29}$ C) $\sqrt{261}$ D) 17 E) 25

3 When figure ABCD is rotated about point O by 360°, imagine that each vertex of figure ABCD traces a circle. What is the ratio of the areas of the four circles from smallest to largest?

A) 8:12:14:15 B) 16:37:50:59 C) 16π:37π:50π:59π
D) 32:74:100:117 E) $\sqrt{32}$: $\sqrt{74}$:10: $\sqrt{117}$

Use the following data for problems 4 – 6.

Source: www.internetlivestats.com/internet-users/

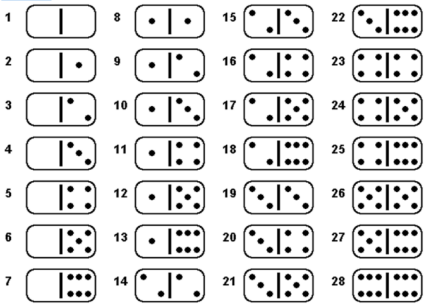
Year	Internet Users	World Population	Non-Users (Internetless)
2016	**3,424,971,237**	7,432,663,275	4,007,692,038
2013	**2,728,428,107**	7,181,715,139	4,453,287,032
2010	**2,023,202,974**	6,929,725,043	4,906,522,069
2007	**1,373,226,988**	6,681,607,320	5,308,380,332
2004	**913,327,771**	6,439,842,408	5,526,514,637
2001	**502,292,245**	6,204,310,739	5,702,018,494

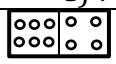
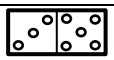
4 What was the world population in 2010, expressed in scientific notation?

A) 4.91×10^9 B) 6.92×10^9 C) 6.93×10^9 D) 2.02×10^9 E) 2.02×10^{10}

5	The number of internet users in the years 2001 and 2016 is rounded to the nearest 100 million. What is the percent increase in internet users from 2001 to 2016, using these rounded numbers? A) 1.72% B) 2.9% C) 17.24% D) 58% E) 580%
6	Over the time span shown in the table, the number of non-users (internetless) has decreased annually on average by approximately 2.5%. If the 2016 number of non-users is rounded to the nearest billion, what would be the predicted number of non-users in 2019, assuming the percent decrease continues to be 2.5% per year? A) 3,900,000,000 B) 3,707,437,500 C) 3,700,000,000 D) 3,614,751,563 E) Answer not given.

Use the following information for problems 7 – 10. In the game of dominoes, different-sized sets of tiles may be used. One type of complete set consists of the 28 tiles shown to the right. This includes all possible pairings of the numbers 0 through 6 on each half of a tile. This is known as a double-six set.



7	The dots on the tiles are known as pips. What is the probability of randomly drawing a tile that has the same number of pips on each side from a double-six set? A) 3/14 B) 1/4 C) 2/7 D) 5/14 E) 3/7
8	What is the total number of pips on all 28 tiles? A) 126 B) 147 C) 168 D) 170 E) 172
9	Another type of set of tiles includes all possible pairings of the numbers 0 through 12 on each half of a tile. This set is known as a double-twelve set. How many tiles are in this set? A) 56 B) 65 C) 78 D) 90 E) 91
10	The probability that the  tile is randomly drawn first and then the  tile is randomly drawn second from a double-six set is A. The probability that the same two tiles are randomly drawn in the same order from a double-nine set, which includes all possible pairings of the numbers 0 through 9 on each half of a tile, is B. In order to calculate A – B, you must find a common denominator, since A and B are both fractions. What is the prime factorization of the least common denominator of A – B? A) $2^2 \cdot 3^3 \cdot 5 \cdot 7 \cdot 11$ B) $2^2 \cdot 3^6 \cdot 5 \cdot 7 \cdot 11$ C) $2^3 \cdot 3^3 \cdot 5 \cdot 7 \cdot 11$ D) $2^3 \cdot 3^6 \cdot 5 \cdot 7 \cdot 11$ E) $2 \cdot 3^3 \cdot 5 \cdot 7 \cdot 11$

Math is Cool" Masters – 2018-19

7th Grade – #date

Final Score:

KEY

Student Name _____

Proctor Name _____Room # _____

SCHOOL NAME _____**Team #**_____

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.***

DO NOT WRITE IN SHADED REGIONS

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

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7th Grade – #date

Final Score:

SCHOOL NAME _____ **Team #** _____

First Score
(out of 10)

Proctor Name _____ Room # _____

Team Contest – Score Sheet

TEAM TEST - 15 minutes – 30% of team score

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

DO NOT WRITE IN SHADED REGIONS

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

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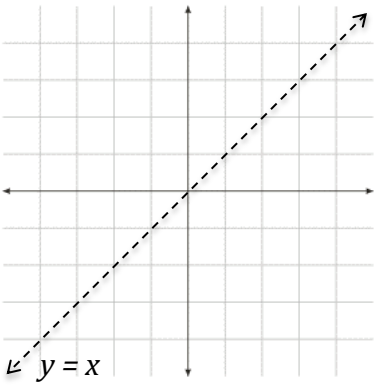
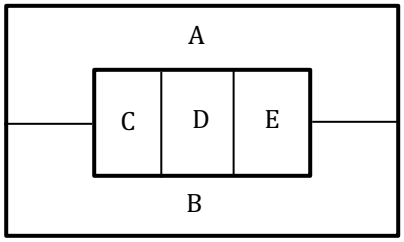
7th Grade – #date

Team Contest

1	It is 165 miles from Vancouver to Seattle and 175 miles from Seattle to Moses Lake. If I drive at an average rate of 55 miles per hour from Vancouver to Seattle, and at an average rate of 70 miles per hour from Seattle to Moses Lake, as a decimal, how many hours long is my trip?
2	How many prime numbers are between 20 and 70?
3	The sum of 4 consecutive numbers is 142. What is the sum of the digits in all 4 numbers?
4	Currently $\frac{5}{12}$ of the hummingbirds in a certain hummingbird farm are Ruby-Throated Hummingbirds and the rest are Bee Hummingbirds. There is a total of 228 hummingbirds in the farm. Assuming that no birds leave the farm and that no new Bee Hummingbirds are added to the farm, what is the number of new Ruby-Throated Hummingbirds that would need to be added to the farm so that Ruby-Throated Hummingbirds make up half of the hummingbirds on the farm?
5	What is the sum of the first 21 positive odd numbers?
6	Jake makes 17 out of his 20 basketball shots. What is the longest streak of consecutive shots that he must have made?
7	The space diagonal is the longest possible diagonal inside a rectangular prism. In simplest radical form, how many inches are in the length of the space diagonal in a 3-inch by 4-inch by 5-inch rectangular prism?
8	On the coordinate plane to the right, the line whose equation is $y = -\frac{2}{3}x + 2$, can be graphed and then reflected over the line with equation $y = x$. Let A be the point on the line with equation $y = -\frac{2}{3}x + 2$, whose x-coordinate is -3 and let A' be the image of A after the reflection. What is the slope of the line containing A and A'? 

9	At the hippo exhibit at the zoo, Audrey notices that a bird called an oxpecker eats a tick off a hippo's back at the same instant that the hippo yawns. She then notices that the oxpecker eats a tick every 8 seconds and the hippo yawns every 41 seconds. For any given time that a tick is eaten without a simultaneous hippo yawn, as a common fraction, what is the probability that the next tick will be eaten before the hippo yawns again? Assume this pattern continues indefinitely. 
10	The figure shown is divided into five regions, A, B, C, D, and E. What is the number of paths that can be drawn that begin at any region, move only to adjacent regions, and visit all five regions exactly once? 

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7th Grade – #date

Final Score:

KEY

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	5.5 [hours]
2	11 [prime numbers]
3	34
4	38 [Ruby-Throated Hummingbirds]
5	441
6	5 [shots]
7	$5\sqrt{2}$ [inches]
8	-1
9	4/5
10	72 [paths]

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7th Grade – #date

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.

“Math is Cool” Masters -- 2018-19

7th Grade – #date

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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7th Grade – #date

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.

“Math is Cool” Masters -- 2018-19

7th Grade – #date

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 Grade	Relay #1 – Person 1
Question 1	A rectangle has a length of 15 cm and a width of 8 cm. What is the number of centimeters in the perimeter of the rectangle?

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7th Grade	Relay #1 – Person 2
Question 1	A rectangle has a length of 15 cm and a width of 8 cm. What is the number of centimeters in the perimeter of the rectangle?
Question 2	TNYWG has 4 positive factors. What is the positive difference between the largest and the smallest of these factors?

7th Grade	Relay #1 – Person 2
Question 1	A rectangle has a length of 15 cm and a width of 8 cm. What is the number of centimeters in the perimeter of the rectangle?
Question 2	TNYWG has 4 positive factors. What is the positive difference between the largest and the smallest of these factors?

7th Grade	Relay #1 – Person 3
Question 2	TNYWG has 4 positive factors. What is the positive difference between the largest and the smallest of these factors?
Question 3	The ratio 3.5 to 7.5 is equal to the ratio x to TNYWG. What is the value of x?

7th Grade	Relay #1 – Person 3
Question 2	TNYWG has 4 positive factors. What is the positive difference between the largest and the smallest of these factors?
Question 3	The ratio 3.5 to 7.5 is equal to the ratio x to TNYWG. What is the value of x?

7th Grade	Relay #1 – Person 4
Question 3	The ratio 3.5 to 7.5 is equal to the ratio x to TNYWG. What is the value of x?
Question 4	TNYWG is equal to the sum of X consecutive positive whole numbers, where X > 1. How many possible values can X have?

7th Grade	Relay #1 – Person 4
Question 3	The ratio 3.5 to 7.5 is equal to the ratio x to TNYWG. What is the value of x?
Question 4	TNYWG is equal to the sum of X consecutive positive whole numbers, where X > 1. How many possible values can X have?

7th Grade	Relay #2 – Person 1
Question 1	What is the sum of the distinct prime factors of 42?

7th Grade	Relay #2 – Person 1
Question 1	What is the sum of the distinct prime factors of 42?

7th Grade	Relay #2 – Person 2
Question 1	What is the sum of the distinct prime factors of 42?
Question 2	What is TNYWG to the third power?

7th Grade	Relay #2 – Person 2
Question 1	What is the sum of the distinct prime factors of 42?
Question 2	What is TNYWG to the third power?

7th Grade	Relay #2 – Person 3
Question 2	What is TNYWG to the third power?
Question 3	How many positive multiples of 18 are less than TNYWG?

7th Grade	Relay #2 – Person 3
Question 2	What is TNYWG to the third power?
Question 3	How many positive multiples of 18 are less than TNYWG?

7th Grade	**Relay #2 – Person 4**
Question 3	How many positive multiples of 18 are less than TNYWG?
Question 4	The geometric mean of A and B is $\sqrt{AB}$. TNYWG is the geometric mean of C and D. What is the value of D when C = 475?

7th Grade	**Relay #2 – Person 4**
Question 3	How many positive multiples of 18 are less than TNYWG?
Question 4	The geometric mean of A and B is $\sqrt{AB}$. TNYWG is the geometric mean of C and D. What is the value of D when C = 475?

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7th Grade – #date

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!*

	Relay #1	Answer
Person 1	A rectangle has a length of 15 cm and a width of 8 cm. What is the number of centimeters in the perimeter of the rectangle?	46 [centimeters]
Person 2	TNYWG has 4 positive factors. What is the positive difference between the largest and the smallest of these factors?	45
Person 3	The ratio 3.5 to 7.5 is equal to the ratio x to TNYWG. What is the value of x?	[x =] 21
Person 4	TNYWG is equal to the sum of X consecutive positive whole numbers, where X > 1. How many possible values can X have?	3 [values]
	Relay #2	Answer
Person 1	What is the sum of the distinct prime factors of 42?	12
Person 2	What is TNYWG to the third power?	1728
Person 3	How many positive multiples of 18 are less than TNYWG?	95 [multiples]
Person 4	The geometric mean of A and B is $\sqrt{AB}$. TNYWG is the geometric mean of C and D. What is the value of D when C = 475?	19

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7th Grade – #date

KEY

RELAY # 1

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
46 [cm]	**45**	**[x=] 21**	**3 [values]**
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	**1728**	**95 [multiples]**	**19**
1 or 0	1 or 0	1 or 0	2 or 0

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7th Grade

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 Grade

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 Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	Solve the following equation for X: Three X plus sixteen equals eighty-five	[x=] 23
2	There are three apples and two oranges in a hat. Abi randomly chooses two pieces of fruit from the hat with replacement. As a common fraction, what is the probability that he selects an orange both times?	4/25 or "4 over 25" or "4 out of 25"
3	What is the slope of the line passing through points two comma two and four comma two?	0
4	Caleb has three pennies, three nickels, and three dimes while Bian has nine dimes. How many cents more is the total value of Bian's coins than the total value of Caleb's coins?	42 [cents]
5	Aidan the Anteater eats three hundred and ninety ants every four hours. How many ants does he eat in three point five days?	8190 [ants]
6	Evaluate eight to the fifth power.	32768
7	What is the positive difference between the number of vertices in a nonagon and the number of edges on a tetrahedron?	3
8	Jeremiah finds one pen each day, but he also loses three pens each day. If he starts with eighteen pens how many days will it take for him to have zero pens?	9 [days]
9	What is ten percent of six factorial?	72
10	What is the sum of the measures of the exterior angles of a one-thousand-sided regular polygon?	360 [degrees]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	A bag contains three red marbles, four white marbles, and three blue marbles. As a common fraction, what is the probability of drawing a blue marble out of the bag?	3/10 or "3 over 10" or "3 out of 10"
2	Zelda is facing north. If she turns ninety degrees counterclockwise seven times, which direction is she facing?	East
3	I have twenty-one candies. If I give three-sevenths of my candies to Jean and eat six of the ones I have left, how many candies will remain?	6 [candies]
4	How many distinct diagonals can be drawn inside a regular octagon?	20 [diagonals]
5	It takes eight zombies eight hours to break a fence. As a decimal, how many hours will it take ten zombies to break the fence?	6.4 [hours]
6	If X plus Y equals fifty, and two X plus two equals Y, what is the value of X?	[x=] 16
7	What time is it two thousand minutes after eight PM? Remember to indicate AM or PM.	5:20 am
8	As a common fraction, what is the ratio of prime numbers to composite numbers between ten and thirty-nine, inclusive?	4/11 or "4 over 11" or "4 to 11"
9	Jin runs at an average rate of six miles per hour. As a decimal, how many miles does he run in forty-three minutes?	4.3 [miles]
10	The formula for volume of a sphere is four-thirds-pi-R-cubed. In terms of pi, what is the number of cubic inches in the volume of a sphere with a radius of six inches?	288π [in^3]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	The English alphabet has five vowels and twenty-one consonants. Assume one letter is drawn at random. As a decimal, how many times more likely is it that the letter is a consonant?	4.2 [times]
2	What is the positive difference between the smallest prime number and the largest two-digit prime number?	95
3	If one of the angles in a quadrilateral is forty-eight degrees, what is the mean number of degrees in the other three angles?	104 [degrees]
4	What is the smallest possible number of cubic centimeters in the volume of a rectangular prism whose three dimensions in centimeters are integers A, B, and C, where C equals 2A, and C equals 3B?	36 [cm^3]
5	If A times B equals one hundred and forty-seven and A is three times B, what is A minus B?	14
6	A jar has six hundred skittles in it which have a total of five different colors. Assume there are at least one hundred of any given color. What is the maximum possible number of skittles of any one color?	200 [skittles]
7	Juneaux and Hailey are playing a game using a standard deck of cards. Juneaux wins if she draws a red face card. Hailey wins if she draws an Ace or a two of any color. As a common fraction, what is the probability that neither Juneaux nor Hailey wins on the first random draw?	19/26 or “19 out of 26” or “19 over 26”
8	What is the sum of the least common multiple and greatest common factor of sixty and one hundred fifty?	330
9	As a decimal, what is the positive difference between eleven-fifths and seven-fourths?	[0].45
10	How many distinct ways can you rearrange the four letters in the word DEED, spelled D-E-E-D?	6 [ways]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	What is the remainder when six hundred and four is divided by eleven?	10
2	What is the sum of the integers three through twenty-one?	228
3	Finian has made seven out of twelve free throws. How many consecutive free throws would he need to make to raise his free-throws-made percentage to exactly ninety percent?	38 [free throws]
4	What percent of seven thousand is eight thousand and fifty?	115 [%]
5	After two thousand fifteen to the third power is evaluated, what is the digit in the tens place?	7
6	How many positive factors does six hundred and forty-eight have?	20 [factors]
7	The formula for the surface area of a sphere is four-pi-R-squared. In terms of pi, what is the number of square feet in the surface area of a sphere with a diameter of eight feet?	64π [ft^2]
8	How many three-digit integers are less than two hundred and divisible by fifteen?	7 [integers]
9	Seven-twelfths plus two-fifths equals a fraction, that in lowest terms is represented by A over B. What is the value of A plus B?	119
10	A palindrome is a number that reads the same forwards and backwards. What is the number of palindromes between twenty and two hundred and twenty?	20 [palindromes]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	Junior will be five times as old as he is now in twenty-four years. How many years old is he now?	6 [years old]
2	The heart rate of a horse is forty-four beats per minute. As a common fraction, what is the horse’s heart rate in beats per second?	11/15 [beats per second] or “11 over 15”
3	If X plus nineteen equals three-fifths of forty-five, what is the value of X?	[x =] 8
4	Kiah bought four packs of gum for two dollars and ninety-nine cents a pack. She paid with a fifty-dollar bill. How much, in dollars and cents, will she get in change?	$38.04 or 38 dollars and 4 cents or thirty-eight-oh-four
5	Two sides of a triangle are fifteen and nineteen centimeters in length. What is the positive difference between the largest and smallest possible integer number of centimeters in the length of the third side?	28 [centimeters]
6	In the set of integers from one to forty, as a common fraction, what is the probability that a randomly chosen integer is a multiple of three, but not a multiple of five?	11/40 or “11 out of 40” or “11 over 40”
7	How many distinct prime factors does forty-six factorial have?	14 [prime factors]
8	If six bananas are worth ten apples and five apples are worth twelve oranges, how many oranges are four bananas worth?	16 [oranges]
9	X equals three squared minus four. What is the value of X cubed minus X squared plus seven X minus eleven?	124
10	There are cows and sheep in a field. The ratio of cows to sheep is two to five. If there are a total of one hundred and twenty-six animals in the field, how many of them are cows?	36 [cows]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	Solve the following equation for X: four hundred X minus six hundred equals two thousand two hundred	[x =] 7
2	Roni guesses on a four-question multiple choice test. Each question has three answer choices, only one of which is correct. As a common fraction, what is the probability that she guesses wrong on all four questions?	16/81
3	How many multiples of nine are there between twenty and eighty?	6 [multiples]
4	As a decimal, what is the mean of the first 5 prime numbers?	5.6
5	Bella trades four of her baseball cards with Connor for his Nelson Cruz card. Connor then trades all his cards with Eman for her Edwin Diaz card. Eman now has a total of twelve baseball cards. What is the greatest number of cards that Connor could have started with?	9 [cards]
6	Let A over B equal C over D. If B equals six times A and C is a two-digit number, what is the greatest possible value of D?	594
7	In terms of pi, what is the number of cubic centimeters in the volume of cylinder if the height is four centimeters and the radius is fourteen centimeters.	784π [cm^3]
8	Jaedin runs at an average rate of one hundred and fifty meters per minute. Jajaani runs at an average rate that is ninety percent of Jaedin's rate. How many minutes will it take Jajaani to run five hundred and forty meters?	4 [minutes]
9	If today is Saturday, what day of the week will it be one hundred and twenty days from now?	Sunday
10	The area of a triangle is thirty-six square centimeters. The length of the base of the triangle is two times its height. What is the number of centimeters in the base?	12 [centimeters]

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7th Grade – #date

COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	Solve the following equation for X: six X minus eleven equals four X plus thirty-seven	[x =] 24
2	What is the number of centimeters in the perimeter of a square whose area is one hundred and ninety-six square centimeters?	56 [centimeters]
3	Let A plus B equal fifty and let A and B both be positive integers. How many distinct ordered pairs can be made in the form A comma B, such that A is greater than B?	24 [ordered pairs]
4	As a common fraction, what is the slope of the line between the points with coordinates three comma six and negative nine comma negative five?	11/12
5	What is one hundred and ninety-nine squared?	39601
6	As a common fraction, what is the probability that a randomly chosen two-digit integer is divisible by four?	11/45

Extra