# "Math is Cool" Championships – 2017-18

January 26, 2018

Total Correct

KEY

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

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

**6th Grade Individual Contest – Score Sheet**

**DO NOT WRITE IN SHADED REGIONS**

| | Answer | 1 or 0 | 1 or 0 |
|---|---|---|---|
| 1 | [a =] 3 | | |
| 2 | 47 | | |
| 3 | 90 [miles] | | |
| 4 | Sue | | |
| 5 | 84 [%] | | |
| 6 | ½ | | |
| 7 | 14 [years] | | |
| 8 | 2 | | |
| 9 | 12 | | |
| 10 | 37 | | |
| 11 | 169 | | |
| 12 | 5 [diagonals] | | |
| 13 | 189 | | |
| 14 | 17 | | |
| 15 | 20 | | |
| **1-15 TOTAL:** | | | |

| | Answer | 1 or 0 | 1 or 0 |
|---|---|---|---|
| 16 | 1000000 or 1 million [millimeters] | | |
| 17 | 18 [square units] | | |
| 18 | 8 [values] | | |
| 19 | 4 [inches] | | |
| 20 | 24/25 | | |
| 21 | 61 | | |
| 22 | 9 | | |
| 23 | 9 | | |
| 24 | 12 | | |
| 25 | 6 | | |
| 26 | 12 | | |
| 27 | 21.6 | | |
| 28 | 100 | | |
| 29 | 128 [pizzas] | | |
| 30 | 15 [days] | | |
| **16-30 TOTAL:** | | | |

| | Answer | 1 or 0 | 1 or 0 |
|---|---|---|---|
| 31 | 4 [normal dogs] | | |
| 32 | 3/8 | | |
| 33 | 625 | | |
| 34 | 36 [cookies] | | |
| 35 | 34 [feet] | | |
| 36 | 4 [dimes] | | |
| 37 | 38 [socks] | | |
| 38 | 1 | | |
| 39 | 1185811 | | |
| 40 | 27000 [ants] | | |
| **31-40 TOTAL:** | | | |

6th Grade

# "Math is Cool" Championships – 2017-18

January 26, 2018

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

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

**6th Grade Individual Contest – Score Sheet**

**DO NOT WRITE IN SHADED REGIONS**

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

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

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

6th Grade

# "Math is Cool" Championships – 2017-18

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January 26, 2017

6th 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. Bad sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise:*
  - *For problems dealing with money, a decimal answer should be given.*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *For fifth and sixth grade, all fractions and ratios must be reduced.*
- *Counting or natural numbers refer to the numbers 1,2,3,4 and so on and do NOT include 0.*
- *Units are not necessary unless it is a problem that deals with time and, in that case, am or pm is needed. However, if you choose to use units, they must be correct.*
- *Leave all answers in terms of π where applicable.*
- *Do not round any answers unless stated otherwise.*
- *Record all answers on the colored cover sheets in the answer column only.*
- *Make sure all answer sheets have all the information filled out at the top of the sheet.*
- *Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will also be scored as a 0.*

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

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

*You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you.* ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

# "Math is Cool" Championships – 2017-18

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6th Grade – January 26, 2018

Mental Math Contest

## Mental Math – 30 sec per question

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

*You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you.* ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

| # | Problem |
|---|---|
| 1 | What is half of seventy-eight? |
| 2 | As a common fraction, what is the probability of getting two heads from two coin flips? |
| 3 | If Charles is driving at an average rate of fifty miles per hour, how many miles will he have driven in two and a half hours? |
| 4 | In terms of pi, what is the number of square inches in the area of a circle with a diameter of eight inches? |
| 5 | What is the remainder when one hundred and one is divided by twelve? |
| 6 | What is the greatest prime number that is less than twenty? |
| 7 | If you triple each of the side lengths of a rectangle, as a common fraction, what is the ratio of the old area to the new area? |
| 8 | Anna drives at an average rate of twenty-five miles per hour and Natalie drives at an average rate of thirty-two miles per hour. How many miles ahead of Anna will Natalie be if they maintain their rates for six hours? |

# “Math is Cool” Championships – 2017-18

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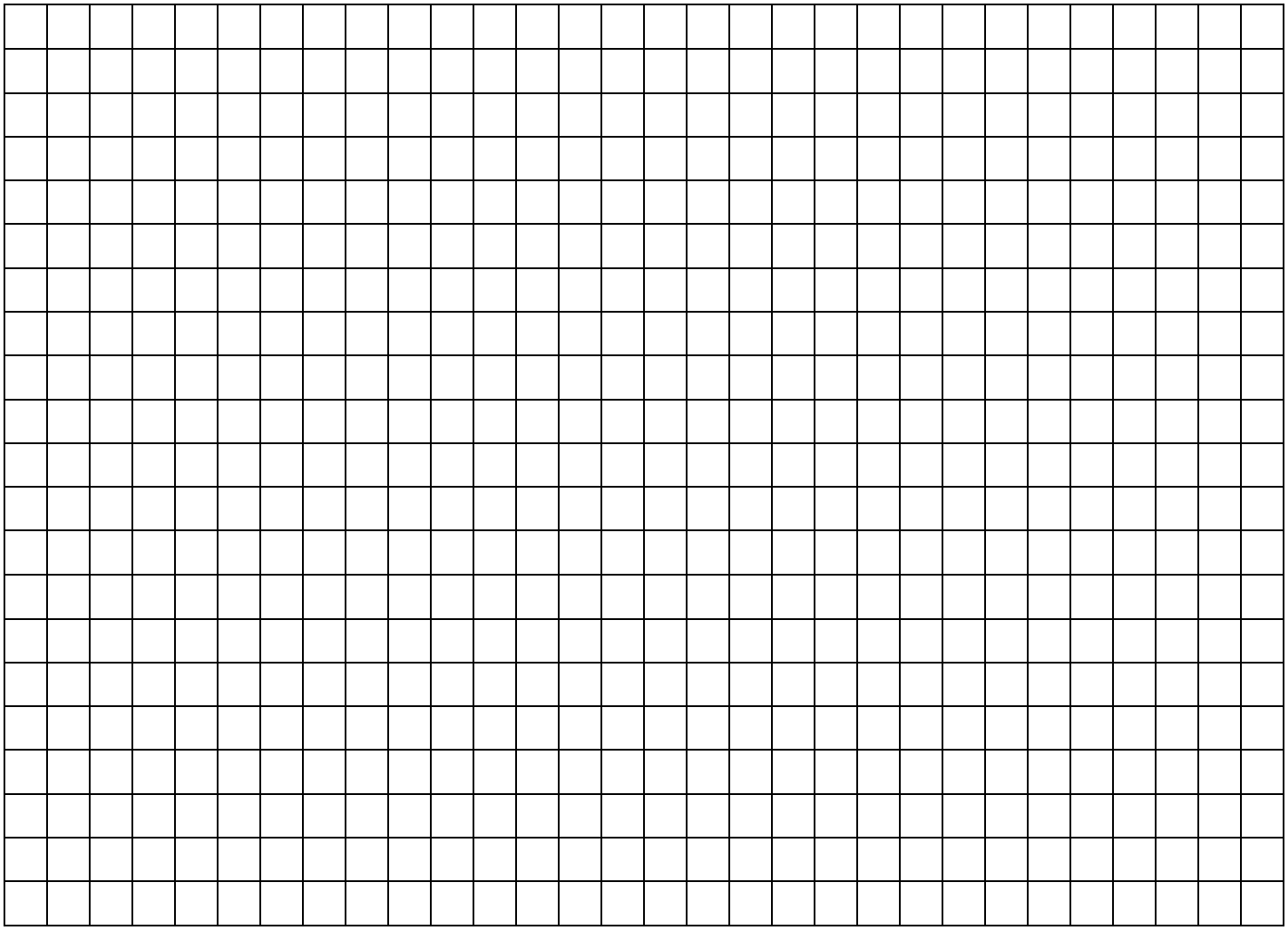
Individual Contest – 6th Grade

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

**INDIVIDUAL TEST - 35 minutes**

*You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. The raw score will be 2 points for correct answers to problems 1-30 and 3 points for 31-40. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.*



# "Math is Cool" Championships – 2017-18

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6th Grade – January 26, 2018

Individual Contest

Record all answers on the colored cover sheet.

| | Questions 1-30: 2 points each |
|---|---|
| 1 | If a + 7 = 10, what is the value of a? |
| 2 | What is the largest prime number less than 50? |
| 3 | William spent two hours driving to visit his grandmother. His average speed during the trip was 45 miles per hour. In miles, what is the distance William drove? |
| 4 | Mary is taller than Sue, but shorter than Jane. Jane is shorter than Molly. Who is the shortest person out of Mary, Sue, Jane, and Molly? |
| 5 | If 4 out of 25 computers in the computer lab are broken, what percentage of the computers are still working? |
| 6 | You toss a fair coin ten times and get heads all ten times. As a common fraction, what is the probability you will get heads on the eleventh toss? |
| 7 | Robert, who is 45 years old, is three years older than three times the age of Tim. What is the number of years in Tim's age? |
| 8 | The sum of three consecutive numbers is 78. What is the positive difference between the largest and smallest of the three numbers? |
| 9 | What is the median of the following data set: {10, 13, 11, 19, 26, 9} |
| 10 | What is the sum of the first 5 composite numbers? |
| 11 | I order 13 boxes of bagels, with each box containing a baker's dozen. How many bagels are there in total? A baker's dozen is 13. |
| 12 | What is the maximum number of diagonals you can draw in a pentagon? A diagonal is a segment connecting any two non-adjacent vertices. |
| 13 | Evaluate: $(6-3)(6^2+18+3^2)$ |
| 14 | What is the positive difference between $3^4$ and $4^3$? |
| 15 | What is the sum of the digits in the decimal representation of $\frac{7}{8}$ ? |
| 16 | There are 100 centimeters in 1 meter. There are 10 millimeters in 1 centimeter. There are 1000 meters in 1 kilometer. How many millimeters are there in 1 kilometer? |
| 17 | Square ABCD can be drawn on a coordinate plane. Its vertices are at the following points; A(0, 3), B(-3, 0), C(0, -3) and D(3, 0). What is the number of square units in the area of the square? |
| 18 | If $\frac{24}{b}$ is equal to a positive integer, what is the number of possible integer values of b? |
| 19 | What is the radius, in inches, of a circle with a circumference of 8π inches? |
| 20 | If $\frac{x+10}{x}$ = 3, then, as a common fraction, what is the value of $\frac{x^2-1}{x^2}$ ? |
| 21 | Convert to base 10: $111101_2$ |
| 22 | What is the sum of the coordinates of the point of intersection of the lines with equations $5x - y = 9$ and $2y - 3x = 3$? |

| | |
|---|---|
| 23 | Find $f(4)$ if $f(x) = x^2 - 2x + 1$ |
| 24 | How much greater is the sum of all proper factors of 42 than 42 itself? (Proper factors of N are all positive factors of N, not including N itself) |
| 25 | The geometric mean of x and y is $\sqrt{xy}$. What is the positive difference between the geometric and arithmetic means of 12 and 48? |
| 26 | What is the mean of the missing terms in the arithmetic sequence below?<br>$1, \_\_, \_\_, \_\_, \_\_, 23$ |
| 27 | A certain geometric sequence increases by multiplying each term in the sequence by $\frac{5}{3}$ to get the next term. As a decimal, what is the fifth term in the sequence if the seventh term is 60? |
| 28 | If $a \# b = \frac{2a}{b}$, and $b$ must be a positive integer with a value of 10 or less, what is the largest integer value of $a$ that would satisfy the condition $a \# b \leq 20$? |
| 29 | At Pappa's Pizza Parlor, when ordering a pizza, you can choose either thin or thick crust. You can choose one, two, or three kinds of meat, pepperoni, beef, or chicken, or choose not to put any meat on your pizza. In addition, you can choose one of four types of cheese and one of two types of sauces. How many different pizzas could this pizza parlor make? |
| 30 | Slimy the Slug is trying to climb a tree, which is 30 feet tall. Slimy can climb three feet each day, but he needs to rest at night. While he rests, he slides back down one foot each night. If he starts at the base of the tree, after how many days will Slimy reach the top of the tree? |

| Challenge Questions: 3 points each | |
|---|---|
| 31 | You walk into a room of normal dogs and mutant dogs, which instead of having one head, have three heads. Each dog, whether normal or mutant, has exactly four feet. You count 44 feet and 25 heads. How many normal dogs are in the room? |
| 32 | Carter forgot to study for his true-false history test. He answered seven of the ten questions without guessing, but guessed on the remaining three. Assuming he got all of the seven questions on which he did not guess right, what is the probability that Carter got a score of exactly 90%? |
| 33 | Two integer values $a$ and $b$ add up to 50. What is the largest possible product of $a$ and $b$? |
| 34 | Abe gave half of his cookies to Bonnie, who gave half of hers to Cynthia, who gave a third of hers to David. After giving a third of her cookies to David, Cynthia had six cookies left. How many cookies did Abe start out with? |
| 35 | In feet, what is the maximum possible integer value perimeter of a rectangle with an area of 16 square feet? |
| 36 | Matt asked Peter if he had change for a dollar. Peter counted all his pennies, dimes, quarters and half-dollars. He replied, "I have more than one dollar's worth of coins. It's the maximum monetary amount with which I still cannot make exact change for a dollar." How many dimes did Peter have in his pocket? |
| 37 | Dara is trying to grab a matching pair of socks out of his drawer. In the drawer, he has twelve blue socks, ten black socks, eight gray socks, six white socks, and four maroon socks. Dara specifically wants to wear maroon socks today. How many socks must Dara pull out of his drawer to guarantee that he has grabbed a pair of maroon socks? |
| 38 | What is the units digit of seven to the power of 128? |
| 39 | A palindrome is a number that reads the same both forwards and backwards. For instance, 343 is a palindrome. What is the largest palindrome that is less than 1186458? |
| 40 | Paul's home is infested with ants. The population of ants in the basement triples every hour. If at 12:00 PM there are 1,000 ants in the basement, how many will there be at 3:00 PM? |

# "Math is Cool" Championships – 2017-18

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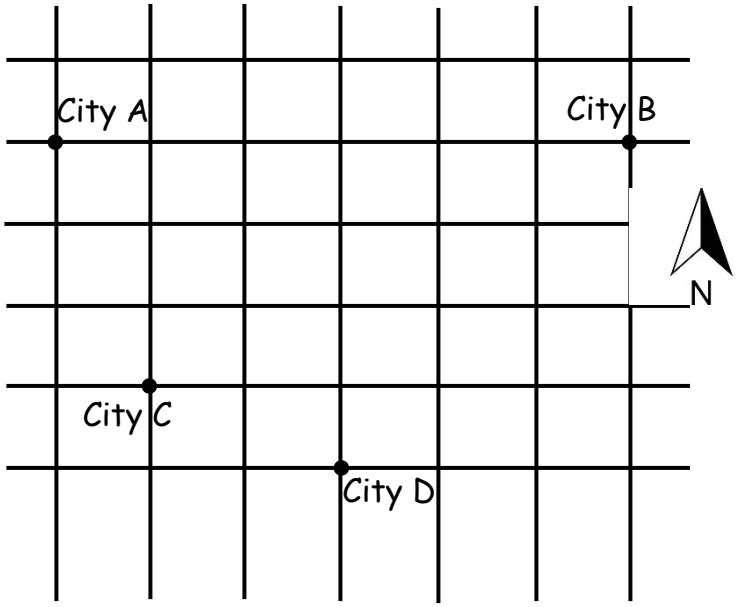
Team Multiple Choice Contest

Use the following map for problems 1 – 5. A group of friends are on a road trip.

The grid squares are 60 miles by 60 miles.




| | |
|---|---|
| 1 | How many hours in total will the group spend driving between City A and City B, if they travel at an average speed of 60 miles per hour?<br><br>A) 3 B) 4 C) 5 D) 6 E) 8 |
| 2 | Let's say the group wanted to reduce their driving time from City A to City B by one hour compared the driving time that was the answer to problem 1. How fast would they have to drive in miles per hour?<br><br>A) 80 B) 72 C) 70 D) 66 E) 64 |
| 3 | Assume the grid lines represent the only roads that can be used to travel between cities. The shortest distance between City B and City D, as the crow flies, is not drivable by car. Let this distance be represented by M. Let N represent the shortest drivable distance between City B and City D. What is the value of N - M?<br><br>A) 120 B) 180 C) 240 D) 300 E) 420 |
| 4 | What is the shortest number of miles that the friends can drive if they start at City A and visit all four cities in alphabetical order while only driving on the roads represented by the grid lines?<br><br>A) 960 B) 1020 C) 1080 D) 1200 E) 1440 |

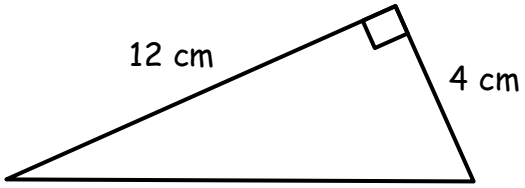
| | |
|---|---|
| 5 | What is the number of possible routes the friends can take in order to start at City A and visit the four cities in alphabetical order if they must follow these rules:<br>1) drive the shortest route from one city to the next<br>2) drive either south or west between City B and City C<br>3) drive either south or east between City C and City D<br><br>A) 59 B) 112 C) 168 D) 180 E) 210 |

Use the following stem-and-leaf plot for problems 6 – 9

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

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

| | |
|---|---|
| 6 | What is the median of the data in the stem-and-leaf plot?<br><br>A) 25 B) 25.5 C) 26 D) 26.5 E) 27 |
| 7 | There is a unique mode (most frequently occurring value) in the data. If all the numbers that equal the mode are removed from the data set, what is the new median?<br><br>A) 23 B) 26 C) 27 D) 27.5 E) 28 |
| 8 | What is the mean of the data set as a decimal rounded to the nearest tenth?<br><br>A) 21.7 B) 25.8 C) 26.8 D) 26.9 E) 27.0 |
| 9 | The current data set has a mean that is not an integer. There is exactly one number in the data set, that when removed, results in the mean of the remaining numbers in the data set being an integer with no rounding. Which number is this?<br><br>A) 18 B) 20 C) 28 D) 32 E) 42 |

| | |
|---|---|
| | The math convention known as simplest radical form is when you multiply a square root by the product of the square roots of any and all factors of the number inside the square root that are perfect squares. For example:<br>$\sqrt{72} = \sqrt{4 \cdot 9 \cdot 2}$<br>$= \sqrt{4} \cdot \sqrt{9} \cdot \sqrt{2}$<br>$= 2 \cdot 3 \cdot \sqrt{2}$<br>$= 6\sqrt{2}$.<br>Note: it is also true that<br>$\sqrt{72} = \sqrt{4 \cdot 18}$<br>$= \sqrt{4} \cdot \sqrt{18}$<br>$= 2\sqrt{18}$<br>but this is not considered *simplest* radical form, because the number inside the square root still has a factor that is a perfect square.<br><br>This convention can be used when solving equations in which the variable is raised to the 2nd power. For example:<br>$c^2 = 5^2 + 10^2$<br>$c^2 = 25 + 100$<br>$c^2 = 125$<br>$c = \sqrt{125}$<br>$c = \sqrt{25 \cdot 5}$<br>$c = \sqrt{25} \cdot \sqrt{5}$<br>$c = 5\sqrt{5}$<br><br>Problem 10 involves simplest radical form |
| 10 | What is the number of centimeters in the length of the hypotenuse of the right triangle below in simplest radical form?<br>  <br><br>A) $2\sqrt{40}$ cm B) $8\sqrt{20}$ cm C) $16\sqrt{10}$ cm D) $4\sqrt{10}$ cm E) $10\sqrt{4}$ cm |

# "Math is Cool" Championships – 2017-18

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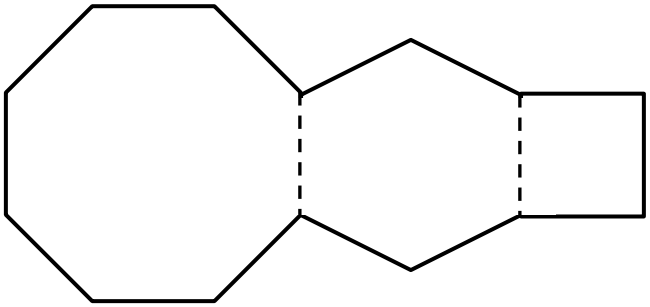
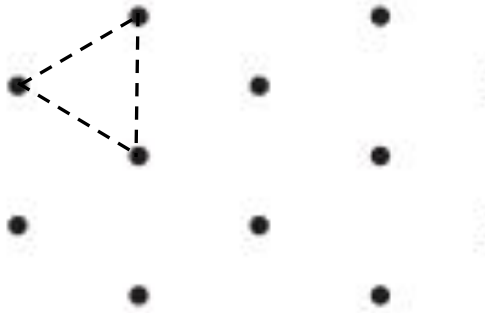
Team Contest

| | |
|---|---|
| 1 | Jaze has read 31 pages of his latest book. This represents 5% of the number of pages in the book. How many pages are in the book? |
| 2 | If a card is drawn at random from a standard deck, as a common fraction, what is the probability that it is an Ace? |
| 3 | In the figure below, the regular octagon, the regular hexagon and the square all have sides of 6 inches. What is the number of inches in the perimeter of the figure?  |
| 4 | What is the value of the largest term in an arithmetic sequence [1,7,13,19…] that is less than 100? |
| 5 | One farmer leaves for the market in a tractor towing his produce in a cart at an average rate of 10 miles per hour. A second farmer leaves from the same farm at the same time, headed for the same market by the same road as the first farmer, on a donkey at an average rate of 4 miles per hour. If it takes the second farmer 45 minutes longer to get to the market, how many miles is it from the farm to the market? |
| 6 | Sally is choosing an outfit for the day. In her closet, she has three different shirts, four different pairs of pants, eight different pairs of socks, and two different pairs of shoes. If an outfit must consist of a shirt, a pair of pants, a pair of socks, and a pair of shoes, how many different outfits could Sally choose from? |
| 7 | One way of generating a number series is by following these rules:<br>1) an even number is always followed by a new number that is half of the even number<br>2) an odd number is always followed by a number that is one greater than the odd number<br>A particular number series follows these rules. It begins with 100 and ends with 1. What is the sum of the numbers in this series? |

| | |
|---|---|
| 8 | What is the number of equilateral triangles that can be created by connecting any three dots in the dot array below? One example of an equilateral triangle is shown.<br>  |
| 9 | Rounded to the nearest whole number, what is the average of all of the numbers that appear on a 12-month calendar? Only include the days of the months. |
| 10 | A cylindrical can has an inner radius of 4 cm and an inner height of 2 cm. A flat, rigid square is entirely enclosed inside the can and the square's four vertices all touch the interior surfaces or edges of the can. What is the number of square centimeters in the area of the largest possible such square? |

# "Math is Cool" Championships – 2017-18

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6th Grade – January 26, 2018

# Robert Dirks' Relay Contest – Questions & Key

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

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

| | **Practice Relay** | Answer |
|---|---|---|
| Person 1 | What is 12 times 8? | 96 |
| Person 2 | What is half of TNYWG? | 48 |
| Person 3 | How many factors does TNYWG have? | 10 |
| Person 4 | What must be added to TNYWG to get a sum of 100? | 90 |
| | **Relay #1** | Answer |
| Person 1 | What is 52 divided by 4? | 13 |
| Person 2 | What is the sum of the digits of TNYWG? | 4 |
| Person 3 | What is TNYWG squared? | 16 |
| Person 4 | What is the area of a circle with a diameter of TNYWG inches, in terms of π? | 64π [square inches] |
| | **Relay #2** | Answer |
| Person 1 | What is the largest prime number less than ten? | 7 |
| Person 2 | What is nineteen minus two times TNYWG? | 5 |
| Person 3 | What is TNYWG factorial? | 120 |
| Person 4 | What is the least common multiple of 50 and TNYWG? | 600 |

# "Math is Cool" Championships – 2017-18

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## COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

| # | Problem | Answer |
|---|---|---|
| 1 | How many two digit numbers contain a zero? | 9 |
| 2 | If I recycle a can, I make three cents. For every ten cans I recycle, I earn a bonus two cents. How many cents did I earn from recycling ninety-six cans? | 306 [cents] |
| 3 | How many numbers from one to one hundred inclusive are neither prime nor composite? | 1 |
| 4 | What is two to the eighth power, minus two squared, minus two? | 250 |
| 5 | The longer leg of a right triangle is twenty-four inches and the hypotenuse is twenty-six inches. In inches, what is the length of the shorter leg of the triangle? | 10 [inches] |
| 6 | If there are black marbles, red marbles, and yellow marbles in a jar how many marbles must be drawn from the jar to ensure that you have at least two marbles of the same color? | 4 [marbles] |
| 7 | When rolling a pair of standard six-sided dice, as a common fraction, what is the probability of rolling a sum of five? | $\frac{1}{9}$ or "1 out of 9" or "1 over 9" |
| 8 | What is the measure of an interior angle of a regular hexagon? | 120 [degrees] |
| 9 | In a farm full of chickens and pigs, there are fourteen heads and thirty-six feet. How many pigs are in the farm? | 4 [pigs] |
| 10 | In football, Russell completed three hundred and twenty-nine passes out of four hundred and eighty-three attempts. To the nearest ten percent, what is his completion percentage? | 70 [%] |

# "Math is Cool" Championships – 2017-18

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## COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

| # | Problem | Answer |
|---|---|---|
| 1 | Thirteen goes into ninety N times with remainder R. What is N plus R? | 18 |
| 2 | How many non-overlapping circles with radius three centimeters can fit entirely inside a square with side length fourteen centimeters? | 4 [circles] |
| 3 | What is the maximum area, in square inches, of a rectangle with a perimeter of forty-eight inches? | 144 [square inches] |
| 4 | By using pennies, nickels, dimes, and quarters, what is the smallest number of coins than can be used to pay for an item that costs sixty-seven cents? | 6 [coins] |
| 5 | What is the sum of five factorial and six factorial? | 840 |
| 6 | In soccer, Hope earned seventy-one shutouts in one hundred and fifty-two games that she played. To the nearest ten percent, what is her shutout success percentage? | 50[%] |
| 7 | As a common fraction, what is the probability of consecutively drawing two queens, without replacement, from a standard deck of cards? | $\frac{1}{221}$ or "1 out of 221" or "1 over 221" |
| 8 | How many factors are in two thousand and eighteen? | 4 [factors] |
| 9 | Sarah counts backwards by eight from nine thousand and thirteen. What is the last positive number Sarah will say? | 5 |
| 10 | What is the sum of the two solutions to the following equation: x squared plus eight equals thirty-three | 0 |

# "Math is Cool" Championships – 2017-18

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## COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

| # | Problem | Answer |
|---|---|---|
| 1 | What is the median of the list of positive multiples of eight that are less than one hundred? | 52 |
| 2 | The three angles of a triangle are in a ratio of two to four to six. What is the number of degrees in the largest angle? | 90 [degrees] |
| 3 | Erik can fold ten paper cranes in one hour. Leanne can fold fifteen paper cranes in seventy-five minutes. How many more paper cranes has Leanne folded than Erik after an hour and a half? | 3 [paper cranes] |
| 4 | A fair coin is tossed four times. As a common fraction, what is the probability that heads will appear at least once? | $\frac{15}{16}$ or "15 out of 16" or "15 over 16" |
| 5 | As a common fraction, what is the sum of the first fifty odd numbers divided by the sum of the first fifty even numbers? | $\frac{50}{51}$ or "50 over 51" |
| 6 | If each dimension of a cube is quadrupled, how many times greater is the new volume than the original volume? | 64 [times] |
| 7 | On a baseball team, the nine starting players each have a unique prime number on their jerseys. As a common fraction, what is the average of the nine numbers that make up the smallest possible sum? | $\frac{100}{9}$ or "100 over 9" |
| 8 | In cubic centimeters, what is the smallest possible volume of a box with distinct dimensions, which are composite numbers of centimeters greater than ten? | 2520 [$cm^3$] |
| 9 | What is the units digit of three to the power of two thousand nine hundred and ninety-nine? | 7 |
| 10 | What is the sum of the two solutions to the equation x squared, minus x, equals 12. | 1 |

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## COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

| # | Problem | Answer |
|---|---|---|
| 1 | As a common fraction, what is the probability that a randomly chosen positive two-digit integer is a factor of twenty-four? | $\frac{1}{45}$ or "1 out of 45" or "1 over 45" |
| 2 | There are A multiples of ten in one hundred and B multiples of one hundred in ten thousand. What is B minus A? | 90 |
| 3 | As a common fraction, what is one-half, minus one-third, plus one-fifth, minus one-seventh? | $\frac{47}{210}$ or "47 over 210" |
| 4 | The first three Fibonacci numbers are one, one, and two. What is the positive difference between the twelfth Fibonacci number and twelve dozens? | 0 |
| 5 | The measure of the angles of a triangle are in a ratio of four to five to six. In degrees, what is the measure of the smallest angle? | 48 [degrees] |
| 6 | As a common fraction, what is the probability of rolling a non-composite number on a four-sided die? | $\frac{3}{4}$ or "3 out of 4" or "3 over 4" |
| 7 | What is the least common multiple of forty-nine and fifty-one? | 2,499 |
| 8 | Each side of a triangle has a different positive integer number of centimeters as its length. What is the least possible number of centimeters in the perimeter of this triangle? | 9 [cm] |
| 9 | What month will it be two thousand and eighteen days from August thirtieth? | March |
| 10 | Twelve people attended a party. The adults all ate two cookies each, while the kids ate seven cookies each. If a total of forty-nine cookies were eaten, how many adults attended the party? | 7 [adults] |

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## COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

| # | Problem | Answer |
|---|---|---|
| 1 | I have a stack of comic books that can be split equally among two, three, four, five and six people. What is the least possible number of comic books that I have? | 60 [comic books] |
| 2 | Evaluate five x squared, plus three x, plus two, if x equals five. | 142 |
| 3 | What is the number of two-digit integers in which the sum of their digits is ten? | 9 [integers] |
| 4 | All the sides of a triangle have integer lengths in inches and the perimeter is seven inches. What is the number of inches in the smallest possible side length of a triangle matching this description? | 1 [inch] |
| 5 | All the red cards are removed from a standard deck of fifty-two cards. What is the probability of drawing the king of hearts from the remaining cards? | 0 |
| 6 | What is the sum of adding the first five prime numbers and the first five composite numbers? | 65 |
| 7 | What is the least common multiple of one hundred and fifty and two hundred and forty? | 1200 |
| 8 | What is twenty-four as a base three number? | 220 [base 3] or two two zero [base 3] |
| 9 | Abby has fifty-seven nickels and dimes in her pocket, totaling four dollars and fifty-five cents. How many dimes does she have? | 34 [dimes] |
| 10 | The surface-area-of-a-cylinder formula is two-pi-R-squared plus two-pi-R-H. What is the surface area, in square inches, of a cylinder with a diameter of four inches and a height of seven inches? Answer in terms of pi. | 36π [square inches] |

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## COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

| # | Problem | Answer |
|---|---|---|
| 1 | There are five thousand two hundred and eighty feet in one mile. How many inches are in one mile? | 63,360 [inches] |
| 2 | A serving size for a bag of chocolate truffles is three truffles and there are four servings in the bag. The percent daily value of saturated fat from one serving is sixty-five percent. What is the percent daily value of saturated fat from the whole bag? | 260 [percent] |
| 3 | At three o'clock the hands of a clock form a ninety-degree angle and a two-hundred-and-seventy-degree angle. The ratio of these angles as a fraction is one over three. As a common fraction, what is the ratio of the angles formed by the hands at five o'clock? | $\frac{5}{7}$ or "5 over 7" |
| 4 | What is the average of the four largest two-digit prime numbers? | 87 |
| 5 | Evaluate twelve factorial divided by ten factorial? | 132 |
| 6 | The price of the stamp went from forty-four cents to forty-seven cents. To the nearest whole percent, what was the increase in the price? | 7 [%] |
| 7 | On one day, Leo noticed that the sun rose at seven thirty AM and set at nine PM. As a decimal number of hours, for how long was the sun *not* visible on that day? | 10.5 [hours] |
| 8 | A bag contains one each of the twenty-six letters of our alphabet. The letters A, E, I, O, and U, are vowels. Three letters are randomly drawn from the bag without replacement. As a common fraction, what is the probability that all three are vowels? | $\frac{1}{260}$ or "1 out of 260" or "1 over 260" |
| 9 | How many perfect square numbers are less than one thousand and twenty-five? | 32 [numbers] |
| 10 | The volume formula for a pyramid is base area times height, divided by three. What is the number of cubic centimeters in the volume of a pyramid, whose square base has a diagonal of six times the square root of two centimeters, and a height of six centimeters? | 72 [$cm^3$] |

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## COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

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

Final Score:

**KEY**

(Out of 8)

# "Math is Cool" Championships -- 2017-18

Student Name _____ Team #_____

School Name _____ Proctor Name_____ Room #_____

6th Grade **Mental Math** – 30 sec per question

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

*You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you.* ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

| | Answer | 1 or 0 | 1 or 0 |
|---|---|---|---|
| **1** | 39 | | |
| **2** | 1/4 | | |
| **3** | 125 [miles] | | |
| **4** | $16\pi$ [$in^2$] | | |
| **5** | 5 | | |
| **6** | 19 | | |
| **7** | 1/9 | | |
| **8** | 42 [miles] | | |
| | | | |

# "Math is Cool" Championships – 2017-18

6th Grade

School Name_____Team #_____

Proctor Name _____Room #_____

| Final Score: KEY |
|---|
| First Score (out of 20) |

## Team Multiple Choice Contest – 15 minutes – 20% of team score

*This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. When you are prompted to begin, tear off the colored sheet, pass out a copy of the test to each team member, and begin testing.* ***Since this is a multiple choice test, ONLY a letter response should be listed as an answer on the answer sheet.***

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

**DO NOT WRITE IN SHADED REGIONS**

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

# "Math is Cool" Championships – 2017-18

6th Grade

School Name_____ Team #_____

Proctor Name_____ Room #_____

| Final Score: KEY |
|---|
| First Score (out of 10) |

## Team Contest – Score Sheet – 15 minutes – 30% of team score

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

**DO NOT WRITE IN SHADED REGIONS**

| Answer | | 1 or 0 | 1 or 0 |
|---|---|---|---|
| 1 | 620 [pages] | | |
| 2 | $\frac{1}{13}$ | | |
| 3 | 84 [inches] | | |
| 4 | 97 | | |
| 5 | 5 [miles] | | |
| 6 | 192 | | |
| 7 | 250 | | |
| 8 | 15 [equilateral triangles] | | |
| 9 | 16 | | |
| 10 | 34 [$cm^2$] | | |
| | | | |

# "Math is Cool" Championships -- 2017-18

6th Grade

KEY

## PRACTICE RELAY

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

## RELAY # 1

| Answer for person # 1 | Answer for person # 2 | Answer for person # 3 | Answer for person # 4 |
|---|---|---|---|
| **13** | **4** | **16** | $64\pi$ [square inches] |
| 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 |
|---|---|---|---|
| **7** | **5** | **120** | **600** |
| 1 or 0 | 1 or 0 | 1 or 0 | 2 or 0 |

# "Math is Cool" Championships -- 2017-18

Student Name _____ Team #_____

School Name _____ Proctor Name_____ Room #_____

6th 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 | | | |
| | | | |

# "Math is Cool" Championships – 2017-18

6th Grade

School Name_____Team #_____

Proctor Name _____Room #_____

| Final Score: |
|---|
| First Score<br>(out of 20) |

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**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 – 2017-18

6th Grade

School Name_____ Team #_____

Proctor Name_____ Room #_____

| Final Score: |
| --- |
| First Score (out of 10) |

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**DO NOT WRITE IN SHADED REGIONS**

| | Answer | 1 or 0 | 1 or 0 |
| --- | --- | --- | --- |
| 1 | | | |
| 2 | | | |
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| 6 | | | |
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| 9 | | | |
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