

# Eric's Puzzle Party – Spring 2005

<http://www.ericarshbarger.org/epp/>

## **DO NOT READ PAST THIS PAGE UNTIL TOLD TO DO SO BY THE REFEREE!**

### Introduction

By now you should have already formed a team of players and designated a captain of the team. While you are waiting for the contest to begin you may want to think of a spiffy team name. In the *very unlikely* event of tie scores, the winning team will be the one the referee thinks has the coolest name.

In addition to this booklet of puzzles your team should have received a box of certain property which will be of use. Scratch paper, pens, pencils, calculators, and graph paper are also available to use (just ask the referee). Besides these items, you should not employ any other tools (no cell phones, internet, etc).

Each team will have a dictionary randomly assigned to it. Certain puzzles may ask you to find words satisfying various conditions. You must only use words that you can find in your team's dictionary. To be valid, a word must appear in that dictionary and must be either listed in boldface or be an inflected form of a boldface entry. Comparative and superlative forms of adjectives are acceptable only if specified after a boldface entry, but noun plurals and verb forms are acceptable if clearly implied by the inflectional patterns of related words. Words may contain accent marks. A word is unacceptable if it:

1. is composed of two or more component words separated by a space, or appears only as a component part;
2. contains an apostrophe, hyphen, or period;
3. is designated as capitalized or usually capitalized;
4. is listed only as an abbreviation or symbol.

**A change of rules from last time:** unless otherwise stated, you may only submit an answer for any particular problem once (no additional points if you later think of a better solution). While you might suspect that this will cause your team to hoard the answers until the very end, two things will discourage this. First, some of the problems award more points to teams that submit correct answers more speedily than other teams. Secondly, there is a "meta-puzzle" to contend with (a puzzle that is only solved as more and more of the basic problems are answered). In addition to Points awarded for puzzles in the booklet, many also reward correct answers with Cards. These Cards will be helpful in solving the Meta-Puzzle. **The Meta-Puzzle is potentially very valuable to your team. It is explained fully on the last page of this booklet.**

You may wish to read all of the problems first (especially the Meta-Puzzle at the end), before starting any of them. If anything is unclear, do not hesitate to ask the referee for clarification. Note that some of the puzzle award more points to the teams who submit their (correct) answers more quickly – you may want to ferret those puzzles out first and attack them immediately.

The contest is scheduled to start at 1:00 PM. It will last 4 hours. It is not necessary to complete all of the puzzles.

While some of the problems use mechanics and themes common among puzzles, all of the challenges in this booklet were created by Eric Harshbarger specifically for this Puzzle Party.

Thank you to Michael Keller for proofreading, test-solving, and feedback about the puzzles herein. And thanks to everyone for coming. If you were at the first Puzzle Party, thanks for returning. If this is your first time... get ready... four hours from now you'll be happily exhausted.

Have fun!

- Eric Harshbarger

**1. ICOSAHEDRAL POKER:** Provided to your team is a set of twenty wooden pieces that will magnetically assemble to form an icosahedron. The outer triangular faces of the pieces have rank and suit designations in the corners. Each of the 52 playing cards is represented, and 8 'blanks' are also present. When the model is constructed, you will see that 12 'hands' are created each from five of the corners from five different triangles (each hand will be grouped together in a circular pattern). If a circle hand contains five actual cards (no 'blanks') then a poker hand has been formed, and may be worth points. If a circle contains 1 or more blanks, it will earn you no points (but is still valuable, see SCORING for more).

After you have assembled the icosahedron, examine the model and determine how many poker hands you have created. Each hand is worth the following number of points:

Straight Flush	1000 Pts.
Four of a Kind	500
Full House	180
Flush	120
Straight	80
3-of-a-Kind	60
2 Pair	40
1 Pair	15

### **SCORING:**

**POINTS:** Your team receives a number of Points equal to the sum of points gained from all valid hands.

**CARDS:** You will receive 3 Cards for each circle grouping formed that has one or more blanks in it.

### **REFERENCE:**

Here are definitions of poker hands (from best to worst):

- **Straight flush:** five cards in sequence in the same suit (Ace may be high or low).
- **Four of a kind:** any four cards of the same rank.
- **Full house:** three of a kind and a pair.
- **Flush:** any hand of five cards all of the same suit.
- **Straight:** any five cards in sequence but not all of the same suit (Ace may be high or low).
- **Three of a kind:** such as three 5's, with two unmatched cards.
- **Two pairs:** two cards of any one rank and two cards of any other rank, with an unmatched fifth card in hand.
- **One pair:** any two cards of the same rank.

**2. TOWERING ACHIEVEMENT:** On display on the mantel above my fireplace is a model of the Eiffel Tower made solely from BBs and tiny magnets. Without touching or otherwise disturbing the fragile sculpture\*, you must determine how many BBs are used in the construction. Answers closest to the exact amount will earn more points (ties will be broken by the results submitted most quickly).

**SCORING:**

POINTS: Based on the closest counts, teams will receive the following Points.

1 <sup>st</sup> (closest)	1000 Pts.
2 <sup>nd</sup>	900
3 <sup>rd</sup>	800
4 <sup>th</sup>	700
5 <sup>th</sup>	600

CARDS: None.

\* This sculpture is VERY fragile (and expensive)... please take utmost care when studying it. It is not glued in any way; only the tiny magnets are holding it together.

**3. STATES OF CONFUSION:** This is a five part problem. The numerical answers you get from each of the five parts will be used in a formula to calculate points earned. In each part “state” refers to a U.S. State. Here are the subparts:

1. Create a list of state names such that no letter is shared between any two of the names. Let  $A$  be the sum of the lengths of the state names on your list. You may ignore spaces in state names. A single state name may have a letter repeated within itself; it simply may not share letters with any of the other states listed.
2. Create a list of state names such that every letter of the alphabet (except ‘Q’) is included somewhere in the list. Let  $B$  be the sum of the lengths of the state names on your list. You may ignore spaces in state names.

3. Choose two of the lower 48 contiguous states. Write them down here:

\_\_\_\_\_

On a map the referee will draw a straight line connecting the capital cities of your two states.  $C$  will be equal to the number of states that line crosses on the map (including the two states you chose).

4. Choose a state and write it down: \_\_\_\_\_ .  $D$  will be equal to the number of states which border your chosen state.

5. Create a list of states such that the capital of each state ends with ‘CITY’.  $E$  will be the value equal to the number of correctly named states minus any incorrectly named states (ones which you thought have a capital ending in ‘CITY’ but do not).

**SCORING:**

POINTS: Your team will earn a number of Points equal to this formula using the values of  $A$  through  $E$  from above:

$$((A * (D + E) - B)) * C$$

CARDS: None.

**4. TEN DIGIT ARITHMETIC:** Using the ten digits 0 through 9 once each and arranging them along with plus (+) and minus (-) signs, it is possible to create an equation equal to 0:

$$0 = 135 - 48 - 6 - 79 - 2 + 0$$

$$\underline{1} = ???$$

$$\underline{2} = ???$$

$$\underline{3} = ???$$

...

Your goal is to create similar equations for other whole numbers, starting at 1 and progressing upward. You will only receive credit for a number's solution if all of its predecessors have also been solved (e.g. an equation equaling 17 is only counted if 1 through 16 have also been solved).

**SCORING:**

**Your team may choose to either receive POINTS or CARDS for this puzzle.**

POINTS: Your team will receive a number of Points equal to  $10 * N * (N+1)$ ,

CARDS: Your team will receive a number of Cards equal to N,

where N is the highest valid number equated from the puzzle.

**5. SCRABBLED WORDS:** Using all 100 Scrabble tiles provided, create a list of words such that the list is as short as possible (the two blanks may be designated as whatever letters you wish). You must use all 100 tiles in your list.

**SCORING:**

POINTS: Your team will receive a number of Points equal to  $(25 - N)^3$  where N is number of words in your list.

CARDS: Your team will receive 3 Cards for each word in your list that begins with a vowel.

**6. EASY AS “A-B-C”:** Notice that the word ‘cabal’ has a pair of alphabetically sequential letters in it adjacently: the ‘A’ and ‘B’ (c-AB-al). Your goal is to find a word for each such pair running through the alphabet. Furthermore, you can earn Cards for your team by finding sequential triplets in words (e.g. is there a word that contains ‘ABC’ in it sequentially and adjacently?) List your words below on the appropriate lines. Note that finding a word with a triplet in it will automatically get you two words with pairs (e.g. if you find an ‘ABC’ word, then you also have found an ‘AB’ word and a ‘BC’ word) in addition to a Card.

PAIRS

`AB' \_\_\_\_\_  
 `BC' \_\_\_\_\_  
 `CD' \_\_\_\_\_  
 `DE' \_\_\_\_\_  
 `EF' \_\_\_\_\_  
 `FG' \_\_\_\_\_  
 `GH' \_\_\_\_\_  
 `HI' \_\_\_\_\_  
 `IJ' \_\_\_\_\_  
 `JK' \_\_\_\_\_  
 `KL' \_\_\_\_\_  
 `LM' \_\_\_\_\_  
 `MN' \_\_\_\_\_  
 `NO' \_\_\_\_\_  
 `OP' \_\_\_\_\_  
 `PQ' \_\_\_\_\_  
 `QR' \_\_\_\_\_  
 `RS' \_\_\_\_\_  
 `ST' \_\_\_\_\_  
 `TU' \_\_\_\_\_  
 `UV' \_\_\_\_\_  
 `VW' \_\_\_\_\_  
 `WX' \_\_\_\_\_  
 `XY' \_\_\_\_\_  
 `YZ' \_\_\_\_\_

TRIPLETS

`ABC' \_\_\_\_\_  
 `BCD' \_\_\_\_\_  
 `CDE' \_\_\_\_\_  
 `DEF' \_\_\_\_\_  
 `EFG' \_\_\_\_\_  
 `FGH' \_\_\_\_\_  
 `GHI' \_\_\_\_\_  
 `HIJ' \_\_\_\_\_  
 `IJK' \_\_\_\_\_  
 `JKL' \_\_\_\_\_  
 `KLM' \_\_\_\_\_  
 `LMN' \_\_\_\_\_  
 `MNO' \_\_\_\_\_  
 `NOP' \_\_\_\_\_  
 `OPQ' \_\_\_\_\_  
 `PQR' \_\_\_\_\_  
 `QRS' \_\_\_\_\_  
 `RST' \_\_\_\_\_  
 `STU' \_\_\_\_\_  
 `TUV' \_\_\_\_\_  
 `UVW' \_\_\_\_\_  
 `VWX' \_\_\_\_\_  
 `WXY' \_\_\_\_\_  
 `XYZ' \_\_\_\_\_

**SCORING:**

POINTS: For each pair satisfied your team will receive 100 Points.

CARDS: For each triplet satisfied your team will receive 3 Cards.

**7. EASY AS “1-2-3”:** Start in the center square of the 7x7 grid below (the boldface ‘3’). Choose a direction to jump (up, down, left, or right; not diagonally). Draw an arrow in the box with the starting ‘3’ indicating the direction you wish to move. You will jump to the box 3 spaces in the arrow’s direction. That new box will have a number in it as well. Again, pick a direction, draw an arrow, and move a number of spaces equal to the number in that current box. Continue this process. You may not return to a box that was already visited (it will already have an arrow in it). Your goal is to visit as many of the boxes as possible before reaching a dead end (being unable to jump).

**SCORING:**

POINTS: You will receive 100 Points for each box you visit (each space with an arrow in it).

CARDS: You will receive a number of Cards equal to the last number you jump to.

3	1	3	1	2	1	1
2	1	3	3	1	2	2
2	2	2	3	2	1	1
2	3	1	<b>3</b>	2	1	3
1	1	2	2	3	1	3
2	3	1	2	2	1	2
2	2	1	3	2	1	2



**8. WILD CARDS:** Consider the following groups of words:

F <u>A</u> N	BE <u>A</u> T
F <u>E</u> N	BE <u>E</u> T
F <u>I</u> N	BE <u>L</u> T
F <u>U</u> N	BE <u>N</u> T
	BE <u>S</u> T

Within each group the letter at a particular position in the word can be changed to form different words (it is a “wild card”). Your goal is to find your own such list of words, trying to maximize both word length and list length. Only a single letter can be changed, and it must always be in the same position within the word. **Also note: the “wild card” letter may not be the first or last letter of the word (those letters of the words must be unchanging).**

**SCORING:**

POINTS: Your team will receive a number of Points equal to  $100 * W * L$ ;

CARDS: Your team will receive a number of Cards equal to  $2 * W$ ;

where  $W$  is the length of the words and  $L$  is the length of the word list.

**9. TEAM BUILDING:** Choose one or more people from your team to be “Describers,” any of the remaining team members may be “Builders.” When ready, tell the referee, and he will record your Start Time. At that moment the Describers will be directed to a geometric model (a “truncated octahedron”, for the mathematically curious) made from magnetic toys; this will be out of sight from the rest of their team. The Describers may mentally study the object for as long as they wish (the clock is running!), but they may not touch it, nor may they write down any notes; they must rely solely on their memories. When satisfied with their examination, the Describers return to the rest of their team. The Builders will have been given a collection of magnetic pieces, exactly enough to replicate the object which the Describers studied.

The goal of the Describers is to instruct the Builders as to how they should recreate the object using the magnetic pieces provided to your team. The Describers may watch the Builders build, *but they may not touch the team's pieces!* Only the Builders are allowed to actually manipulate the new object as it is being built. If they wish, the Describers may go back to the model and study it more (but obviously, no Builders may join them, nor may the Describers take their team's partially completed model with them). When the Builders complete the reconstruction, they should show it to the referee for verification. If correct, the End Time is recorded and the total duration calculated. The goal is to complete the building faster than the other teams. Note that the duration is for both the studying and the building of the model. If the Builders submit a reconstruction that is incorrect, the referee will state that fact, and they may continue working on the model.

**Note:** the color of the replicated model does not matter, only the shape has to be exactly the same.

**SCORING:**

POINTS: Based on the speediest times, teams will receive the following Points.

1 <sup>st</sup> Place	4000 Pts.
2 <sup>nd</sup>	3800
3 <sup>rd</sup>	3400
4 <sup>th</sup>	2800
5 <sup>th</sup>	2000
Forfeit	0

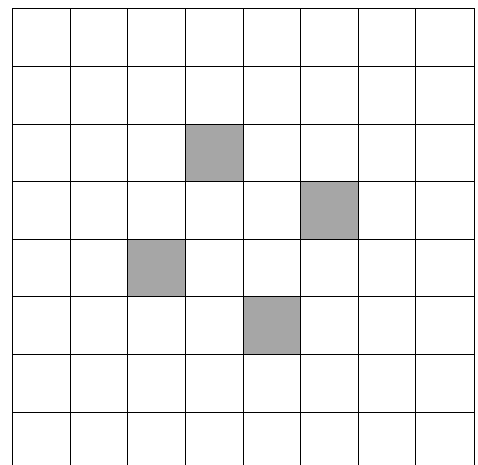
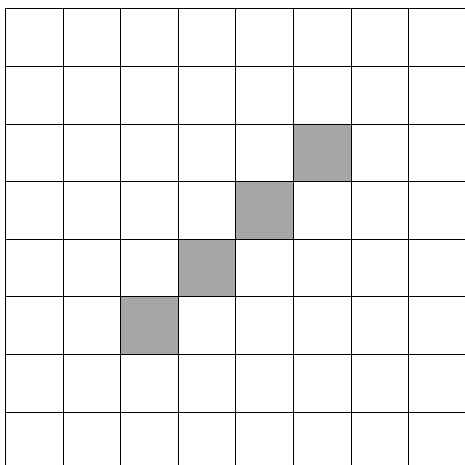
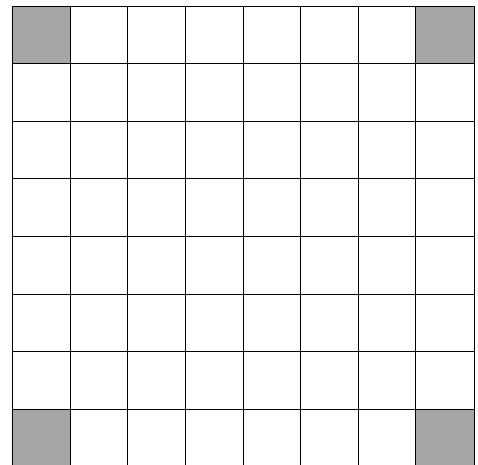
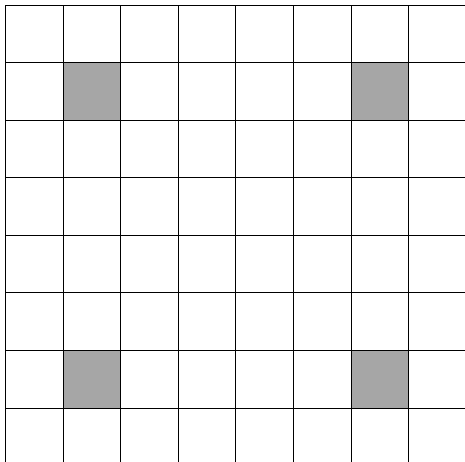
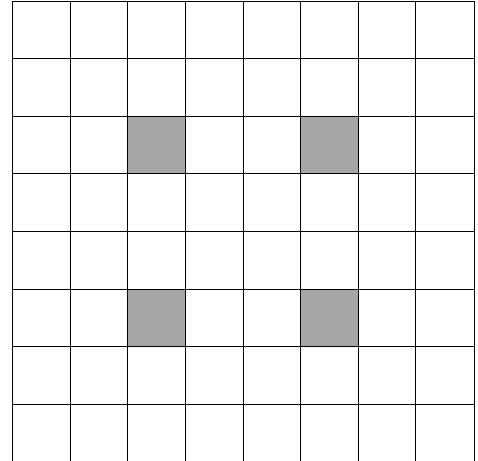
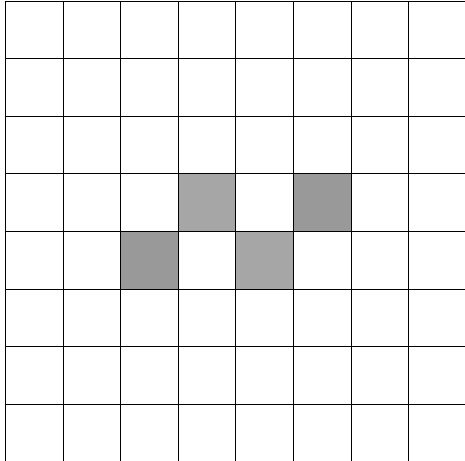
CARDS: None.



**11. PENTOMINOES, REDUX (for Kelly):** Using the 12 Pentominoes provided, construct each of the configurations below (the shaded squares represent empty spaces). A grid has been provided on the next page to facilitate the process. Show the referee each solution for credit.

**SCORING:**

For each correct solution your team may receive *either* 1000 Points *or* 5 Cards. You need not complete all six configurations to get credit for solved ones (and you may show the individual answers to the referee one at a time, as you complete them).







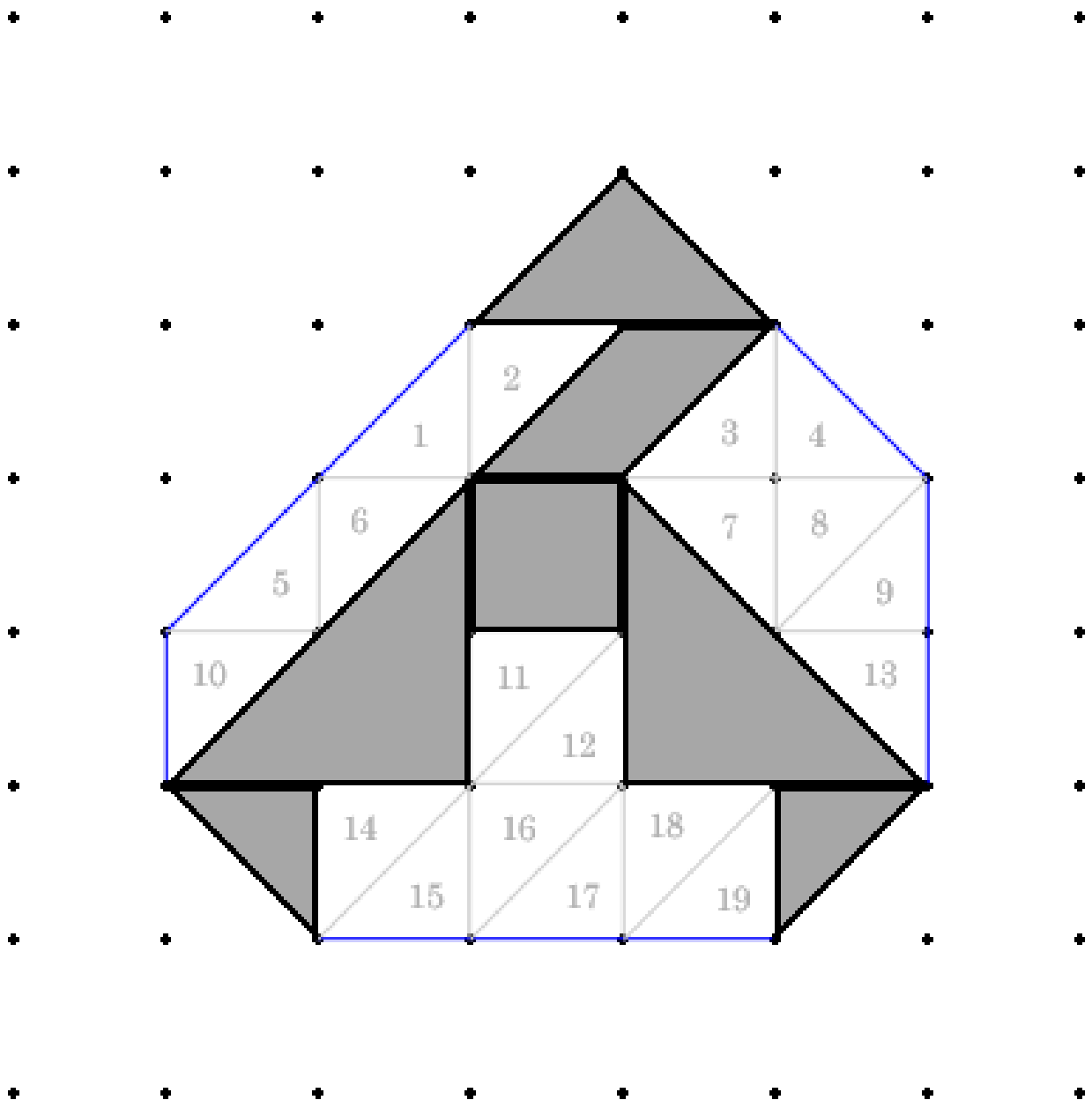
**13. COMPLEXITY CONVEXITY:** Below is a diagram created from the 7 pieces of the classic Tangram puzzle. The pieces are placed such that their corners (vertices) align with dots in a grid pattern. The blue line fences in an area which establishes the “convex hull” of the shape. The convex hull of a shape is the minimum convex polygon with vertices at the dots which contains that shape (“convex” basically meaning that the shape does not indent around the edges). There is obviously area within the convex hull which is not part of the original shape (the white space inside the blue fence). The total area of this extra space (measured in basic, small, right triangles) is 19 (counted as shown).

Your puzzle is to use the 7 Tangram pieces (provided in your prop-box) to create a shape whose convex hull encloses as much extra white space as possible (how much better than “19” can you do?) Use the dot-grid provided (in the prop-box, as well) to lay the pieces out and sketch convex hulls (you may ask the referee questions if you are still unclear as to what the “convex hull” of a particular shape is). All of your Tangram pieces must be properly connected to one another (touching along an edge); you may flip pieces over if you wish.

**SCORING:**

**POINTS:** Your team will receive 100 Points for each basic unit triangle of extra which space enclosed within your Tangram’s convex hull (in the example, the 19 enclosed triangle units would earn the team 1900 Points).

**CARDS:** No Cards are earned for this puzzle.



14. UNTITLED:

R	S	L	O	O	E	I	I	T	A	E	S
M	D	C	T	H	K	G	T	8	S	V	H
O	2	E	F	4	R	I	F	F	E	I	O
I	D	V	E	N	F	F	H	D	E	R	E
O	A	T	W	O	A	O	I	S	R	T	W
T	O	H	I	B	N	Y	T	E	W	G	H
T	I	L	W	O	O	O	L	O	G	P	O
E	G	E	F	L	U	O	R	O	C	F	B
T	R	Y	F	B	F	H	I	F	O	S	T
R	R	I	F	C	R	K	D	O	F	N	H
O	O	T	O	O	T	M	T	S	N	E	T
O	E	P	K	T	O	B	C	T	D	A	T





**16. STACK THE DECK II:** Using the standard deck of playing cards provided to your team (with jokers, 54 cards total), build a 'house of cards' as tall as possible (it may be any shape of structure). You must only stack the cards; you may not cut, bend, glue, or otherwise modify them. You may not use any material other than the cards in your construction. You may build your structure on any suitable solid surface (height will be measured from that base, of course).

**SCORING:**

**POINTS:** Your structure's height will be measured by the referee when you so request. Your team will receive 100 points per inch of height.

**CARDS:** Your team will receive 1 Card for every five unused playing cards that you have not incorporated into your structure (rounded down -- so, yes, if you decide to not build a structure at all, you may turn in all 54 unused playing cards and receive 10 meta-puzzle Cards).

**17. (ESCHER)<sup>3</sup>:** Provided to your team is a paper cube with prints of M. C. Escher's *Ascending and Descending* on each face. Of the six images only one is the original; the other five are flawed duplicates. For each inaccuracy between the faces, the original copy always shares its version of that difference with a majority of the other sides. Which side is the original?

**SCORING:**

The quicker teams get better rewards. Submitting an incorrect answer will result in a penalty.

1 <sup>st</sup> to solve	1500 Points	or	5 Cards
2 <sup>nd</sup>	1400 Points	or	4 Cards
3 <sup>rd</sup>	1200 Points	or	3 Cards
4 <sup>th</sup>	900 Points	or	2 Cards
5 <sup>th</sup>	500 Points	or	1 Card

No answer: 0 Points

Wrong answer: -500 Points

**18. WORD BUILDING:** Consider the following list of words:

**A**

**AN**

**RAN**

**RAIN**

**BRAIN**

**BRAINY**

Each word in the list is created by adding a new letter somewhere to the previous word (adding to either the beginning or ending of the word, or inserting it into the middle of the previous word). This example list is 6 words long. How much better can you do? Each step in the list must be a valid word.

**SCORING:**

**Your team may choose to either receive POINTS or CARDS for this puzzle.**

POINTS: Your team will receive a number of Points equal to  $30 * N * N$ ,

CARDS: Your team will receive a number of Cards equal to  $N$ ,

where  $N$  is the length of your list.

**19. (LATIN)<sup>2</sup> PLUS SOME:** Using nine sets of digits 1 through 9, fill in the 9x9 grid below so that no row or column repeats a digit (one digit per square, of course). Furthermore, numbers which lie within the same (dark) partitioning boxes must sum up to the small number in the corner the boxes (i.e. if a boxed area has a small '14' in the upper left corner, the numbers in that box must add up to 14).

**SCORING:**

The quicker teams get better rewards:

- 1<sup>st</sup> to solve      2000 Points      or      10 Cards
  - 2<sup>nd</sup>                1900 Points      or      9 Cards
  - 3<sup>rd</sup>                1700 Points      or      8 Cards
  - 4<sup>th</sup>                1400 Points      or      7 Cards
  - 5<sup>th</sup>                1000 Points      or      5 Cards
- Unable to solve: nothing.

10	17		9		10		8	10
	5		6	10		6		
21			16	7			7	
4	9			6		14		24
	3		14		9		17	
19	8	14	7		3			
			2	15		9	8	5
	9		4	16	14			3
9		7				11		

**20. HISTORY OF PRIMES:** Below is a list of 10 historical events. Your goal is to guess in what year each occurred.

- **Helpful hint:** each century from the 11<sup>th</sup> to the 20<sup>th</sup> is represented exactly once.
- **Not-so-helpful hint:** each answer/year is a prime number.

**SCORING:**

POINTS: This puzzle will likely result in points being subtracted from your score; the goal is to 'minimize the damage' by guessing as accurately as possible. For each year of inaccuracy in your answers 1 Point will be subtracted from your team's overall score. **BE SURE TO TRY A GUESS FOR EACH EVENT!** If you leave any blanks empty, it will be assumed you entered the year "2005" and the penalty will be calculated accordingly!  
CARDS: 10 Cards for each year guessed exactly.

- Oliver Cromwell became Lord Protector of England.
- The 16<sup>th</sup> Amendment to the U.S. Constitution was ratified, authorizing the Federal government to impose and collect income tax.
- Joan of Arc led a French relief army in the Battle of Orléans.
- William II became King of England.
- Dante Alighieri (author of *The Divine Comedy*) died.
- On December 27<sup>th</sup> of this year Charles Darwin embarked on his historic voyage aboard the HMS *Beagle*.
- George Washington was elected the first President of the United States.
- William Wallace of Scotland (qv *Braveheart*) began his revolt against England.
- Nicolaus Copernicus published *De revolutionibus orbium coelestium* ("On the Revolution of Celestial Spheres"). He died the same year.
- Construction of Notre-Dame de Paris began.

# META-PUZZLE

"The quick fox jumps over lazy brown dog."

The above sentence is an example of a *pangram*, a sentence that uses every letter of the alphabet. At 33 letters it is one of the shortest pangrams known that uses common words and actually kind of makes sense. None of this is particularly relevant to the Meta-Puzzle, but I thought you might find it interesting.

The Meta-Puzzle does involve the words of that sentence, however. Your goal is to find the "value" of each of the eight words. I have randomly assigned the values 1 through 26 to the letters of the alphabet. The value of a word based on that assignment is equal to the sum of the numbers associated with each letter in the word. So, for example, if, in the random assignment, E=3, H=17, and T=11; the first word of the pangram above would be worth 31 Points ( $11 + 17 + 3 = 31$ ).

Obviously, to figure out the values of all of the above words, you will need to determine the value assigned to each of the 26 letters of the alphabet. So, how do you do that? Well, for many of the puzzles in this booklet, in addition to Points being awarded for answers, your team can also receive Cards.

These Cards are simply blank index cards. Throughout the competition for each Card your team gets, use it in the following way: **on the Card write any valid four letter word you wish and show it to me, the referee.** I will then write *that* word's value on the Card for you. If you chose your word carefully, you should be a small step closer to solving the Meta-Puzzle (if it's not clear how this helps... well, that's why it's called a "puzzle"). One Card won't be nearly enough to deduce the values of the 26 letters in the alphabet, but there is opportunity to obtain many, many Cards throughout the day. Use them wisely.

## Basic rules for Cards:

- You may only use each Card once.
- Only one word per Card.
- Your words must be exactly four letters long.
- The word must be "valid" according to the dictionary rules from the introduction page.

Once you have the values of the letters of the alphabet, you can then calculate the value of each word in the pangram. Write them down here:

THE	QUICK	FOX	JUMPS	OVER	LAZY	BROWN	DOG

**SCORING:** Okay, so what's all this worth to your team? Well, depending on how quickly you submit the answer (compared to the speeds of the other teams), all of your team's Points, earned from previously solved puzzles, recorded (up to that moment) on the official scoreboard will be multiplied by some factor:

1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
x2	x1.8	x1.6	x1.4	x1.2

Thus, if yours was the second team to submit the correct answer to the Meta-Puzzle, and up to that moment your team had accumulated 6732 Points so far in the overall competition, those Points would be immediately multiplied by a factor of 1.8 (resulting in your team now having 12118 Points). Note that any further Points earned after that would NOT be multiplied; only ones earned before the correct Meta-Puzzle answer is submitted are multiplied. Scores for certain puzzles cannot be determined until all teams have completed them; nonetheless, if your team submits answers for these BEFORE solving the Meta-Puzzle, those scores will also be multiplied retroactively.

Unlike the most puzzles in this booklet, you are allowed to try again if you submit an incorrect answer to the Meta-Puzzle. So, if you come to me with values for the eight words in the pangram, and they are not all correct, I will tell you to go back and try again.

Obviously, you would like to use the awarded multiple to augment as many Points as possible, so you do not have to submit an answer to the Meta-Puzzle immediately upon solving it... you may "sit on it" for as long as you wish. Of course, if you wait too long, another team may submit an answer in the meantime...