Doctor When's Recruiting Test

Congratulations! You've all been selected as candidates to be Doctor When's assistants in preparation for the unveiling of his time machine, scheduled to happen this fall, six months from now, on September 17th and 24th.

Unfortunately, Doctor When is a bit reclusive and is still very busy getting things ready, so he's not here. Instead, we're going to run this little recruiting test that he prepared.

The goal of this test is see how well you can build a proper circuit board for Doctor When's chrono-mentometer. Now, Doctor When is an electronics genius, so he doesn't go for the standard electronic parts. Instead, you'll have to learn to use electronic gizmos that he has designed himself!

Each individual will get one copy of the recruiting test, but for maximum efficiency we recommend you partner up into teams of three or four. Initially, you'll have the following sheets:

* A "How to Build a Circuit Board" instruction manual
* A blank Circuit Board diagram for you to start with
* 26 Circuit Constraints (your manual will explain how to use this)

You'll have the entire time to work on building the circuit board, but we will also be passing out extra Tests during the event. At the 15-minute mark we will pass out Test 1, and at the 30-minute mark we will pass out Test 2. Each Test has a simple one-word answer.

When you solve a Test, please signal us and tell us the answer. Each solved Test will earn you 13 more Circuit Constraints. You will need all 52 Circuit Constraints to build a full circuit board.

If you are having trouble with the Tests, don't fret (too much). Once half of the room has solved a Test, we will pass out the Circuit Constraints for that Test to everybody!

Once you've completed your Circuit Board, come find us to get a Super-Electro-Extreme Testing Kit. The Testing Kit will use your test results and your correctly-constructed Circuit Board to extract a simple message. Succeed and you'll be considered strongly for the minio -- er, assistant position.

Don't worry if you can't pass this test; we have plenty of positions available! Check out our website at **http://doctorwhen.com/** for more information.

Thanks to our playtesters:
Jim Boyce, Allen Cohn, Dwight Freund, Sean Gugler, Dan Kurtz, Trisha Lantznester, Chris Lopez, Linnsey Miller, Dale Neal, Erik Stuart, Melissa Wilson
Puzzles inspired by the work of Hans Eendebak, Everett Kaser, Bob Stigger

How to Build a Circuit Board (by W. When, Ph. D.)

To the right is an example of a completed circuit board.

There are 52 different parts ("nodes") in thirteen different types:
* Twopacitors
* Threesistors
* Enfourcers
* Rectifivers
* Transixtors
* Sevenar Circuits
* Freight Chips
* Neonine Cores
* Tensor Modules
** Input Jacks
** Queenistors
** Sparking Spots
** Acentuators

 Each type comes in four brands: Spartan (♠), Hartley (♡), Dimension (◇), or Cluster (♣). There are four designated slots for each type. Those four slots are always in the same location in each circuit; along a row (*) or a column (**).
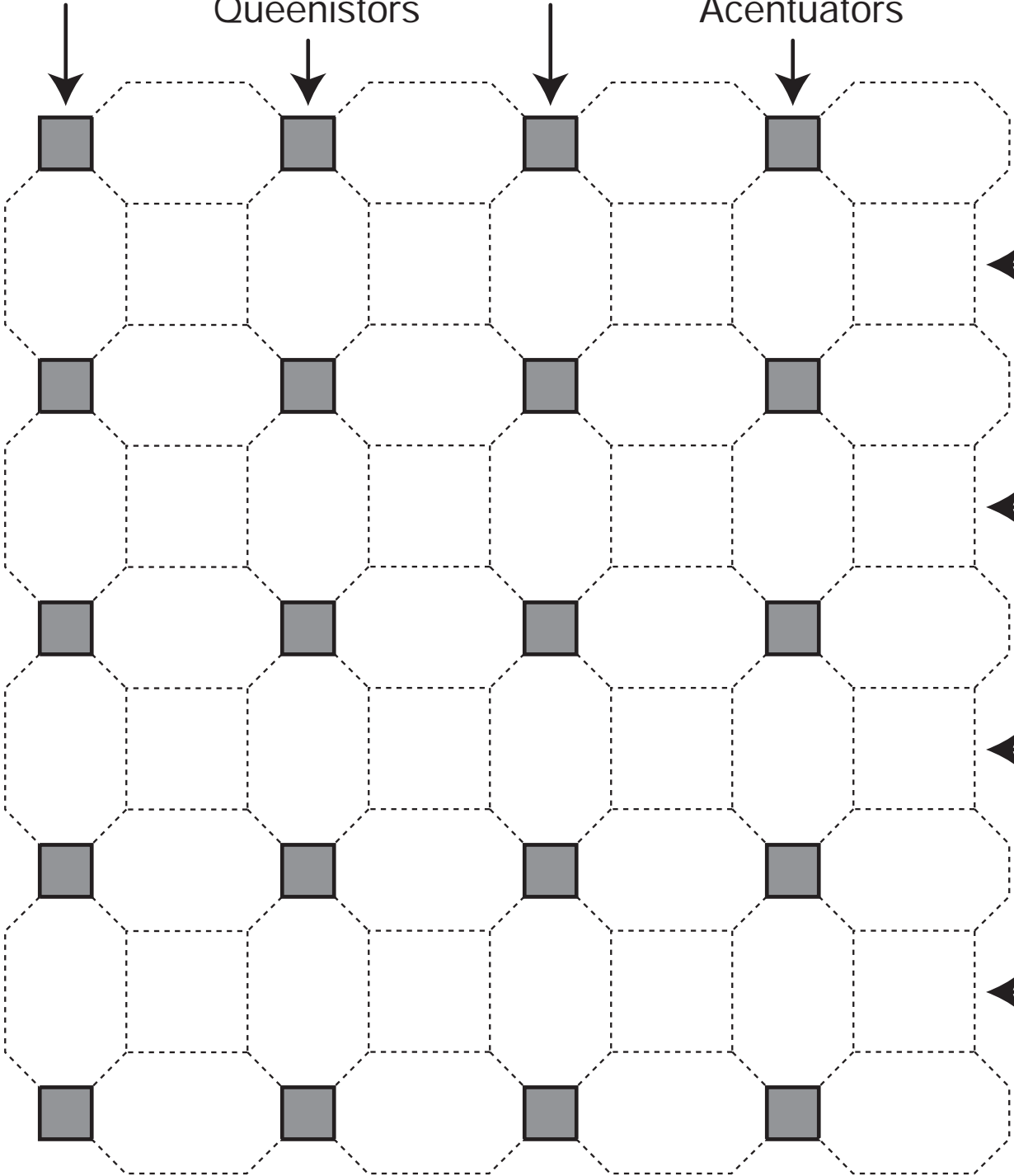
Input Jacks   Queenistors   Sparking Spots   Acentuators

→ Twopacitors
→ Threesistors
→ Enfourcers
→ Rectifivers
→ Transixtors
→ Sevenar Circuits
→ Freight Chips
→ Neonine Cores
→ Tensor Modules
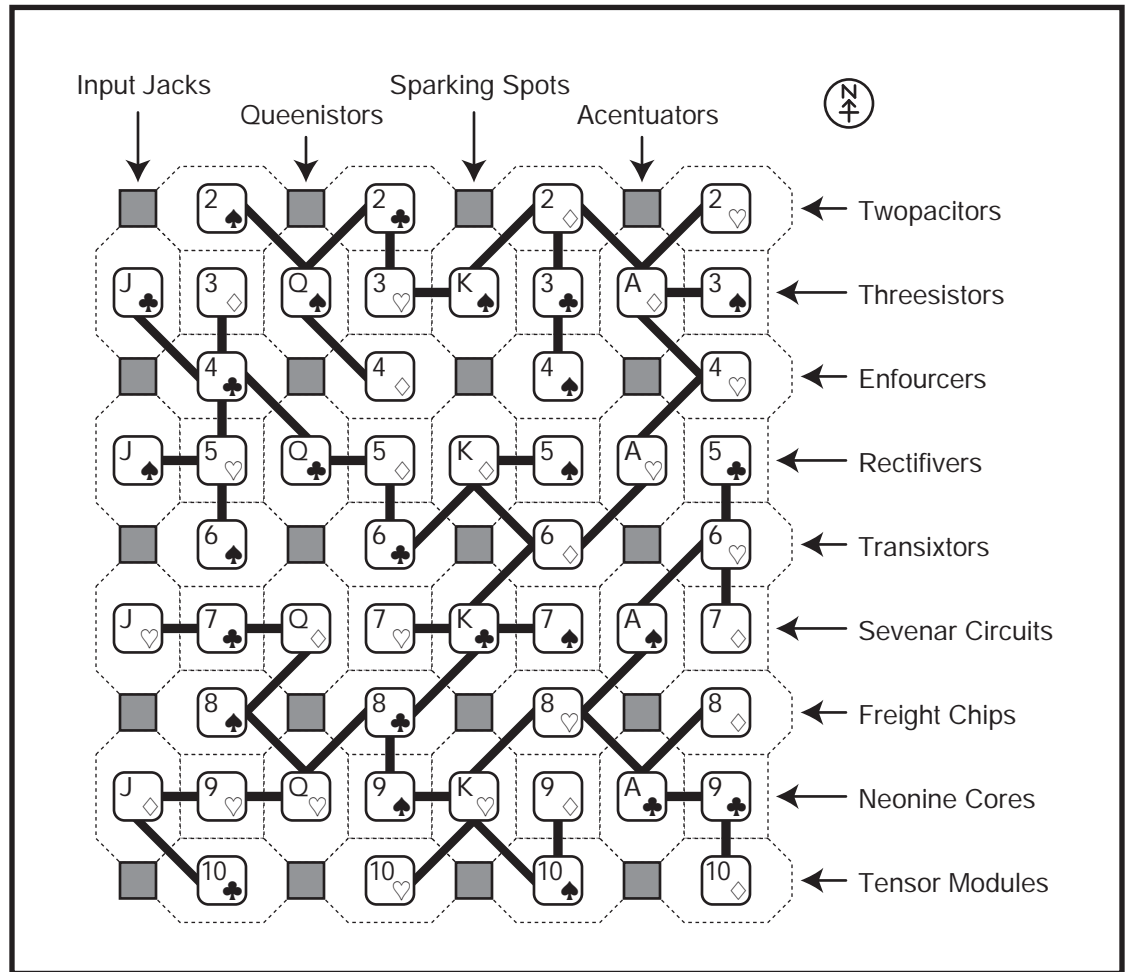
Note that in addition to figuring out where each node goes, you will have to wire the proper nodes together. Wires always cross between touching nodes, but only along an edge -- a connection between two nodes is called a "hop." The gray squares cannot be used. All the nodes have to be connected, and there CANNOT be any loops (that causes what Doctor When calls a "short circuit" -- I know, that's a technical term, you probably haven't heard it before).

Now, although the example is a COMPLETED circuit board, it is not the CORRECT circuit board. The good Doctor is busily trying to give us a list of necessary Circuit Constraints for the correct circuit board.   Note that there is a compass rose in the upper-left of the diagram. There are two types of Circuit Constraints: "Directional" Constraints use the compass rose to tell you the direction between two nodes (but tell you nothing about their connectivity), and "Connectivitiy" Constraints tell you how many hops are between specific nodes (but tell you nothing about their relative direction).

This is an example of a Directional Constraint. It depicts the Dimension Acentuator and the Hartley Enfourcer, as well as the compass rose in the middle. It tells you that the Hartler Enfourcer is due northwest of the Dimension Acentuator, although there may be other nodes between them. Note that the direction is DUE northwest, north-by-northwest doesn't count.
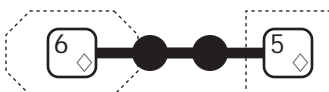
This is an example of a Connectivity Constraint. It tells you that the Dimension Transixtor and the Dimension Rectifiver are three "hops" apart; that is, there are two nodes between them along the circuit. Since there aren't any loops and all nodes are connected, there's only one way to get from one node to the other. However, these two nodes could be located right next to each other on the board (without a connection between them); this Constraint tells you NOTHING about their direction; the Rectifiver might even be to the left (west) of the Transixtor.

That should be all you need to get started. Good Luck!

Blank Circuit Board Diagram

Input Jacks   Queenistors   Sparking Spots   Acentuators

N

← Twopacitors

← Threesistors

← Enfourcers

← Rectifivers

← Transixtors

← Sevenar Circuits

← Freight Chips

← Neonine Cores

← Tensor Modules

Use this for your work. When you think you have the correct circuit, please show it to us for your Testing Kit.

Circuit Constraints 1-13

Doctor When comments:
"The first set of constraints should be pretty straightforward. If you study them in order, you should be able to place at least one component or draw at least one connection. Some of the early constraints won't be completely used up, so don't forget about them when you get the later constraints!"
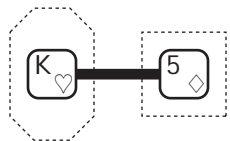
1. The Hartley Sparking Spot should be **one hop away** from the Dimension Rectifiver.
(But remember, not necessarily on the left!)
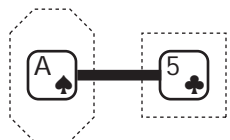
2. The Spartan Acentuator should be **one hop away** from the Cluster Rectifiver.
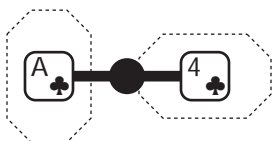
3. The Cluster Acentuator should be **two hops away** from the Cluster Enfourcer.
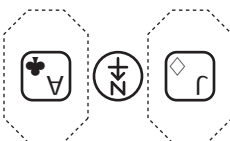
4. The Cluster Acentuator should be **due east** of the Dimension Input Jack.
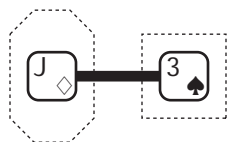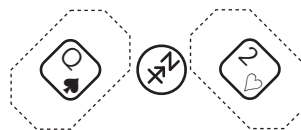
5. The Dimension Input Jack should be **one hop away** from the Spartan Threesistor.
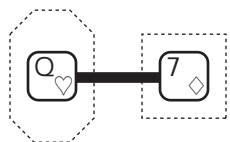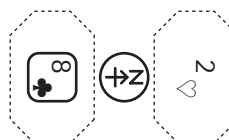
6. The Hartley Queenistor should be **one hop away** from the Dimension Sevenar Circuit.
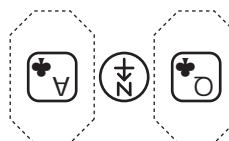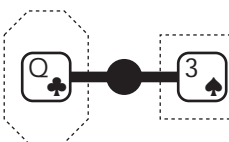
7. The Cluster Acentuator should be **due east** of the Cluster Queenistor.
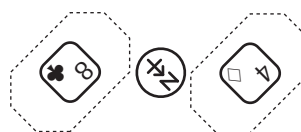
8. The Spartan Queenistor should be **due southwest** of the Hartley Twopacitor.
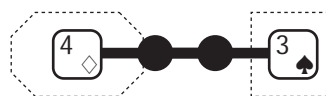
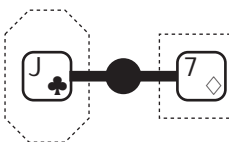**9.** The Cluster Freight Chip should be **due south** of the Hartley Twopacitor.

10. The Cluster Queenistor should be **two hops away** from the Spartan Threesistor.

11. The Cluster Freight Chip should be **due southeast** of the Dimension Enfourcer.

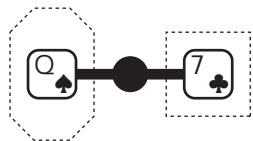**12.** The Dimension Enfourcer should be **three hops away** from the Spartan Threesistor.

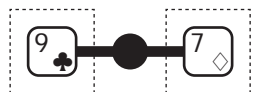**13.** The Cluster Input Jack should be **two hops away** from the Dimension Sevenar Circuit.

Circuit Constraints 14-26

Doctor When comments:
"The second set of constraints is a bit tricker. You'll see some three-hop and four-hop constraints now, and you might have to look ahead an extra constraint to make progress. By the by, by the end of this page you should have been able to place all the transixtors."
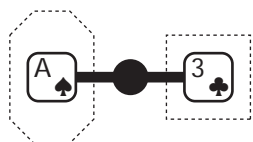
14. The Spartan Queenistor should be **two hops away** from the Cluster Sevenar Circuit.
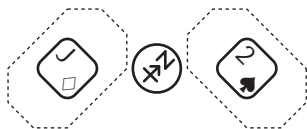
15. The Cluster Neonine Core should be **two hops away** from the Dimension Sevenar Circuit.
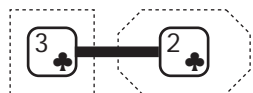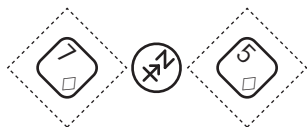
16. The Cluster Threesistor should be **one hop away** from the Cluster Twopacitor.

17. The Spartan Acentuator should be **two hops away** from the Cluster Threesistor.
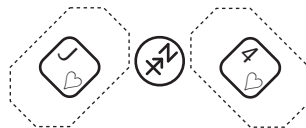
18. The Dimension Input Jack should be **due southwest** of the Spartan Twopacitor.
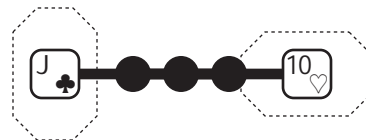
19. The Dimension Sevenar Circuit should be **due southwest** of the Dimension Rectifiver.
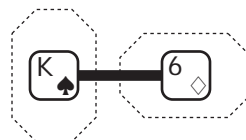
20. The Hartley Rectifiver should be **three hops away** from the Spartan Twopacitor.

21. The Hartley Input Jack should be **due southwest** of the Hartley Enfourcer.

22. The Cluster Freight Chip should be **four hops away** from the Hartley Tensor Modules.
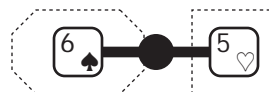
23. The Spartan Sparking Node should be **one hop away** from the Dimension Transixtor.

24. The Cluster Transixtor should be **due west** of the Dimension Transixtor.
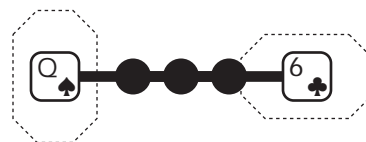
25. The Spartan Queenistor should be **four hops away** from the Cluster Transixtor.

26. The Spartan Transixtor should be **two hops away** from the Hartley Rectifiver.

Test 1 (Reward: Constraints 27-39)

Warning! Unlike the example, each group has a "decoy" word that doesn't match!

☺ ► BFFPSST
A ► ●LS
B ► ER
D ► O
E ► ●●ADNPRRTZ
F ► EE
G ► A
I ► P
L ► ELO
M ► B
N ► ●G
O ► ●MNRV
P ► EIL
R ► AEEO
S ► EOT
T ► ●EO
V ► E
Z ► ●

☺ ► BCGSSSW
A ► ●IMNNNNPT
B ► AM
C ► AA
D ► E
E ► ●ENRRRRR
G ► R
I ► CDNNT
L ► AV
M ► AAAEI
N ► ●●●●AELT
O ► L
P ► EIT
R ► EIIMMN
S ► PUU
T ► ●AEM
U ► BP
V ► E
W ► O

☺ ► CJLPPSZ
A ► GT
C ► A
E ► ●GKPRU
G ► OOS
H ► II
I ► LNVV
J ► E
K ► Y
L ► ●●IL
N ► EG
O ► ●NR
P ► EEHP
R ► ●Y
S ► ●EST
T ► EO
U ► S
V ► AI
Y ► ●L
Z ► H

Example Puzzle:

☺ ► ACDHJKQS
A ► CCDMR
B ► ●
C ► EKL
D ► ●EI
E ► ●●AEN
G ► ●
H ► E
I ► AN
J ► A
K ► ●I
L ► U
M ► O
N ► ●DG
O ► N
P ► A
Q ► U
R ► T
S ► P
T ► ●
U ► BE

Example Answer:

ACE
CLUB
DIAMOND
HEART
JACK
KING
QUEEN
SPADE

CARD

☺ ► ABENTTT
A ► DKLMMNRRV
B ► L
C ► H
D ► ●O
E ► ●●●A
H ► EOQ
I ► ●Z
K ► E
L ► AI
M ► EI
N ► ●AAAC
O ► ●NOR
P ► H
Q ► U
R ► DNT
S ► U
T ► HOSY
U ► AN
V ► A
Y ► P
Z ► AZ

☺ ► CEHLMPW
A ► I
C ► IKR
E ► ●●CTY
G ► ●●
H ► A
I ► LNNNRS
K ► I
L ► ELU
M ► I
N ► ●GG
O ► Q
P ► I
Q ► U
R ► ●EO
S ► IS
T ► ●
U ► CE
W ► R
Y ► E

☺ ► AFJLMSS
A ► ●ELMNT
C ► H
D ► R
E ► ●LLSWW
F ► R
H ► A
I ► C
J ► E
L ► ●●●AL
M ► ●IU
N ► DE
O ► MNY
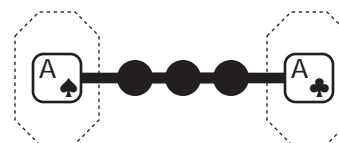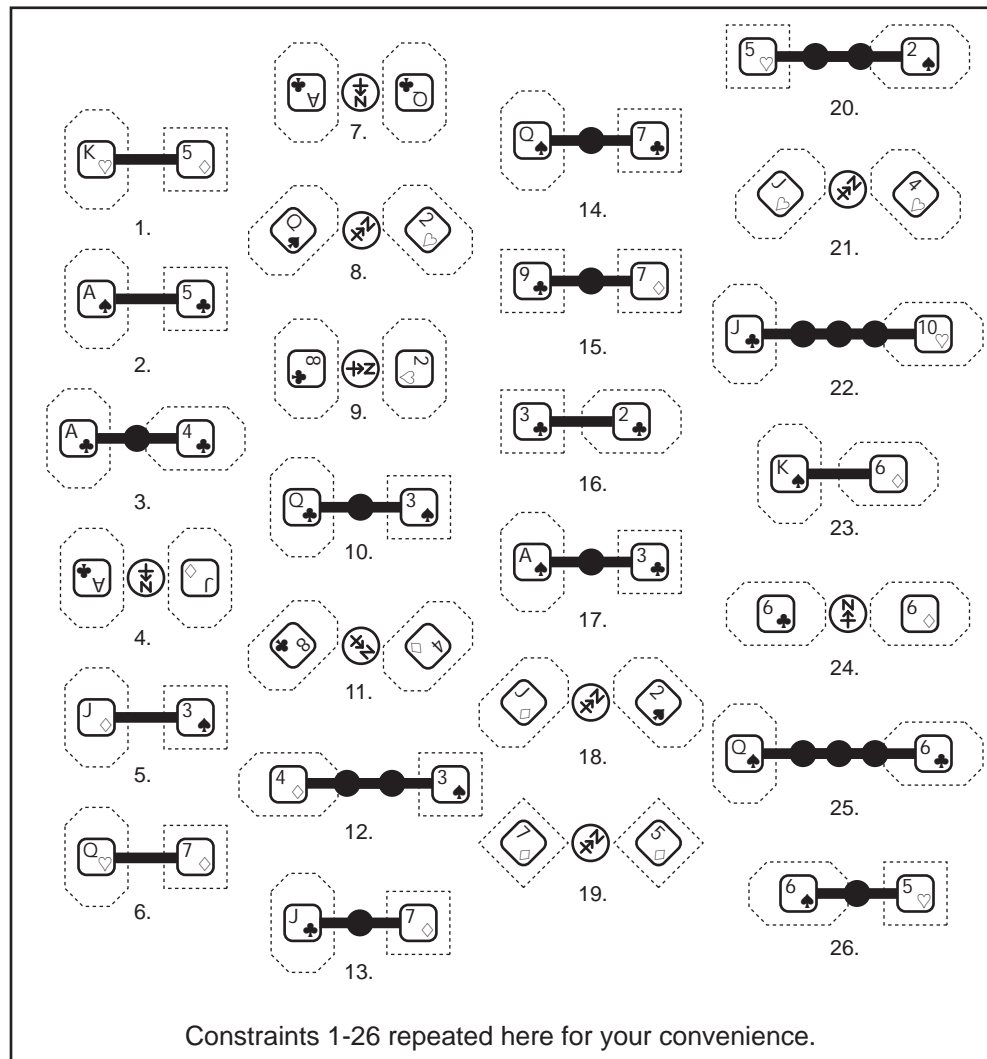R ► EO
S ► AEST
T ► OO
U ► E
W ► ●A
Y ► A

☺ ► BCLLPPS
A ► NNSTT
B ► E
C ► AI
D ► AE
E ► AELNNRSX
F ► I
G ► V
H ► ●E
I ► CLNNS
L ► AAFILL
M ► ●
N ► ●DGIOU
O ► M
P ► EE
R ► ●
S ► ●HHTT
T ► ●DEIS
U ► T
V ► E
X ► ●

☺ ► ADDGHJS
A ► CDLRS
C ► KT
D ► IOW
E ► AANRRRR
G ► ER
H ► EE
I ► S
J ► A
K ► S
L ► EL
N ► ●●
O ► ●CNRU
P ► ●E
R ► ●●●GHOO
S ► AOTU
T ► EO
U ► PP
W ► E

# Circuit Constraints 27-39 (Test 1 Reward)

Doctor When Comments:
"I hope by now you have come up with some notation to indicate where there CAN'T be a connection (such as to avoid short circuits). I like drawing little walls between cells myself. You'll find that drawing walls will be very instrumental... for example, If you draw walls for Constraint 27, then you can finally place that Cluster Enfourcer from way back in Constraint 3."

Constraints 1-26 repeated here for your convenience.

1.

2.

3.

4.

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7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20.

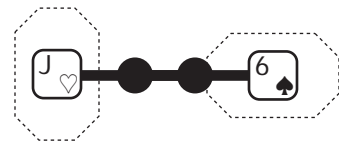21.

22.

23.

24.

25.

26.

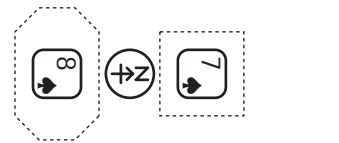27. The Spartan Acentuator should be **four hops away** from the Cluster Acentuator.
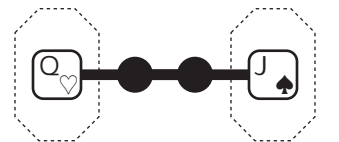
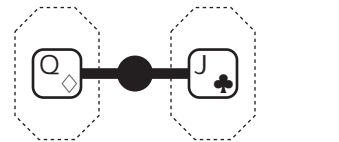28. The Hartley Queenistor should be **three hops away** from the Spartan Input Jack.
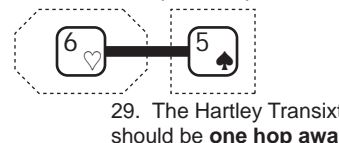
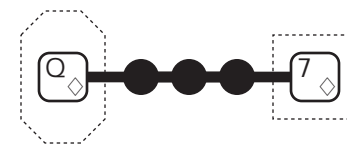29. The Hartley Transixtor should be **one hop away** from the Spartan Rectifiver.

30. The Hartley Input Jack should be **three hops away** from the Spartan Transixtor.

31. The Spartan Freight Chip should be **due south** of the Spartan Sevenar Circuit.

32. The Dimension Queenistor should be **two hops away** from the Cluster Input Jack.

33. The Dimension Queenistor should be **four hops away** from the Dimension Sevenar Circuit.
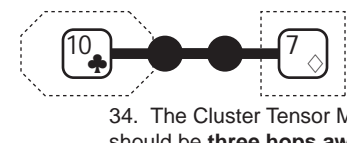
34. The Cluster Tensor Module should be **three hops away** from the Dimension Sevenar Circuit.
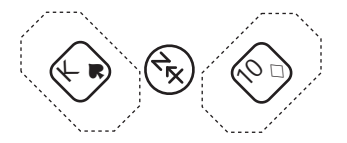
35. The Spartan Sparking Node should be **due northwest** of the Dimension Tensor Module.
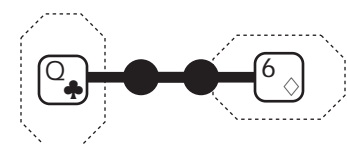
36. The Cluster Queenistor should be **three hops away** from the Dimension Transixtor.

37. The Spartan Tensor Module should be **two hops away** from the Spartan Freight Chip.
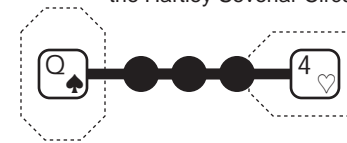
38. The Spartan Neonine Core should be **two hops away** from the Hartley Sevenar Circuit.

39. The Spartan Queenistor should be **four hops away** from the Hartley Enfourcer.

Test 2 (Reward: Constraints 40-52)

Twenty-eight surnames of movie actors are hidden in the grid, one in each row and one in each column. The letters in each name are scrambled and can appear in any order, BUT each letter in the grid can belong to at most one name. The lengths of the names for that row (or column) are provided, and the first names of the actors are provided below in alphabetical order. We've filled in one actor to get you started.

When you are done, there is a two-part secret message for you to discover. The unused letters will spell out the first part of the secret message. To discover the second part of the secret message, find fourteen intersections in the grid, each one representing a movie that the actor for that row and the actor for that column starred together in. All the movies are thematically connected in some way. Those intersections will spell out the second part of the secret message.
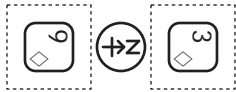
Alan YOUNG	Christopher	Jean-Claude	Mary
Alex	Christopher	Jonathan	Mia
Amy	Daniel	Kathleen	Michael
Arnold	Drew	Keanu	Nicolas
Ashton	Emma	Leonard	Patrick
Brad	Jake	Linda	Rod
Bruce	Jane	Malcolm	William

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Y  W  T  L  U  L  S  I  O  I  C  H  S  F   (6)
H  E  T  A  G  L  L  Y  L  E  N  G  A  R   (10)
A  R  T  A  E  E  R  S  W  H  A  E  T      (7)
O  A  D  O  B  L  L  T  A  Y  L  I  F  T   (5)
E  R  A  L  F  T  C  F  I  V  S  O  R  D   (9)
R  Y  I  S  S  O  T  I  N  E  M  O  A  O   (5)
R  R  M  S  N  Y  U  U  N  E  N  N  Y  O   (7)
B  N  N  M  R  A  E  E  R  A  A  M  V  D   (3,5)
Y̶  T  U̶  R  T  A  N̶  N  W  G̶  E  M  R  O̶   (5)   ALAN YOUNG
R  E  P  E  G  O  M  C  A  E  R  T  O  X   (4)
E  R  U  A  E  F  H  R  T  R  T  E  K  C   (7)
M  I  V  S  E  R  A  E  T  E  E  A  K  R   (6)
O  W  C  E  N  L  R  M  S  L  D  L  S  W   (8)
H  E  G  Z  E  R  C  A  G  R  S  E  N  W   (14)
(9) (6) (4) (4) (11) (6) (5) (6) (6) (5) (7) (8) (6) (3)
```
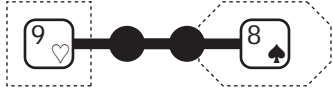
Circuit Constraints 40-52 (Test 2 Reward)
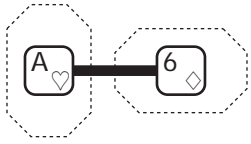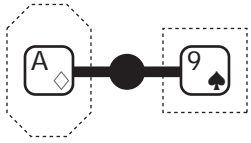
40. The Dimension Neonine Circuit should be **due south** of the Dimension Threesistor.
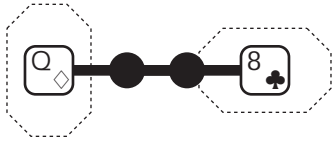
41. The Hartley Neonine Circuit should be **three hops away** from the Spartan Freight Chip.

42. The Hartley Acentuator should be **one hop away** from the Dimension Transixtor.
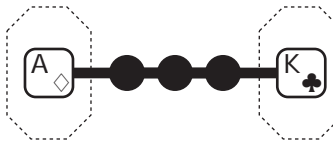
43. The Dimension Acentuator should be **two hops away** from the Spartan Neonine Core.

44. The Dimension Queenistor should be **three hops away** from the Cluster Freight Chip.

45. The Cluster Freight Chip should be **four hops away** from the Hartley Freight Chip.

46. The Dimension Acentuator should be **four hops away** from the Cluster Sparking Node.
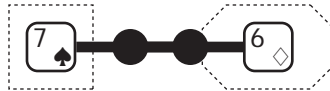
47. The Spartan Sevenar Circuit should be **three hops away** from the Dimension Transixtor.

48. The Cluster Rectifiver should be **four hops away** from the Hartley Enfourcer.
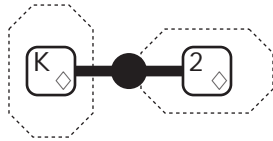
49. The Dimension Sparking Node should be **two hops away** from the Dimension Twopacitor.

50. The Cluster Rectifiver should be **four hops away** from the Dimension Twopacitor.

51. The Hartley Enfourcer should be **three hops away** from the Hartley Twopacitor.

52. The Hartley Sparking Node should be **three hops away** from the Hartley Transixtor.

Dr. When comments:
"Be careful around Constraint 44... the direct route might be three hops, but some indirect routes have three hops too!"

Constraints 1-26 repeated here for your convenience.
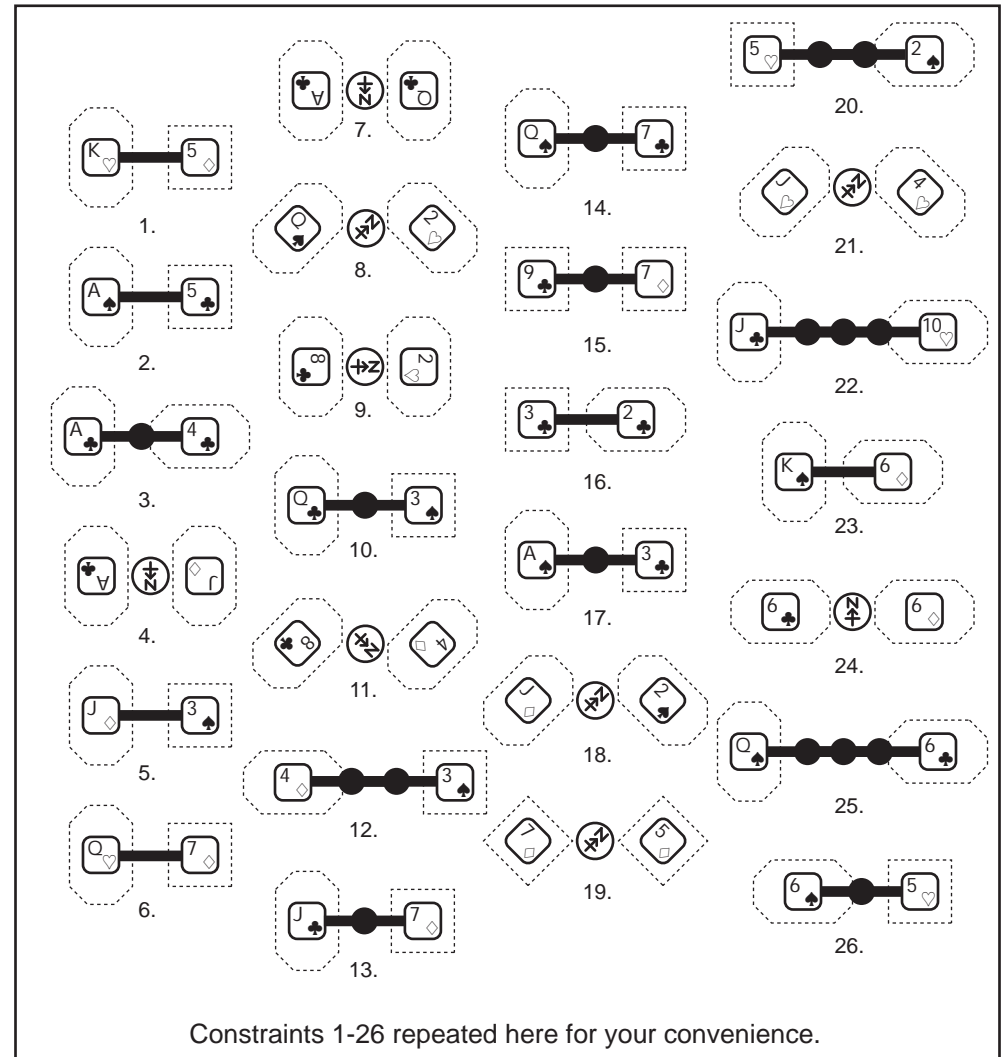
Super-Electro-Extreme Testing Kit

Step 1. Fill in the squares below with the answers from both tests, using A=1, B=2, C=3, etc. (The icons have no meaning; we just chose them because they looked pretty.)

Test 1
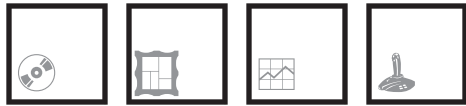
Test 1

Step 2. Use the following decoder chart to match each square to a Circuit Board part.

1	2	3	4	5	6	7	8	9	10	11	12	13
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	Q♠	K♠	A♠
2♡	3♡	4♡	5♡	6♡	7♡	8♡	9♡	10♡	J♡	Q♡	K♡	A♡
14	15	16	17	18	19	20	21	22	23	24	25	26

Step 3. Fill in the missing parts below to get 12 pairs of Circuit Board parts.
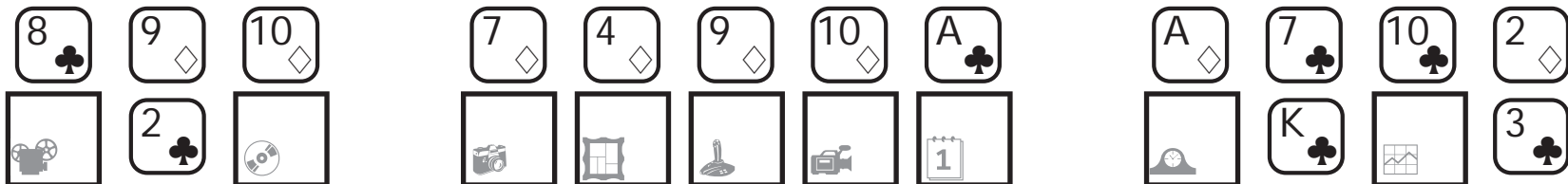
Step 4. Figure out a way to interpret the pairs to get a message, which will tell you what we think of your application to our team!

Answer Circuit Board Diagram
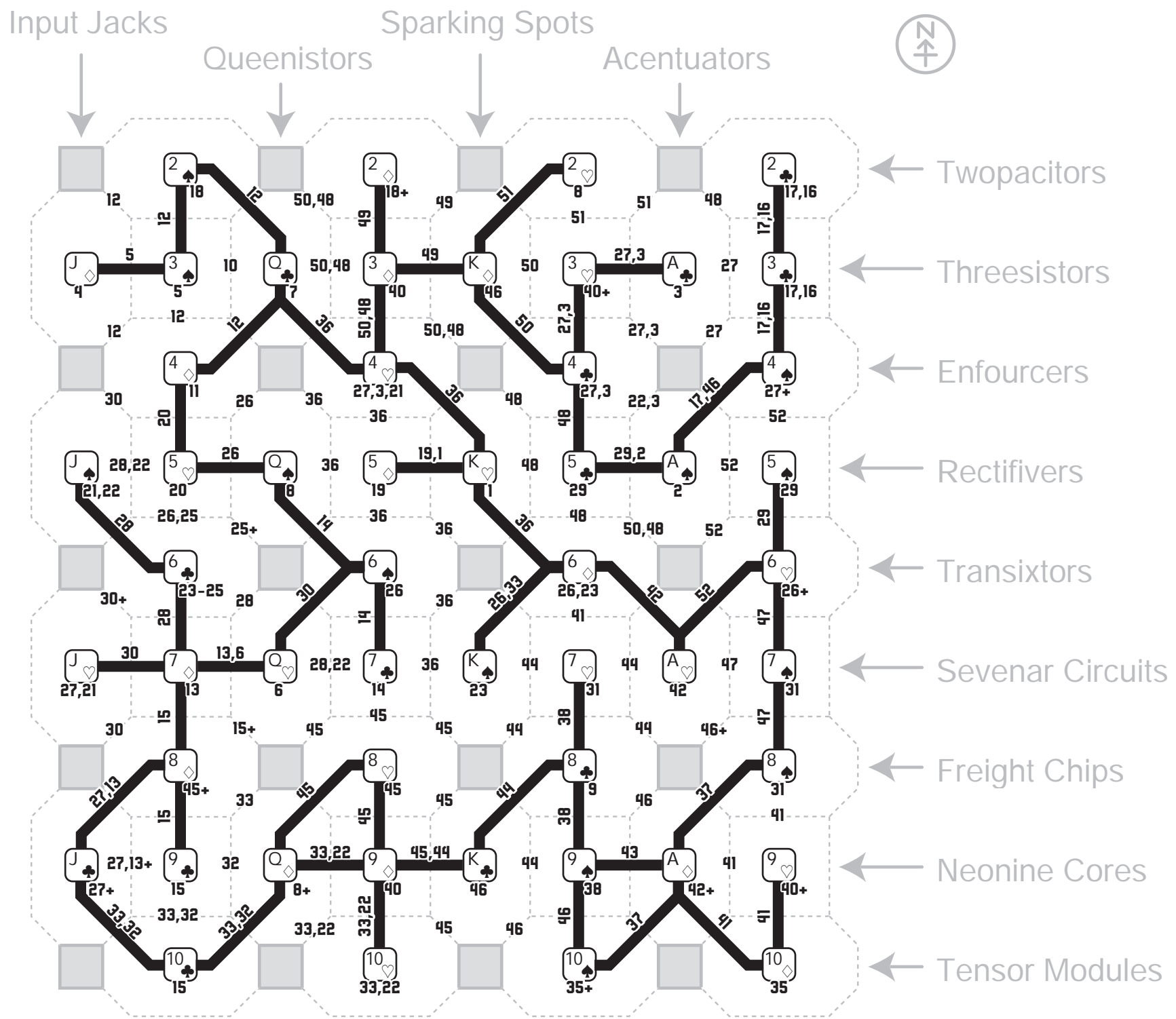
fez   superman   zhivago   avalanche   eye   andrew   penicillin   headwear
fedora   batman   seuss   tornado   hair   michael   shellfish   superhero
beret   spiderman   jekyll   typhoon   pin   jesse   catdander   doctor
sombrero   wolverine   pepper   earthquake   lucille   latoya   latex   disaster
stovepipe   greenlantern   phil   tsunami   wrecking   samuel   peanuts   allergen
tengallon   captainamerica   livingstone   blizzard   croquet   stonewall   beestingvenom   jackson
please   submit   category   name   missing   from   last   group

Test 1
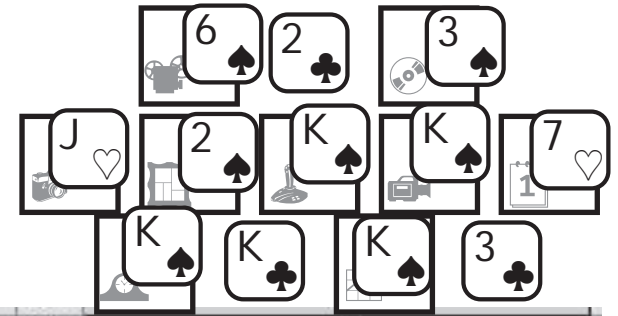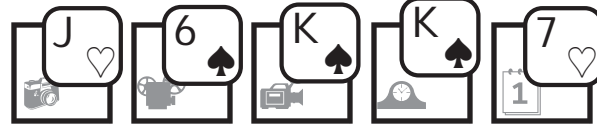
Test 1

														Name	#	L	Movie
Y	W	T	L	U	L	S	I	O	I	C	H	S	F	WILLIS	6	T	12 Monkeys
H	E	T	A	G	L	L	Y	L	E	N	G	A	R	GYLLENHAAL	10	H	Donnie Darko
A	R	T	A	E	E	R	S	W	H	A	E	T		STEWART	7	E	ST: First Contact
O	A	D	O	B	L	L	T	A	Y	L	I	F	T	LLOYD	5	T	Back to the Future
E	R	A	L	F	T	C	O	I	V	S	F	R	D	RADCLIFFE	9	I	HP & the Pris. of Azk.
R	Y	I	S	S	O	T	I	N	E	M	O	A	O	NIMOY	5	M	ST IV: The Voyage Home
R	R	M	S	N	Y	U	U	N	E	N	N	Y	O	SEYMOUR	7	E	Somewhere in Time
B	N	N	M	R	A	E	E	R	A	A	M	V	D	VANDAMME	8	M	Timecop
Y	T	U	R	T	A	N	N	W	G	E	M	R	O	YOUNG	5	A	The Time Machine
R	E	P	E	G	O	M	C	A	E	R	T	O	X	CAGE	4	C	Peggy Sue Got Married
E	R	U	A	E	F	H	R	T	R	T	E	K	C	KUTCHER	7	H	The Butterfly Effect
M	I	V	S	E	R	A	E	T	E	E	A	K	R	REEVES	6	I	Bill & Ted's Exc. Adv.
O	W	C	E	N	L	R	M	S	L	D	L	S	W	MCDOWELL	8	N	Time after Time
H	E	G	Z	E	R	C	A	G	R	S	E	N	W	SCHWARZENEGGER	14	E	Terminator (series)
BARRYMORE	WINTER	PITT	SARA	STEENBURGEN	TAYLOR	SMART	TURNER	WATSON	REEVE	SHATNER	HAMILTON	FRAKES	FOX				
9	6	4	4	11	6	5	6	6	5	7	8	6	3				