ISAAC NEWTON

+
F.G. NEWTON

ISAAC NEWTON

GENERAL DESCRIPTION

ISAAC NEWTON is a game that will let you match your wits against the computer. Use your deductive powers to discover the secret LAWS OF NATURE which are used to classify all OBJECTS in NEWTON's universe. Play against the computer and try to deduce which of the thousands of possible LAWS the computer has chosen. Play against a human opponent by choosing your own LAW and letting your opponent try to discover it. Demonstrate your knowledge of the LAW by correctly classifying a preset number of OBJECTS in a row. As soon as you demonstrate knowledge of a LAW the computer will rate your deductive skills and gear the complexity of the next LAW you try to guess to your level. The LAWS range from very simple to fiendishly complex.

METHOD OF PLAY

A. START.

At the beginning of play **NEWTON** will ask you if you wish to enter your own LAW and play against another person or let the computer choose one. (For you intrepid souls who wish to choose your own LAW see the appendix.) **NEWTON** will then ask you for your skill level and how many correct classifications in a row will demonstrate knowledge. After choosing a LAW, **NEWTON** will display five OBJECTS and corrrectly classify them for you.

B. TURN.

On each turn you may choose to name an OBJECT and let **NEWTON** classify it or you may let **NEWTON** choose an OBJECT for you to classify. **NEWTON** will let you know if you have classified the OBJECT correctly.

C. CLASSIFICATION.

ALL OBJECTS belong to one of two classes.
   1.   The OBJECT obeys the LAWS OF NATURE.
   2.   The OBJECT does **not** obey the LAW OF NATURE.

D. OBJECTS.

There are six types of OBJECTS in **NEWTON's** universe. All of the OBJECTS are composed of one or two letters or numbers in the following combinations:

OBJECT TYPE	DESCRIPTION	SYMBOL	EXAMPLE
1	(Number)	(N)	(42)
2	(Letter)	(L)	(Q)
3	(Number, Number)	(N,N)	(12,67)
4	(Letter,Letter)	(L,L)	(B,E)
5	(Number,Letter)	(N,L)	(46,Z)
6	(Letter,Number)	(L,N)	(J,6)

E. DEMONSTRATION OF KNOWLEDGE

OBJECTS that you choose for **NEWTON** to classify do not count toward your DEMONSTRATION OF KNOWLEDGE. The first time that you correctly classify an OBJECT that **NEWTON** chooses, you gain a POINT toward DEMONSTRATION OF KNOWLEDGE. As long as you continue to correctly classify OBJECTS of **NEWTON's** choosing, you continue to accumulate POINTS until you reach the number of points specified at the start of play. If you incorrectly classify an OBJECT, your POINT total goes back to zero. When you name an object for **NEWTON** to classify, your point total is not affected.

F. RATING.

Your deductive powers will be rated by **NEWTON** based on the following factors: difficulty level and number of turns played before achieving DEMONSTRATION OF KNOWLEDGE.

G. PROPERTIES.

You are now almost ready to play **ISAAC NEWTON.** The following list of PROPERTIES of OBJECTS indicates the kind of PROPERTIES that are considered when forming LAWS OF NATURE:

1. The mathematical properties of numbers.
2. The shape of numerals (symmetry, openness, etc.).
3. The sounds of numbers.
4. The shape of letters (symmetry, etc.).
5. The sound of letters.
6. The numerical position of letters in the alphabet.
7. The mathematical properties of the numerical position of letters.
8. The relationship between the two ELEMENTS forming an OBJECT.
9. The relationship between the current OBJECT and previous OBJECTS.
10. The sequence of answers given by the player.

We suggest that you start to play **ISAAC NEWTON** at the lower levels of difficulty. Even at these lower levels, **NEWTON** can be quite challenging. Good Luck!

APPENDIX A

CHOOSING A LAW OF NATURE

In the sections below, all of the information required to completely specify the LAWS OF NATURE are given.

Each LAW OF NATURE is composed of five parts:

1. An OBJECT type (1-6).
2. A TRANSFORMATION rule (1-19).
3. A COMBINATION rule (1-13).
4. A DECISION rule (1-8).
5. A LOGICAL STATUS rule (1-14).

A specific level of difficulty is associated with each of the various OBJECT types, TRANSFORMATION rules, etc. These levels of difficulty are listed in the tables below. The difficulty level of a particular LAW is determined by adding together the difficulty levels of each of the five parts.

To choose your own LAW OF NATURE, follow these five STEPS:

STEP 1.

Choose an OBJECT type from among the following six:

OBJECT TYPE		DIFFICULTY LEVEL
1	(Number)	1
2	(Letter)	1
3	(Number,Number)	2
4	(Letter,Letter)	3
5	(Number,Letter)	4
6	(Letter,Number)	4

STEP 2

Choose a TRANSFORMATION rule from the list below. If the OBJECT type you have chosen contains two ELEMENTS, then you must choose a TRANSFORMATION rule for each ELEMENT. Be sure that the TRANS-FORMATION you choose is compatible with the ELEMENT to which it is to be applied.

TRANS-FORMATION	DESCRIPTION (ELEMENT BECOMES . . .)	RESULT	COMPATIBLE WITH	DIFFICULTY LEVEL
1	No transformation.	$N \leftarrow N$	N	0
2	Square root of number if number is perfect square, else no transformation.	$\left.\begin{array}{c}\sqrt{N}\\N\end{array}\right\} \leftarrow N$	N	4
3	Half of number if number is even, else no transformation.	$\left.\begin{array}{c}\frac{1}{2}N\\N\end{array}\right\} \leftarrow N$	N	4
4	The greatest of all previous numbers.	$Max\,N \leftarrow N$	N	4
5	The least of all previous numbers.	$Min\,N \leftarrow N$	N	4
6	The sum of all previous numbers (including current number).	$\sum N \leftarrow N$	N	5
7	30 if uppercase letter or numeral has vertical symmetry, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N,L$	N,L	6
8	30 if uppercase letter or numeral has horizontal symmetry, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N,L$	N,L	6
9	30 if uppercase letter or numeral contains closed area, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N,L$	N,L	6
10	30 if upper and lowercase letter have same symmetry, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow L$	L	8
11	30 if upper and lowercase letter have same openess, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow L$	L	8
12	30 if lowercase printed letter has a descender, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow L$	L	8
13	30 if sound of letter or number begins with a vowel, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N,L$	N,L	7
14	30 if letter is a vowel, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow L$	L	5
15	Numerical position of letter in alphabet.	$\left.\begin{array}{c}1-\\26\end{array}\right\} \leftarrow L$	L	5
16	Number of syllables in name of number.	$\left.\begin{array}{c}1-\\5\end{array}\right\} \leftarrow N$	N	5
17	30 if pattern of digits in number is symmetric, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N$	N	5
18	30 if digits in number are in ascending order, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N$	N	6
19	30 if digits in number are in descending order, else it becomes 60.	$\left.\begin{array}{c}30\\60\end{array}\right\} \leftarrow N$	N	6

STEP 3.

Choose a COMBINATION rule. The purpose of the COMBINATION rules is to convert the two numbers obtained in STEP 2, into one number. If the OBJECT type you have chosen contains only one element, then choose COMBINATION rule 1 (no combination).

COMBINA-TION	DESCRIPTION	RESULT	DIFFICULTY LEVEL
1	No combination. (For single ELEMENT OBJECTS.)	$N \leftarrow N$	0
2	Take first ELEMENT only.	$N \leftarrow N1$	2
3	Take second ELEMENT only.	$N \leftarrow N2$	2
4	Take greater of two ELEMENTS.	$N \leftarrow Max(N1, N2)$	4
5	Take smaller of two ELEMENTS.	$N \leftarrow Min(N1, N2)$	4
6	Take sum of two ELEMENTS.	$N \leftarrow N1 + N2$	5
7	Difference of first and second ELEMENTS.	$N \leftarrow N1 - N2$	5
8	Difference of second and first ELEMENTS.	$N \leftarrow N2 - N1$	6
9	Product of two ELEMENTS.	$N \leftarrow N1 \times N2$	6
10	The integer obtained when the first ELEMENT is divided by the second.	$N \leftarrow INT(N1/N2)$	7
11	The integer obtained when the second ELEMENT is divided by the first.	$N \leftarrow INT(N2/N1)$	7
12	The remainder when the first ELEMENT is divided by the second.	$N \leftarrow N1(MOD\ N2)$	9
13	The remainder when the second ELEMENT is divided by the first.	$N \leftarrow N2(MOD\ N1)$	9

Note: N1 refers to the TRANSFORMED first ELEMENT
N2 refers to the TRANSFORMED second ELEMENT

STEP 4.

Choose one or two DECISION rules. By now the OBJECT you started with has been TRANSFORMED and COMBINED into one number. The DECISION rules enable you to test that number and assign a value of TRUE or FALSE to the OBJECT. If you choose two DECISION rules, then you will be able to assign two truth values to the OBJECT. T1 represents the truth value based on the first DECISION rule; T2 represents the truth value based on the second DECISION rule. A random number, A, is generated by the computer for use in the DECISION rules.

DECISION	DESCRIPTION	RESULT	DIFFICULTY LEVEL
1	T is TRUE if the number is greater than or equal to A.	T if $N \geq A$ F if $N < A$	1
2	T is TRUE if the number is less than or equal to A.	T if $N \leq A$ F if $N > A$	1
3	T is TRUE if the number equals A.	T if $N = A$ F if $N <> A$	1
4	T is TRUE if the number is greater than the initial value of the number.	T if $N > N_0$ F if $N \leq N_0$	3
5	T is TRUE if the number is less than the initial value of the number.	T if $N < N_0$ F if $N \geq N_0$	3
6	T is TRUE if the current number is greater than the previous number.	T if $N > N_{n-1}$ F if $N \leq N_{n-1}$	3
7	T is TRUE if the current number is less than the previous number.	T if $N < N_{n-1}$ F if $N \geq N_{n-1}$	3
8	T is TRUE if the number is a prime.	T if N is prime F if N is composite	4

STEP 5.

Choose a LOGICAL STATUS rule. Rules 3 through 11 require that two DECISION rules were applied in STEP 4. The other LOGICAL STATUS rules do not depend on the number of DECISION rules applied in STEP 4. The truth values of T1 and T2 obtained in STEP 4 are matched against the STATUS rule selected. If a match is obtained, then the OBJECT obeys the LAW. Otherwise it does not obey the LAW.

LOGICAL STATUS	DESCRIPTION	DIFFICULTY LEVEL
1	T1 is TRUE.	1
2	T1 is FALSE.	1
3	T1 and T2 are TRUE.	3
4	T1 TRUE and T2 False.	4
5	T1 FALSE and T2 TRUE.	4
6	T1 FALSE and T2 FALSE.	3
7	T1 TRUE or T2 TRUE.	5
8	T1 TRUE or T2 FALSE.	6
9	T1 FALSE or T2 TRUE.	6
10	(T1 TRUE and T2 FALSE) **OR** (T1 FALSE and T2 TRUE).	7
11	T1 FALSE or T2 FALSE.	7
12	The player is always wrong.	18
13	The player alternates between right and wrong.	22
14	The player is randomly right and wrong.	25

APPENDIX B

In order to illustrate exactly how LAWS OF NATURE are evaluated, two examples are worked out below.

EXAMPLE 1:

LAW OF NATURE		DIFFICULTY LEVEL	SAMPLE 1	SAMPLE 2	SAMPLE 3
OBJECT TYPE	1	1	(24)	(19)	(25)
TRANS-FORMATION	2	4	(24)	(19)	(5)
COMBINA-TION	1	0	(24)	(19)	(5)
DECISION	2	1	FALSE	TRUE	TRUE
LOGICAL STATUS	1	1	DOES NOT OBEY	OBEYS	OBEYS

RANDOM A   20   7   Total Difficulty

EXAMPLE 2:

LAW OF NATURE		DIFFICULTY LEVEL	SAMPLE 1	SAMPLE 2	SAMPLE 3
OBJECT TYPE	5	3	(6,D)	(20,S)	(53,B)
TRANS-FORMATION	6,13	5 7	(6,60)	(26,30)	79,60)
COMBINA-TION	5	4	(6)	(26)	(60)
DECISION	2,8	1 4	TRUE,FALSE	TRUE,FALSE	FALSE,FALSE
LOGICAL STATUS	6	6	OBEYS	OBEYS	DOES NOT OBEY

RANDOM A   50   30   Total Difficulty

F.G. NEWTON

F.G. NEWTON is a graphic version of **ISAAC NEWTON**. In this game you are again challenged to discover Newton's laws about objects in the universe, but the objects in **F.G. NEWTON's** universe are square grids ranging in size from 3 × 3 to 9 × 9. The individual cells in the grid can be filled in or left empty. The laws are concerned with the pattern of filled and empty cells in a grid. **F.G. NEWTON** will allow you to specify your own objects in order to test your theories. When you think you know the rule, **F.G. NEWTON** will allow you to venture a guess.

THE LAWS

1. Vertical symmetry
2. Horizontal symmetry
3. Both horizontal & vertical symmetry
4. Solid edge
5. Solid inside (non-edge)
6. Edge empty
7. Inside empty (non-edge)
8. Both diagonals filled
9. Main diagonal filled
10. Inverse diagonal filled
11. Both diagonals filled
12. Main diagonal blank
13. Inverse diagonal blank
14. All corners filled
15. No corners filled
16. 1, 2, or 3 corners filled
17. # vertical lines filled = x
18. # horizontal lines filled = x
19. # vertical lines blank = x
20. # horizontal lines blank = x
21. Side of largest filled = x
22. Side of largest blank square = x
23. # vertical lines filled × = x
24. # vertical lines filled × = x
25. # horizontal lines filled × = x
26. # horizontal lines filled × = x
27. Length of longest filled vertical = x
28. Length of longest filled horizontal = x
29. Longest left to right diagonal chain = x
30. Longest filled chain common to both diagonals = x

LOADING INSTRUCTIONS

CASSETTE VERSIONS — contain multiple programs on each tape. These may be loaded in the usual manner. LOAD for Apple and PET versions. CLOAD for TRS-80 versions.

DISK VERSIONS — In order to protect the copyrighted materials of disk operating systems manufacturers, these disks are furnished without operating systems.

APPLE — Place diskette in Drive 1 and boot .

TRS-80 — Boot system with TRS-DOS or other operating system in Drive 0. When DOS READY message appears type BASIC. When questions MEMORY SIZE? and NUMBER OF FILES? appear hit ENTER. Next replace operating system diskette with Krell program diskette then type RUN "NEWTON" and hit ENTER.

PET — The diskettes do **not** contain the "DOS SUPPORT PROGRAM" (also known as the "wedge"). If you wish to use the "wedge" commands, then load and run the "DOS SUPPORT" program from one of your other disks before using your Krell Disk. If you do not run the "DOS SUPPORT" program you can still load and run any of the programs on this disk by typing:

LOAD "ISAAC NEWTON", 8 return
RUN return

To see a directory type:

LOAD "$0", 8 return
LIST return

Be sure to use this disk in Drive 0

INSTRUCTIONS FOR TRS-80 MODEL III OWNERS

1. Put a copy of your TRSDOS into Drive #0.
2. Put diskette with programs you want to load into Drive #1.
3. ENTER CONVERT (See your Radio Shack manual if you want to read more about the Convert program).
4. Your SOURCE diskette is in Drive #1.
5. Your DESTINATION diskette is in Drive #0.
   The CONVERT program will transfer all the programs on Drive #1 to Drive #0. You now have a Model III diskette.

ISAAC NEWTON +
F.G. NEWTON
Krell Software Copr. © 1981

APPLE™

Protect
Proteger
Protéger
Schützen
保護

Never
Nunca
Jamais
Nie
絶対禁止

10°C—52°C
50°F—125°F

No
No
Non
Falsch
注意

Insert Carefully
Insertar
Inserer avec soin
Sorgfältig
Einsetzen
挿入注意

Never
Nunca
Jamais
Nie
絶対禁止

ISAAC NEWTON

ISAAC NEWTON +
F.G. NEWTON
Krell Software Copr. © 1981

APPLE™