

<b> </b>	<b>bars make cores</b>	
_	spec alas (map term tome) produces a door (a core with sample)	
%	(unit term) (map term tome) produces a core (battery and payload)	
@	(unit term) (map term tome) produces a wet core (battery and payload)	
.	hoon produces a trap (a core with one arm)	
:	[hoon hoon] produces a gate with a custom sample	
-	hoon produces a trap (a core with one arm) and evaluates it	
^	hoon (map term tome) produces a core whose battery includes a \$ arm and computes the latter	
~	[spec value] produces an iron gate	
*	[spec value] produces a wet gate (a one-armed core with sample)	
=	[spec value] produces a dry gate (a one-armed core with sample)	
?	hoon produces a lead trap	
\$	(lest term) spec produces a mold	
<b>\$</b>	<b>bucs form molds</b>	
\$@	[spec spec] structure that normalizes a union tagged by head atom	
\$:	(list spec) forms a cell type (tuple)	[a=foo b=bar c=baz]
\$_	hoon structure that normalizes to an example	_foo
\$\$	(list spec) structure that recognizes a union tagged by head atom	
\$*	hoon bunt (irregular form is *)	
\$\$	hoon structure that normalizes a union tagged by head depth (cell)	
\$~	[hoon spec] defines a custom type default value	
\$-	[spec spec] structure that normalizes to an example gate	
\$=	[skin spec] structure that wraps a face around another structure	foo=bar
\$?	(list spec) forms a type from a union of other types	?\$foo \$bar \$baz
\$>	[spec spec] structure from filter (requiring)	
\$<	[spec spec] structure from filter (excluding)	
\$\$	[spec (map term spec)] structure from recursion	

<b>\$ </b>	[spec hoon] structure with verification	
<b>\$.</b>	[spec (map term spec)] structure as read-write core	
<b>\$+</b>	[stud spec] standard structure	
<b>\$;</b>	hoon manual structure	
<b>\$/</b>	[spec (map term spec)] structure as write-only core	
<b>\$`</b>	[spec (map term spec)] structure as read-only core	
<b>\$&amp;</b>	[spec hoon] repaired structure	
<b>\$!</b>	[spec (map term spec)] structure as opaque core	
<b>%</b>	<b>cens put the fun in function</b>	
<b>%_</b>	[wing (list (pair wing hoon))] resolves a wing with changes, preserving type	
<b>%.</b>	[hoon hoon] calls a gate, inverted	
<b>%^</b>	[hoon hoon hoon hoon] calls a gate with triple sample	
<b>%+</b>	[hoon hoon hoon] calls a gate with a cell sample	
<b>%-</b>	[hoon hoon] calls a gate	(fun arg)
<b>:%</b>	[hoon (list hoon)] calls a gate with many arguments	
<b>%~</b>	[wing hoon hoon] evaluates an arm in a door	~(arm core arg)
<b>%*</b>	[wing hoon (list (pair winghoon))] evaluates an expression, then resolves a wing with changes	
<b>%=</b>	[wing (list (pair wing hoon))] resolves a wing with changes	foo(x 1, y 2, z 3)
<b>:</b>	<b>cols make cells</b>	
<b>:_</b>	[hoon hoon] constructs a cell, inverted	
<b>:^</b>	[hoon hoon hoon hoon] constructs a cell, 4-tuple	[a b c d]
<b>:+</b>	[hoon hoon hoon] constructs a cell, 3-tuple	[a b c]
<b>:-</b>	[hoon hoon] constructs a cell, 2-tuple	[a b], a^b
<b>:~</b>	(list hoon) constructs a null-terminated list	~[a b c]
<b>:*</b>	(list hoon) constructs an n-tuple	[a b c d e ...]
<b>::</b>	marks a comment	

•	<b>dots nock</b>	
•+	atom increments an atom using Nock 4	+(42)
•*	[hoon hoon] evaluates using Nock 2	
•=	[hoon hoon] tests for equality using Nock 5	=(a b)
•?	hoon tests for cell or atom using Nock 3	
•^	[spec hoon] loads from namespace using Nock 12	
^	<b>kets cast</b>	
^	hoon converts a gold core to an iron core (invariant)	
^.	[hoon hoon] typecasts on value	
^-	[spec hoon] typecasts by explicit type label	`foo`bar
^+	[hoon hoon] typecasts by inferred type	
^&	hoon converts a core to a zinc core (covariant)	
^~	hoon folds constant at compile time	
^=	[skin hoon] binds name to a value	foo=bar
^?	hoon converts a core to a lead core (bivariant)	
^*	spec produces example type value	
^:	spec produces a 'factory' gate for a type	
~	<b>sigs hint</b>	
~	[hoon hoon] prints in stack trace if failure	
~\$	[term hoon] profiler hit counter	
~-	[hoon hoon] prints in stack trace, user-formatted	
~%	[chum hoon tyre hoon] registers jet	
~/	[chum hoon] registers jet with registered context	
~<	[\$@(term [term hoon]) hoon] raw hint, applied to product ("backward")	
~>	[\$@(term [term hoon]) hoon] raw hint, applied to computation ("forward")	
~+	[@ hoon] caches a computation	
~&	[@ud hoon hoon] prints (used for debugging)	
~?	[@ud hoon hoon hoon] prints conditionally (used for debugging)	

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~=[hoon hoon]
  detects duplicate
~![hoon hoon]
  prints type if compilation failure
; mics make
;:[hoon (list hoon)]
  calls a binary function as an $n$-ary function           :(fun a b c d)
;<[spec hoon hoon hoon]
  glues a pipeline together (monadic bind)
;~[hoon (list hoon)]
  glues a pipeline together with a product-sample adapter (monadic bind)
;;[spec hoon]
  normalizes with a mold, asserting fixpoint
;+
  (Sail) makes a single XML node
;*
  (Sail) makes a list of XML nodes from Hoon expression
;= marl:hoot
  (Sail) makes a list of XML nodes
;/ hoon
  (Sail) yields tape as XML element
= tises alter
=|[spec hoon]
  combines default type value with the subject
=.[wing hoon hoon]
  changes one leg in the subject
=?[wing hoon hoon hoon]
  changes one leg in the subject conditionally
=^[skin wing hoon hoon]
  pins the head of a pair; changes a leg with the tail
=:[(list (pair wing hoon)) hoon]
  changes multiple legs in the subject
=/[skin hoon hoon]
  combines a named noun with the subject
=;[skin hoon hoon]
  combines a named noun with the subject, inverted
=<[hoon hoon]
  composes two expressions, inverted                       foo:bar
=>[hoon hoon]
  composes two expressions
=-[hoon hoon]
  combines a new noun with the subject
=*[ (pair term (unit spec)) hoon hoon]
  defines an alias
=,[hoon hoon]
  exposes namespace
=+[hoon hoon]
  combines a new noun with the subject
=~(list hoon)
  composes many expressions

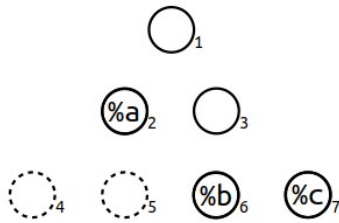
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<b>? wuts test</b>	
<b>? </b> [list hoon] logical OR (loobean)	(foo bar baz)
<b>?:</b> [hoon hoon hoon] branches on a boolean test	
<b>?.</b> [hoon hoon hoon] branches on a boolean test, inverted	
<b>?&lt;</b> [hoon hoon] negative assertion	
<b>?&gt;</b> [hoon hoo] positive assertion	
<b>?-</b> [wing (list (pair spec hoon))] switches against a union, no default	
<b>?^</b> [wing hoon hoon] branches on whether a wing of the subject is a cell	
<b>?=</b> [spec wing] tests pattern match	
<b>?#</b> [skin wing] tests pattern match	
<b>?+</b> [wing hoon (list (pair spec hoon))] switches against a union, with default	
<b>?&amp;</b> (list hoon) logical AND (loobean)	& (foo bar baz)
<b>?@</b> [wing hoon hoon] branches on whether a wing of the subject is an atom	
<b>?~</b> [wing hoon hoon] branches on whether a wing of the subject is null	
<b>?!</b> hoon logical NOT (loobean)	!foo
<b>! zaps run wild</b>	
<b>!:</b> turns on stack trace	
<b>!.:</b> turns off stack trace	
<b>!,</b> [hoon hoon] emits AST of expression	
<b>!;</b> [hoon hoon] emits the type for an expression using the type of type	
<b>!&gt;</b> hoon wraps a noun in its type	
<b>!=</b> hoon makes the Nock formula for a Hoon expression	
<b>!?</b> [\$@(@ { @ @}) hoon] restricts Hoon version	
<b>!!</b> ~ crashes	
<b>!&lt;</b> hoon lift dynamic value into static context	

**/ fases ford**  
**/\$** slams a gate on extra arguments  
**/|** takes a series of horns and produces the first one (L-to-R) that succeeds; if none succeed, produces stack traces from arguments  
**/=** runs a horn (usually produced by another Ford rune), takes the result of that horn, and wraps a face around it  
**/.**  produces a null-terminated list from a sequence of horns, terminated by ==  
**/,**  acts as switch statement, picking a branch to evaluate based on whether the current path matches the path in the switch statement  
**/&**  pass a horn through multiple marks  
**/\_**  *unfiltered*: takes a horn, producing new horn mapping supplied horn over list of files in current directory; *filtered*: runs a horn on each file matching aura  
**/~**  produces a horn that evaluates a twig and places the product in the subject  
**/:**  takes a path and a horn, and evaluates the horn with the current path set to the supplied path  
**/^**  takes a mold and a horn, and casts the result of the horn to the mold  
**!/**  produces a mark  
**/+**  accepts a filename and loads that filename from the lib directory  
**/-**  accepts a filename and loads that filename from the sur directory  
**//**  parses relative path as a hoon twig, and adds the resulting twig to the subject  
**;/**  takes a twig and a horn; the twig should evaluate to a gate, which is then slammed with the result of the horn as its sample  
**/#**  takes a horn and produces a cell of the dependency hash of the result of the horn, and the result itself  
**/%**  forwards extra arguments to enclosed renderers  
**/?**  parses %zune version  
**-/= terminators terminate**  
**--**  terminates core expression  
**==**  terminates running series of Hoon expressions  
**+ luses change**  
**+|**   
labels a chapter (produces no arm)  
**+\$**  [term spec]  
produces a structure arm (type definition)  
**++**  [term hoon]  
produces a (normal) arm  
**+\***  [term term spec]  
produces a type constructor arm

**syntax**

+1:[%a [%b %c]]	[%a [%b %c]]	..:[%a [%b %c]]	[%a [%b %c]]
+2:[%a [%b %c]]	%a	-:[%a [%b %c]]	%a
+3:[%a [%b %c]]	[%b %c]	+:[%a [%b %c]]	[%b %c]
+4:[%a [%b %c]]	%ride failed	-<:[%a [%b %c]]	%ride failed
+6:[%a [%b %c]]	%b	+<:[%a [%b %c]]	%b
+7:[%a [%b %c]]	%c	+>:[%a [%b %c]]	%c



. current subject

+ +:.

- -:.

+> +>:.

^face face in outer core

..arm core in which ++arm is defined

~ 0 (nil)  
%.y & yes/true  
%.n | no/false

eny entropy  
now current time

`a [~ a]  
~[a b c] [a b c ~]  
[a b c]~ [[a b c] ~]

<[1 2 3]> renders list as a tape  
>[1 2 3]< renders list as a tank

?=(\$hoon %hoon) %.y  
?=( \$hoon %loon) %.n

-:!> type spear, use as -:!>(.3.14)

**@p notation**

@c	Unicode codepoints	~~45fed.
@d	Date	
@da	Date, absolute	~2020.12.25..7.15.0..1ef5
@dr	Date, relative	~d71.h19.m26.s24..9d55
@f	Loobean (for compiler, not castable)	&
@n	Nil (for compiler, not castable)	~
@p	Phonemic base	~laszod-dozser-fosrum-fanbyr
@q	Phonemic base, unscrambled (used with Urbit HD wallet)	~.laszod-dozser-dalteb-hilsyn
@r	IEEE-754 floating-point number	
@rh	Floating-point number, half-precision, 16-bit	.~~3.14
@rs	Floating-point number, single-precision, 32-bit	.3.141592653589793
@rd	Floating-point number, double-precision, 64-bit	~3.141592653589793
@rq	Floating-point number, quadruple-precision, 128-bit	~.~~3.141592653589793
@s	Integer, signed (sign bit low)	
@sb	Signed binary	--0b10.0000
@sd	Signed decimal	--1.000
@sv	Signed base-32	--0v201.4gvml.245kc
@sw	Signed base-64	--0w2.04AfS.G8xqc
@sx	Signed hexadecimal	--0x2004.90fd
@t	UTF-8 text (cord)	'urbit'
@ta	ASCII text (knot)	~.urbit
@tas	ASCII text symbol (term)	%urbit
@u	Integer, unsigned	
@ub	Unsigned binary	0b10.1011
@uc	Bitcoin address	0c1A1zP1eP5QGefi2DMPTfTL5SLmv7DivfNa
@ud	Unsigned decimal	8.675.309
@uv	Unsigned base-32	0v88nvd
@uw	Unsigned base-64	0wx5~J
@ux	Unsigned hexadecimal	0x84.5fed

Capital letters at the end of auras indicate the bitwidth in binary powers of two, starting from A.

- @ubD signed single-byte (8-bit) decimal
- @rhE half-precision (16-bit) floating-point number
- @uxG unsigned 64-bit hexadecimal
- @uvJ unsigned 512-bit integer (frequently used for entropy)

Auras are non-coercive, but conversions may have to go via the empty aura: ^-(@ud ^-(@ 'foo')).

**text**

Single-quoted text 'urbit' denotes a cord or @t, which is an atom.

Double-quoted text "urbit" denotes a tape, which is a list of characters, ['u' 'r' 'b' 'i' 't' ~].

Use `crip` to convert tape to cord, `trip` to convert cord to tape.