

| | |
|---------------------------------|------------|
| All logicians are millionaires. | all L is M |
| Gensler is a logician. | g is L |
| ∴ Gensler is a millionaire. | ∴ g is M |

Syllogistic logic (our first system)
deals with such arguments; it uses
capital and small letters and five words
("all," "no," "some," "is," and "not").

Wffs are sequences having
any of these eight forms:

| | |
|-----------------|------------|
| all A is B | x is A |
| no A is B | x is not A |
| some A is B | x is y |
| some A is not B | x is not y |

Use capital letters for *general terms* (terms that *describe* or put in a *category*):

B = a cute baby
C = charming
D = drives a Ford

Use small letters for *singular terms* (terms that pick out a *specific* person or thing):

b = the world's cutest baby
c = this child
w = William Gensler



A *syllogism* is a vertical sequence of one or more wffs in which each letter occurs twice and the letters “form a chain” (each wff has at least one letter in common with the wff just below it, if there is one, and the first wff has at least one letter in common with the last wff).

| | |
|-------------------|-----------------|
| no P is B | no P is B |
| some C is B | some C is not B |
| ∴ some C is not P | ∴ some C is P |

A letter is *distributed* in a wff if it occurs just after “all” or anywhere after “no” or “not.”

| | |
|-------------------------|-------------------|
| all <u>A</u> is B | x is A |
| no <u>A</u> is <u>B</u> | x is not <u>A</u> |
| some A is B | x is y |
| some A is not <u>B</u> | x is not y |

Star test: Star premise letters that are distributed and conclusion letters that aren’t distributed. Then the syllogism is VALID if and only if every capital letter is starred exactly once and there is exactly one star on the right-hand side.

no P* is B* Valid
 some C is B
 ∴ some C* is not P

no P* is B* Invalid
 some C is not B*
 ∴ some C* is P*

English arguments: First use intuition.

1. All segregation laws degrade human personality.
All laws that degrade human personality are unjust.
 \therefore All segregation laws are unjust.

Then translate into logic and work it out.

Idioms are hard!

Every / each / any / whoever ... = all ...

A's are B's = all A is B

Only men are NFL football players \neq all M is F
= all F is M

No one is an NFL fb player unless they are a man \neq no F is M
= all F is M

“all A is B” and “some A is not B” are contradictories:



Not all of the pills are white = Some of the pills aren't white

“some A is B” and “no A is B” are contradictories:



It's false that some pills are black = No pills are black

Idiom flashcards

Whoever
is thin is
not jolly.

=

?

Not all
people are
happy.

=

?

Only rich
people
are happy.

=

?

Deriving conclusions

(1) Translate the premises, star, see if rules are broken.

(2) Figure out the conclusion letters.

(3) Figure out the conclusion form.

(4) Add the conclusion, do the star test.



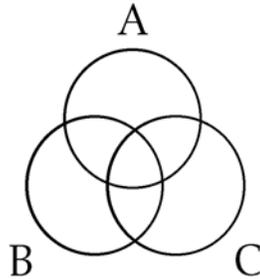
If both conclusion letters are capitals: use an “all” or “no” conclusion if every premise starts with “all” or “no”; otherwise use a “some” conclusion.

If at least one conclusion letter is small: the conclusion will have a small letter, “is” or “is not,” and then other letter.

Always derive a negative conclusion if any premise has “no” or “not.”

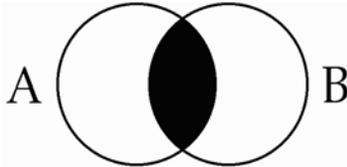
| | | |
|-----------|-----------------------------|---|
| Examples: | all, all \therefore all | all, some is not \therefore some is not |
| | all, no \therefore no | no, some \therefore some is not |
| | all, some \therefore some | x is A, x is B \therefore some A is B |

Venn Diagrams

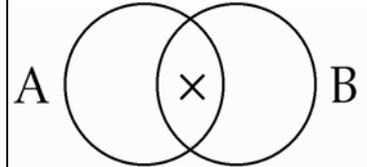


First draw “all” and “no” premises by shading. Then draw “some” premises by putting an “x” in an unshaded area. (See below if there are two unshaded areas.) If you *must* draw the conclusion, the argument is **VALID**; otherwise, it’s invalid.

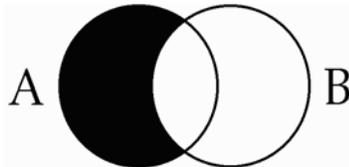
“no A is B”
Shade wherever
A and B overlap.



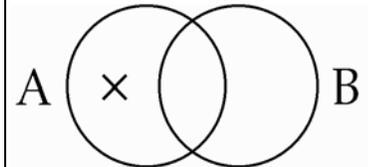
“some A is B”
“x” an unshaded
area where A
and B overlap.



“all A is B”
Shade areas of A
that aren’t in B.



“some A is not B”
“x” an unshaded
area in A that
isn’t in B.



When “x” could go in either of two unshaded areas, the argument is invalid; to show this, put “x” in an area that doesn’t draw the conclusion.

Idiomatic arguments

1. Identify the conclusion.

These often indicate premises:

Because, for, since, after all ...

I assume that, as we know ...

For these reasons ...

-
-

These often indicate conclusions:

Hence, thus, so, therefore ...

It must be, it can't be ...

This proves (or shows) that ...

2. Translate into logic. Use wffs – and make sure each letter occurs twice. Add implicit premises if needed.

3. Test for validity.