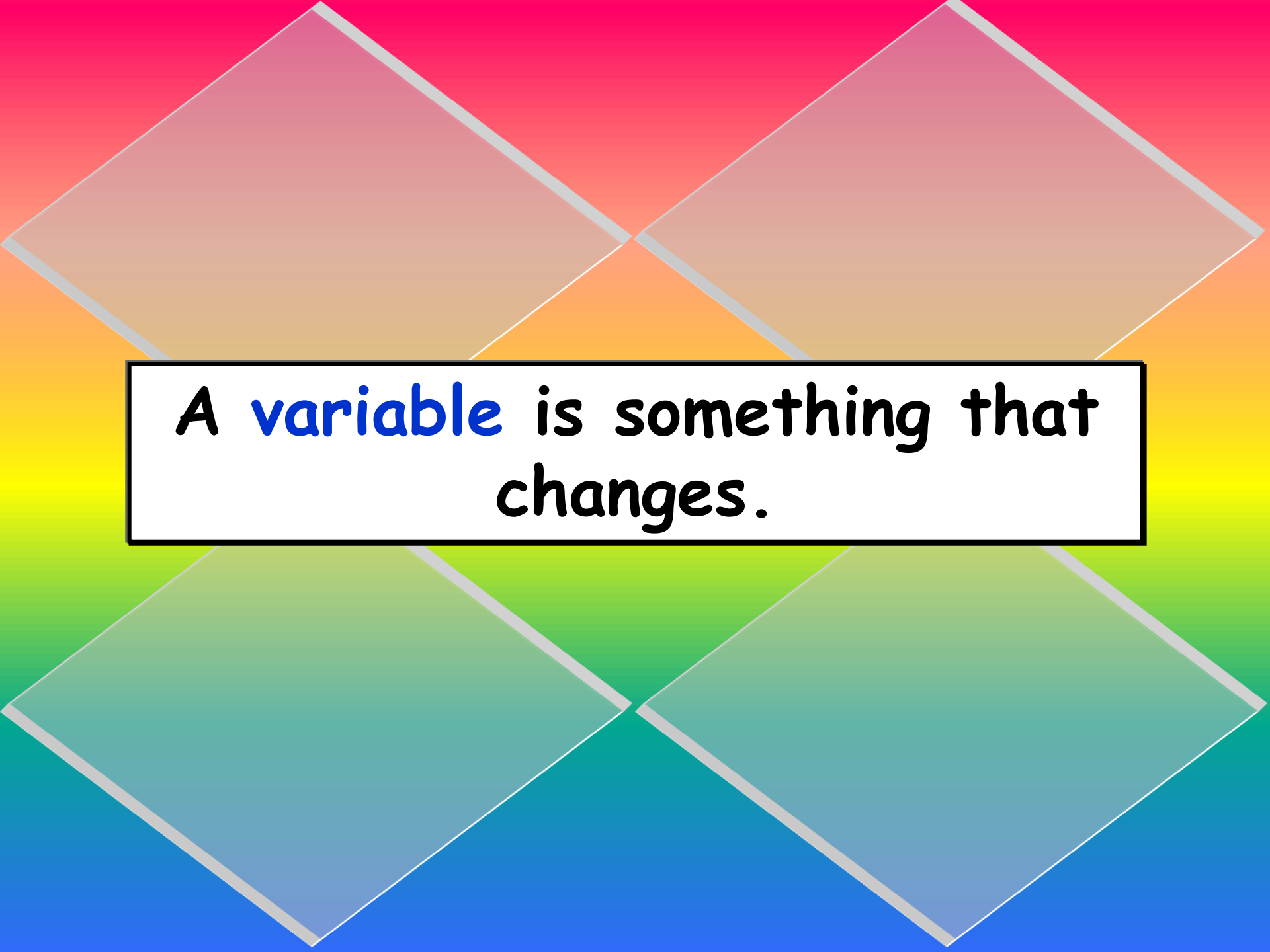


designing an

**Experiment**



A **variable** is something that changes.

# 6 concepts of experimental design

independent variable

dependent variable

constants

control group

experimental group

repeated trials

**independent variable**



the variable that is changed  
**on purpose** by the experimenter



aka cause, stimulus, reason,  
manipulated variable, etc.

**dependent variable**

```
graph TD; A[dependent variable] --> B[the variable that responds]; B --> C[aka effect(s), result(s), responding variable, etc.]
```

the variable that responds

**aka effect(s), result(s), responding  
variable, etc.**

**constants**



all factors which are **NOT** allowed  
to change during the experiment

**control group**



**the group (standard) to which  
everything is compared**

**experimental group**

**the group(s) being tested with the independent variable**

**Each test group has only one factor different from the other test groups: the independent variable.**



repeated trials



the number of times the experiment  
is repeated



The more times you repeat the  
experiment, the more **VALID** your  
results are.



The **IVCDV** chart

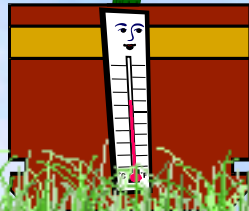
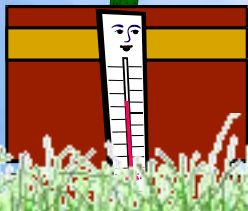
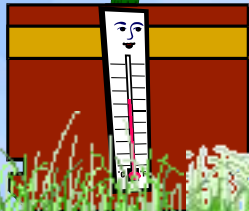
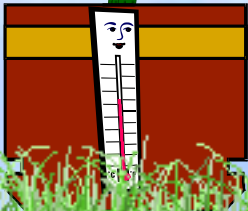
is used to design an experiment.

no fertilizer

2 drops fertilizer

4 drops fertilizer

6 drops fertilizer



iv

constants

dv

fertilizer



0 drops

2 drops


4 drops

6 drops

The variable (factor) that you will change is the **independent variable**.

These are the fertilizer amounts varied by the experimenter.

Plants with no fertilizer make up the **control** or control group.

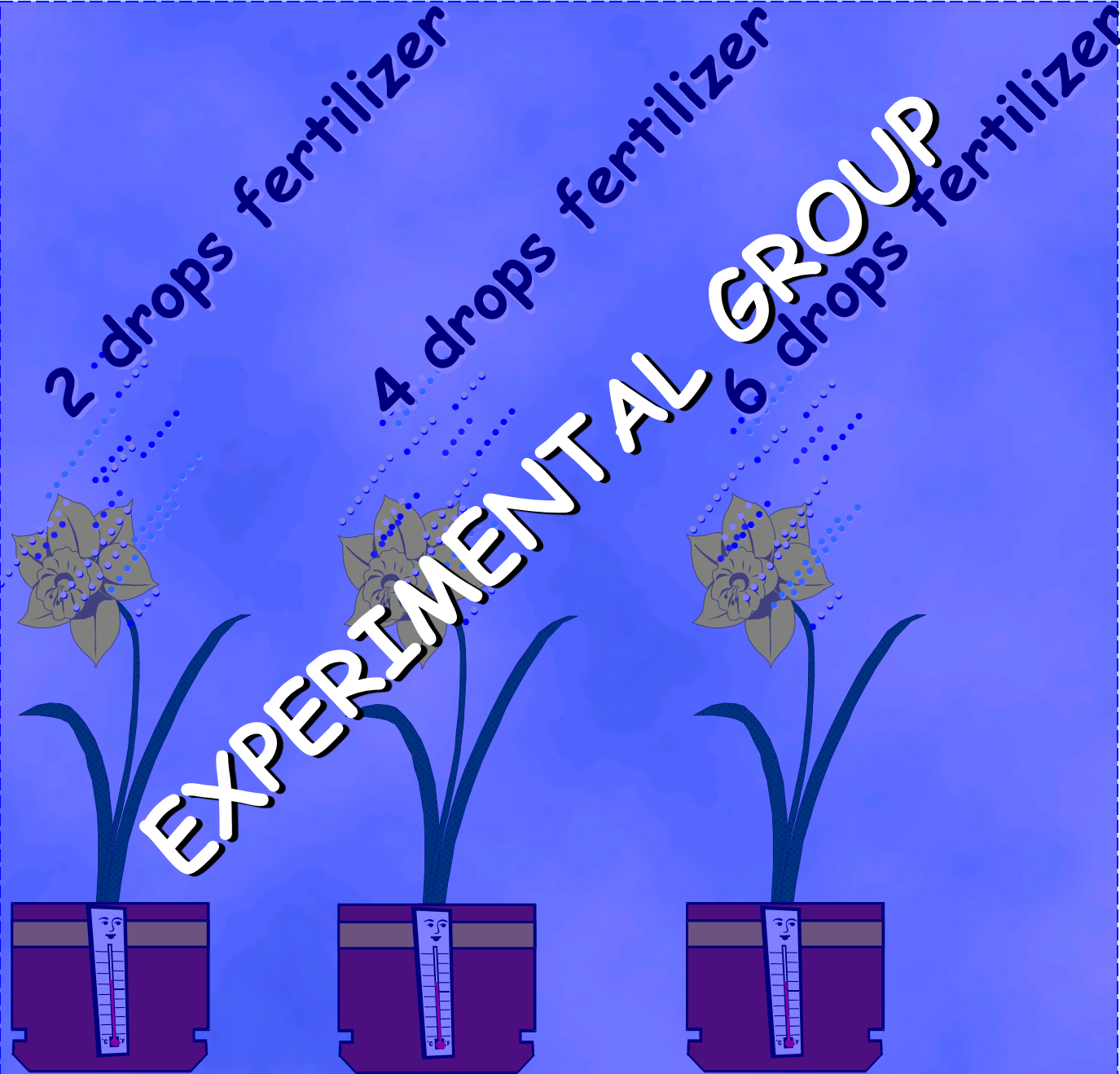
iv	constants	dv
fertilizer		plant growth
0 drops		
2 drops	The variable (factor) resulting from the independent variable is the dependent variable.	
4 drops		
6 drops		

iv	constants	dv
fertilizer	amt. of water	plant growth

These are the factors that must **NOT** change during experimentation. They must remain **constant**.

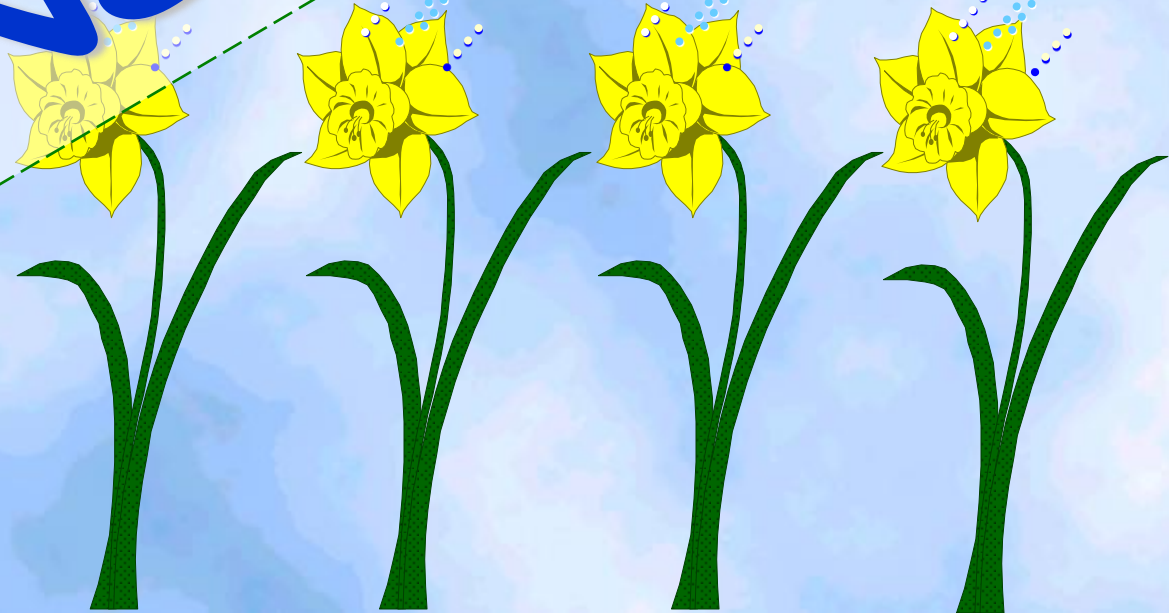
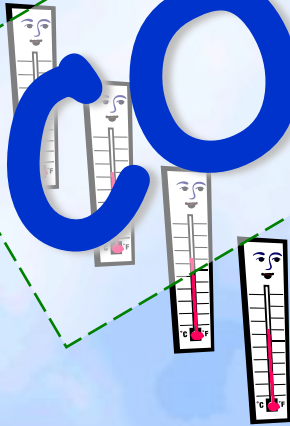
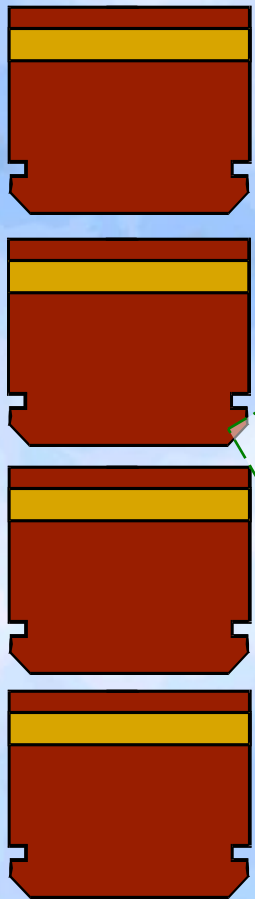
7 drops		
6 drops	type of planter	
	size of planter	
	type of light	
	location	

# What is this called? What are these called?



What are these called?

CONSTANTS



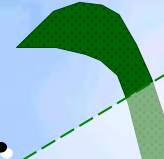
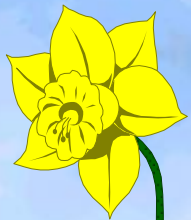


What is this called?

The plant growth that you observe here can be called . . .

- ✓ the **results** (of adding fertilizer)
- ✓ the **response** (to adding fertilizer)
- ✓ the **effects** (of adding fertilizer)

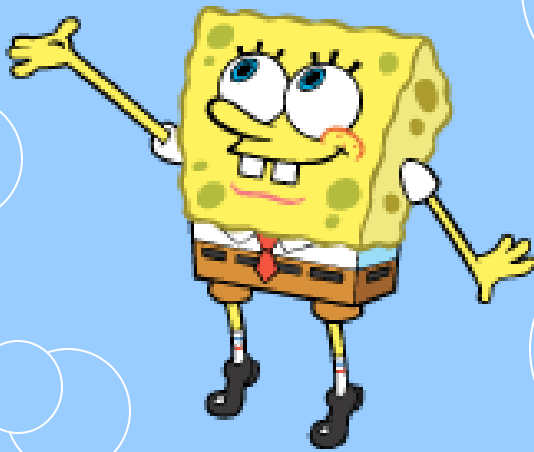
dependent variable



What do you do if you want to test the **type of soil** instead of **fertilizer**?

iv	constants	dv
<b>type of soil</b>	amt. of water <b>fertilizer</b> amt. of soil <b>type of plant</b>	plant growth
<b>Fertilizer becomes a constant.</b>		
	size of planter type of light <b>location</b>	

**SpongeBob wants to find out how the temperature of his bubble solution affects the size of bubbles.**



**Take 5 minutes to design an experiment using the IVCDV chart to test SpongeBob's experiment.**

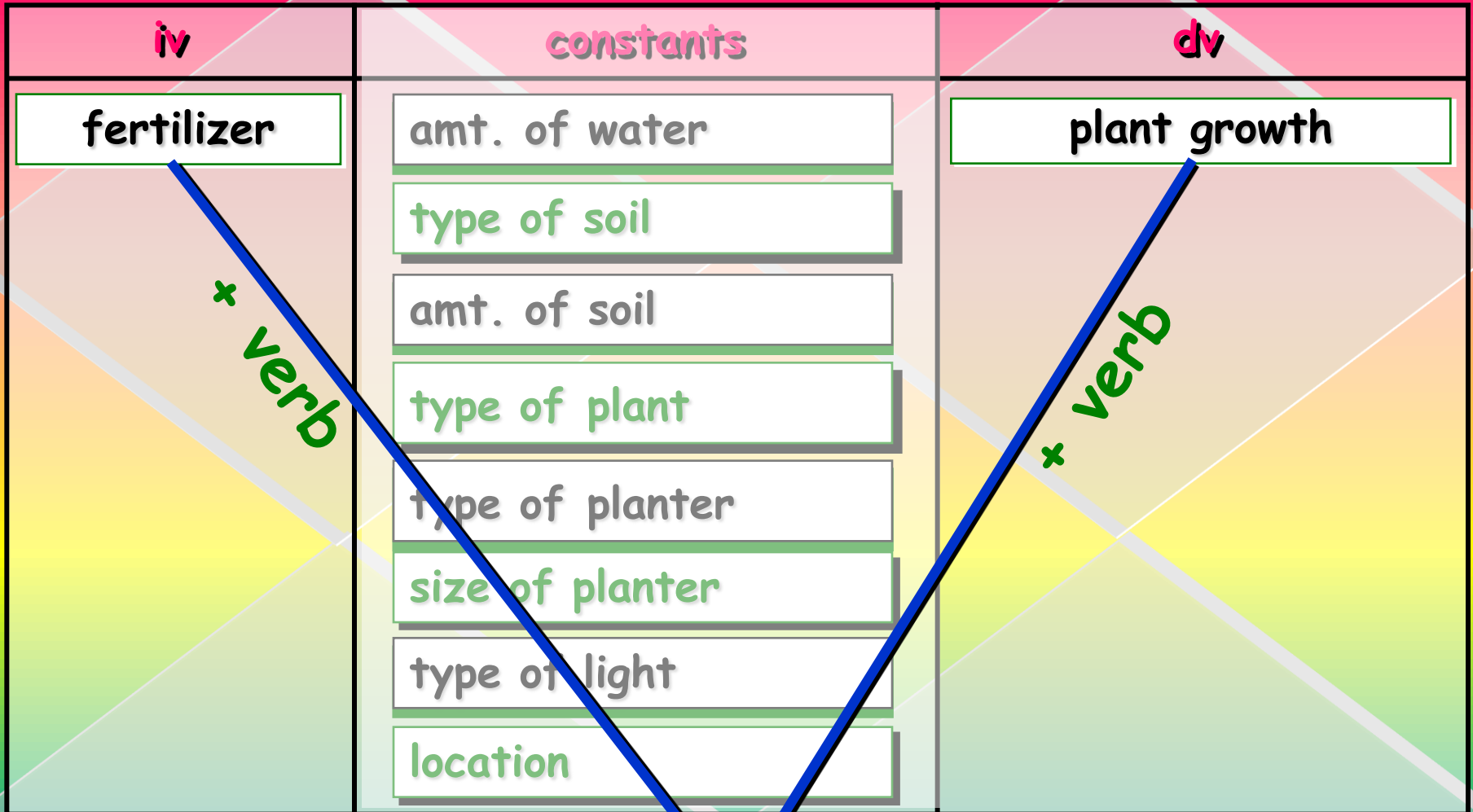


forming a

**hypothesis**



# V Chart



If fertilizer is added to plants, then plant growth will improve.

# V Chart

Independent Variable

Dependent Variable

If independent variable + verb,

then dependent variable + verb.

hypothesis



Practice writing a hypothesis  
from your SpongeBob example.

If the temperature of the bubble solution  
becomes warmer, then the size of the  
bubbles will become smaller.