

Dependent and Independent Variables Explained



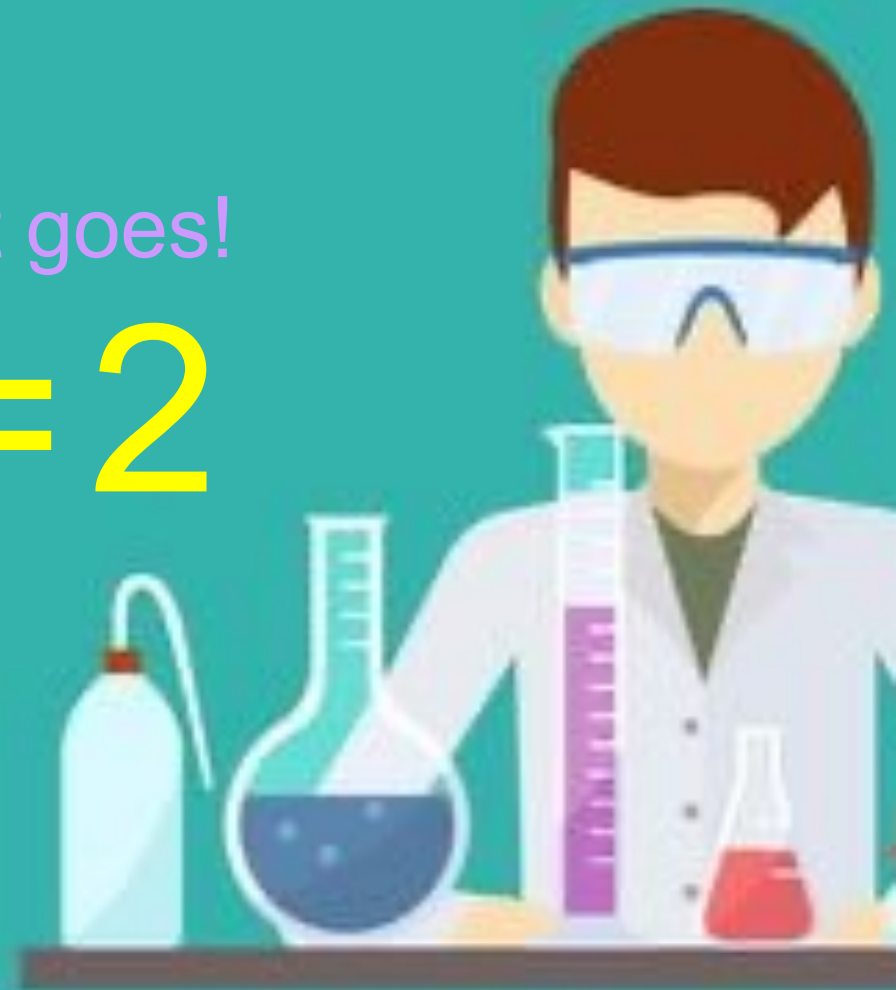
Did you know that if you can add
1+1 then you can learn today's
lesson about variables?



Ok...here it goes!

$$1 + 1 = 2$$

So, I guess
you're ready!

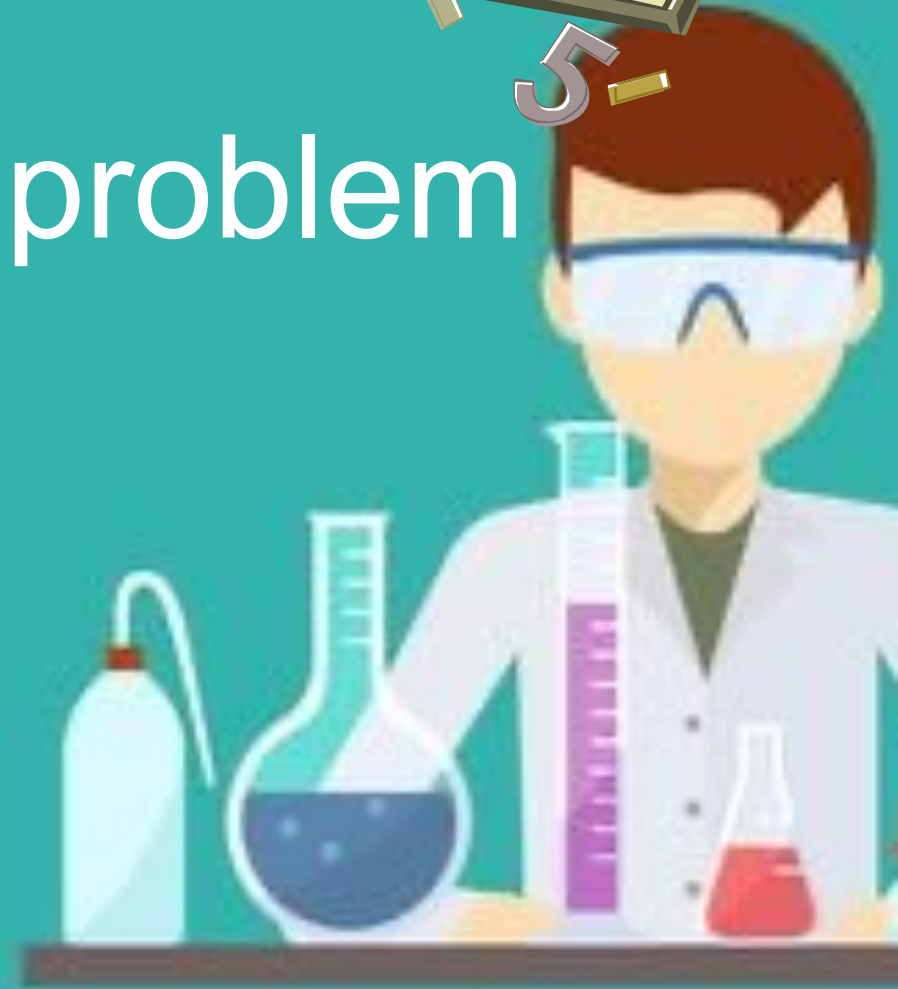


$$2 + \underline{\quad} = \underline{\quad?}$$

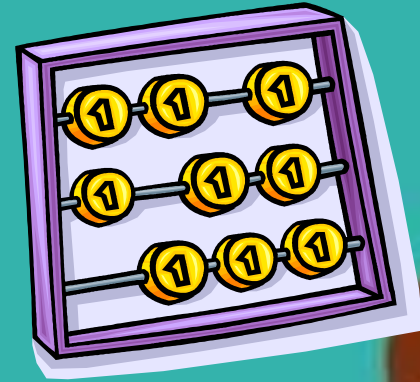


What does this problem
equal?

You're right!
It Depends...

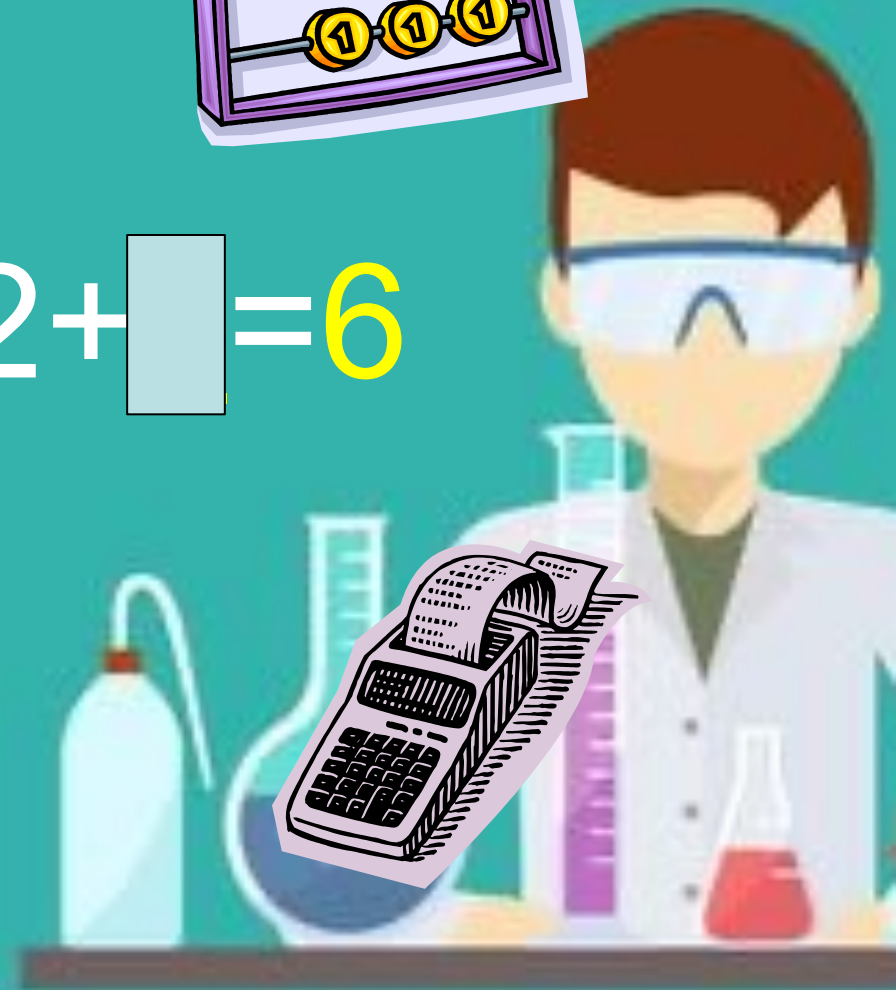


$$2 + \square = 4$$

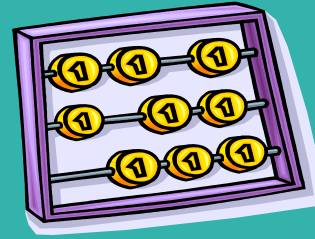


$$2 + \square = 6$$

$$2 + \square = 52$$



$$2 + \underline{2} = 4$$



...and it affected the answer!



$$2 + \underline{4} = 6$$



$$2 + \underline{50} = 52$$

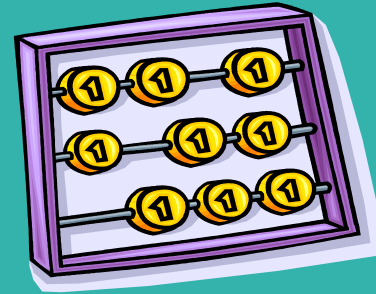
In every example, we changed one number...

Therefore, the answer depended on the number we changed!



Simple, but try it!

$$10 + \underline{\quad} = \underline{\quad}$$

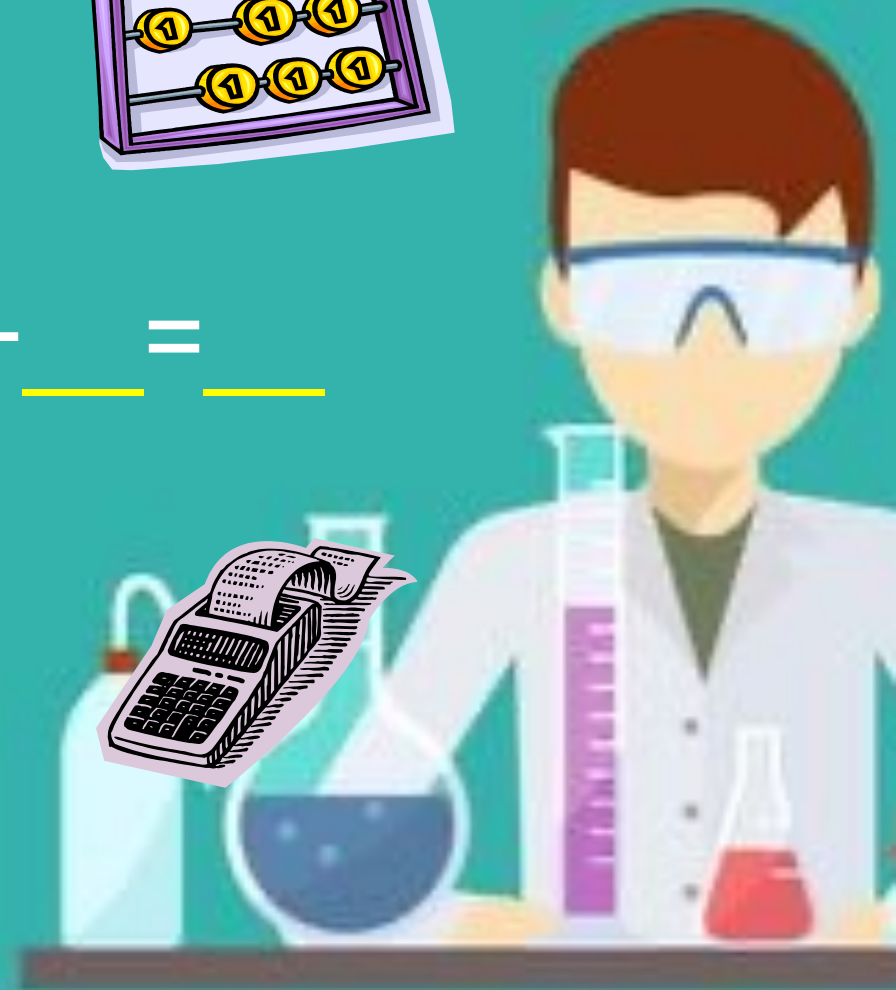


$$10 + \underline{\quad} = \underline{\quad}$$

$$10 + \underline{\quad} = \underline{\quad}$$



Fill in the above problems to make 3 true math sentences.



You ask...

?

?

What does this
have to do with
Science?

?

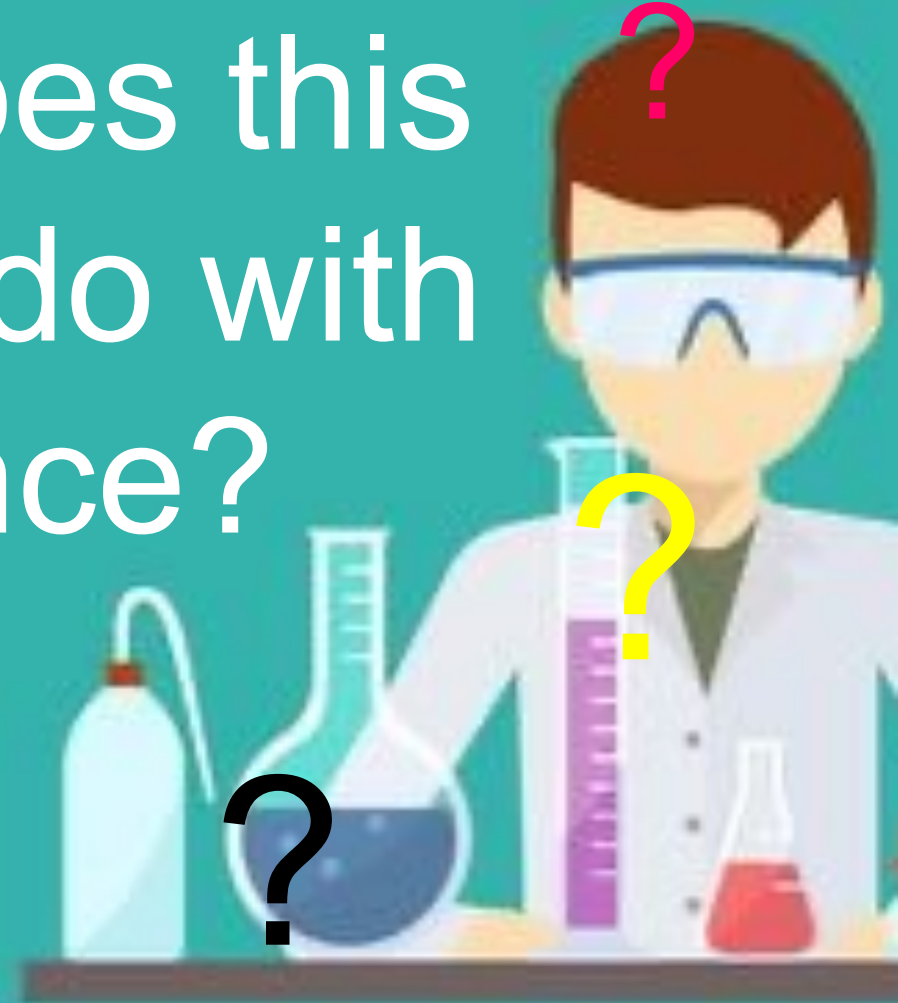
?

?

?

?

?



Variables are used in Math and Science!

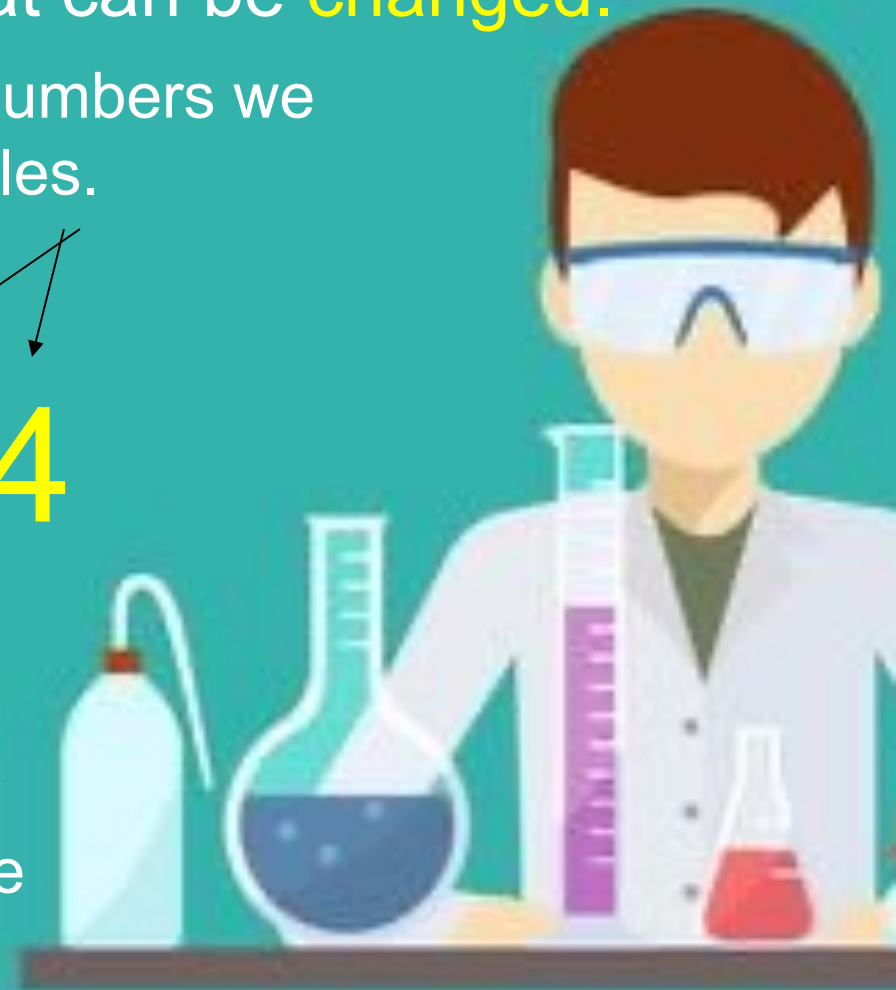
A variable is... something that can be **changed**.

In our math problems, the numbers we changed were called variables.

A constant is... something that **does not change**.

$$2 + \underline{2} = 4$$

In our math problems, the number we decided not to change could be called a constant.



Science experiments use...

Independent variables – the one factor changed by the person doing the experiment.

Dependent variables – the factor being measured in an experiment.

Constants – all the factors that stay the same in an experiment.



In our math problems we used
independent and dependent
variables too!

Independent variable

(The one number we changed)

Constant

(It stayed the same)

→ $2 + \underline{2} = 4$

Dependent variable

(The number that depended
on the independent variable)



Now, how does it fit with science experiments?

Imagine you want to do an experiment to test what kind of plant food works the best. Miracle Gro, Jobe sticks, or the name brand.



You would want to be sure that you changed **ONLY** what you are testing so that your results wouldn't be messed up.



Our Experiment



Constants	water soil light daisy seed	water soil light daisy seed	water soil light daisy seed
Independent Variable	Miracle Gro	Jobe's Sticks	name brand
Dependent Variable	Plant growth (most)	Plant growth (good)	Plant growth (little)

Our Constants and Variables!



Constants: The type and amount of dirt (same).
The amount and timing of watering (same).
+ The type and amount of light (same).
The amount of plant food given (same).

Independent variable: The brand of plant food testing.
(Miracle Gro, Jobes Stick, name brand)
=

Dependent variable: The health and growth of the plants.

Here's How it Works!

Constants

Same types
and amounts
of:
water, light,
and soil

Independent
Variable

Different
plant
foods
tested.

Dependent
Variable

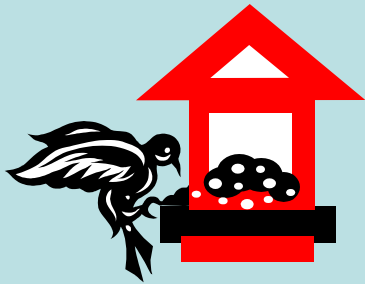
Health and
growth
of plants

+

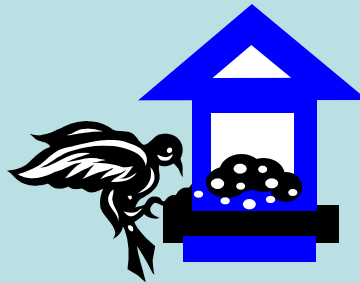
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A birdy example...

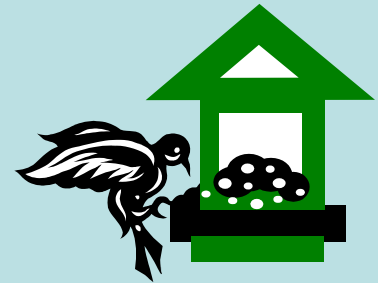
Imagine you want to see what color of bird feeders your local birds preferred.



Red?



Blue?

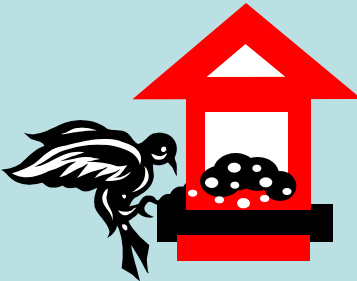
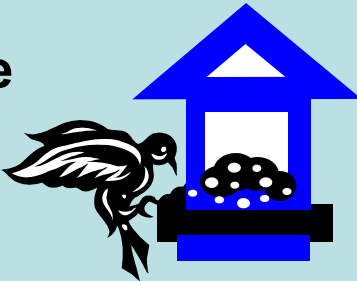
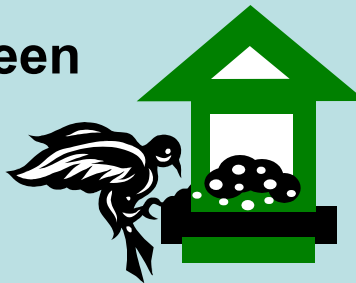


Green?

Our Constants and Variables

- **Independent Variable:** color of the feeders
- **Dependent Variable:** amount of seed eaten
- **Constants:** everything else that is kept the same, for example:
 - the location of the feeders
 - the kind of feeder used
 - putting the feeders out at the same time

Our Experimental Design

Constants	Location of feeders Kind of seed Type of feeder		
Independent Variable	Red 	Blue 	Green 
Dependent Variable	Amount of Seed Eaten	Amount of Seed Eaten	Amount of Seed Eaten

Identifying variables and Designing Investigations

Example

- A student thinks that 8th graders will be better at doing a quiz than 7th graders.
 - **Task** Write down the independent, dependent and control variables in this experiment.

Identifying variables and Designing Investigations

Example

- **Independent variable** = the year group the students are in (7th vs 8th)
- **Dependent variable** = the students scores on the quiz
- **Control variables** = the same quiz should be used, students should have the same amount of time to complete it.

Identifying variables and Designing Investigations

Example

- A student has made the following prediction for an experiment; “the more caffeine I drink the quicker my reaction times will be.”
 - **Task** What are the independent, dependent and control variables in this experiment.

Identifying variables and Designing Investigations

Example

- **Independent variable** = the amount of caffeine drunk by the student (e.g. number of cups of cola)
- **Dependent variable** = the students reaction times (e.g. how quick they can catch a ruler)
- **Control variables** = the same type of drink, same method of measuring reaction time.

Identifying variables and Designing Investigations

Example Listening to music helps your ability to study.

- **Task:** What are the independent, dependent and control variables in this experiment.

Identifying variables and Designing Investigations

Example

- **Independent variable** = whether the student is listening to music or not.
- **Dependent variable** = the students ability to recall information learnt while listening to music (e.g. score on a memory test).
- **Control variables** = the same type of music, the same information to be learnt.