Unit 2 Learning Goal

GEO.B.11.IndDedReasoning
Use inductive and deductive reasoning to make conjectures both verbally, algebraically, and geometrically.

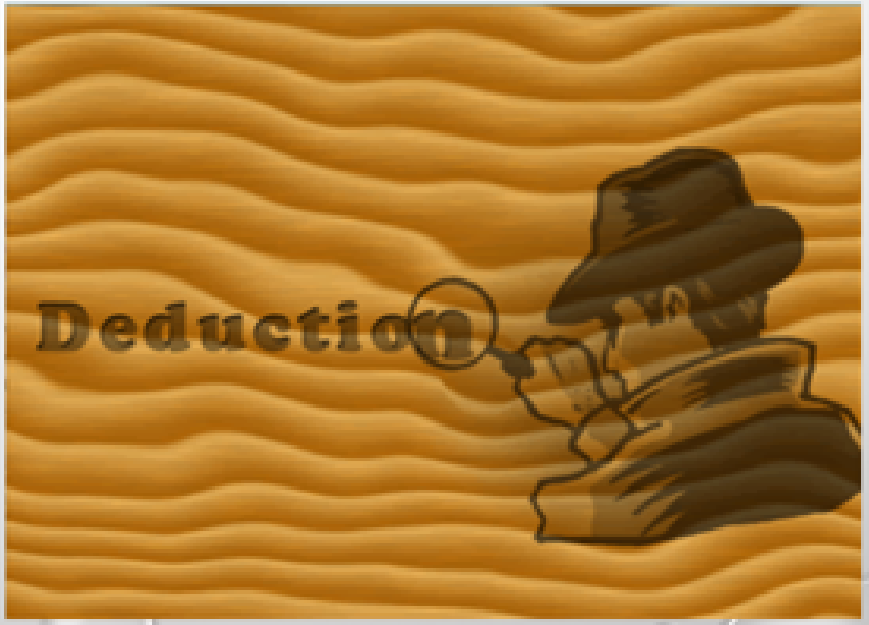
Lesson 2-3 Learning Target

- I can use the Law of Detachment and Syllogism to reason Deductively

- I can determine if reasoning happens Inductively or Deductively

VOCABULARY

- DEDUCTIVE REASONING (LOGICAL REASONING) = THE PROCESS OF REASONING LOGICALLY FROM GIVEN STATEMENTS TO A CONCLUSION. YOU CONCLUDE FROM FACTS.



EXAMPLE

- A PHYSICIAN DIAGNOSING A PATIENT'S ILLNESS USES DEDUCTIVE REASONING. THEY GATHER THE FACTS BEFORE CONCLUDING WHAT ILLNESS IT IS.

LAW OF DETACHMENT

- LAW OF DETACHMENT = IF A CONDITIONAL IS TRUE AND ITS HYPOTHESIS IS TRUE, THEN ITS CONCLUSION IS TRUE

- IN SYMBOLIC FORM:
- IF $P \rightarrow Q$ IS A TRUE STATEMENT AND P IS TRUE, THEN Q IS TRUE

LAW OF DETACHMENT EXAMPLE

- USE LAW OF DETACHMENT TO DRAW A CONCLUSION

IF A STUDENT GETS AN A ON A FINAL EXAM, THEN THE STUDENT WILL PASS THE COURSE.

FELICIA GETS AN A ON THE MUSIC THEORY FINAL EXAM

CONCLUSION: SHE WILL PASS MUSIC THEORY CLASS

LAW OF DETACHMENT: TRY IT

- USE LAW OF DETACHMENT TO DRAW A CONCLUSION

IF IT'S SNOWING, THEN THE TEMPERATURE IS BELOW 37 DEGREES

IT IS SNOWING OUTSIDE

CONCLUSION: IT'S BELOW 37 DEGREES

LAW OF DETACHMENT EXAMPLE: CAREFUL!

- USE THE LAW OF DETACHMENT TO DRAW A CONCLUSION

IF A ROAD IS ICY, THEN DRIVING CONDITIONS ARE HAZARDOUS

DRIVING CONDITIONS ARE HAZARDOUS

CONCLUSION: YOU CAN'T CONCLUDE ANYTHING!!!

QUICK SUMMARY

- YOU CAN ONLY CONCLUDE IF YOU ARE GIVEN THE HYPOTHESIS!!!
- IF YOU ARE GIVEN THE CONCLUSION YOU CAN NOT PROVE THE HYPOTHESIS

LAW OF SYLLOGISM

- IF $P \rightarrow Q$ AND $Q \rightarrow R$ ARE TRUE STATEMENTS, THE $P \rightarrow R$ IS A TRUE STATEMENT
- EXAMPLE:

IF THE ELECTRIC POWER IS CUT, THEN THE REFRIGERATOR DOES NOT WORK.

IF THE REFRIGERATOR DOES NOT WORK, THEN THE FOOD IS SPOILED.

SO IF THE ELECTRIC POWER IS CUT, THEN THE FOOD IS SPOILED.

LAW OF SYLLOGISM EXAMPLE:

- USE LAW OF SYLLOGISM TO DRAW A CONCLUSION

- IF YOU ARE STUDYING BOTANY, THEN YOU ARE STUDYING BIOLOGY.
- IF YOU ARE STUDYING BIOLOGY, THEN YOU ARE STUDYING A SCIENCE

- CONCLUSION: IF YOU ARE STUDYING BOTANY, THEN YOU ARE STUDYING A SCIENCE

LAW OF SYLLOGISM: TRY IT

- USE THE LAW OF SYLLOGISM AND DRAW A CONCLUSION
- IF YOU PLAY VIDEO GAMES, THEN YOU DON'T DO YOUR HOMEWORK
- IF YOU DON'T DO YOUR HOMEWORK, THEN YOUR GRADE WILL DROP
- CONCLUSION: IF YOU PLAY VIDEO GAMES, THEN YOUR GRADE WILL DROP

WHAT'S THE DIFFERENCE BETWEEN INDUCTIVE AND DEDUCTIVE REASONING?

INDUCTIVE REASONING

- WHEN WE MAKE CONJECTURES BASED ON OBSERVATIONS.
- EX. FOR 3 WEEKS, THE CAFETERIA SERVED PIZZA ON WEDNESDAY. I CONCLUDE NEXT WEDNESDAY THE CAFETERIA WILL HAVE PIZZA.

DEDUCTIVE REASONING

- USE FACTS, DEFINITIONS AND ACCEPTED PROPERTIES IN LOGICAL ORDER TO WRITE A LOGICAL ARGUMENT.
- EX. DICTIONARIES ARE USEFUL BOOKS.
  USEFUL BOOKS ARE VALUABLE.
  THEREFORE, DICTIONARIES ARE VALUABLE.

INDUCTIVE OR DEDUCTIVE??

- 1. JULIE KNOWS THAT DELL COMPUTERS COST LESS THAN GATEWAY COMPUTERS. JULIE ALSO KNOWS THAT GATEWAY COMPUTERS COST LESS THAN COMPAQ COMPUTERS. JULIE REASONS THAT DELL COMPUTERS COST LESS THAN COMPAQ COMPUTERS.
- DEDUCTIVE REASONING.

- 2. MIKE KNOWS THAT GARRETT IS A SOPHOMORE AND KYLE IS A JUNIOR. ALL THE JUNIORS MIKE KNOWS ARE OLDER THAN GARRETT. MIKE REASONS THAT KYLE IS OLDER THAN GARRETT BASED ON THESE OBSERVATIONS.
- INDUCTIVE REASONING-BASED ON OBSERVATIONS.

- 3. IF YOU LIVE IN NEVADA AND ARE BETWEEN AGES OF 16 AND 18, THEN YOU MUST TAKE DRIVER'S EDUCATION CLASSES TO GET YOUR LICENSE. MARK LIVES IN NEVADA, IS 16, AND HAS HIS DRIVER'S LICENSE. THEREFORE, MARK TOOK DRIVER'S EDUCATION CLASSES.
- DEDUCTIVE REASONING