DISCIPLINES – WHAT DO YOU KNOW? WHAT DO YOU ASK?

Preparation
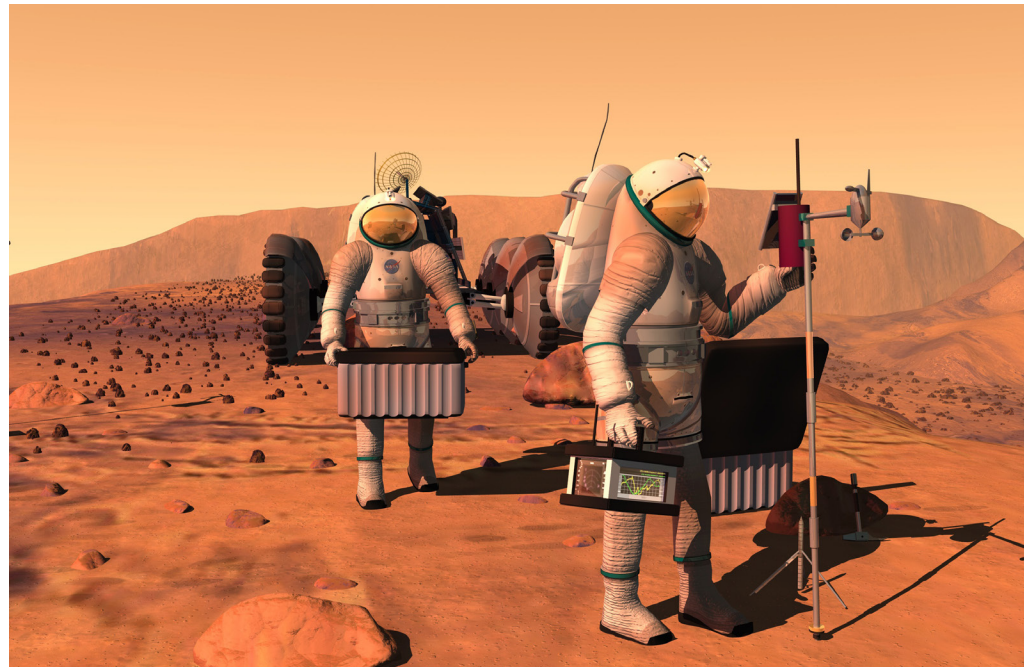
- Download the Disciplines Chart

Purpose

This activity is a follow up to the opening activity where you decided what different people would ask about a significant event (including some younger versions of you!). Now we're going to make things tricky... instead of asking questions from your perspective, or from the perspective of professions that you probably know a lot about, you're going to ask the questions from the viewpoint of the new disciplines that you just learned about earlier in this lesson. This will help you solidify your understanding of the different kinds of questions people from different disciplines ask, as well as allow you to get a sense of how well you understand those disciplines.

Process

Make sure you have the What Do You Know? What Do You Ask? Worksheet. Your job is think about how you could assemble a research team to best understand if humans could ever survive on Mars. The worksheet will help walk you through that process. Once you've assembled a team, you'll have to explain why your team is the best team for this job.
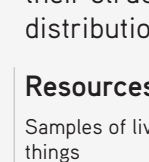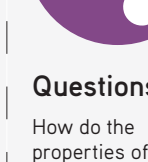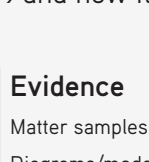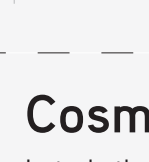
Once you've completed the worksheet, be prepared to share your answers with the class. Then, think about why understanding this event as an interdisciplinary team is better than doing it from an individual perspective.

Crew members setting up weather monitoring equipment on the surface of Mars (artist's concept), *NASA, public domain.*

DISCIPLINES – WHAT DO YOU KNOW? WHAT DO YOU ASK? Name: _____ Date: _____

Directions: Your job is to assemble the best research team possible to best understand an object or event (you must include at least three disciplines). Fill out this worksheet to construct your research team and plan their approach to better understanding the object or event. Finally, you'll argue for why your team is best suited for the job.

Object or Event: _____

Discipline: _____	**Discipline:** _____	**Discipline:** _____
What would someone from this discipline know or want to know about this object or event?	What would someone from this discipline know or want to know about this object or event?	What would someone from this discipline know or want to know about this object or event?

What are the two most important scientific and historical questions your team would ask about the event or object? Make sure the questions include the interests of each discipline.

Why is this team the best for the job?

BHP DISCIPLINE CARDS

Agriculture
I study farming and work to increase productivity and improve crop quality.

Questions
When and where did agriculture farming begin?

How did agriculture change human development?

How does the availability or lack of crops contribute to the growth or fall of a civilization?

How did agriculture increase collective learning?

Resources
Domesticated animals

Fertilizers/ Pesticides

Tractors/ Mechanical Reapers, etc.

Historical climate data

Irrigation systems

Evidence
Soil types/samples

Weather forecasts/ history

Ecosystem health

Crop development

Plant germination

Anthropology
I study human language, culture, and societies all around the world and throughout time.

Questions
When, where, and how did humans evolve?

How do people adapt to different environments?

How have societies developed and changed from the past to the present?

Resources
Observations

Primary and secondary sources

Artifacts; i.e. tools, foods, clothing, etc.

Evidence
Bones, fossils

Human remains and artifacts

First observations of living individuals and groups

Written accounts of events and interpretations.

Archaeology
I study ancient people and the world they lived in.

Questions
What is driving human evolution? Why did it happen?

What role does technology play in evolution?

How much does hunting have to do with it? Or larger social groups?

How can artifacts help us understand the past and our future?

Resources
Excavation tools; i.e. hammers, chisels, brushes

Maps (physical, political, topographic, etc.)

Primary sources

Evidence
Artifacts from ancient settlements

Bones and burial remains

Soil deposits from previous settlement sites

Astronomy
I study the universe, including stars, solar systems, galaxies.

Questions
How long will it take for our sun to "die"?

What is inside a black hole?

How quickly is the universe expanding?

Is our galaxy unique?

Resources
Telescope

Camera

Spectrogram

Computer imaging

Evidence
Space debris

Doppler Effect

Observational data from telescopes

Computer monitoring and images from space craft

Astrophysics
I study how the laws of physics can be applied to the natural world and space itself.

Questions
How did the universe begin? Is it evolving?

Is there more than one dimension to the universe?

What's the universe made of?

Resources
Mathematical models

Telescopes

Experiments

Observational data

Computer modeling

Scientific method

Evidence
Observations

Proven mathematical equations

Computer models

Biochemistry
I study the molecules that make up all living things.

Questions
What are the causes and cures of diseases?

How do genes mutate over time?

How can we develop medications to cure diseases?

Resources
Electron microscopes

Lasers

Laboratory instruments

Computer-generated modeling programs

Scientific method

Evidence
DNA, enzymes, and protein samples

Examples of gene mutations

BHP DISCIPLINE CARDS

Biology

I study living organisms; their structure, behavior and distribution.

Questions
- How do human brains work?
- How does language impact us?
- How can we remember what we hear?
- How do we learn?

Resources
- Samples of living things
- Microscope
- Slides, test tubes, petri dishes
- Bunsen burner
- Beakers
- Scientific method

Evidence
- Samples of organisms
- Environmental impact reports
- Soil samples

Chemistry

I study what everything is made of (matter) and how it changes.

Questions
- How do the properties of an element determine its use?
- What affects the behavior of matter?
- How, why and where were chemical elements formed?

Resources
- X-rays
- Models
- Microscopes
- Spectroscopy/Mass spectrometer
- Computer modeling
- Scientific method

Evidence
- Matter samples
- Diagrams/models
- Water/soil samples
- Observations about chemical reactions

Conservation Science

I study the integration of natural resources in both the physical and biological sciences.

Questions
- How do we survive through the Anthropocene?
- What are ways that we can lessen the human impact on the environment?
- How do we not exhaust nature?
- What trade-offs to support both human and environmental needs?

Resources
- Environmental impact reports
- Water quality testing supplies
- Maps (physical, topographical, political, etc.)
- Weather patterns

Evidence
- Endangered species numbers/reports
- Population density maps
- Statistics about refuse production and distribution
- Water/ozone quality

Cosmology

I study the origin and evolution of the universe from the earliest possible time to today.

Questions
- What was there before the Big Bang?
- Are we alone in the universe?
- Why did the Big Bang happen? What is dark matter/dark energy?

Resources
- Telescope
- Satellites
- Spectrographs
- Scientific method

Evidence
- Speed of light
- CMBR data
- Radio/infrared rays
- Satellite images

Economics

I study how society produces and consume goods and the impact of those decisions.

Questions
- What should be produced?
- How should it be produced?
- For whom should it be produced?
- Who owns and controls the factors of production?

Resources
- Law of supply and demand
- Mathematic models and projections
- Statistics
- Stock market data

Evidence
- Statistics about particular companies, nations, individuals
- GDP/GNP
- Stock Market reports

Engineering

I study science and math to create solutions to real-world problems.

Questions
- How can people be protected from natural hazards and climate change?
- How can humans work in concert with natural Earth systems?
- What will the world look like in the future?
- How can computers solve everyday problems?

Resources
- Hand tools
- Computers
- Programming software
- Maps
- Simple machines
- Mathematics

Evidence
- Models
- Simulations
- Computer-based testing
- Environmental and safety reports
- technical data
- Design analysis

BHP DISCIPLINE CARDS

Genealogy
I study families, tracing their lineages throughout history

Questions
- Who are the members in the family?
- What impact has this family had on history?
- How does this family fit into the larger story of a group of people?

Resources
- DNA testing
- Computer modeling
- Internet databases
- Primary sources (birth, marriage, and death records)

Evidence
- Oral interviews
- Historical records
- Genetic analysis
- Family trees
- Diaries
- Letters
- Emigration/ immigration/ naturalization records
- Photographs

Geology
I study the makeup of the Earth and its processes.

Questions
- How does the Earth work?
- How did the Earth get here?
- What drives plate movement?
- What is inside the Earth?
- What will happen on the Earth in the distant future?

Resources
- Pick and axe
- Brushes
- Ice/rock core samples
- Electron microscope
- Spectrometers

Evidence
- Chemical analyses of rocks and minerals
- Soil/rock samples
- Maps
- Satellite images

History
I study the past as it relates to individuals and societies.

Questions
- How do things change over time and what factors contribute to those changes?
- What elements of an institution or a society persist despite change?
- What is the narrative of people who lived in the past?

Resources
- Primary and secondary sources
- Artifacts; i.e. weaponry, clothing, pottery, etc.
- Interviews
- Journals

Evidence
- Artifacts
- First-hand accounts (journals, letters, etc.)
- Public/private records
- Visual materials

Nutrition
I study how food can be used to increase the health and well-being of patients.

Questions
- How does food impact human development?
- How has the relationship between humans and food changed over time?
- How does food and food production play a role in culture?

Resources
- Body mass index
- Weight/height measurements
- Food models
- Recipes

Evidence
- Experiments (controlled and trial)
- Observational studies
- Peer-reviewed journals
- Evidence-based systematic reviews
- Weight loss measurements
- Food journals

Oceanography
I study marine life and ecosystems, health of the sea, and geologic processes.

Questions
- How do processes in the ocean impact the rest of the Earth?
- How do species adapt to changes in the ocean? How do waves, storms, tides, and currents affect human movement around the globe?

Resources
- Nets
- Water sampling supplies
- Satellites
- Boats
- Moors/buoys
- Sonar
- Computer tracking programs
- Seafloor sampling

Evidence
- Salinity measures
- Animal sensors/"tags"
- Computer generated current measures
- Seafloor mapping

Paleontology
I study fossils to find links between extinct animals and plants and living relatives.

Questions
- How have animals and plants evolved?
- Are we experiencing normal levels of extinction, or are we experiencing a mass extinction?
- How have mass extinction events helped push evolution forward?

Resources
- GPS
- Chisel
- Rock Hammer
- Brushes
- Tape measure
- Plastic/paper bags
- Walkie-talkie
- Markers

Evidence
- Fossils
- DNA
- Biological remains
- Amber

BHP DISCIPLINE CARDS

Physics

I study matter and energy and the interaction between them.

Questions

Can we ever travel back in time?

What is dark matter/dark energy?

How do stars produce elements?

How does gravity affect the Earth?

Resources

Balances and mass sets

Glassware

Calculators

Computer models

Mathematics

Scientific method

Evidence

Particle colliders

Observational data

Mathematical models

Satellite imagery

Research reports

Political Science

I study how political systems are created and change over time.

Questions

How do power imbalances create world tensions?

Is war a permanent part of political life?

What is justice and how is it carried out in a society?

What is the link between power and justice?

How does resource distribution impact power?

Resources

Public opinion survey

Economics data

Data analysis essays

Evidence

Historical documents

Polling

Academic research

Expert opinions

Social media

Newspapers

Laws/government documents

Psychology

I study the human brain and experience; how people behave, think and feel.

Questions

What do people think or feel about a situation or event?

How do our feelings impact our behavior?

What do our reactions tell us about our feelings?

Resources

Research on mental illnesses

Personality/behavioral testing

Observational data

Holistic/prescription medicine

Evidence

Observations

Medical history

Letters/journals

Lab experiments

Interviews

Personality Tests

Behavioral Tests

Theology

I study religions, religious history, and the current role of religion in today's world.

Questions

Why do humans exist? What is a human being? What is the meaning of life?

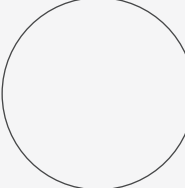What happens to a person at death?

How do we know what is right and wrong?

Resources

Religious texts

Artifacts; i.e. relics, scriptures, symbols, etc.

Primary sources

Interviews

Evidence

Sacred books, (i.e. the Bible)

Artifacts
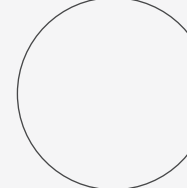
Sacred sites

Observations of religious ceremonies

I study ...

Questions

Resources

Evidence

I study ...

Questions

Resources

Evidence