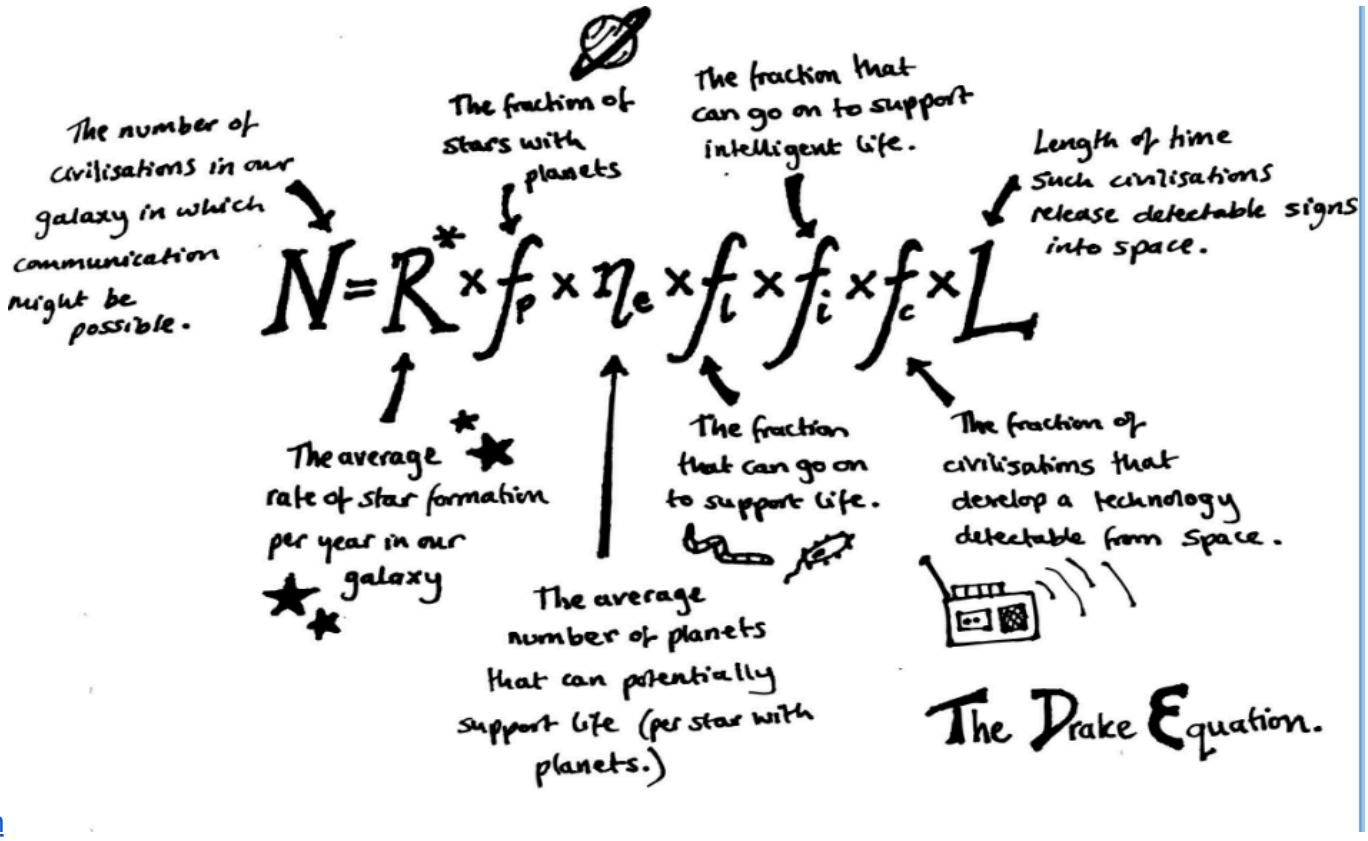
edit

Drake equation Solution Instructions:

For each variable include why you choose it and what core theme, optional theme and/or AOK best aligns with your solution and provide a rationale



Drake Equation
https://www.seti.org/drake-equation-index

Core theme

Knowledge & the Knower- This theme encourages careful and critical consideration of claims, provoking students to reflect on how we distinguish between claims that are contestable and claims that are not. It highlights the importance of not simply accepting claims at face value, and then explores how this can be reconciled with a recognition that many situations require us to make decisions without possessing absolute certainty. The core theme has been explicitly designed to provide rich opportunities for teachers and students to make links to the IB learner profile. Students are encouraged to consider both the power and the limitations of the tools that they have at their disposal as knowers and thinkers, and to become more aware of their own biases and assumptions. They could also consider what it really means to be open-minded or consider the importance of caring about how knowledge is used and controlled.

Types of knowledge questions

- *What criteria can we use to distinguish between knowledge, belief and opinion?*
- *How do we distinguish claims that are contestable from claims that are not?*
- *Does knowledge always require some kind of rational basis?*
- *Is there knowledge that a person or society has a responsibility to acquire or not to acquire?*

Optional Themes

Knowledge and technology: This optional theme focuses on issues relating to the impact of technology on knowledge and knowers, and how technology helps and hinders our pursuit of knowledge. It examines the ways that technology can be seen to shape knowledge creation, knowledge sharing and exchange, and even the nature of knowledge itself. This theme provides an

opportunity for students to engage with highly topical and engaging issues, such as those relating to the impact of artificial intelligence on knowledge and knowing. For example, there could be discussion of whether humans are needed to create new knowledge; whether machines can know, think or learn; or whether a knower is always human.

Types of knowledge questions

- *How has technology had an impact on collective memory and how knowledge is preserved?*
- *What is the difference between "data", "information" and "knowledge"?*
- *To what extent is the internet changing what it means to know something?*

Knowledge and politics: This theme provides an opportunity for discussions about the practice of politics and our everyday interactions with politics in the world around us. For example, this theme is intended to provide an opportunity to engage with high-profile contemporary debates and examples, such as those around "fake news" and "post-truth politics". It considers where our political views and values come from, and how these inform and influence other areas of our lives. It encourages students to consider the role and origin of their own political beliefs and positions, as well as exploring issues relating to how groups make decisions that affect large numbers of people. Another key focus of this theme is the "politics of knowledge" and issues around knowledge, power and oppression. This could, for example, include discussion of the concept of "epistemic injustice" and situations where someone's knowledge or expertise may be dismissed because they are a member of a particular social group. It could also include exploration of examples relating to the control of knowledge; for example, cases where political leaders and groups (such as the Khmer Rouge in Cambodia) have attempted to eradicate specific bodies of knowledge, "rewrite" history or persecute educated elites.

Types of knowledge questions

- *In what ways is factual evidence sometimes used, abused, dismissed and ignored in politics?*
- *Is being knowledgeable an important quality in a political leader?*
- *How is the practice of politics distinct from the discipline of political science?*

Areas of Knowledge

History: Studying history involves exploration and inquiry into the past. This raises questions about whether it is possible to talk meaningfully about a historical fact, or how far we can speak with certainty about anything in the past. History provides particularly interesting material for TOK discussions because of the challenges presented by not being able to directly observe the past, and because the historian is unable to utilize some of the methods of inquiry that are used in other areas of knowledge. Studying history can also promote empathy with, and understanding of, people living in diverse places and at different times. These characteristics open up many interesting issues and questions that are unique, or particularly pertinent, to history as an area of knowledge.

Types of knowledge questions

- *Is it possible to have knowledge of the past?*
- *Is knowledge about the past different from other kinds of knowledge?*
- *Are all areas of knowledge concerned with knowledge of the past to some extent?*
- *Why does history enjoy a privileged position as its own dedicated area of knowledge in the TOK curriculum?*

Human sciences: The human sciences include a diverse range of disciplines, such as psychology, social and cultural anthropology, economics, political science, and geography. These disciplines share a common focus on the study of human existence and behaviour. The diversity of the disciplines included within the human sciences can itself be a stimulus for interesting TOK discussions, as can the coexistence of different approaches within a single discipline (for example psychodynamic versus behaviourist versus humanistic approaches in psychology).

Types of knowledge questions

- *How do we decide whether a particular discipline should be regarded as a human science?*
- *Do the human sciences and literature provide different types of knowledge about human existence and behaviour?*
- *Are predictions in the human sciences inevitably unreliable?*

Natural sciences The natural sciences are often seen to rely on evidence, rationality and the quest for deeper understanding. Observation and experimentation play a key role, and terms such as "theory" have a special meaning in the natural sciences compared to how they are used in daily life and in other areas of knowledge. A focus for discussions of the natural sciences could be what differentiates the scientific from the non- scientific or "pseudoscientific". Many people would suggest that it is the methods used in the natural sciences that is the key distinguishing factor—which raises the question of what it is about these methods that

means that the knowledge they generate is often regarded as being highly reliable. Students could also consider whether the word "science" means different things in different languages, or whether it has been used differently in different periods of history.

Types of knowledge questions

- *Why might some people regard science as the supreme form of all knowledge?*
- *Should the natural sciences be regarded as a body of knowledge, a system of knowledge or a method?*
- *Could there be scientific problems that are currently unknown because the technology needed to reveal them doesn't exist yet?*

Arts: The arts" is used in TOK to include a diverse range of disciplines such as visual arts, theatre, dance, music, film and literature. The forms and methods of these disciplines are often dissimilar, so the diversity within this single area of knowledge can itself be an excellent stimulus for TOK discussions. The arts provide rich material for discussions of concepts such as interpretation. For example, students could consider how we ascribe meaning to works of art, or whether the intention of the artist is what determines meaning. During these discussions, students could be encouraged to draw on their experiences from their DP studies in language and literature classes, where they are required to understand and interpret a range of texts. *Types of knowledge questions*

- *Do the disciplines in the arts diverge from one another more fundamentally than disciplines within other areas of knowledge?*
- *Does new knowledge in the arts always build on what is already known?*
- *How have new technologies changed the nature and scope of the arts as an area of knowledge?*
- *Are the arts best seen as a system of knowledge, a type of knowledge or a means of expressing knowledge?*

Mathematics: knowledge or is seen to be founded on a set of more or less universally accepted definitions and basic assumptions. This makes mathematics an excellent source of material for TOK discussions. One interesting focus for discussions could be the status of mathematics as an area of knowledge. Students could consider why disciplines in the human sciences are often keen to cast their conclusions in mathematical terms, or why mathematical treatments of a topic are often taken by many to be a sign of intellectual rigour. They could also consider why mathematics is often given a privileged position in many education systems.

Types of knowledge questions

- *Why is mathematics so important in other areas of knowledge, particularly the natural sciences?*
- *How have technological innovations, such as developments in computing, affected the scope and nature of mathematics as an area of knowledge?*
- *Is absolute certainty attainable in mathematics?*
- *Is there a distinction between truth and certainty in mathematics?*
- *Should mathematics be defined as a language?*

Example Chart (copy and paste if your group wants to use it.

Variables	Value	Reasoning
N		
R		
F_p		
N_e		
F_l		
F_i		
F_c		

L		

Drake Equation Analysis

David James - Drake Equation