

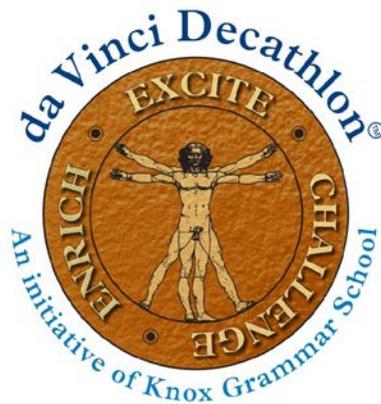


KNOX
GRAMMAR
SCHOOL

STATE

DA VINCI DECATHLON 2018

CELEBRATING THE ACADEMIC GIFTS OF STUDENTS
IN YEARS 9, 10 & 11



IDEATION

TEAM NUMBER _____

1	2	3	4	Total	Rank
/15	/15	/15	/15	/60	

IDEATION

WATCH THIS SPACE

BACKGROUND

With all the problems in the world today – poverty, refugees, terrorism, global warming, even a possible nuclear war – the last thing we need is another **potential** disaster, least of all from **outside our own planet**.

Fortunately, anything of this nature seems **highly unlikely** and is not something that any world leaders would be **expecting**, nor therefore hastily preparing for. But what if we were forced to face the **unknown**?



In 2015, NASA's Chief Scientist Ellen Stofan declared that we **would** find alien life by at least the year **2025**. This is just some of what she had to say:

"I think we're going to have strong indications of life beyond Earth within a decade, and I think we're going to have definitive evidence within 20 to 30 years... we know where to look. We know how to look... in most cases we have the technology, and we're on a path to implementing it... so I think we're definitely on the road."

Recently, **oceans** of liquid water slosh have been found on Europa and Ganymede, two of the moons of **Jupiter**, and also on Enceladus, one of the satellites of **Saturn**. It was also confirmed that salty oceans and flowing water once cover most of the surface of **Mars**. As recently as the 12th of January 2018, large **ice sheets** were discovered underneath Mars' red exterior, but what would happen if a **giant leap forward** was made from this?

THE PROBLEM

Astronauts from the **International Space Station** have seen, with their own eyes, an alien spacecraft **heading for Earth**. It was only small, but two **green, humanoid figures** were visible in what must have been the driver and passenger seats of the UFO. Based on the position of the ISS, the astronauts predict that the aliens will land in **Geneva, Switzerland**, one of the headquarters of the United Nations, in approximately **three days** from now.



The **consequences** of this event will be **monumental**. Some news outlets are predicting that this will be the **most seminal moment in the history of humanity**. As the leading global body, the United Nations has immediately stepped forward to take control of the situation. It is quite convenient that the spacecraft is likely to land right on top of their offices. Or **maybe**, this was **planned by the aliens**? In any case, there is an immense decision to be made. To be **hostile**, to be **welcoming**, to **protect ourselves** or to **seek friendship**?

THE DESIGN CHALLENGE

Your task is to **decide, explain and justify** the response that the United Nations will adopt.

Will they be **open** or **conservative**? Or **both**? Will they use **technology**, or the powers of **human communication**? **Who** will be there? Is there a **backup plan**? All of these questions and many more need to be considered.

The best solutions will combine a range of **strategies and technologies** and will be **realistic** yet also **forward-thinking**. It is critical to consider the potential **lasting effects** for humanity, both **negative and positive**. As much as this event will be about **protecting** our own planet and species, it also presents an **opportunity** like no other. Whether that opportunity is able to arise through **cooperation** or **exploitation** is something that teams will have to consider carefully. The best solutions will have **contingencies** for a range of possibilities, but with an **overarching** theme and **preferred approach** – we simply **cannot know** how the aliens will respond to us!

Stimulus material to assist in your solution is attached at the end of this paper.

Please **carefully read** the marking criteria on the following pages for additional guidance on what to include in the answer templates provided, and where to do so.

You will have **ninety (90) minutes** to complete the four components below. You will be provided with templates on which to complete your answers.

EMPATHISE (Ethical Decision-Making Framework) (15 marks)

This involves evaluating what 'ought to be done', through considering rights, obligations, fairness, the benefits and detriments for societies and other virtues. Reaching a final decision involves a degree of conviction and belief in what is 'the right thing to do'.

DEFINE (Design Brief) (15 marks)

Here, you must identify the problem, outline the ethical issues, evaluate the challenges and research findings, and identify possible solutions.

IDEATE (Reflection) (15 marks)

You must then reflect on their solutions and whether they will be viable. A preferable solution should be identified, and any unanswered questions should be addressed. Issues of implementation are also crucial to reflect upon.

CREATE (Prototype) (15 marks)

Finally, a design for how your ideas and solution will be disseminated must be produced. This could be a story-board, mind-map, diagram, model, narrative or any other appropriate medium. Critically, an audience must be able to understand the process of dissemination by examining this prototype.



MARKING GUIDELINES

1. Ethical decision-making framework (15 marks)

QUESTIONS	LIMITED	SOUND	OUTSTANDING	TOTAL
1: At least two facts	0	1	2	
2: Identifies challenges	0	1	2	
3: States why it matters	0	1-2	3	
4: Identifies negative consequences	0	1	2	
5: Identifies positive consequences	0	1	2	
6: Demonstrates empathy	0	1	2	
7: Identifies community concerns	0	1	2	
TOTAL				/15

2. Design Brief (15 marks)

ASPECT	LIMITED	SOUND	EFFECTIVE	OUTSTANDING	TOTAL
Ideate: What – why it matters, challenges, ethical issues & the vision	0-1	2-3	4	5	
Research: Why-justification for choices	0-1	2-3	4	5	
Solutions: How – preferred solution and backup plans	0-1	2-3	4	5	
TOTAL					/15

3. Reflection (15 marks)

ASPECT	LIMITED	SOUND	EFFECTIVE	OUTSTANDING	TOTAL
Ideation: Ideas	0-1	2-3	4	5	
Implementation: Who, what and how?	0-1	2-3	4	5	
Dissemination: Support and success	0-1	2-3	4	5	
TOTAL					/15

4. Prototype (15 marks)

ASPECT	LIMITED	SOUND	EFFECTIVE	OUTSTANDING	TOTAL
Originality and creativity	0-1	2-3	4	5	
Clarity and communication of ideas	0-1	2-3	4	5	
Detail and depth – use of preferred plan and backups	0-1	2-3	4	5	
TOTAL					/15

TOTAL: /60

ADDITIONAL STIMULUS

Alien invasion: THIS is what would happen if extraterrestrials colonised Earth

By Sean Martin, published in the Express UK, July 7 2017; available at <https://www.express.co.uk/news/science/826063/alien-invasion-colonise-SETI-stephen-Hawking-UFO>

Are we prepared for an alien invasion?

Governments around the globe remain tight-lipped on counter-invasion strategies, with the US claiming nothing is in place and it would have to react to what exactly is in front of them.

But what is clear is there would be no point in humans trying to fight them.

Any extra-terrestrial which can make its way across the universe would have technology that would make it look like our arsenal is a pile of rocks.

Jill Tarter, a member of Search for Extra-Terrestrial Life (SETI) Institute and part of the management board for the Allen Telescope Array in California, said: "If they showed up on our doorstep, that means they have technologies that are considerably advanced with respect to ours.

Alien technology would be far superior to ours

"And because of that, they're going to be the ones that set the rules."

While there is no official plan, it is believed that the United Nations would take charge.

They group would be responsible for every country's atomic weaponry and air strikes, as well as distributing, and probably rationing, food across the planet.

If ET has bad intentions for Earth, conscription may take place with many healthy men and women of fighting age being forced into battle – although it probably will not make much of a difference.

Far more likely than aliens arriving on our doorstep would be they send a signal or a message to Earth.

SETI is an agency which has been scanning the skies in search of alien activity since 1984.

The ET hunters have laid out a set of guidelines and recommendations to follow if, or when, we make contact.

Firstly, the people who detect the signal would have to make sure it is genuine, then once it is confirmed they would have to inform the Central Bureau for Astronomical Telegrams would be informed, who would inform professional observers across the globe and the United Nations Secretary General.

There are then a few factors to take into consideration as to whether the public should be informed which is judged on the Rio Scale (see end of this article).

According to Seth Shostak, senior astronomer for SETI: "A SETI detection could have important consequences for society.

The Rio Scale would help experts determine how much of a threat it is

"The Rio Scale runs from 0 (forget it) to 10 (this is definitely IT!). It's composed of two multiplicative factors: a term Q that measures the importance of the discovery (for example,

if a signal comes from within the solar system, it's adjudged to be more important than one coming from the other side of the Galaxy), and a term δ that estimates the credibility of the claim (is there hard data, or only an anecdotal report?) The Rio index is imply Q times δ ."

After that, a response would have to be calculated.

Although it has always been denied, Director of UN Office for Outer Space Affairs would probably lead contact.

Malaysian astrophysicist Mazlan Offman, who served from 2010 to 2014, was strongly tipped to be the person to go to if aliens come out with the classic "take us to your leader", but she refuted this during her time in charge, saying "It sounds really cool but I have to deny it."

Simonetta Di Pippo took over Offman's post and so she could be the point of contact.

Another likely candidate is Paul Davies – chairman of SETI's post detection task force.

As any alien's grasp of English, or any human language, will probably be non-existent, experts have devised other ways to show that we are intelligent, with the mathematical formula for Pie as good as anything to send back to show that we are not completely primitive.

However, others think, including Stephen Hawking, that we should not respond at all.

Professor Hawking said that it would be best to keep schtum as, judging by what has happened when humans have met other humans who they deem inferior, it could spell the end of us.

The theoretical physicist said: "One day we might receive a signal from a planet like Gliese 832c, but we should be wary of answering back."

"Meeting an advanced civilisation could be like Native Americans encountering Columbus.

"That didn't turn out so well."

The Rio Scale

Credibility δ

δ	Credibility
0	Obviously fake or fraudulent
1/6	Very uncertain, but worthy of verification effort
2/6	Possible, but should be verified before taken seriously
3/6	Very probable with verification already carried out
4/6	Absolutely reliable, without any doubt

The Rio Scale Continued

Q ₁	Class of Phenomenon	Q ₂	Discovery Type	Q ₃	Distance
1	Traces of astroengineering at any distance, or any indication of technological activity by extant or extinct civilization	1	From archival data; a <i>posteriori</i> discovery without possibility of verification	1	Extragalactic
2	Leakage radiation, without possible interpretation	2	Non-SETI/SETA observation; transient phenomenon that is reliable but never repeated	2	Within the Galaxy
3	Omnidirectional beacon designed to draw attention	3	SETI/SETA observation; transient phenomenon that has been verified but never repeated	3	Within a distance which allows communication (at light speed) within a human lifetime
4	Earth-specific beacon to draw our attention	4	Non-SETI/SETA observation; steady phenomenon verifiable by repeated observation or investigation	4	Within the solar system
5	Omnidirectional message with decipherable information	5	Same as 4, but result of SETI/SETA observation		
6	Earth-specific message or physical encounter				

Search for Extraterrestrial Intelligence Institute (SETI) First Contact Protocol

Copyright SETI, 2017; available at <https://www.seti.org/post-detection.html>

We, the institutions and individuals participating in the search for extraterrestrial intelligence,

Recognizing that the search for extraterrestrial intelligence is an integral part of space exploration and is being undertaken for peaceful purposes and for the common interest of all mankind,

Inspired by the profound significance for mankind of detecting evidence of extraterrestrial intelligence, even though the probability of detection may be low,

Recalling the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, which commits States Parties to that Treaty "to inform the Secretary General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results" of their space exploration activities (Article XI),

Recognizing that any initial detection may be incomplete or ambiguous and thus require careful examination as well as confirmation, and that it is essential to maintain the highest standards of scientific responsibility and credibility,

Agree to observe the following principles for disseminating information about the detection of extraterrestrial intelligence:

1. Any individual, public or private research institution, or governmental agency that believes it has detected a signal from or other evidence of extraterrestrial intelligence (the discoverer) should seek to verify that the most plausible explanation for the evidence is the existence of extraterrestrial intelligence rather than some other natural phenomenon or anthropogenic phenomenon before making any public announcement. If the evidence cannot be confirmed as indicating the existence of extraterrestrial intelligence, the discoverer may disseminate the information as appropriate to the discovery of any unknown phenomenon.
2. Prior to making a public announcement that evidence of extraterrestrial intelligence has been detected, the discoverer should promptly inform all other observers or research organizations that are parties to this declaration, so that those other parties may seek to confirm the discovery by independent observations at other sites and so that a network can be established to enable continuous monitoring of the signal or phenomenon. Parties to this declaration should not make any public announcement of this information until it is determined whether this information is or is not credible evidence of the existence of extraterrestrial intelligence. The discoverer should inform his/her or its relevant national authorities.
3. After concluding that the discovery appears to be credible evidence of extraterrestrial intelligence, and after informing other parties to this declaration, the discoverer should inform observers throughout the world through the Central Bureau for Astronomical Telegrams of the International Astronomical Union, and should inform the Secretary General of the United Nations in accordance with Article XI of the Treaty on Principles

Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Bodies. Because of their demonstrated interest in and expertise concerning the question of the existence of extraterrestrial intelligence, the discoverer should simultaneously inform the following international institutions of the discovery and should provide them with all pertinent data and recorded information concerning the evidence: the International Telecommunication Union, the Committee on Space Research, of the International Council of Scientific Unions, the International Astronautical Federation, the International Academy of Astronautics, the International Institute of Space Law, Commission 51 of the International Astronomical Union and Commission J of the International Radio Science Union.

4. A confirmed detection of extraterrestrial intelligence should be disseminated promptly, openly, and widely through scientific channels and public media, observing the procedures in this declaration. The discoverer should have the privilege of making the first public announcement.
5. All data necessary for confirmation of detection should be made available to the international scientific community through publications, meetings, conferences, and other appropriate means.
6. The discovery should be confirmed and monitored and any data bearing on the evidence of extraterrestrial intelligence should be recorded and stored permanently to the greatest extent feasible and practicable, in a form that will make it available for further analysis and interpretation. These recordings should be made available to the international institutions listed above and to members of the scientific community for further objective analysis and interpretation.
7. If the evidence of detection is in the form of electromagnetic signals, the parties to this declaration should seek international agreement to protect the appropriate frequencies by exercising procedures available through the International Telecommunication Union. Immediate notice should be sent to the Secretary General of the ITU in Geneva, who may include a request to minimize transmissions on the relevant frequencies in the Weekly Circular. The Secretariat, in conjunction with advice of the Union's Administrative Council, should explore the feasibility and utility of convening an Extraordinary Administrative Radio Conference to deal with the matter, subject to the opinions of the member Administrations of the ITU.
8. No response to a signal or other evidence of extraterrestrial intelligence should be sent until appropriate international consultations have taken place. The procedures for such consultations will be the subject of a separate agreement, declaration or arrangement.
9. The SETI Committee of the International Academy of Astronautics, in coordination with Commission 51 of the International Astronomical Union, will conduct a continuing review of procedures for the detection of extraterrestrial intelligence and the subsequent handling of the data. Should credible evidence of extraterrestrial intelligence be discovered, an international committee of scientists and other experts should be established to serve as a focal point for continuing analysis of all observational evidence collected in the aftermath of the discovery, and also to provide advice on the release of information to the public. This committee should be constituted from representatives of

each of the international institutions listed above and such other members as the committee may deem necessary. To facilitate the convocation of such a committee at some unknown time in the future, the SETI Committee of the International Academy of Astronautics should initiate and maintain a current list of willing representatives from each of the international institutions listed above, as well as other individuals with relevant skills, and should make that list continuously available through the Secretariat of the International Academy of Astronautics. The International Academy of Astronautics will act as the Depository for this declaration and will annually provide a current list of parties to all the parties to this declaration.