namazu contest

Episode 4 – Questions issued on the 1ˢᵗ of March, 2021; answers due on or before the 15ᵗʰ of June, 2021 to namazu@geoazur.unice.fr

Part I – Mars in the news.

Choose the correct response(s).

Q1. Last month the InSight mission was renewed, but for how many years?

- 1 Earth year
- 2 Earth years
- 1 Martian year
- 2 Martian years

Q2. During the previous challenge, you worked on HP3, modeling the drilling of the "mole". What HP3 is doing now?

- It finally sank to the desired depth and data has been arriving for a few weeks
- HP3 broke against a rock and no further measurement is possible
- It could not sink further into the ground despite the efforts of NASA and the engineers do not want to try again
- It can no longer sink because of the sandstorms which limit the energy supply of the solar panels

Q3. Perseverance aims to analyze certain samples of Martian rocks for traces of past life. Eventually, the samples should return to Earth, but when?

- At the end of 2021
- In 2025
- In 2031
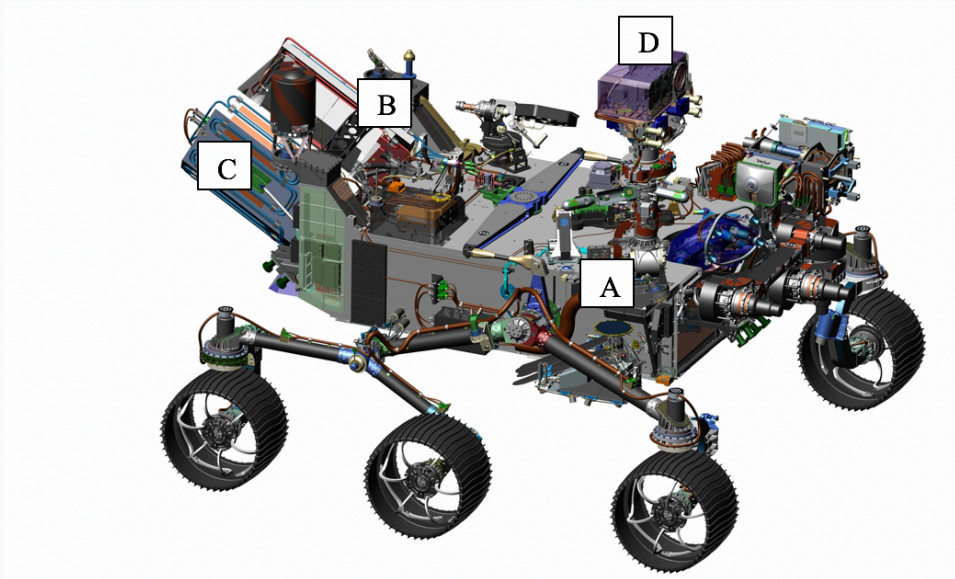- Never, it's technically unimaginable at the moment

Q4. Imagine a race between the Perseverance rover, the Curiosity rover and the fastest snail in the world (0.0275m/s - 2006 world championship). What would the podium be?

- 1 / Perseverance, 2 / Curiosity, and 3 / Snail
- 1 / Curiosity, 2 / Perseverance, and 3 / Snail
- 1 / Curiosity, 2 / Snail, and 3 / Perseverance
- 1 / Snail, 2 / Curiosity, and 3 / Perseverance

Q5. On the Perseverance rover, a microchip is made up of the 11 million names of people who signed up to "Send Your Name to Mars", but where is that chip on the rover?

- A
- B
- C
- D

If you want to be on the next flight, you can check in now:
https://mars.nasa.gov/participate/send-your-name/mars2020/

Q6. In order to familiarize you with Perseverance's on-board instruments, here are 4 names, which is not an instrument on the Rover?

- SHERLOC
- MEDA
- SuperCam
- SEIS

Q7. The first panoramic photograph from Perseverance was delivered to us by NASA.
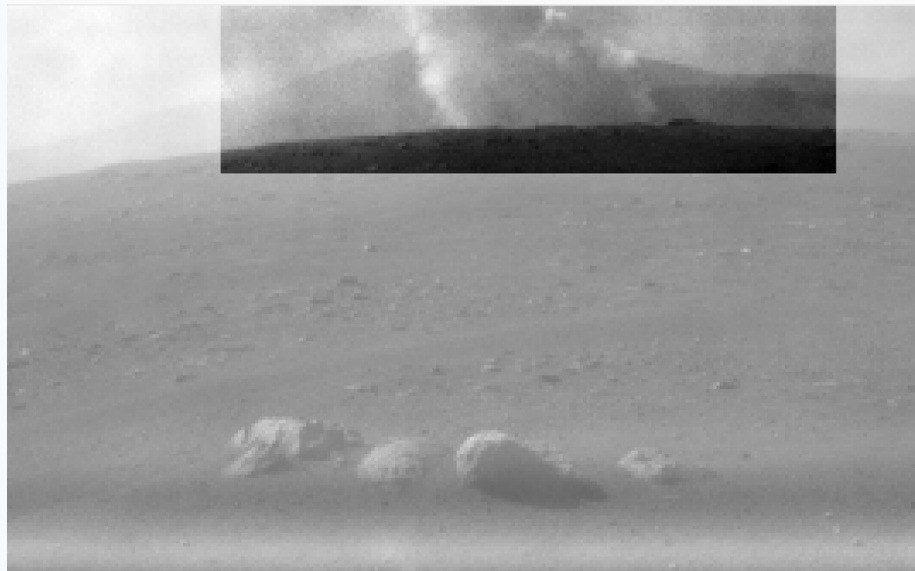
With what on-board instrument was this panoramic picture possible?

- Mastcam-Z
- SuperCam
- RIMFAX
- MOXIE

Q8. Here is another image from Perseverance, what do you see at the back of the image?

- A dust devil
- A water geyser indicating the presence of liquid water on the surface of Mars
- The crash of a piece of the Mars2020 mission
- We don't know but Perseverance will take a closer look

Q9. Mystery question:
What does Thomas Pesquet hold in his hand while he was on board of the International Space Station (ISS) in 2017?

- A fragment of a Martian meteorite that fell to Earth that Thomas Pesquet took with him to the ISS and which is now partially on the Perseverance rover
- A lens created on board the ISS which is currently in the SuperCam instrument of the rover Perseverance
- A USB key containing his answers to the Namazu 2016-2017 challenges
- The first nut that will have been used to build Perseverance. It has been tested in the ISS to find out its thermal resistance

Q10. After the soundtrack delivered by NASA from InSight data, now Perseverance delivers a soundtrack from Mars: https://mars.nasa.gov/mars2020/multimedia/audio/
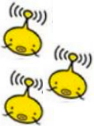How Perseverance and InSight recorded sounds?

- They both have microphones
- Perseverance has microphones and InSight has converted vibrations into audible sounds
- The soundtracks were created by internet users during a competition launched by NASA
- We do not know

Part II - Let's get into the minds of the teasing engineers of JPL.

You have certainly all seen the footage of Perseverance landing on Martian soil. If not, here is the link to the video released by NASA:
https://www.youtube.com/watch?v=4czjS9h4Fpg
The comments are certainly interesting but Namazu thinks you can do as well.

Q1. It's up to you to remove the soundtrack, via software or simply via the "mute" button and it's up to you to comment by integrating your voice into the NASA images. The goal is ambitious, but Namazu is sure you can do it.
The video (or only the soundtrack if the editing technique is too complex for the youngest) will have to be deposited on a file transfer site of which you will provide the link.
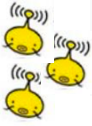
In addition, in the first images of the video, you can see that the mission parachute is special:
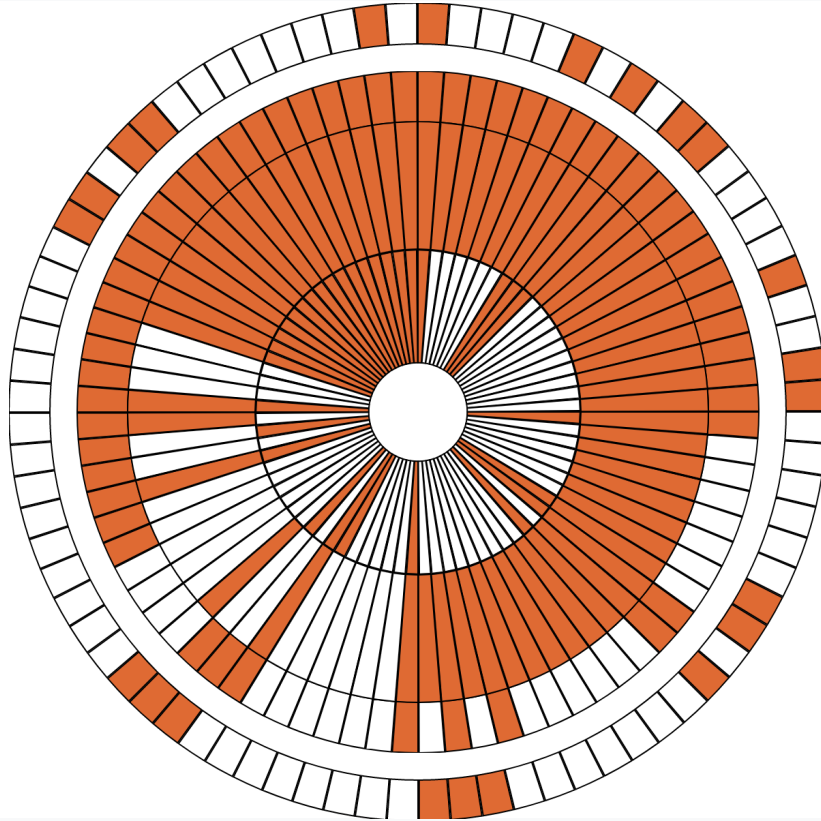

The alternation of orange and white bands is not due to chance and the JPL has placed a coded message :

"Dare mighty things"

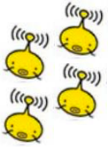To understand how this message is coded, here is a website
https://github.com/tanyafish/parachute/blob/main/The%20Parachute%20Message.pdf

Q2. Using these internet resources, discover Namazu's coded message below:

This is not the first time that the JPL team has placed a coded message within a mission. Remember the message in Morse code on the wheels of the Curiosity rover:
"JPL" for Jet Propulsion Laboratory, the research center of NASA.

Q3. Using simple materials of your choice, construct a wheel that can write the name of your school in Morse code on a table covered with flour.

For this question, you will have to film your production. The video will have to be deposited on a file transfer site of which you will provide the link.

Q4. Do the same with the name of a school other than yours registered in the Namazu contest.

Part III. Ingenuity in the spotlight!

The Mars 2020 mission embarks for the first time a machine intended to fly on a planet other than Earth.
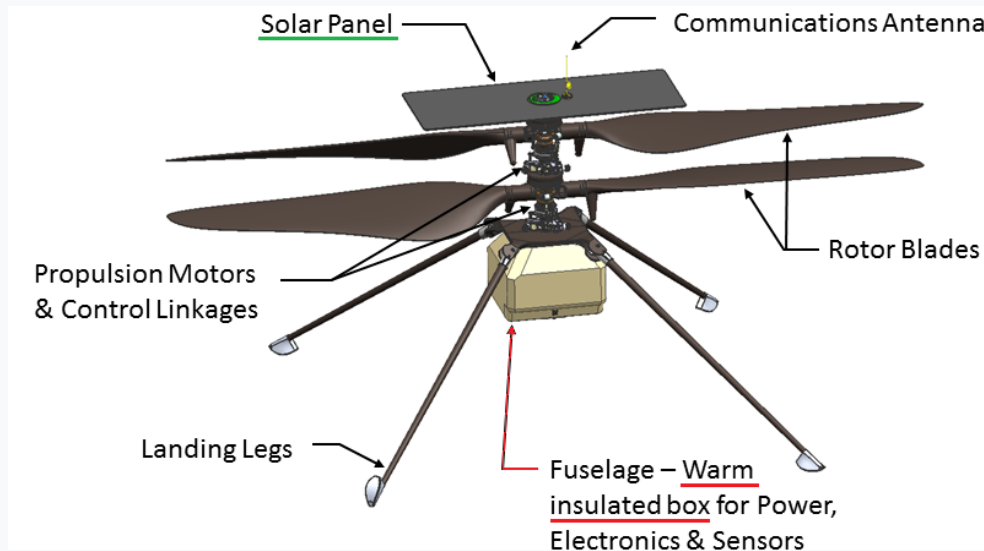The Ingenuity helicopter is equipped with a double rotor system rotating in opposite directions to each other so that it can take off in the thin Martian atmosphere.
Its motor deploys an average power of 350 W to be able to turn the rotor blades at 2400 rpm.
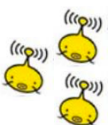The battery consists of 6 Lithium-ion cells, all of which, charged to the maximum, can provide 40 Wh.

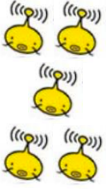**Q1. Calculate the maximum possible flight time while completely depleting the battery.**

This time is unfortunately only theoretical because the battery must also be used to supply the instruments (sensors, altimeter, cameras, on-board computer) as well as to heat the electronic components (in red, the "warm box"): at night Martians are cool and can reach - 130 ° C.

Ingenuity will therefore only perform short flights (only 90s).

Q2. Calculate the energy expended during this flight and deduct the remaining energy allocated to heating and operating the instruments.

Scratch!

Now it's up to you to create a game in which Ingenuity will be the hero.
Your response will correspond to sending your game link.

Download the Mars surface images and the Mars helicopter sprite image and save them to a computer.
They can be downloaded at:
https://mars2020.oca.eu/en/mars2020-namazu-contest

Unzip the zip file of the surface images into a new folder. There are jpg and png versions of each file.
On the Scratch website, click Create to start a new project. (Log in or create an account, if you want to save your work so you can revisit or rethink your game in the future.)
Create a new background by moving the mouse over the Choose Background icon in the Scene window and selecting Upload Background. Choose the image of the Mars surface of your choice.
Create a new sprite by moving the mouse over Choose Sprite in the Sprite window and selecting Upload Sprite. Choose the helicopter sprite image. There should now be a helicopter placed over your background image with the original cat sprite.
Remove the existing chat sprite by clicking on it in the Sprite window and clicking the "x" in the corner.
With the helicopter sprite selected, you are ready to create the code that runs the game and controls the helicopter!

Objective n ° 1
Fly the helicopter up, down, left and right across the screen using four different keys on the keyboard.
Expert Level: Create a script that uses sprite costumes to make the helicopter appear to be spinning.

Objective n ° 2
Create a code that places the helicopter in a specific location at the start of the game. Make sure it starts on the ground, not in the sky!

Expert Level: Change your landing code so that the helicopter starts at a random location on the ground.

Objective n ° 3
Create a landing target visible on the background. You can draw a landing location with the background editor, or add a sprite that will serve as a landing target. Avoid placing the landing target on large rocks which could damage the helicopter while landing.

Expert Level: Generate code that identifies an unmarked region as a safe landing zone for players to find when attempting to land in different regions. Remember, you'll want to place these unmarked regions in areas without large boulders!

Objective n ° 4:
Create a stopwatch that counts from a set time to zero. Tip: Create a time variable that you can program to modify.
Stop the game when the stopwatch reaches zero.
Display a "Mission complete" message when the stopwatch reaches zero.
Restart the timer when a player clicks the green flag to restart the game.

Expert Level: Develop a code to bring the helicopter back to the ground no matter where it is when the timer hits zero.
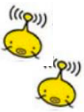
Objective n ° 5:
Create a code that announces "mission successful" after the helicopter lands safely at the landing site.
Stop the game when landing.
Create a script that stops the execution of the "mission complete" script when the mission is successful.

To end this last episode of Namazu for the 2020-2021 season, here is a game made by the Jules Michelet medium school in Tours with mblock (software similar to Scratch).

https://planet.mblock.cc/project/625193

Q3. It's your turn to take a screenshot of your best score. The 3 establishments with the best scores will earn 2 Namazu points.