CONCOURS COMMUN INP

ÉPREUVE MUTUALISÉE AVEC E3A-POLYTECH

ÉPREUVE COMMUNE - FILIÈRES MP - PC - PSI - TSI - TPC

LANGUE VIVANTE B

ANGLAIS - ESPAGNOL

L'épreuve de langue vivante B est obligatoire pour Lorraine INP - EEIGM (filières MP, PC et PSI)

Durée : 1 heure

N.B. : si un candidat croit repérer ce qui paraît être une erreur d'énoncé, il le signalera par écrit :
- en cochant la case 40 A (1re ligne) ;
- en expliquant au verso de la grille réponse les raisons des initiatives qu'il a été amené à prendre et poursuivra normalement son épreuve.

L'usage de toute machine (calculatrice, traductrice, etc.) est strictement interdit.

INSTRUCTIONS GÉNÉRALES

Définition et barème

QCM en trois parties avec quatre propositions de réponse par item.

I.	Compréhension :	12 items (10 points sur 20)
II.	Lexique :	12 items (5 points sur 20)
III.	Compétence grammaticale :	15 items (5 points sur 20)

Réponse juste : +3
Pas de réponse : 0
Réponse fausse ou réponses multiples : −1

Instructions

Lisez le texte et répondez ensuite aux questions.
Choisissez parmi les quatre propositions de réponse (A, B, C ou D) celle qui vous paraît la mieux adaptée. Il n'y a qu'une seule réponse possible pour chaque item.
Reportez votre choix sur la feuille de réponse.

Index "alphabétique"

ANGLAIS

Space mining on the moon and beyond may be solar powered

Off-Earth miners will probably leave their pickaxes at home. The best way to extract water from the moon and near-Earth asteroids involves hitting the stuff with sunlight or other forms of radiation, if three NASA-funded projects are any guide. And getting at this water is vital if humanity wants to extend its footprint beyond Earth's orbit, mining advocates say. Water provides life support for astronauts, of course, but it can also be split into its constituent hydrogen and oxygen, the chief components of rocket fuel. So, moon and asteroid mining could lead to the construction of off-Earth propellant depots, which would allow voyaging spacecraft to fill their tanks on the go.

"Everyone's starting to realize that water will be the oil of space industrialization," Joel Sercel, the founder and CEO of California-based TransAstra Corp., told Space.com. TransAstra is working to prime the pump: This year, two of the company's projects were given funding from the NASA Innovative Advanced Concepts (NIAC) program, which seeks to spur the development of potentially game-changing exploration technologies. TransAstra's Lunar-Polar Propellant Mining Outpost (LPMO) idea received a Phase 1 NIAC award, which funds early concept studies. LPMO lays out a potential architecture for exploiting the huge stores of water ice in polar craters.

The floors of these craters are in permanent shadow, and have been for billions of years. Indeed, that's why they harbor so much ice; they've served as "cold traps" since shortly after the moon's birth. But these craters' rims are in near-constant sunlight. And, in many cases, these rims aren't too high up – just 330 feet (100 meters) or less off the crater floor. "In these prospective landing sites, deployable solar arrays held vertically on masts 100 m or so in length (lightweight and feasible in lunar gravity) can provide nearly continuous power," the LPMO description on the NIAC website reads. So, the description adds, a large lander or medium-size mining outpost "could sit on mineable permafrost with solar arrays in perpetual sunlight on masts providing affordable electric power without the need to separate power supply from the load." The mining work would be done by electrically powered rovers, which would beam a combination of radio-frequency, microwave and infrared light into the dirt beneath their wheels. The radiation would vaporize water ice, causing it to migrate upward into "cryotraps" aboard the rovers.

A mining rover sized to launch atop NASA's huge Space Launch System rocket or Blue Origin's New Glenn booster, both of which are in development, would likely weigh between 2 and 5 tons, and be capable of harvesting between 20 and 100 times its own mass in water every year, TransAstra representatives said. "LGMO promises to vastly reduce the cost of establishing and maintaining a sizable lunar polar outpost that can serve first as a field station for NASA astronauts exploring the moon, and then as the beachhead for American lunar industrialization, starting with fulfilling commercial plans for a lunar hotel for tourists," the LMPO description reads. TransAstra Corp. aims to mine asteroid water by harnessing sunlight, thereby helping open the solar system to exploration.

A second TransAstra space-mining project is considerably farther along. The company also received a Phase 3 NIAC award this year to continue developing its APIS (Asteroid Provided In-situ Supplies) mission architecture and patent-pending "optical mining" technology. This latter method involves bagging up a suitable near-Earth asteroid, then using concentrated sunlight to ablate and fracture the rock, releasing its stores of water. APIS describes the family of spacecraft that will do such work, ranging from a "Mini Bee" technology demonstrator in low-Earth orbit

(LEO) to a "Queen Bee" vehicle capable of capturing and mining a 130-foot-wide (40 m) space rock. A chief goal of the Phase 3 NIAC work is to get the Mini Bee ready to fly, so that the team can propose a demonstration-mission launch to LEO, Sercel said.

Radiation is also the extractive force envisioned by another of this year's NIAC awardees. A team led by George Sowers of the Colorado School of Mines received a Phase 1 NIAC to investigate the potential of "thermal mining" on the moon and other cold bodies throughout the solar system. So, perhaps humanity's expansion beyond low-Earth orbit, and the emergence of a true off-planet economy, will be driven by solar power, at least in its early stages. Space mining will start with water, after all, but it likely won't end there. "Once we learn to mine propellant from asteroids, it becomes cost-effective to mine metals," Sercel said.

Adapted from *Space.com*
4 September 2019

I. COMPRÉHENSION

Choisissez la réponse qui vous paraît la plus adéquate en fonction du sens du texte.

1. From line 1 to line 8, it should be understood that to find water on some planets, sunlight:
(A) may be useful.
(B) won't be used.
(C) will have to be filtered.
(D) will be avoided.

2. From line 1 to line 8, it should be understood that to fill in their rocket tanks, astronauts:
(A) won't need water.
(B) will use oxygen and hydrogen.
(C) will use only hydrogen.
(D) will use only oxygen.

3. From line 9 to line 16, it should be understood that TransAstra Corp.:
(A) has already started the exploration project.
(B) has received money from NASA.
(C) will not take part in the project.
(D) will only use their own funding.

4. From line 17 to line 28, it should be understood that:
(A) there is not enough ice inside the polar craters.
(B) the crater bottoms have always been exposed to the sun.
(C) there is a lot of ice to be found in the craters.
(D) the ice in the craters has recently melted.

5. From line 17 to line 28, it should be understood that:
(A) the crater rims can be used to produce energy.
(B) there will be an electricity shortage on the spot.
(C) it will be dangerous to use electricity.
(D) the temperature on the rims will be too low.

6. From line 17 to line 28, it should be understood that the digging rovers:
(A) will have to stand far from the crater rims.
(B) will only use microwaves to collect the water.
(C) will use the energy produced on the field.
(D) won't need any electricity to work.

7. From line 29 to line 37, it should be understood that the mining rover:
(A) is already equipped with a rocket and a booster.
(B) will collect between 2 to 5 tons of water every year.
(C) will waste up to 100 tons of water every year.
(D) will dig up at least 40 tons of water yearly.

8. From line 29 to line 37, it should be understood that the space mining location:
(A) will then be abandoned.
(B) may later be used for other purposes.
(C) will never be habitable.
(D) will be covered with rocks after the project.

9. From line 38 to line 46, it should be understood that TransAstra's APIS project:
(A) has not been approved yet.
(B) will be more costly.
(C) is also going on.
(D) will not be funded by NASA.

10. From line 38 to line 46, it should be understood that, to dig up water, APIS:
(A) won't use any sunlight.
(B) will resort to only one vehicle.
(C) won't need to break the rock.
(D) will use various robots.

11. From line 47 to line 53, it should be understood that:
(A) radiation can't be used in space mining.
(B) NASA will never approve of radiation use.
(C) radiation has caused a lot of space damage.
(D) radiation is another option to extract space water.

12. From line 47 to line 53, it should be understood that:
(A) minerals will never be found in space.
(B) there are other space prospects after water mining.
(C) thermal mining will never be used on the moon.
(D) mining metals would be too expensive.

II. LEXIQUE

Choisissez la réponse qui vous paraît la plus appropriée en fonction du contexte.

13. spur (line 12) means:
(A) start
(B) encourage
(C) resume
(D) stop

14. harbor (line 18) means:
(A) reject
(B) absorb
(C) shelter
(D) break

15. rims (line 19) means:
(A) edges
(B) centers
(C) hearts
(D) surfaces

16. outpost (line 23) means:
(A) emission
(B) settlement
(C) factory
(D) frontier

17. harvesting (line 31) means:
(A) pouring
(B) drinking
(C) wasting
(D) collecting

18. beachhead (line 34) means:
(A) pioneer
(B) argument
(C) alternative
(D) base

19. harnessing (line 36) means:
(A) filtering
(B) exploiting
(C) improving
(D) reducing

20. thereby (line 36) means:
(A) in addition
(B) before
(C) in that way
(D) after

21. bagging up (line 41) means:
(A) getting hold of
(B) forgetting
(C) watching
(D) following

22. ablate (line 42) means:
(A) reach
(B) find
(C) destroy
(D) hit

23. releasing (line 42) means:
(A) capturing
(B) freeing
(C) increasing
(D) discovering

24. cost-effective (line 53) means:
(A) money-saving
(B) expensive
(C) useful
(D) convenient

III. COMPÉTENCE GRAMMATICALE

Choisissez la réponse adéquate.

25. Space research has become ….
(A) the more and the more expensive.
(B) the more and more expensive.
(C) more and the more expensive.
(D) more and more expensive.

26. …. so much money.
(A) They should not to have invested
(B) They should not have invested
(C) They should to not have invested
(D) They should not to have invest

27. …. you look into it, …. you understand.
(A) The more / the less
(B) More / less
(C) The most / the least
(D) Most / least

28. The astronauts have provided us with ….
(A) a lot of informations.
(B) many informations.
(C) a great deal of information.
(D) many information.

29. As soon as ….
(A) we get news, we'll let you know.
(B) we will get news, we'll let you know.
(C) we get news, we let you know.
(D) we would get news, we'll let you know.

30. The project …. billions of dollars.
(A) is said to have costed
(B) is told to have cost
(C) is told to have costed
(D) is said to have cost

31. Sirius is …. star in the sky.
(A) the most bright
(B) the more bright
(C) the brighter
(D) the brightest

32. It is the first time …. an exoplanet.
(A) they detect
(B) they have detected
(C) they had detected
(D) they detected

33. They say we …. habitats on an exoplanet.
(A) might build
(B) might to build
(C) might built
(D) might to built

34. Once the habitat …., the colony …. continuous supplies of water and oxygen.
(A) will be built / will need
(B) is built / will need
(C) was built / needs
(D) has built / needs

35. We may need to improve this technology ….
(A) much more far.
(B) much further.
(C) more further.
(D) most further.

36. …. they will carry out the mission.
(A) However it is risky,
(B) However if it is risky,
(C) However is it risky,
(D) However risky it is,

37. …. waste so much energy.
(A) You'd better not
(B) You'd to better not
(C) You'd not better
(D) You'd better to not

38. The space race between the US and Russia …. half a century ago.
(A) has ended
(B) have ended
(C) ended
(D) ends

39. If there …. water on that planet, it …. easier to live there.
(A) is / would be
(B) was / will be
(C) were / would be
(D) has been / would be

FIN